Part A and Part B Permit Renewal Application for the

TRIASSIC PARK
WASTE DISPOSAL FACILITY

RCRA Permit No. NM0001002484

Chaves County, New Mexico

Volume 1
Permit Application Parts A and B / Permit

October 17, 2011

Prepared for:

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Attachment			Included? Yes	Included? No
A		General Facility Description and Information	X	
B		Procedures to Prevent Hazards	X	
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Attachment			Included? Yes	Included? No
S		RCRA Facility Investigation - Scope of Work		X
T		Corrective Measures Study - Scope of Work		X
U		Action Levels for Corrective Action (completed after permit approval)		X
	U1	Background Concentrations for Soil (completed after permit approval)		X
	U2	Vadose Zone Baseline Concentrations for Non-Leachates (completed after permit approval)		X
	U3	Background Concentrations for Ground Water (completed after permit approval)		X
V		Vadose Zone Monitoring Indicator Parameters (completed after permit approval)		X
W		Facility Corrective Action Work Plan (DRAFT)	X	

VOLUME 3

Attachment			Included? Yes	Included? No
	L1	Engineering Drawings	X	

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OCTOBER 2000 PERMIT APPLICATION APPENDICES

Itemized list of appendices that have been updated for the October 2011 Permit Application

Appendix (from Permit Application dated October 2000)		Included? Yes	Included? No
Volume II			
A	RCRA Permit Application Checklist *(included as Regulatory Crosswalk in the Application Introduction)*	X	
B	Oil Well Log		X
C	Lithology Logs and Plugging Logs		X
D	Geophysical Logs		X
E	Geotechnical Laboratory Results		X
F	Grain Size Analyses		X
G	Cross-Sections *(included as figures in the Part B Application)*	X	
H	Example Waste Profile Sheet		X
I	Tank Certification Statement and Example		X
J	Inspection Sheet *(included in Attachment D1)*	X	
K	Coordinating Agreement		X
L	List of Emergency Coordinators		X
M	Evacuation Plans		X
N	Location, Description, and Capabilities of Emergency Equipment		X
O	Vadose Zone Monitoring System Work Plan *(included as Attachment I)*	X	
Volume III			
A	Design Drawings *(included as Attachment L1)*	X	
Volume IV			
B	Construction Quality Assurance Plan *(included as Attachment M)*	X	
C	Construction Specifications		X
D	Laboratory Test Results		X
E	Engineering Calculations *(new landfill engineering calculations in Attachment L4)*	X	
Volume V			
E	Engineering Calculations		X
Volume VI			
E	Engineering Calculations		X
F	Surface Water Control Plan		X
G	Action Leakage Rate and Response Action Plan *(included as Attachment J)*	X	
H	Manufacturer Information		X

Introduction

The Triassic Park Waste Disposal Facility will be a full-service Resource Conservation and Recovery Act (RCRA) Subtitle C waste disposal facility. The Facility will be located in southeastern New Mexico on approximately 480 acres of privately owned land in Chaves County, New Mexico. By road, this location is approximately 43 miles east of Roswell and 36 miles west of Tatum.

A landfill will be utilized for the disposal of hazardous waste that meets the RCRA land disposal restrictions (LDRs). The Facility will accept polychlorinated biphenyl (PCB) wastes that are not regulated by the Toxic Substances Control Act (TSCA); that is, only PCB wastes at concentrations of less than500 parts per million (ppm) for bulk PCB remediation waste.

This Permit Renewal Application is submitted to address the requirements of the New Mexico Administrative Code Title 20, Chapter 4, Part 1 (20.4.1 NMAC). The Triassic Park Waste Disposal Facility has not been constructed.

Pursuant to the New Mexico Hazardous Waste Regulations and Permit Section 1.2.1, the term of the Permit is 10 years from the date of issuance. An application to renew the Permit must be submitted at least 180 calendar days before the expiration date of the Permit (Permit Section 1.2.2). The Permit was issued on March 18, 2002 and an application for permit renewal is due on or before October 17, 2011.

Part A of the Renewal Application includes information required by 40 CFR §270.13. Part B of the Renewal Application includes information required by 40 CFR §270.14 and §270.21.

In the Renewal Application, the Permittees are seeking the following changes to the Permit:

- Elimination of the provisions allowing for the treatment of hazardous waste prior to disposal, including the use of an evaporation pond for managing wastewaters and a stabilization process for treating liquids, sludges and solids to ensure that no free liquids are present and that all LDRs are met prior to placing the wastes in the landfill.
- Elimination of the provisions allowing for solid waste storage in two container storage areas that would have been used to store waste prior to treatment or disposal.
- Elimination of the provisions allowing the utilization of four aboveground storage tanks to accumulate regulated bulk liquid hazardous wastes prior to stabilization.
- Requirement that all wastes meet the LDRs and other requirements for disposal prior to their acceptance for disposal in the landfill.
- Revisions to the landfill leachate collection system and management plan.
- Revisions and updates to the engineering drawings to reflect the changes in the Facility.

The Permit Renewal Application includes proposed changes to the text of the current Permit and Permit Attachments in redline/strikeout format, so that all changes proposed under the permit renewal are clearly evident. The Part B Permit Application is presented as an original document. The changes to Part B may be reviewed in consistent changes highlighted in the permit attachments. The version of the Permit used to create the Renewal Application is the version posted on the New Mexico Environment Department (NMED) website. The engineering design drawings provided in Permit Attachment L1 are similarly marked to show drawings that are new, revised, or eliminated.

This permit renewal application includes all materials that are being revised from the original permit. Portions of the original permit that are not being changed are not being resubmitted, as they are in NMED's administrative record for the Permit. The table of contents of this Permit Renewal Application indicates which sections of the application have been revised and included with this submittal or have not been revised and are not included.

List of Acronyms

ALR	action leakage rate
ANOVA	analysis of variance
ASTM	American Society for Testing and Materials
AUY	animal unit year-long
BLM	U.S. Bureau of Land Management
CFR	Code of Federal Regulations
CQA	construction quality assurance
DOT	U.S. Department of Transportation
EC	emergency coordinator
EPA	U.S. Environmental Protection Agency
gpad	gallons per acre per day
HAS	health and safety
HDPE	high-density polyethylene
HELP	Hydrological Evaluation of Landfill Performance
FIRMB	Hazardous and Radioactive Materials Bureau
HSWA	Hazardous and Solid Waste Amendments
LCRS	leachate collection and removal system
LDRs	RCRA land disposal restrictions
LDRS	leak detection and removal system
MSDS	material safety data sheet
MTR	minimum technology requirements
NFPA	National Fire Protection Association
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center
OCD	Oil Conservation Division
OJT	on-the-job training
ONA	Outstanding Natural Area
OSHA	Occupational Safety and Health Administration
PA	public address
PCB	polychlorinated biphenyl
PMO	preventive maintenance order
PPE	personal protective equipment
ppm	parts per million
ppmw	parts per million by weight
PQL	practical quantitation limit
QA/QC	quality assurance/quality control
RFA	RCRA Facility Assessment
RCRA	Resource Conservation and Recovery Act
SCBA	self contained breathing apparatus
SWMU	Solid Waste Management Unit
TCE	trichloroethylene

TCLP	Toxicity Characteristic Leaching Procedure
TDS	total dissolved solids
TOC	total organic carbon
TSCA	Toxic Substances Control Act
USGS	U.S. Geological Survey
VZMS	vadose zone monitoring system

Regulatory Requirements Crosswalk

20.4.1.900 NMAC Regulatory Requirement	Description of Requirement	Location in the Renewal Application	Explanation of Why Requirement is Not Applicable (N/A)
§270.13	Revised Part A Application	Part A Application	
§270.14(b)(1)	General Facility Description	Section 1 and Permit Attachment A	
§270.14(b)(2)	Chemical and Physical Analyses of Waste	Section 4 and Permit Attachments F, F1, F2, F3, and F4	
§270.14(b)(3)	Waste Analysis Plan	Section 4 and Permit Attachments F, F1, F2, F3, and F4	
§270.14(b)(4)	Security Procedures	Section 5.1 and Permit Attachment B	
§270.14 (b)(5)	Inspection Schedule	Section 5.2 and Permit Attachments D and D1	
§270.14(b)(6)	Preparedness and Prevention Waiver	N/A	Permittee is not requesting a preparedness and prevention waiver.
§270.14(b)(7)	Contingency Plan	Section 6 and Permit Attachment C	
§270.14(b)(8)(i)	Prevent hazards in uploading operations	Section 5.4.1 and Permit Attachment B	
§270.14(b)(8)(ii)	Prevent runoff from hazardous waste handling areas	Section 5.4.2 and Permit Attachment B	
§270.14(b)(8)(iii)	Prevent contamination of water supplies	Section 5.4.4 and Permit Attachment B	
§270.14(b)(8)(iv)	Mitigate effects of equipment failure and power outages	Section 5.4.5 and Permit Attachment B	
§270.14(b)(8)(v)	Prevent undue exposure of personnel to hazardous waste	Section 5.4.6 and Permit Attachment B	
§270.14(b)(9)	Description of precautions to prevent accidental ignition or reaction of ignitable ore reaction of ignitable reactive, or incompatible wastes	Section 5.5 and Permit Attachment B	
§270.14(b)(10)	Traffic patterns, estimated volume, and control	Section 1.4 and Permit Attachment A	

Regulatory Requirements Crosswalk

20.4.1.900 NMAC Regulatory Requirement	Description of Requirement	Location in the Renewal Application	Explanation of Why Requirement is Not Applicable (N/A)
§270.14(b)(11)(i)	Facility location information	Section 1.3 and Permit Attachment A	
§270.14(b)(11)(ii)	Seismic standard requirements	N/A	Refer to Appendix VI of Part 264, *Political Jurisdictions in Which Compliance with §264.18(a) Must Be Demonstrated.* The Triassic Park Waste Disposal Facility is located in Chaves County, New Mexico, which is not listed in Part 264, Appendix VI. No further information is required to demonstrate compliance with §264.18(a), *Location Standards.*
§270.14(b)(11)(iii) and (iv)	100-year floodplain standard	Section 1.3.1	
§270.14(b)(11)(v)	Compliance with 264.18(b)	N/A	As the Triassic Park Waste Disposal Facility is not in a flood plain, this requirement is not applicable.
§270.14(b)(12)	Personnel Training Program	Section 7 and Permit Attachment E	
§270.14(b)(13)	Closure and Post-Closure Plans	Section 8 and Permit Attachments O, O1, and O2	
§270.14(b)(14)	Documentation of closed units (264.119)	N/A	The Triassic Park Waste Disposal Facility has not been constructed. Therefore, no units have opened or closed. This requirement is not applicable.
§270.14(b)(15)	Closure cost estimate (264.142) and documentation (264.143)	Section 8.7 and Permit Attachment O	
§270.14(b)(16)	Post closure cost estimate (264.144) and documentation (264.145)	Sections 8.2 and 8.7 and Permit Attachment O	
§270.14(b)(17)	Documentation of insurance (264.147)	Section 8.8.3 and Permit Attachment O	
§270.14(b)(18)	Proof of financial assurance (264.149-150)	Section 8.8 and Permit Attachment O	
§270.14(b)(19)	Topographic map requirements	Part B Permit Application Figures 3-2 and 3-18	

Regulatory Requirements Crosswalk

20.4.1.900 NMAC Regulatory Requirement	Description of Requirement	Location in the Renewal Application	Explanation of Why Requirement is Not Applicable (N/A)
§270.14(b)(20)	Additional information required by regulator	N/A	No additional information has been required at this time.
§270.14(b)(21)	Extension or petition for land disposal facilities	N/A	No extension has been requested.
§270.14(b)(22)	Summary of the pre-application meeting		No pre-application meeting was held.
§270.14(c)(1)	Summary of groundwater monitoring data obtained during interim status	N/A	The Triassic Park Waste Disposal Facility was never in interim status.
§270.14(c)(2)	Identification of the uppermost aquifer	Section 7 Regulatory Background and Permit Attachment H	
§270.14(c)(3)	Delineation of waste management area, property boundary, point of compliance, and groundwater monitoring wells	Attachments A, H, and I	
§270.14(c)(4)	Description of any plume of contamination	N/A	There is not a contamination plume associated with the site.
§270.14(c)(5)	Describe proposed groundwater monitoring program to meet requirements of 40CFR §264.97	Section 7 and Permit Attachments H and I	
§270.14(c)(6)	Describe proposed detection monitoring program to meet requirements of 40CF §264.98	Section 7 and Permit Attachments H and I	
§270.14(c)(7)	Information relative to contamination in excess of limits	N/A	There is no contamination in excess of limits at the site.
§270.14(c)(8)	Information relative to contamination in excess of limits	N/A	No contamination has entered the groundwater from a regulated unit.
§270.14(d)	Information on SWMUs	N/A	There are no existing SWMUs.
§270.15	Requirements for storage in containers	N/A	The Triassic Park Waste Disposal Facility will not store hazardous waste in containers.
§270.16 thru §270.20	Information for tank systems, surface impoundments, waste piles, incinerators, and land treatment facilities	N/A	The Triassic Park Waste Disposal Facility will not include units covered by §270.16 thru §270.20.

Regulatory Requirements Crosswalk

20.4.1.900 NMAC Regulatory Requirement	Description of Requirement	Location in the Renewal Application	Explanation of Why Requirement is Not Applicable (N/A)
§270.21(a)	Specific Part B information requirements for landfills List of Hazardous Waste	Part A List of Hazardous Waste	
§270.21(b)(1)(i)	Detailed plans, engineering report of landfill design Liner system	Section 6 and Permit Attachments L, L1, L2, L4, L5, and M	
§270.21(b)(1)(ii)	Detailed plans of the double liner leak(leachate) detection, collection and removal system	Section 6 and Permit Attachments L, L1, L2, L4, L5, and M	
§270.21(b)(1)(iii)	Design of leak detection system if located in a saturated zone	Section 6 and Permit Attachments I, L, and L1	
§270.21(b)(1)(iv)	Construction Quality Assurance plan required under §264.19	Section 6.2.1.b and 6.2.2 and Permit Attachment M	
§270.21(b)(1)(v)	Proposed action leakage rate with rationale required under §264.302 and response action plan if require under §264.303	Section 6.5.3 and Permit Attachment J	
§270.21(b)(2)	Control of run-on	Section 6.2.1.g and Permit Attachments L, L1, and L4	
§270.21(b)(3)	Control of runoff	Section 6.2.1.g and Permit Attachments L, L1, and L4	
§270.21(b)(4)	Run-on and runoff control system management	Sections 6.2.1g and 6.6.1.d and Permit Attachments D, D1, L, and N	
§270.21(b)(4)	Control of wind dispersal of particulate matter	Sections 6.6.3 and Permit Attachments L and N	
§270.21(c)	Description of how liner system, leachate collection and removal system, leak detection system, cover system, and appurtenances for run-on and runoff will be inspected	Section 6.6.1 and Permit Attachments D and D1	
§270.21(d)	Description of landfill inspection	Section 5.2.2 and Permit Attachments D and D1	

Regulatory Requirements Crosswalk

20.4.1.900 NMAC Regulatory Requirement	Description of Requirement	Location in the Renewal Application	Explanation of Why Requirement is Not Applicable (N/A)
§270.21(e)	Detailed plans and engineering report of final cover	Section 8.1.8.C and Permit Attachments L, L1, and O	
§270.21(f)	Explain how ignitable and reactive waste will be landfilled under requirements of §264.312	Section 5.5 and Permit Attachment N	
§270.21(g)	Explain how incompatible wastes will be landfilled under requirements of §264.313	Section 5.5 and Permit Attachment N	
§270.21(h)	Waste landfilled before May 8, 1985	N/A	No waste disposal has occurred at the site.
§270.21(i)	Explain how containers of hazardous waste are to be landfilled as required by §264.315 or 264.316	Permit Attachment N	
§270.21(j)	Waste management plan for EPA Hazardous Waste nos. F020.F021, F023, F026, and F027	N/A	Triassic Park does not plan to accept EPA HW Nos. F020, F021, F023, F026, and F027.

Gandy Marley, Inc.
Triassic Park Waste Disposal Facility
Certification of Permit Renewal Application
October, 2011 Submittal

I certify under penalty of law that this document and all attachments were prepared under by direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the persons or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

H. Dale Gandy
Signature

10-9-11
Date

OMB# 2050-0024; Expires 11/30/2011

SEND COMPLETED FORM TO: The Appropriate State or Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**

1. Reason for Submittal MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ☐ To provide an Initial Notification (first time submitting site identification information / to obtain an EPA ID number for this location) ☐ To provide a Subsequent Notification (to update site identification information for this location) ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application ☒ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment # 1) ☐ As a component of the Hazardous Waste Report (If marked, see sub-bullet below) ☐ Site was a TSD facility and/or generator of ≥1,000 kg of hazardous waste, >1 kg of acute hazardous waste, or >100 kg of acute hazardous waste spill cleanup in one or more months of the report year (or State equivalent LQG regulations)
2. Site EPA ID Number	**EPA ID Number** N M 0 0 0 1 0 0 2 4 8 4
3. Site Name	**Name:** Triassic Park Waste Disposal Facility
4. Site Location Information	**Street Address:** U.S. Hwy. 380, 36 miles west of Tatum, New Mexico **City, Town, or Village:** Tatum **County:** Chaves **State:** New Mexico **Country:** U.S. **Zip Code:** 88267
5. Site Land Type	☒ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other
6. NAICS Code(s) for the Site (at least 5-digit codes)	A. 5 6 2 2 1 1 C. B. D.
7. Site Mailing Address	**Street or P.O. Box:** P.O. Box 1658 **City, Town, or Village:** Roswell **State:** New Mexico **Country:** U.S. **Zip Code:** 88202
8. Site Contact Person	**First Name:** Larry **MI:** **Last:** Gandy **Title:** Vice President **Street or P.O. Box:** P.O. Box 1658 **City, Town or Village:** Roswell **State:** New Mexico **Country:** U.S. **Zip Code:** 88202 **Email:** Lgandy@gandycorporation.com **Phone:** 575-347-0434 **Ext.:** **Fax:**
9. Legal Owner and Operator of the Site	**A. Name of Site's Legal Owner:** Gandy Marley Inc. **Date Became Owner:** July 22, 2000 **Owner Type:** ☒ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other **Street or P.O. Box:** P.O. Box 1658 **City, Town, or Village:** Roswell **Phone:** 575-347-0434 **State:** New Mexico **Country:** U.S. **Zip Code:** 88202 **B. Name of Site's Operator:** Gandy Marley, Inc. **Date Became Operator:** 1998 **Operator Type:** ☒ Private ☐ County ☐ District ☐ Federal ☐ Tribal ☐ Municipal ☐ State ☐ Other

EPA ID Number N M 0 0 0 1 0 0 2 4 8 4 OMB#: 2050-0024; Expires 11/30/2011

10. Type of Regulated Waste Activity (at your site)
Mark "Yes" or "No" for all current activities (as of the date submitting the form); complete any additional boxes as instructed.

A. Hazardous Waste Activities; Complete all parts 1-7.

Y ☐ N ☒ **1. Generator of Hazardous Waste**
If "Yes", mark only one of the following – a, b, or c.

- ☐ a. LQG: Generates, in any calendar month, 1,000 kg/mo (2,200 lbs./mo.) or more of hazardous waste; **or** Generates, in any calendar month, or accumulates at any time, more than 1 kg/mo (2.2 lbs./mo) of acute hazardous waste; **or** Generates, in any calendar month, **or** accumulates at any time, more than 100 kg/mo (220 lbs./mo) of acute hazardous spill cleanup material.
- ☐ b. SQG: 100 to 1,000 kg/mo (220 – 2,200 lbs./mo) of non-acute hazardous waste.
- ☐ c. CESQG: Less than 100 kg/mo (220 lbs./mo) of non-acute hazardous waste.

If "Yes" above, indicate other generator activities.

Y ☐ N ☐ d. Short-Term Generator (generate from a short-term or one-time event and not from on-going processes). If "Yes", provide an explanation in the Comments section.

Y ☐ N ☐ e. United States Importer of Hazardous Waste

Y ☐ N ☐ f. Mixed Waste (hazardous and radioactive) Generator

Y ☐ N ☒ **2. Transporter of Hazardous Waste**
If "Yes", mark all that apply.
- ☐ a. Transporter
- ☐ b. Transfer Facility (at your site)

Y ☒ N ☐ **3. Treater, Storer, or Disposer of Hazardous Waste** Note: A hazardous waste permit is required for these activities.

Y ☐ N ☒ **4. Recycler of Hazardous Waste**

Y ☐ N ☒ **5. Exempt Boiler and/or Industrial Furnace**
If "Yes", mark all that apply.
- ☐ a. Small Quantity On-site Burner Exemption
- ☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☒ **6. Underground Injection Control**

Y ☒ N ☐ **7. Receives Hazardous Waste from Off-site**

B. Universal Waste Activities; Complete all parts 1-2.

Y ☐ N ☒ **1. Large Quantity Handler of Universal Waste (you accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste managed at your site. If "Yes", mark all that apply.**

- a. Batteries ☐
- b. Pesticides ☐
- c. Mercury containing equipment ☐
- d. Lamps ☐
- e. Other (specify) _____ ☐
- f. Other (specify) _____ ☐
- g. Other (specify) _____ ☐

Y ☐ N ☒ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities; Complete all parts 1-4.

Y ☐ N ☒ **1. Used Oil Transporter**
If "Yes", mark all that apply.
- ☐ a. Transporter
- ☐ b. Transfer Facility (at your site)

Y ☐ N ☒ **2. Used Oil Processor and/or Re-refiner**
If "Yes", mark all that apply.
- ☐ a. Processor
- ☐ b. Re-refiner

Y ☐ N ☒ **3. Off-Specification Used Oil Burner**

Y ☐ N ☒ **4. Used Oil Fuel Marketer**
If "Yes", mark all that apply.
- ☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
- ☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

D. Eligible Academic Entities with Laboratories—Notification for opting into or withdrawing from managing laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

- You must check with your State to determine if you are eligible to manage laboratory hazardous wastes pursuant to 40 CFR Part 262 Subpart K

☐ 1. Opting into or currently operating under 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories
See the item-by-item instructions for definitions of types of eligible academic entities. Mark all that apply:

☐ a. College or University

☐ b. Teaching Hospital that is owned by or has a formal written affiliation agreement with a college or university

☐ c. Non-profit Institute that is owned by or has a formal written affiliation agreement with a college or university

☐ 2. Withdrawing from 40 CFR Part 262 Subpart K for the management of hazardous wastes in laboratories

11. Description of Hazardous Waste

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

See attached	sheets					

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-Regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed.

12. Notification of Hazardous Secondary Material (HSM) Activity

Y ☐ N ☒ Are you notifying under 40 CFR 260.42 that you will begin managing, are managing, or will stop managing hazardous secondary material under 40 CFR 261.2(a)(2)(ii), 40 CFR 261.4(a)(23), (24), or (25)?

If "Yes", you must fill out the Addendum to the Site Identification Form: Notification for Managing Hazardous Secondary Material.

13. Comments

14. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. For the RCRA Hazardous Waste Part A Permit Application, all owner(s) and operator(s) must sign (see 40 CFR 270.10(b) and 270.11).

Signature of legal owner, operator, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
[illegible]	President	10/07/11

EPA ID Number | N | M | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 4 | 8 | 4 |

OMB#: 2050-0034; Expires 7/31/2012

United States Environmental Protection Agency

HARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact	**First Name:** Larry	**MI:**	**Last Name:** Gandy
	Contact Title: Vice President		
	Phone: 575-347-0434	**Ext.:**	**Email:** Lgandy@gandycorporation.con
2. Facility Permit Contact Mailing Address	**Street or P.O. Box:** P.O. Box 1658		
	City, Town, or Village: Roswell		
	State: New Mexico		
	Country: U.S.	**Zip Code:** 88202	
3. Operator Mailing Address and Telephone Number	**Street or P.O. Box:** P.O. Box 1658		
	City, Town, or Village: Roswell		
	State: New Mexico	**Phone:** 575-347-0434	
	Country: U.S.	**Zip Code:** 88202	
4. Facility Existence Date	**Facility Existence Date (mm/dd/yyyy):** 1998		

5. Other Environmental Permits

A. Facility Type (Enter code)	B. Permit Number													C. Description
R	N	M	0	0	0	1	0	0	2	4	8	4		Hazardous Waste Disposal Permit
	5			6		2		2		1		1		

6. Nature of Business:

Hazardous Waste Disposal Facility

7. Process Codes and Design Capacities – Enter information in the Section on Form Page 3

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), describe the process (including its design capacity) in the space provided in Item 8.

B. PROCESS DESIGN CAPACITY – For each code entered in Item 7.A; enter the capacity of the process.

1. **AMOUNT – Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.**
2. **UNIT OF MEASURE – For each amount entered in Item 7.B(1), enter the code in Item 7.B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.**

C. PROCESS TOTAL NUMBER OF UNITS – Enter the total number of units for each corresponding process code.

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Disposal	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectares-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure Listed Below
	Storage	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure Listed Below
	Treatment	
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Metric Tons Per Hour; or Million BTU Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Short Tons Per Day; BTUs Per Hour; Gallons Per Day; Liters Per Hour; or Million BTU Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; BTUs Per Hour; or Million BTU Per Hour

Process Code	Process	Appropriate Unit of Measure for Process Design Capacity
	Treatment (Continued)	**(for T81 – T94)**
T81	Cement Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; Liters Per Hour; Kilograms Per Hour; or Million BTU Per Hour
T82	Lime Kiln	
T83	Aggregate Kiln	
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used in the Recovery of Sulfur Values from Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR 260.10	
T94	Containment Building Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; BTU Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million BTU Per Hour
	Miscellaneous (Subpart X)	
X01	Open Burning/Open Detonation	Any Unit of Measure Listed Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; BTU Per Hour; or Million BTU Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code	Unit of Measure	Unit of Measure Code
Gallons	G	Short Tons Per Hour	D	Cubic Yards	Y
Gallons Per Hour	E	Short Tons Per Day	N	Cubic Meters	C
Gallons Per Day	U	Metric Tons Per Hour	W	Acres	B
Liters	L	Metric Tons Per Day	S	Acre-feet	A
Liters Per Hour	H	Pounds Per Hour	J	Hectares	Q
Liters Per Day	V	Kilograms Per Hour	X	Hectare-meter	F
		Million BTU Per Hour	X	BTU Per Hour	I

7. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 7 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	[redacted]
X	1	S	0	2	533.788	G	001	
	1	D	8	0	553.200	Y	001	
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
1	0							
1	1							
1	2							
1	3							

Note: If you need to list more than 13 process codes, attach an additional sheet(s) with the information in the same format as above. Number the line sequentially, taking into account any lines that will be used for "other" process (i.e., D99, S99, T04, and X99) in Item 8.

8. Other Processes (Follow instructions from Item 7 for D99, S99, T04, and X99 process codes)

Line Number (Enter #s in sequence with Item 7)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	(2) Unit of Measure	C. Process Total Number of Units	[redacted]
X	2	T	0	4	100.00	U	001	
					NA			

9. Description of Hazardous Wastes - Enter Information in the Sections on Form Page 5

A. EPA HAZARDOUS WASTE NUMBER – Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY – For each listed waste entered in Item 9.A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Item 9.A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE – For each quantity entered in Item 9.B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all listed hazardous wastes.

For non-listed waste: For each characteristic or toxic contaminant entered in Item 9.A, select the code(s) from the list of process codes contained in Items 7.A and 8.A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. **Enter the first two as described above.**
2. **Enter "000" in the extreme right box of Item 9.D(1).**
3. **Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 9.E.**

2. PROCESS DESCRIPTION: If code is not listed for a process that will be used, describe the process in Item 9.D(2) or in Item 9.E(2).

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. **Select one of the EPA Hazardous Waste Numbers and enter it in Item 9.A. On the same line complete Items 9.B, 9.C, and 9.D by estimating the total annual quantity of the waste and describing all the processes to be used to store, treat, and/or dispose of the waste.**
2. **In Item 9.A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Item 9.D.2 on that line enter "included with above" and make no other entries on that line.**
3. **Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.**

EXAMPLE FOR COMPLETING Item 9 (shown in line numbers X-1, X-2, X-3, and X-4 below) – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES									
								(1) PROCESS CODES (Enter Code)									(2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

9. Description of Hazardous Wastes *(Continued. Use additional sheet(s) as necessary; number pages as 5a, etc.)*

Line Number	A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Qty of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter Code)	D. PROCESSES (2) PROCESS DESCRIPTION (If code is not entered in 9.D(1))
1					
2		SEE	ATTACHED		
3		SHEETS			
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
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36					

10. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all spring, rivers, and other surface water bodies in this map area. See instructions for precise requirements.

11. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

12. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas (see instructions for more detail).

13. Comments

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
D001	Only those ignitable wastes which can be treated by permitted methods prior to placement in the landfill.	42,120	T	D80, T01, S01, S02, T02	
D002	Only those corrosive wastes which can be treated by permitted methods prior to placement in the landfill.	42,120	T	D80, T01, S01, S02, T02	
D003	Only those reactive wastes which can be treated by permitted methods prior to placement in the landfill.	42,120	T	D80, T01, S01, S02, T02	
D004	Arsenic	42,120	T	D80, T01, S01, S02, T02	
D005	Barium	42,120	T	D80, T01, S01, S02, T02	
D006	Cadmium	42,120	T	D80, T01, S01, S02, T02	
D007	Chromium	42,120	T	D80, T01, S01, S02, T02	
D008	Lead	42,120	T	D80, T01, S01, S02, T02	
D009	Mercury	42,120	T	D80, T01, S01, S02, T02	
D010	Selenium	42,120	T	D80, T01, S01, S02, T02	
D011	Silver	42,120	T	D80, T01, S01, S02, T02	
D012	Endrin	42,120	T	D80, T01, S01, S02, T02	
D013	Lindane	42,120	T	D80, T01, S01, S02, T02	
D014	Methoxychlor	42,120	T	D80, T01, S01, S02, T02	
D015	Toxaphene	42,120	T	D80, T01, S01, S02, T02	
D016	2,4-D	42,120	T	D80, T01, S01, S02, T02	
D017	2,4,5-TP (Silvex)	42,120	T	D80, T01, S01, S02, T02	
D018	Benzene	42,120	T	D80, T01, S01, S02, T02	
D019	Carbon tetrachloride	42,120	T	D80, T01, S01, S02, T02	
D020	Chlordane	42,120	T	D80, T01, S01, S02, T02	
D021	Chlorobenzene	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
D022	Chloroform	42,120	T	D80, T01, S01, S02, T02	
D023	o-Cresol	42,120	T	D80, T01, S01, S02, T02	
D024	m-Cresol	42,120	T	D80, T01, S01, S02, T02	
D025	p-Cresol	42,120	T	D80, T01, S01, S02, T02	
D026	Cresol	42,120	T	D80, T01, S01, S02, T02	
D027	1,4-Dichlorobenzene	42,120	T	D80, T01, S01, S02, T02	
D028	1,2-Dichloroethane	42,120	T	D80, T01, S01, S02, T02	
D029	1,1-Dichloroethylene	42,120	T	D80, T01, S01, S02, T02	
D030	2,4-Dinitrotoluene	42,120	T	D80, T01, S01, S02, T02	
D031	Heptachlor (and its epoxide)	42,120	T	D80, T01, S01, S02, T02	
D032	Hexachlorobenzene	42,120	T	D80, T01, S01, S02, T02	
D033	Hexachlorobutadiene	42,120	T	D80, T01, S01, S02, T02	
D034	Hexachloroethane	42,120	T	D80, T01, S01, S02, T02	
D035	Methyl ethyl ketone	42,120	T	D80, T01, S01, S02, T02	
D036	Nitrobenzene	42,120	T	D80, T01, S01, S02, T02	
D037	Pentrachlorophenol	42,120	T	D80, T01, S01, S02, T02	
D038	Pyridine	42,120	T	D80, T01, S01, S02, T02	
D039	Tetrachloroethylene	42,120	T	D80, T01, S01, S02, T02	
D040	Trichloroethylene	42,120	T	D80, T01, S01, S02, T02	
D041	2,4,5-Trichlorophenol	42,120	T	D80, T01, S01, S02, T02	
D042	2,4,6-Trichlorophenol	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
D043	Vinyl chloride	42,120	T	D80, T01, S01, S02, T02	

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; All spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	42,120	T	D80, T01, S01, S02, T02	
F002	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, orthodichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; All halogenated solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	42,120	T	D80, T01, S01, S02, T02	
F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; All spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	42,120	T	D80, T01, S01, S02, T02	
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene: All spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	42,120	T	D80, T01, S01, S02, T02	
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; All spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
F006	Wastewater treatment sludges from electroplating operations except from the following processes:(1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum	42,120	T	D80, T01, S01, S02, T02	
F007	Spent cyanide plating bath solutions from electroplating operations	42,120	T	D80, T01, S01, S02, T02	
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process	42,120	T	D80, T01, S01, S02, T02	
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process	42,120	T	D80, T01, S01, S02, T02	
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process	42,120	T	D80, T01, S01, S02, T02	
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations	42,120	T	D80, T01, S01, S02, T02	
F012	Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process	42,120	T	D80, T01, S01, S02, T02	
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process	42,120	T	D80, T01, S01, S02, T02	
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in §261.31 or §261.32.)	42,120	T	D80, T01, S01, S02, T02	
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution	42,120	T	D80, T01, S01, S02, T02	
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, F027.	42,120	T	D80, T01, S01, S02, T02	
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with 40 CFR 261.35 of this chapter and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving process generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	42,120	T	D80, T01, S01, S02, T02	
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving process generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	42,120	T	D80, T01, S01, S02, T02	
F037	Petroleum refinery primary oil/water/solids separation sludge-Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in 40 CFR 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing	42,120	T	D80, T01, S01, S02, T02	
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge-Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in 40 CFR 261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing	42,120	T	D80, T01, S01, S02, T02	
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol	42,120	T	D80, T01, S01, S02, T02	
K002	Wastewater treatment sludge from the production of chrome yellow and orange pigments	42,120	T	D80, T01, S01, S02, T02	
K003	Wastewater treatment sludge from the production of molybdate orange pigments	42,120	T	D80, T01, S01, S02, T02	
K004	Wastewater treatment sludge from the production of zinc yellow pigments	42,120	T	D80, T01, S01, S02, T02	
K005	Wastewater treatment sludge from the production of chrome green pigments	42,120	T	D80, T01, S01, S02, T02	
K006	Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated)	42,120	T	D80, T01, S01, S02, T02	
K007	Wastewater treatment sludge from the production of iron blue pigments	42,120	T	D80, T01, S01, S02, T02	
K008	Oven residue from the production of chrome oxide green pigments	42,120	T	D80, T01, S01, S02, T02	
K009	Distillation bottoms from the production of acetaldehyde from ethylene	42,120	T	D80, T01, S01, S02, T02	
K010	Distillation side cuts from the production of acetaldehyde from ethylene	42,120	T	D80, T01, S01, S02, T02	
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile	42,120	T	D80, T01, S01, S02, T02	
K013	Bottom stream from the acetonitrile column in the production of acrylonitrile	42,120	T	D80, T01, S01, S02, T02	
K014	Bottoms from the acetonitrile purification column in the production of acrylonitrile	42,120	T	D80, T01, S01, S02, T02	
K015	Still bottoms from the distillation of benzyl chloride	42,120	T	D80, T01, S01, S02, T02	
K016	Heavy ends or distillation residues from the production of carbon tetrachloride	42,120	T	D80, T01, S01, S02, T02	
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin	42,120	T	D80, T01, S01, S02, T02	
K018	Heavy ends from the fractionation column in ethyl chloride production	42,120	T	D80, T01, S01, S02, T02	
K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production	42,120	T	D80, T01, S01, S02, T02	
K020	Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production	42,120	T	D80, T01, S01, S02, T02	
K021	Aqueous spent antimony catalyst waste from fluoromethanes production	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
K022	Distillation bottom tars from the production of phenol/acetone from cumene	42,120	T	D80, T01, S01, S02, T02	
K023	Distillation light ends from the production of phthalic anhydride from naphthalene	42,120	T	D80, T01, S01, S02, T02	
K024	Distillation bottoms from the production of phthalic anhydride from naphthalene	42,120	T	D80, T01, S01, S02, T02	
K025	Distillation bottoms from the production of nitrobenzene by the nitration of benzene	42,120	T	D80, T01, S01, S02, T02	
K026	Stripping still tails from the production of methy ethyl pyridines	42,120	T	D80, T01, S01, S02, T02	
K027	Centrifuge and distillation residues from toluene diisocyanate production	42,120	T	D80, T01, S01, S02, T02	
K028	Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane	42,120	T	D80, T01, S01, S02, T02	
K029	Waste from the product steam stripper in the production of 1,1,1-trichloroethane	42,120	T	D80, T01, S01, S02, T02	
K030	Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene	42,120	T	D80, T01, S01, S02, T02	
K031	By-product salts generated in the production of MSMA and cacodylic acid	42,120	T	D80, T01, S01, S02, T02	
K032	Wastewater treatment sludge from the production of chlordane	42,120	T	D80, T01, S01, S02, T02	
K033	Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane	42,120	T	D80, T01, S01, S02, T02	
K034	Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane	42,120	T	D80, T01, S01, S02, T02	
K035	Wastewater treatment sludges generated in the production of creosote	42,120	T	D80, T01, S01, S02, T02	
K036	Still bottoms from toluene reclamation distillation in the production of disulfoton	42,120	T	D80, T01, S01, S02, T02	
K037	Wastewater treatment sludges from the production of disulfoton	42,120	T	D80, T01, S01, S02, T02	
K038	Wastewater from the washing and stripping of phorate production	42,120	T	D80, T01, S01, S02, T02	
K039	Filter cake from the filtration of diethylphosphorodithoic acid in the production of phorate	42,120	T	D80, T01, S01, S02, T02	
K040	Wastewater treatment sludge from the production of phorate	42,120	T	D80, T01, S01, S02, T02	
K041	Wastewater treatment sludge from the production toxaphene	42,120	T	D80, T01, S01, S02, T02	
K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
K043	2,6-Dichlorophenol waste from the production of 2,4-D	42,120	T	D80, T01, S01, S02, T02	
K044	Wastewater treatment sludges from the manufacturing and processing of explosives	42,120	T	D80, T01, S01, S02, T02	
K045	Spent carbon from the treatment of wastewater containing explosives	42,120	T	D80, T01, S01, S02, T02	
K046	Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds	42,120	T	D80, T01, S01, S02, T02	
K047	Pink/red water from TNT operations	42,120	T	D80, T01, S01, S02, T02	
K048	Dissolved air flotation (DAF) float from the petroleum refining industry	42,120	T	D80, T01, S01, S02, T02	
K049	Slop oil emulsion solids from the petroleum refining industry	42,120	T	D80, T01, S01, S02, T02	
K050	Heat exchanger bundle cleaning sludge from the petroleum refining industry	42,120	T	D80, T01, S01, S02, T02	
K051	API separator sludge from the petroleum refining industry	42,120	T	D80, T01, S01, S02, T02	
K052	Tank bottoms (leaded) from the petroleum refining industry	42,120	T	D80, T01, S01, S02, T02	
K060	Ammonia still lime sludge from coking operations	42,120	T	D80, T01, S01, S02, T02	
K061	Emission control dust/sludge from the primary production of steel in electric furnaces	42,120	T	D80, T01, S01, S02, T02	
K062	Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332)	42,120	T	D80, T01, S01, S02, T02	
K064	Acid plant blowdown slurry/sludge resulting from the thickening of blowdown slurry from primary copper production	42,120	T	D80, T01, S01, S02, T02	
K065	Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities	42,120	T	D80, T01, S01, S02, T02	
K066	Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production	42,120	T	D80, T01, S01, S02, T02	
K069	Emission control dust/sludge from secondary lead smelting. (Note: This listing is stayed administratively for sludge generated from secondary acid scrubber systems. The stay will remain in effect until further administrative action is taken. If EPA takes further action effecting this stay, EPA will publish a notice of the action in the Federal Register.)	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTIO
K071	Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used	42,120	T	D80, T01, S01, S02, T02	
K073	Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production	42,120	T	D80, T01, S01, S02, T02	
K083	Distillation bottoms from aniline production	42,120	T	D80, T01, S01, S02, T02	
K084	Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds	42,120	T	D80, T01, S01, S02, T02	
K085	Distillation or fractionation column bottoms from the production of chlorobenzenes	42,120	T	D80, T01, S01, S02, T02	
K086	Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead	42,120	T	D80, T01, S01, S02, T02	
K087	Decanter tank tar sludge from coking operations	42,120	T	D80, T01, S01, S02, T02	
K088	Spent potliners from primary aluminum reduction	42,120	T	D80, T01, S01, S02, T02	
K090	Emission control dust or sludge from ferrochromium-silicon production	42,120	T	D80, T01, S01, S02, T02	
K091	Emission control dust or sludge from ferrochromium production	42,120	T	D80, T01, S01, S02, T02	
K093	Distillation light ends from the production of phthalic anhydride from ortho-xylene	42,120	T	D80, T01, S01, S02, T02	
K094	Distillation bottoms from the production of phthalic anhydride from ortho-xylene	42,120	T	D80, T01, S01, S02, T02	
K095	Distillation bottoms from the production of 1,1,1-trichloroethane	42,120	T	D80, T01, S01, S02, T02	
K096	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane	42,120	T	D80, T01, S01, S02, T02	
K097	Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane	42,120	T	D80, T01, S01, S02, T02	
K098	Untreated process wastewater from the production of toxaphene	42,120	T	D80, T01, S01, S02, T02	
K099	Untreated wastewater from the production of 2,4-D	42,120	T	D80, T01, S01, S02, T02	
K100	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
K116	Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine	42,120	T	D80, T01, S01, S02, T02	
K117	Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene	42,120	T	D80, T01, S01, S02, T02	
K118	Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene	42,120	T	D80, T01, S01, S02, T02	
K123	Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salt	42,120	T	D80, T01, S01, S02, T02	
K124	Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts	42,120	T	D80, T01, S01, S02, T02	
K125	Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts	42,120	T	D80, T01, S01, S02, T02	
K126	Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts	42,120	T	D80, T01, S01, S02, T02	
K131	Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide	42,120	T	D80, T01, S01, S02, T02	
K132	Spent absorbent and wastewater separator solids from the production of methyl bromide	42,120	T	D80, T01, S01, S02, T02	
K136	Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene	42,120	T	D80, T01, S01, S02, T02	
K141	Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludges from coking operations).	42,120	T	D80, T01, S01, S02, T02	
K142	Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products from coal.	42,120	T	D80, T01, S01, S02, T02	
K143	Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.	42,120	T	D80, T01, S01, S02, T02	
K144	Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.	42,120	T	D80, T01, S01, S02, T02	
K145	Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
K147	Tar storage tank residues from coal tar refining	42,120	T	D80, T01, S01, S02, T02	
K148	Residues from coal tar distillation, including but not limited to, still bottoms	42,120	T	D80, T01, S01, S02, T02	
K149	Distillation bottoms from the production of alpha-(or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups (this waste does not include still bottoms from the distillation of benzyl chloride).	42,120	T	D80, T01, S01, S02, T02	
K150	Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha-(or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	42,120	T	D80, T01, S01, S02, T02	
K151	Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha-(or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
P001	Warfarin, & salts, when present at concentrations greater than 0.3%, 2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1 phenylbutyl)-, & salts, when present at concentrations greater than 0.3%	42,120	T	D80, T01, S01, S02, T02	
P002	Acetamide, N-(aminothioxomethyl)-, 1-Acetyl-2-thiourea	42,120	T	D80, T01, S01, S02, T02	
P003	Acrolein, 2-Propenal	42,120	T	D80, T01, S01, S02, T02	
P004	Aldrin, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa-chloro- 1,4,4a,5,8,8a,-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)-	42,120	T	D80, T01, S01, S02, T02	
P005	2-Propen-1-ol, Allyl alcohol	42,120	T	D80, T01, S01, S02, T02	
P006	Aluminum phosphide	42,120	T	D80, T01, S01, S02, T02	
P007	5-(Aminomethyl)-3-isoxazolol, 3(2H)-Isoxazolone, 5-(aminomethyl)-	42,120	T	D80, T01, S01, S02, T02	
P008	4-Pyridinamine, 4-Aminopyridine	42,120	T	D80, T01, S01, S02, T02	
P009	Phenol, 2,4,6-trinitro-, ammonium salt, Ammonium picrate	42,120	T	D80, T01, S01, S02, T02	
P010	Arsenic acid H_3AsO_4	42,120	T	D80, T01, S01, S02, T02	
P011	Arsenic pentoxide, Arsenic oxide As_2O_5	42,120	T	D80, T01, S01, S02, T02	
P012	Arsenic oxide As_2O_3, Arsenic trioxide	42,120	T	D80, T01, S01, S02, T02	
P013	Barium cyanide	42,120	T	D80, T01, S01, S02, T02	
P014	Benzenethiol, Thiophenol	42,120	T	D80, T01, S01, S02, T02	
P015	Beryllium powder	42,120	T	D80, T01, S01, S02, T02	
P016	Dichloromethyl ether, Methane, oxybis(chloro-	42,120	T	D80, T01, S01, S02, T02	
P017	2-Propanone, 1-bromo-, Bromoacetone	42,120	T	D80, T01, S01, S02, T02	
P018	Strychnidin-10-one, 2,3-dimethoxy-, Brucine	42,120	T	D80, T01, S01, S02, T02	

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RPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
P020	Phenol, 2-(1-methylpropyl)-4,6-dinitro-, Dinoseb	42,120	T	D80, T01, S01, S02, T02	
P021	Calcium cyanide, Calcium cyanide $Ca(CN)_2$	42,120	T	D80, T01, S01, S02, T02	
P022	Carbon disulfide	42,120	T	D80, T01, S01, S02, T02	
P023	Acetaldehyde, chloro-, Chloroacetaldehyde	42,120	T	D80, T01, S01, S02, T02	
P024	Benzenamine, 4-chloro-, p-Chloroaniline	42,120	T	D80, T01, S01, S02, T02	
P026	Thiourea, (2-chlorophenyl)-, 1-(o-Chlorophenyl)thiourea	42,120	T	D80, T01, S01, S02, T02	
P027	Propanenitrile, 3-chloro-, 3-Chloropropionitrile	42,120	T	D80, T01, S01, S02, T02	
P028	Benzene, (chloromethyl)-, Benzyl chloride	42,120	T	D80, T01, S01, S02, T02	
P029	Copper cyanide, Copper cyanide Cu(CN)	42,120	T	D80, T01, S01, S02, T02	
P030	Cyanides (soluble cyanide salts), not otherwise specified	42,120	T	D80, T01, S01, S02, T02	
P031	Ethanedinitrile, Cyanogen	42,120	T	D80, T01, S01, S02, T02	
P033	Cyanogen chloride (CN)Cl, Cyanogen chloride	42,120	T	D80, T01, S01, S02, T02	
P034	2-Cyclohexyl-4,6-dinitrophenol, Phenol, 2-cyclohexyl-4,6-dinitro-	42,120	T	D80, T01, S01, S02, T02	
P036	Dichlorophenylarsine, Arsonous dichloride, phenyl-	42,120	T	D80, T01, S01, S02, T02	
P037	Dieldrin, 2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexa- chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aal- pha,2beta,2aalpha,3beta,6beta,6aalpha,7beta, 7aalpha)-	42,120	T	D80, T01, S01, S02, T02	
P038	Arsine, diethyl-, Diethylarsine	42,120	T	D80, T01, S01, S02, T02	
P039	Disulfoton, Phosphorodithioc acid, O,O-diethyl...S- [2-(ethylthio)ethyl] ester	42,120	T	D80, T01, S01, S02, T02	
P040	O,O-Diethyl O-pyrazinyl phosphorothioate, Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	42,120	T	D80, T01, S01, S02, T02	
P041	Phosphoric acid, diethyl 4-nitrophenyl ester, Diethyl-p-nitrophenyl phosphate	42,120	T	D80, T01, S01, S02, T02	
P042	Epinephrine, 1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-,	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
P043	Phosphorofluoridic acid, bis(1-methylethyl) ester, Diisopropylfluorophosphate (DFP)	42,120	T	D80, T01, S01, S02, T02	
P044	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester, Dimethoate	42,120	T	D80, T01, S01, S02, T02	
P045	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[methylamino)carbonyl] oxime, Thiofanox	42,120	T	D80, T01, S01, S02, T02	
P046	Benzeneethanamine, alpha,alpha-dimethyl-, alpha,alpha-Dimethylphenethylamine	42,120	T	D80, T01, S01, S02, T02	
P047	Phenol, 2-methyl-4,6-dinitro-, & salts, 4,6-Dinitro-o-cresol, & salts	42,120	T	D80, T01, S01, S02, T02	
P048	Phenol, 2,4-dinitro-, 2,4-Dinitrophenol	42,120	T	D80, T01, S01, S02, T02	
P049	Dithiobiuret, Thioimidodicarbonic diamide $[(H_2N)C(S)]_2NH$	42,120	T	D80, T01, S01, S02, T02	
P050	Endosulfan, 6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	42,120	T	D80, T01, S01, S02, T02	
P051	2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexa- chloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta, 7aalpha)-, & metabolites, Endrin, & metabolites, Endrin	42,120	T	D80, T01, S01, S02, T02	
P054	Ethyleneimine, Aziridine	42,120	T	D80, T01, S01, S02, T02	
P056	Fluorine	42,120	T	D80, T01, S01, S02, T02	
P057	Acetamide, 2-fluoro-, Fluoroacetamide	42,120	T	D80, T01, S01, S02, T02	
P058	Acetic acid, fluoro-, sodium salt, Fluoroacetic acid, sodium salt	42,120	T	D80, T01, S01, S02, T02	
P059	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro ...3a,4,7,7a-tetrahydro-, Heptachlor	42,120	T	D80, T01, S01, S02, T02	
P060	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa-chloro- 1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)-, Isodrin	42,120	T	D80, T01, S01, S02, T02	
P062	Tetraphosphoric acid, hexaethyl ester, Hexaethyl tetraphosphate	42,120	T	D80, T01, S01, S02, T02	
P063	Hydrocyanic acid, Hydrogen cyanide	42,120	T	D80, T01, S01, S02, T02	
P064	Methyl isocyanate, Methane, isocyanato-	42,120	T	D80, T01, S01, S02, T02	
P065	Fulminic acid, mercury(2+) salt, Mercury fulminate	42,120	T	D80, T01, S01, S02, T02	
P066	Methomyl, Ethanimidothioic acid,...N-[[(methylamino)carbonyl]oxy]-, methyl ester	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
P067	Aziridine, 2-methyl-, 1,2-Propylenimine	42,120	T	D80, T01, S01, S02, T02	
P068	Methyl hydrazine, Hydrazine, methyl-	42,120	T	D80, T01, S01, S02, T02	
P069	2-Methyllactonitrile, Propanenitrile, 2-hydroxy-2-methyl-	42,120	T	D80, T01, S01, S02, T02	
P070	Propanal, 2-methyl-2-(methylthio)-,...O-[(methylami- no)carbonyl] oxime, Aldicarb	42,120	T	D80, T01, S01, S02, T02	
P071	Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester, Methyl parathion	42,120	T	D80, T01, S01, S02, T02	
P072	Thiourea, 1-naphthalenyl-, alpha-Naphthylthiourea	42,120	T	D80, T01, S01, S02, T02	
P073	Nickel carbonyl $Ni(CO)_4$, (T-4)-, Nickel carbonyl	42,120	T	D80, T01, S01, S02, T02	
P074	Nickel cyanide, Nickel cyanide $Ni(CN)_2$	42,120	T	D80, T01, S01, S02, T02	
P075	Nicotine, & salts, Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts	42,120	T	D80, T01, S01, S02, T02	
P076	Nitric oxide, Nitrogen oxide NO	42,120	T	D80, T01, S01, S02, T02	
P077	p-Nitroaniline, Benzenamine, 4-nitro-	42,120	T	D80, T01, S01, S02, T02	
P078	Nitrogen dioxide, Nitrogen oxide NO_2	42,120	T	D80, T01, S01, S02, T02	
P081	1,2,3-Propanetriol, trinitrate, Nitroglycerine	42,120	T	D80, T01, S01, S02, T02	
P082	N-Nitrosodimethylamine, Methanamine, N-methyl-N-nitroso-	42,120	T	D80, T01, S01, S02, T02	
P084	N-Nitrosomethylvinylamine, Vinylamine, N-methyl-N-nitroso-	42,120	T	D80, T01, S01, S02, T02	
P085	Diphosphoramide, octamethyl-, Octamethylpyrophosphoramide	42,120	T	D80, T01, S01, S02, T02	
P087	Osmium oxide OsO_4, (T-4)-, Osmium tetroxide	42,120	T	D80, T01, S01, S02, T02	
P088	Endothall, 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	42,120	T	D80, T01, S01, S02, T02	
P089	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester, Parathion	42,120	T	D80, T01, S01, S02, T02	
P092	Phenylmercury acetate, Mercury, (acetato-O)phenyl-	42,120	T	D80, T01, S01, S02, T02	
P093	Thiourea, phenyl-, Phenylthiourea	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
P094	Phosphorodithioic acid, O,O-diethyl...S- [(ethylthio)methyl] ester, Phorate	42,120	T	D80, T01, S01, S02, T02	
P095	Phosgene, Carbonic dichloride	42,120	T	D80, T01, S01, S02, T02	
P096	Phosphine, Hydrogen phosphide	42,120	T	D80, T01, S01, S02, T02	
P097	Famphur, Phosphorothioic acid,...O-[4-[(dimethyl-amino)sulfonyl]phenyl] O,O-dimethyl ester	42,120	T	D80, T01, S01, S02, T02	
P098	Potassium cyanide, Potassium cyanide K(CN)	42,120	T	D80, T01, S01, S02, T02	
P099	Potassium silver cyanide, Argentate(1-), bis(cyano-C)-, potassium	42,120	T	D80, T01, S01, S02, T02	
P101	Ethyl cyanide, Propanenitrile	42,120	T	D80, T01, S01, S02, T02	
P102	Propargyl alcohol, 2-Propyn-1-ol	42,120	T	D80, T01, S01, S02, T02	
P103	Selenourea	42,120	T	D80, T01, S01, S02, T02	
P104	Silver cyanide Ag(CN), Silver cyanide	42,120	T	D80, T01, S01, S02, T02	
P105	Sodium azide	42,120	T	D80, T01, S01, S02, T02	
P106	Sodium cyanide, Sodium cyanide Na(CN)	42,120	T	D80, T01, S01, S02, T02	
P108	Strychnidin-10-one, & salts, Strychnine, & salts	42,120	T	D80, T01, S01, S02, T02	
P109	Thodiphosphoric acid, tetraethyl ester, Tetraethyldithiopyrophosphate	42,120	T	D80, T01, S01, S02, T02	
P110	Plumbane, tetraethyl-, Tetraethyl lead	42,120	T	D80, T01, S01, S02, T02	
P111	Tetraethyl pyrophosphate, Diphosphoric acid, tetraethyl ester	42,120	T	D80, T01, S01, S02, T02	
P112	Tetranitromethane, Methane, tetranitro-	42,120	T	D80, T01, S01, S02, T02	
P113	Thallic oxide, Thallium oxide Tl_2O_3	42,120	T	D80, T01, S01, S02, T02	
P114	Selenious acid, dithallium(1+) salt, Thallium(I) selenite	42,120	T	D80, T01, S01, S02, T02	
P115	Thallium(I) sulfate, Sulfuric acid, dithallium(1+) salt	42,120	T	D80, T01, S01, S02, T02	
P116	Hydrazinecarbothioamide, Thiosemicarbazide	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
P118	Methanethiol, trichloro-, Trichloromethanethiol	42,120	T	D80, T01, S01, S02, T02	
P119	Vanadic acid, ammonium salt, Ammonium vanadate	42,120	T	D80, T01, S01, S02, T02	
P120	Vanadium oxide V_2O_5, Vanadium pentoxide	42,120	T	D80, T01, S01, S02, T02	
P121	Zinc cyanide $Zn(CN)_2$, Zinc cyanide	42,120	T	D80, T01, S01, S02, T02	
P122	Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	42,120	T	D80, T01, S01, S02, T02	
P123	Toxaphene	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U001	Acetaldehyde, Ethanal	42,120	T	D80, T01, S01, S02, T02	
U002	Acetone, 2-Propanone	42,120	T	D80, T01, S01, S02, T02	
U003	Acetonitrile	42,120	T	D80, T01, S01, S02, T02	
U004	Ethanone, 1-phenyl-, Acetophenone	42,120	T	D80, T01, S01, S02, T02	
U005	2-Acetylaminofluorene, Acetamide, N-9H-fluoren-2-yl-	42,120	T	D80, T01, S01, S02, T02	
U006	Acetyl chloride	42,120	T	D80, T01, S01, S02, T02	
U007	Acrylamide, 2-Propenamide	42,120	T	D80, T01, S01, S02, 02	
U008	Acrylic acid, 2-Propenoic acid	42,120	T	D80, T01, S01, S02, T02	
U009	Acrylonitrile, 2-Propenenitrile	42,120	T	D80, T01, S01, S02, T02	
U010	Azirino[2',3':3,4]pyrrolo [1,2-a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-, Mitomycin C	42,120	T	D80, T01, S01, S02, T02	
U011	Amitrole, 1H-1,2,4-Triazol-3-amine	42,120	T	D80, T01, S01, S02, T02	
U012	Aniline, Benzenamine	42,120	T	D80, T01, S01, S02, T02	
U014	Benzenamine, 4,4'-carbonimidoylbis [N,N-dimethyl-, Auramine	42,120	T	D80, T01, S01, S02, T02	
U015	Azaserine, L-Serine, diazoacetate (ester)	42,120	T	D80, T01, S01, S02, T02	
U016	Benz[c]acridine	42,120	T	D80, T01, S01, S02, T02	
U017	Benzal chloride, Benzene, (dichloromethyl)-	42,120	T	D80, T01, S01, S02, T02	
U018	Benz[a]anthracene	42,120	T	D80, T01, S01, S02, T02	
U019	Benzene	42,120	T	D80, T01, S01, S02, T02	
U020	Benzenesulfonic acid chloride, Benzenesulfonyl chloride	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U021	[1,1'-Biphenyl]-4,4'-diamine, Benzidine	42,120	T	D80, T01, S01, S02, T02	
U022	Benzo[a]pyrene	42,120	T	D80, T01, S01, S02, T02	
U023	Benzotrichloride, Benzene, (trichloromethyl)-	42,120	T	D80, T01, S01, S02, T02	
U024	Dichloromethoxy ethane, Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-	42,120	T	D80, T01, S01, S02, T02	
U025	Ethane, 1,1'-oxybis[2-chloro-, Dichloroethyl ether	42,120	T	D80, T01, S01, S02, T02	
U026	Chlornaphazin, Naphthalenamine, N,N'-bis(2-chloroethyl)-	42,120	T	D80, T01, S01, S02, T02	
U027	Dichloroisopropyl ether, Propane, 2,2'-oxybis[2-chloro-	42,120	T	D80, T01, S01, S02, T02	
U028	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester, Diethylhexyl phthalate	42,120	T	D80, T01, S01, S02, T02	
U029	Methane, bromo-, Methyl bromide	42,120	T	D80, T01, S01, S02, T02	
U030	Benzene, 1-bromo-4-phenoxy-, 4-Bromophenyl phenyl ether	42,120	T	D80, T01, S01, S02, T02	
U031	n-Butyl alcohol, 1-Butanol	42,120	T	D80, T01, S01, S02, T02	
U032	Calcium chromate, Chromic acid H_2CrO_4, calcium salt	42,120	T	D80, T01, S01, S02, T02	
U033	Carbon oxyfluoride, Carbonic difluoride	42,120	T	D80, T01, S01, S02, T02	
U034	Chloral, Acetaldehyde, trichloro-	42,120	T	D80, T01, S01, S02, T02	
U035	Chlorambucil, Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	42,120	T	D80, T01, S01, S02, T02	
U036	Chlordane, alpha & gamma isomers, 4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	42,120	T	D80, T01, S01, S02, T02	
U037	Benzene, chloro-, Chlorobenzene	42,120	T	D80, T01, S01, S02, T02	
U038	Chlorobenzilate, Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-al- pha-hydroxy-, ethyl ester	42,120	T	D80, T01, S01, S02, T02	
U039	p-Chloro-m-cresol, Phenol, 4-chloro-3-methyl-	42,120	T	D80, T01, S01, S02, T02	
U041	Epichlorohydrin, Oxirane, (chloromethyl)-	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U042	Ethene, (2-chloroethoxy)-, 2-Chloroethyl vinyl ether	42,120	T	D80, T01, S01, S02, T02	
U043	Ethene, chloro-, Vinyl chloride	42,120	T	D80, T01, S01, S02, T02	
U044	Chloroform, Methane, trichloro-	42,120	T	D80, T01, S01, S02, T02	
U045	Methane, chloro-, Methyl chloride	42,120	T	D80, T01, S01, S02, T02	
U046	Chloromethyl methyl ether, Methane, chloromethoxy-	42,120	T	D80, T01, S01, S02, T02	
U047	beta-Chloronaphthalene, Naphthalene, 2-chloro-	42,120	T	D80, T01, S01, S02, T02	
U048	o-Chlorophenol, Phenol, 2-chloro-	42,120	T	D80, T01, S01, S02, T02	
U049	4-Chloro-o-toluidine, hydrochloride, Benzenamine, 4-chloro-2-methyl-, hydrochloride	42,120	T	D80, T01, S01, S02, T02	
U050	Chrysene	42,120	T	D80, T01, S01, S02, T02	
U051	Creosote	42,120	T	D80, T01, S01, S02, T02	
U052	Cresol (Cresylic acid), Phenol, methyl-	42,120	T	D80, T01, S01, S02, T02	
U053	Crotonaldehyde, 2-Butenal	42,120	T	D80, T01, S01, S02, T02	
U055	Benzene, (1-methylethyl)-, Cumene	42,120	T	D80, T01, S01, S02, T02	
U056	Cyclohexane, Benzene, hexahydro-	42,120	T	D80, T01, S01, S02, T02	
U057	Cyclohexanone	42,120	T	D80, T01, S01, S02, T02	
U058	Cyclophosphamide, 2H-1,3,2-Oxazaphosphorin-2-amine,...N,N-bis(2-chloroethyl) tetrahydro-, 2-oxide	42,120	T	D80, T01, S01, S02, T02	
U059	5,12-Naphthacenedione, 8-acetyl-10- [(3-amino-2,3,6-tride-oxy)-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-, Daunomycin	42,120	T	D80, T01, S01, S02, T02	
U060	DDD, Benzene, 1,1'-(2,2-dichloroethylidene)bis [4-chloro-	42,120	T	D80, T01, S01, S02, T02	
U061	DDT, Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-chloro-	42,120	T	D80, T01, S01, S02, T02	
U062	Diallate, Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U063	Dibenz[a,h]anthracene	42,120	T	D80, T01, S01, S02, T02	
U064	Benzo[rst]pentaphene, Dibenzo[a,i]pyrene	42,120	T	D80, T01, S01, S02, T02	
U066	1,2-Dibromo-3-chloropropane, Propane, 1,2-dibromo-3-chloro-	42,120	T	D80, T01, S01, S02, T02	
U067	Ethane, 1,2-dibromo-, Ethylene dibromide	42,120	T	D80, T01, S01, S02, T02	
U068	Methane, dibromo-, Methylene bromide	42,120	T	D80, T01, S01, S02, T02	
U069	Dioutyl phthalate, 1,2-Benzenedicarboxylic acid, dibutyl ester	42,120	T	D80, T01, S01, S02, T02	
U070	o-Dichlorobenzene, Benzene, 1,2-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U071	m-Dichlorobenzene, Benzene, 1,3-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U072	Benzene, 1,4-dichloro-, p-Dichlorobenzene	42,120	T	D80, T01, S01, S02, T02	
U073	3,3'-Dichlorobenzidine, [1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U074	1,4-Dichloro-2-butene, 2-Butene, 1,4-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U075	Methane, dichlorodifluoro-, Dichlorodifluoromethane	42,120	T	D80, T01, S01, S02, T02	
U076	Ethylidene dichloride, Ethane, 1,1-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U077	Ethylene dichloride, Ethane, 1,2-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U078	1,1-Dichloroethylene, Ethene, 1,1-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U079	1,2-Dichloroethylene, Ethene, 1,2-dichloro-, (E)-	42,120	T	D80, T01, S01, S02, T02	
U080	Methane, dichloro-, Methylene chloride	42,120	T	D80, T01, S01, S02, T02	
U081	2,4-Dichlorophenol, Phenol, 2,4-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U082	2,6-Dichlorophenol, Phenol, 2,6-dichloro-	42,120	T	D80, T01, S01, S02, T02	
U083	Propane, 1,2-dichloro-, Propylene dichloride	42,120	T	D80, T01, S01, S02, T02	
U084	1,3-Dichloropropene, 1-Propene, 1,3-dichloro-	42,120	T	D80, T01, S01, S02, T02	

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EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U085	2,2'-Bioxirane, 1,2:3,4-Diepoxybutane	42,120	T	D80, T01, S01, S02, T02	
U086	N,N'-Diethylhydrazine, Hydrazine, 1,2-diethyl-	42,120	T	D80, T01, S01, S02, T02	
U087	O,O-Diethyl S-methyl dithiophosphate, Phosphorodithioic acid, O,O-diethyl S-methyl ester	42,120	T	D80, T01, S01, S02, T02	
U088	Diethyl phthalate, 1,2-Benzenedicarboxylic acid, diethyl ester	42,120	T	D80, T01, S01, S02, T02	
U089	Diethylstilbesterol, Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)-	42,120	T	D80, T01, S01, S02, T02	
U090	Dihydrosafrole, 1,3-Benzodioxole, 5-propyl-	42,120	T	D80, T01, S01, S02, T02	
U091	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-, 3,3'-Dimethoxybenzidine	42,120	T	D80, T01, S01, S02, T02	
U092	Methanamine, N-methyl-, Dimethylamine	42,120	T	D80, T01, S01, S02, T02	
U093	p-Dimethylaminoazobenzene, Benzenamine, N,N-dimethyl-4-(phenylazo)-	42,120	T	D80, T01, S01, S02, T02	
U094	Benz[a]anthracene, 7,12-dimethyl-, 7,12-Dimethylbenz[a]anthracene	42,120	T	D80, T01, S01, S02, T02	
U095	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-, 3,3'-Dimethylbenzidine, 233,3'-Dimethylbenzidine	42,120	T	D80, T01, S01, S02, T02	
U096	Hydroperoxide, 1-methyl-1-phenylethyl-, alpha,alpha-Dimethylbenzylhydroperoxide	42,120	T	D80, T01, S01, S02, T02	
U097	Carbamic chloride, dimethyl-, Dimethylcarbamoyl chloride	42,120	T	D80, T01, S01, S02, T02	
U098	1,1-Dimethylhydrazine, Hydrazine, 1,1-dimethyl-	42,120	T	D80, T01, S01, S02, T02	
U099	Hydrazine, 1,2-dimethyl-, 1,2-Dimethylhydrazine	42,120	T	D80, T01, S01, S02, T02	
U101	2,4-Dimethylphenol, Phenol, 2,4-dimethyl-	42,120	T	D80, T01, S01, S02, T02	
U102	1,2-Benzenedicarboxylic acid, dimethyl ester, Dimethyl phthalate	42,120	T	D80, T01, S01, S02, T02	
U103	Dimethyl sulfate, Sulfuric acid, dimethyl ester	42,120	T	D80, T01, S01, S02, T02	
U105	Benzene, 1-methyl-2,4-dinitro-, 2,4-Dinitrotoluene	42,120	T	D80, T01, S01, S02, T02	
U106	2,6-Dinitrotoluene, Benzene, 2-methyl-1,3-dinitro-	42,120	T	D80, T01, S01, S02, T02	
U107	Di-n-octyl phthalate, 1,2-Benzenedicarboxylic acid, dioctyl ester	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U108	1,4-Dioxane, 1,4-Diethyleneoxide	42,120	T	D80, T01, S01, S02, T02	
U109	1,2-Diphenylhydrazine, Hydrazine, 1,2-diphenyl-	42,120	T	D80, T01, S01, S02, T02	
U110	Dipropylamine, 1-Propanamine, N-propyl-	42,120	T	D80, T01, S01, S02, T02	
U111	Di-n-propylnitrosamine, 1-Propanamine, N-nitroso-N-propyl-	42,120	T	D80, T01, S01, S02, T02	
U112	Acetic acid ethyl ester, Ethyl acetate	42,120	T	D80, T01, S01, S02, T02	
U113	Ethyl acrylate, 2-Propenoic acid, ethyl ester	42,120	T	D80, T01, S01, S02, T02	
U114	Ethylenebisdithiocarbamic acid, salts & esters, Carbamodithioic acid, 1,2-ethanediylbis-,...salts & esters	42,120	T	D80, T01, S01, S02, T02	
U115	Ethylene oxide, Oxirane	42,120	T	D80, T01, S01, S02, T02	
U116	Ethylenethiourea, 2-Imidazolidinethione	42,120	T	D80, T01, S01, S02, T02	
U117	Ethyl ether, Ethane, 1,1'-oxybis-	42,120	T	D80, T01, S01, S02, T02	
U118	Ethyl methacrylate, 2-Propenoic acid, 2-methyl-, ethyl ester	42,120	T	D80, T01, S01, S02, T02	
U119	Ethyl methanesulfonate, Methanesulfonic acid, ethyl ester	42,120	T	D80, T01, S01, S02, T02	
U120	Fluoranthene	42,120	T	D80, T01, S01, S02, T02	
U121	Methane, trichlorofluoro-, Trichloromonofluoromethane	42,120	T	D80, T01, S01, S02, T02	
U122	Formaldehyde	42,120	T	D80, T01, S01, S02, T02	
U123	Formic acid	42,120	T	D80, T01, S01, S02, T02	
U124	Furfuran, Furan	42,120	T	D80, T01, S01, S02, T02	
U125	2-Furancarboxaldehyde, Furfural	42,120	T	D80, T01, S01, S02, T02	
U126	Glycidylaldehyde, Oxiranecarboxyaldehyde	42,120	T	D80, T01, S01, S02, T02	
U127	Benzene, hexachloro-, Hexachlorobenzene	42,120	T	D80, T01, S01, S02, T02	
U128	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-, Hexachlorobutadiene	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U129	Lindane, Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1al- pha,2alpha,3beta,4alpha,5alpha,6beta)-	42,120	T	D80, T01, S01, S02, T02	
U130	Hexachlorocyclopentadiene, 1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	42,120	T	D80, T01, S01, S02, T02	
U131	Hexachloroethane, Ethane, hexachloro-	42,120	T	D80, T01, S01, S02, T02	
U132	Hexachlorophene, Phenol, 2,2'-methylenebis[3,4,6-trichloro-	42,120	T	D80, T01, S01, S02, T02	
U133	Hydrazine	42,120	T	D80, T01, S01, S02, T02	
U134	Hydrogen fluoride, Hydrofluoric acid	42,120	T	D80, T01, S01, S02, T02	
U135	Hydrogen sulfide H_2S, Hydrogen sulfide	42,120	T	D80, T01, S01, S02, T02	
U136	Cacodylic acid, Arsinic acid, dimethyl-	42,120	T	D80, T01, S01, S02, T02	
U137	Indeno[1,2,3-cd]pyrene	42,120	T	D80, T01, S01, S02, T02	
U138	Methane, iodo-, Methyl iodide	42,120	T	D80, T01, S01, S02, T02	
U140	Isobutyl alcohol, 1-Propanol,	42,120	T	D80, T01, S01, S02, T02	
U141	Isosafrole, 1,3-Benzodioxole, 5-(1-propenyl)-	42,120	T	D80, T01, S01, S02, T02	
U142	Kepone, 1,3,4-Metheno-2H-cyclobuta [cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-U	42,120	T	D80, T01, S01, S02, T02	
U143	Lasiocarpine, 2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-...2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-...2,3,5,7 a-t etrahydro-1H-pyrrolizin-1-yl ester,...[1S-[1alpha(Z),7(2S*,3R*),7aalpha]]-	42,120	T	D80, T01, S01, S02, T02	
U144	Lead acetate, Acetic acid, lead(2+) salt	42,120	T	D80, T01, S01, S02, T02	
U145	Lead phosphate, Phosphoric acid, lead(2+) salt (2:3)	42,120	T	D80, T01, S01, S02, T02	
U146	Lead, bis(acetato-O)tetrahydroxytri-, Lead subacetate	42,120	T	D80, T01, S01, S02, T02	
U147	Maleic anhydride, 2,5-Furandione	42,120	T	D80, T01, S01, S02, T02	
U148	Maleic hydrazide, 3,6-Pyridazinedione, 1,2-dihydro-	42,120	T	D80, T01, S01, S02, T02	
U149	Malononitrile, Propanedinitrile	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U150	Melphalan, L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-	42,120	T	D80, T01, S01, S02, T02	
U151	Mercury	42,120	T	D80, T01, S01, S02, T02	
U152	Methacrylonitrile, 2-Propenenitrile, 2-methyl-	42,120	T	D80, T01, S01, S02, T02	
U153	Methanethiol, Thiomethanol	42,120	T	D80, T01, S01, S02, T02	
U154	Methyl alcohol, Methanol	42,120	T	D80, T01, S01, S02, T02	
U155	Methapyrilene, 1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2- thienylmethyl)-	42,120	T	D80, T01, S01, S02, T02	
U156	Methyl chlorocarbonate, Carbonochloridic acid, methyl ester	42,120	T	D80, T01, S01, S02, T02	
U157	3-Methylcholanthrene, Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	42,120	T	D80, T01, S01, S02, T02	
U158	4,4'-Methylenebis(2-chloroaniline), Benzenamine, 4,4'-methylenebis[2-chloro-	42,120	T	D80, T01, S01, S02, T02	
U159	Methyl ethyl ketone (MEK), 2-Butanone	42,120	T	D80, T01, S01, S02, T02	
U160	2-Butanone, peroxide, Methyl ethyl ketone peroxide	42,120	T	D80, T01, S01, S02, T02	
U161	4-Methyl-2-pentanone, Methyl isobutyl ketone, Pentanol, 4-methyl-	42,120	T	D80, T01, S01, S02, T02	
U161		42,120	T	D80, T01, S01, S02, T02	
U162	Methyl methacrylate, 2-Propenoic acid, 2-methyl-, methyl ester	42,120	T	D80, T01, S01, S02, T02	
U163	MNNG, Guanidine, N-methyl-N'-nitro-N-nitroso-	42,120	T	D80, T01, S01, S02, T02	
U164	Methylthiouracil, 4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	42,120	T	D80, T01, S01, S02, T02	
U165	Naphthalene	42,120	T	D80, T01, S01, S02, T02	
U166	1,4-Naphthalenedione, 1,4-Naphthoquinone	42,120	T	D80, T01, S01, S02, T02	
U167	1-Naphthalenamine, alpha-Naphthylamine	42,120	T	D80, T01, S01, S02, T02	
U168	beta-Naphthylamine, 2-Naphthalenamine	42,120	T	D80, T01, S01, S02, T02	
U169	Nitrobenzene, Benzene, nitro-	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U170	p-Nitrophenol, Phenol, 4-nitro-	42,120	T	D80, T01, S01, S02, T02	
U171	Propane, 2-nitro-, 2-Nitropropane	42,120	T	D80, T01, S01, S02, T02	
U172	1-Butanamine, N-butyl-N-nitroso-, N-Nitrosodi-n-butylamine	42,120	T	D80, T01, S01, S02, T02	
U173	Ethanol, 2,2'-(nitrosoimino)bis-, N-Nitrosodiethanolamine	42,120	T	D80, T01, S01, S02, T02	
U174	Ethanamine, N-ethyl-N-nitroso-, N-Nitrosodiethylamine	42,120	T	D80, T01, S01, S02, T02	
U176	N-Nitroso-N-ethylurea, Urea, N-ethyl-N-nitroso-	42,120	T	D80, T01, S01, S02, T02	
U177	Urea, N-methyl-N-nitroso-, N-Nitroso-N-methylurea	42,120	T	D80, T01, S01, S02, T02	
U178	Carbamic acid, methylnitroso-, ethyl ester, N-Nitroso-N-methylurethane	42,120	T	D80, T01, S01, S02, T02	
U179	N-Nitrosopiperidine, Piperidine, 1-nitroso-	42,120	T	D80, T01, S01, S02, T02	
U180	N-Nitrosopyrrolidine, Pyrrolidine, 1-nitroso-	42,120	T	D80, T01, S01, S02, T02	
U181	Benzenamine, 2-methyl-5-nitro-, 5-Nitro-o-toluidine	42,120	T	D80, T01, S01, S02, T02	
U182	Paraldehyde, 1,3,5-Trioxane, 2,4,6-trimethyl-	42,120	T	D80, T01, S01, S02, T02	
U183	Benzene, pentachloro-, Pentachlorobenzene	42,120	T	D80, T01, S01, S02, T02	
U184	Ethane, pentachloro-, Pentachloroethane	42,120	T	D80, T01, S01, S02, T02	
U185	Benzene, pentachloronitro-, Pentachloronitrobenzene (PCNB)	42,120	T	D80, T01, S01, S02, T02	
U186	1-Methylbutadiene, 1,3-Pentadiene	42,120	T	D80, T01, S01, S02, T02	
U187	Acetamide, N-(4-ethoxyphenyl)-, Phenacetin	42,120	T	D80, T01, S01, S02, T02	
U188	Phenol	42,120	T	D80, T01, S01, S02, T02	
U189	Sulfur phosphide, Phosphorus sulfide	42,120	T	D80, T01, S01, S02, T02	
U190	1,3-Isobenzofurandione, Phthalic anhydride	42,120	T	D80, T01, S01, S02, T02	
U191	2-Picoline2-methyl-, Pyridine, 2-methyl-	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U192	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-, Pronamide	42,120	T	D80, T01, S01, S02, T02	
U193	1,2-Oxathiolane, 2,2-dioxide, 1,3-Propane sultone	42,120	T	D80, T01, S01, S02, T02	
U194	n-Propylamine, 1-Propanamine	42,120	T	D80, T01, S01, S02, T02	
U196	Pyridine	42,120	T	D80, T01, S01, S02, T02	
U197	2,5-Cyclohexadiene-1,4-dione, p-Benzoquinone	42,120	T	D80, T01, S01, S02, T02	
U200	Reserpine, Yohimban-16-carboxylic acid, 11,17-dimethoxy-18- [(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester, (3be- ta,16beta,17alpha,18beta,20alpha)-	42,120	T	D80, T01, S01, S02, T02	
U201	1,3-Benzenediol, Resorcinol	42,120	T	D80, T01, S01, S02, T02	
U202	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide, & salts, Saccharin, & salts	42,120	T	D80, T01, S01, S02, T02	
U203	1,3-Benzodioxole, 5-(2-propenyl)-, Safrole	42,120	T	D80, T01, S01, S02, T02	
U204	Selenium dioxide, Selenious acid	42,120	T	D80, T01, S01, S02, T02	
U205	Selenium sulfide, Selenium sulfide SeS_2	42,120	T	D80, T01, S01, S02, T02	
U206	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-...carbonyl]amino]-, Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-, D-, Streptozotocin	42,120	T	D80, T01, S01, S02, T02	
U207	Benzene, 1,2,4,5-tetrachloro-, 1,2,4,5-Tetrachlorobenzene	42,120	T	D80, T01, S01, S02, T02	
U208	Ethane, 1,1,1,2-tetrachloro-, 1,1,1,2-Tetrachloroethane	42,120	T	D80, T01, S01, S02, T02	
U209	Ethane, 1,1,2,2-tetrachloro-, 1,1,2,2-Tetrachloroethane	42,120	T	D80, T01, S01, S02, T02	
U210	Ethene, tetrachloro-, Tetrachloroethylene	42,120	T	D80, T01, S01, S02, T02	
U211	Carbon tetrachloride, Methane, tetrachloro-	42,120	T	D80, T01, S01, S02, T02	
U213	Furan, tetrahydro-, Tetrahydrofuran	42,120	T	D80, T01, S01, S02, T02	
U214	Acetic acid, thallium(1+) salt, Thallium(I) acetate	42,120	T	D80, T01, S01, S02, T02	
U215	Carbonic acid, dithallium(1+) salt, Thallium(I) carborate	42,120	T	D80, T01, S01, S02, T02	

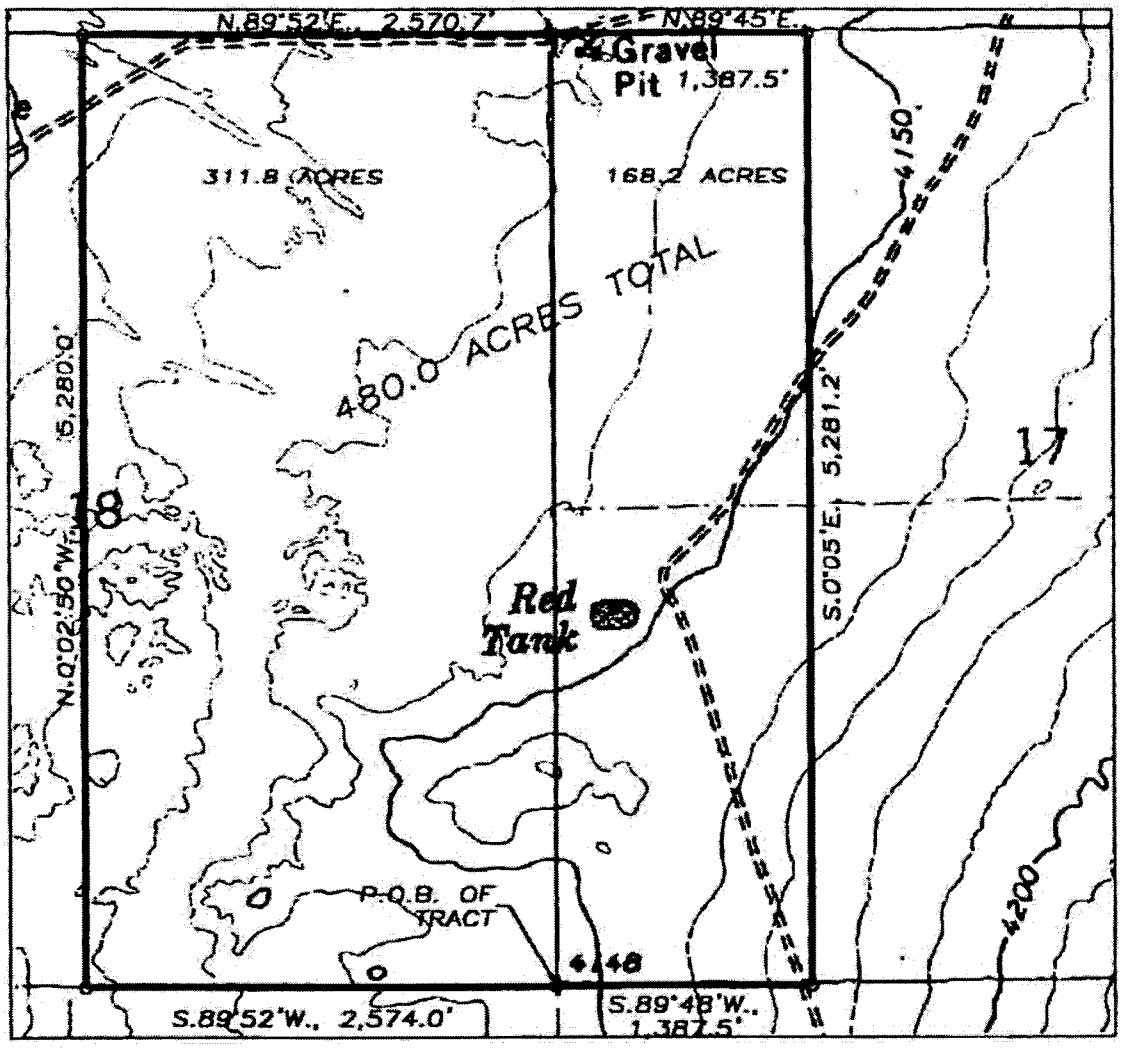
XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U216	Thallium(I) chloride, Thallium chloride Tlcl	42,120	T	D80, T01, S01, S02, T02	
U217	Nitric acid, thallium(1+) salt, Thallium(I) nitrate	42,120	T	D80, T01, S01, S02, T02	
U218	Ethanethioamide, Thioacetamide	42,120	T	D80, T01, S01, S02, T02	
U219	Thiourea	42,120	T	D80, T01, S01, S02, T02	
U220	Benzene, methyl-, Toluene	42,120	T	D80, T01, S01, S02, T02	
U221	Benzenediamine, ar-methyl-, Toluenediamine	42,120	T	D80, T01, S01, S02, T02	
U222	Benzenamine, 2-methyl-, hydrochloride, o-Toluidine hydrochloride	42,120	T	D80, T01, S01, S02, T02	
U223	Benzene, 1,3-diisocyanatomethyl-, Toluene diisocyanate	42,120	T	D80, T01, S01, S02, T02	
U225	Bromoform, Methane, tribromo-	42,120	T	D80, T01, S01, S02, T02	
U226	Ethane, 1,1,1-trichloro-, Methyl chloroform	42,120	T	D80, T01, S01, S02, T02	
U227	Ethane, 1,1,2-trichloro-, 1,1,2-Trichloroethane	42,120	T	D80, T01, S01, S02, T02	
U228	Ethene, trichloro-, Trichloroethylene	42,120	T	D80, T01, S01, S02, T02	
U234	Benzene, 1,3,5-trinitro-, 1,3,5-Trinitrobenzene	42,120	T	D80, T01, S01, S02, T02	
U235	Tris(2,3-dibromopropyl) phosphate, 1-Propanol, 2,3-dibromo-, phosphate (3:1)	42,120	T	D80, T01, S01, S02, T02	
U236	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl [1,1'-biphenyl]-4,4'-diyl)bis(azo)bis [5-amino-4-hydroxy]-, tetrasodium salt, Trypan blue	42,120	T	D80, T01, S01, S02, T02	
U237	Uracil mustard, 2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chl oroethyl)amino]-	42,120	T	D80, T01, S01, S02, T02	
U238	Ethyl carbamate (urethane), Carbamic acid, ethyl ester	42,120	T	D80, T01, S01, S02, T02	
U239	Benzene, dimethyl-, Xylene	42,120	T	D80, T01, S01, S02, T02	
U240	2,4-D, salts & esters, Acetic acid, (2,4-dichlorophenoxy)-, salts & esters	42,120	T	D80, T01, S01, S02, T02	
U243	Hexachloropropene, 1-Propene, 1,1,2,3,3,3-hexachloro-	42,120	T	D80, T01, S01, S02, T02	

XIV DESCRIPTION OF HAZARDOUS WASTES

EPA CODE	CHARACTERISTIC OR CONTAMINANT	ESTIMATED ANNUAL QUANTITY OF WASTE	UNIT OF MEASURE	PROCESS CODES	PROCESS DESCRIPTION
U244	Thioperoxydicarbonic diamide $[(H_2N)C(S)]_2S_2$, tetramethyl-, Thiram	42,120	T	D80, T01, S01, S02, T02	
U246	Cyanogen bromide (CN)Br	42,120	T	D80, T01, S01, S02, T02	
U247	Methoxychlor, Benzene, 1,1'-(2,2,2-trichloroethylidene)bis [4-methoxy-	42,120	T	D80, T01, S01, S02, T02	
U248	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations of 0.3% or less, Warfarin, & salts, when present at concentrations of 0.3% or less	42,120	T	D80, T01, S01, S02, T02	
U249	Zinc phosphide Zn_3P_2, when present at concentrations of 10% or less	42,120	T	D80, T01, S01, S02, T02	
U328	Benzenamine, 2-methyl-, o-Toluidine	42,120	T	D80, T01, S01, S02, T02	
U353	Benzenamine, 4-methyl-, p-Toluidine	42,120	T	D80, T01, S01, S02, T02	
U359	Ethylene glycol monoethyl ether, Ethanol, 2-ethoxy-	42,120	T	D80, T01, S01, S02, T02	

SECTIONS 17 & 18, TOWNSHIP 11 SOUTH, RANGE 31 EAST, NMPM, CHAVES COUNTY, NEW MEXICO.



DESCRIPTION:

A 480.0 ACRE TRACT OF LAND LOCATED IN SECTIONS 17 & 18, TOWNSHIP 11 SOUTH, RANGE 31 EAST, NMPM, CHAVES COUNTY, NEW MEXICO AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

BEGINNING AT THE POINT OF BEGINNING OF SAID TRACT A POINT BEING THE SOUTH COMMON CORNER BETWEEN SAID SECTION 17 & 18 (SOUTHEAST CORNER OF SAID SECTION 18 AND THE SOUTHWEST CORNER OF SAID SECTION 17); THENCE S.89°52'W., 2,574.0 FEET ALONG THE SOUTH SECTION LINE OF SAID SECTION 18; THENCE N.0°02'50"W., 5,280.0 FEET TO THE NORTH SECTION LINE OF SECTION 18; THENCE N.89°52'E., 2,570.7 FEET, ALONG THE NORTH SECTION LINE OF SECTION 18 TO THE NORTH COMMON CORNER BETWEEN SAID SECTIONS 17 & 18; THENCE N.89°45'E., 1,387.5 FEET ALONG THE NORTH SECTION LINE OF SECTION 17; THENCE S.0°05'E., 5,281.2 FEET TO THE SOUTH SECTION LINE OF SECTION 17; THENCE S.89°48'W., 1,387.5 FEET ALONG THE SOUTH SECTION LINE OF SECTION 17, BACK TO THE POINT OF BEGINNING OF SAID TRACT, DESCRIBING 480.0 ACRES, MORE OR LESS.

1000' 0 1000' 2000'

Scale 1" = 50'

THE PREPARATION OF THIS PLAT AND THE PERFORMANCE OF THE SURVEY UPON WHICH IT IS BASED WERE DONE UNDER MY DIRECTION AND THE PLAT ACCURATELY DEPICTS THE RESULTS OF SAID SURVEY AND MEETS THE REQUIREMENTS OF THE STANDARDS FOR LAND SURVEYS IN NEW MEXICO AS ADOPTED BY THE NEW MEXICO STATE BOARD OF REGISTRATION FOR PROFESSIONAL ENGINEERS AND LAND SURVEYORS.

3640

HERSCHEL L. JONES SR. L.S. No.3840

GENERAL SURVEYING COMPANY P.O. BOX 1928
LOVINGTON, NEW MEXICO 88260

GANDY — MARLEY INC.

A 480.0 ACRE TRACT OF LAND LOCATED IN SECTIONS 17 & 18, TOWNSHIP 11 SOUTH, RANGE 31 EAST, NMPM, CHAVES COUNTY, NEW MEXICO.

Survey Date: 7/20/2000	Sheet 1 of 1 Sheets
Drawn By: Ed Blevins	W.O. Number
Date: 7/22/00	Scale 1" = 1000' GANDY

Permit Renewal Application
October 17, 2011

Part B Application

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March 2002

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List of Acronyms

ALR	action leakage rate
ANOVA	analysis of variance
ASTM	American Society for Testing and Materials
AUY	animal unit year-long
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CQA	Construction Quality Assurance
DOT	U.S. Department of Transportation
EC	emergency coordinator
EPA	U.S. Environmental Protection Agency
gpad	gallons per acre per day
HAS	health and safety
HDPE	high-density polyethylene
HELP	Hydrological Evaluation of Landfill Performance
FIRMB	Hazardous and Radioactive Materials Bureau
HSWA	Hazardous and Solid Waste Amendments
LCRS	leachate collection and removal system
LDRs	land disposal restrictions
LDRS	leak detection and removal system
MSDS	Material Safety Data Sheet
MTR	Minimum Technology Requirements
NFPA	National Fire Protection Association
NMED	New Mexico Environment Department
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center
OCD	Oil Conservation Division
OJT	on-the-job training
ONA	Outstanding Natural Area
OSHA	Occupational Safety and Health Administration
PA	public address
PCB	polychlorinated biphenyl
PMO	preventive maintenance order
PPE	personal protective equipment
ppm	parts per million
ppmw	parts per million by weight
PQL	practical quantitation limit
QA/QC	quality assurance/quality control

RFA	RCRA Facility Assessment
RCRA	Resource Conservation and Recovery Act
SCBA	self contained breathing apparatus
SWMU	Solid Waste Management Unit
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TDS	total dissolved solids
TOC	total organic carbon
TSCA	Toxic Substances Control Act
USGS	U.S. Geological Survey
VZMS	vadose zone monitoring system

1. General Facility Standards

This section provides a general description of the Triassic Park Waste Disposal Facility (the Facility), including waste management practices, site environment and climate, location information, emergency management, and traffic patterns.

1.1 General Description

The Facility will be a full-service Resource Conservation and Recovery Act (RCRA) Subtitle C waste disposal operation. The Facility will be located in southeastern New Mexico on approximately 480 acres of privately owned land in Chaves County, New Mexico (Figure 1-1). By road, this location is approximately 43 miles east of Roswell and 36 miles west of Tatum, as shown on Figure 1-2.

All waste placed in the Facility will meet land disposal restrictions (LDRs) prior to disposal. The Facility will accept polychlorinated biphenyl (PCB) wastes that are not regulated by Toxic Substances Control Act (TSCA); that is, only PCB wastes at concentrations of less than 500 parts per million (ppm) for bulk PCB remediation waste.

1.1.4 Land Disposal

A landfill will be utilized for the disposal of waste that meets LDRs. Support units and structures include a chemical laboratory, administration building, weigh scale area, maintenance shop, clay processing area, clay liner material stockpiles, daily cover stockpiles, and a stormwater detention basin.

Because the Facility has not yet been constructed or operated, there are no solid waste management units (SWMUs) at this time. Satellite and/or 90-day accumulation areas may possibly be located at the chemical laboratory and the maintenance shop. Other areas at the Facility that may be designated as SWMUs include the untarping, sampling, and weigh scales area, the truck staging area, and the stormwater retention basin. Detailed information on location, unit type and dimensions, and a structural description of these units is provided in the design of the Facility contained in Permit Attachments L, L1, L2 (Engineering Report and attachments) and M (Construction Quality Assurance Plan).

1.1.5 Facility Name

Gandy Marley, Inc. (GMI) owns the Facility. The waste disposal operations covered by this permit will operate under the name of the Triassic Park Waste Disposal Facility.

1.1.6 Facility Contact

Larry Gandy, Vice President.
Gandy Marley, Inc.
P.O. Box 1658
Roswell, New Mexico 88202
575-347-0434

1.1.7 Facility Address

P.O. Box 1658
Roswell, New Mexico 88202

1.1.8 Purpose of Facility

The purpose of the Facility will be the permanent disposal of hazardous wastes in a manner protective of human health and the environment. Wastes that do not meet LDRs will not be accepted for placement into the landfill. Infectious wastes and radioactive wastes will be prohibited at this Facility. The Waste Analysis Plan (Permit Attachment F) contains more details regarding wastes that can be accepted at the Facility and wastes that are prohibited.

1.1.9 Facility Location

The Facility will be located in southeastern New Mexico on approximately 480 acres of privately owned land in Chaves County, New Mexico, Sections 17 and 18 of R31E, T11S (Figure 1-1). By road, this location is approximately 43 miles east of Roswell and 36 miles west of Tatum, as shown on Figure 1-2. The only major road in the vicinity is U.S. Highway 380, which runs east and west approximately 4 miles north of the proposed site. State Highway 172, which runs north and south, is approximately 4 miles east of the proposed site. State Highway 172 is not a major thoroughfare and does not provide access to the proposed site.

1.1.10 Hazardous Waste Generation

Some hazardous waste will be generated as a result of normal Facility operations. Various support operations will likely generate such wastes. Examples of typical hazardous waste forms likely to be generated during normal Facility operations include solvents, oils, acids and bases, laboratory chemicals and equipment, paint and paint strippers, sludges, solvent contaminated solids, and personal protective equipment (PPE). Non-recyclable hazardous wastes, excluding liquids, will be disposed of on-site in accordance with the requirements outlined in Section 4.5.6 of the Waste Analysis Plan (Permit Attachment F). Any waste not meeting LDRs will be managed through off-site disposal at a facility permitted to accept the material..

1.1.11 Sanitary Waste Generation

Sanitary liquid wastes will be generated in most Facility buildings. This waste form consists primarily of shower water, janitorial wastes, rest room wastes, and liquid wastes generated from cleaning operations. Non-hazardous liquid wastes will be managed as sewage and disposed of off-site.

1.1.12 Non-Hazardous Refuse Generation

Non-hazardous municipal solid waste (MSW) and construction and demolition (C&D) waste will be generated during building and normal operations at the Facility. These wastes will include such things as cardboard packing containers, garbage, paper refuse, and construction debris. Collection, transportation, and disposal of non-recyclable waste will be contracted to a MSW and C&D waste disposal company. Recyclable wastes, such as office paper, will be sent off-site for usable materials recovery. The disposal of non-routine waste materials will be administratively controlled on a case-by-case basis in accordance with applicable regulatory requirements.

1.2 Site Environment and Climate

The selected site for the Facility is on the western edge of a geological bench known locally as the Caprock. The Caprock is characterized by rocky terrain which runs north and south. Detailed information about the geologic characteristics of the site is contained in Section 3.

The site is approximately 4,150 feet above sea level. Climatic conditions of the area are typical of semiarid regions and are characterized by dry, warm winters with minimal snow cover and hot, somewhat moister summers. The frost-free season averages from 190 to 215 days per year. The mean annual soil temperature ranges from 59 to 65 degrees Fahrenheit (°F). The average annual precipitation rate for Roswell for a 118-year record of data from 1894 to 2011 is 11.6 inches per year. Winter precipitation usually consists of occasional snowfall from November through April. Snowfall typically melts within a short period of time. Most precipitation (approximately 80 percent of the annual total) occurs between June and September.

Normally, two-thirds of the summer days reach temperatures in excess of 90°F, with maximum temperatures commonly 100°F or higher. Night temperatures during the winter months commonly fall below freezing, occasionally reaching below 0°F. Moderate temperatures are typical at the Facility throughout the year, with annual average high and low temperatures of 75°F and 45°F, respectively.

The prevailing wind is from the south. Winds of up to 40 miles per hour are common during the spring and in association with summer thunderstorms.

Area vegetation consists primarily of Tobosa, Buffalo Grass, Vine-Mesquite, Mesquite, Cactus, Sand Dropseed, Little Bluestem, Sand Bluestem, Sandbur, Three-Awn, Shinnery Oak, Yucca, and Sand Sagebrush. According to the New Mexico Forestry and Resources Conservation Division of the State Department of Energy, Minerals, and Natural Resources, there are no rare or endangered plant species located in either Section 17 or 18.

According to the Bureau of Land Management (BLM) - Roswell Resource Area, there are 54 bird species, 33 species of mammals, and 36 species of reptiles and amphibians in what is designated as the Caprock Wildlife Habitat Area. The Facility location is within that wildlife habitat designation.

Pursuant to the United States Endangered Species Act, there are 35 listed and sensitive species in Chaves County and 17 species of concern, which are identified for planning purposes only. As of February 28, 1996, the ferruginous hawk (*Buteo regalis*) is no longer listed as a candidate species but does remain a species of management concern.

The sand dune lizard (formerly the sand dune sagebrush lizard) (*Scelopurus graciosus arenicolous*) and the lesser prairie chicken are currently listed as candidate species. In 2008, the U.S. BLM adopted a Special Status Resource Management Plan for both the sand dune lizard and the lesser prairie chicken.

GMI will continue to monitor the existence of threatened or endangered species in the area. Should any threatened or endangered species be identified within the Facility area, GMI will take measures to ensure that these species are protected. GMI will implement protective measures for the wildlife population in the area, including the use of restrictive fencing around the operational portions of the Facility.

1.3 Location Information

A topographic map of the site has been developed from a 1997 aerial photograph and U.S. Geological Survey (USGS) 7.5 minute series map (Mescalero Point, New Mexico, 1973) and is presented in Drawing 3 (Permit Attachment L1). This drawing illustrates Facility boundaries, access roads, access control locations, internal roads, and site fences. The Facility layout is presented as Drawing 4 (Permit Attachment L1) of this Permit Application.

The site is located in eastern Chaves County, in an area that has historically been utilized primarily as range land for livestock grazing and for limited oil and gas activities. The residence nearest the site is owned by Marley Ranches, Ltd. and is located approximately 2.9 miles to the east-southeast. Land ownership for a

4-mile radius around the site is shown in Figure 1-1. All of the residences within a 10-mile radius of the site are listed in Figure 1-3.

The site will encompass 480 acres and will be enclosed by a 3-strand barbwire fence. Gates to the same height as the perimeter fence will be constructed. The area will be secured and monitored so that only authorized personnel or personnel being accompanied and supervised by authorized personnel are allowed on-site. Employees responsible for site security will be present at all times to prevent unauthorized entry and to report unusual events and/or emergencies. Site security personnel will be responsible for conducting regular inspections and routine maintenance of the perimeter area (see Section 5).

Land use plans and/or zoning maps have not been developed for Chaves County. All areas within the county, except those within municipal boundaries, are designated as Zone A (agricultural). The eastern half of the county is further designated as Area 1 and the western half as Area 2. Area 1 and Area 2 are zoning Land Use Areas, whose boundaries have been determined by a joint-powers agreement between the Board of Chaves County Commissioners and the Roswell City Council. Existing uses in Area 1 are livestock grazing, mineral exploration and production, wildlife habitat, and extensive recreation. Single-family dwellings require permits in Area 1. Area 2 covers an important part of the recharge area of the Roswell Artesian Basin. Existing uses in Area 2 are livestock grazing, mineral exploration and production, extensive recreation, wildlife habitat, and flood control structures and floodways. Any new parcels created in the area must be 5 acres or larger.

Approximately 2 miles northwest of the Facility location, the Mescalero Sands recreational "complex" has been established for use by off-road vehicles. The South Dunes area of Mescalero Sands has been designated as an "Outstanding Natural Area" (ONA) and is utilized by the public primarily for wildlife observation activities.

The land in the area of the Facility is used predominantly for grazing cattle and to a much lesser extent for oil and gas exploration activities. The nearest production well is 3 miles from the site. Additional information about the drilling activities in the area is contained in Section 3 of this document.

All abandoned wells in the area have been plugged in accordance with New Mexico Oil Conservation Division (OCD) regulations. These regulations require the use of mud-laden fluids, cement, and plugs in the well "in a way to confine crude petroleum oil, natural gas, or water in the strata in which it is found and to prevent it from escaping into other strata." Surface reclamation of abandoned wells prevents surface water from entering and contaminating subsurface strata.

1.3.1 Flood Plain Information

Sections 17 and 18, T11S, R31E are included on Federal Insurance Rate Map 35005C1775D. This map has not been printed because this is a non-participating community, a status that generally indicates that the area is an area of minimal flood hazard. This information was originally provided to GMI by the Director of Planning and Environmental Services, Chaves County, New Mexico, and was confirmed with the National Flood Insurance Program at their website, www.msc.fema.gov on October 11, 2011.

To confirm that the Facility is an area of minimal flood hazard, stormwater runoff calculations were performed to determine whether the site falls within the flood plain of a 100-year, 24-hour storm event. Based on information in the Precipitation Frequency Atlas published by the National Oceanic and Atmospheric Association, a rainfall amount of 5.75 inches was used in the calculations. The nearest drainage to the site was determined from the USGS 7 5-minute series topographic map of the Mescalero Point Quadrangle (see Section 3.0). This drainage flows westerly from Mescalero Point, which is approximately 0.75 mile south of the site.

Stormwater runoff flows were calculated for the area using the Rational Method (see Appendix F-3 in Volume VI of the Permit Application dated October 2000). A runoff coefficient of 0.3 was used in the calculations. It was determined that the maximum flow could be accommodated in a triangular channel with a width of 78 feet at a water depth of 1.2 feet. It may be concluded from this calculation that a flood plain does not exist for the drainage and that there are no flood plains within 1 mile of the site. It may be further concluded that flood plain regulations are not applicable to this Facility.

1.3.2 Fire Control and Emergency Response

Fire control and emergency response will be the responsibility of the Emergency Coordinator (EC) who is on call or duty at the time of an incident. Each EC will be trained to handle emergencies and to notify appropriate authorities (see Section 7.0). Each EC will have the authority to commit resources necessary to implement the site Contingency Plan described in Section 6.

In addition to on-site emergency response capabilities, cooperative agreements will be established with local emergency response organizations in surrounding communities to respond to and assist in any emergencies that arise at the Facility (see Section 6).

1.4 Traffic Patterns

The flow of traffic within the Facility boundary will not be significant except during shift changes. The number of employee vehicles will not be substantial enough to require elaborate signage or other traffic control systems. All personnel will be given written instructions that will caution them to be alert to other vehicles and pedestrians. Each vehicle must enter and exit through the security gate at the northeast comer of the perimeter of the Facility boundary. Drawing 26, Sheet 2 in Permit Attachment L1 illustrates traffic flow patterns for the operations and waste processing area, traffic control signage and truck staging areas.

1.4.1 Traffic Control

Access to the Facility will be gained through the security gate at the northeast comer of the perimeter fence (see Drawing 26, Sheet 2 in Permit Attachment L1). Authorization to enter the Facility will be verified for each vehicle. Visitors will be required to sign in at the guard shack and will be escorted while on-site unless other arrangements are made with the Facility. Only authorized persons will be allowed past the security gate guard shack.

1.4.2 On-Site Transportation of Wastes

All trucks transporting wastes will be stopped at the security gate prior to entering the Facility. Security personnel will record the license number, transportation company, arrival time, and other pertinent information with regard to the vehicle and driver.

After being granted access to the Facility through the security gate entrance, waste transport vehicles will be directed to the untarping/sampling area. Here, a sample of the waste will be collected for fingerprint testing, along with the shipment manifest and other pertinent documentation. While the sample is being analyzed at the chemical laboratory, the truck will be directed to the weigh scales and finally to the truck staging area. The truck will remain at the staging area until laboratory analysis verifies that the waste meets acceptance criteria and the waste characteristics are consistent with profile information from the shipment manifest.

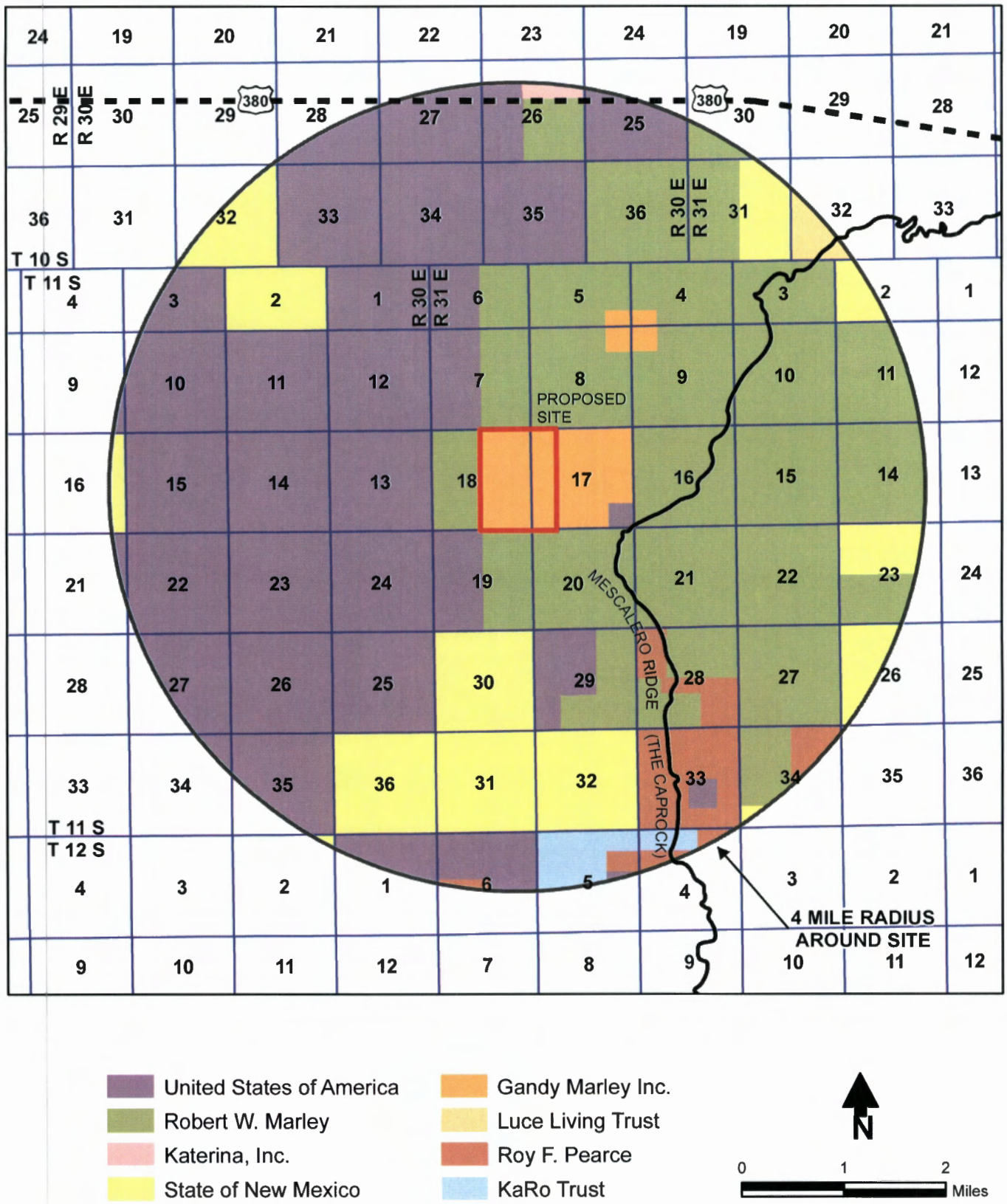
Following determination that waste acceptance criteria have been met, the truck will be directed to the landfill, where the waste will be placed in the landfill for permanent disposal.

1.4.3 Routes

Transporters must use U.S. Highway 380 to reach the Facility. U.S. Highway 380 runs east and west between Roswell and Tatum, New Mexico as shown in Figure 1-2.

1.5 Remainder of Permit Renewal Application

The remainder of the Permit Renewal Application discusses disposal; groundwater protection; Facility design; waste analysis; procedures to prevent hazards; contingency plan; personnel training; closure; waste minimization; corrective action; and organic air emissions. A list of references used for the preparation of this application is also provided.



LAND OWNERSHIP WITHIN 4 MILE RADIUS

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 1-1

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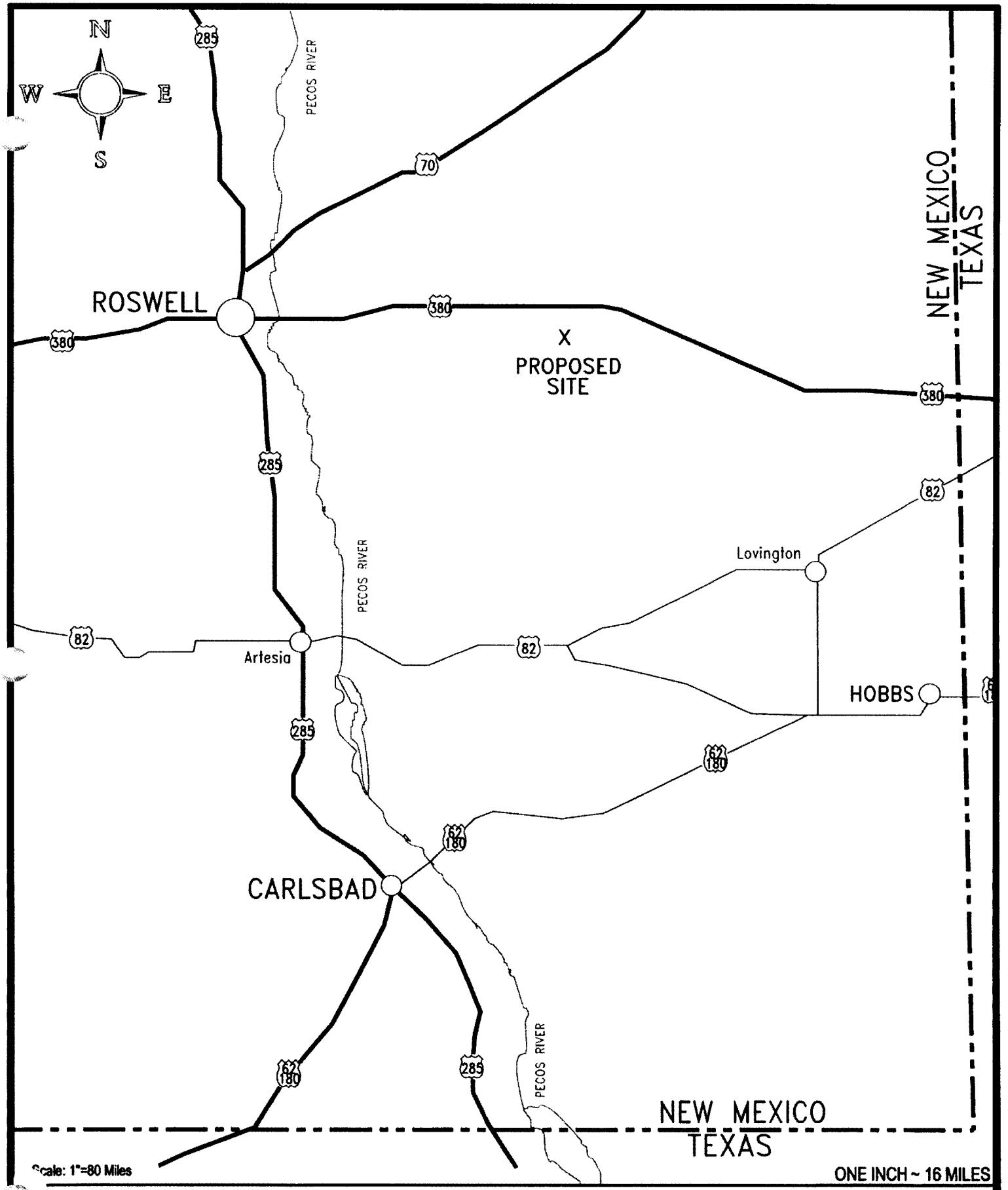

SITE LOCATION MAP

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 1-2

OWNER	DISTANCE	DIRECTION
Marley Ranch	Approximately 2.9 Miles	East-Southeast
Bill Kolb, Jr. - KOBR TV Towers	Approximately 4.5 Miles	East
KOBR TV - Two Dwellings (Vacant 20+ Years)	Approximately 4.5 Miles	East
Pearce Ranch	Approximately 4.5 Miles	Southeast
Sand Ranch (Vacant 10+ Years)	Approximately 6.3 Miles	Northeast
Jack Luce Ranch	Approximately 6.5 Miles	Northeast
Pearce Ranch	Approximately 7 Miles	West
Perry Dean Goff Ranch	Approximately 7 Miles	East-Southeast
Sand Ranch	Approximately 7.2 Miles	Northwest
Jackie & Cindy Reynolds	Approximately 7.9 Miles	Southeast
Luce Ranch and Store	Approximately 8 Miles	Northeast
Tivis Ranch	Approximately 8.2 Miles	Southeast
Johnson Ranch	Approximately 9.7 Miles	Northeast

RESIDENCES WITHIN A TEN MILE RADIUS

Figure 1-3

TRIASSIC PARK WASTE DISPOSAL FACILITY

AutoCAD FILE: GANDY-FIG1-3

2. Disposal Process

This section provides a general description of the disposal process for the Facility. Detailed design drawings and associated engineering reports are contained in Permit Attachments L, Engineering Report, and L1, Engineering Drawings. The drawings and specifications present final designs for the RCRA permitted landfill. Details on the non-RCRA components of the Facility will be supplemented during the bidding and construction phase. GMI will supply the additional details on the non-RCRA components of the design to the New Mexico Environment Department (NMED) for review and approval prior to the start of construction.

2.1 Facility Overview

An overview of the Facility layout is provided in Permit Attachment L1, Drawing 4, and identifies areas to be used for waste acceptance, waste receiving, and waste disposal activities at the Facility. Each activity is described below.

2.1.1 Facility Waste Acceptance

Prior to initiation of a shipment of waste to the Facility, the generator of the waste must provide a full characterization of its waste and receive approval from the Facility to ship the waste. This process is more completely described in the Waste Analysis Plan presented in Section 4. The Facility will use the waste characterization data to perform the following activities:

- ensure that the waste can be accepted in accordance with the RCRA permit;
- verify that the Facility has the capability to properly dispose of the waste;
- identify any safety precautions that must be taken to properly manage the waste;
- use the physical characteristics and chemical composition of the waste to determine whether the waste may be accepted for disposal;
- select parameters to be tested upon arrival at the Facility to verify that the waste accepted is the waste characterized; and
- develop a cost estimate for disposal.

2.1.2 Waste Receiving

Once approved for acceptance at the Facility, the waste can be shipped. The Facility can be accessed only from New Mexico State Highway 380, as shown in Figure 1-2. When a shipment arrives at the Facility, a Facility representative will verify that the shipment was scheduled. If unscheduled shipments arrive at the Facility, the Facility manager will be consulted to determine if the appropriate paperwork has been received and the shipment can be accepted.

The shipment and shipping papers will be inspected to ensure that the correct inventory has been received, that the hazardous waste manifest is properly completed, and that an LDR certification is attached. Any discrepancies will be resolved prior to acceptance of the shipment. If discrepancies cannot be resolved, the shipment will be rejected. Representative samples of the waste will be taken and fingerprint testing will be conducted. Fingerprint testing is described in Section 4.5 of the Waste Analysis Plan. If the fingerprint test results are inconsistent with the generator's information, several actions can be taken (see Section 4.5). Waste

will be received only if fingerprint tests are consistent with information provided by the waste generator. Containers and drums will be inspected for visible cracks, holes or gaps.

2.1.5 Waste Disposal

Wastes arriving at the Facility that meet LDRs and contain no free liquids will be directly landfilled. When wastes are unable to be directly landfilled, such as during landfill equipment maintenance periods or extreme weather conditions, the waste will not be unloaded and will be temporarily stored in the truck staging area.

An access ramp will be constructed from the top of the landfill to the bottom of the active portion of the landfill (see Drawings 8 and 14 in Permit Attachment L1). Bulk hazardous wastes will be placed and compacted on the bottom of the landfill in 5- to 10-foot layers or lifts. Containers (drums) will be placed upright in the cell using a forklift or barrel snatcher. Sufficient space will be left around the containers for the placement and compaction of compatible bulk hazardous wastes or soil. Materials in roll-off containers will be dumped with the bedliners at preselected locations. Containers or bulk waste can be placed adjacent to the roll-off material. A layer of cover soil sufficient to prevent wind dispersal of waste will be placed over the bulk hazardous wastes and containers following emplacement or before the end of each working day (see Section 2.5.1.7). The soil cover will be deposited on top of the waste placement face and then spread and compacted with a landfill compactor or tracked bulldozer. The minimum cover thickness will be 0.5 foot.

The landfill will be laid out in an engineered grid system consisting of blocks that are 50 feet wide, 50 feet in length, and 10 feet in depth. Grid stakes will be established by survey. A two-dimensional grid system along with lift elevation designation will provide a three-dimensional record of the location of all wastes placed in the landfill. Records of the location, date of placement, waste source, manifest, and profile numbers will be maintained at the Facility.

2.5 Landfill

This section describes the design, construction, and operation of the landfill. The detailed design for the landfill is contained in Permit Attachments L, Engineering Report, and L1, Engineering Drawings. The overall landfill will be constructed in phases, as shown on Drawing 4. The first phase to be considered will be Phase 1A. This permit application refers only to Phase 1A. However, potential expansions of the landfill in future phases have been included in the general layout drawing for completeness. Detailed design drawings (Permit Attachment L1) are only submitted for Phase 1A. The landfill design is presented on Drawings 6 through 27, and a list of these drawings is provided on Drawing 1, Sheet 2.

2.5.1 Design of Landfill

The landfill design specifies a double-lined landfill with a leachate collection and removal system (LCRS) above the primary liner and a leak detection and removal system (LDRS) between the primary and secondary liners. The detailed design specifically describes the relationship between the existing site topography and the landfill subgrade.

2.5.1.1 Nature and Quantity of Waste

As specified in the Waste Analysis Plan in Section 4, the Facility will accept RCRA hazardous waste and PCB waste, excluding selected waste. The excluded waste is listed in the Waste Analysis Plan (Section 4).

The wastes that will be accepted for placement in the landfill include all wastes listed in the Part A Permit Application. All waste to be placed in the landfill must meet LDR treatment standards. Additional details on wastes to be accepted at the Facility can be found in Section 4.1.1, Waste Analysis Plan.

The total landfill will have an area of approximately 100 acres and a capacity of approximately 10 million cubic yards of waste. The Phase 1A area will include approximately 35 acres (estimated final cover area) and have a capacity of approximately 553,200 cubic yards.

2.5.1.2 Liner Systems

The liner system will be installed to cover all surrounding earth that may come in contact with waste or leachate (see Drawings 9 and 11 in Permit Attachment L1). The primary liner system will consist of, from top to bottom, a 2-foot layer of protective soil, a geocomposite drainage layer, and a HDPE geomembrane liner. The secondary liner system will consist of a geocomposite drainage layer, HDPE geomembrane liner, geosynthetic clay layer (GCL), and 6 inches of prepared subgrade. Both the primary and secondary liner systems will extend over the floor and slope areas of the landfill

The primary and secondary geomembrane liners will be constructed of HDPE as defined in the construction specifications. This material will have sufficient strength and thickness to prevent failure as a result of pressure gradients, physical contact with waste or leachate, climatic conditions, stress of installation, and stress of daily operations. The liner systems and geosynthetic drainage layers will rest upon a prepared subgrade capable of providing support to the geosynthetics and preventing failure due to settlement, compression, or uplifting.

Initially, the Phase 1A liner system will be installed. As authorized in future permits, the liner system will be installed in stages as the landfill expands both in the vertical direction up slope and in the horizontal direction by phase. The three horizontal phases of landfill expansion are shown in Drawings 4, 6 and 7 in Permit Attachment L1. The benching technique considered for expansion of the landfill vertically up slope is shown in Drawings 8 through 11 (Permit Attachment L1) for Phase 1A. Geosynthetic liner component tie-ins for the vertical expansion will be made on the access ramps leading into the landfill.

Stresses to the liner system can result from consolidation settlement of the subgrade during waste filling and localized equipment loading during protective soil placement. The subgrade consists of the 6 inch thickness of prepared soil subgrade and the existing ground formations below the landfill (see Drawing 7, Permit Attachment L1). Because the existing ground formations have been prestressed by overburden forces prior to landfill excavation, additional consolidation settlement during waste filling will be minimal.

Consolidation settlement of the 6 inch prepared soil subgrade layer will also be minimal because it is limited by the thickness of this layer and because this material will be compacted during installation. Localized equipment loading to the liner during protective soil placement will be controlled by specifying maximum equipment ground pressures in the construction specifications and by monitoring the placement of this material. Monitoring can be performed by individuals operating the placement equipment or by grade checkers who will observe the material placement to assure that appropriate thicknesses have been installed.

2.5.1.3 Leachate Collection and Removal System (LCRS)

The LCRS will be located above the primary liner system. Drawing 12 in Permit Attachment L1 provides the design details of the LCRS. A filtered LCRS layer consisting of a geocomposite drainage material will be constructed. Within the floor area of the LCRS layer will be the primary leachate collection piping, which is used to remove leachate from the landfill during the active life and post-closure care period. The piping as shown in Drawing 12 is nominally 8 inches in diameter.

As demonstrated in the engineering report (Permit Attachment L), the LCRS will be (1) constructed of materials that are chemically resistant to the waste managed in the landfill and the leachate expected to be generated; (2) of sufficient strength and thickness to prevent collapse under pressure exerted by overlying wastes, waste cover material, and equipment used in the landfill; and (3) designed and operated to minimize

clogging during the active life and post-closure care period through selection of an appropriate geotextile for the filtration application.

The LCRS is sloped so that any leachate above the primary liner will drain to the sump. Phase 1A includes one sump as shown in Drawings 8, 15, 16, and 17 (Permit Attachment L1). The sump and liquid removal methods will be of sufficient size to collect and remove liquids from the sump and prevent liquids from backing up into the drainage layer.

The sump will be lined with the same liner system components as elsewhere in the landfill except that the drainage layer will expand to include gravel and a compacted clay liner material beneath the primary and secondary geomembranes in the sump area. Leachate that collects in the sump will be pumped through a pipe to the surface of the landfill where it will be collected in temporary storage tanks.

The leachate storage tanks will be chemically resistant, double lined poly tanks anchored to a concrete crest pad as shown in Sheets 1 and 2 of Drawing 19 (Permit Attachment L1). To prevent overfilling of the tanks, an individual tank will be installed for each landfill phase, and each tank will be equipped with high-level control switches, which will automatically shut down the leachate collection or leak detection sump pumps. In addition, an alarm will be activated that will notify personnel that the system requires maintenance. Pumps will be hard piped to the leachate storage tanks, and flow meters will be installed to monitor leachate pumping from the landfill should a catastrophic tank or pipe failure occur. All piping will be located within the concrete tank pad. The pump control panel will be located inside the tank pad with electrical wiring enclosed in waterproof conduits.

The sump system will provide a method for measuring and recording the volume of liquid removed. Drainage materials will meet the minimum drainage requirements per the specifications. Sump design, filter fabric selection, floor pipe design, pump design, disposal system design, and action leakage rate (ALR) calculations involving removal of leachate flow from a 1-mm^2 hole/acre are discussed in the engineering report (Permit Attachment L). All pumpable liquid in the sump will be removed in a timely manner to prevent the head on the primary liner from exceeding 12 inches.

Leachate will be managed by recirculating the liquid and applying it to the landfill soil cover for enhanced evaporation. A moveable piping and sprinkler system will be used to distribute the water onto the soil cover. Vacuum trucks with spray bars may also be used to apply leachate to the soil cover. Management of leachate has been evaluated through calculations that are provided with the Engineering Report in Permit Attachment L. Calculations show that the leachate generation rate is much less than the potential evaporation rate within the Phase 1A landfill. Management of leachate by recirculation for enhanced evaporation keeps all leachate and potential contaminants within the lined landfill cell.

2.5.1.4 Leak Detection and Removal System (LDRS)

The design of the LDRS is similar to the design of the LCRS. The LDRS will be capable of detecting, collecting, and removing leaks of hazardous constituents through areas of the primary liner during the active life and post-closure care period. A filtered LDRS layer consisting of a geocomposite will be constructed below the primary geomembrane. Within the LDRS layer will be the LDRS piping, which will be used to detect and remove liquid from between the primary and secondary liners. The piping arrangement is shown on Drawing 18 in Permit Attachment L1.

As demonstrated in the engineering report (Permit Attachment L), the LDRS will be (1) constructed with a bottom slope of one percent or more; (2) constructed of a geocomposite with a hydraulic conductivity that exceeds 1×10^{-2} cm/s; (3) constructed of materials that are chemically resistant to the waste managed in the landfill and the leachate expected to be generated; (4) of sufficient strength and thickness to prevent collapse under pressure exerted by overlying wastes, waste cover material, and equipment used at the landfill; and (5) designed and operated to minimize clogging during the active life and post-closure care period.

In addition, the sump and liquid removal methods are designed to be of sufficient size to collect and remove liquid from the sump and prevent liquid from backing up into the drainage layer (see ALR calculations in Permit Attachment J). A method will be provided for measuring and recording the volume of liquid present in the sump and liquid removed. All pumpable liquid in the sump will be removed in a timely manner to maintain the head on the secondary liner at less than 12 inches. The pump for the LDRS sump is located at the sump's low point so that pumpable liquids can be removed to the maximum extent possible.

2.5.1.5 Vadose Zone Monitoring System

The vadose zone monitoring system (VZMS) sump serves as a detection system for potential leakage from the secondary LDRS system. Located directly beneath the LDRS sump, leakage through the secondary liner system will flow into the VZMS sump, allowing it to be detected and removed. The vadose pipe and gravel arrangement is similar to the LCRS and LDRS arrangements. Drawings 16 through 18 (Permit Attachment L1) show the VZMS sump.

2.5.1.6 Run-On/Runoff Control

The run-on/runoff system is designed to be constructed, operated and maintained to control at least the water volume resulting from a 24-hour, 25-year storm. The run-on/runoff control system design is provided in Permit Attachment L. The purpose of the run-on/runoff control system is to prevent any contamination present on-site from migrating off-site by minimizing the volume of liquid entering the landfill and therefore, limiting the potential to transport contaminants placed in the landfill.

Run-on/runoff will be collected in one of three different collection basins, depending on the source of the water. The collection basins are listed and discussed in detail below:

- The Facility Stormwater Detention Basin
- The Phase 1A Landfill Stormwater Collection Basin
- The Phase 1A Landfill Contaminated Water Basin

The Facility Stormwater Detention Basin is located northwest of the landfill area, as shown on Drawings 6 and 25 (Permit Attachment L1). Run-on originating from around the landfill will be directed away from the proposed landfill area using unlined landfill perimeter ditches (see Drawing 25). These ditches will prevent water from outside the landfill from entering the active portion of the landfill Based on the topography of the site, the run-on is expected to move from the east/southeast to the west/northwest and be diverted to the Stormwater Detention Basin. The Stormwater Detention Basin is also intended to collect runoff from the rest of the Facility (not including the landfill) and will be lined with a single 60-mil HDPE liner as a precaution to prevent infiltration of ponded stormwater.

The Phase 1A Landfill Stormwater Collection Basin is located at the toe of the inter-phase cut slope in the landfill, as shown on Drawings 10 and 13 (Permit Attachment L1). This basin will collect runoff from the inactive portion of the Phase 1A landfill. During the initial stages of the landfill operation, runoff from the landfill side slopes above the liner system will be channeled away from the waste by the slope drainage interceptor ditch. The water in the Stormwater Collection Basin will be handled as clean water because it will not come in contact with the landfill waste. The basin is lined with a single 60-mil HDPE liner.

The Phase 1A Landfill Contaminated Water Basin is located at the bottom of the Phase 1A landfill, as shown on Drawing 10. This basin overlies the landfill liner system. The contaminated water basin will be maintained to ensure that the adequate amount of protective cover soil (2 feet) is present over the liner system.

Runoff from the active portion of the landfill, which does not infiltrate into the LCRS, will be collected in the landfill contaminated water basin. Runoff water collected within the contaminated water basin will be managed by pumping the water to remove the standing water in the basin and applying it to the landfill soil cover for enhanced evaporation. A moveable piping and sprinkler system will be used to distribute the water onto the soil cover. Vacuum trucks with spray bars may also be used to apply water to the soil cover. Management of runoff water within the Phase 1A landfill has been evaluated through calculations that are provided with the Engineering Report in Permit Attachment L. Because evaporation rates greatly exceed precipitation rates at the site, runoff water can be removed from the basin and eliminated by enhanced evaporation. Management of runoff water by recirculation for enhanced evaporation keeps all water that has a potential to contact waste within the lined landfill cell.

2.5.1.7 Wind Dispersal Control Procedures

Wind dispersal control will consist of a daily soil cover obtained from excavation. Typically, the daily cover will consist of soil spread on top of the waste placement area to a depth of approximately 0.5 foot.

Depending on the local wind conditions, traffic, and the number of fine particles in the soil cover, dust may be generated from the surface. Typically, this dust generation is reduced by restricting traffic to predetermined haul roads on the surface of the daily cover and applying small amounts of water spray to moisten the soil surface. Water applied for dust control may include clean water supply, leachate, and runoff water collected within the landfill contaminated water basin. The water will be applied using both a piping and sprinkler system and water trucks equipped with a pump, piping, and an array of nozzles that spray very small water droplets onto the soil cover.

The frequency of the water application depends on the climate and traffic. In areas on the daily cover surface where traffic is not present, an occasional water spray will cause a crust to form on the soil surface, inhibiting dust formation. Sufficient moisture will be applied to all soil surfaces, including roads, on an as needed basis to prevent wind erosion of the daily cover. However, the application of water will be limited so that ponding in the landfill does not occur. Because the water is a topical surface application, the majority of it will evaporate or be absorbed rather than seep through the waste to become leachate.

2.5.1.8 Gas Generation Management

The landfill will not receive MSW or C&D waste, limiting the gas generated as a result of biological decomposition of organic wastes. Organic wastes placed in the landfill will meet LDRs, which will limit the organic gas generation potential. The waste acceptance procedures at the Facility will be designed to limit receipt of wastes with potential for significant gas generation. The waste acceptance program is described in Section 4.3 and outlines the procedures that will be used to test for reactive cyanides and sulfides, other reactive chemical groups, waste compatibility, and biodegradability of sorbents.

During the operational phase of the landfill, periodic checks will be made within the landfill to detect the presence of hazardous gases and volatile organics. Surveys of the active landfill surface area and the riser pipes with an organic vapor meter (OVM) or comparable device will be performed quarterly to detect the presence of organic compounds. PPE levels and respiratory protection levels will be modified accordingly, if necessary. This testing will be conducted in addition to the fingerprint testing conducted on incoming waste. The data from both tests will be evaluated to determine what steps are necessary to reduce the generation and/or release of these gases to levels which meet prescribed regulatory air quality standards.

Prior to closure of the landfill, an assessment will be made of the landfill waste gas generating potential. This assessment will be based on review of fingerprint test data and data gathered in the landfill during operations. Based on this assessment, if it is concluded that gas generation may result in gas build-ups beneath the barrier layer of the cover or releases following closure exceeding regulatory air quality standards, then provisions will be made to collect and monitor gas generation and release during the post-closure period. If this occurs, the

latest technology available will be implemented into the construction of the cover system, which may require a modification to the Permit.

2.5.1.9 Cover Design

The design of the final cover is described in Section 8, Closure and Post-Closure of Permitted Units. Additional details of the final cover design are provided in Permit Attachment L of this application.

2.5.1.10 Landfill Location Description

The proposed site is in eastern Chaves County, New Mexico.

Geographic Location

The proposed site is located in a remote, unpopulated portion of New Mexico, approximately 43 miles east of the City of Roswell and 36 miles west of the City of Tatum. The primary land use in the surrounding area is ranching, which will not be impacted by landfill operations.

Geologic Setting

The proposed site is to be developed within impermeable, geologically stable sediments of the Dockum Group of Triassic age (see Section 3.4). The base of the proposed landfill will be designed to rest on 600-foot thickness of unsaturated mudstone of the Lower Dockum. This thick sequence acts as a geologic barrier to potential vertical migration of contaminants. Potential lateral migration through unsaturated Upper Dockum sediments will be retarded by the low permeability of the host sediments (siltstones and mudstones) and engineered barriers such as the liner systems.

2.5.2 Construction

Construction activities will consist of site preparation; excavation and preparation of landfill bottoms and subsurface sides; and construction of the liner, LCRS, and LDRS in accordance with the specifications and Construction Quality Assurance (CQA) Plan. The CQA plan is included as Permit Attachment M.

2.5.2.1 Site Preparation

Existing site drainage will be modified to route any run-on away from the landfill area. Additionally, drainage of the landfill area itself will be modified to route water away from the initial fill area. Access roads and weighing units will be constructed. A fence will also be installed around the Facility. These components and installations are shown in Drawing 4 (Permit Attachment L1).

2.5.2.2 Excavation and Preparation of Landfill Bottom and Subsurface Sides

The landfill will be constructed and excavated in sections to allow a smaller portion of the landfill surface to be exposed to precipitation at any one time. The initial working area of the landfill will be excavated to design depth. The excavated material will be stockpiled on unexcavated soil near the active area for use as cover material. The landfill bottom will be sloped toward the central axis of each phase to provide drainage of leachate to the sump. The U.S. Environmental Protection Agency (EPA) minimum required slope of 1 percent has been exceeded in all cases. The upper 6 inches of the subgrade will consist of a soil material that has been sized, moisture conditioned, compacted, and trimmed to provide a smooth stable surface for geosynthetic material placement.

2.5.2.3 Construction Quality Assurance Plan

The CQA Plan is provided as Permit Attachment M. Implementation of CQA procedures will result in increased leachate collection efficiency and reduced leakage through the landfill liner. Additionally, use of

CQA will result in fewer costly repairs to the landfill after wastes have been received, fewer occasions of exceeding the ALR, and a decreasing need for corrective action.

The CQA Plan describes the CQA procedures for the installation of the soil and geosynthetic components for the hazardous waste landfill, which comprise soils and geosynthetic components constructed at the Facility. These procedures apply to construction of the lining systems and final cover systems, including the LCRS and LDRS.

The objectives of the CQA program include the following:

- development of a clearly defined organizational structure within which the project can be planned and completed;
- assurance that the methods, techniques, and procedures used to collect, analyze, verify, and report data will produce sound, documented, and defensible results;
- assurance that equipment or instrumentation used in field or laboratory testing activities has been properly maintained and calibrated as required;
- assurance that the required documentation of quality performance is properly generated and that such documentation is adequate and complete for the activity;
- development of permanent project CQA document files identifiable and traceable to each activity;
- systematic control of items, equipment, materials, or activities not in conformity with established requirements or methods, and assurance of prompt and effective corrective action when nonconforming conditions are identified;
- regular evaluation of the adequacy of the CQA program by means of quality audits coupled with the effective action necessary to correct deficiencies and prevent recurrence;
- assurance that technical and CQA personnel are qualified and trained to perform the work activities to which they have been assigned; and
- assurance that subcontractors and consultants used in assisting project activities have an acceptable CQA program or are participating in accordance with the Facility CQA program guidelines.

Upon completion of construction activities, the Facility will submit certification signed by the New Mexico registered professional engineer serving as the CQA certifying engineer, which states that the unit has been constructed in accordance with the design drawings, CQA Plan, and Construction Specifications and meets the requirement of 40 CFR 264.19. Documentation supporting the certification will be maintained in the operating record and will be furnished to NMED upon request. Wastes will not be accepted at the constructed portion of the landfill until NMED either approves the certification or waives the approval requirement.

2.5.3 Operation

The landfill will be operated in a safe and proper manner, in accordance with the following requirements.

2.5.3.1 Inspections and Monitoring

Section 5, Procedures to Prevent Hazards, contains information on inspections and monitoring.

2.5.3.2 Maintenance and Repairs

The landfill structure will be maintained through a routine preventive maintenance program, which will be fully defined in the final site operations plan. Preventive maintenance will involve regular visual inspections of the landfill liner (where feasible) and review of leachate collection and analysis results. Equipment, such as pumps, generators, electrical lighting, and warning systems, will be subject to manufacturer recommended programs. Preventive maintenance information will be documented and any deviation from normal conditions will be closely tracked and corrected as necessary.

2.5.3.3 Warning Signs

Section 5, Procedures to Prevent Hazards, contains information about warning signs.

2.5.3.4 Record Keeping

All documentation pertaining to the results of waste analyses, waste compatibility analyses, and waste handling compliance will be maintained in the Facility operating record. The Facility will be capable of determining exactly where a waste has been placed within a three-dimensional grid system. Landfill inspection records will be maintained on file for at least 3 years, in accordance with 40 CFR 264.15(d) (see Section 5.2.2).

2.5.3.5 List of Hazardous Wastes to be Placed in Landfill

The wastes to be placed in the landfill are described in Section 4, Waste Analysis Plan.

2.5.3.6 Specific Requirements for Ignitable/Reactive Wastes

Wastes that do not meet LDRs, as defined in Section 4.5 of the Waste Analysis Plan, will not be placed in the landfill. Therefore, untreated ignitable and reactive waste (as defined in 20.4.1 NMAC) will not be placed in the landfill.

2.5.3.7 Procedures for Protecting Wastes

Procedures for the handling of incompatible wastes, lab packs, and containers that are less than full are discussed below.

Procedures for Ensuring Safe Disposal of Incompatible Wastes

Procedures for identifying incompatible wastes are discussed in Section 4, Waste Analysis Plan. At a minimum, incompatible wastes will be spaced a sufficient distance apart in the landfill to prevent commingling. The landfill placement operation will be based on a set of grids along the north end of the landfill and along both the east and west sides of the landfill. Incompatible waste will be placed with a minimum of one grid in between the loads. Grids are normally spaced at approximately 50- to 100-foot intervals. Therefore, the minimum spacing would be 50 feet.

Procedures for Identifying Contents and Ensuring Proper Landfilling of Incoming Lab Packs

Lab packs may be placed in the landfill only if they meet the requirements in 40 CFR 264.316. Containers must be non-leaking and appropriate to the waste being contained. Appropriate non- biodegradable sorbents will be used. The Waste Analysis Plan presented in Section 4 will ensure that lab packs meet all of the applicable requirements prior to disposal. As with all other waste, lab packs must be properly characterized prior to acceptance at the Facility and meet the LDR treatment criteria prior to disposal. Lab packs will not be accepted if incompatible wastes are placed within the same lab pack or if reactive wastes have not been treated to render them non-reactive prior to receipt at the Facility. Lab packs will meet all applicable LDRs (40 CFR 268).

Special Requirements for Bulk and Containerized Liquids

Bulk and containerized wastes will not be placed in the landfill unless they meet the requirements in 40 CFR 264.314. Containers holding bulk liquids will not be received at the Facility or placed in the landfill. Very small containers, such as ampules or containers designed to hold liquids for use other than storage, may be placed in the landfill (40 CFR 264.314[d]).

Special Requirements for Containers

Containers, except those that are very small such as ampules, will be 90 percent full when placed in tact in the landfill. Containers less than 90 percent full will be crushed to the maximum extent possible though compaction when placed in the landfill.

2.5.3.8 Action Leakage Rate

The ALR proposed for the landfill is 900 gallons per acre per day (gpad). This proposed ALR was selected based on a discussion in the preamble to the January 29, 1992 final rule for Liners and Leak Detection Systems for Hazardous Waste Land Disposal Units (57 FR 3462). A discussion of the proposed ALR and supporting calculations are presented in the engineering report in Permit Attachment L.

The average daily flow rate in the LDRS sump will be calculated in accordance with the Action Leakage Rate and Response Action Plan, which is presented in Permit Attachment J.

2.5.3.9 Response Action Plan

The elements of the response action plan for the landfill include (1) reducing the head on the liner to the maximum extent possible to aid in the prevention of leaks, (2) determine the failure mechanism of any leaks, and establish procedures to minimize the potential for reoccurrence of this failure mechanism, and (3) responding immediately and appropriately to a leak exceeding the ALR. Each of these elements is described below.

Reducing the Head on the Landfill Liner

The head on the liner will be reduced by:

- Monitoring the leachate collection system sumps weekly and after all significant precipitation events.
- Removing pumpable liquids from the sump when monitoring indicates the presence of liquid. A reasonable effort will be made to remove as much liquid as possible. As previously described, it is standard landfill design practice to locate a low point or sump box in the base of the landfill sump. The pump for the sump is located at this low point, and it is from here that pumpable liquids are removed to the maximum extent possible.
- Waste material and soil cover will be placed in the landfill in a configuration to provide slopes that will prevent ponding and drain to the contaminated water collection basin within the Phase 1A landfill liner.
- If water ponds on the surface of the daily cover due to a heavy rain event, vacuum trucks will be utilized to remove as much of the standing water as possible before it can seep into the waste.

Leak Detected Below the Action Leakage Rate

Flow rates less than the ALR are expected under normal operation conditions. However, the following actions will be taken in response to a leak below the ALR:

- determine whether the leak can be attributed to some operational disturbance such as an equipment or power failure;
- verify that the sump pump is working as designed;
- increase the pump rate on the leachate collection system pump;
- remove all standing water, if any, from the surface of the landfill;
- assess operations to determine if waste receipt should be temporarily curtailed or waste should be removed for inspection, repair, or controls;
- determine if the flow rate varies with precipitation;
- repair any damage to the exposed portion of the liner in a manner which conforms to original design specifications and by qualified technicians in accordance with the CQA Plan (Permit Attachment M);
- document any damage and repairs in the Facility operating record; and
- investigate alternative sources of liquids.

Leak Detected Above Action Leakage Rate

If a leak is detected above the ALR, the following actions will be implemented in response:

- Notify the NMED in writing of the exceedance within 7 days of the determination;
- Submit a preliminary written assessment to NMED within 14 days of the exceedance determination, as to the amounts of liquids, likely sources of liquids, possible location, size, and cause of any leaks, and short-term actions taken and planned.
- Determine, to the extent practicable, the location, size, and cause of any leak;
- Determine whether waste receipt should cease or be curtailed, whether any waste should be removed from the unit for inspection, repairs, or controls, and whether or not the unit should be closed;
- Determine any other short-term and long-term actions to be taken to mitigate or stop any leaks;
- Within 30 days after the notification that the action leakage rate has been exceeded, submit to NMED the results of the determinations described above, the results of the actions taken, a description of the actions planned;
- Monthly, as long as the action leakage rate continues to be exceeded, submit a report to NMED summarizing the results of any remedial actions taken and planned; and
- In making the determinations described in this section, either conduct the following investigation or document why such an investigation is not needed:
    - Assess the source and amount of liquid from each source collected in the sump.
    - Conduct a hazardous constituent analysis of the liquid collected in the sump and use the results to help identify the source(s) of the liquid and possible location of any leaks as well as the potential hazard associated with the liquid and its mobility.
    - Assess the seriousness of any leaks in terms of potential for escaping into the environment.

2.5.3.10 Closure

A description of landfill closure is provided in Section 8, Closure and Post-Closure of Permitted Units.

2.7 Operations and Maintenance

The regulated landfill unit will be constructed in accordance with the Design Drawing, Specifications, and CQA Plan presented in Permit Attachments L1, L2, and M. The operations and maintenance of the landfill unit will be in accordance with the Operations and Maintenance Plan presented in Permit Attachment N. In general, all maintenance and repairs to the facilities will be completed to meet the requirements of the original Design Drawings and Specifications and will be monitored in compliance with the CQA Plan.

3. Groundwater Protection

On January 12, 2000, the NMED Hazardous Waste Bureau (HWB) of granted GMI a Groundwater Monitoring Waiver for its proposed Triassic Park Waste Disposal Facility. The Groundwater Monitoring Waiver and a VZMS Work Plan for liquid detection and water quality monitoring were part of the permit approval for the Triassic Park Waste Disposal Facility authorized by NMED in a Final Order on March 18, 2002.

Section 3 presents hydrogeologic field data that demonstrate that the proposed landfill at the Facility will not impact groundwater resources. The EPA's RCRA Groundwater Monitoring Technical Enforcement Guidance Document was used in the preparation of this material.

The proposed Facility is located in a remote portion of eastern Chaves County, New Mexico, 36 miles from the City of Tatum (Figure 3-1). Section 3.1, Geographical Setting and Topography, describes the favorable physical attributes of the proposed site location.

Climatic conditions, which are favorable for the efficient and environmentally safe operations of the proposed landfill and the ability to provide long-term isolation of hazardous waste, are described in Section 3.2. Data in this section were obtained from the National Oceanic and Atmospheric Administration's (NOAA's) recording station at Roswell, New Mexico.

Section 3.3, Soils and Land Use, describes soils, ranching, and other land uses in the area surrounding the proposed site. This section shows that the proposed hazardous waste disposal activities should have no impact on the existing occupational or recreational use of the surrounding land.

The regional and local geologic setting of the proposed landfill site is detailed in Section 3.4. Sediments of the Dockum Group of Triassic age are proposed as host rocks for this Facility. These unsaturated and low permeability sediments represent a stable geologic barrier to potential migration of contaminants from the proposed site.

Section 3.5, Surface Water and Water Balance, describes surface waters and meteorological conditions used to estimate groundwater recharge at the proposed site. Results from this section show that the proposed site's low groundwater recharge rate significantly reduces the potential for migration of contaminants to groundwater.

Regional and local aquifers are described in Section 3.6. This section documents the lack of groundwater present in the proposed Triassic host rocks and presents contaminant transport modeling results that demonstrate that the proposed landfill design, in conjunction with the site's geologic setting, will meet or surpass all RCRA minimum technology requirements.

Section 3.7, Groundwater Protection Requirements, presents the design of the groundwater monitoring network for the proposed Facility.

Section 3.8, Summary and Conclusions, summarizes the detailed technical data, which demonstrate that the proposed Facility is situated in a hydrologic setting that will assure long-term isolation of hazardous wastes from the environment. Technical data to support this conclusion are contained in the attachments included with this Permit Application.

3.1 Geographical Setting and Topography

The proposed site is located in a remote portion of eastern Chaves County in New Mexico. The proposed Facility area is located in the eastern half of Section 18 and western half of Section 17, T11S, R31E, encompassing 480 acres.

This site is approximately 4 miles south of U.S. Highway 380, which provides the main access to the property. Roswell, New Mexico is approximately 43 miles west of the proposed site, and Tatum, New Mexico is approximately 36 miles to the east. Other New Mexico communities in the region include Lovington (42 miles to the southeast) and Artesia (50 miles to the southwest).

3.1.1 Physiographic Setting

The proposed site lies within a region of transition between the northern extension of the Chihuahuan Desert and the Southern High Plains. The Caprock escarpment, located approximately 2 miles east of the proposed site, delineates the western boundary of the Southern High Plains province, which, in west Texas and eastern New Mexico, is known as the Llano Estacado. The Llano Estacado is a flat-lying elevated plain, whose grass-covered surface is remarkably different from the windblown, sandy desert environment to the west.

3.1.2 Topography

The proposed site is located on the far eastern flank of the Pecos River Basin. The land surface gently slopes to the west at approximately 40 to 50 feet per mile toward the river. This sloping plain is characterized by low-relief hummocky wind-blown deposits, sand ridges, and dunes. The average elevation above sea level of the proposed site is 4,150 feet.

The Caprock escarpment (or Mescalero Rim) is one of the most prominent topographic features in southeastern New Mexico. East of the proposed site, the escarpment has approximately 200 feet of relief. On top of the Caprock, the land surface consists of low-relief undulating plains.

Figure 3-2 contains a portion of the USGS topographic map coverage of the proposed site. The Caprock escarpment is well illustrated in the southeastern corner of the mapped area. The proposed site and surrounding area are covered by two USGS 71/2° quadrangle maps: Mescalero Point and Mescalero Point NE.

3.2 Climate

The information used to evaluate the climate of the project area was obtained from climatological data summaries from the Class A recording station in Roswell, New Mexico. This recording station is part of the National Climatic Center of NOAA. The local climatological data summaries provided extreme and normal values of the meteorological parameters (for the period of record at the Roswell Municipal Airport and more recent data from the Roswell Industrial Air Center) that were used to characterize the area's climate.

The climate of the region is semiarid, with generally mild temperatures, low precipitation and humidity, and a high evaporation rate. Winds are most commonly from the south and moderate. During the winter, the weather is dominated by a high-pressure system often situated in the central portion of the western United States and a low-pressure system commonly located in north-central Mexico. During the summer, the region is affected by a low-pressure system normally situated over Arizona.

3.2.1 Temperatures

Moderate temperatures are typical throughout the year, although seasonal changes are distinct. Mean annual temperatures in southeastern New Mexico are near 60°F (Eagleman, 1976). Temperatures in December through February show a large diurnal variation, averaging 36°F at Roswell. On approximately 75 percent of winter mornings, temperatures are below freezing, and afternoon maximum temperatures average in the high fifties. Afternoon winter temperatures of 70°F or more are not uncommon. Nighttime lows average near 23°F, occasionally dipping as low as 14°F. Generally, there are only two or three winter days when the temperature fails to rise above freezing.

Table 3-1 shows the average monthly and average daily maximum/minimum temperatures recorded for Roswell for a typical year.

3.2.2 Precipitation

Precipitation is light and unevenly distributed throughout the year. Winter is the season of least precipitation, averaging less than 0.6 inch of rainfall per month. Snow averages about 5 inches per year at the site and seldom remains on the ground for more than a day because of the typically above-freezing temperatures in the afternoon. More than half the annual precipitation comes from frequent thunderstorms associated with monsoon season moisture in June through September. Rains are usually brief but often intense.

Precipitation for the project area varies greatly from year to year. For example, Roswell's record low and high annual precipitation are 2.9 inches in 2003 and 32.9 inches in 1941. The maximum 24-hour rainfall was 5.65 inches in October 1901. An average precipitation rate for Roswell, for a 118-year period from 1878 to 2010, is 11.6 inches per year. Table 3-2 shows monthly precipitation rates for the Roswell area for a 5-year period and compares annual rates to the average precipitation.

3.2.3 Wind

Prevailing winds are from the south, with a normal mean wind speed at Roswell of 9.6 mph. An annual wind rose for a four-year period is shown in Figure 3-3. This wind rose shows the predominant southerly winds occurring 14 percent of the time.

3.3 Soils and Land Use

The proposed site is located in a rural portion of Chaves County, New Mexico. This section describes soil profiles of the land surface in this area, existing vegetation, and the current land usage.

3.3.1 Soil Profiles

Information on soil profiles at the proposed site has been obtained from the National Cooperative Soil Survey. This survey covers Chaves County and was made cooperatively by the Soil Conservation Service, the BLM, and the New Mexico Agricultural Experiment Station.

There are two types of soils present on the proposed site. The Roswell-Faskin-Jalmar Association is present on the sandy slopes throughout the property. The Alama Series is restricted to topographically lower drainage areas and is associated with flood plain deposits.

3.3.1.1 Roswell-Faskin-Jalmar Association

This association consists of excessively drained and well-drained soils with slopes of 0 to 15%. The association is about 40% Roswell soils, 25% Faskin soils, 15% Jalmar soils, and the remainder being a mixture of various soil types. The soils of this association are used for grazing and wildlife habitat. Vegetation is mainly sand dropseed, little bluestem, sand bluestem, sandbur, three-awn, shinnery oak, yucca, and sand sagebrush. Elevation ranges from 3,500 to 4,100 feet. The frost-free season ranges from 190 to 205 days per year.

Roswell soils are deep, gently undulating to rolling, and rapidly permeable. They are found in hummocky or billowy areas of deep sands. They consist of a surface layer of light brown fine sand. The underlying material is pink fine sand.

Faskin soils are deep, level to nearly level, and moderately permeable. They are intermingled with Roswell soils in depressions. They have a surface layer of brown and strong brown fine sand and loamy fine sand. The subsoil is yellowish red sandy clay loam and reddish brown clay loam.

Jalmar soils are deep, evenly deposited, and moderately permeable. They are intermingled with Roswell soils in depressions. They consist of a surface layer of brown, reddish yellow, and yellowish red fine sand and loamy fine sand. The subsoil is light reddish brown, heavy loamy fine sand, and sandy clay loam.

3.3.1.2 Alama Series

The Alama Series consists of deep, well-drained soils formed in alluvium on flood plains. Slopes are 1% to 3%. Elevation is 3,400 to 3,600 feet. These soils are used for grazing, watershed, and wildlife habitat. Vegetation is mainly tobosa, buffalo grass, vine-mesquite, mesquite, and cactus. The frost- free season ranges from 200 to 215 days per year.

In a representative profile, the surface layer of these soils is brown loam about 3 inches thick. The subsoil is reddish brown clay loam and silty day loam about 16 inches thick. The substratum is stratified reddish brown and light reddish brown sandy clay loam, silty clay loam, and loam to a depth of 69 inches or more. The soil profile is strongly calcareous and moderately alkaline throughout.

Permeability is moderately slow, and available water capacity is 11 to 12 inches. Effective rooting depth is 69 inches or more.

3.3.2 Land Ownership and Use

The property for the proposed site is owned by GMI. Adjacent lands are both federally and privately owned. Generally, lands to the west are owned by the BLM, and lands to the east are privately owned.

The predominant land use in this area is grazing. With existing vegetation, approximately one section of land is required to sustain five animal units year-long. Intermittently, the land is the site of exploratory drilling for gas and oil wells, but there are no abandoned well sites within the proposed Facility boundary, and the nearest production well is approximately 3 miles from the proposed site.

The BLM has developed a recreation area known as Mescalero Sands approximately 2 miles northwest of the proposed site. The recreation area allows hikers and recreational vehicles in the sand dunes.

3.4 Geology

This section describes the regional and geologic setting of the proposed landfill

3.4.1 Regional Geology

The geologic formations present within the region range in age from Quaternary through Triassic. Those include Quaternary alluvium, Tertiary Ogallala Formation, and the Triassic Dockum Group. Permian sediments do not outcrop in this region but, because they underlie the proposed host sediments, they are also discussed in this section.

3.4.1.1 Regional Stratigraphy

The stratigraphic relationship of the formations discussed in this section is illustrated in Figure 3-4. Information concerning formation tops and thicknesses was obtained from well logs from the New Mexico OCD office in Hobbs, New Mexico. Appendix B of the Permit Application dated October 2000 contains a representative oil well log.

Quaternary

The surface throughout the project area is covered by alluvial deposits of Quaternary age. These deposits are comprised of fine-grained, red-brown sands, interbedded with red-brown silts and clays. A major source of these sediments was the topographically higher Ogallala Formation, as evidenced by the abundant granitic cobbles, chert pebbles, and fragments of petrified wood found throughout this unit. The thickness of these alluvial deposits along the eastern flank of the Pecos River Basin in Chaves County varies from a few feet to as much as 50 feet.

Tertiary

The "Caprock," which is the surface expression of the Tertiary Ogallala Formation, unconformably overlies Triassic sediments in southeastern New Mexico. This flat-lying sandstone and conglomeritic unit is approximately 300 to 400 feet thick. It consists of fluviatile sand, silt, clay, and gravel capped by caliche. The sand deposits of the Ogallala Formation consist of fine- to medium-grained quartz grains, which are silty and calcareous. Bedding features range from indistinctly bedded to massive to crossbedded. The formation varies from unconsolidated to weakly cohesive and contains local quartzite lenses. The sand intervals of the Ogallala Formation occur in various shades of gray and red.

Ogallala Formation silt and clay deposits are reddish brown, dusky red, and pink and contain caliche nodules. Gravels occur as basal conglomerates in intra-formational channel deposits and consist primarily of quartz, quartzite, sandstone, limestone, chert, igneous rock, and metamorphic rock. There are abundant petrified wood fragments throughout this unit.

Triassic

Triassic sediments are the potential host rocks for the proposed Facility and, as such, are described in more detail than the other formations. The Depositional Framework of the Lower Dockum Group (Triassic), Texas Bureau of Economic Geology, No. 97, 1979, by McGowen was used as a major reference for gathering information on the characteristics of Triassic sediments.

Triassic sediments unconformably overlie Permian sequences in Texas and New Mexico and have been classified as the Triassic Dockum Group. The Dockum Group is comprised of a complexly interrelated series of fluvial and lacustrine mudstone, siltstone, sandstone, and silty dolomite deposits that can be as much as 2,000 feet thick in this part of the Permian Basin. These sediments accumulated in a variety of continental depositional settings, including braided and meandering streams, alluvial fan deltas, lacustrine deltas, lacustrine systems, and mud flats.

The Triassic Dockum Group is divided into an Upper and Lower Unit. The Upper Dockum Unit is very near the surface within the project boundary, covered only by a thin veneer of Quaternary sediments. The

character of this unit, also know as the Chinle Formation, is a series of fluvial sediments. These sediments conformably overlie the Lower Dockum Unit and consist of red-green micaceous mudstones, interbedded with thin, discontinuous lenses of siltstone and silty sandstones. A continental fluvial depositional environment predominated during Upper Dockum time, when the Triassic basin was filled with lacustrine sediments. The Chinle Formation is widespread in the southwestern United States.

The Lower Dockum accumulated in a fluvial lacustrine basin defined by the Amarillo Uplift on the north and the Glass Mountains on the south. As presented in the basin map shown on Figure 3-5, the Lower Dockum represents sediments from a large, regional depositional system. For any given portion of this basin, these sediments tend to be very homogeneous and not subject to abrupt local changes. This basin was peripherally filled, receiving sediment from the east, south, and west. Chief sediment sources were Paleozoic sedimentary rocks. Lowlands to the east and west were traversed chiefly by meandering streams. Higher gradient streams with flashy discharge existed at northern and southern ends of the basin. The large shallow lake (or lakes) was the last portion of the basin to be filled. The lacustrine sediments that accumulated here consist primarily of low-energy mudstone.

The proposed site, situated on the western flank of the Triassic paleobasin, is underlain by thick sequences of Lower Dockum mudstones. In Triassic times this area was dominated by meandering streams. The former tectonic belts were more than 200 miles away, and the regional slopes were relatively low. Surface exposures today in these areas consist of thick sequences of maroon-red-purple variegated mudstones with thin discontinuous layers of siltstones and silty sandstones.

The stratigraphy of Lower Dockum sediments in east-central New Mexico is significantly different from that of the proposed site. Figure 3-6, a subsurface sand percent map of this unit, was compiled from drill hole data from more than 1,500 oil wells throughout the basin. Thick sequences of sandstones at the northern and southern portions of the basin are shown projecting inward toward the center of the basin. In the New Mexico portion of this basin, these sand accumulations are related to the occurrence of the Santa Rosa Sandstones. This medium-to-coarse grained, white to buff sandstone represents the lowermost Triassic depositional unit and is a major aquifer in this portion of New Mexico.

Figure 3-6 illustrates that the great accumulation of Santa Rosa Sands that fills the northern portion of the Triassic paleobasin pinches out before reaching the Facility site. During the Lower Dockum time, the Facility site was part of a low-relief area with little fluvial deposition. The McGowen report specifies sand percentages of the Lower Dockum group in the Facility site area to be in the 10 to 20% range. This is consistent with data gathered from the two deeper drill holes completed north and south of the site boundary. There is a basal sand unit in the Lower Dockum below the site, but it appears not to be depositionally related to the Santa Rosa Sandstone.

Permian

Permian sediments are important to the geologic setting because they are immediately below the proposed Triassic host rocks. The deeper formations of Permian age were deposited in a restricted marine environment and thus contain salt deposits, which make the groundwater produced from them too brackish for use.

Permian sediments underlying the Triassic units in the project area are assigned to the Artesia Group. Oil well logs from the New Mexico OCD in Hobbs, New Mexico, have provided sufficient data to identify the Dewey Lake Formation, Rustler Formation, and Yates Formation from the upper portion of this group. Geologic literature describes these Permian sediments to be gently dipping to the east. This fact was confirmed by using oil well log data to construct a graphic 3-point solution, as shown in Figure 3-7. Using the top of the anhydrite (Rustler) as a marker bed, the following simple calculations were made:

Known Point Elevations of Marker Bed

A = Lowest elevation - 2,975 feet
C = Highest elevation - 3,148 feet
B = Middle elevation - 3,091 feet

Strike Determination

Strike is defined as the direction of a horizontal line along the bedding plane and is calculated as follows:

D = point along AC with the same elevation as B (BD is strike)

$$AD = AC \times \frac{\text{difference in elevation between A and B}}{\text{difference in elevation between A and C}}$$

$$AD = 18{,}500 \text{ ft} \times \frac{3091 - 2975}{3148 - 2975} = 12{,}405 \text{ ft}$$

CD = 18,500 ft – 12,405 ft = 6,095 ft

BD = direction of strike = N6°E

Dip Determination

Dip is defined as the angle of the bedding plane measured from a horizontal line perpendicular to the strike and is calculated as follows:

E = point along strike, therefore, E(elevation) = B(elevation)

$$\text{Tangent of dip angle} = \frac{\text{E(elevation) - A(elevation)}}{\text{AE}}$$

$$\text{Tangent of dip angle} = \frac{3091 \text{ ft} - 2975 \text{ ft}}{7520 \text{ ft}} = \frac{116 \text{ ft}}{7520 \text{ ft}} = .015$$

Dip angle = Tangent $^{-1}$ (.015)

Dip angle = 0°52'

These calculations indicate a north-south strike and a dip of less than 1° to the east. These results are consistent with the reported regional dip for Permian (and Triassic) sediments along the western flank of the Permian Basin.

Dewey Lake Formation—The uppermost Permian sediments underlying the Triassic sequence in the project area correlate to the Dewey Lake Formation. These sediments are predominately red to red-brown mudstones and siltstones and are virtually indistinguishable from the overlying Triassic sediments. Geologic literature reports a conformable relationship between these sediments and the overlying Triassic sediments. There are approximately 240 feet of Permian redbeds in this section.

Rustler Formation—The top of the Rustler Formation was identified on OCD well logs and corresponds to the top of a 40-foot bed of anhydrite. These anhydrites are visible in outcrop on the hills immediately east of the Pecos River drainage east of Roswell, New Mexico. Underlying the anhydrite are approximately 500 feet of halite (salt). The Rustler Formation represents the youngest anhydrite sequence in the Permian Basin.

Yates Formation—Unconformably underlying the Rustler, the Yates Formation is composed primarily of interbedded sandstone with minor dolostone and limestone. The sands are light gray and fine to very fine grained. Limestone is white to very light gray microcrystalline lime mudstone with a chalky texture. Dolostone is pink to light gray and microcrystalline

3.4.1.2 Regional Structure

The tectonic setting and seismic activity are discussed in this section.

Tectonic Setting

The proposed Facility site is located on the western flank of the Permian Basin of west Texas. Because of the distance from tectonic centers and the minimal seismic activity, this is considered one of the more geologically stable regions within the United States.

The region underwent intense deformation, however, during late Paleozoic times. Major uplifting occurred along the Ouachita Tectonic Belt and the Wichita System of Texas and Oklahoma (shown in Figure 3-5). The Sacramento and Sangre de Cristo uplifts in northeastern New Mexico were also active during late Paleozoic time. The overall structural configuration of the Permian Basin was established at this time.

This period of intense deformation was followed by a long period of gradual subsidence. The sea covered the region, and throughout the remainder of Permian era, the Permian Basin was slowly filled with several thousand feet of evaporites, carbonates, and shales. As discussed in Section 3.4.1.1, non-marine deposition began in Triassic time with the accumulation of lacustrine/fluvial sediments into a large shallow lake.

During the late Cretaceous to early Tertiary Laramide Orogeny, there was renewed uplifting along the Sacramento, Sangre de Cristo, and other ranges within the Rocky Mountains. This orogeny uplifted the region to its present position and supplied sediments for the Tertiary Ogallala Formation.

Seismic Activity

The Permian Basin is an area of moderate to low seismic activity. Data obtained from the National Geophysical Data Center of NOAA indicate a total of 102 observed earthquakes within a 250-km (155-mile) radius of the proposed site. These data reflect observations made from 1930 to 1993.

As shown in Figure 3-8, there were no recorded earthquakes with a magnitude greater than 3.9 within 70 miles of the proposed site and no recorded seismic activity within a radius of 45 miles. The distance from any tectonic centers and the low recorded seismic activity suggest that the proposed site is located in an extremely stable environment where activity is not expected. Consequently, little damage from earthquake activity is anticipated.

3.4.2 Site Geology

Figure 3-9 illustrates the surficial geology on and adjacent to the proposed site. This section will provide detailed descriptions of the proposed Triassic host sediments and the Quaternary alluvium that overlies these sediments only.

3.4.2.1 Site Stratigraphy

Specific data for this section was obtained through drilling activities described in Section 3.4.3. Figure 3-10 is a stratigraphic cross-section based on this drilling, illustrating relationships between the proposed Triassic host sediments and adjacent formations. Other site-specific cross-sections are located in Appendix G of the Permit Application dated October 2000.

Quaternary

The thickness of Quaternary alluvial deposits at the site varies from less than 10 feet to 35 feet. The upper portion of these sediments consists of fine to very fine, wind-blown yellow-brown sands. Below this sand are varying thicknesses of red-brown to yellow-brown siltstones and silty mudstones.

Scattered throughout these sediments are small chert pebbles and granitic cobbles derived from the Tertiary Ogallala Formation.

A caliche zone (Mescalero Caliche) is present in most of this unit. The caliche is found immediately under the top wind-blown sands and coats and fills fractures within the more consolidated siltstones. Where the Quaternary alluvium is quite thin, this caliche is found coating Triassic sediments.

Triassic

Drilling at the site has delineated 1,175 feet of Dockum sediments. Two distinct units can be identified in these sediments: the Upper Dockum (475 feet thick) and the Lower Dockum (700 feet thick). Within the proposed Facility boundary the thickness of the Upper Dockum unit never exceeds 100 feet. Upper Dockum sediments are in contact with the overlying Quaternary alluvium throughout the project area.

Upper Dockum—This unit consists of variegated (red-brown-green) mudstones interbedded with reddish gray siltstones and reddish-gray-green sandy siltstones. The siltstones are micaceous (predominantly muscovite), indicating they were part of a relatively active fluvial system capable of transporting material into the basin from distant source rocks.

From examination of lithology and down-hole electric logs, it is estimated that mudstones comprise 30 percent of the unit. Lithologies of the remainder of the unit are evenly divided between siltstones and sandy siltstones. However, as the geotechnical properties of these two lithologies are very similar, this geologic discussion will simply refer to them both as siltstone. Mudstones were found to have an average permeability of 2.45×10^{-7} cm/s, and the siltstones average 1.22×10^{-5} cm/s.

These sediments were deposited in a fluvial environment. Mudstone and siltstone bodies are very lenticular and are found to pinch out abruptly. Accordingly, individual lithologies are not correlatable over significant distances (thousands of feet).

Cross sections prepared from the close-spaced drilling within the proposed Facility boundary establish an understanding of the fluvial nature of this unit (see Appendix G of the Permit Application dated October 2000). Figure 3-11 shows the locations of drill holes for the close-spaced drilling pattern and provides an index of cross-sections that illustrate the character of the Upper Dockum Unit. Also shown on Figure 3-11 is the location of the "most favorable" area for the construction of the proposed landfill. Figure 3-12 shows the lithology of the site. As shown in the cross sections on Figures 3-10 and 3-12, the lithology of this area is predominantly mudstone, with thin beds of siltstones. The lenticular nature of the mudstone and siltstone bodies is also shown in these cross-sections. Cross sections 3-1 and 3-2 in Appendix G of the Permit Application dated October 2000 show the facies relationships of the "most favorable" area.

The fluvial nature of the Upper Dockum Unit has led to the scouring of channels into the underlying Lower Dockum Unit. This scouring and the pinching-out of fluvial sediments have resulted in the local development of an undulatory surface on top of the Lower Dockum Unit. This phenomenon is well illustrated in Cross sections 3-3, 3-4, and 3-5, in Appendix G of the Permit Application dated October 2000.

Lower Dockum—The Lower Dockum Unit, described in Section 3.4.1.1, has a completely different character from the upper unit. The lower unit represents a time of relatively quiet lacustrine deposition, which resulted in the accumulation of thick sequences of predominantly mudstones interbedded with thin siltstones. These

sediments are very homogeneous, in contrast with the abrupt facies changes present in the more active Upper Dockum depositional system.

Most of the close-spaced drilling within the proposed Facility boundary "bottomed" in Lower Dockum mudstones. These mudstones were consistently a moderate reddish brown color, which according to McGowen (1979) is associated with low stand lacustrine and mud flat deposition.

The 1995 confirmation drilling provided some important data on this unit. As illustrated in Figure 3- 13, all three holes penetrated the clays of the Lower Dockum unit. PB-36 encountered 64 feet of this unit, PB-37 encountered 55 feet, and PB-38 encountered 18 feet. A total of 10 feet of core of Lower Dockum were collected from PB-36 at a depth of 138 to 148 feet and 7 feet of Lower Dockum were collected from PB-37 at a depth of 148 to 155 feet. Four representative samples of this core were sent to AGRA Earth & Environmental laboratories for permeability analyses. The results of these analyses confirm the Lower Dockum to be a very impermeable unit (average permeability of 5.7 x 10^{-8} cm/s), capable of performing as a geologic barrier to downward migration from the proposed landfill. Following are the results of the core analyses:

Core Interval	Permeability (cm/sec)
PB-36 (144'-445')	5.2 x 10^{-8}
PB-36 (147'-148')	6.8 x 10^{-8}
PB-37 (150'-151')	5.8 x 10^{-8}
PB-37 (154'-155')	4.9 x 10^{-8}

3.4.2.2 Site Structure

There are no identified faults within the project area. As previously discussed, the proposed site is located in a geologically stable area. There are no mapped faults on or adjacent to the project area. Color air photos of the area were examined for surface lineations, which can reflect faulting in the subsurface. All surface lineations observed on these photos were attributed to man-made features (i.e., fences, roads, etc.).

Subsurface drilling did not encounter displacement or repeating of geologic sequences that would be indicative of faulting. In the Upper Dockum Unit, there are abrupt changes in lithologies, but these are attributed to depositional processes associated with an active fluvial system. The fluvial nature of the Upper Dockum Unit has led to the scouring of channels into the underlying Lower Dockum Unit. This scouring and the pinching-out of fluvial sediments have resulted in the local development of an undulatory surface on top of the Lower Dockum Unit (Figure 3-14). Figure 3-14 also shows the northeast dip of the Lower Dockum.

3.4.3 Site Investigation Activities

Triassic sediments in eastern Chaves County were initially identified as excellent host rocks for proposed hazardous waste disposal because they (1) contain thick sequences of low permeability clays; (2) occur in remote, unpopulated areas; and (3) produce virtually no groundwater. This section describes the series of exploration activities undertaken to verify and document the suitability of the site for hazardous waste disposal.

As part of this permit application, a total of 41 drill holes were completed. The lithologies of these holes were recorded and a geophysical log was run on each drill hole. A total of 31 of these drill holes were completed within the project boundary (Figure 3-15).

3.4.3.1 Preliminary Evaluation Activities

The first phase in determining an appropriate disposal site was to identify potential sites with exposed or near-surface Triassic sediments. To identify such sites, color aerial photos were obtained of areas underlain by Triassic sediments in eastern Chaves County (Figure 3-16). The areas exhibiting the characteristic coloration associated with the Triassic sediments on the photos were then plotted on topographic maps. The locations with desirable geology were screened for additional factors, including accessibility and land ownership. From this process, a prioritization of sites was developed and a shallow drilling program designed.

In July and September 1993, two shallow drilling programs were conducted to examine Triassic sediments underlying the Quaternary alluvium. Average depth of these holes was 40 to 60 feet, and the drilling was conducted on a spacing of approximately 1,000 feet between holes. As shown in Figure 3-17, three areas encompassing seven sections were examined. The objective of this drilling was to identify an area where the Triassic sediments were unsaturated, were situated close to the surface, and contained low permeability clays. An Ingersol Rand 1500 air-rotary drill was used to perform this work. This air-rotary technique was used because of the high quality of drill cuttings it produces and because the presence of any subsurface water can be easily detected.

Of all areas investigated, the surface and near-surface geology in the vicinity of Red Tank (the proposed site) was found to be the most favorable. Over most of this area, the thickness of Quaternary alluvium averaged approximately 10 feet, and the shallow drilling indicated the presence of unsaturated mudstones underlying the alluvium. Five shallow core holes were completed, adjacent to rotary air holes, to obtain preliminary geotechnical data on the near-surface Triassic sediments. As a result of the shallow depth of these sediments, many of the clays were very dry and brittle. This presented some difficulty in obtaining "undisturbed" core samples. Despite these difficulties, materials testing results showed low permeabilities for Triassic clays, ranging from 1×10^{-7} to 3×10^{-8} cm/s. These values, along with the local geologic setting, established the Red Tank area as an area conducive to more detailed site characterization.

Two deep holes (WW-1 and WW-2) were drilled to the base of the Dockum Group in November 1993. These holes encountered an unsaturated thickness of 600 to 650 feet of Lower Dockum mudstones consisting primarily of reddish brown, maroon, and purple mudstones with thin intervals of reddish brown silts.

Lithologic logs developed from cuttings samples and down-hole geophysical logs (gamma and thermal neutron) confirm the homogeneity of this thick mudstone interval. In addition, samples of drill cuttings from one of the deep holes (WW-2) were taken to the University of New Mexico's Diagnoses Laboratory for a grain size analysis. This analysis showed a remarkably constant grain size distribution throughout the sequence, which is consistent with the technical definition of a mudstone. This procedure involved desegregating, centrifuging, drying, wet sieving, and weighing the samples. A complete procedure and the results of this analysis are contained in Appendix F of the Permit Application dated October 2000.

The 600- to 650-foot mudstone interval rests on a basal sandstone unit that is approximately 50 feet thick. This basal unit is present in oil well logs in the area as a clean to a silty sand. The deep drilling did not retrieve any cuttings from this basal unit. The drilling was performed with air, and the moisture in this unit prevented the return of cuttings to the surface. Casing was placed in these holes, and water levels were taken (Section 3.6.2).

WW-1 and WW-2 were drilled north and south of the project boundary to characterize the nature of the Lower Dockum. Because of the consistent, continuous depositional environment within the lacustrine sediments at the Lower Dockum, it was decided (and approved by the NMED) that it was unnecessary to penetrate the entire Lower Dockum sediments within the site boundary. Such penetration would have

certainly violated the integrity of the formation in the area of the planned hazardous waste landfill and in all likelihood would not have provided additional geologic information.

Details for the closure of the two deep wells (WW 1 and WW 2) will be provided for review and approval by NMED prior to plugging. Both wells will be abandoned prior to the start of any facility construction.

3.4.3.2 1994 Site Characterization Activities

In June 1994, a drilling plan for site characterization activities at the proposed site was prepared and submitted to the NMED Hazardous and Radioactive Materials Bureau. The plan identified drilling locations, depths and methods, proposed geotechnical tests and methods, and down-hole geophysical logging methods. The 100-foot depth was sufficient to penetrate the base of the Upper Dockum (with the exception of the easternmost portion of the site). The plan was approved as submitted.

Drilling operations commenced on July 17, 1994 and a total of 36 drill holes were completed. There were three distinct phases of this drilling program: (1) close-spaced pattern drilling in the area of the proposed site (to a depth of 100 feet) to obtain detailed lithologic and hydrologic information for the design of a landfill, (2) stratigraphic drilling across the project area (to a depth of 200 feet) to correlate the site geology with the regional setting, and (3) selected core drilling in the proposed site for geotechnical samples. Samples of drill cuttings were collected and logged for each hole (see Appendix C of the Permit Application dated October 2000). Southwest Geophysical Services, Inc. conducted down-hole geophysical logging of each drill hole. These electrical surveys consisted of thermal neutron and gamma logs. The electric logs provide lithologic information from drill holes to supplement and verify the lithologic interpretations based on drill cuttings. Copies of all geophysical logs can be found in Appendix D of the Permit Application dated October 2000.

An air-rotary rig (Ingersol Rand 1500) was used for this work. Drilling with air provides cleaner drill cuttings than drilling with water, and usually a good indication of water saturation. However, in the case of the Upper Dockum sediments on the Facility site, this drilling technique was not always successful in identifying water saturation. This failure was a result of the low to very low permeabilities of the silty sands and the low amount of water saturation. The pressure of the air from the drilling process prevented water from immediately entering the holes. If groundwater was present, it was not always detected until the hole had stabilized and a geophysical log was taken. Geophysical logs on all 31 drill holes within the site boundary encountered no saturated Upper Dockum sediments.

Three core holes were completed and a total of 85 feet of core recovered. A CME-55 hollow-stem auger rig using a continuous sampler was used to collect these samples. The dry, brittle nature of these shallow, unsaturated sediments made the recovery of undisturbed core samples difficult.

Representative core samples of mudstones, siltstones, and sandy siltstones were sent to materials testing laboratories for measurement of geotechnical parameters to be used in the Facility design and contaminant transport modeling. In addition to core samples, 11 backhoe pits were dug adjacent to drill holes for the collection of bulk samples. Proctor tests were performed on these bulk samples to provide information required for design studies. All geotechnical results are contained in Appendix E of the Permit Application dated October 2000.

3.4.3.3 1995 Confirmation Drilling Program

In order to confirm the unsaturated nature of the Upper Dockum sediments on the eastern boundary of the proposed Facility, a drilling plan was submitted to Mr. Bob Sweeney of NMED on June 26, 1995. This plan was modified and approved in a letter from Mr. Ronald A. Kern, dated July 12, 1995. A three-hole drilling program was conducted on the GMI site on July 24 and 25, 1995. Mr. Bob Sweeney visited the site and observed the drilling operations on Monday, July 24, 1995.

Holes PB-36, PB-37, and PB-38 were completed as an extension to an existing east-west line of drill holes. The westernmost drill hole was located on the eastern boundary of the proposed landfill. The other two holes were drilled 1,000 feet apart and examined the area immediately east of the proposed landfill. All surface locations for these drill holes were surveyed.

No groundwater saturation was encountered. All holes were completed with air so that saturated sediments could have easily been detected. Lithology logs describing drill hole cuttings were prepared in the field and down-hole geophysical logs were run on each hole. The geophysical logs included gamma ray, thermal neutron, and caliper profiles.

3.4.3.4 1999 Drilling Program

In order to further clarify the subsurface stratigraphy and groundwater conditions underlying and adjacent to the proposed site within the upper Dockum and its contact with the Lower Dockum, a drilling program was conducted in August 1999 consisting of 10 drill holes. This drilling program was conducted at the request of NMED and in accordance with the Final Work Plan for Stratigraphic and Groundwater Characterization Program, dated July 28, 1999. The results of this program were documented in Final Report for 1999 Stratigraphic and Groundwater Characterization Program, dated September 10, 1999 (Montgomery Watson).

The results of this program 1999 demonstrated that the subsurface stratigraphy underlying the proposed site is both continuous with and predictable from previous drilling results, as shown in Figure 3-14. There were no unexplainable features within the depositional environment. In all cases, the depth of the contact between the Upper Dockum and the Lower Dockum sediments was encountered where it was estimated to be. There was no groundwater within these sediments.

The groundwater characterization drilling demonstrated that there is even less groundwater in the vicinity of the site than originally thought. Pooled surface waters have the potential of migrating through the surface alluvial sediments. Limited saturation encountered one-mile northeast of the site in the Upper Dockum now appears to have been an isolated occurrence of perched groundwater. Upper Dockum sediments underlying the site and extending 0.75 mile downgradient have been examined by over 40 drill holes and found to be unsaturated.

3.5 Surface Water and Water Balance

This section describes surface waters and meteorological conditions used to estimate groundwater recharge at the proposed site.

3.5.1 Surface Water

There are no perennial stream drainages on or near the proposed site. The nearest surface drainage is the Pecos River, approximately 30 miles to the west.

There is one small stock tank (Red Tank) within the proposed Facility boundary and several additional tanks on adjacent lands. These tanks are approximately 200 feet by 200 feet and contain water for livestock. The tanks are clay-lined and retain water from runoff or receive water from an underground pipeline. Water in the underground pipeline is supplied from three water wells on the Marley Ranch located in Section 10, T11S, R31E. These wells are east of the Mescalero Rim and produce water from the Ogallala Formation. In the past, water from the springs along the Caprock escarpment was used in this pipeline, but now water is pumped from the Ogallala Formation. The pipeline is personally owned and maintained by the Marley Ranch to provide water to cattle operations below the Caprock.

Once the site is designated as a disposal area, cattle operations on this property will cease and the Marley Ranch will stop using Red Tank. They will also re-route their personal pipeline, as appropriate, to avoid landfill operations and continue to supply water to their cattle operations below the Caprock.

3.5.2 Water Balance

The water balance analysis estimated groundwater recharge from direct precipitation, surface water bodies, and irrigation at the proposed landfill site. This information is useful for assessing the potential migration of contaminants released at or near the surface to groundwater. The groundwater recharge rate is directly related to the potential for contaminants spilled or leaked at the surface to reach groundwater. In areas with little or no groundwater recharge, there is less potential for groundwater contamination from releases of hazardous substances than in high recharge areas because the mechanisms to transport potential contamination are limited.

A water balance requires quantification of the hydrologic components, which can result in changes in the amount of water stored in the area of interest. Often, water balances are calculated for an entire watershed to understand the relative importance of the hydrologic components within that area. For this analysis, the water balance was performed to estimate groundwater recharge at the proposed landfill site.

Groundwater recharge at the proposed site can be estimated by summing precipitation, infiltration from surface water bodies, and irrigation at the site and subtracting evapotranspiration and surface runoff. As no natural surface water bodies or irrigation occur at the site, groundwater recharge is estimated as the difference between direct precipitation and evapotranspiration. This assumes no surface runoff at the site.

The water balance used precipitation data collected at the Roswell weather station indicating that mean annual precipitation is 10.61 inches (Section 3.2.2). This annual mean is used as the average precipitation at the proposed site.

Evapotranspiration refers to the processes that return water to the atmosphere by a combination of direct evaporation and transpiration by plants and animals. It is the largest item in the water budget because most of the precipitation that falls in the area returns almost immediately to the atmosphere without becoming part of the surface water or groundwater systems. On unirrigated rangeland, much of the precipitation that does not evaporate immediately is taken up fairly rapidly by plants and transpired. In a regional water balance conducted in southeastern New Mexico, it was estimated that approximately 96 percent of total precipitation is lost to evapotranspiration (Hunter, 1985). This number corresponds to data presented for the Rio Grande Basin by Todd (1983), which estimated that 95.4 percent of total precipitation was being lost to evapotranspiration.

Assuming a mean annual precipitation rate of 10.61 inches, of which 96 percent is lost to evapotranspiration, the net recharge to groundwater is estimated as 0.42 inch per year. This low groundwater recharge rate significantly reduces the potential for groundwater contamination from spills or leaks at the proposed Facility.

The purpose of this water balance is to provide a conceptual understanding of the hydrologic components at the site. The amount of groundwater recharge is a reflection of the arid climate of the region. The net recharge estimate of 0.42 inch per year (based on average hydrologic components) represents the expected long term annual conditions at the site. The relatively low recharge rate appears to be reasonable given the unsaturated conditions of the Upper Dockum within the site boundaries. Using the highest recorded annual precipitation value of 32.92 inches yields only a slightly higher recharge rate of 1.32 inches (assuming an evapotranspiration rate of 0.96). This short-term (1-year) increase in recharge is unlikely to have a significant impact on the unsaturated flow regime at the proposed site.

3.6 Groundwater

This section describes regional and local aquifers.

3.6.1 Regional Aquifers

In the region surrounding the proposed site, there are two geologic units that have produced groundwater, the Triassic and the Tertiary Ogallala Formation. Very minor amounts of groundwater have been produced from Triassic sediments, but the Tertiary Ogallala Formation is a major aquifer in southeastern New Mexico, west Texas, and several other western states.

An updated record of all water wells within a 10-mile radius of the Facility was obtained from the New Mexico Office of the State Engineer in October 2011. No water wells are located within 3 miles of the Facility. Water wells within a 10-mile radius are listed in Table 3-3 and shown in Figure 3-18. Water wells identified for the Permit Application dated October 2000 within a 4-mile radius, along with oil well locations and the locations for all site investigation drilling activities, are shown in Figure 3-19.

A total of 16 water wells were reported, 14 from the Ogallala Formation and 2 from the Triassic. Of the 2 Triassic wells, 1 is now reported to be dry and the other is actually located more than 6 miles west of the proposed site. Six of these wells are shallow completions (100 feet or less) from the 1910s and 1940s and are used with windmills to supply water to livestock and wildlife. The numbers of these wells are RA-8585 through RA-8589 and RA-8363. These include wells that appear to penetrating Triassic sediments because of their surface locations, but due to their shallow depths, the source of water could be from surface alluvial sediments.

Four of the remaining eight wells range in depth from 560 to 640 feet and have been completed within the Lower Dockum sediments (including the Santa Rosa Sandstone equivalent). Following is a description of these wells:

- RA-8577 was drilled to a depth of 614 feet in 1992. Its initial production was 4 gallons per minute (gpm).
- RA-9320 was drilled in 1996 to a depth of 560 feet. The estimated yield was 6 gpm; however, the water was determined to be not potable. The well was plugged and abandoned on November 25, 1996.
- RA-9568 was drilled to a depth of 640 feet in 1998. It was a dry hole and was plugged and abandoned on August 14, 1998.
- RA-9670 was drilled in 1998 to a depth of 587 feet. The estimated initial yield was 2 gpm.

Little information about the remaining four wells was available at the time of the study.

3.6.1.1 Ogallala Aquifer

The Ogallala Aquifer is the primary freshwater aquifer within the regional study area and serves as the principal source of groundwater in the Southern High Plains. The saturated thickness of the Ogallala Aquifer ranges from a few feet to approximately 300 feet in the Southern High Plains. Groundwater within the Ogallala Aquifer is typically under water table conditions, with a regional hydraulic gradient toward the southeast ranging from approximately 10 feet per mile (ft/mi) to 15 ft/mi. The average hydraulic conductivity of the Ogallala Aquifer ranges from 3.5×10^{-4} cm/s to 9.5×10^{-3} cm/s.

The Ogallala Aquifer is recharged primarily through the infiltration of precipitation. The rate of recharge is believed to be less than 1 inch/year. Groundwater discharge from the Ogallala Aquifer occurs naturally through springs, underflow, evaporation, and transpiration, but groundwater is also removed artificially through pumpage and catchment. Currently, the rate of withdrawal exceeds the rate of recharge for much of the Ogallala Aquifer.

3.6.1.2 Triassic

Regionally, the only aquifer within Triassic sediments is the Lower Dockum Aquifer. However, because the Upper Dockum is known to have permeable facies that locally produce low quantities of good to poor quality water, it is included in this section.

Lower Dockum Aquifer

The major aquifer within the Lower Dockum is the Santa Rosa Sandstone. This sandstone is present along the northern and southern flanks of the Permian Basin and is a principal source of groundwater in Roosevelt and Curry Counties, New Mexico. The Santa Rosa Sandstone is not present along the western flank of the Permian Basin, which includes the proposed site.

Where the Santa Rosa Aquifer has been studied, hydrochemical analyses and groundwater oxygen isotopes indicate that it is distinctly different from the Ogallala Aquifer. The thick, impermeable clays within the Triassic section have been sufficiently impermeable to prevent hydraulic communication between these aquifers.

Upper Dockum Aquifer

There is no regional aquifer developed within Upper Dockum sediments. In local areas, recharge to the Upper Dockum is provided through vertical infiltration from overlying aquifers which are water- bearing units within the Ogallala Formation. This relationship has been illustrated in Figure 3-10.

3.6.2 Site Groundwater

Potential Triassic host sediments within the proposed Facility boundary are unsaturated. Detailed drilling within this boundary has encountered no groundwater. Drilling outside the proposed Facility boundary has identified saturated zones in both the Upper and Lower Dockum Units. The following subsections contain descriptions of these saturated zones.

3.6.2.1 Ogallala Aquifer

The western boundary of the Ogallala Aquifer, represented by the Caprock escarpment, is located topographically/stratigraphically above and 2 miles east of the proposed site. At the base of the escarpment, along the contact of the Ogallala Formation and the underlying Upper Dockum, are numerous springs, which are a result of downward-migrating Ogallala groundwater coming into contact with low permeability zones within the Upper Dockum and being diverted to the surface.

3.6.2.2 Upper Dockum - "Uppermost Aquifer"

For the purpose of this application, the uppermost aquifer is considered to be the Upper Dockum Unit because the Ogallala Aquifer is not present at the site. The EPA has defined the uppermost aquifer as the geologic formation, group of formations, or part of a formation that is the aquifer nearest to the ground surface capable of yielding a significant amount of groundwater to wells or springs. The Upper Dockum Unit certainly does not yield a significant amount of groundwater. However, preliminary drilling in the site area has found portions of this unit to be water-bearing and to possess consistent hydrologic characteristics.

The identification of a confining layer on the lower boundary is an essential factor in the identification of the uppermost aquifer. The thick sequence of mudstones of the Lower Dockum Unit (as discussed in Section 3.4.2.1) represents a high-integrity aquitard, effectively confining the aquifer. Although there is a saturated basal sandstone in this unit, the 600 to 650 feet of mudstones separating the Upper Dockum sediments from this sandstone are of sufficiently low permeability to prevent hydraulic communication between the Upper and Lower Dockum Units.

As previously discussed in Section 3.6.2.1, several springs are present where the Ogallala Formation crops out, two miles east of the Facility site, along the 200-foot high Caprock escarpment. These springs are present where the Ogallala sands unconformably overlie impermeable Dockum mudstones and claystones and the groundwater moves laterally to the surface. Where these water-bearing Ogallala sands are in contact with more permeable units of the Upper Dockum, saturation of these underlying sediments occurs. The result, as illustrated in Figure 3-10, is the formation of a groundwater divide east of the proposed site. The majority of the groundwater entering the Upper Dockum flows to the east, conforming to the regional dip of the unit. There is also a minor flow component which slopes away from the unconformable contact, creating a steep hydraulic gradient towards the west. This gradient does not extend beneath the Facility site. As shown in Figure 3-20, this gradient must lie immediately east of PB-38, which is still unsaturated, whereas holes WW-1 and PB-26 are saturated.

Where groundwater has been observed in the Upper Dockum, not all lithologies within the unit are saturated. Air drilling through these sediments found the mudstones to be unsaturated. The more permeable sandy siltstone facies were water-bearing below depths of 135 to 150 feet. These saturated lithologies were encountered approximately 2,500 feet east (downdip) of the proposed landfill site, beyond the proposed Facility boundary (Figure 3-20). It is extremely significant that this saturation does not extend beneath the Facility site. All 31 drill holes within the site boundary, as shown on Figure 3-15, were unsaturated. For this reason, there were no groundwater production tests conducted.

Exploratory drilling west of the proposed Facility boundary (updip), near the outcrop of the Upper Dockum Unit, the small sandy hills located along the section line between Section 18, T11S, R31E and Section 13, T1 1S, R30E, encountered an isolated occurrence of groundwater (Figure 3-19). In a single drill hole (PB-14), at a depth of 42 feet, a small accumulation of groundwater was found in a depression developed on the surface of the underlying Lower Dockum mudstones. This depression is consistent with the "scouring" of the Upper Dockum fluvial sediments into the Lower Dockum mudstones (Section 3.4.3.2). Closer spaced drilling in the vicinity of this occurrence encountered no other such accumulations. This isolated "pooling" is most likely a result of surface runoff entering the subsurface from the nearby outcrop and being caught in a small "stratigraphic trap."

Because of the identification of groundwater in borehole 14, an offset (borehole 14o) was completed 400 feet to the east (down-gradient). This borehole location was in addition to those pre-approved by the NMED, but determining the potential extent of groundwater saturation was important. Borehole 14o was drilled to a depth of 100 feet.

There was no saturation observed while drilling this offset, but the geophysical log indicated the presence of fluid at the bottom of this borehole. The top of the fluid was observed to be at a depth of 92.0 feet, indicating a maximum apparent concentration of 3.5 feet. This is an apparent concentration because a 2.25-inch probe will displace approximately one-half of the volume of the hole. Regardless of all of these factors, there was approximately 1 gallon of fluid in the bottom of this borehole introduced by a heavy rainfall that occurred after the hole was drilled and before it could be logged. Due to the impermeable nature of the Lower Dockum mudstones, the water did not infiltrate into the formation and was trapped in the bottom of the hole.

The hole was cased with 3-inch plastic tubing and monitored for several weeks. No additional water entered the hole, and, in fact, the gallon of water eventually dispersed into the Lower Dockum. An examination of the log for PB-14o shows the bottom of the sandy silt unit (Upper Dockum) to be a depth of 36 feet. If the Upper Dockum was the source of the water, the hole would have equilibrated or filled to a depth of at least 36 feet. The fluid did not migrate upward through several hundred feet of Lower Dockum mudstones; therefore, there is no apparent subsurface source for the small quantity of water shown in the log for this hole.

Water Level Measurements—After the stratigraphically trapped water (Cross section 3-3, Appendix G, of the Permit Application dated October 2000) was encountered, temporary casing was placed in the drill hole (PB-14) so that piezometric water levels could be measured. For the first six weeks after casing the drill hole, the water was pumped from the hole weekly. After each pumping event, the water returned to a static level of 42 feet. Subsequent water level measurements have confirmed a static water level in this drill hole.

In addition to casing drill hole PB-14, nine other drill holes, located downdip, were also cased. Although the Upper Dockum is unsaturated in these other drill holes, the holes were examined weekly for six weeks. No water was observed except for that previously described in PB-14o. The drill holes that were cased with 3-inch plastic casing and the perforated intervals for these holes are as follows:

Hole No.	Perforated Zone	Base of Upper Dockum
PB-14	30-80	42'
PB-14o	20-40	36'
PB-33	20-55	52'
PB-18	60-80	78'
PB-16	60-80	79'
PB-15	30-65	62'
PB-13	30-50	48'
PB-9	40-80	72'
PB-7	20-40	38'
PB-17	60-85	80'

The intent of installing casing in these 10 holes was to allow any groundwater in the vicinity of these drill holes to collect for detection purposes. The depths of the cased intervals varied because there is an approximate 1° regional dip to the east. All cased intervals extend down to the bottom of the Upper Dockum sand. Slits were cut in the PVC casing every foot throughout the perforated zones.

Water Quality—Preliminary water quality data were obtained from limited chemical analyses on a sample of the stratigraphically trapped groundwater from drill hole PB-14. These results include the following measurements:

- Total dissolved solids (TDS): 4,920 milligrams per liter (mg/L)
- Alkalinity: 396 mg/L
- Sodium: 1,640 mg/L
- Magnesium: 103 mg/L

These preliminary data indicate that water from the Upper Dockum is of poor quality. The most significant parameter is TDS; water with TDS values of greater than 1,000 mg/L is considered to be unfit for human consumption.

3.6.2.3 Lower Dockum Aquifer

The basal sandstone of the Lower Dockum Unit is the water-bearing portion of this unit. As shown in Figure 3-10, this unit is overlain by a thick sequence (600 to 650 feet) of low permeability mudstones that act as an aquitard. The recharge area for the Lower Dockum Aquifer is the Pecos River drainage to the west. Groundwater flow direction is easterly, along the regional dip of this unit.

Most of the shallow drilling in the site area has "bottomed" in the upper portion of the aquitard. Two holes (WW-1 and WW-2) were drilled to approximately the base of the Triassic section and encountered water from the Lower Dockum Aquifer (Figure 3-20). Hole WW-1 also penetrated a saturated zone in the Upper Dockum Unit, resulting in a mixing of these groundwaters in this drill hole.

Both holes were drilled with an air-rotary rig and drill cutting samples were collected. WW-1 was completed to a depth of 820 feet and, at the time of drilling, no water saturation was apparent in the drill cuttings. WW-2 was completed to a depth of 710 feet; however, circulation was lost at a depth of 645 feet. Loss of circulation commonly occurs when drill cuttings are too wet for the air pressure of the rig to remove the cuttings from the hole. It is likely that the basal sandstone of the Lower Dockum Unit was penetrated at this depth.

Water Level Measurements—Temporary plastic casing was placed in each of the two holes immediately after completion. In July 1994, geophysical logs were run for each hole, and water levels were identified. WW-1 had a water level of 155 feet. This level is 20 feet above the Upper/Lower Dockum contact, and it is likely that groundwaters from both units are present in this drill hole. A water level of 467 feet was observed for WW-2. This finding indicates that there is a hydrostatic head pressure within the Lower Dockum Aquifer of 178 feet.

Both of these cased holes were pumped and allowed to recover. After a sufficient recovery period, a static water level (155 feet for WW-1 and 467 feet for WW-2) was maintained.

Water Quality—Preliminary water quality data are presented only for WW-2. This drill hole encountered groundwater from the Lower Dockum. Because groundwater from the Upper Dockum and Lower Dockum was mixed in drill hole WW-1, preliminary water quality data from WW-1 do not accurately characterize either aquifer and are not presented. The results from WW-2 include the following:

- TDS: 18,800 mg/L
- Alkalinity: 83 mg/L
- Sodium: 7,030 mg/L
- Magnesium: 87 mg/L

These preliminary data indicate that the water quality of the Lower Dockum is saline. The extremely high TDS values are indicative of long formation retention times, which reflects low groundwater flow and low permeability conditions within the Lower Dockum aquifer.

3.6.3 Contaminant Transport Modeling

For the purpose of this application, two types of groundwater modeling were performed to estimate contaminant transport times. One approach is extremely conservative and presents a "worst-case" scenario. One of the many conservative assumptions used in these calculations, despite field evidence, is that contaminant transport will take place under saturated conditions. A second, more realistic approach, assumes unsaturated flow conditions.

3.6.3.1 Saturated Flow Modeling

Saturated flow modeling was used to simulate potential leakage or infiltration from the Facility landfill. The objective of contaminant transport modeling was to calculate the time necessary for a hypothetical leak from the landfill to reach the uppermost aquifer. Travel time was calculated using a steady-state groundwater flow model. The model was based on results of the site investigation and geologic characterization, which indicated that perched groundwater exists upgradient and downgradient of the site (Section 3.6.2.2).

Perched groundwater located approximately 2,500 feet downgradient of the proposed landfill is the uppermost aquifer that could be affected by a contaminant. For the purpose of calculating travel time to the uppermost aquifer, contaminants were assumed to travel from the location of the Upper Dockum/Lower Dockum contact at borehole PB-3 to the perched groundwater downgradient of the site (Figure 3-20). This location was chosen for contaminant transport modeling because it represents the shortest distance from the proposed landfill to downgradient groundwater. The Lower Dockum unit will act as a barrier limiting the vertical migration of contaminants because of its lower permeability and contaminated groundwater will preferentially migrate along the Upper Dockum/Lower Dockum contact until reaching the uppermost aquifer, located 2,500 feet downgradient of the site.

As mentioned in Section 3.4.3.2, representative core samples from the Upper and Lower Dockum were sent to a materials testing laboratory for measurement of geotechnical parameters, including hydraulic conductivity (1994 Site Investigation).

The following assumptions were made during modeling groundwater flow and contaminant transport to the uppermost aquifer. All of these assumptions are believed to be conservative in that they result in shorter travel times to the uppermost aquifer:

- It was assumed that contaminants would migrate completely through siltstones, along the Upper Dockum/Lower Dockum contact. A saturated hydraulic conductivity value of the siltstone unit (1.22×10^{-5} cm/s) was used for calculating travel time. In reality, both higher permeability siltstones and lower permeability mudstones (2.45×10^{-7} cm/s) will exist along the migration pathway. As contaminant velocity is directly proportional to the permeability value that is used in the calculation, using a value approximately two orders of magnitude greater than the lower permeability unit results in an extremely conservative estimate of travel time to the uppermost aquifer.

- It is reasonable to assume that any lateral migration of contaminants from the proposed landfill will occur in the most permeable units (siltstones/sandstones) within the Upper Dockum unit. However, the fluvial depositional environment of the Upper Dockum resulted in the formation of discontinuous lenses of various lithologies. This discontinuous deposition pattern (fades changes) is well illustrated in cross sections shown in Figure 3-13. Using these cross sections as a specific example, any lateral migration within the siltstones/sandstones at the base of the Upper Dockum unit will encounter a lower permeability mudstones fades approximately 1,000 feet downgradient from the eastern edge of the proposed landfill. This permeability barrier will severely retard continued migration. In the contaminant modeling for this section, these lithologic changes were not credited. Instead, it was assumed that there was a continuous siltstone/sandstone migration pathway from the proposed landfill to the uppermost aquifer. This assumption, based on the discontinuous, fluvial deposition environment within the Upper Dockum, is considered to be conservative;

- To provide an additional degree of conservatism for the travel time calculations, a non-reactive contaminant was assumed to be transported in the groundwater at the interstitial water velocity. Most contaminants are reactive, which results in longer travel times. The ratio of the reactive transport time to non-reactive travel time is given by the retardation coefficient. The retardation coefficient can be calculated, for organic contaminants, by using Equation 1:

$$R = 1 + \frac{(\rho_b \,\&\, F_{oc} * K_{oc})}{\phi} \tag{1}$$

where R = retardation coefficient
ρ_b = bulk density
K_{oc} = organic carbon partition coefficient
F_{oc} = fraction of organic carbon
ϕ = porosity

- For a typical reactive compound such as trichloroethylene (TCE), a retardation coefficient of 4.89 is calculated using measured values of 0.0089 for the fraction of organic carbon, 1.96 g/cm^3 for bulk density, and 0.48 for the porosity of the siltstone; and a handbook value of 107.15 cm^3/g for the organic carbon partition coefficient (Knox et al., 1993). This means that TCE would require 489 percent more time to reach the uppermost aquifer than a non-reactive contaminant;

- The Upper Dockum sediments in the area of the proposed landfill and extending approximately 2,500 feet downgradient from the landfill are unsaturated. For the purpose of this contaminant transport modeling, it was assumed that these sediments were saturated and that lateral migration occurred under steady-state conditions. Due to our understanding of the subsurface conditions of the Upper Dockum unit at the proposed site, this assumption is also considered to be conservative. Assuming saturated conditions results in a conservative estimate of travel time to the uppermost aquifer because unsaturated hydraulic conductivities are orders of magnitude less than saturated values, especially at low water contents (Fetter, 1988). Assuming saturated conditions may result in slightly underestimating hydraulic gradients, especially at short distances; however, at longer distances hydraulic gradients will approach saturated values. Most importantly, while hydraulic gradients vary only by a factor of two or three, this variation is more than offset by the use of values for hydraulic conductivity. The hydraulic conductivity values are orders of magnitude greater during saturated conditions.

- Saturated hydraulic conductivity and porosity values for the Upper Dockum siltstone used during modeling were based on laboratory tests of cores collected during the drilling program. Average saturated hydraulic conductivity and porosity values for the siltstone were 1.22 x 10^{-5} cm/s and 0.48, respectively.

- Travel time was calculated using a steady-state model represented by Darcy's Law as shown in Equation 2 (Fetter, 1988).

$$q = K_{sat} \frac{dh}{dl} \tag{2}$$

where q = darcy flux
K_{sat} = saturated hydraulic conductivity
h = hydraulic head
l = length

- The hydraulic gradient used in the model was calculated by dividing the elevation difference between the location of the hypothetical leak and the perched downgradient water (4055-4025) by the distance between these sites (2,500 feet). This calculation results in a hydraulic gradient of 0.012 and a darcy flux of 1.46 x 10^{-7} cm/s.

- Interstitial water velocity was calculated using Equation 3. Water content was assumed to be 0.48 based on the assumption of saturated flow.

$$v = \frac{q}{\theta} \tag{3}$$

where v = interstitial water velocity
q = darcy flux
θ = water content

The results of the modeling indicate that a solute would travel at an interstitial velocity of 3.05×10^{-7} cm/s and would require 7,920 years to reach the uppermost aquifer. This estimate of travel time is extremely conservative for the following reasons: (1) the saturated hydraulic conductivity of the siltstone used in the calculations is two orders of magnitude greater than the hydraulic conductivity of the mudstone; (2) non-reactive chemical transport was assumed; and (3) saturated hydraulic conductivity values used in the model are orders of magnitude greater than unsaturated values.

To confirm this travel time, similar calculations were conducted using the results of the 1995 confirmation drilling program. A hydraulic gradient of 0.0135 was calculated between drill holes PB-36 and PB-38. The same modeling parameters and equations were applied to this gradient. It was estimated that the time required for contaminants to migrate 2500 feet from the eastern boundary of the proposed landfill to the uppermost aquifer will be 7,042 years.

3.6.3.2 Unsaturated Flow Modeling

Unsaturated flow modeling was performed to simulate potential leakage or infiltration from the proposed hazardous waste landfill. Site characterization data indicate unsaturated conditions in the strata surrounding the proposed landfill. The unsaturated flow model developed by Mckee and Bumb (1988) predicts the extent of wetting fronts emanating from leakage sources on the base and side slopes of the landfill. Leakage rates were based on preliminary HELP (Hydrologic Evaluation of Landfill Performance) modeling results presented in Tables 3-3 and 3-4. The modeling results help illustrate how the natural hydrological conditions at the site inhibit subsurface fluid flow. [Note: These HELP modeling results should not be confused with those presented in the engineering report in Attachment L of the Permit Application dated October 2000, which support the current landfill design.] Three separate simulations were performed to account for the heterogeneities at the site. The first simulation predicts the soil moisture distribution in the Lower Dockum from leakage sources at the base of the landfill. The second simulation predicts the lateral movement of the wetting front into the Upper Dockum from leakage sources on the side slopes of the landfill. The third simulation predicts fluid movement through the clay berm and adjacent Quaternary alluvium along the perimeter of the landfill. The predicted wetting fronts led to the estimation of unsaturated hydraulic conductivities, darcy flux rates, interstitial water velocities and approximate contaminant travel times to the nearest aquifers. The primary modeling objectives include the following:

- prediction of the effective saturation distribution (wetting front) emanating from the landfill source;
- determination of the unsaturated hydraulic conductivity and advective transport rates; and
- breakthrough time of the wetting front at the edge of the clay berm.

Modeling Methodology

Unsaturated flow modeling was performed using the exact steady-state solution developed by Mckee and Bumb (1988) and Bumb and Mckee et al. (1988). The steady-state solution derived from the Richards equation (1931) of unsaturated flow provides more conservative results in lieu of transient based solutions.

The Mckee and Bumb (1988) and Bumb and Mckee et al. (1988) steady-state solution for a continuous point source in an infinite isotropic medium is governed by the following equation:

$$\Delta\eta_\infty = \frac{Q^{\exp\left[\frac{\alpha}{2}\left(z-z'-\sqrt{r^2+(z-z')^2}\right)\right]}}{4\pi\sqrt{r^2+(z-z')^2}}$$

$$r = \sqrt{(x-x')^2-(y-y')^2} \tag{4}$$

$$\Delta\eta_\infty = \text{hydraulic potential}$$

$$S = S_r + (S_m - S_r)(\alpha\eta / K_o)^{1/n}$$

$$S_e = (\alpha\eta / K_o)^{1/n}$$

At the Facility site, the evapotranspiration rate is high with respect to precipitation. According to Mckee and Bumb (1988), the soils in semiarid regions of the western United States are at or below residual saturation (S_r). Therefore, the observed initial moisture contents are probably at or near the residual moisture content. Generally fluid flow is inhibited at soil moisture contents at or below the residual moisture content. The amount of saturation above the residual moisture content is referred to as the effective saturation. Unsaturated hydraulic conductivity is a function of the effective saturation and is expressed in the following equation (Mckee and Bumb, 1988; Bumb and Mckee et al., 1988):

$$K(\theta) = K_o S_e^n \tag{5}$$

Brooks and Corey (1964) correlated the N exponent with the pore size distribution index a. Mckee and Bumb (1988) by confirmation of theoretical derivations by Irmay (1954) suggest an optimal value of 3 for η.

Under steady-state conditions flow is driven by the force of gravity as the matric potential approaches unity (Hillel, 1980). Therefore, under steady-state conditions the unsaturated hydraulic conductivity ($K(\theta)$) is equal to the darcy flux ($q(\theta)$), which in turn is multiplied by the unit area to obtain a leakage or discharge rate (Q). The following equations express these relationships:

$$q(\theta) = K(\theta)$$

$$Q = \frac{q(\theta)}{A} \tag{6}$$

The average interstitial water velocity was used to estimate advective transport rates of non-reactive conservative solutes. Approximate travel times to the nearest aquifers can be estimated from the interstitial water velocity using the following expression:

$$v = \frac{q}{\theta} \tag{7}$$

In summary, modeling assumptions include steady state unsaturated flow in an infinite domain, a continuous leakage source, flow through porous medium, complete saturation of the soil beneath the source, and initial

uniform saturation of the medium. The modeling does not account for secondary permeability features such as faults, fractures and macropores.

Input Parameters

Input parameters and initial boundary conditions were based on observed field conditions, landfill design specification, and preliminary HELP modeling results. [Note: These preliminary HELP modeling results were based on a landfill liner design which did not incorporate a double liner system on the side slope areas. These results should not be confused with the HELP modeling results presented in the engineering report in Attachment L of the Permit Application dated October 2000. The results presented in the engineering report support the currently proposed landfill design which incorporates a double liner in all areas and does not indicate any leakage from the landfill.] Average hydraulic parameters for the Lower and Upper Dockum and landfill design specifications are presented in this section. Input parameters used for the unsaturated flow modeling are presented in Table 3-6.

The source term geometry was based on the east-west geologic cross section. Modeled source coordinates correspond to the basal and eastern slope dimensions of the proposed landfill. Conservative average leakage rates from the preliminary HELP modeling were used as source terms along the base (8.58 gpad) and eastern side slope (40.86 gpad) of the landfill to provide conservative "worst-case" estimate of unsaturated flow. The leakage rate for the floor of the landfill was based on HELP modeling simulations between 70 and 200 years. The initial leakage rates for the first 50 years of HELP modeling were excluded from the average because these rates were extremely low and probably not representative of steady state conditions. These simulated leakage rates are based on extreme conditions such as waste moisture content conditions which exceed the field capacity of the waste and a termination of leachate pumping following the 30-year post-closure period. Average site-specific saturated hydraulic conductivity values for the Upper Dockum siltstone (1.22×10^{-5} cm/s) and Lower Dockum (5.68×10^{-8} cm/s) were used as initial conditions for the first two modeling simulations. The design specifications of the clay berm require material with a permeability on the order of 10^{-7} cm/s. The saturated hydraulic conductivity of the Quaternary alluvium was assumed to be three orders of magnitude less than that of the clay berm. The effective saturation values for the Upper and Lower Dockum simulations were based on site-specific average initial moisture contents (Stoller, 1994). The bubbling pressures for the Upper and Lower Dock-urn, clay berm, and Quaternary alluvium simulations were based on average values of similar types of geologic materials reported by Bumb and Mckee et al. (1988).

Initial boundary conditions are presented in Figure 3-21, which shows a schematic of the proposed landfill and surrounding hydrostratigraphy. As displayed in Figure 3-21, the Lower Dockum Aquifer is approximately 600 feet (200 meters) below the site. The perched aquifer in the Upper Dockum is located approximately 2,500 feet (755 meters) to the east. The clay berm surrounding the proposed landfill is approximately 20 feet (6 meters) thick and rests on top of the Upper Dockum. The initial soil moisture contents of the surrounding day berm and strata are assumed to be uniform and at residual saturation.

Modeling Results

The steady state unsaturated flow modeling results are presented in Figures 3-22 through 3-26. The Upper Dockum and clay berm results are presented as a function of lateral distance from the landfill source. The Lower Dockum results are presented as a function of depth from the source. The results of the modeling simulations are in reference to the landfill source.

Figure 3-22 displays the effective saturation at various distances from the source. As the wetting front disperses from the landfill source the chart shows abrupt decreases in saturation. The clay berm/Quaternary alluvium and Upper Dockum simulations show the sharpest decrease in saturation with S_e values decreasing by nearly an order of magnitude at less than 100 meters from the source. Although the effective saturation dissipates less rapidly in the Lower Dockum, moisture contents decrease by nearly on order of magnitude at approximately 200 meters from the landfill source. The modeling results indicate that the Lower Dockum

maintains greater saturation than the Upper Dockum, clay berm and Quaternary alluvium because fluid movement is driven primarily by gravitational forces; therefore fluid migration is greatest in the vertical direction.

Figures 3-23 and 3-24 display the unsaturated hydraulic conductivity and interstitial water velocity results, respectively. Comparison of these data to the effective saturation distributions (Figure 3-22) shows the high degree of correlation between unsaturated flow and soil moisture content. Figures 3-23 and 3-24 show abrupt decreases in unsaturated hydraulic conductivity and interstitial water velocity, respectively, at relatively short distances from the source. Although Figure 3-24 shows that the interstitial water velocities decrease exponentially over distance, gross travel times may be estimated. The simulated interstitial water velocities were used to compute the following contaminant travel times of non-reactive solutes:

- contaminant travel time from the base of the landfill to the Lower Dockum Aquifer, located approximately 200 meters (600 feet) below the site, is estimated at 4,084,674 years;
- contaminant travel time from the eastern slope of the landfill to the perched groundwater in the Upper Dockum at a lateral distance of 755 meters (2,500 feet) was estimated at 3.4 billion years;
- breakthrough time of the wetting front at the edge of the clay berm (a travel distance of 6 meters or (20 feet) was estimated at 866 years; and
- contaminant travel time through the clay berm and Quaternary alluvium to a point above the perched groundwater (a distance of 755 meters) was estimated at 574,507,913 years.

Figures 3-25 and 3-26 display the steady state leakage per unit area as a function of distance from the source. Figure 3-26 also shows that the leakage rate at the edge of the clay berm (6 meters from the source) is approximately 10 gpad but quickly dissipates in the Quaternary alluvium. Despite the high leakage rate (10 to 11 gpad), calculations indicate that it would take a wetting front approximately 866 years to reach the outer edge of the berm.

Explanation of equation parameters:

A = area [L^2]
k = hydraulic conductivity [L/T]
K_o = hydraulic conductivity at maximum saturation [L/T]
n = power in the power-law relationship for K as a function of soil saturation
Q = flow rate or strength of point source [L^3/T]
R = distance from point source [L]
S = saturation of the soil
S_e = effective saturation
S_m = maximum saturation
S_r = irreducible or residual saturation
v = velocity of particles
x,y,z = Cartesian coordinates, z defined positive downward [L]
x',y',z' = location of point source [L]
α = constant defined by n/β [1/L]
β = bubbling pressure [L]
θ = volumetric moisture content
$\varnothing$ = porosity

$\Delta\eta$ = hydraulic potential

3.7 Groundwater Protection Requirements

The following sections present general monitoring requirements and detection monitoring requirements, respectively.

3.7.1 General Monitoring Requirements

The selection of a monitoring program to identify contaminant releases from the proposed Facility was based on results of the geologic characterization and RCRA guidance. For the purposes of designing a monitoring program for the site, the Upper Dockum Unit was considered the uppermost aquifer (Section 3.6.2.2). This unit is not saturated within the Facility boundaries.

Two major geologic factors influence the design of a program to monitor potential contaminant releases from the site. These factors are the intermittent nature of saturation in the Upper Dockum downgradient of the Facility and the presence of a low permeability layer (the Lower Dockum) that significantly limits the potential for vertical migration of contaminants. These two factors influence potential groundwater transport pathways for contaminants released from the Facility, and therefore affect the placement of monitoring devises.

There is no regional aquifer within the Upper Dockum; however, adjacent to the project boundary, permeable zones have been observed to be saturated. Exploratory drilling upgradient and downgradient of the site has identified isolated pockets of groundwater in permeable facies of the Upper Dockum (Section 3.6.2.2). Downgradient of the site, perched groundwater was detected above the Upper Dockum/Lower Dockum contact, approximately 2,500 feet east of the proposed landfill. Upgradient of the site, an isolated pocket of groundwater was detected at bore hole 14. The low permeability of the underlying Lower Dockum will prevent significant vertical migration of groundwater and will direct flow downdip along the Upper Dockum/Lower Dockum contact in the direction of perched groundwater east of the site. Therefore, potential contaminant releases from the proposed Facility will preferentially migrate downdip along the Upper Dockum/Lower Dockum contact.

Given the geologic and hydrologic features controlling the movement of groundwater at the site, monitoring the Upper Dockum is the most effective manner in which to immediately detect potential releases from the Facility. However, the placement of monitoring wells in the Upper Dockum is limited due to the fact that this unit is unsaturated within the site boundary. The utility of placing groundwater monitoring wells 2,500 feet downgradient of the landfill is questionable. The most effective monitoring program will involve vadose zone monitoring.

A formal groundwater monitoring waiver was submitted to NMED in January 2000 and approved January 12, 2000. As part of the groundwater monitoring waiver, a VZMS was proposed, and was approved in the 2002 permit. Details of the VZMS are presented in Section 3.7.2.

3.7.2 Vadose Zone Monitoring Requirements

The VZMS consists of two components. The first is a vadose zone sump beneath the landfill LCRS and LDRS sumps. The second component is a network of vadose zone monitoring wells downdip and updip of the landfill with respect to the dip of the geologic formation stratigraphy. The intent of the VZMS sump is to provide an immediate indication if there is any leakage from the double composite liner system. Leakage from the secondary liner will be intercepted by the VZMS sump, which will be checked daily for the presence

of liquids. The vadose zone monitoring wells are intended to detect any water flowing from the facilities in a lateral (downdip) direction.

The design of the VZMS is shown in the Design Drawings 15 through 19 in Attachment L1. It includes a 60-mil HDPE liner system below the bottom of the secondary liner system in the area of the sump. The vadose zone liner system is limited to an area directly beneath the sump, as this is the area expected to have the most liquids ponded for the longest period of time. Above the HDPE liner in the vadose zone sump, a drainage gravel surrounds a side slope riser pipe that extends into the sump. The sideslope riser pipe allows a pump to be installed in the sump to remove accumulated liquids.

The VZMS, shown in the design drawings (Permit Attachment L1) and described above, is expected to be a much more immediate indicator of leakage from the landfill than a groundwater monitoring system in the deep regional aquifer. Given the geologic and hydraulic conditions at the base of the landfill (unsaturated Upper Dockum siltstones and claystones), any fluids leaking from the landfill will best be monitored by the VZMS sump and vadose zone monitoring wells at the Upper Dockum/Lower Dockum contact. Because each cell is graded so that leachate will collect in the sump, the sump area will have the highest hydraulic head on the liner system. A vadose liner below the sump areas will indicate quickly if liquids are escaping from the liner system in the sump area. The VZMS sump will not only provide an indication that the LDRS sump is leaking, but will also provide access to remove the leakage and minimize head buildup in the sump and in liners above. The VZMS sump for the landfill will be monitored for the presence of liquids whenever the primary or secondary sumps are monitored. As described in Section 5.2.2, these systems will be checked daily during active operations and closure.

Details of the location, depth and construction for the vadose zone monitoring system wells are presented in the VZMS Work Plan (Appendix I). In addition, specific procedures for monitoring and sampling the sump and wells and the required procedures for analyzing any collected liquid are presented in the VZMS Work Plan.

3.8 Summary and Conclusions

The proposed location of the Facility landfill in eastern Chaves County, New Mexico is ideal. It is located in an unpopulated portion of the county, on privately owned land, and more than 36 miles from the nearest community. The semiarid climate of this region with its high evaporation rate and lack of surface water will play an important role in the proposed site's ability to confine and control material placed in the landfill.

Large-scale ranching is the primary land use for this portion of Chaves County. However, setting aside the 480 acres proposed for the Facility will have no impact on the ranching industry in the region, as these acres support fewer than five animal units year-long. Because the economic stimulation provided by landfill-related jobs will greatly offset the minimal economic impact of the loss of grazing land, the project has the support of the surrounding community.

A geologic setting for the Facility was selected that will enable the proposed landfill to be developed in an environment that will protect groundwater resources and ensure long-term isolation of wastes. The host rocks for this Facility are the sediments of the Dockum Group of Triassic age. Because these sediments are unsaturated and of low permeability, they represent a stable geologic barrier to the potential migration of contaminants from the landfill.

The landfill will be developed within sediments of the Upper Dockum unit. These sediments, consisting of fluvial, interbedded mudstones (30 percent) and siltstones (70 percent), are unsaturated beneath the proposed site. The nearest groundwater production comes from the Tertiary Ogallala Aquifer. The western boundary of this aquifer forms a topographic feature called the Caprock, which is approximately 2 miles east and several hundred feet higher than the proposed site.

While the Upper Dockum unit is unsaturated beneath the site, it is partially saturated 2,500 feet east of the proposed landfill (downdip). The source of this groundwater is infiltration from the overlying Ogallala Aquifer. Due to this perched groundwater, the Upper Dockum unit is designated as the uppermost aquifer for the purposes of this permit application.

The hydrologic setting of the Facility is extremely protective of groundwater resources. To demonstrate the integrity of the natural barriers present at this site, conservative contaminant transport modeling was performed, in which the most conservative parameters were consistently input into the modeling process. Acceptable conclusions were obtained even though "worst-case" assumptions were used. The site's actual values will obviously provide an even larger margin of safety than the conclusions indicate.

For example, conservative transport modeling calculated that it will take 7,000 to 8,000 years for potential contaminates to migrate laterally through the sediments on the flanks of the proposed landfill to the nearest perched groundwater-bearing intervals within the uppermost aquifer. To emphasize the conservative nature of these calculations, saturated conditions were assumed for this modeling even though the Upper Dockum sediments at the proposed site are unsaturated. The migration pathway was assumed to be entirely through highly permeable siltstones, although close-spaced drilling indicated that 30 percent of this pathway would be composed of low-permeability mudstones. A non-reactive contaminant was also assumed, even though in reality a contaminant would react with the sediments through which it was traveling, adding considerably to the overall travel time.

To illustrate the conservative nature of this 7,000- to 8,000-year travel time, a second, unsaturated flow modeling approach was applied to the lateral contaminant migration scenario. This more realistic calculation resulted in an estimated travel time of 3.4 billion years.

The character of the Lower Dockum sediments is much different from that of the overlying Upper Dockum unit. The Lower Dockum consists of a 600-foot thickness of homogeneous, lacustrine mudstones overlying a thin basal sandstone. This thick sequence of unsaturated, low permeability mudstones represents a geologic barrier to the potential downward migration of contaminants from the proposed landfill. Unsaturated flow modeling estimated that 4 million years would be required for contaminants to migrate downward through these Lower Dockum mudstones and reach a Lower Dockum aquifer.

The description of the Facility, as presented in this permit application, is a result of numerous years of investigation to identify an environmentally sound site in southeastern New Mexico where hazardous wastes could be safely disposed of. The location, geology, and hydrology of the proposed site present a unique setting, where natural geologic barriers, combined with a protective landfill design, will ensure long-term isolation of hazardous wastes from the environment.

Table 3-1. Temperatures at Roswell, 1977 to 1978

Month	Monthly Average (°F)	Average Daily Maximum (°F)	Average Daily Minimum (°F)
January	38.1	55.4	20.8
February	42.9	60.9	24.8
March	49.3	57.7	30.9
April	59.7	78.2	41.2
May	68.5	86.4	50.5
June	77.0	94.2	59.8
July	79.2	94.7	63.7
August	77.9	93.4	62.3
September	70.4	86.5	54.3
October	59.6	77.0	42.2
November	46.9	64.8	29.0
December	39.3	56.8	21.8
Annual	59.1	76.3	41.8

Table 3-2. Monthly and Annual Precipitation Summary for Roswell (inches), 1977 through 1982

	Precipitation (inches)												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1977	0.07	0.36	0.27	1.25	2.43	0.25	0.46	4.45	0.29	0.62	0.48	0.02	10.95
1978	0.50	0.48	0.39	0.02	1.81	4.31	0.52	3.49	3.58	1.47	1.25	0.43	18.25
1979	0.41	0.44	0.13	0.32	1.25	1.56	1.44	2.28	0.15	0.18	T	0.37	8.53
1980	0.85	0.19	0.00	1.06	0.85	0.29	0.01	2.45	6.58	T	0.77	0.15	13.20
1981	0.27	0.17	0.10	0.79	3.35	4.55	6.27	4.73	2.70	1.02	0.25	0.13	24.33
1982	0.66	0.20	0.12	0.41	0.20	0.76	1.03	0.93	2.00	0.20	0.92	1.62	9.05
												Normal	10.61

T = Trace

Table 3-3. Water Wells Within 10 Miles
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Basin	County	OSE POD Number	Use	Diversion (ac-ft/yr)	Owner	Township	Range	Section	Q64 [a]	Q16 [a]	Q4 [a]	Distance (meters)	Distance (miles)
Lea County	Lea	L 11326 S2	COM	80	Gandy Marley, Inc.	11S	31E	27	2	4	4	6,352	3.9
Lea County	Lea	L 11326				11S	31E	27	4	4	4	6,471	4.0
Lea County	Lea	L 11326 S2				11S	31E	27	4	4	4	6,471	4.0
Lea County	Chaves	L 12224 POD2	PDL	3	Fred Pearce	12S	31E	3	4	2	2	8,250	5.1
Lea County	Lea	L 05636	PRO	0	Glenn's Water Well Service	12S	32E	6	1	1	3	11,073	6.9
Lea County	Lea	L 08054	PLS	3	Nelva G. Smith	11S	32E	10	2	1	3	13,657	8.5
Lea County	Chaves	L 06749 POD2	STK	3	Cindy J. Graham	12S	31E	26		3	4	14,883	9.2
Lea County	Chaves	L 06749 POD2	COM	0	Lyman Graham	12S	31E	26		3	4	14,883	9.2
Lea County	Lea	L 10141	SRO	170	Commissioner of Public Lands of New Mexico	12S	31E	25			3	15,154	9.4
Roswell Artesian	Chaves	RA 10249	DOM	0	Daniel Orozco	10S	31E	31	4	4	3	4,999	3.1
Roswell Artesian	Chaves	RA 08576	STK	3	Fred Pearce	11S	31E	34	4	2	2	6,724	4.2
Roswell Artesian	Chaves	RA 08585	STK	3	Pearce Trust	12S	30E	2	3	1	1	7,388	4.6
Roswell Artesian	Chaves	RA 08302	STK	4	Bureau of Land Management	12S	30E	3	4	4	4	8,504	5.3
Roswell Artesian	Chaves	RA 08586	STK	3	Pearce Trust	12S	30E	3	4	4	4	8,504	5.3
Roswell Artesian	Chaves	RA 11023 POD1	IRR	3	U.S. Department of Interior Bureau of Land Management	12S	30E	11	1	1	1	8,570	5.3
Roswell Artesian	Chaves	RA 08587	STK	3	Pearce Trust	12S	30E	4	4	2	1	9,165	5.7
Roswell Artesian	Chaves	RA 02944 REPAR	DOM	3	Alf W. Guffey	10S	29E	34	1	4	4	10,965	6.8
Roswell Artesian	Chaves	RA 08589	STK	3	Pearce Trust	11S	30E	19	1	3	1	10,998	6.8
Roswell Artesian	Chaves	RA 10577	STK	3	Button Mesa Ranch, Watts Land & Cattle	10S	31E	35	1	2	1	11,014	6.8

Source: Data were downloaded from the New Mexico Office of the State Engineer WATERS database on October 13, 2011 (http://nmwrrs.ose.state.nm.us/nmwrrs/index.html).
[a] Quarters are 1=NW, 2=NE, 3=SW, and 4=SE (quarters are smallest to largest).

COM = Commercial
PDL = Non 72-12-1 Domestic & Livestock
PRO = 72-12-1 Prospecting or Development of Natural Resource
PLS = Non 72-12-1 Livestock Watering
STK = 72-12-1 Livestock Watering
SRO = Secondary Recovery of Oil
DOM = 72-12-1 Domestic One Household
IRR = Irrigation
Q = Quarter
OSE New Mexico Office of the State Engineer
POD = Point of diversion

Table 3-3. Water Wells Within 10 Miles
Page 2 of 2

Basin	County	OSE POD Number	Use	Diversion (ac-ft/yr)	Owner	Township	Range	Section	Q64 [a]	Q16 [a]	Q4 [a]	Distance (meters)	Distance (miles)
Roswell Artesian	Chaves	RA 10574	DOM	3	Sand Ranch, Watts Land & Cattle	10S	31E	35	2	2	1	11,193	7.0
Roswell Artesian	Chaves	RA 09320	STK	3	Pearce Trust	11S	29E	1		4	2	11,707	7.3
Roswell Artesian	Chaves	RA 10572	DOM	9	Sand Ranch, Watts Land & Cattle	10S	29E	23	3	3	2	11,798	7.3
Roswell Artesian	Chaves	RA 08577	STK	3	Pearce Trust	10S	29E	34			3	11,855	7.4
Roswell Artesian	Chaves	RA 10568	STK	10	Sand Ranch, Watts Land & Cattle	10S	31E	10	3	4	3	12,897	8.0
Roswell Artesian	Chaves	RA 10571	DOM	3	Sand Ranch, Watts Land & Cattle	10S	31E	10	3	4	3	12,897	8.0
Roswell Artesian	Chaves	RA 08588	STK	3	Pearce Trust	12S	30E	17	4	1	4	12,905	8.0
Roswell Artesian	Chaves	RA 09483	STK	3	Johnson Cattle Company	10S	31E	23	2	3	2	12,993	8.1
Roswell Artesian	Chaves	RA 09482	STK	3	Johnson Cattle Company	10S	31E	25	3	1	4	13,092	8.1
Roswell Artesian	Chaves	RA 10567	STK	3	Sand Ranch, Watts Land & Cattle	10S	31E	3	3	3	3	13,943	8.7
Roswell Artesian	Chaves	RA 08363	STK	1	Frates Seelingson	09S	30E	28	4	3	4	14,917	9.3
Roswell Artesian	Chaves	RA 10205	STK	3	Andrew Glenn Ranch, LLC	10S	29E	3	3	4	4	15,459	9.6
Roswell Artesian	Chaves	RA 10206	DOM	3	Andrew Glenn Ranch, LLC	10S	29E	3	3	4	4	15,459	9.6
Roswell Artesian	Chaves	RA 11306 POD1	STK	3	Kenneth Owens	09S	30E	30	4	4	4	15,551	9.7
Roswell Artesian	Lea	RA 09487	STK	3	Johnson Cattle Company	10S	32E	18	3	3	4	15,853	9.9
Roswell Artesian	Chaves	RA 09568	DOM	3	Andrus Ranch, Inc.	09S	30E	30	3	2	4	16,080	10.0

Source: Data were downloaded from the New Mexico Office of the State Engineer WATERS database on October 13, 2011 (http://nmwrrs.ose.state.nm.us/nmwrrs/index.html).
[a] Quarters are 1=NW, 2=NE, 3=SW, and 4=SE (quarters are smallest to largest).

COM = Commercial
PDL = Non 72-12-1 Domestic & Livestock
PRO = 72-12-1 Prospecting or Development of Natural Resource
PLS = Non 72-12-1 Livestock Watering
STK = 72-12-1 Livestock Watering
SRO = Secondary Recovery of Oil
DOM = 72-12-1 Domestic One Household
IRR = Irrigation
Q = Quarter
OSE New Mexico Office of the State Engineer
POD = Point of diversion

Table 3-4. Triassic Park HELP Model Result Summary for Cell Floor

Time (years)	LCRS Operational Beyond 30 Years Post Closure			LCRS Not Operational Beyond 30 Years Post Closure		
	Leakage (gal/acre/day)		Final Waste Moisture Content (vol/vol)	Leakage (gal/acre/day)		Final Waste Moisture Content (vol/vol)
	Liner	Cap		Liner	Cap	
0	1.3781	NA	0.1410	1.3781	NA	0.1410
20	0.9400	0.0454	0.1222	0.9400	0.0454	0.1222
30	0.2735	0.0430	0.1181	0.2735	0.0430	0.1181
50	0.1927	0.0450	0.1125	3.4579	0.0450	0.1125
70	0.1329	0.0450	0.1087	8.0071	0.0450	0.1098
90	0.1007	0.0439	0.1059	9.1465	0.0439	0.1083
100	0.0775	0.0442	0.1049	8.5811	0.0442	0.1076
120	0.0744	0.0453	0.1029	8.8612	0.0453	0.1062
140	0.0629	0.0461	0.1013	8.6989	0.0461	0.1048
160	0.0547	0.0442	0.0999	8.5494	0.0442	0.1034
180	0.0482	0.0442	0.0987	8.4178	0.0442	0.1021
200	0.0431	0.0431	0.0976	8.2818	0.0442	0.1008

NA = Not applicable

Table 3-5. Triassic Park HELP Model Result Summary for Cell Slope

Time (years)	LCRS Operational Beyond 30 Years Post Closure			LCRS Not Operational Beyond 30 Years Post Closure		
	Leakage (gal/acre/day)		Final Waste Moisture Content (vol/vol)	Leakage (gal/acre/day)		Final Waste Moisture Content (vol/vol)
	Liner	Cap		Liner	Cap	
0	173.0000	NA	0.1410	173.0000	NA	0.1414
20	123.0000	0.0453	0.1221	123.0000	0.0453	0.1223
30	53.5373	0.0442	0.1182	53.5373	0.0442	0.1182
50	37.0011	0.0453	0.1152	37.0282	0.0453	0.1152
70	24.5001	0.0461	0.1087	24.5114	0.0452	0.1087
90	18.0529	0.0442	0.1059	18.0583	0.0449	0.1059
100	13.6143	0.0425	0.1049	13.6174	0.0430	0.1049
120	12.9000	0.0443	0.1029	12.9032	0.0450	0.1029
140	10.7627	0.0439	0.1013	10.7642	0.0450	0.1013
160	9.2002	0.0457	0.0999	9.2030	0.0439	0.0999
180	8.0161	0.0462	0.0987	8.0178	0.0457	0.0987
200	7.0994	0.0461	0.0976	7.1002	0.0462	0. 0976

Note: Initial HELP modeling results were based on landfill liner system without double liner system on side slopes. These should not be confused with HELP results presented in the Engineering Report.

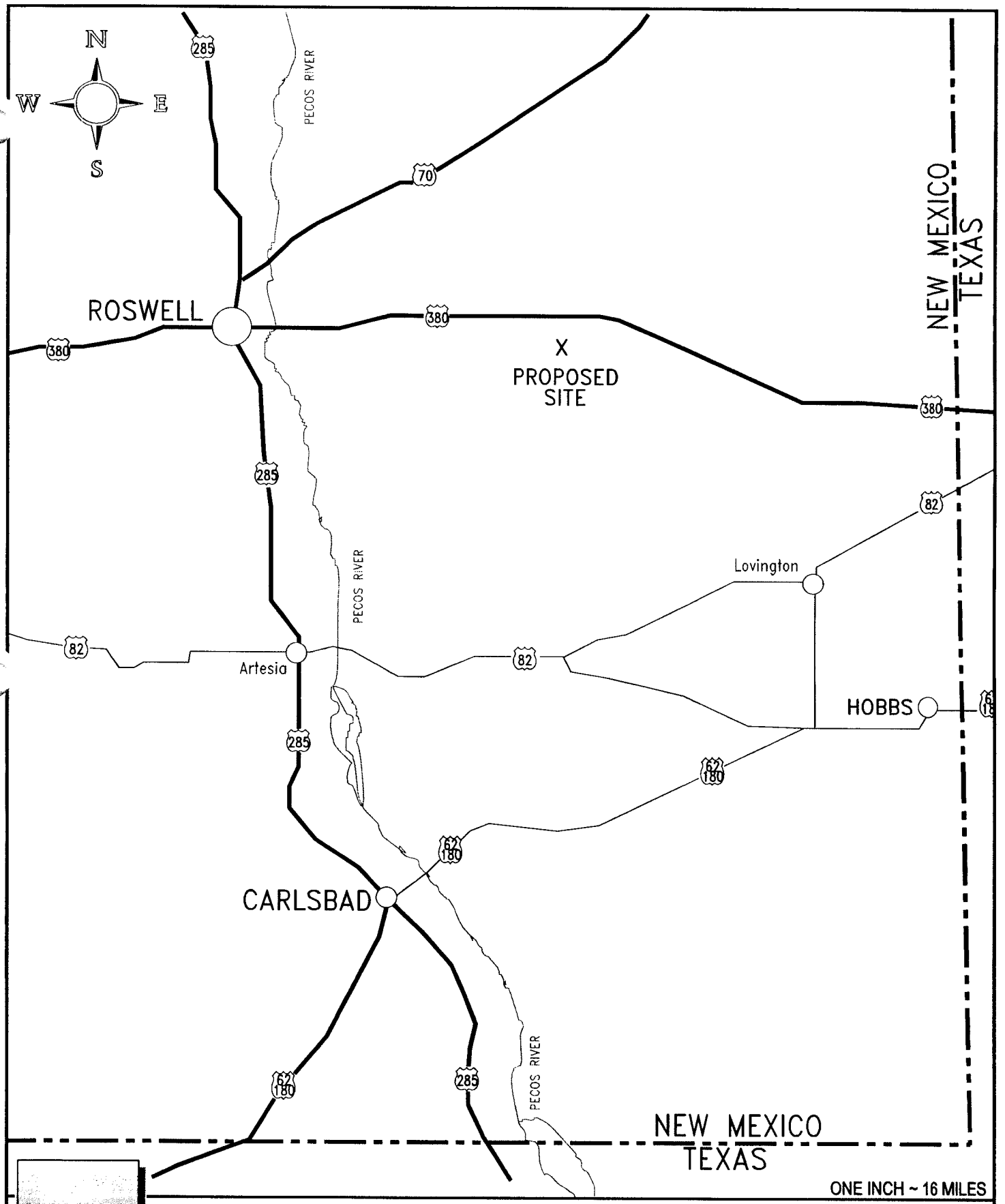
NA = Not applicable

Table 3-6. Input Parameters for Unsaturated Flow Modeling

Unit	Parameter							Source Coordinates (meters)		
	β (m)	Ko (m/day)	Sr	Sm	Q (m^3/day)	n	α (1/m)	x [a]	y [a]	z [a]
Lower Dockum	0.373	4.90E-05	0.279		8.00E-05	3	8.042	0, 33, 66, 99, 132, 165, 193, 231, 264, 297, 330, 363, 396, 429, 462	0	0
Upper Dockum	0.2076	1.05E-02	0.161		3.80E-05	3	14.45	5.5, 11, 16.5, 22, 27.5, 33, 38.5, 44, 49.5, 55, 60.5, 66, 71.5, 77	0	24.5, 22.6, 20.72, 18.84, 16.96, 15.07, 13.19, 11.31, 9.42, 7.54, 5.65, 3.77, 1.88, 0
Clay berm	0.37	8.64E-05	0.126 [b]	1	3.80E-05	3	8.108	0, 5.5, 11	0	3.77, 1.88, 0
Quaternary alluvium	0.0726 [b]	8.64E-02	0.0458 [b]	1	3.80E-05	3	41.32	0, 5.5, 11	0	3.77, 1.88, 0

β = Bubbling pressure; typical values reported by Bumb and Mckee et al. (1988)
Ko = Saturated hydraulic conductivity; site-specific mean values
Sm = Maximum saturation; assumed
Sr = Residual saturation; site-specific mean values
Q = Leakage rate; based on HELP modeling results
n =Curve fitting parameter based on pre size index (Mckee and Bumb, 1988)
a =n/β

[a] Typical values reported by Bumb and Mckee et al (1988)
[b] Typical values reported by Bumb and Mckee et al. (1988)

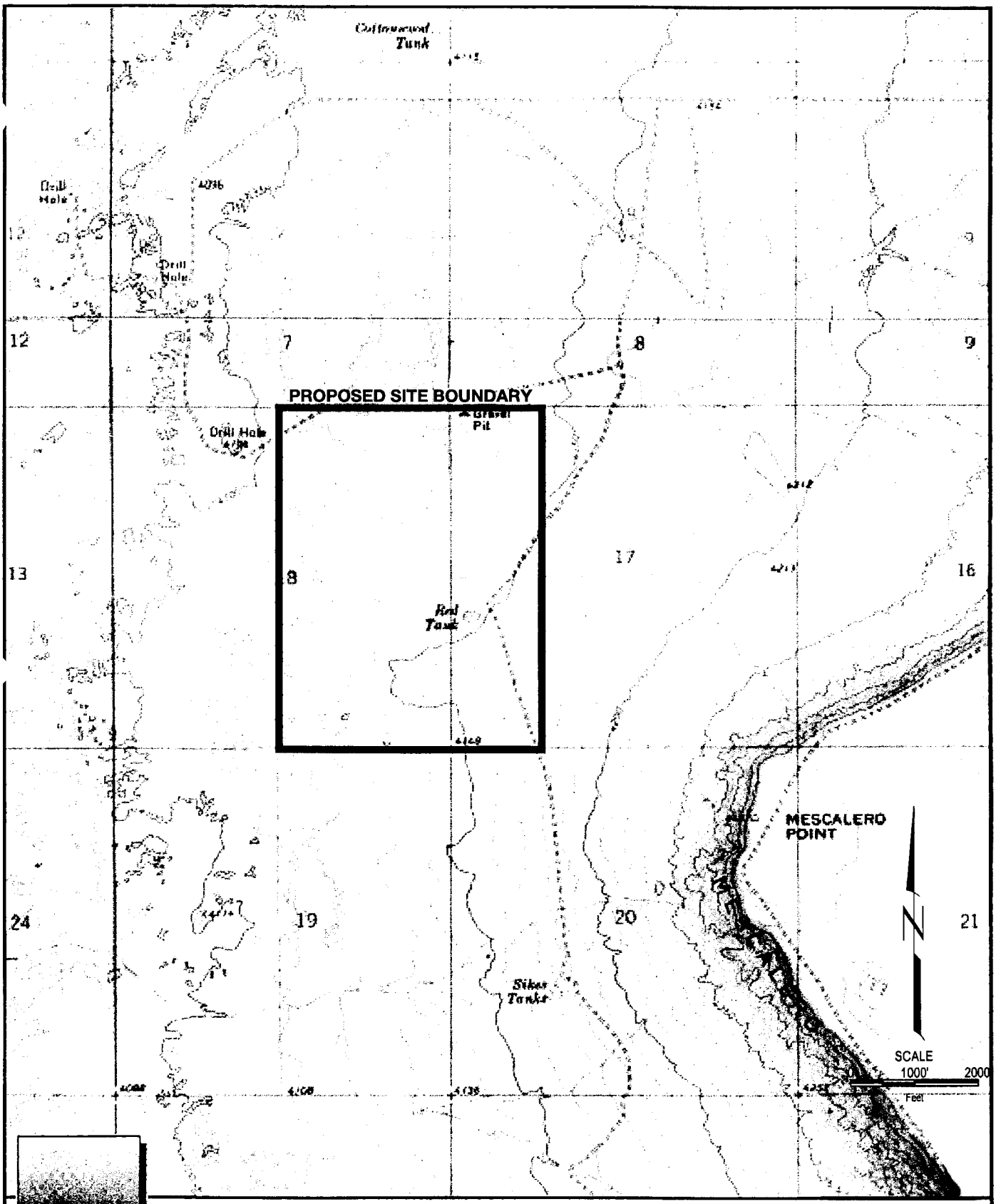


INDEX MAP PROPOSED SITE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-1

AutoCAD FILE: GANDY-FIG3-1

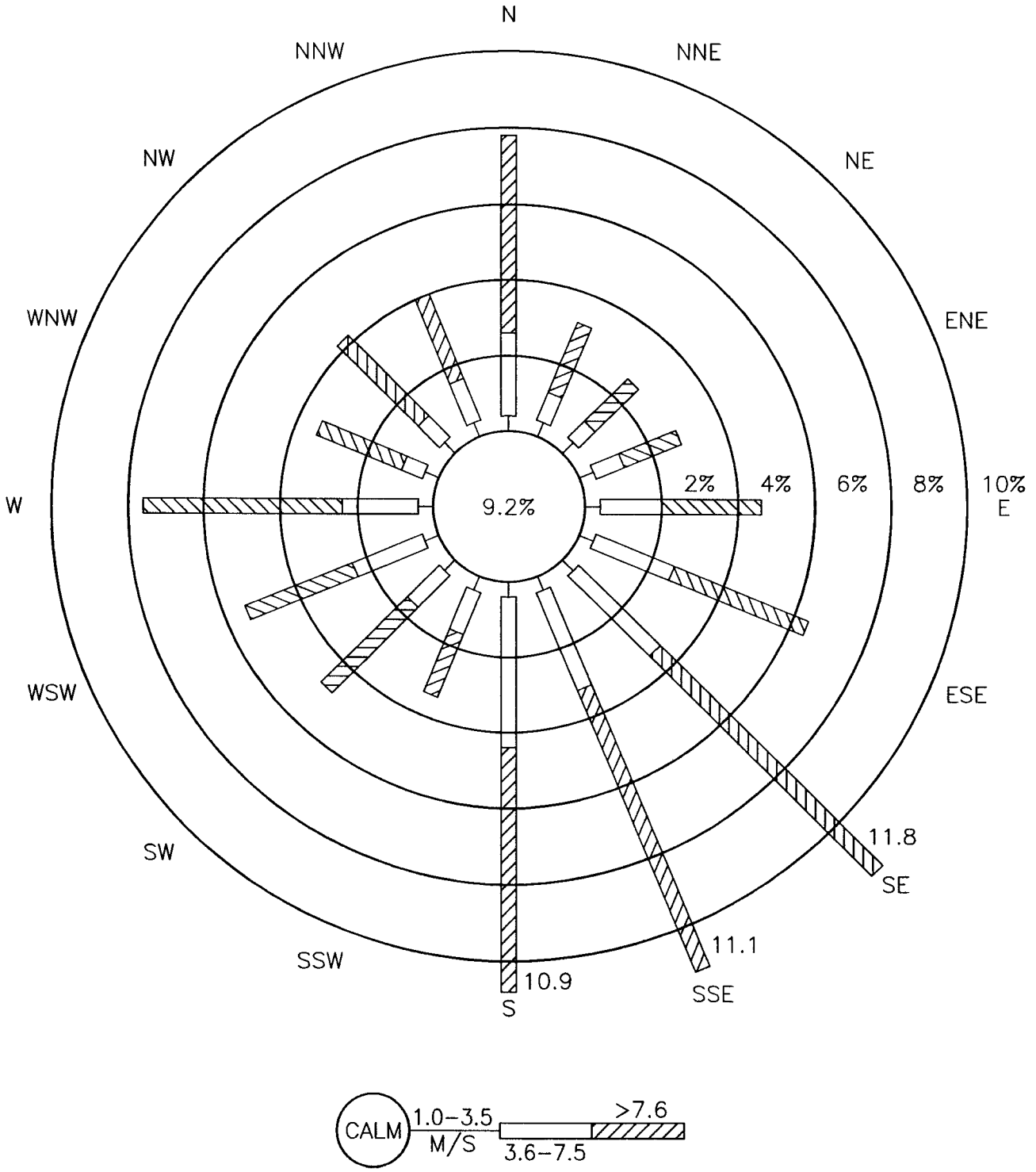


TOPOGRAPHY OF SITE VICINITY

Figure 3-2

TRIASSIC PARK WASTE DISPOSAL FACILITY

AutoCAD FILE: GANDY-FIG3-2

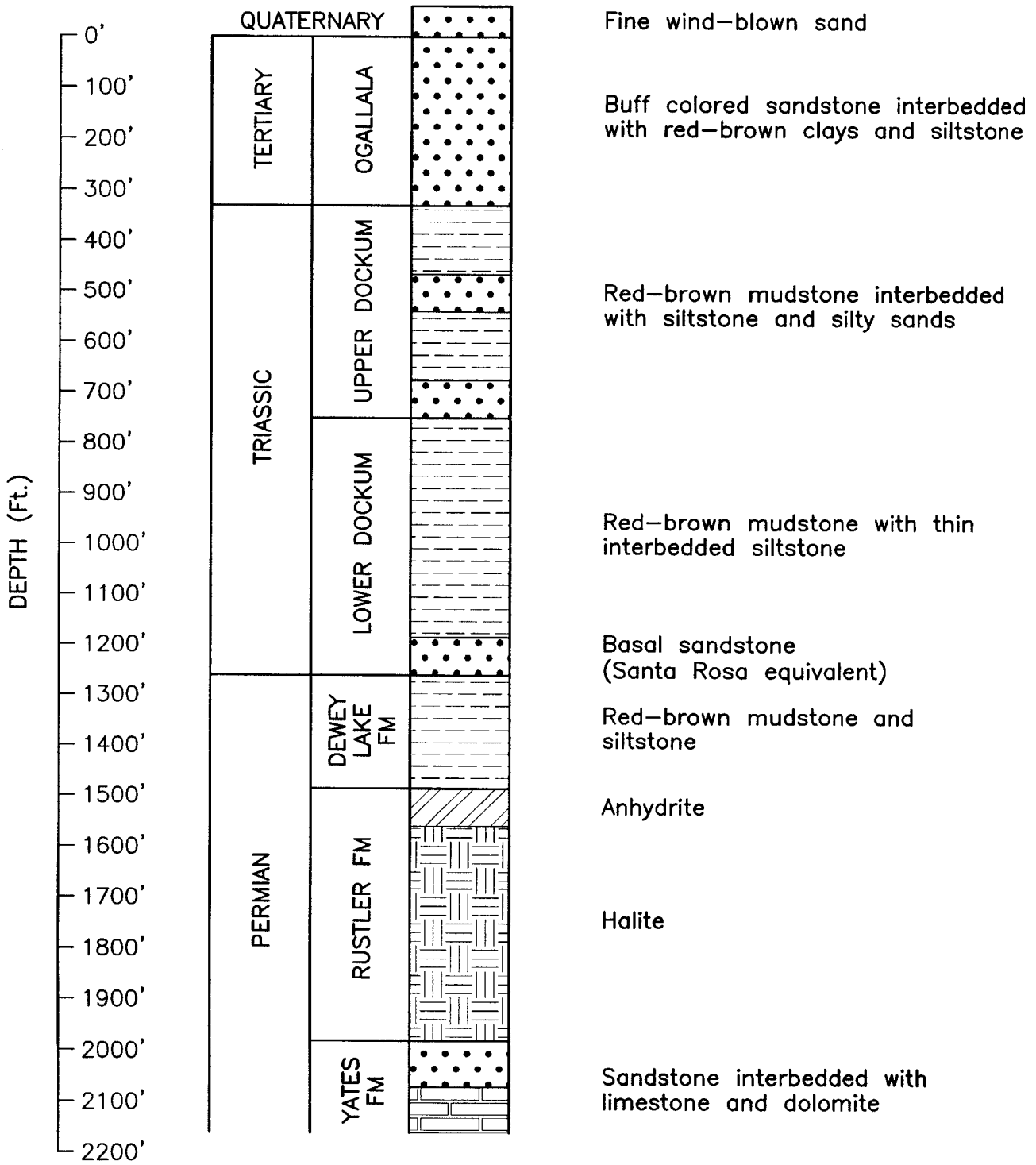


WIND ROSE- SOUTHEAST NEW MEXICO

Figure 3-3

TRIASSIC PARK WASTE DISPOSAL FACILITY

AutoCAD FILE: *GANDY-FIG3-3*

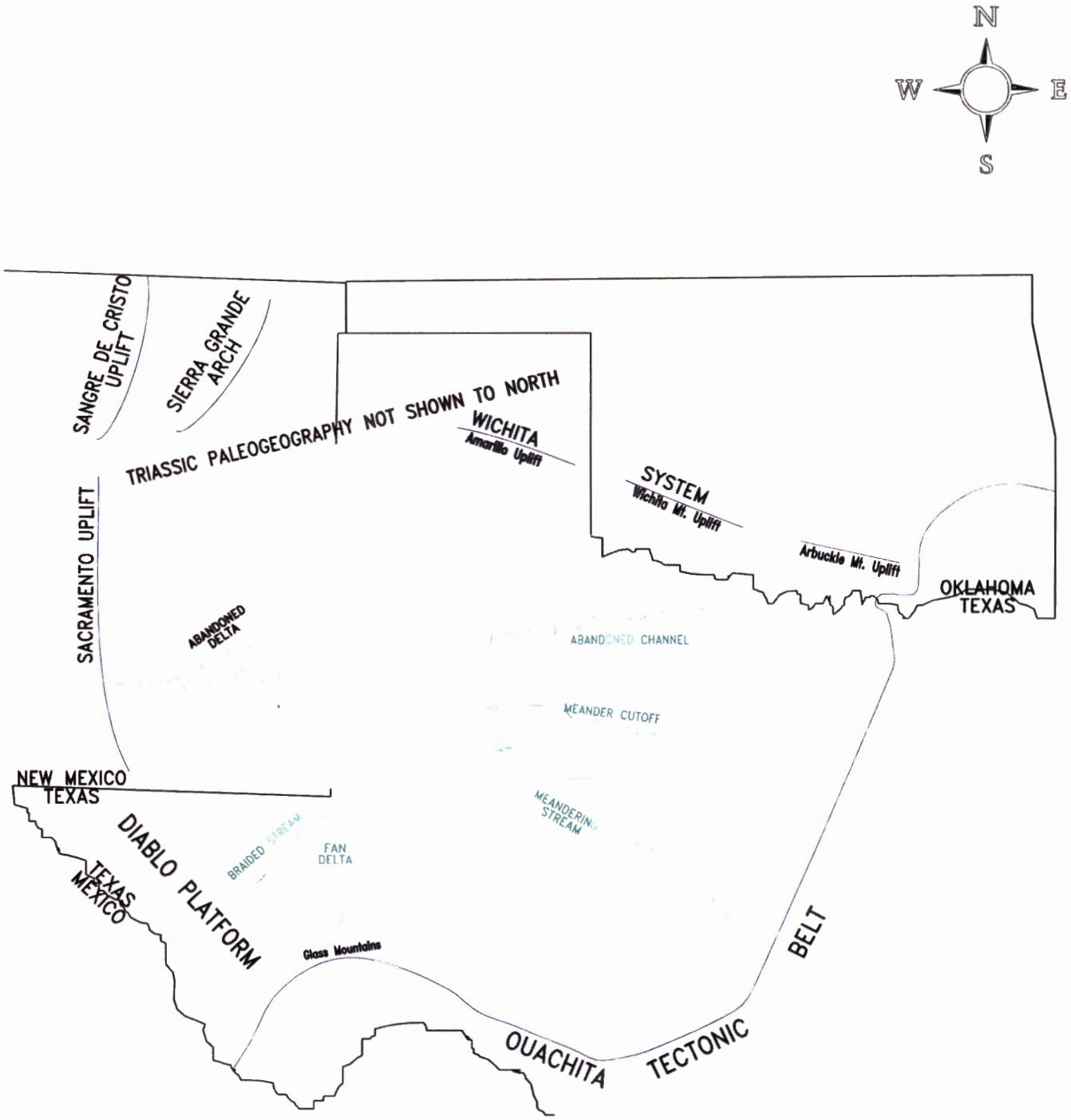


STRATIGRAPHIC COLUMN

Figure 3-4

TRIASSIC PARK WASTE DISPOSAL FACILITY

AutoCAD FILE: GANDY-FIG3-4



Scale: 1"=80 Miles

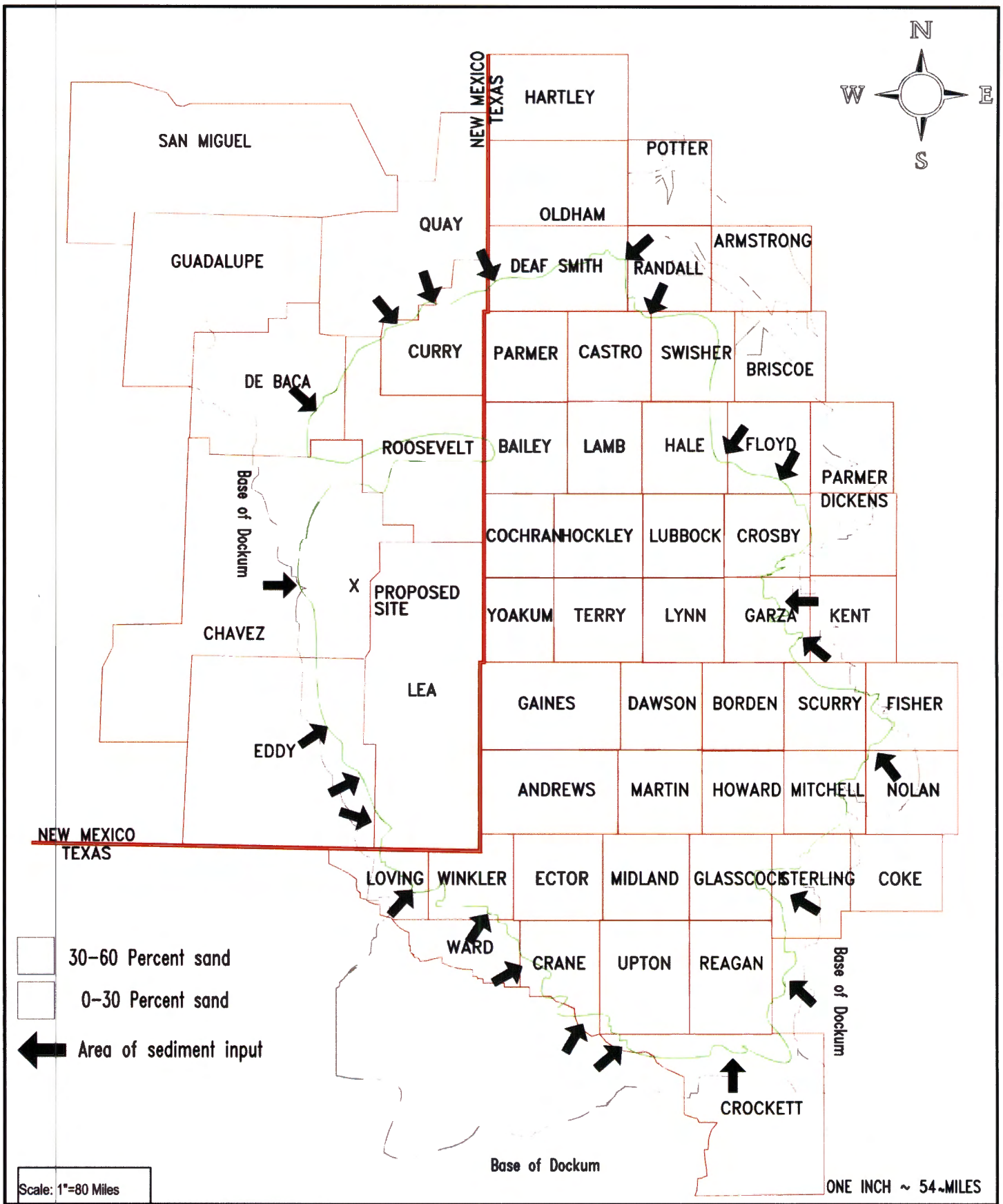
ONE INCH ~ 100 MILES

BASIN PALEOMAP FOR TRIASSIC PERIOD

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-5

AutoCAD FILE. GANDY-FIG3-2

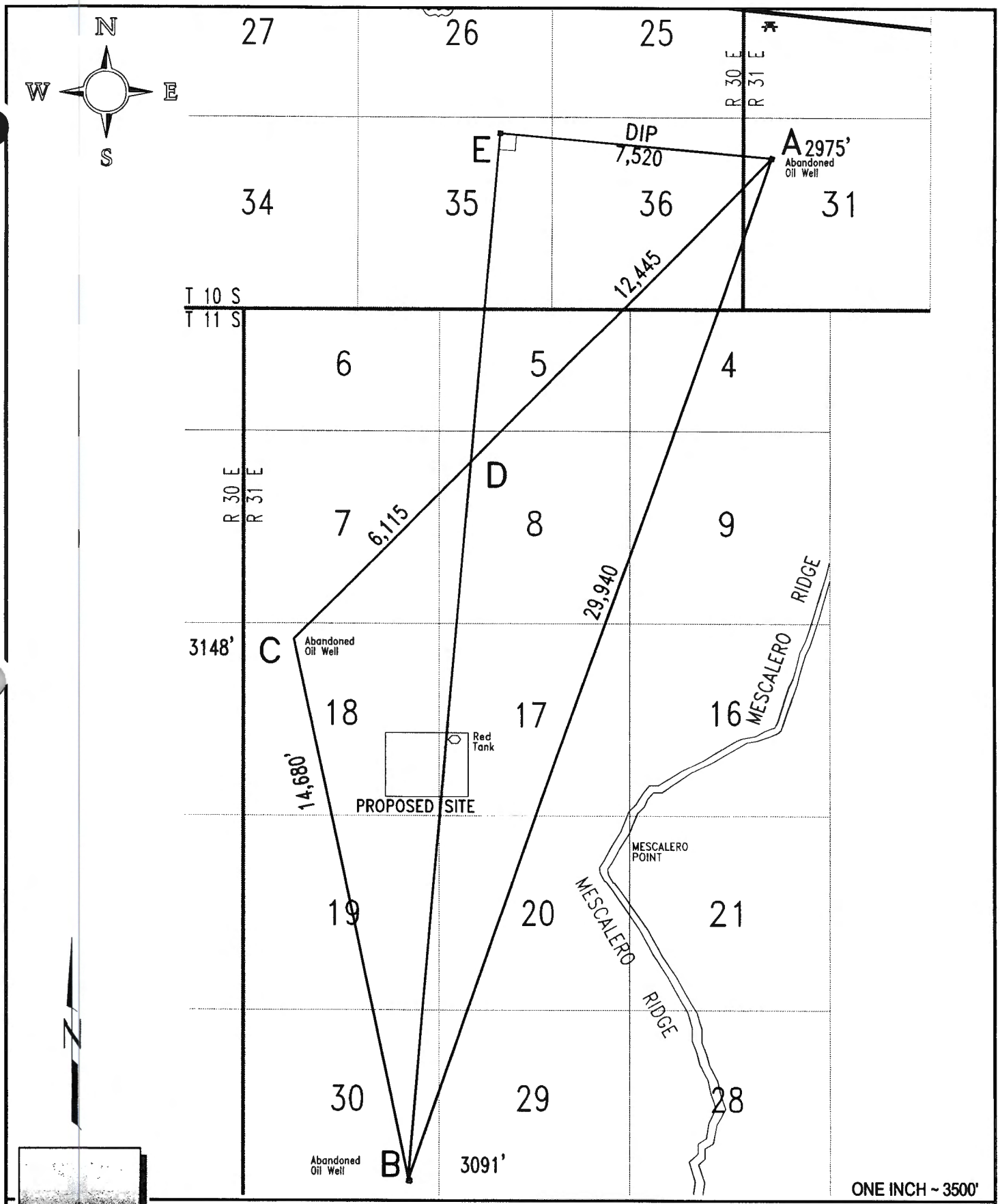


TRIASSIC PERIOD SAND ACCUMULATION IN PALEOBASIN

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-6

AutoCAD FILE: GANDY-FIG3-3



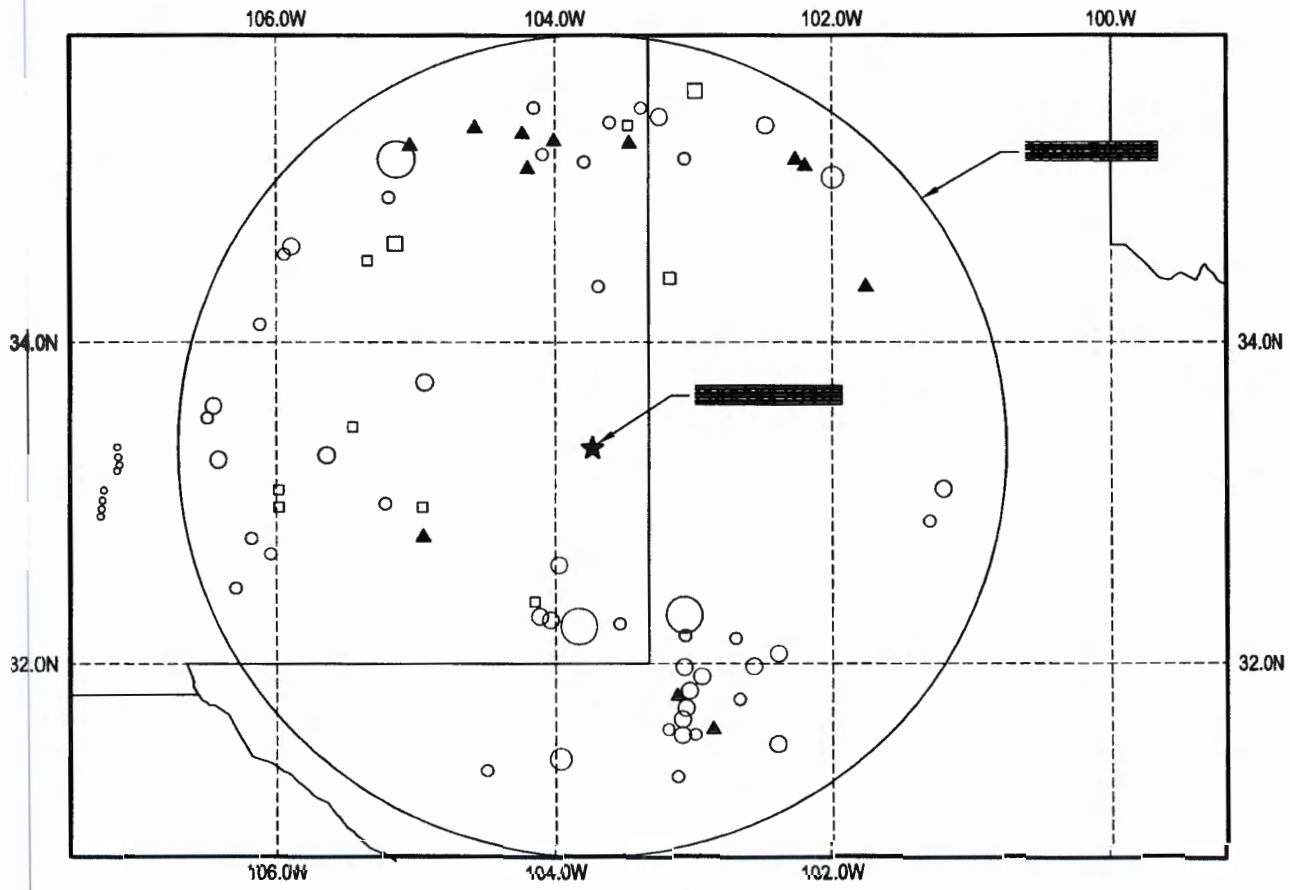
PLAN VIEW, 3 POINT SOLUTION FOR BEDDING STRIKE AND DIP ANGLE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-7

AutoCAD FILE: GANDY-FIG3-7

SEISMICITY WITHIN 250 KM OF 33.367N 103.850W



MAGNITUDES

0.1-1.9 =	∘	4.0-4.4 =	○
2.0-2.9 =	∘	4.5-4.9 =	○
3.0-3.4 =	○	5.0-5.4 =	○
3.5-3.9 =	○	> 5.4 =	○

NO INTENSITY OR MAGNITUDE ▲

INTENSITIES

I-III	▫	VII	□
IV	▫	VIII	□
V	□	IX	□
VI	□	X-XII	□

National Geophysical Data Center/NOAA Boulder, Colorado 80303

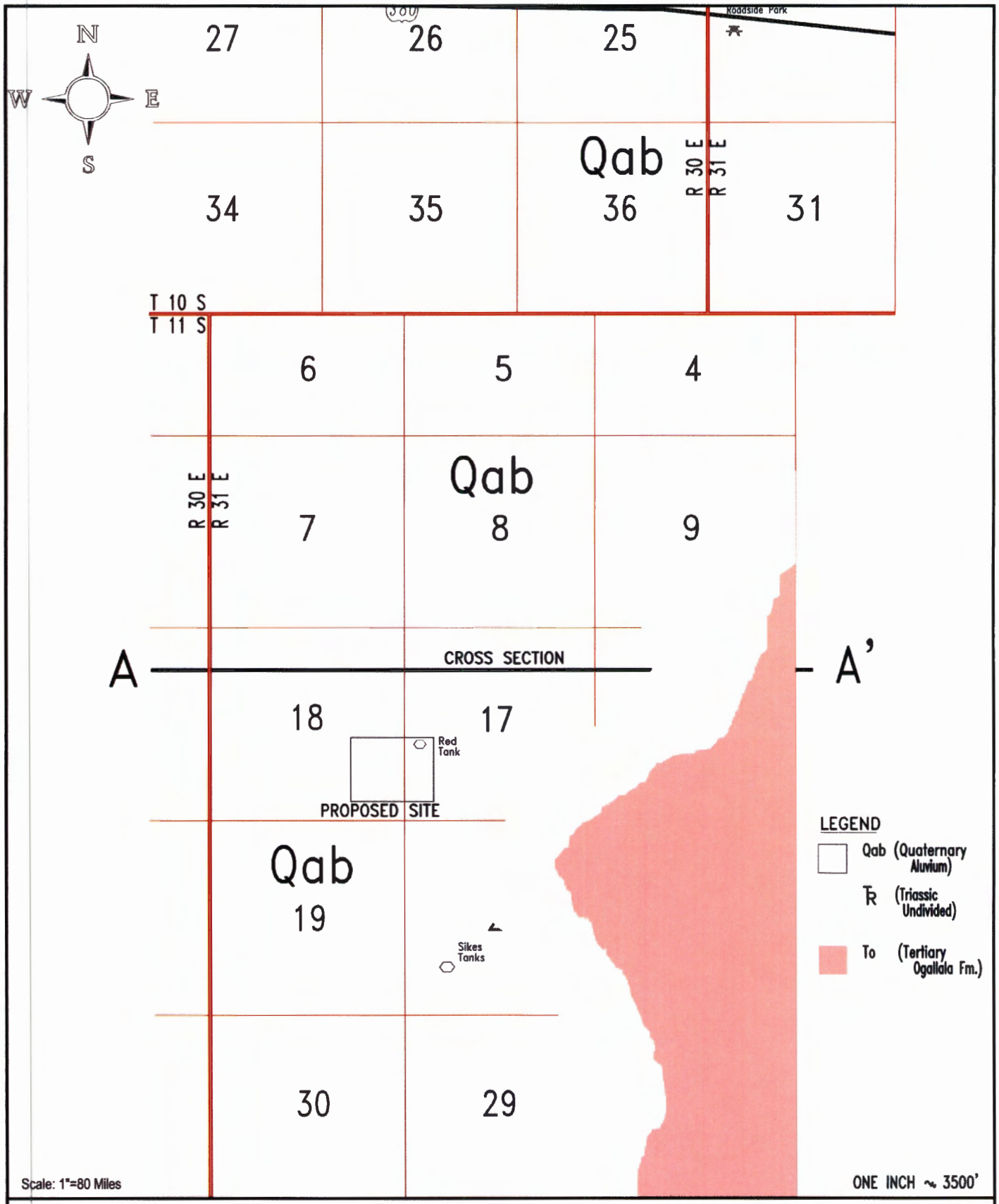
N

SEISMIC ACTIVITY MAP- SOUTHEAST NEW MEXICO

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-8

AutoCAD FILE: GANDY-FIG3-81

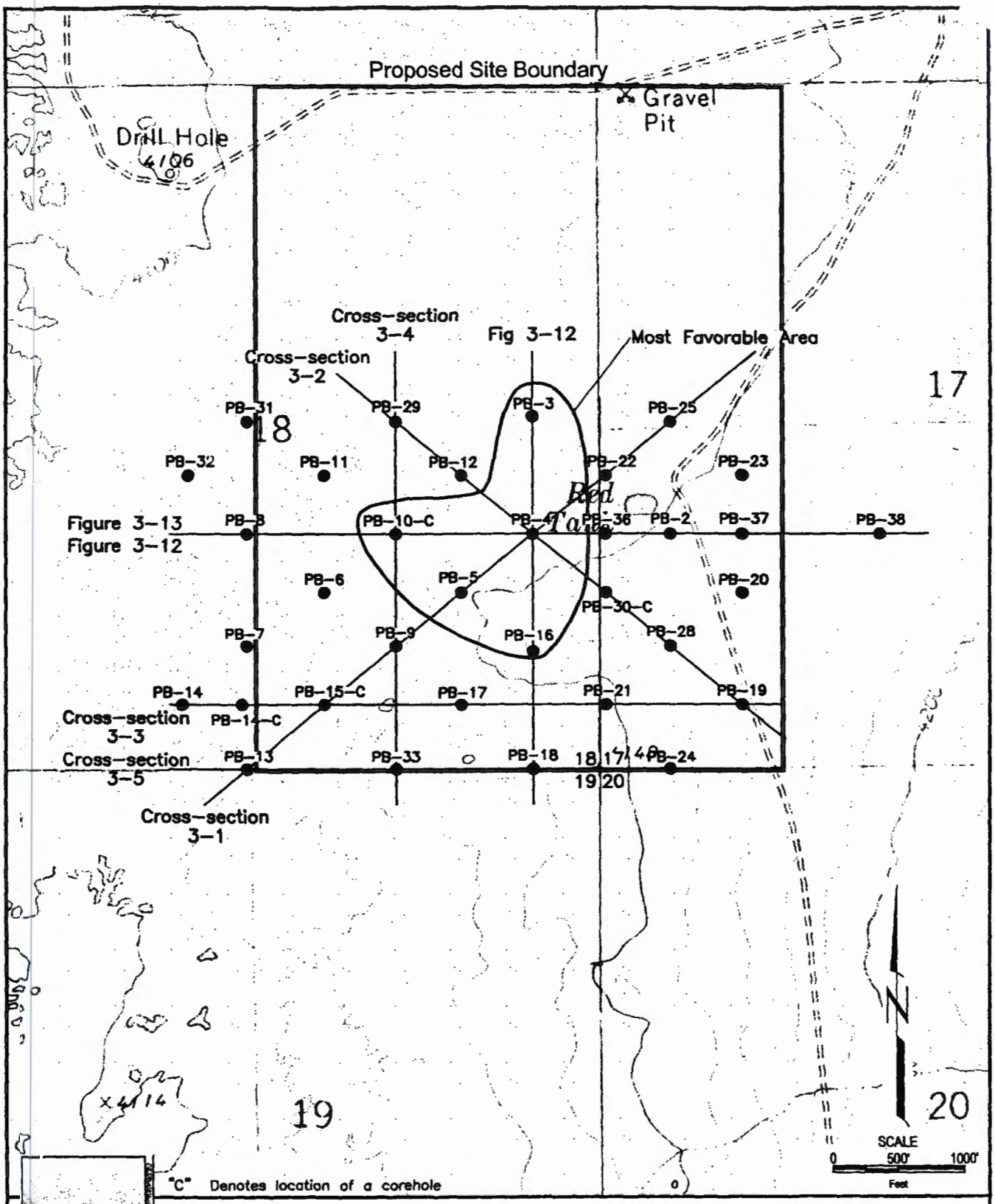


SURFACE GEOLOGY - PROJECT AREA

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-9

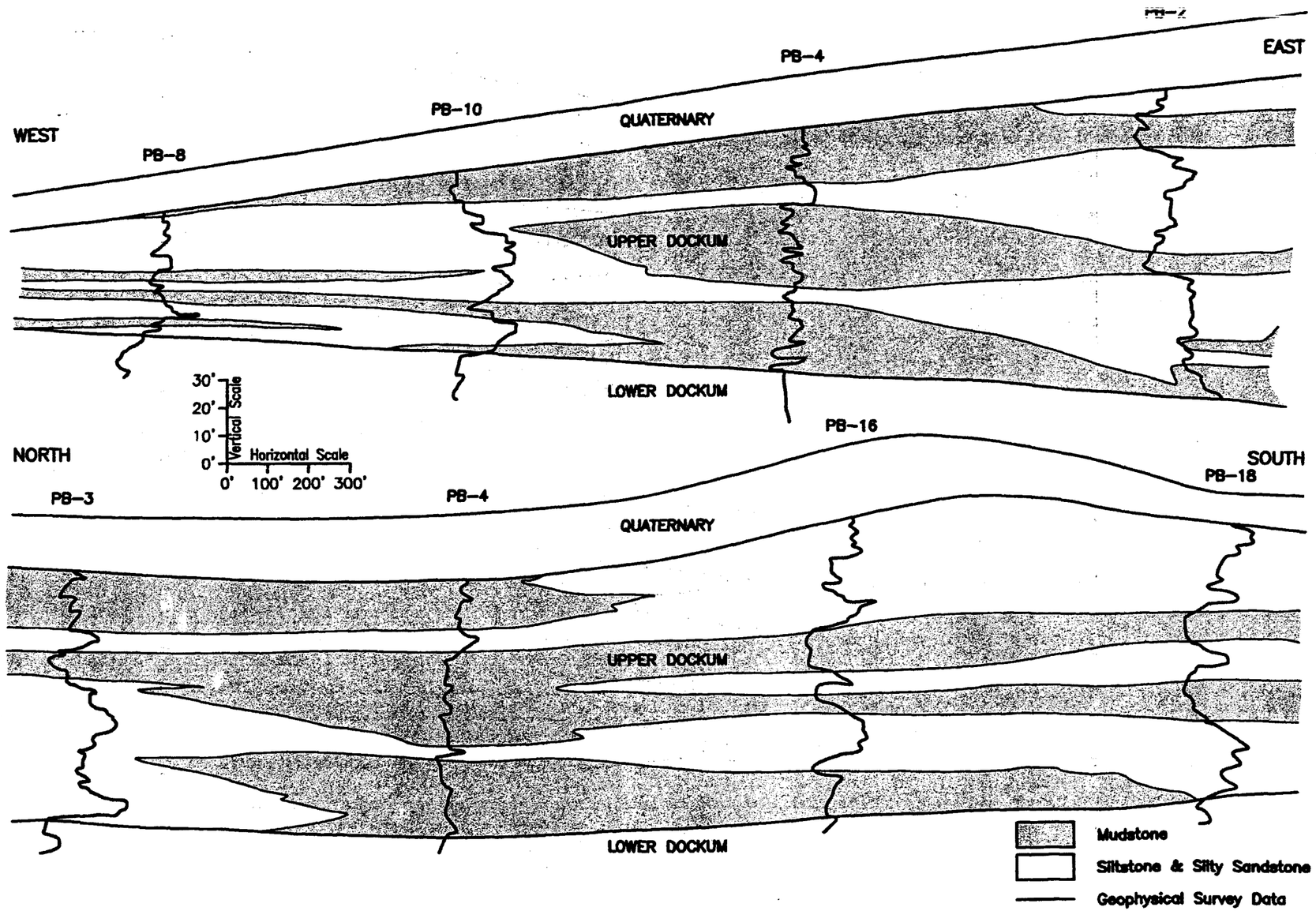
AutoCAD FILE. GANDY-FIG3-4



CLOSE SPACED DRILLING PATTERN

TRIASSIC PARK WASTE DISPOSAL FACILITY

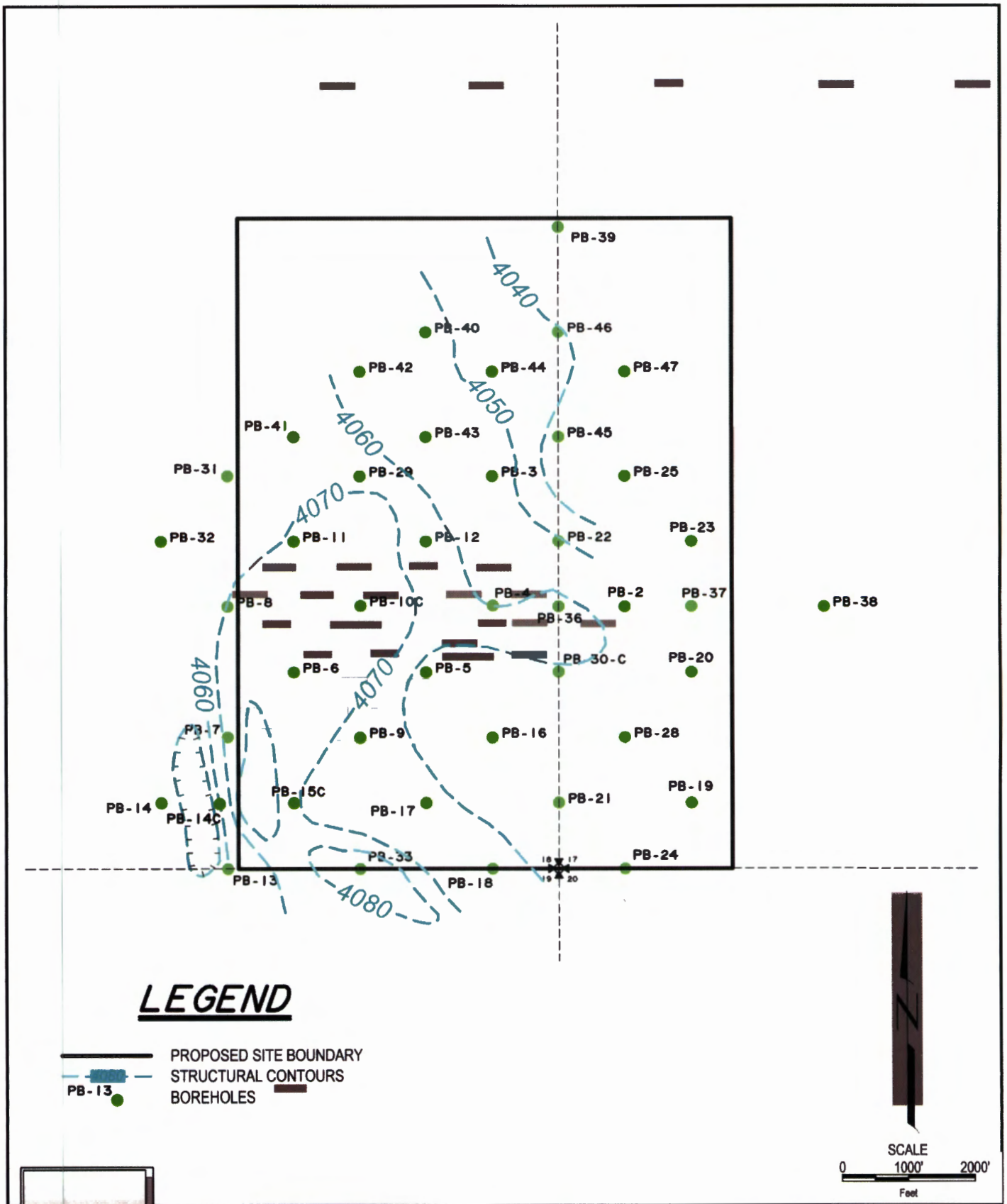
Figure 3-11



GEOLOGIC CROSS-SECTION

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-12

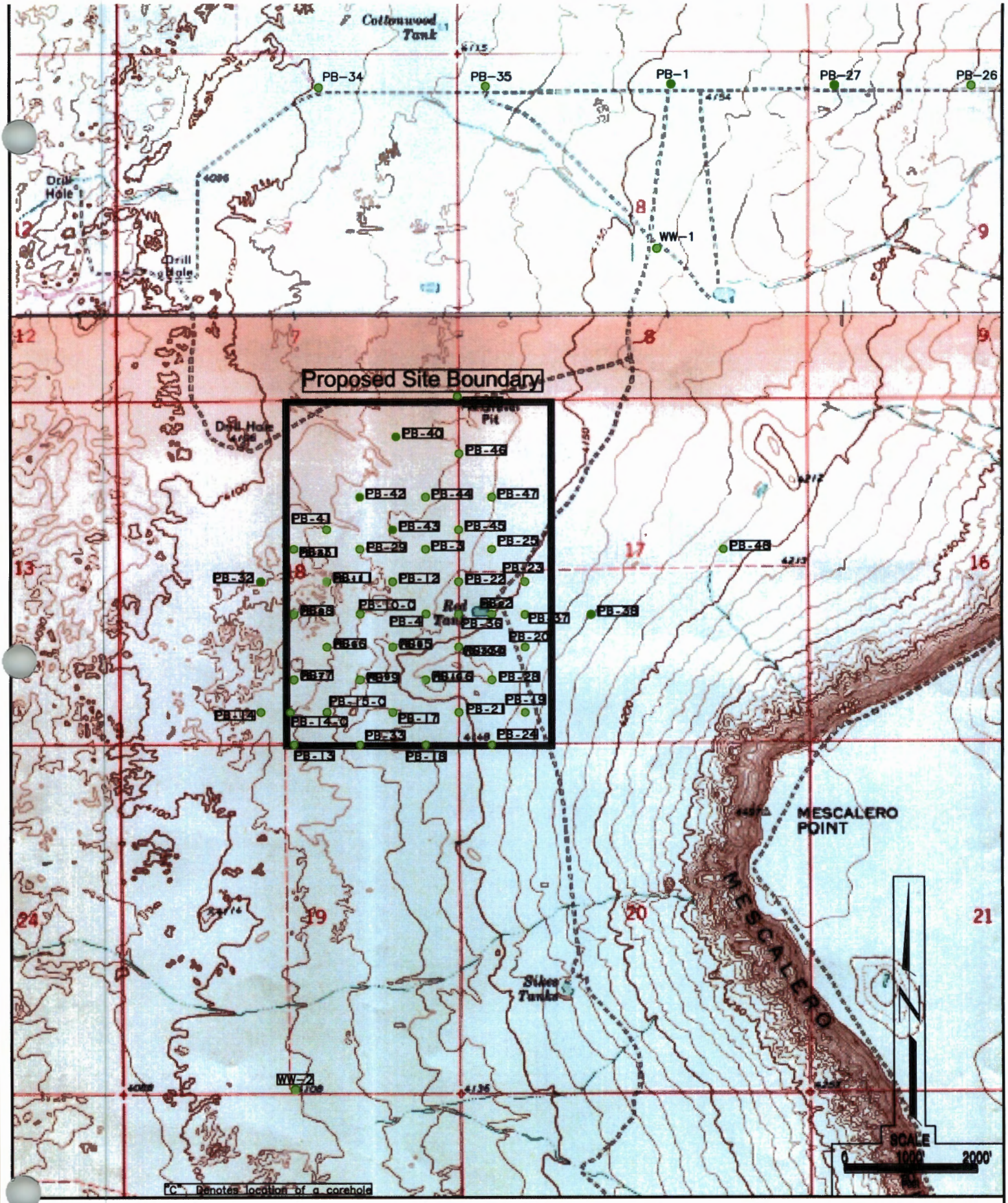


STRUCTURE CONTOUR TOP OF LOWER DOCKUM

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-14

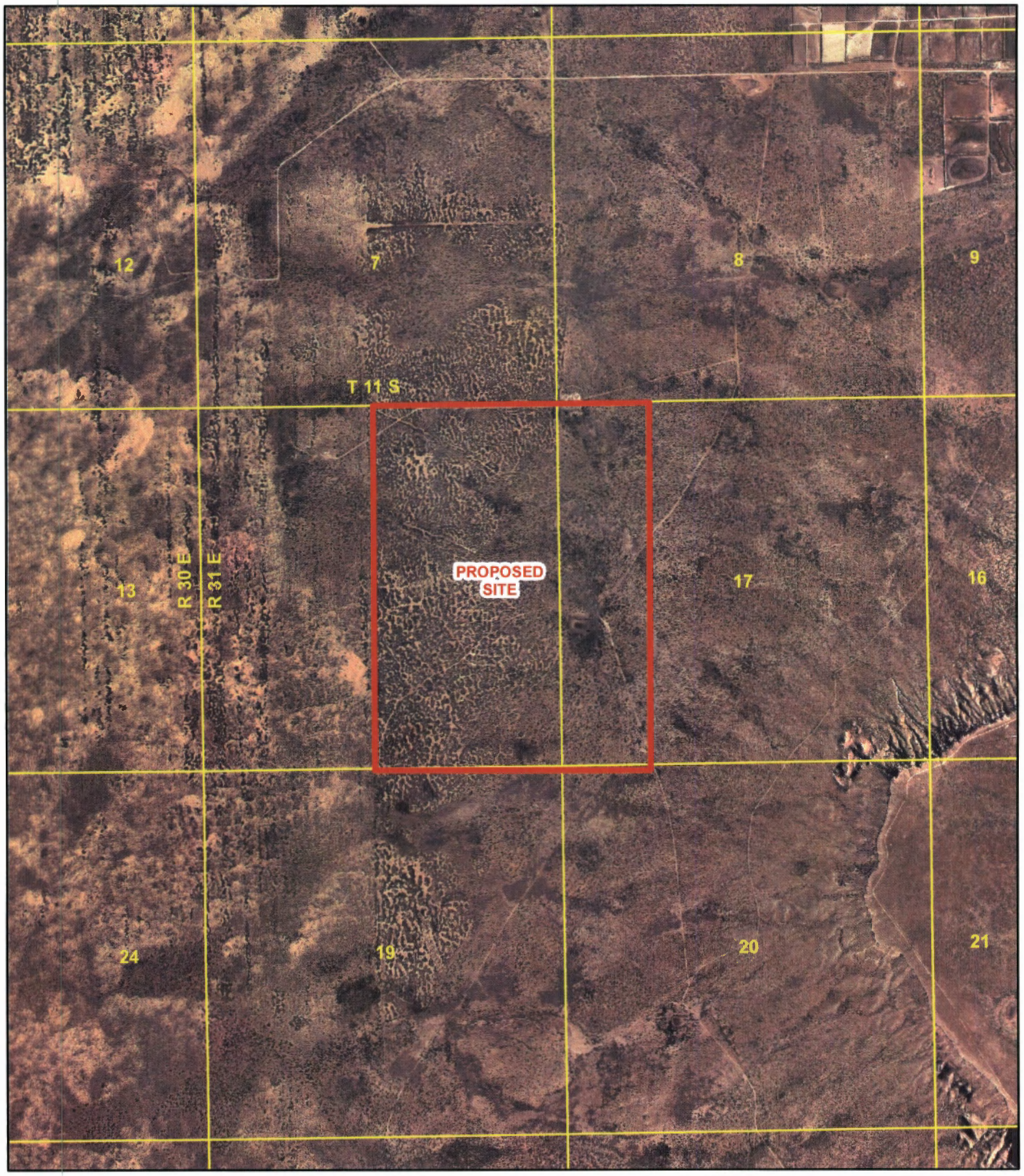
AutoCAD FILE GANDY-FIG-3-6



DRILL HOLE LOCATIONS

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-15



0 1,000 2,000 Feet

N

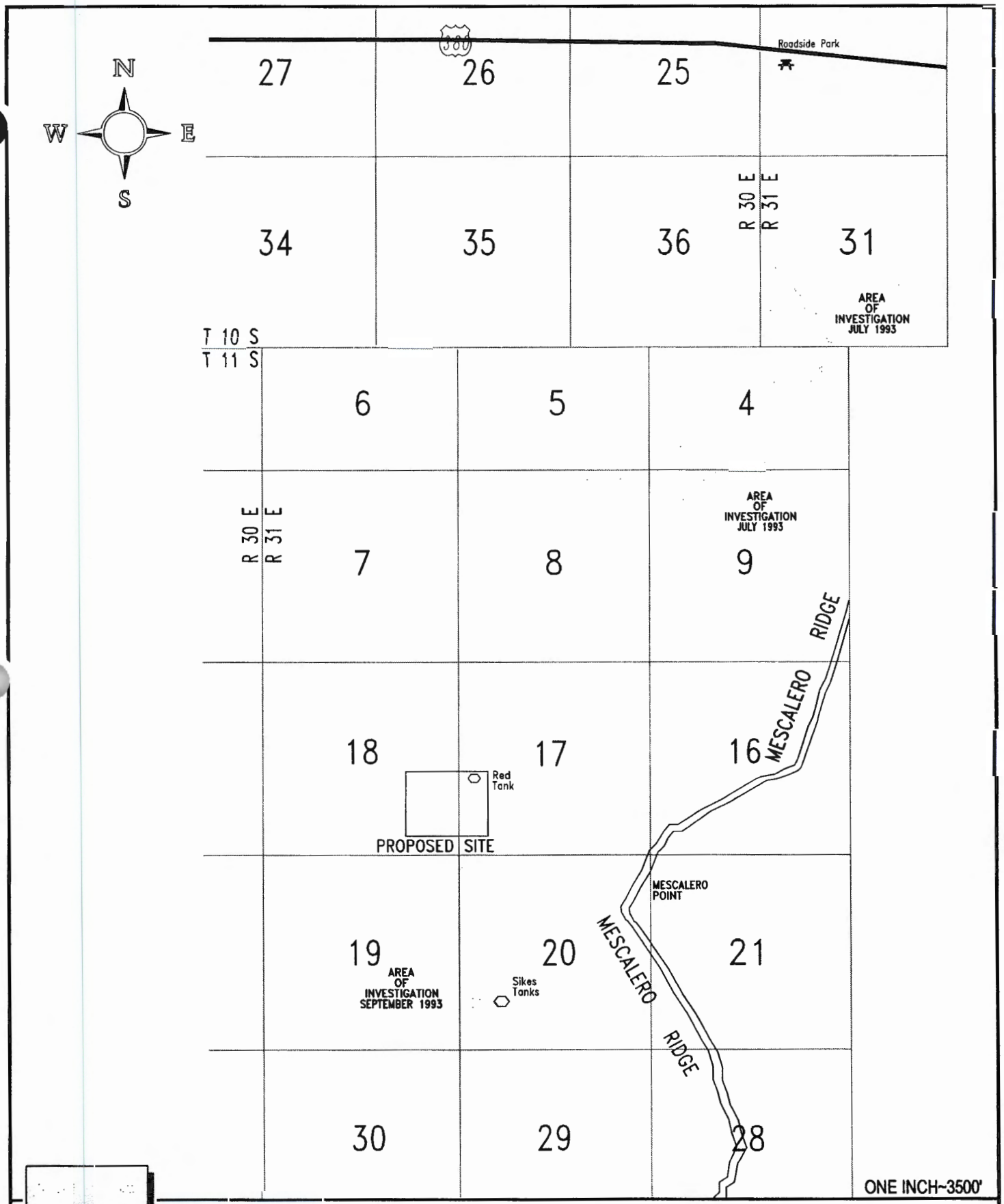
AIR PHOTO - SOUTHEAST NEW MEXICO

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-16

S:/PROJECTS/F 0141 TRIASSIC PARK PERMIT RENEWAL/GIS/MXDS/AIR PHOTO SITE LO ON.MXD 114101

10/14/2011

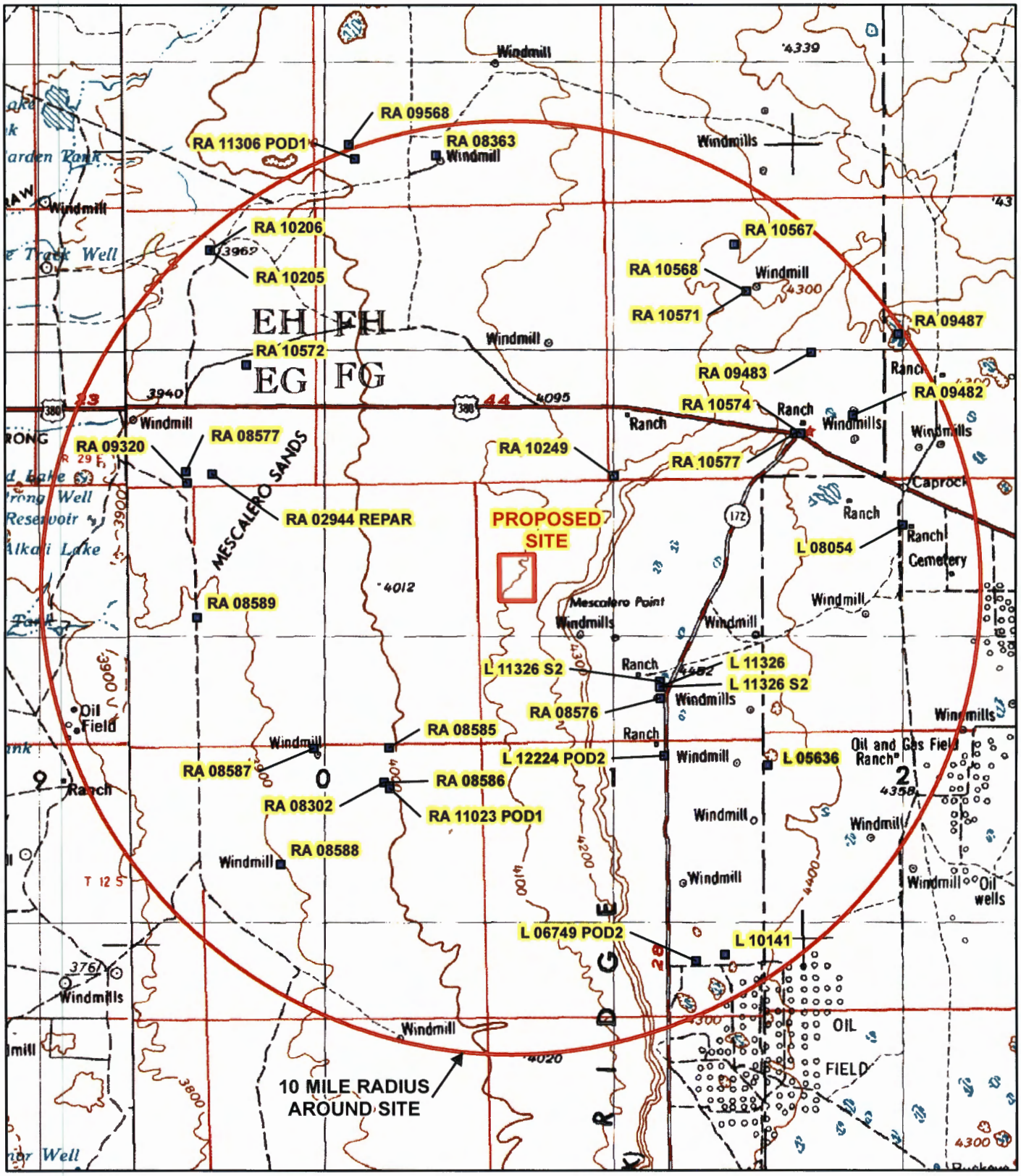


PROJECT AREA - AREAS OF INVESTIGATION

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-17

AutoCAD FILE: SANDY-FIG3-17



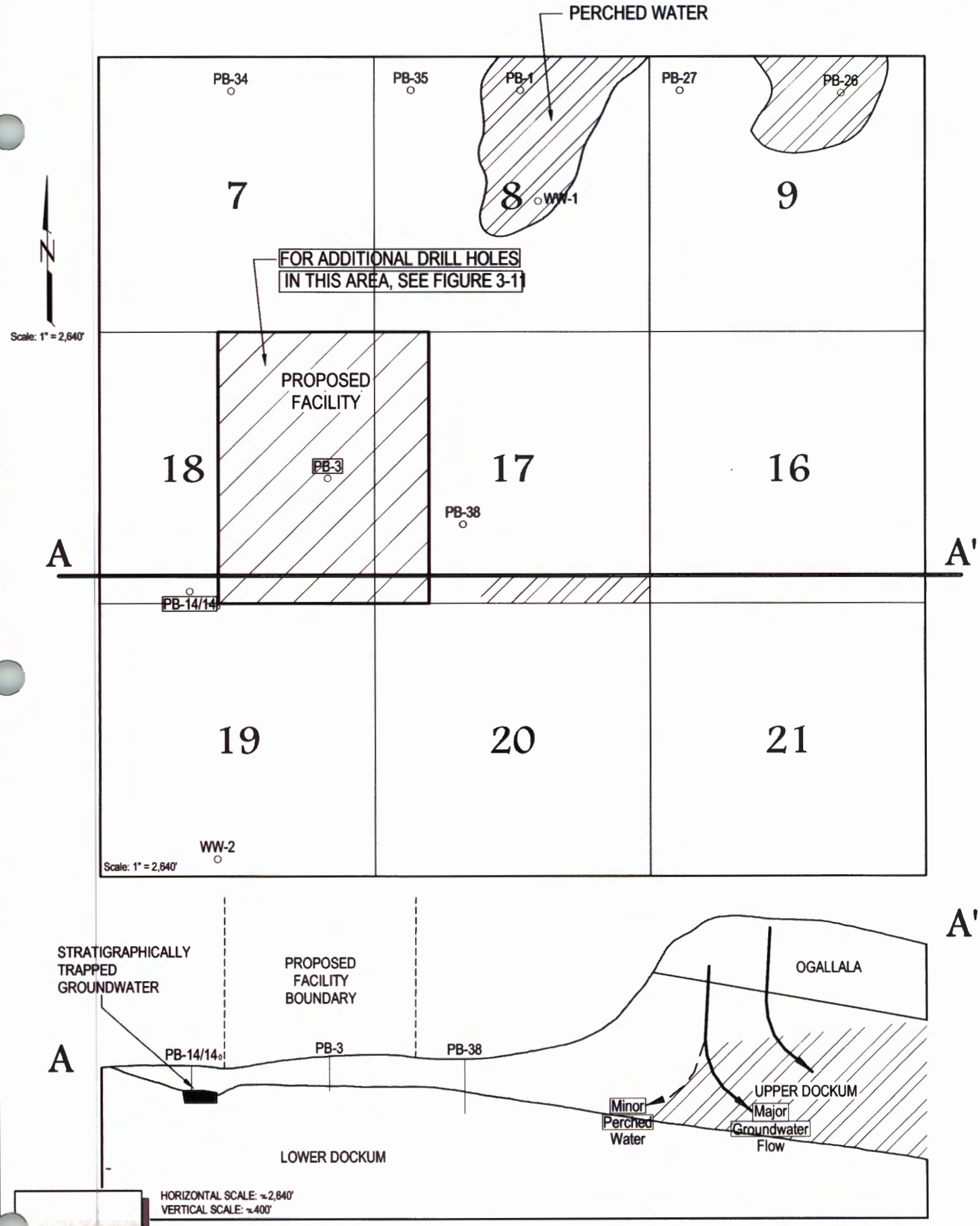
AREA TOPOGRAPHY AND WATER WELLS - 10 MILE RADIUS

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-18

S:/PROJECTS/P 0141 TRIASSIC PARK PERMIT RENEWAL/GIS/MXDS/WELLS 10 MI.MXD 1

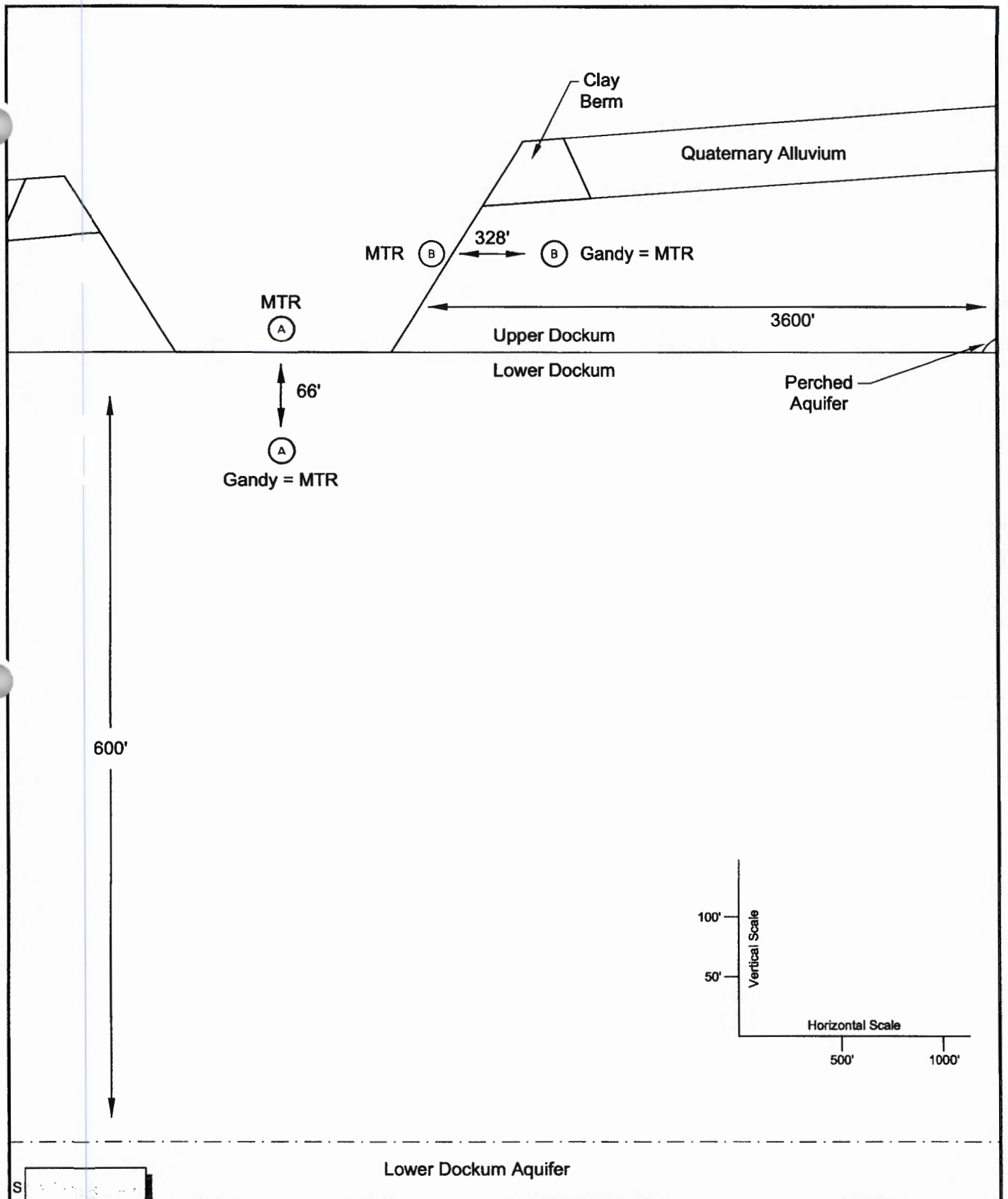
10/14/2011



UPPER DOCKUM - PERCHED WATER

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-20

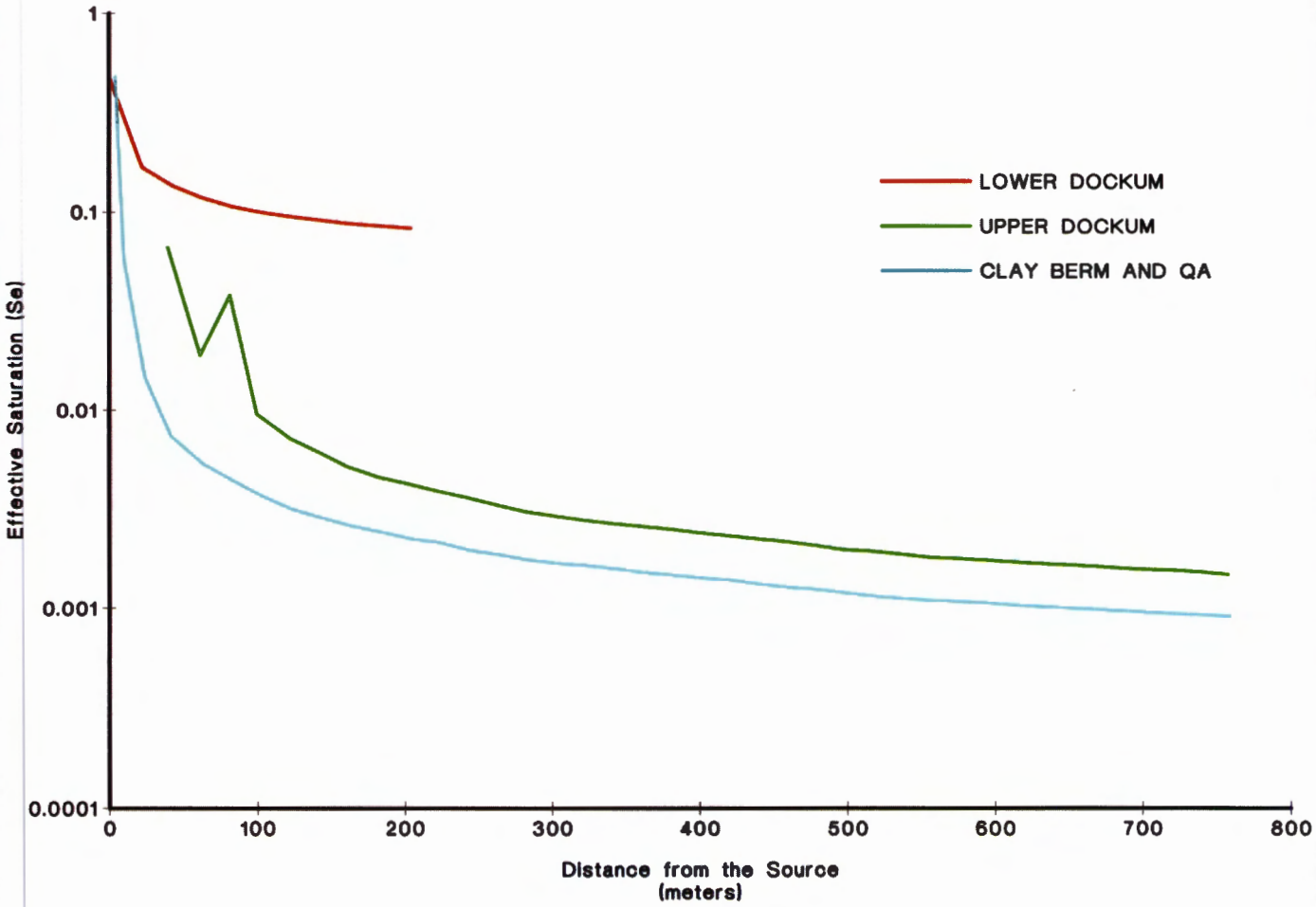


LANDFILL PROFILE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-21

AutoCAD FILE: GANDY-FIG3-21

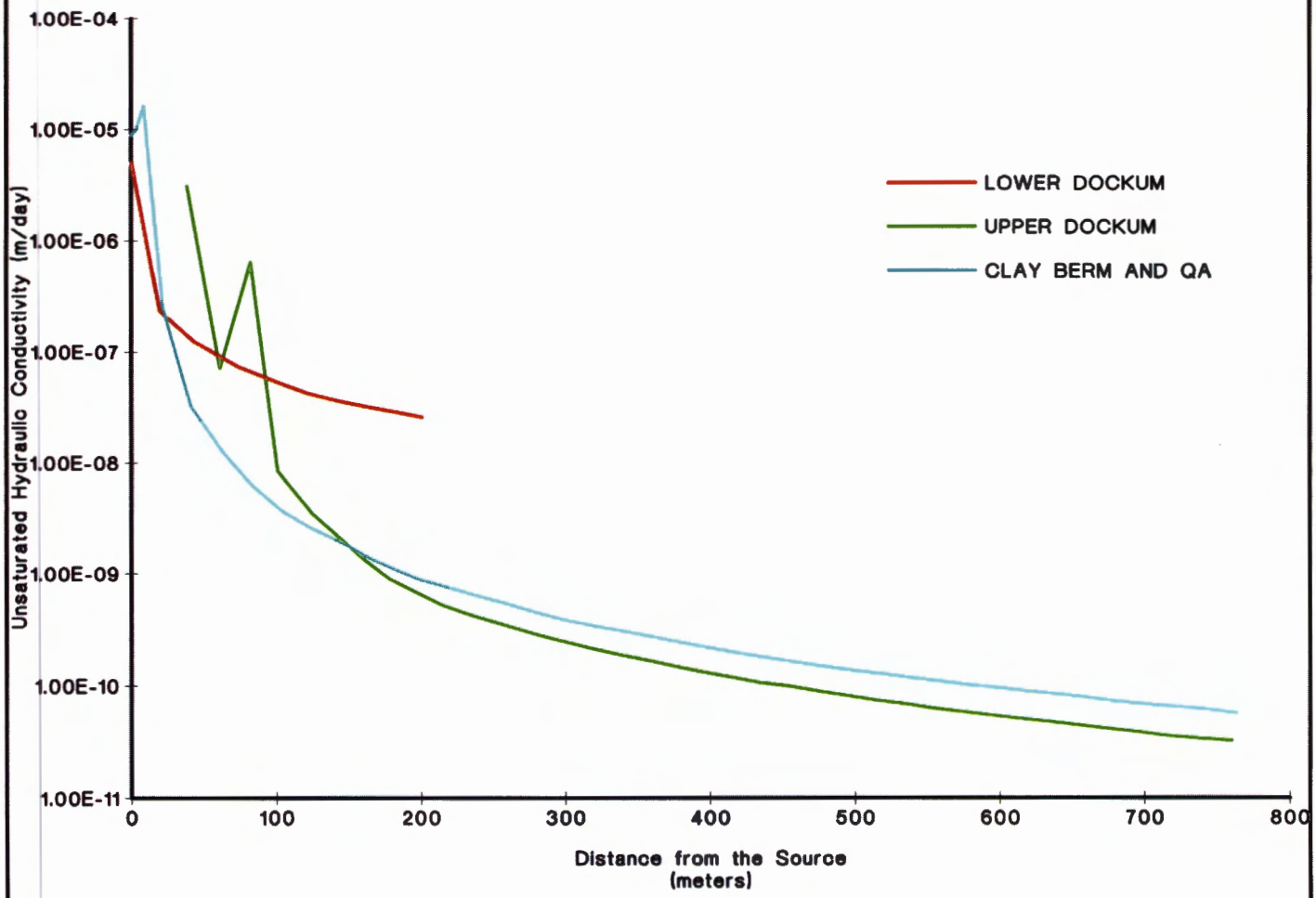


STEADY STATE EFFECTIVE SATURATION vs. DISTANCE FROM SOURCE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-22

AutoCAD FILE GANDY-FIGB-2

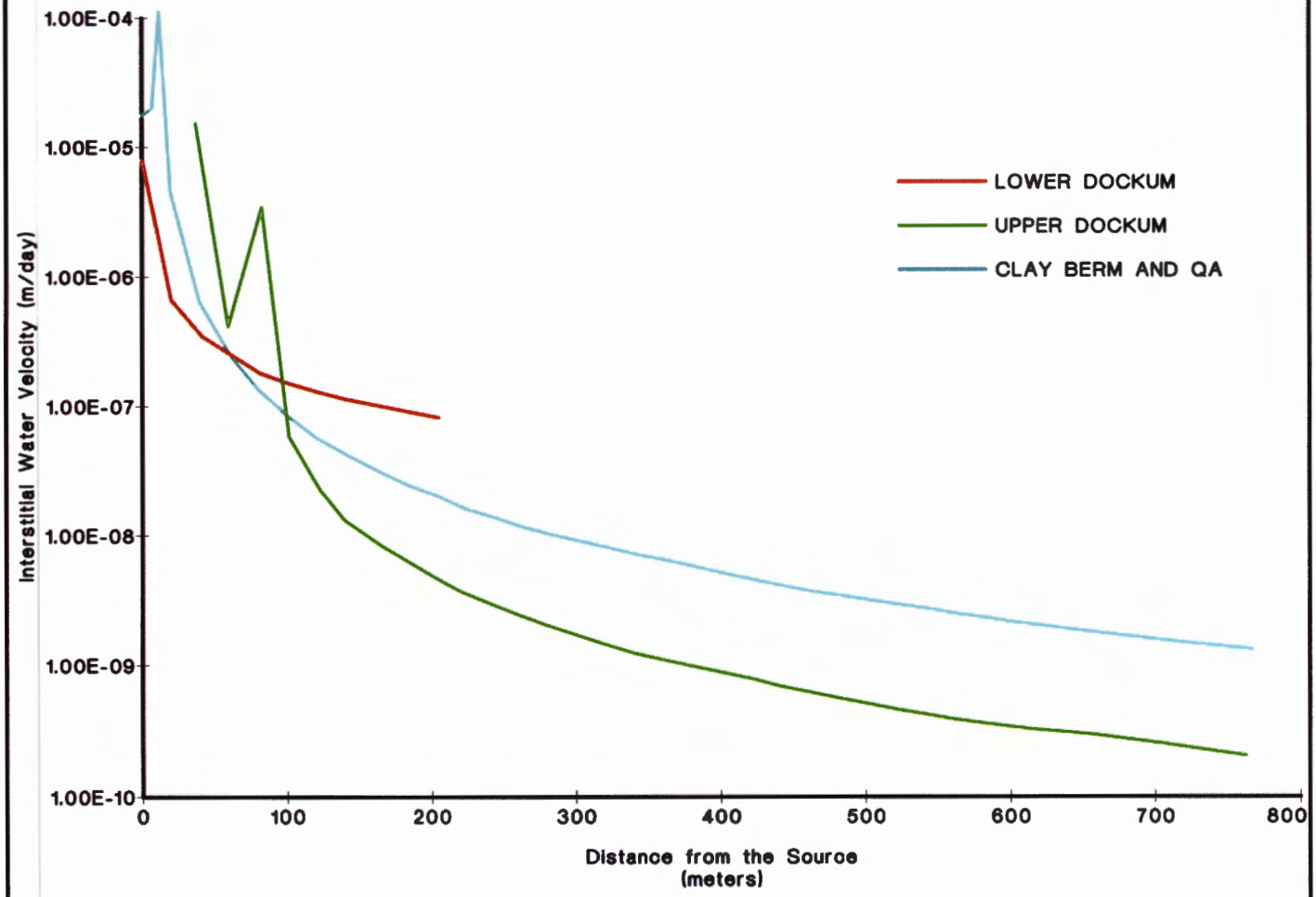


STEADY STATE UNSATURATED HYDRAULIC CONDUCTIVITY vs. DISTANCE FROM SOURCE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-23

AutoCAD FILE: GANDY-FIG8-3

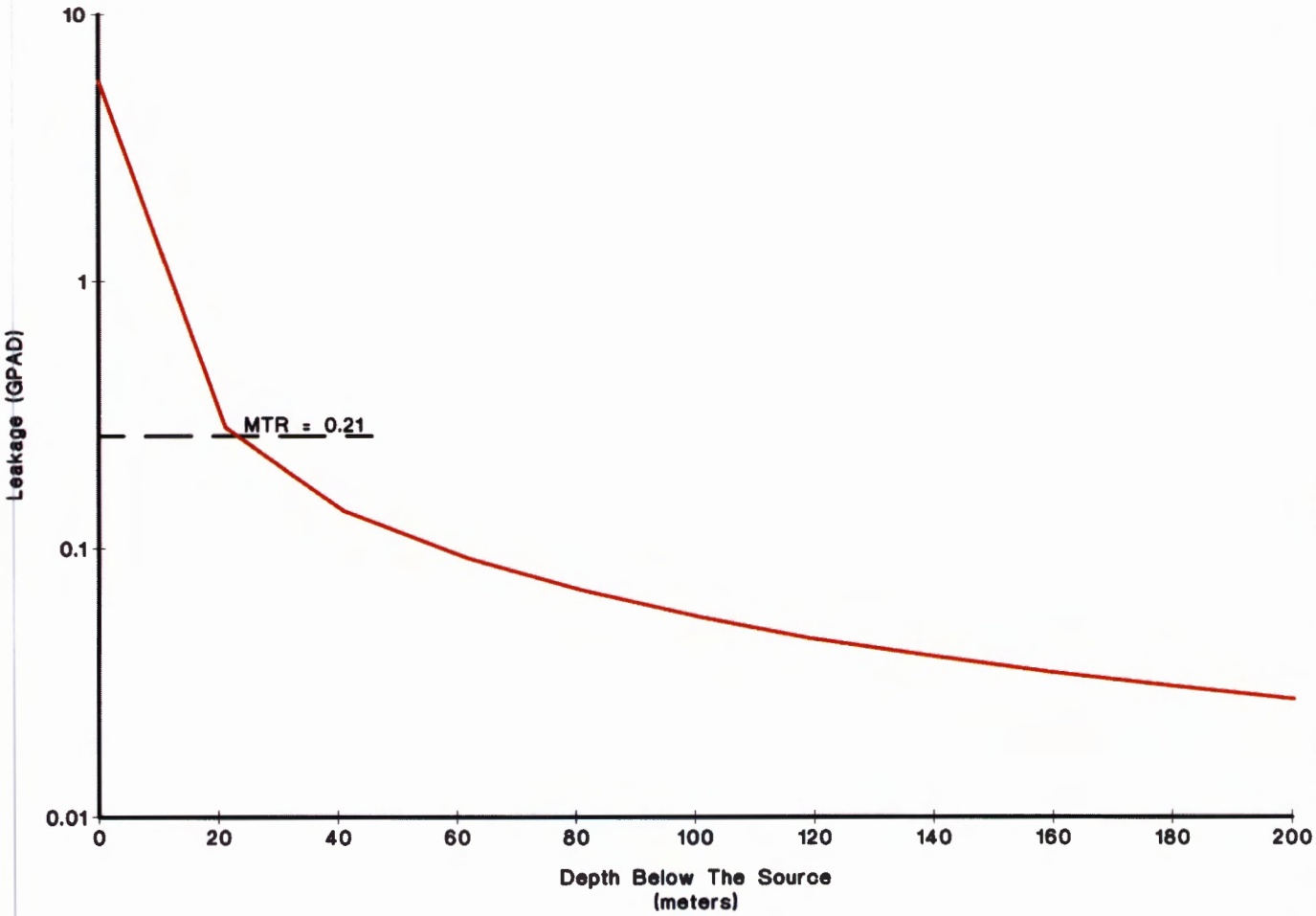


INTERSTITIAL WATER VELOCITY vs. DISTANCE FROM SOURCE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-24

AutoCAD FILE: GANDY-FIGB-4

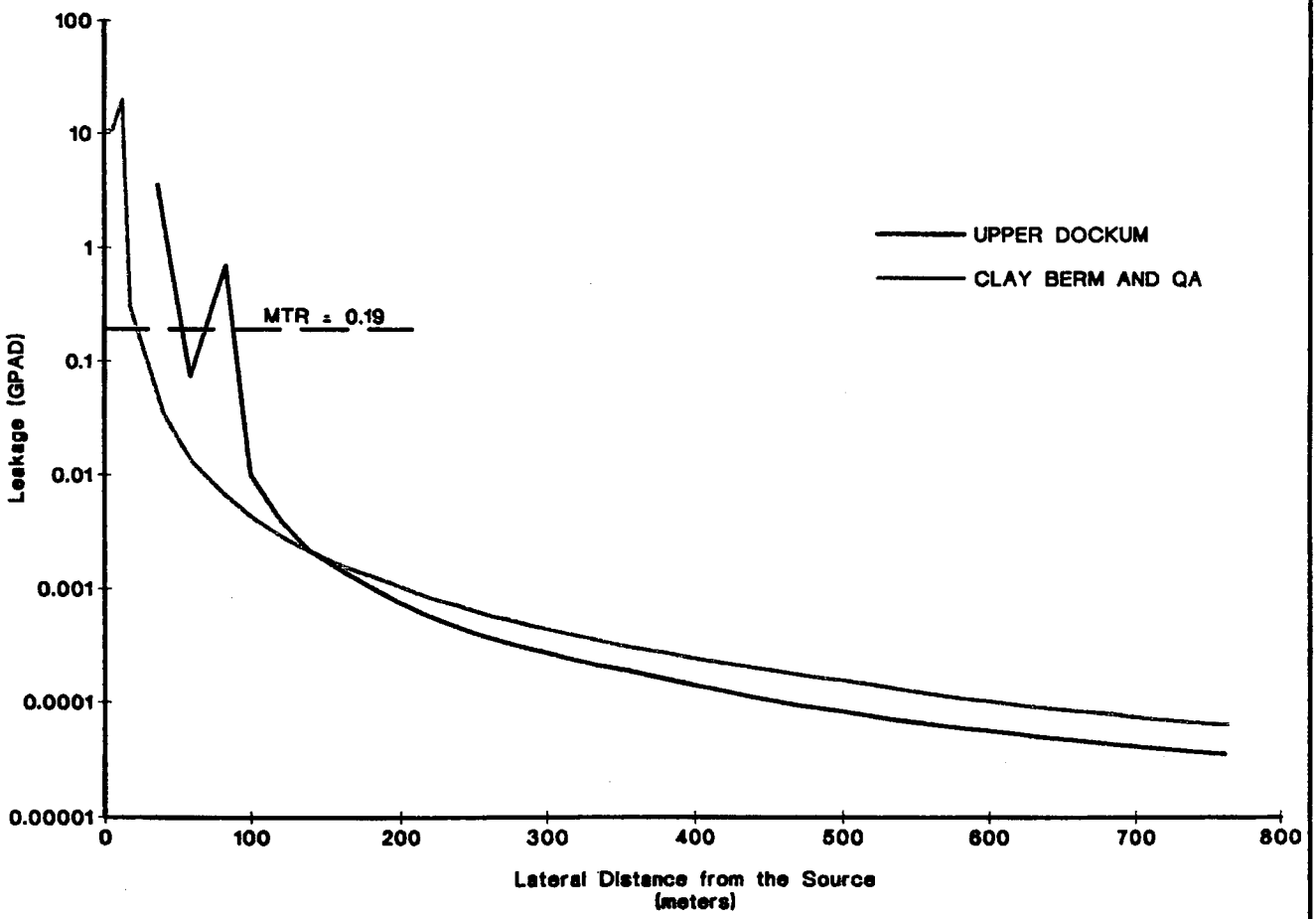


STEADY STATE LEAKAGE INTO LOWER DOCKUM vs.DISTANCE FROM SOURCE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-25

AutoCAD FILE. GANDY-FIGB-5



STEADY STATE LEAKAGE vs. LATERAL DISTANCE FROM SOURCE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 3-26

AutoCAD FILE: GANDY-FIG3-26

4. Waste Analysis Plan

The Triassic Park Hazardous Waste Disposal Facility (the Facility) is a commercial facility that receives hazardous waste generated off-site for disposal. This Waste Analysis Plan (WAP) establishes Facility requirements for accepting and characterizing hazardous waste generated both off-site and on-site. The WAP requirements are established in the 1995 New Mexico Hazardous Waste Management Regulations at 20.4.1.500 NMAC incorporating 40 CFR 264.13, 20.4.1.800 NMAC incorporating 40 CFR 268.7, and 20.4.1.900 NMAC incorporating 40 CFR 270.14(b)(3). The most recent revision of this WAP will be maintained at the facility as part of the facility Operating Record. The facility will continually upgrade the WAP with regard to the LDR regulations contained in 40 CFR 268.

Section 4.1 identifies wastes that will be accepted at the Facility and wastes that are prohibited. Section 4.2 lists criteria for waste acceptance and management. Sections 4.3 and 4.4 contain pre-acceptance procedures for initial acceptance of hazardous waste received from off-site generators and management procedures for incoming shipments of waste. The various waste analysis protocols that will be required at the Facility are contained in Section 4.5. Sampling and analytical methods and protocols for quality assurance/quality control (QA/QC) are discussed in Sections 4.6 and 4.7. Section 4.8 explains the Facility's waste tracking system. Section 4.9 summarizes notification, certification, and recordkeeping requirements related to waste analysis.

4.1 Permitted and Prohibited Waste

Section 4.1.1 identifies hazardous waste permitted for acceptance at the Facility. Hazardous waste prohibited at the Facility is identified in Section 4.1.2.

4.1.1 Permitted Waste

The Facility will dispose of only those hazardous wastes listed in Part A of the Facility Permit Application. Only hazardous waste which meets the LDR treatment standards identified in 40 CFR 268, Subpart Dwill be accepted. These treatment standards are applicable to both primary contaminants and underlying constituents.

4.1.2 Prohibited Waste

The Facility will not accept the following wastes from off-site generators:

- *Dioxin-contaminated wastes:* Wastes listed in 40 CFR 268.31 as adopted by 20.4.1.800 NMAC.
- *Certain PCB-contaminated soils:* Soils with PCB concentrations greater than or equal to 500 ppm will not be accepted at the Facility, except for those soils (or other wastes) that are PCB bulk product waste or PCB remediation waste (40 CFR 761). The Facility may obtain a permit from the U.S. Environmental Protection Agency (EPA) for management of Toxic Substances Control Act (TSCA) wastes in order to accept other wastes containing PCB concentrations greater than 500 ppm. A copy of this permit will be transmitted to the New Mexico Environment Department (NMED) before such waste is accepted.
- *Organic liquids/sludges:* Liquids/sludges with organic concentrations at levels that make them subject to the treatment, storage, and disposal requirements described in 40 CFR 264 Subpart AA or CC; and that have not been treated, prior to receipt at the Facility, to applicable LDR treatment standards (40 CFR 264 Subpart AA and CC as adopted by 20.4.1.500 NMAC).

- *Explosives:* Any substance or article, including a device, that is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or that, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion.
- *Radioactive/nuclear materials:* Materials regulated by NMED or the New Mexico Oil Conservation Division and defined in 20.3.1 NMAC Subpart 14, or materials regulated under the Atomic Energy Act of 1954, as amended (including source, special nuclear materials and byproduct materials as defined in 10 CFR 20.1003).
- *Medical waste:* Waste including infectious/biologic/pathogenic solid waste generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals. This also includes infectious waste as defined in 20.9.1.105.AL NMAC.
- *Packing house and killing plant offal:* Defined as a special waste by 20.9.1.105.BZ NMAC.
- *Certain hazardous debris:* Hazardous debris that has not been treated, prior to receipt at the Facility, to meet the LDR treatment standards.
- *Certain lab packs:* Lab packs that contain wastes [identified in 40 CFR 268, Appendix IV (adopted by reference in 20.4.1.800 NMAC)] excluded from lab packs under the alternative treatment standards of 40 CFR 268.42(c) (adopted by reference in 20.4.1.800 NMAC).
- *Compressed gases:* Gases stored at pressures higher than atmospheric.
- *Unknown or unidentified waste:* These wastes cannot be accepted at the Facility except by special provision and direction from the NMED Secretary (e.g., emergency clean-up operations) or until full characterization has been performed.

4.2 Criteria for Waste Management at the Facility

Waste managed at the Facility must meet the Facility's criteria for acceptance and management. Waste analysis (or, in some cases, acceptable process knowledge) will be used to ensure determination of:

- Complete characterization of the waste.
- Compliance with LDR treatment standards, including, where applicable, underlying constituents. If the waste stream does not meet the LDR treatment standards, the waste will be rejected.
- Compliance with the Facility's regulatory and operational limits (e.g., the waste is not included in the permitted wastes listed in Part A of this application or the waste does not meet other operational boundaries established by this WAP).

4.3 Pre-Acceptance Procedures for Off-Site Waste

Before a waste stream is accepted, all off-site generators will be required to provide a complete waste characterization (Section 4.3.1). After evaluating the paperwork supplied by the generator (Section 4.3.2), the Facility will send a representative sample of the waste to a laboratory for analysis and will evaluate the analytical results (Section 4.3.3). Finally, the Facility will notify the generator that the Facility will accept the waste stream (Section 4.3.4).

4.3.1 Waste Characterization Information Provided by the Generator

The activities associated with pre-acceptance of off-site waste streams are shown in Figure 4-1. The generator must provide the following waste characterization information for each waste stream:

- A completed Waste Profile Form signed by an authorized agent of the generator. An example of a Waste Profile Form is contained in Permit Attachment F2. This form may be changed if the Facility believes that more information is warranted or if there are changes in regulations governing the Facility.
- Other documentation that supports the information presented on the Waste Profile Form (e.g., material safety data sheets [MSDSs]).
- A description of the process that generated the waste.
- A completed Land Disposal Restriction Notification.
- All other supporting data required by 40 CFR 268.7.
- All required certifications.
- Waste analysis data used to characterize the waste and/or process knowledge documentation.
- A representative sample of the waste, of adequate volume for analysis.

If waste analysis is used to characterize the waste, the generator must supply, at a minimum, the following waste analysis data for each representative sample:

- identification of the sample medium (e.g., sludge, soil);
- information about waste stratification;
- brief description of the sampling strategy, including
  - a description of the sampling technique (i.e., biased or random);
  - rationale for selection of the number and location of samples;
  - a description of the statistical approach, if any; and
  - the sample type (i.e., grab or composite);
- identification of the analytical methods that were used and the rationale for the selection of these parameters;
- final laboratory reports including case narratives, waste analyses, and QA/QC analyses; and
- identification of the laboratory that performed the waste analyses.

The Facility will evaluate the way each representative sample was obtained in order to determine whether it is truly representative of the waste stream. The Facility will evaluate the information provided by the supplier and will use the documents listed below for guidance.

- The Sampling Plan, Section 4.6 of this document
- Standard Practice for Sampling Waste and Soil for Volatile Organics (American Society for Testing and Materials (ASTM) D4547-91)
- Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods, Part III (US Environmental Protection Agency Publication SW-846, latest edition)

- RCRA Sampling Procedures Handbook (EPA Region VI)

In certain cases, generators may meet waste analysis requirements by supplying "acceptable knowledge". Acceptable knowledge includes process knowledge and waste analysis. (Permit Attachment F4 identifies acceptable knowledge requirements for foreign generators). Process knowledge includes detailed information of a waste obtained from existing published or documented waste analysis data or studies on hazardous wastes generated by processes similar to that which generated the waste, or industry or trade association hazardous waste profile studies, or EPA documents. Examples of waste streams where process knowledge may be adequate for characterization are K-listed wastes (hazardous wastes from specific sources), which are identified by comparing the specific process that generated the waste to those processes listed in 40 CFR 261.32. The application of process knowledge is appropriate where the physical/chemical make-up of the waste is well known and consistent. Process knowledge is often used in conjunction with physical and analytical analysis.

Foreign Generators shall, in addition to all of the above requirements, analyze wastes at an accredited laboratory in accordance with Section 4.7.4, Laboratory Requirements for Foreign Generators, and shall characterize all waste streams in accordance with Permit Attachment F4, Waste Characterization Using Acceptable Knowledge.

4.3.2 Paperwork Evaluation

The Facility will evaluate all of the waste characterization paperwork to determine if it adequately represents the physical and chemical characteristics of the waste stream and whether the waste stream is appropriate for management at the Facility. As part of the pre-shipment process, the Facility will work with the off-site waste generator to ensure that all necessary waste analyses and waste characterization information are provided to meet the applicable requirements for acceptance.

If waste analysis was used to characterize the waste, the Facility will evaluate the data to determine that:

- appropriate extraction and preservation techniques were used;
- appropriate sampling strategies were used;
- appropriate sample types were collected;
- appropriate parameters were selected for analysis;
- appropriate analytical methods were used;
- recommended holding times were met;
- detection limits were below applicable standards (e.g., the LDR standards); and
- the quality of the analytical data is adequate for making a waste determination based on an evaluation of the final laboratory reports.

If the data supplied are not adequate to provide a complete characterization of the waste stream, the Facility will either require additional information from the generator or will not agree to accept the waste.

All of the waste characterization information supplied by the generator will be maintained in the Facility's Operating Record. In addition, the Facility's evaluation of this information and the results of the independent analysis will be maintained in the Operating Record.

4.3.3 Representative Sample Assessment

After evaluation and approval of the sample representativeness and waste characterization data paperwork, the representative sample submitted by the generator will be analyzed by a qualified laboratory other than the one used by the generator. Based upon the Facility evaluation of the information supplied by the generator, the Facility will inform the laboratory of the medium type (e.g., aqueous or solid) and appropriate parameters for analysis. The rationale for selection will be maintained in the Facility Operating Record.

The generator's Waste Profile Form will be compared with the results of the laboratory analysis of the representative sample and with the Facility's permit to ensure that the waste is acceptable for disposal at the Facility. Should there be a discrepancy between the analytical results and the generator information, the Facility will contact the generator to resolve the discrepancy. The generator will not be authorized to ship the waste until all discrepancies are resolved. If the discrepancies cannot be resolved with the information provided by the generator, the Facility will request a new Waste Profile Form and any additional information that may be required to characterize the waste adequately. In addition, the Facility may require the generator to submit additional samples of the waste for analysis. If the generator cannot supply adequate information to provide a complete characterization of the waste stream, the Facility will not accept the waste. The generator will submit a new Waste Profile Form for each new waste stream and for an existing waste stream if it is modified significantly.

4.3.3.1 Major Discrepancies

Major discrepancies include the following:

- analytical results indicating that the generator applied an incomplete or wrong waste code to the waste stream;
- analytical results indicating that the generator submitted incomplete or wrong information on the LDR Notification Form;
- analytical results including constituents or underlying hazardous characteristics that are not explained by a description of the process; and
- other information indicating that the waste stream is not characterized properly.

In the event of a major discrepancy, the Facility will reject the paperwork and require the generator to analyze the waste in accordance with a sampling plan that is consistent with the guidance in EPA document SW-846, *Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods*, Chapter 9. The Facility will require the generator to resubmit the waste characterization information listed in Section 4.3.1 and one or more additional representative samples for analysis.

4.3.3.2 Minor Discrepancies

Minor discrepancies include any other waste characterization discrepancy (e.g., discrepancies that do not question hazardous waste code assignments, waste treatment, or the presence of prohibited items). In the event of a minor discrepancy, the Facility will work with the generator to resolve the discrepancy. For example, uncertainties regarding whether sorbents are present will be handled as minor discrepancies. The Facility will contact the generator if the Waste Profile Form does not indicate whether a sorbent was added to the waste, or if it indicates that a sorbent was added but does not specify the name and type of sorbent and whether it is biodegradable. If the generator cannot provide this documentation, the waste must be tested to determine whether it contains a biodegradable sorbent. If the waste is determined to contain a biodegradable sorbent, it will be rejected.

4.3.3.3 Additional Waste Acceptance Conditions

In addition to complete characterization of the waste, the Facility will also evaluate the waste to ensure that it can be managed at the Facility. Waste analysis will be conducted where necessary to ensure that:

- the waste is not prohibited (e.g., the waste is included in Part A of this application, is not listed in Section 4.1 as a prohibited waste, or does not exceed allowable PCB concentrations or include dioxins);
- the LDR treatment standards contained in 40 CFR; 268, Subpart D, including the standards for underlying hazardous constituents, are met;
- the general requirements contained in 40 CFR 264.17 for ignitable, reactive, and/or incompatible waste are met; and
- the waste does not contain biodegradable sorbents, as required in 40 CFR 264.314(e).

All major and minor discrepancies, discrepancy resolutions, and compliance with the additional waste acceptance conditions listed above will be documented in writing and maintained in the Facility Operating Record.

4.3.4 Notification and Approval of Waste Shipment

After the Facility determines that the waste stream meets the pre-acceptance requirements, the Facility will send a written notification to the generator. This notification will include the following:

- a statement that the waste is acceptable for shipment;
- a unique identifier number for the waste stream, assigned by the Facility (see Section 4.10);
- instructions to put the unique identifier number on all shipment paperwork and all future waste characterization data that are submitted for the waste stream;
- a requirement to notify the Facility at least 24 hours before shipping, so that the Facility can ensure that there are sufficient resources and capacity to manage the shipment when it arrives;
- a statement that the Facility reserves the right to delay shipments beyond the 24-hour time frame;
- instructions to ensure safe management of the waste (e.g., packaging or labeling requirements not otherwise required by regulations);
- if the generator has treated the waste prior to shipment to meet applicable LDR treatment standards, a requirement that the generator develop and follow a written WAP that describes the procedures used; and
- a requirement that the generator retain on-site a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation produced pursuant to characterization of the waste stream for five years from the date that the waste was last sent to the Facility.

Once the Facility has completed pre-acceptance requirements and has determined that a waste stream is acceptable for shipment, the on-site laboratory will be notified in writing. The notification will include the waste type, waste stream identifier, physical form, packaging, and how the waste is to be managed. This information will be used by the laboratory as follows:

- the waste stream identifier will be used to track the samples in relation to the waste stream;

- the waste type will be used to help determine the analytical methods that will be employed for fingerprint analysis; and
- the physical form and packaging will determine the most applicable sampling methods.

Using this information, the on-site laboratory will designate a sampling and analytical protocol specific to each waste stream as described in Section 4.6. The unique identifier number for the waste stream will be used to track all activities for the waste stream. Individual shipments from within the waste stream will receive an additional identifier to enable the Facility to tie information back to the specific shipment as well as to the waste stream.

4.4 Procedures for Incoming Waste Acceptance

The activities associated with incoming waste shipment are shown in Figure 4-2. These procedures will be used for both initial shipment of a waste stream and for waste streams that have previously been accepted by the Facility from the same generator and process. The Facility will review the waste shipment paperwork and resolve paperwork discrepancies (Section 4.4.1), and visually inspect the waste inside the containers and roll-off boxes (Section 4.4.2). Waste analyses for incoming shipments consist of fingerprint analysis and an annual analysis to update characterization of the waste stream (Section 4.4.3). Based on the Facility's evaluation of the waste stream, a determination to accept or reject the waste will be made (Section 4.4.4)..

4.4.1 Paperwork Review

Upon receipt of a waste shipment, the truck will be routed to a parking area outside the Facility gate while documents are reviewed. The Facility will:

- review all paperwork for completeness to verify that all required documentation is present and signed as necessary;
- compare the information in the manifest, the Waste Profile Form, the LDR Notification Form, and pre-acceptance waste characterization information for consistency;
- compare the number of containers, the volume or weight of the waste, and the waste labels on each container with the manifest for consistency; and
- review all paperwork to verify that the unique identifier number for the waste stream is on all the waste shipment paperwork and all accompanying waste characterization data.

If the Facility determines that the paperwork is complete and consistent, the waste shipment will be routed to the truck sampling station, a staging area inside the Facility gate.

If the Facility determines that the paperwork is incomplete or inconsistent, the waste shipment will be routed to a segregated, secure area inside the Facility gate pending resolution of the discrepancies. An attempt will be made to resolve discrepancies with the waste generator or transporter within 24 hours. In those instances where a discrepancy with the manifest cannot be resolved within 15 days of receiving the waste, a letter will be submitted to NMED describing the discrepancy and the attempts made to reconcile it. A copy of the manifest or shipping paper at issue also will be provided to NMED, as specified in 40 CFR 264.72(b). If the Facility is unable to resolve the manifest discrepancies, the waste will not be accepted.

The Facility will resolve significant manifest discrepancies in accordance with 40 CFR 264.72. Manifest discrepancies are differences between the quantity or type of hazardous waste designated on the manifest and the quantity or type of hazardous waste contained in the shipment received at the Facility.

Significant discrepancies in quantity are:

- *Bulk waste:* Variations greater than 10 percent in weight.
- *Batch waste:* Any variation in piece count, such as a discrepancy of one drum in a truckload.

Significant discrepancies in type are obvious differences which can be discovered by inspection or waste analysis, such as waste solvent substituted for waste acid, or toxic constituents not reported on the manifest or shipping paper.

All discrepancy resolutions will be documented in writing and maintained in the Facility Operating Record. If manifest discrepancies are not resolved within 90 days of identifying the discrepancy, waste will not be accepted for disposal, and the waste will either be returned to the sender or disposed at an appropriate off-site facility.

4.4.2 Visual Inspection

After all paperwork discrepancies have been resolved, the Facility will physically open and inspect the waste inside drums and roll-off boxes for color, similar physical appearance (e.g., single phase, bi-layer, multi-layer), and physical state (e.g., solid or semi-solid). This information will be compared with the waste characterization information provided by the generator and the physical appearance of the representative sample. If the color and/or viscosity of bulk wastes (solids and sludges) appear inconsistent, the Facility may elect to perform additional chemical tests (i.e., composite samples would be taken from within the different areas of coloration or viscosity).

The Facility will inspect a minimum of 10 percent of all drums of each waste stream per shipment (but not less than one drum per waste stream) and each roll-off container.

The Facility will physically open all containers of hazardous debris and inspect the contents to ensure that the waste shipment matches the waste that is expected. Prior to acceptance of hazardous debris, the Facility will require the generator to provide a certification that the waste has been treated in accordance with the requirements defined for the treatment of hazardous debris in 40 CFR 268. Hazardous debris is visually inspected because it is exempted from the representative sample waste analysis requirements discussed in Section 4.7.2. This visual inspection will ensure that the waste stream matches the description provided by the generator.

Certain loads may not be sampled, at the discretion of the Facility manager or laboratory supervisor, for environmental and safety reasons (e.g., severe weather which causes unsafe working conditions). In these cases, the generator or his agent will be required to provide a signed certification that the load conforms to the Waste Profile Form. This variance from established procedure will be documented in the Facility Operating Record.

If a discrepancy is found, the Facility will contact the waste generator for resolution (see Section 4.4.1). The results of visual inspections and all discrepancy resolutions will be documented in writing and maintained in the Facility Operation Record. If discrepancies noted during visual examination are not resolved within 90 days of identifying the discrepancy, waste will not be accepted for disposal, and the waste will either be returned to the sender or disposed of off-site at an appropriate facility.

4.4.3 Waste Analysis for Incoming Shipments

Waste analysis for incoming shipments consists of fingerprint tests (Section 4.5.4) and an annual analysis to ensure correct characterization of each waste stream (Section 4.5.3).

4.3.3.1 Fingerprint Test Procedure

Fingerprint testing is an abbreviated analysis and is used to confirm that an incoming shipment of waste received at the Facility is the actual waste expected and that it matches the expected chemical content for that waste. Fingerprint analysis will be conducted on each waste stream in each shipment prior to shipment acceptance. Fingerprint analysis will be conducted generally for parameters that will give information that can be used to help verify that a waste stream received from off-site matches the expected characteristics of the waste.

While the incoming shipment is staged at the sampling station, laboratory personnel or other trained personnel will review the sampling and laboratory requirements for the specific waste stream. After completion of this review, sampling personnel will obtain the necessary samples in the manner prescribed by the Sampling Plan and applicable laboratory requirements. Sampling will be conducted in accordance with approved site operating procedures. These procedures will detail the sampling requirements, sample labeling, chain-of-custody requirements, any necessary sample preservation requirements, and other sampling components (see Section 4.6).

Each waste stream in each shipment will be sampled in accordance with the following sampling rate, at a minimum:

- *Bulk waste:* One sample will be collected from each shipment of bulk waste (one shipment of bulk waste is considered to be one truck load or one roll-off box). If, upon visual inspection, the color and characteristics of solids or sludges appear inconsistent, the Facility may elect to obtain additional samples. These samples would be composites from within the different areas of color or characteristics.
- *Batch waste:* One sample will be collected from each 10 waste drums in each waste stream in each shipment. If there are fewer than 10 waste drums in the waste stream, one drum will be sampled. One sample will be collected from each drum if the waste appears to be inconsistent with the pre-acceptance waste characterization data.

The Facility can increase this sampling rate for any reason. For example, the Facility may decide to collect additional samples if the waste appears to be inconsistent with the pre-acceptance characterization data. In some instances, the Facility may elect to waive one or more analyses under the following conditions:

- The transported waste is a portion of a continuously shipped, well documented waste stream, such as waste produced from a consistent, non-variable process or contaminated soils from a specific remedial action.
- The waste has been approved for receipt by NMED on an emergency basis.
- Facility personnel at the point of generation sampled, or oversaw the sampling of, the waste, and the fingerprint test/supplemental analyses have been conducted. (In cases where a generator is sending very large or continual shipments, the Facility may elect to station personnel at the point of generation to obtain samples prior to or during loading of the waste).

Prior to waiving sampling and analysis requirements, however, the Facility will request a variance from NMED and will not dispose of the waste until NMED approval is received.

4.4.3.2 Annual Analysis Procedure

As part of the Facility's QA/QC procedures (see Section 4.7), the representative sample analysis for each waste stream from each generator will be repeated annually. Repeating this pre-acceptance procedure will ensure that the analysis is accurate and up-to-date and that the waste stream has remained within the

operational bounds of the Facility. This annual analysis will be performed by an independent laboratory. This analysis will be repeated more frequently if the Facility believes, or has been informed by the generator, that the process generating the waste stream has changed. In the case of a change in the waste generation process the waste stream will be managed as a new waste stream in accordance with the requirements of this WAP.

4.4.4 Acceptance/Rejection Determination

4.4.4.1 Discrepancy Resolution

Upon completion of the fingerprint analysis, a determination will be made as to whether or not the wastes are consistent with the pre-acceptance waste characterization information and within acceptance limits of the Facility. If any of the analyses determine the waste is not within the operational acceptance limits for disposal, the waste will not be accepted by the Facility. If the results of the analysis conflict with the waste profile information, the Facility may take any or all of the following actions:

- Resample the waste, if necessary, and perform a second fingerprint test. The Facility manager has discretion to accept the waste if the second fingerprint results match those on the waste profile sheet. The discrepancy between results will be explained and included in the Facility Operating Record for that waste stream or shipment.
- Perform further characterization as necessary to verify the composition of the waste by sending a sample to a qualified independent analytical laboratory.
- Reject the entire waste shipment or the nonconforming portion of the shipment.

If discrepancies between fingerprint analysis and waste stream characterization information exist upon completion of discrepancy resolution, the waste will be rejected by the Facility. The Facility will return the rejected waste to the generator or ensure proper disposal of the waste at an appropriate off-site facility within 30 days of the waste rejection.

4.4.4.2 Shipment Acceptance Procedures

Once the decision has been made to accept a waste shipment, the appropriate papers will be signed for the generator, and the waste stream will be transported by truck to the landfill.

4.5 Waste Analysis

Tables 4-1 through 4-3 specify parameters which will be analyzed to ensure that all criteria for waste acceptance and management are met. The Facility will use approved SW-846 or ASTM analytical methods, or other approved method. If an alternative method not contained in SW-846 is to be used, the Facility will demonstrate that such alternative method is equivalent to the approved method contained in SW-846 or this WAP. Alternative methods will be submitted to the NMED Secretary at least 15 days prior to the sample collection event.

Section 4.5.1 identifies the rationale for selecting parameters and analytical methods which will be used to test hazardous waste managed at the Facility. Requirements for the pre-acceptance analysis of a representative sample of waste generated off-site and for the annual analysis are discussed in Sections 4.5.2 and 4.5.3, respectively. Section 4.5.4 contains requirements for fingerprint testing. Section 4.5.5 contains waste analysis requirements specific for the landfill. Section 4.5.6 contains requirements for analysis of waste generated on-site.

4.5.1 Analytical Parameters

The analytical parameter lists for pre-acceptance waste characterization, fingerprint analysis, and additional unit-specific analysis are presented in Tables 4-1, 4-2, and 4-3. The Facility will augment these lists as necessary to ensure that additional considerations pertaining to waste-stream-specific pre-acceptance characteristics, LDR standards analysis, and other Facility operational limits are met. The rationale used to determine pre-acceptance characterization is specified in Section 4.5.1.1. The rationale for selecting additional parameters to ensure compliance with the LDR standards is specified in Section 4.5.1.2. The rationale for selecting parameters to ensure compliance with other facility regulatory and operational limits is contained in Section 4.5.1.3. For each waste stream accepted and disposed of at the facility, appropriate parameters will be selected to ensure that each of the facility acceptance criteria is met.

4.5.1.1 Parameters for Waste Characterization

Table 4-1 specifies parameters to confirm that a waste stream agrees with the information provided by the generator. The rationale for the selection of these parameters is as follows:

- *Total volatile organic compounds (VOCs):* This test will determine the presence and concentration of individual VOCs.

- *Total semivolatile organic compounds (SVOCs):* This test will determine the presence and concentration of individual SVOCs.

- *Metals and inorganic constituents:* These tests will determine the presence and concentrations of individual metals and other inorganic constituents.

- *Physical appearance:* This test determines the general identity of the waste and establishes baseline characteristics that can then be subjectively compared with the waste shipment when it arrives at the facility. The waste is visually inspected and the physical appearance of the waste is recorded, including, at a minimum, the following properties: Color, physical state (solid or semi-solid), texture, viscosity, layering (single phase, bi-layer, multi-layer), and presence of free liquids.

- *pH:* This test indicates the corrosive nature of the waste. It also determines compatibility with other wastes and with liners. The tolerance range for pH is plus or minus 2.5 pH units.

- *Radioactivity screen:* This test screens each load using a gamma ray scintillation detector or other appropriate equipment. This test will be used to ensure that the level of radioactivity observed in NORM waste or equipment from oil, gas, and water production containing hazardous constituents, or other naturally occurring radioactive materials not regulated under 20.3.1.14 NMAC, is not above regulated limits as defined in 20.3.1.14 NMAC (i.e., the maximum radiation exposure reading at any accessible point does not exceed 50 microroentgens per hour [ΦR/hr] and the maximum radiation reading for sludges and scales contained in oil, gas, and water production equipment does not exceed 50 ΦR/hr, or, if the radiation readings for removable sludges and scales exceed 50 ΦR/hr, the concentration of radium 226, in a representative sample, does not exceed 30 picocuries per gram [pCi/g]). Material regulated under the Atomic Energy Act of 1954, as amended, is not permitted for waste management.

4.5.1.2 Additional Analysis to Ensure Compliance with the LDR Treatment Standards

The rationale for the selection of additional parameters to ensure compliance with the LDR standards is as follows:

- *Ignitability:* This is a qualitative test to determine the ignitable nature of the waste and indicate if the waste is prohibited. It also helps to determine whether the waste is compatible with liners, piping, structures, equipment, and other waste streams.

- *Explosive meter vapor test (TLV sniff test):* This test determines the fire-producing potential of the waste and whether it is regulated as flammable or combustible by the US Department of Transportation. If liquid waste exceeds 200 ppm, the waste will also be tested for ignitability using the flash point test. The tolerance range for the TLV sniff test is plus or minus 200 ppm.

- *Flash point test:* This test determines the flash point of the waste and determines whether the waste is ignitable.

- *pH:* This test indicates the corrosive nature of the waste. It also determines compatibility with other wastes and with liners. The tolerance range for pH is plus or minus 2.5 pH units.

- *Reactive sulfide:* This test determines the reactive nature of the waste and indicates if the waste is prohibited. It is also used to determine whether the waste is compatible with liners, piping, structures, equipment, and other waste streams. Wastes containing total releasable sulfide with concentrations less than 500 ppm are considered non-reactive.

- *Reactive cyanide:* This test determines if cyanide could potentially be reactive under acidic conditions, indicates if the waste is prohibited. It also determines whether the waste is compatible with liners, piping, structures, equipment, and other waste streams. Wastes containing total releaseable cyanide with concentrations less than 250 ppm are considered non-reactive.

- *Reactivity (compatibility):* This test determines the compatibility between the waste and the liner or equipment which the waste may contact.

  The Facility will ensure that potentially incompatible wastes will not be disposed of in the same location. The facility will perform a compatibility determination based on the pre-acceptance waste characterization information. Acceptable knowledge or assessment information provided on the Waste Profile Form may be used to assign compatibility codes to each waste type form based on 40 CFR 264, Appendix V.

  Chemical analysis will be accomplished in three steps, as appropriate for the waste being analyzed:

  - An analysis of the waste for reactive cyanide and sulfide. This analysis will be used to determine the waste's potential to release dangerous levels of hydrogen cyanide or hydrogen sulfide gases in acidic conditions (i.e., pH less than 2).

  - An evaluation of the reactivity characteristics of the waste through process knowledge and a series of analytical procedures that will test for the presence of reactive chemical groups. The procedures in the EPA document, *Design and Development of a Hazardous Waste Reactivity Testing Protocol,* EPA-600/2-84-057, February 1984, will be followed and the results used to assign the waste a reactivity group designation. Figure 4-3, Sequence of Procedure Sets for Determining Reactivity Group, summarizes the reactivity testing protocol.

- Use of the reactivity group designation contained in Figure 4-3 to evaluate compatibility of the waste with other wastes by comparing it to the compatibility matrix shown in Figure 4-4, Reactivity Group Designation. (Refer to EPA document, A Method for Determining the Compatibility of Hazardous Wastes, EPA-600/2-80-076, April 1980, and 40 CFR Part 264, Appendix V, for additional information on waste compatibility).

- *Total VOCs:* This test will determine the presence and concentration of individual VOCs.

- *Total SVOCs:* This test will determine the presence and concentration of individual SVOCs.

- *Metals:* These tests will determine the presence and concentrations of individual metals and other inorganic constituents.

- *Organochlorine pesticides:* This test determines the pesticide concentration of the waste.

- *Chlorinated herbicides:* This test determines the herbicide concentration of the waste.

- *PCBs:* This is a quantitative test to determine whether PCBs are contained in oil-bearing and other types of waste and to determine the concentration.

- *Leachate:* Leachate must be tested for all leachate constituents listed in the table in 40 CFR 268.40.

4.5.1.3 Additional Analysis to Ensure Compliance with Regulatory and Operational Limits

The rationale for the selection of additional parameters to ensure compliance with the Facility's regulatory and operational limits is as follows:

- *Radioactivity screen:* See Section 4.5.1.1. This test will determine if the waste is prohibited from acceptance at the Facility (see Section 4.1.2 for a list of prohibited wastes).

- *PCBs:* See Section 4.5.1.2. This test will determine if the waste contains a prohibited concentration of PCBs.

- *VOCs (Subpart BB):* These tests are conducted as required by 40 CFR 264.1063(d) to determine, for each piece of equipment subject to the requirements of 40 CFR; 264, Subpart BB, whether the equipment contains or exceeds 10 percent VOCs by weight. Applicable process knowledge may be used to make this determination.

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- *Dioxins and dibenzofurans:* This test is conducted to ensure that the waste stream does not contain dioxins and/or dibenzofurans.

- *Non-biodegradable sorbent test:* This test is performed as required by 40 CFR 264.314 (prohibition of liquids in landfills). This test is required if the Facility determines that the generator did not indicate whether a sorbent was added to the waste or indicates that a sorbent was added but did not specify the name and type of sorbent and whether it is nonbiodegradable. If any of this information is not present, the generator will be contacted for clarification. If uncertainty remains, 40 CFR 264.314(e)(1)(i-iii) will be reviewed. If the sorbent's biodegradability cannot be determined from the

list or if the name of the sorbent is unknown, the material will be analyzed following one of the tests referenced in 40 CFR 264.314(e)(2). The Facility will select one of the following tests:

- ASTM Method G21-70 (1984a) - Standard Practice for Determining Resistance of Synthetic Polymer Materials to Fungi;
- ASTM Method G22-76 (1984b) - Standard Practice for Determining Resistance of Plastics to Bacteria;
- OECD Test 301B - CO_2 Evolution (Modified Sturm Test) ASTM Method G21-70 (1984a) - Standard Practice for Determining Resistance of Synthetic Polymer Materials to Fungi; or
- Other approved test method.

- *Total organic halogens (TOX):* This test determines if concentrations of halogens in the waste are in compliance with the LDR treatment standards. It also determines if the waste contains constituents that could degrade a liner. Wastes containing TOX greater than 1,000 mg/L (based on TCLP extract) will not be placed in the landfill.

- *Free liquid content test (paint filter liquids test):* This test is a qualitative test to determine the free liquids concentration contained within the waste matrix and will be used as a control parameter for wastes that are to be landfilled.

- *Toxicity characteristic leaching procedure (TCLP):* This test must be used to obtain an extract of the waste where treatment standards are based on concentrations in the waste extract:
  - major ions and metals in non-leachate (sulfides and sulfates, radionuclides, VOCs, SVOCs, pesticides, PCBs, perchlorate, and TPH).

4.5.2 Representative Sample Analysis

The Facility will select parameters for analysis to ensure that the criteria for waste acceptance identified in Section 4.2 are met. The analysis will include, at a minimum, testing for each hazardous waste contained in the waste stream, as identified by EPA hazardous waste code, and for each underlying hazardous constituent, as identified in 40 CFR 268.48, Table 4-1, Parameters and Methods for Representative Sample Analysis. Additionally, parameters on Tables 4-2, Tests and Analytical Methods for Fingerprint Analysis, and 4-3, Additional Tests and Analytical Methods, will be included, as applicable.

For foreign wastes, in addition to the conditions specified above, representative sample analysis for each waste stream shall include testing for all constituents listed in 40 CFR 268.48 using practical quantitation limits capable of measuring the standards specified in 268.48. The results of this test will be used to perform the comparison with the generator's Waste Profile Form specified in the *Representative Sample Assessment* Section (Waste Analysis Plan Condition 4.3.3). Testing for all constituents listed in 40 CFR 268.48 shall not be required for the annual analyses.

Hazardous debris, as defined in 40 CFR 268.2(g), that has already been treated to meet the LDR treatment standards as described in 40 CFR 268.45 does not have to meet the representative sample analysis requirements if the Facility determines that the generator provided waste characterization information that demonstrates that the proper EPA Hazardous Waste Numbers were applied and indicates whether or not the LDR treatment standards have been met.

4.5.3 Annual Analysis

The representative sample analysis for each waste stream from each generator will be repeated annually at an independent laboratory not used by the generator (see Section 4.4.3.2).

4.5.4 Fingerprint Analysis

Fingerprint samples will be analyzed for all parameters listed on Table 4-2, and may include tests for physical appearance, pH, and radioactivity. Additional fingerprint parameters will be selected based on the pre-acceptance waste characterization data, shipment paperwork, physical form of the waste, and the visual inspection of the contents of containers and bulk waste. The Facility will follow the additional parameter selection process described in Section 2.2 of the EPA guidance document, *Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes* (EPA, OSWER 9938.4-03, April 1994).

Because the Facility already knows the detailed chemical and physical properties of a waste, additional necessary and appropriate fingerprint or spot check parameters can be chosen easily, as the purpose of the fingerprint is only to verify that the waste fingerprint analysis will include, at a minimum, the parameters received is the waste expected. These parameters will be analyzed at the on-site laboratory. Analyses which are not within the on-site laboratory's capability will be sent to an independent laboratory for analysis.

Fingerprint analysis will also include parameters as necessary to ensure that the waste is within the Facility regulatory and operational acceptance limits (see Table 4-3). To select these additional sample parameters, the Facility will consider.

- compliance with applicable regulatory and permit requirements (This may require selection of parameters not reported by the generator);
- identification of incompatible and inappropriate wastes; and
- process and design considerations.

As noted, fingerprint analysis helps the Facility minimize the potential to receive waste that is unacceptable. Therefore, the level of additional analysis required for a waste shipment is a function of Facility knowledge about the waste generation process and the waste generator. The Facility may elect to perform additional fingerprint tests to achieve a higher level of confidence that a full waste characterization is achieved. If discrepancies are noted between the received waste and the Waste Profile Form, the waste will be further analyzed using additional fingerprint parameters. Discrepancies that can result in the Facility requiring additional analysis include non-conformance with the results of required testing or a change in color, texture, liquid content, or other characteristics that can be observed upon receipt.

The Facility will follow the additional parameter selection process described in Section 2.2 of the EPA guidance document, *Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes* (EPA, OSWER 9938.4-03, April 1994).

4.5.5 Additional Analysis Requirements for the Landfill

4.5.5.1 Overview of Waste Management Procedures in the Permitted Hazardous Waste Management Unit

Upon completion of the fingerprint analysis, and supplemental analyses if conducted, waste will be transferred to the appropriate staging area. Prior to final disposition of the waste, however, additional analyses may be required to ensure that requirements for the landfill are met.

Analysis necessary for disposal is generally conducted as part of the pre-acceptance procedure (see Section 4.7.2). Appropriate parameters will be selected from Tables 4-2 and 4-3. The Facility will use a combination of process knowledge and analytical results to obtain the information needed prior to placing waste in the landfill. The Facility may elect to use other EPA-approved analytical methods if it is felt that information other than that obtainable by these methods is needed to manage the waste safely.

The landfill has specific ignitability, reactivity, and compatibility requirements that must be met. Acceptable knowledge or waste analysis will be used to determine whether a waste stream is ignitable, reactive, or incompatible with other wastes to be placed in the landfill. In addition, acceptable knowledge or waste analysis will be used to determine whether the waste stream is compatible with the landfill. Specific ignitability, reactivity, and compatibility tests will be conducted as part of the representative sample analysis, and may be repeated in the fingerprint test, for wastes assigned to specific management units. Management of these wastes is discussed inPermit Attachment B, Section 5.5. Ignitability, reactivity, and compatibility determination is discussed in Section 4.5.1.2.

The Facility will conduct compatibility tests as part of the representative sample analysis procedure on an incoming waste stream specific to other waste streams with which it may be combined.

4.5.5.5 Waste Analysis Requirements Specific to the Landfill.

Prior to placement of waste in the landfill, it must be determined that the waste meets LDR standards as set forth in 40 CFR 268, Subpart D. 40 CFR 268.40 states that a waste identified in the table "Treatment Standards for Hazardous Wastes" may be land disposed only if it meets the requirements found in the table. For each waste, the table identifies one of three types of treatment standard requirements:

- All hazardous constituents in the waste or in the treatment residue must be at or below the values found in the table for that waste ("total waste standards"); or

- The hazardous constituents in the extract of the waste or in the extract of the treatment residue must be at or below the values found in the table ("waste extract standards"); or

- The waste must be treated using the technology specified in the table ("technology standard") which are described in detail in 40 CFR 268.42, Table 4-1.

In cases where treatment standards are based on concentrations in the waste extract, the generator will use toxicity characteristic leaching procedures (TCLP, see 40 CFR 261, Appendix II) to determine if the waste meets the standards. The sampling and analysis protocols outlined in Sections 4.5 through 4. 7 of this permit application will apply to all wastes to ensure compliance with LDR standards. Parameters for analysis will be determined by the characterization of the waste before analysis. All information obtained to document LDR compliance will be maintained in the Facility Operating Record.

In addition to other required procedures and analyses, on an annual basis the Facility will randomly sample and analyze a minimum of 10 percent of incoming waste streams that are to be directly landfilled to verify conformance with the LDR requirements. These additional samples will be analyzed for the specific regulated hazardous constituents contained in the hazardous waste stream. The data generated from these samples, in conjunction with the generator-supplied data, will be used to verify conformance with the LDR requirements.

Facility personnel, either at the Facility or at the point of generation, will collect these samples. The samples will be split into a minimum of two aliquots. One will be retained and the other analyzed for conformance with the applicable LDR requirements. If the results of the analysis indicate that the waste does not conform with the applicable LDR requirements, the retained sample will be analyzed, generator-supplied information

re-evaluated, and an evaluation made of the potential for the waste's variability based on the process that generates the waste stream.

The retained sample will subsequently be analyzed, the generator-supplied information re-evaluated, and an evaluation made of the potential for the waste's variability based on the process that generated the waste stream. These factors, along with an evaluation of the QA/QC data from the laboratory (both the generator's and the Facility's), will be used to determine if the subject waste stream is eligible for continued disposal at the Facility or if additional treatment is necessary prior to disposal. Disposal of the waste stream will be discontinued until the discrepancy regarding compliance with the LDR requirements has been resolved and the generator has demonstrated that its on-going program for compliance with LDR requirements is adequate.

Procedures to meet LDR standards for specific wastes include the following:

- *Lab packs:* Prior to acceptance by the Facility for disposal, hazardous wastes contained in lab packs will be treated to meet applicable treatment standards for each waste type identified. Lab packs will also be analyzed to ensure that they do not contain hazardous wastes listed in 40 CFR 264, Appendix IV. In cases where hazardous lab pack wastes are combined with non--hazardous lab pack wastes prior to or during treatment, the entire mixture will be treated to meet the most stringent treatment standard for each hazardous constituent before being disposed of in the landfill.

- *Ignitable or reactive wastes:* Ignitable or reactive hazardous waste will be tested to ensure that it will not be placed in the landfill until the waste has been rendered non-ignitable or non-reactive by treatment.

- *Characteristic wastes.* Generator process knowledge and/or analytical data will be used to determine whether characteristic wastes meet the applicable treatment standards or to demonstrate that the waste has been treated by the appropriate specified treatment technology. In accordance with 40 CFR 268.41, where treatment standards are based on concentrations in the waste extract, generators shipping waste to the Facility will determine if their wastes meet treatment standards.

- *Reactive wastes:* Reactive wastes will not be placed in the landfill until they have been rendered nonreactive by treatment.

- *Incompatible wastes:* Incompatible wastes will be sufficiently separated when placed in the landfill to ensure that they do not combine to cause adverse reactions. These wastes will be managed to ensure that they meet the requirements specified in 40 CFR 264.313 and 274.17. This management includes placing incompatible wastes in non-adjacent landfill grids and treatment of potentially noncompatible wastes prior to shipment of the waste to the Facility..

- *Hazardous debris:* The Facility will only accept hazardous debris that has been treated and certified to meet the LDR treatment standards specified in 40 CFR 268.45(b) or (c) by the generator prior to shipment to the Facility.

- *Listed waste:* Listed waste will not be placed in the landfill until it has been shown to meet the requirements of 40 CFR 268.40.

4.5.6 Waste Analysis Requirements for Waste Generated On-Site

4.5.6.1 Overview of Waste Generated On-Site

The Facility is expected to generate some waste on-site through day-to-day facility operations, leachate, or releases of hazardous waste to the environment (see Table 4-4).

Waste generated on-site will be assumed to be RCRA-regulated until process knowledge and/or sampling and analysis can be used to determine the actual nature of the waste. Sampling and analysis will be accomplished in accordance with the requirements this WAP.

The Facility will select waste analysis parameters to confirm the identity of waste streams generated at the Facility. The selection of waste analysis parameters will typically be based on knowledge of the physical and chemical processes that produced the waste stream. If there is doubt as to the specific source, the Facility will use the waste tracking system to identify all possible sources and to develop a list of specific parameters for laboratory analysis. Acceptable knowledge and analytical testing as necessary will be used to ensure compliance with LDR requirements and provide waste compatibility and other information to determine appropriate waste management activities.

The Facility will ensure that all on-site generated waste sent to the landfill meets all LDR treatment standards.

Day-to-day operations at the Facility will produce some waste on-site from day-to-day operations (e.g., paint and paint strippers, laboratory chemicals and equipment, vehicle maintenance). This waste will be characterized using acceptable knowledge, or waste analysis if the source cannot be definitively determined. If it is hazardous waste and meets all disposal requirements, it may be disposed in the landfill. If it does not meet the requirements for disposal in the landfill or if it is not hazardous waste, it will be sent off-site for disposal.

A **release** is defined as "any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous waste (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents)". Management protocols for releases generated on-site are discussed below:

- *Spills and leaks:* Spills and leaks may occur during ordinary Facility operations (e.g., release of fluid from a leaking drum to the cell trench and sump in the drum handling unit, a spill at any loading or unloading area).

Provisions for the detection, characterization, and management of spills and leaks are discussed in Sections 2.0, 5.4.2, 6.3.5.2, and 6.3.7 of this Permit Application. If spills and/or leaks are identified during inspections, the materials will typically be removed from the system, characterized, and managed appropriately. If necessary, the contaminated area will be sampled to ensure that all contaminated materials are removed.

- *Decontamination rinse water:* Personal protective equipment (PPE), as well as other equipment (e.g., trucks, sampling equipment, industrial absorbents used during spill or leak clean-up, emergency equipment), may become contaminated during the course of site operations such as the handling of wastes, the transfer of waste to another unit, or emergency operations. The water used to rinse this equipment will be analyzed to determine if it is a hazardous waste and if the equipment has been adequately decontaminated. Provisions for the detection, characterization, and management of decontamination rinse water are discussed in Sections 5.2.5, 5.2.10, and 9.1.2 of this Permit

Application. Rinse water and residues will be chemically analyzed and handled in an appropriate manner.

- *Run-on/run-off:* Facility stormwater control is provided by a network of surface run-on and run-off diversion channels and collection and detention basins (see Drawing 25 of the Facility design drawings in Permit Attachment L1). To control the runoff from the Facility, several collection channels and culverts will be built to divert discharges from storm events to a stormwater retention basin (see Section 2.7 of the Operations and Maintenance Plan, submitted separately). Procedures for management of run-on/runoff are discussed in Sections 2.5.1.6, 2.6.1.4, and 5.4.2 of this Permit Application. Sampling will be conducted upstream of the stormwater detention basin to determine the source of any hazardous constituents that could be introduced into the stormwater. Appropriate corrective actions will be implemented to prevent further contamination during future stormwater events.

- *Investigation derived wastes (IDW):* IDW may include drill muds and cuttings from well installation associated with the investigation of spills and releases; soils and other materials from regularly scheduled sampling activities associated with waste management units and the vadose zone monitoring system; and contaminated PPE. All IDW will be assumed to be hazardous waste until site or material specific information becomes available. IDW will be stored near the point of generation in appropriately labeled containers for no greater than 90 days and will be appropriately analyzed to determine whether it is either a characteristic or listed hazardous waste. Analysis of materials associated with the IDW may be used also to characterize the IDW. An example of associated analysis for urge waters from the vadose zone monitoring system would be the final analytical results for the samples collected to satisfy regularly scheduled monitoring requirements.

- *Contaminated soil:* Soil means unconsolidated earthen material consisting of clay, silt, sand or gravel size particles as classified by the US Natural Resource Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made primarily of soil by volume based on visual inspection. Contaminated soil is soil impacted by a hazardous constituent release. Soil may become impacted by a release either at the surface or subsurface. If the contaminated soil exists at the surface, the appropriate response is described in the Contingency Plan in the Permit Application. If the contaminated soil exists subsurface, the appropriate response will be developed by NMED as permit conditions. Contaminated soils that are managed as hazardous wastes will be analyzed and managed in accordance with the alternative LDR treatment standards for contaminated soil contained in 40 CFR 268.49.

- *Air emissions:* Procedures for detection of hazardous gases and volatile organic at the landfill are discussed in Sections 2.5.1.8 and 6.2.2 of this Permit Application. Procedures to minimize wind dispersal of dust throughout the Facility are identified in Section 5.4.8. This section also discusses pollution control systems in the stabilization unit to minimize the release of particulate to the atmosphere. The Facility will apply to NMED for a new source air emissions permit before start-up of operations.

- *Leachate:* Leachate as used here refers to landfill fluids. The definition of leachate is in 40 CFR 260.10, collected from the leachate collection and removal system (LCRS), the leak detection and removal system (LCRS), or the vadose zone monitoring system (VZMS) sump.

Leak detection and removal/vadose zone monitoring for landfill leachate is discussed in Sections 2.5.1.3, 2.5.1.4, and 2.5.1.5 and in the Engineering Report in Permit Attachment L. Leachate generated from the

landfill will be managed and removed by enhanced evaporation through leachate recirculation within the landfill. All leachate will be contained within the lined landfill unit.

Leachate may also be collected from the vadose zone monitoring wells, but only in the unlikely event of a leachate release from the landfill. These wells will be monitored monthly; if any fluids are present, they will be sampled and analyzed for all F039 constituents. Biennially, the wells will be analyzed for all the Ground Waste Monitoring List constituents identified in 40 CFR 264, Appendix IX, if water is present.

Leachate sampling and analysis will follow the sampling and analytical procedures and recordkeeping requirements contained in the VZMS Work Plan (Attachment I) and this section.

4.6 Sampling Plan

The Sampling Plan is based upon the guidance provided in Chapter 9 of SW-846. The overall plan takes into account the regulatory and scientific objectives identified in this WAP. Based upon these objectives, the sampling strategy ensures that the data collected will minimize the potential for accepting waste that is unsuitable for management at the Facility. Modifications to the Sampling Plan to include detailed sampling protocols specific to the site activities will likely be required to reflect the sampling to be performed during operation of the Facility.

The sampling program will take into account the different types of waste constituents and the various waste matrices that may be encountered. By taking these variables into account, the Facility will identify the protocols by which sample locations will be selected and the methods most appropriate for collecting samples from the different waste streams.

The latest revision of SW-846 methods (ASTM) or other approved methods will be used, and site procedures will be revised as necessary to incorporate new requirements.

General sampling methods and collection techniques are discussed in section 4.6.1. Section 4.6.2 contains specific sampling procedures. Section 4.6.3 and 4.6.4 provide information on sample location and sample type, respectively. Section 4.6.5 discusses sampling QA/QC procedures. Sections 4.6.6 and 4.6.7 present requirements regarding sample preservation, volume and holding times, and equipment decontamination, respectively.

4.6.1 Sampling Methods

Sampling methods will follow Appendix I of 40 CFR, Part 261 unless a more appropriate method is identified. Table F-5 lists general waste matrices and appropriate sampling methods that will be used at the Facility.

Matrices that will be sampled include containerized liquid, viscous liquids/sludges, crushed/powdered material, rock/rock-like material, soil, and fly-ash-like material. The methods and equipment used for sampling wastes will vary with the form and consistency of the material to be sampled. Also, these matrices will be sampled using a variety of sampling tools (see Table F-5), including the Coliwasa (containerized liquid/viscous liquid), dipper (containerized liquid/viscous liquid), thief (containerized liquid/viscous liquid), weighted bottle (containerized liquid), scoop (sludge, powdered material, rock/soil material, fly-ash material), shovel (powdered material, rock/soil material), auger (soil/fly-ash-like material) and tube sampler (fly-ash like material and liquids). The Facility will select the appropriate sampling method from Table F-5 based upon the sample matrices, chemical constituents within the sample, and sampling conditions. If a sampling method not presented on Table F-5 would be more appropriate for the specific matrices to be sampled given site-specific conditions or if the procedures presented below must be modified, an alternative method will be

used. If an alternative method is used, the sampling method will be well documented, justified, placed in the Operating Record, and approved by NMED prior to implementation.

Sampling equipment will be compatible with waste, and are generally made of glass, steel, or Teflon. Stainless steel is more suitable for sampling solids and soils, while glass and Teflon are more suitable for liquids.

4.6.1.2 Sampling with a Dipper

Dippers are used to collect liquid samples and free-flowing slurries. The dipper consists of a glass, plastic, or stainless steel beaker or similar container typically clamped, as necessary, to the end of a pole which serves as a handle. The following process will be used to sample with the dipper:

1. Clean/decontaminate the dipper.

2. Insert dipper into the liquid to be sampled, preferably through the entire sample container, if possible.

3. Remove dipper and place sample into the appropriate sample container.

4.6.1.3 Sampling with a Thief Sampler

A thief sampler may be used to collect sludge samples or to sample small dry granules. Thief samplers typically consist of two slotted concentric tubes of stainless steel; the outer tub has a conical tip allowing the sampler to penetrate the sample material, while the inner tube is rotated to open/close the sampler. The following general process will be used to sample with a thief sampler:

1. Clean/decontaminate the sampler.

2. Insert closed thief into material to be sampled. Rotate the inner tube to open the thief; collect sample.

3. Withdraw the thief, and remove inner tube, transferring sample to sampler container.

4.6.1.5 Sampling with a Scoop/Shovel

Scoops/shovels are used to sample rock/soil-like, solid or powdered matrices. The following general process will be used to sample with scoops/shovels:

1. Clean/decontaminate the sampler.

2. Obtain a full cross section of the waste material using the scoop or shovel that is large enough to contain the waste collected in one cross sectional sweep.

4.6.1.6 Sampling with an Auger

Augers are used to sample relatively hard packed solid waste material or soils. Augers are spiral drilling blades attached to metal shafts which are "turned" downward through sample material, allowing sample to exit the sample matrix by moving upward along the auger spirals. The following general process will be used to sample with an auger:

1. Clean/decontaminate the sampler.

2. Drill downward, using the auger, into the waste material, capturing waste moving upward along the auger blades in the appropriate sample container.

4.6.1.7 Sampling with a Tube Sampler

Tube samplers are used to collect soil/solid samples, and are generally glass or steel tubing that can be inserted into relatively compact matrix. (Modified tube samplers, however, can be used for liquid sampling.) Following insertion of the tube, and tube is extracted with the sample contained in the inserted tube. The following general process will be used to sample with the tube sampler:

1. Clean/decontaminate the sampler.

2. Lower/insert the tube into the waste to the desired depth.

3. When the desired depth is reached, slowly withdraw the tube, taking care to retain as much sample with the tube as possible.

4. Extract sample into the appropriate sample container.

4.6.2. Sample Collection Procedures

This section discusses the general sampling procedures for each type of sample to be collected at the Facility, as presented in Table 4-6. It is recognized that the specific sampling that will take place at the Facility may differ from general procedures included herein, and approval by NMED is required before revisions are implemented. Additionally, selection of sample locations (Section 4.6.2.8) and sample types (Section 4.6.2.9) for on-site samples to be collected are addressed.

4.6.2.1 Fingerprint Sampling

Fingerprint sampling will be conducted for all in-coming waste, except for debris waste. Eeach container of debris waste will be visually inspected, however, as will each drum and roll-off, regardless of waste matrix. Matrices that will undergo fingerprint sampling include sludges and solids arriving in containers such as roll-offs and drums/containers. Refer to Table 4-6 and Section 4.4.3.1 for sampling frequency and waste analysis.

Trucks delivering bulk solid material (e.g. in roll-offs) will be sampled using solid sampling equipment, such as a scoop (see Section 4.6.1). A surface sample will be collected from the front one-third area of the truck, middle one-third area, and rear one-third area of the bulk; samples will then be composited (see Section 4.6.4). Vertical waste composition will be determined, as possible, by collecting an additional sample from more than approximately 2 feet below the surface of the waste at each of the three sample locations using the appropriate sample collection tool (e.g., auger); these three samples will be composited with the first three samples. All loads will be visually inspected during unloading. If the load exhibits different color, texture, or wetness, samples from these areas will also be collected and included in the composite sample.

Sample methodology for drummed waste will depend on the sample matrix, but will likely include solid sampling using a scoop or auger. A single sample, collected through as much depth of the drummed waste as possible, will be collected. The location of samples collected is discussed in Section 4.6.3.

The Facility will detail the sampling method used for fingerprint waste sample collection, including but not limited to sample collection technique, sample type, sample representativeness, sample volume, sample containers, sample preservation, chain-of-custody, etc., and will place this information in the Operating Record.

4.6.2.2 Annual Sampling

Wastes that underwent representative sampling prior to initial waste shipment will undergo annual sampling to confirm waste composition. The Facility will assess the representative sampling procedure prior to initial waste acceptance, and this same representative sampling procedure will be used for annual sampling. Annual sampling will follow the representative sampling process performed prior to initial waste shipment; if the process is modified, the Facility will assess the sampling process to ensure collection of a representative sample, and place this assessment in the Operating Record.

4.6.2.3 Spills/Releases

See Section 4.6.2.7

4.6.2.6 Landfill Input

All incoming waste to the landfill will be sampled to ensure continued compliance with LDR requirements. On an annual basis, the Facility will randomly sample and analyze a minimum of 10 percent of incoming waste streams that are to be directly landfilled to verify conformance with the LDR requirements. These additional samples will be analyzed for the specific regulated hazardous constituents contained in the hazardous waste stream. The data generated from these samples, in conjunction with the generator-supplied data, will be used to verify conformance with the LDR requirements. Sampling procedures will follow those presented in Sections 4.6.2.1 and 4.6.2.4, as applicable.

4.6.2.7 On-Site Generated Waste

Several wastes may be generated on-site that require sampling and analysis (see Table 4-4). Specifically, treated waste, day-to-day generated waste (e.g. personal protective equipment), releases of wastes, run-on/run-off, investigation-derived waste, contaminated soil, air emissions, and leachate/sludges from the landfill are considered on-site generated waste.

4.6.3 Selection of Sample Locations

The Facility will collect samples from containers and roll-off boxes using either random (i.e., probability) or biased (i.e., authoritative) sampling methods. Random sampling methods will be used to select drummed containers for fingerprint analysis. All other on-site sampling, except for annual sampling of waste directly landfilled (i.e., 10 percent of the waste) requires sampling of each load, bulk container, or waste transfer, and random selection of waste containers to be sampled is therefore not applicable. However, the Facility will collect random samples from within the waste to be sampled for non-fingerprint or annual analysis (e.g., leachate, landfill input) if the wastes are expected to be fairly homogeneous waste streams. A biased sampling method will be used to select roll-off waste sample locations. (Biased samples will be collected if the wastes are expected to be or are found to be heterogeneous.) For some waste streams, the Facility may use both sampling techniques, as determined appropriate by the facility and justified in the Operating Record.

With random sampling, every unit in a population (e.g., every drum from a given waste stream in a shipment) has a theoretically equal chance of being selected for sampling. Consequently, data generated by these samples are unbiased estimators of the range of concentrations in a population. If a sufficient number of samples are taken, they would be representative of the average concentrations within the entire population. For example, in the case of drums, those drums to be fingerprint sampled will be numbered, and numbers will be randomly drawn to determine those containers that will be sampled.

With biased sampling, a preference is given to selecting only certain units in a population. This technique requires the sampler to use discretion and to have knowledge of the waste. The sampler selects the sample locations from areas where contamination is known or suspected (e.g., the sampler could collect a biased sample from areas where there is layering or differences in color or consistency). Also, the Facility may use a

field screening instrument to bias the sample location, (e.g., a photoionization detector could be used to select locations having higher volatile organic concentrations). EPA-approved ASTM method D140-70 identifies the procedure for estimating the number of containers that should be sampled. Samples collected from roll-offs, for example, may include biased sampling if areas of obvious discoloration, and other pertinent information, are noted.

The Facility will document the sampling technique that is used to locate each waste sample collected pursuant to this WAP. The Facility will maintain this information in the Facility Operating Record.

4.6.4 Sample Types

Samples of the waste will be collected as either composite or grab samples. It is possible that the Facility may modify or augment the procedures discussed below for the collection of composite and grab samples before the Facility becomes operational; if so, these revisions will be approved by NMED prior to implementation.

In composite sampling, a number of samples are initially collected from a waste and combined into a single sample which is then analyzed for the constituents of concern. Composite sampling is a valid method for homogeneous samples and tends to minimize the between-sample variation, much like the maximization of the physical size of a sample. This has the effect of reducing the number of samples that must be analyzed to verify the contents of a waste shipment. Composite samples can also be obtained from a waste that has stratified; however, a composite would only be made from samples obtained from the same strata within the waste. Composite samples will be taken with clean sampling equipment and samples will be blended before analysis. Grab sampling will be used to obtain samples of heterogeneous wastes.

4.6.5 Sampling QA/QC

QA sampling procedures will be conducted in accordance with the guidance provided in the EPA document SW-846 and EPA's waste analysis plan guidance manual, *Waste Analysis at Facilities that Generate, Treat, Store and Dispose of Hazardous Waste.* The QA requirements will be applicable to on-site sampling (e.g., leachate collection system samples) as well as to the sampling of incoming waste shipments. This program is necessary to ensure that decisions regarding the acceptance and disposition of waste are based on sound, statistically valid, and documented data. Additional QA procedures associated with sampling and analysis determined prior to initiation of on-site sampling will be included in the Operating Record.

The sampling QA program will include the following:

- training requirements for personnel responsible for sample collection;
- chain-of-custody protocols for tracking samples;
- QA review of procedures to ensure proper use of equipment;
- protocols for equipment maintenance;
- identification of required sampling techniques for specific media;
- field sampling QC procedures; and
- documentation of sampling locations.

Deviations from the approved sampling program, sampling methods, or chemical analytical methods will be documented and reviewed by personnel responsible for site QA. NMED will be notified in writing of the QA exceptions within seven days of the occurrence and measures will be taken to correct the problems as soon as practicable.

4.6.5.1 Training Requirements for Personnel Responsible for Sample Collection

All personnel and supervisory staff responsible for collecting waste samples for screening and chemical analysis will be trained in the use of all sampling methods and equipment used at the site.

4.6.5.2 Chain-of-Custody Protocols for Tracking Samples

The integrity of the sampling/analytical scheme will be maintained by following chain-of-custody procedures from the point of sample collection through analytical data reporting to sample disposal. The possession and handling of samples will be traceable from the time of collection through analysis and final disposition.

A sample is considered to be in a person's custody if it is:

- in a person's physical possession;
- in view of the person after taking possession; or
- secured in a container sealed by the responsible person so that it cannot be tampered with during transport to the designated destination or during storage after being secured by that person in an area of restricted access.

The sampler will place a sample label on each sample container. The label will include the following information:

- sample number, a unique identifier that is traceable to the waste stream and shipment;
- name of collector (sampler);
- date and time of collection; and
- place of collection.

Labels will be affixed to sample containers prior to or at the time of sampling and will be filled out at the time of collection.

Sample chain-of-custody seals will be required if the sample is designated to leave the possession of Facility personnel for transport to an analytical laboratory. The seal will include the same information as the sample label. The seal will be attached in such a way that it is necessary to break it in order to open the sample container. In addition, chain-of-custody seals will be affixed to sample storage containers in a similar manner in order to prevent tampering prior to shipment from the Facility to off-site analytical laboratories. Samples and storage containers which require seals must be sealed prior to leaving the possession of Facility personnel.

To establish the documentation necessary to trace sample possession from the time of collection, a chain of custody record will be filled out and will accompany every sample. A sample chain of custody record is provided in Permit Attachment F3.

If the sample is to be shipped off-site for analysis, it will be accompanied by a sample analysis request sheet. The sample analysis request sheet will include the information necessary to identify the sample and the analyses requested by the Facility. Samples shipped off-site for analysis will be packaged and shipped in accordance with DOT transportation requirements.

Laboratory samples will be maintained in a secure area and retained until holding times expire, as listed in SW-846, or three months, whichever comes earlier. After the holding time or three month holding period has expired, samples will be disposed at the Facility with compatible waste batches. Records of the date the

samples are removed from storage and the date and method of disposal will be maintained at the Facility until completion of post-closure care. In cases where samples are not analyzed within their holding times, the Facility will resample.

4.6.5.3 QA Review of Procedures to Ensure Proper Use of Equipment

Standard operating procedures will be developed for the use, decontamination, and storage of sampling equipment used to characterize waste shipped to the Facility. The standard operating procedures will include the sampling equipment to be used, instructions for use, and the applications for use of the equipment for collection of samples from specific media and types of shipping containers. The procedures and QA standards for waste sample collection will be included in the standard operating procedures.

4.6.5.4 Protocols for Equipment Maintenance

The protocols for equipment maintenance will be included in the standard operating procedures. Protocols will be developed, as described in the preceding paragraph, for use, decontamination, and storage of equipment. Protocols for equipment maintenance will be included in the standard operating procedures (See Section 4.6.7 for general decontamination requirements).

4.6.5.5 Identification of Required Sampling Techniques For Specific Media

The sampling methods and equipment used for collecting samples from specific media will be selected in accordance with the guidelines included in 40 CFR, Part 261, Appendix I, and in the EPA guidance manual, *Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Waste*, Chapter 2. Alternative sampling methods may be used with prior approval of NMED.

4.6.5.6 Field Sampling QC Procedures

Blank and duplicate samples will be obtained during waste characterization sampling to confirm that sample collection and handling procedures meet the QA/QC standards outlined in the standard operating procedures and data quality objectives included in the Facility sampling manual. Duplicate samples will be collected at a minimum frequency of 10 percent (1 for every 10 samples). Field blanks and equipment blanks will be collected at a minimum frequency of 5 percent (1 for every 20 samples). Trip blanks will be included with all sample kits where samples are sent to off-site laboratories for chemical analysis. The field QA samples are described below:

- *Field blanks:* Field blanks are prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative (if required for a specific activity). Contaminants found may indicate airborne contamination, contaminated equipment, or cross-contamination during sampling. A minimum of one field blank will be collected for every 20 waste samples collected.

- *Trip blanks:* Trip blanks are sample containers that are prepared with an inert material such as de-ionized water and carried into and out of the field, but not opened at any time during the sampling event. Contaminants detected in the trip blank may indicate that the source where the sample was prepared or the container that transported the trip blank was contaminated. A trip blank will accompany all sample shipping containers sent from and to off-site laboratories.

- *Equipment blanks:* Equipment blanks are prepared in the field prior to sampling by running de-ionized water over sampling equipment and placing it into a clean sample container. Contamination in this type of sample will indicate that the sampling equipment is contaminated. A minimum of one equipment blank will be collected for every 20 waste samples collected.

- *Field duplicates:* Field duplicates are independent samples that are taken from the same location at the same time and are used to measure the effectiveness of obtaining representative samples. A minimum of one field duplicate will be collected for every 10 waste samples collected.

4.6.5.7 Documentation of Sampling Activities

Sampling activities, including observations and field procedures, will be recorded on appropriate forms and kept on file at the Facility. Copies of the completed forms will be maintained in a bound and sequentially numbered file. The record of waste stream sampling activities will include:

- the date;
- the time of arrival and departure;
- weather conditions (including estimated temperature and wind direction);
- the name of the sample collector;
- daily activities and times sampling was conducted;
- observations;
- a record of samples collected, with sample designations and locations specified;
- field monitoring data, including health and safety monitoring;
- a list of equipment used and calibration records, if appropriate;
- a list of additional data sheets completed; and
- the signature of personnel completing the field record.

Each sample collected during waste stream sampling activities will be identified by a unique sample designation. The sample designation will be included on the sample label. QA samples will be designated with a "Q" (QA/QC samples) at the end of the sample designation, followed by one of the following to indicate the type of QA sample:

- "D" will be used for a duplicate sample;
- "E" will be used for equipment rinsate blanks;
- "F" will be used for field blank samples; or
- "TB" will be used for field trip blanks.

This coding will be used to assure that duplicates and blanks are submitted "blind" to the laboratory, but can still be easily tracked by the Facility for QA purposes.

4.6.6 Sample Preservation, Volumes, and Holding

Table 4-7 presents general preservation, container, and holding time information for samples collected. SW-846 guidelines have been used to determine these general requirements, although these may be modified or augmented to account for waste-specific requirements, waste-container compatibility considerations, or additional waste parameters for analysis. Specific sample volumes and containers appropriate for the sampling event will be determined by the Facility. Prior to any sampling event, sample container labels will be prepared and affixed to sample containers, and all sample containers will be certified clean by the supplying laboratory. Sample labels will identify, at a minimum, sample number, date, sampler, matrix, analyses to be performed, and sample preservation. Once collected, samples will be placed immediately into the shipping container (i.e., cooler), and chain-of-custody documentation will be filled out (see Section 4.6.5.2).

4.6.7 Equipment Decontamination

Sampling equipment will be decontaminated prior to use. Decontamination of sampling equipment typically includes initial scrubbing with a biodegradeable commercial detergent, followed by a de-ionized water rinse. The decontamination process will include wiping down of sampling equipment to remove surface residue, followed by detergent wash, rinse, a second detergent wash, and second rinse. Modifications to this process may be required to account for site/contaminant conditions, and may take place so long as the decontamination procedure is well documented and appropriate supporting information is placed in the Operating Record.

4.7 Analytical Methods

Analytical methods which the Facility will use for specific tests are identified in the waste analysis tables (Tables 4-1 through 4-3). All analytical methods used in conjunction with this WAP must be EPA-approved methods or methods required by hazardous waste regulations. If there is no equivalent EPA-approved method, an ASTM method or other approved method may be used. If the Facility or a generator wishes to use alternate test methods, the Facility or generator will first demonstrate to the NMED Secretary that the proposed method is equal or superior to the corresponding methods prescribed in 40 CFR 261 or 264, in accordance with 40 CFR 260.21.

An example of a non-EPA method required by hazardous waste regulations are the ASTM tests specified in 40 CFR 264.314(e)(2) to determine the presence of non-biodegradable sorbents.

Section 4.7.1 identifies the duties of the laboratory manager. Section 4.7.2 identifies the contents of the laboratory QA/QC plan. Requirements for off-site laboratories used by the Facility are contained in Section 4.7.3.

4.7.1 Duties of the Laboratory Manager

The on-site laboratory manager will have the following responsibilities to ensure an effective quality assurance program:

- ensuring that laboratory personnel are adequately trained to perform sampling and analytical procedures and in safety procedures;
- ensuring that equipment and instrumentation under his or her control are calibrated and functioning properly;
- coordinating internal and external assurance audits;
- reviewing procedures and QA plans of outside laboratories used. QA/QC practices will be considered during the selection of independent analytical laboratories. QA/QC practices that will be reviewed include written procedures, certification, internal and external audits, personnel training, and chain-of-custody procedures; and
- development, updating, and implementation of the laboratory QA plan.

4.7.2 Facility Laboratory QA/QC Plan

Prior to beginning operations, the Facility will develop procedures which will comprise the laboratory QA/QC plan. The Facility will develop a QA manual for operation of the on-site laboratory. The manual will be submitted to NMED for review.

The results of chemical analysis of waste samples generated by the on-site laboratory will not be used as part of the waste acceptance evaluation process prior to NMED's review of the QA manual.

The overall QA objective for measurement data is to ensure that data of known and acceptable quality are provided. All measurements will be made to yield accurate and precise results representative of the media and conditions measured. QA objectives for precision, accuracy, and completeness will be established for each measurement variable, where possible, and will be included in the QA manuals of the on-site and off-site laboratories where waste samples will be submitted for chemical analysis. The laboratory procedures, practices, and qualifications will be included in the QA manual for each laboratory.

The laboratory QA/QC plan will be based on guidance provided in EPA's *Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA QA/R-5). As such, the plan will address the following key elements in compliance with EPA QA/R-5: project organization; laboratory quality assurance organization; data quality objectives and criteria; employee training and certification requirements; laboratory analytical methods; quality control requirements; laboratory equipment and instrumentation calibration, testing, inspection, and maintenance; QA/QC of suppliers and vendors; data acquisition requirements; data management; data review, validation and verification; and, reconciliation with quality objectives and criteria. These elements and other procedures which will be included in this plan are discussed in the following sections:

- laboratory quality assurance;
- equipment calibration;
- laboratory QA/QC samples;
- laboratory QC;
- analytical procedures; and
- laboratory maintenance.

4.7.2.1 Laboratory Quality Assurance

The Facility laboratory and each off-site laboratory will maintain an internal quality assurance program, as documented in its laboratory quality assurance manual. The laboratories will use a combination of blanks, surrogates, duplicates, MS/MSD (matrix spike/matrix spike duplicate) and laboratory control samples, BS/BSD (blank spike/blank spike duplicate), to demonstrate analytical QA/QC. Control limits will be established for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The specific procedures to be completed and the laboratory control limits will be included in the QA manual for each laboratory.

4.7.2.2 Equipment Calibration

The laboratory equipment calibration procedures, calibration frequency, and calibration standards will be in accordance with EPA (or equivalent method) specified test methodology requirements and will be documented in the laboratory's QA manual. All instruments and equipment used by the laboratory will be operated, calibrated, and maintained according to manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance will be kept on file at the laboratory.

4.7.2.3 Laboratory QA/QC samples

Analytical procedures will be evaluated by analyzing reagent or method blanks, surrogates, MS/MSDs, BS/BSDs, and/or laboratory duplicates, as required or appropriate for each method. The laboratory

QA/QC samples and frequency of analysis to be completed will be in accordance with EPA or equivalent method protocols and will be included in the QA manual for each laboratory.

The laboratory QA manuals and procedures will incorporate data quality objectives (DQOs) to verify that waste characterization data obtained by the methods established in this WAP meet regulatory requirements with regard to regulatory compliance and Facility waste management requirements. The following DQOs are established for the sampling and analysis of waste managed by the Facility:

- Identify and quantify the hazardous constituents in the waste to ensure compliance with 40 CFR 264 and the requirements of the Facility permit, and
- Compare the contaminant concentrations in the waste with the specified characteristics of 40 CFR 261 in order that the waste may be managed in accordance with Facility requirements.

To ensure that the laboratory data quality objectives are met, the following analyses will be completed in the laboratory to monitor the analytical process:

- *Laboratory duplicate samples:* Laboratory duplicate samples will be analyzed to monitor for intralaboratory precision of data generated. These samples will be analyzed at a rate of no less than 5 percent (1 for every 20 samples) of the total samples with at least one replicate if fewer than 20 samples are analyzed for any particular parameter.

- *Spiked samples (MS/BS):* Spiked samples will be analyzed to monitor analytical precision. Spiked samples will be tested on no less than a five percent (1 for every 20 samples) basis for any particular parameter. At least one spiked sample will be run if fewer than 20 samples are analyzed.

- *Control charts:* Control charts will be utilized to establish laboratory control limits to monitor and review the accuracy of the data generated as a result of spike analyses. Control limits reflect long-term data accuracy trends and will be modified as new data are acquired.

- *Method/reagent blanks:* Method/reagent blanks will be prepared using samples of purified water or reagents which will then subjected to the entire sample analytical procedure to monitor potential contamination of samples due to contamination in the laboratory or laboratory equipment. Method or reagent blanks will be included with each set of samples.

- *Laboratory equipment blanks:* Laboratory equipment blanks will be analyzed to monitor potential contamination of samples due to improper or ineffective cleaning of equipment. These samples will be analyzed at a rate of no less than 5 percent (1 for every 20 samples) of the total samples.

- *Quality control samples:* QC samples will be analyzed to monitor for accuracy of data generated. EPA QC samples or samples purchased from a reputable independent source will be submitted to off-site laboratories as blind samples for chemical analysis of a set of selected analytes approved by NMED at the beginning of the Facility operation and also at regular intervals during the Facility operating life.

- *Surrogates:* Surrogates will be analyzed in accordance with EPA guidelines for organics analysis. Surrogate recovery is a measure of the effectiveness of the analytical process. Surrogates will be tested on no less than a 5 percent (1 for every 20 samples) basis for any analysis of organic compounds.

- *Calibration standards and devices:* Calibration standards and devices will be used in accordance with the manufacturers' recommended guidelines to calibrate laboratory instrumentation.

- *Internal standards:* Internal standards prepared in the laboratory will be referenced against external standards to measure accuracy.

Laboratory QC procedures will be included in the laboratory QA manuals prepared by each laboratory.

4.7.2.4 Laboratory Quality Control

QC objectives for the analytical data are a means of checking and controlling the sources of error in analytical data results. The criteria for data evaluation include assessing the data accuracy, precision, completeness, representativeness, and comparability. The criteria are described below:

- *Accuracy:* Accuracy is a measure of the error between chemical analytical results and the true sample concentrations. Accuracy is a measure of the bias in a system and will be expressed as the percent recovery of spiked samples. Accuracy will be presented as percent recovery and will be calculated as follows:

$$\%R - (S-U) \text{ X } 100\%C_{sa}$$

where %R = percent recovery
S = spike sample analytical result
U = sample analytical result
C_{sa} = known spike concentration

The data quality objectives (DQOs) for accuracy for each analytical method will be presented in the laboratory QA manual.

- *Precision:* Precision is a measure of data variability. Variability can be attributed to sampling activities and/or chemical analysis. Relative percent difference (RPD) will be used to assess the precision of the sampling and analytical method and will be calculated as follows:

$$RPD = [*C_1 - C_2*/(C_1 + C_2)/2)] \text{ x } 100$$

where RPD = relative percent difference
C1 = larger of the two concentrations
C_2 = smaller of the two concentrations

The DQOs for precision for each analytical method will be presented in the laboratory QA manual.

- *Completeness:* Completeness will be evaluated to assess whether a sufficient amount of valid data is obtained. Completeness is described as the ratio of acceptable measurements. Completeness will be calculated as follows:

C = (Number of samples having acceptable data)/(total number of samples analyzed) x 100%

where C = completeness

The DQOs for completeness will be presented in the laboratory QA manual.

- *Representativeness:* Representativeness is a qualitative parameter related to the degree to which the sample data represent the specific characteristics of concern. Procedures in sample collection will be implemented to assure representative samples, such as repeated measurements of the same parameter from the same waste stream in the same shipping container over several distinct sampling events. Any procedures or variations that may affect the collection or analysis of representative samples will be noted and the data qualified as appropriate.

- *Comparability:* Comparability is a qualitative parameter related to whether similar sample data can be prepared. To assure comparability, analytical results will be reported in appropriate units for comparison with other data (such as past studies or clean-up standards), and the standard collection and analytical procedures included in this WAP will be implemented. Any procedures or variations that may affect comparability will be noted, and the data will be qualified as appropriate.

4.7.2.5 Analytical Procedures

Specific QA/QC procedures to be used for sampling, chain-of-custody, calibration, analytical methods, reporting, internal QC, audits, and preventative maintenance will be included in the laboratory QA manual.

Laboratory procedures and methods to be used will contain all of the information presented in the EPA document, SW-846, for each method. The format for each method will be similar to that used in SW-846. If there is no appropriate SW-846 method ASTM or other approved methods will be employed. The laboratory procedures and methods also will include the following:

- *Scope:* A description of the scope of applicability of the procedure.

- *Principal:* A brief description of the steps to be taken and/or the theory involved in the laboratory analysis.

- *Interference:* A description of known interfering agents that would cause difficulty in the laboratory analysis.

- *Apparatus:* A listing or description of equipment required to perform the laboratory analysis.

- *Reagents:* A listing of the reagents required, a description of the steps involved in preparing the reagents, and instructions on storage requirements and retention times.

- *Procedures (instructions):* An enumeration of the sequence of activities to be followed. The topics include sample preparation or pretreatment, sample storage requirements, instrument set-up, standardization or calibration, sample analysis, calculations, and glassware-cleaning procedures. The procedure includes any precautions, explanation, or clarifications needed to properly perform the analysis. These include safety precautions, the frequency of standardization required, the acceptance criteria or procedures for determining the acceptability of standard curves, clarification or special techniques critical to the analysis, and the procedure the analyst uses to determine the reliability of sample results based on the standard curves.

- *Quality control requirements:* A listing of the QC checks to be performed and the acceptance criteria used to evaluate the QC data.

- *Reference:* A listing of the publications from which the information was derived in preparing the laboratory method. All references pertain to these documents. As a rule, laboratory methods are derived from the following publications:

- Standard Methods for the Examination of Water and Wastewater, American Public Health Association;
- Annual Book of Standards, American Society for Testing and Materials;
- Methods for Chemical Analysis of Water and Waste, US Environmental Protection Agency;
- Test Methods for Evaluating Solid Waste, SW-846, US Environmental Protection Agency;
- National Functional Guidelines for Organics Data Review; and
- Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses.

Editions used will be those currently specified in 40 CFR, as updated.

4.7.2.6 Laboratory Maintenance

The analytical laboratory will have in place a procedure that details the steps to be taken to calibrate and standardize instruments to ensure that analytical data produced are accurate. Records of all calibrations, preventative maintenance, and service calls will be readily available from the laboratory files. Calibration procedures will follow the method procedures outlined in the EPA document, SW-846, or the *Annual Book of ASTM Standards.*

A procurement procedure that identifies methods to be used to document and control the purchase of materials, parts, and services will be implemented by the laboratory and will be presented in the laboratory QA manual. The procedure will include identifying the quality of laboratory chemicals and equipment, management approval of procedure items, inspection of shipments for compliance with requirements, and isolation of nonconforming items to be returned to vendors. The quality of all equipment will conform to the requirements specified in the most current edition of the EPA document, *Handbook of Analytical Quality Control in Water and Wastewater Laboratories*, the Federal Register, or other regulatory agency publications. This procurement procedure will serve to ensure that spare parts routinely required will be readily available.

4.7.3 Requirements for Off-Site Laboratories

The Facility will document that the following conditions are met for each off-site laboratory performing waste analyses for the Facility:

- the laboratory will not be the same laboratory that was used by the generator;
- the laboratory must be approved by the Facility;
- the laboratory must use the analytical methods identified in Section 4.5;
- if there is more than one analytical method for a specific test identified in Section 4.5, the laboratory must follow the guidance in Chapter Two of the current version of EPA document SW-846 to determine the appropriate analytical method; and
- the laboratory must follow the QA/QC requirements described in this WAP.

4.7.4 Laboratory Requirements for Foreign Generators

The Facility will ensure and document that laboratory analysis provided by foreign generators is performed by a laboratory accredited or certified for the appropriate hazardous waste field of testing (FOT) by an authority using the EPA's National Environmental Laboratory Accreditation Conference standards.

4.7.5 Laboratory Requirements for Foreign Generators

The Facility will ensure and document that laboratory analysis provided by foreign generators is performed by a laboratory accredited or certified for the appropriate hazardous waste field of testing (FOT) by an authority using the USEPA's National Environmental Laboratory Accreditation Conference standards.

4.8 Waste Tracking

To identify and track the waste managed at the Facility, a Facility-specific number will be assigned to each waste stream and to each shipment within that waste stream. Each waste shipment will be tracked using a unique alphanumeric designation. This designation will identify the generator, a sequential number specific to the shipment, substance and source and the delivery date (or, in the case of site-generated waste, the date the waste entered the system). An example is presented below:

ABC-0001-043099

where ABC identifies the generator
0001 identifies the waste stream, source, and shipment
043099 is the date the waste was delivered

The waste numbering system will assist in the tracking of waste as it moves through the Facility. The number will be recorded on:

- all incoming paperwork from the generator;
- samples received from the generator;
- samples taken on-site; and
- site-generated records.

The date will not be recorded until the waste actually arrives on-site. This numbering system will allow the Facility to track a specific waste with regard to the final disposition of the waste. In addition, assigning a unique designation to each generator and a unique number to each waste stream from that generator will make possible determining the amount of waste from a given waste stream that has been received by the Facility. Individual shipments from within the waste stream will receive an additional identifier to enable the Facility to tie information back to the specific shipment as well as to the waste stream. The system will allow the Facility to locate the current position of the waste at the Facility, including the location of the waste in the landfill.

Tracking waste in this manner will allow the Facility to determine the efficiency and accuracy of a generator's profiling efforts and the rejection rate for incoming waste. This information will be used to assist Facility operations in determining the rate of fingerprint analysis required for a given generator.

The Facility number will designate waste generated on-site. All other numbering and tracking will be the same for all waste managed at the Facility. The tracking system will be maintained in the Facility records as either hard copy or electronically (computer database).

Table 4-1. Parameters and Methods for Pre-Acceptance Representative Sample Analysis

Waste Parameters	Extraction/Sample Preparation	Method [a]
Volatile organic compounds	502 [a] 5031 5032 5035	8260
Semivolatile organic compounds	3510 3520	8270
Organochlorine pesticides	3510 3520	8081/8270
PCBs	3520	8082/8080
TCLP: Organics	1311	8260/8270/8080/8150
Chlorinated herbicides	8151 [b]	8151
Reactive cyanide	—	9014
Reactive sulfide	—	9034
Ignitability	—	1010/1030
Flashpoint	—	1010/1020A
Corrosivity to metals	—	1110 pH paper pH electrometer 9040A/9041A/9045A
pH	—	9040A19041A9045A
Dioxins	—	8280
Total metals	3000 1311	6000 series 7000 series
Liner compatibility tests	—	9090A
Extractable volatiles	3500	8260
Extractable semivolatiles	3500	8270
Physical appearance		ASTM D4979
Radioactivity		Industry standard survey technique (e.g., scintillation detector)

[a] Most current revision of SW-846 will be used.
[b] Method 8151 contains the extraction, cleanup, and determinative procedures for these analytes.

Table 4-2. Tests and Analytical Methods for Fingerprint Samples

Test	Method and Description	Qualitative or Quantitative
Flammability potential screen	ASTM D4982	Qualitative
Free liquids	Paint filter test, penetrometer, or visual/9095	Qualitative
Ignitability	Match test, Pansky-Martens closed cup or Set-a-flash 1010/1020A	Qualitative
Miscibility	50/50 mixture with water	Qualitative
Chlorinated solvents	Colorimetric test or Beilsten test	Quantitative
Cyanide	Electrode or colorimetric test (ASTM D5049 Test Method B)	Quantitative
PCBs	Colorimetric test/8080	Quantitative
Specific gravity	Hydrometer/Method dependent on material composition and physical state	Quantitative
Sulfide screen	ASTM 4978	Quantitative

Table 4-3. Additional Tests and Analytical Methods

Test	Reference	Description
Paint Filter Test	EPA 9095	This test will determine the free liquids that are contained within the waste matrix and will be used as a control parameter for wastes that are to be landfilled.
Heavy Metals	6010A/7470	This test determines the concentration of heavy metals.
Free Cyanides	APHA 412G, H	This test determines if cyanides could potentially be reactive under acidic conditions.
Toxicity Characteristic Leaching Procedure [a]	Extraction Method 1311/3010A	Determines if waste, or stabilized waste, contains level of restricted constituents above BDAT treatment standards.
Total Organic Halogens	EPA 9020	Determines if the waste potentially contains LDR constituents above BDAT standards for California List wastes.
PCBs	Colorimetric test/ EPA 8080	Determines if PCBs are contained in the waste matrix and determines the concentration.
IR Scan	ASTM D2621, D4053	Determines the presence of organics and provides a rough estimate of their concentration.

[a] Analytical method chosen is dependent upon constituent being determined (i.e., Organics 8260, 8270, 8080).

Table 4-4. Potential On-Site Waste Generation Areas/Activities

Area	Method of Generation	Waste Form [a]
Landfill	Leachate collected in the leachate collection system	L, SL
Stormwater detention basin	Contaminated rain water	L, SL
Operations	Personal Protective Equipment (PPE) contaminated during routine and non-routine operations	S
Site operations	Spill residues primarily from waste handling operations. Sampling activities.	L, SL, S

[a] L = Liquid, SL = Sludge, S = Solid

Table 4-5. Sampling Methods

Waste Matrix	Sampling Method	Sampling Equipment
Sludge	ASTM D140-70	Dipper, scoop, thief
Crushed or powdered material	ASTM D346-75	Scoop, shovel, tube sampler
Soil or rock-like material	ASTM D420-69	Scoop, shovel, auger
Soil-like material	ASTM 01452-65	Scoop, shovel, tube sampler
Fly ash-like material	ASTM D2234-76	Tube sampler, trier, auger, scoop, shovel

Table 4-6. On-Site Sample Collection Activities

Sample Type	Matrix	Collection Frequency	Comments
Fingerprint sample	All incoming sludge and solid; debris waste will not be fingerprinted	One/shipment for bulk shipments 1/10 drums for drummed waste	Table 4-2 defines base fingerprint analysis required
Annual sample	All incoming sludge and solid; debris waste will not be fingerprinted	One sample annually for each waste that underwent representative sampling prior to initial shipment	Table 4-1 defines base representative analysis required. Sampling will be performed at the generator site.
Spills/releases	Spilled waste and contaminated material (sludge, liquid, soil)	Each release	For Hazardous Waste determination
Landfill input	All incoming sludge and solidified solid waste to landfill except debris	Random sampling of waste directly landfilled.	To determine LDR status.
On-site waste	1 Treated waste 2 Day-to-day operations 3 Releases 4 Run-on/runoff 5 Investigation-derived waste 6 soil 7 air 8 Leachate/sludges from landfill	1,2 When acceptable knowledge is not available 3,4 See appendices in Volume II of the Permit Application dated October 2000 5 Each container 6 Contingency Plan 7 See appendices in Volume II of the Permit Application dated October 2000 Sampled monthly	To determine hazardous/LDR status See Table 4-5 for specific waste matrices generated by on-site activities

Table 4-7. General Container, Holding Time, and Preservative Requirements by Sample Matrix

Sample Matrix	Concen-tration	Fraction	Volume	Container Type [a]	Preservative	Holding Times
Inorganics						
Soil, sediment, and residue	Low/medium Medium	Total metals	6 Oz	F or G	Cool to 4°C	6 months
Organics						
Soil, sediment, and residue	Low/medium	VOCs	240 mL	D	Cool to 4°C	14 days
		SVOCS	3 Oz	F or G	Cool to 4°C	14 days for extraction, 40 days after extraction to analysis
		Petroleum hydrocarbons	3 Oz	F or G	Cool to 4°C	15 days for extraction, 40 days after extraction to analysis

The above table is general in nature and may be modified or augmented, so long as the requirements are congruent with SW-846 requirements.

[a] D = 120-ml glass vial with teflon lined, white poly cap
F = 8 oz wide-mouthed glass jar with teflon-lined black poly cap Water
G = 4 oz wide-mouth glass jar with teflon-lined, black poly cap Water

5. Procedures to Prevent Hazards

This section provides information on the prevention of hazards to both the public and the environment. Specific procedures for implementing those safeguards will be developed during the construction phase of the project and prior to Facility operations.

The engineered barriers for the mitigation of hazards discussed in this section are shown in design drawings contained in Permit Attachment L.

5.1 Security Procedures to Prevent Hazards

Security at the Facility will be provided by security guards, fences surrounding the Facility and warning signs. Each of these is described in the following sections.

5.1.1 Barrier and Means to Control Entrance

The Facility will be bounded by a barbed-wire fence. The active portion of the Facility (i.e. the processing area) will be bounded by an additional fence with two access gates located in the northern portion of the Facility. The northwest gate will remain locked at all times and will serve as a secondary or emergency entrance/exit. Access into the Facility will be controlled by means of the primary gate, located in the northeast corner of the Facility. The gate will be fitted with a cattle guard to prevent livestock from entering the Facility. A security guard post will be located at this entrance gate and will be attended 24 hours a day. The fence, gates, and guard will provide adequate access control and will prevent unwitting entry of persons or livestock to the active portion of the Facility.

Visitors will be required to sign a visitors log prior to movement in or around the Facility. Each visitor will be issued a security badge, which will be worn while the visitor is on-site. The badge will be worn on the visitor's outermost garment in a clearly visible location above the waist. The security guard will be responsible for ensuring that all visitors comply with these requirements. Visitors will be escorted unless other arrangements are made with Facility personnel.

5.1.2 Warning Signs

Warning signs stating "Danger - Unauthorized Personnel Keep Out" will be posted at the site entrance and every 50 feet along the perimeter fence. The signs will be posted in English and Spanish and will be legible from a distance of at least 25 feet. If ignitable wastes are stored or treated in the area, a "No Smoking" sign will also be posted.

5.2 Inspection Procedures

This section of the permit application provides written inspection guidelines and an inspection schedule for the Facility in accordance with 20.4.1 NMAC.

5.2.1 General Inspection Procedures

Facility personnel will conduct inspections of all equipment and structures as frequently as necessary to prevent, detect, or respond to environmental or human health hazards. Inspection records describing malfunctions, deteriorations, operator errors, and discharges that may cause or contribute to a release of hazardous waste constituents to the environment or that may be a threat to human health will be kept at the

Facility administration building for three years from the date of the inspection. Specific inspection procedures are outlined in Sections 5.2.2 through 5.2.10.

Personnel will receive general training about hazardous waste inspections as part of the Facility hazardous waste training program. Personnel responsible for inspecting particular equipment or areas of the Facility will receive classroom and/or on-the-job training in inspection procedures. Inspection procedures will be described in the operating manual, which will be located in the EC's office.

Facility guards will make rounds of the Facility at least once daily to detect any unauthorized entry to the Facility or any other abnormalities. The guards will not use inspection checklists, but they will notify the EC and/or emergency response personnel of any spills or other emergencies. Requirements for the EC and/or emergency response personnel, subsequent to an inspection notification, are outlined in the Contingency Plan in Section 6.

5.2.1.1 Inspection Checklist

Inspection checklists and an inspection schedule have been developed to ensure that inspections occur at appropriate frequencies. An inspection schedule matrix is provided in Table 5-1. This matrix will be expanded, as necessary, to reflect new equipment or changes to existing equipment inspection frequencies.

Inspection frequencies will vary according to the type and age of the equipment, the frequency of its use, and its importance in preventing environmental incidents. The inspection frequencies provided in Table 5-1 show that inspections will occur frequently so that problems can be identified in time to correct them before harm is done to human health or the environment.

The inspection checklists will identify the name of the inspector, date and time of the inspection, frequency of inspection, specific items to be checked, any notations or observations of abnormalities, and the nature and date of any corrective actions taken. Checklists are provided in Appendix I of the Permit Application dated October 2000. The inspection schedules will be kept in the EC's office.

When new or modified equipment is installed or used at the Facility, the inspection procedures, forms, and schedule will be revised to reflect these changes and submitted to NMED.

5.2.1.2 Remedial Action

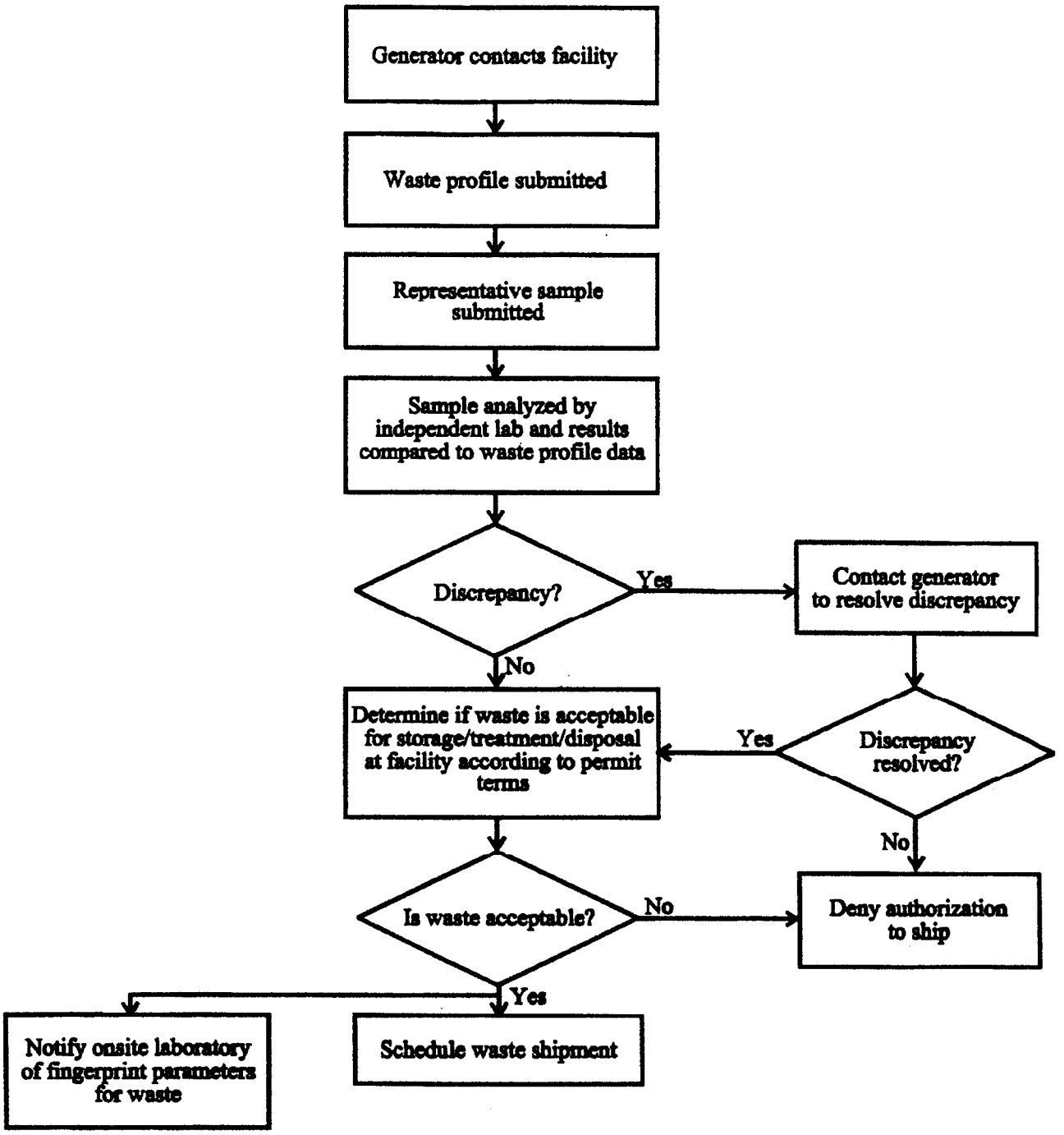
Facility personnel or contract personnel will remedy any deterioration or malfunction of equipment or structures encountered during inspections. The remedy will be completed in sufficient time to ensure that the problem does not result in an environmental or human health hazard.

All repairs to permitted portions of the Facility will be made in accordance with the original construction specifications and CQA plan.

If a hazardous or potentially hazardous condition is identified, the EC, as specified in the Contingency Plan (Section 6), will be notified immediately to assess the situation and determine how to correct the situation and whether the Contingency Plan should be implemented.

5.2.2 Landfill Inspection Procedures

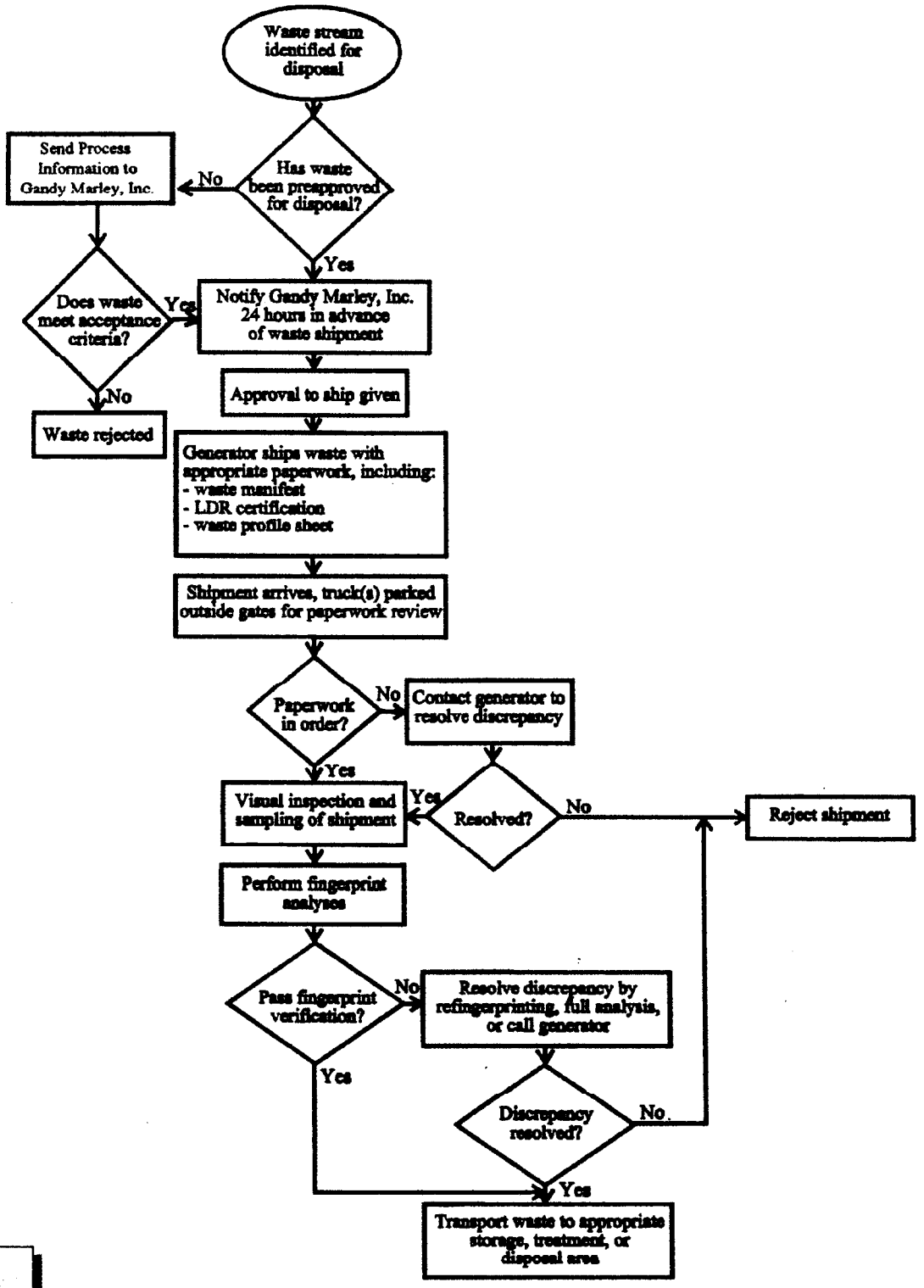
Landfill liners and the cover will be inspected during and immediately after installation in accordance with the CQA Plan, which is discussed in Section 2.5.2.3.



PRE-ACCEPTANCE PROCEDURE FOR FIRST TIME WASTE

TRIASSIC PARK WASTE DISPOSAL FACILITY

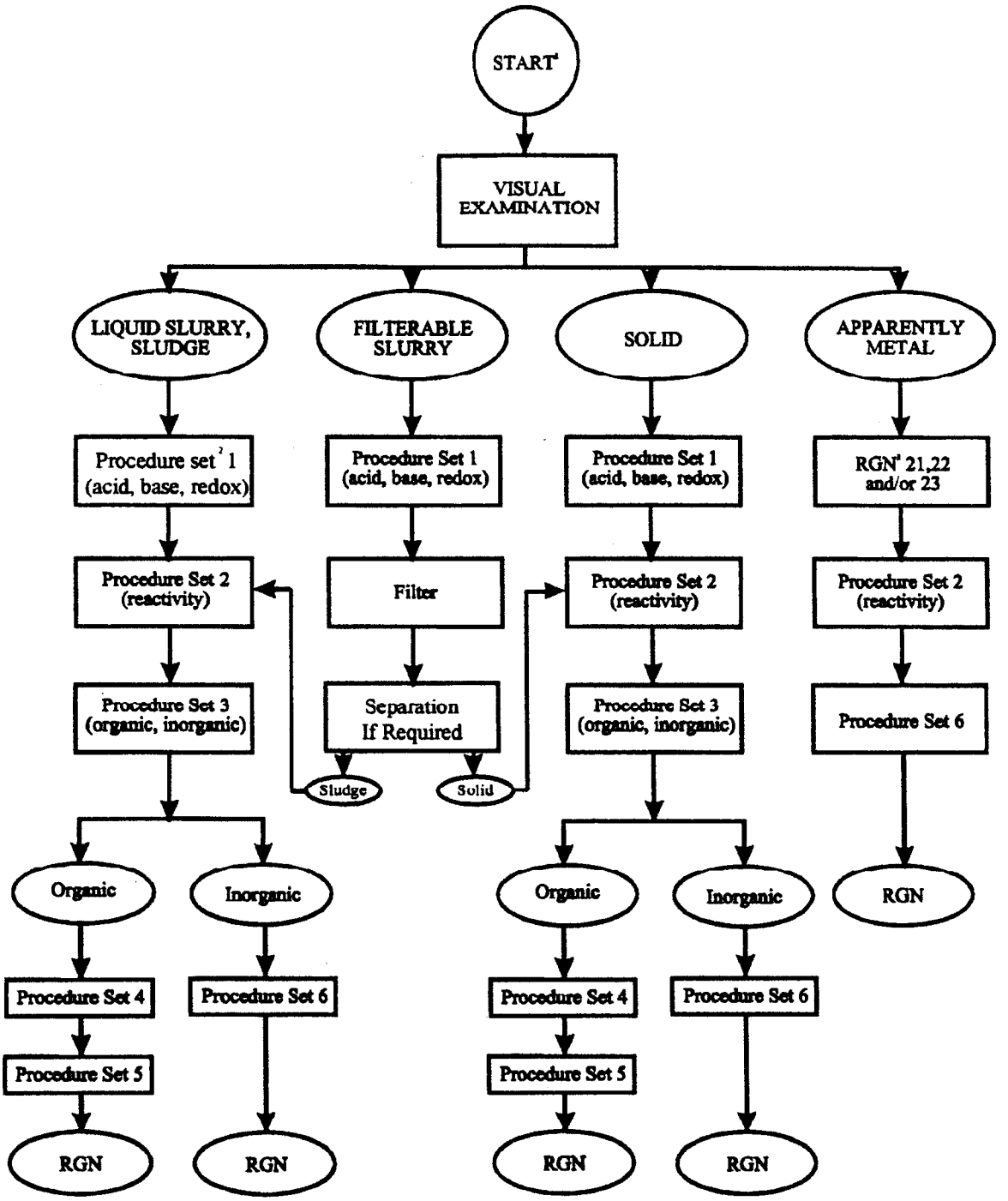
Figure 4-1



INCOMING WASTE SHIPMENT PROCEDURES

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 4-2



[1] Based upon its knowledge of the waste, a generator may only need to use parts of the following sequence to confirm the generator's knowledge of the material.
[2] Procedure sets are identified in EPA's "Design Development of a Hazardous Waste Reactivity Testing Protocol" (EPA 600/2-84-057, February 1984).
[3] RGN = Reactivity Group Number

Start, Stop, Continue
Procedure
Result

SEQUENCE OF PROCEDURE SETS FOR DETERMINING REACTIVITY GROUP

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 4-3

REACTIVITY GROUP DESIGNATION AND WASTE COMPATIBILITY MATRIX (1)

TRIASSIC PARK WASTE DISPOSAL FACILITY — **Figure 4-4**

Reactivity Group No	Reactivity Group Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107
1	Acids, Mineral, Nonoxidizing	1																																								
2	Acids, Mineral, Oxidizing		2																																							
3	Acids, Organic		G H	3																																						
4	Alcohols and Glycols	H	HP	HP	4																																					
5	Aldehydes	HP	HP	HP		5																																				
6	Amides	H	H GT				6																																			
7	Amines, Aliphatic and Aromatic	H	H GT	H		H		7																																		
8	Azo Compounds, Diazo Compounds, and Hydrazines	H G	H GT	H G	H G	H			8																																	
9	Carbamates	H G	H GT						G H	9																																
10	Caustics	H	H	H		H				H G	10																															
11	Cyanides	GT GF	GT GF	GT GF					G			11																														
12	Dithiocarbamates	H GF F	H GF F	H GF F		GF GT		U	H G				12																													
13	Esters	H	H F						H G		H			13																												
14	Ethers	H	H F												14																											
15	Fluorides, Inorganic	GT	GT	GT												15																										
16	Hydrocarbons, Aromatic		H F														16																									
17	Halogenated Organics	H GT	H F GT					H GT	H G		H GF	H						17																								
18	Isocyanates	H GT	H F GT	H G	H P			H P	H G		H F G	H G	U						18																							
19	Ketones	H	H F						H G		H	H								19																						
20	Mercaptans and Other Organic Sulfides	GT GF	H F GT						H G									H	H	H	20																					
21	Metals, Alkali and Alkaline Earth, Elemental	GT H GF	GT H GF	GT H GF	GT H GF	GT H GF	GF H	GF H	GF H	GF H	GF H	GF H	GF GT H	GF H				H E	GF H	GF H	GF H	21																				
22	Metals, Other Elemental & Alloys as Powders, Vapors or Sponges	GF H F	GF H F	GF					H F GT	U	GF H							H E	GF H		H GF F		22																			
23	Metals, Other Elemental & Alloys as Sheets, Rods, Moldings, etc.	GF H GF	GF H GF						H F G									H F						23																		
24	Metals and Metal Compounds, Toxic	S	S	S			S	S			S														24																		
25	Nitrides	GF H F	H F	H GF	GF H E	GF H			U	H G	U	GF H	GF H	GF H				GF H	U	GF H	GF H	E				25																
26	Nitriles	H GT GF	H F GT	H							U											H F			S	GF H	26															
27	Nitro Compounds, Organic		H F GT			H					H E											H GF F				H GF F		27														
28	Hydrocarbons, Aliphatic Unsaturated	H	H F			H																	H E						28													
29	Hydrocarbons, Aliphatic Saturated		H F																											29												
30	Peroxides and Hydroperoxides, Organic	H HG	H E		H P	H G		H GT	H F E	H F GT		H E GT	H F GT					H E	H	H E	H F GT	H E	H B		H G	H GF F	H F GT		H F		30											
31	Phenols and Cresols	H	H F						H G										H F			GF H				GF H					H	31										
32	Organophosphates, Phosphothioates, Phosphodithioates	H GT	H GT						U		H E											H									U		32									
33	Sulfides, Inorganic	GT GF	HF GT	GT		H			E										H												H GT			33									
34	Epoxides	H P	H P	H P	H P	U		H P	H P		H P	H P	U								H F	H F	H S		H F	H F					H F	H F	U	H P	34							
101	Combustibles and Flammable Materials, Miscellaneous	H G	H F GT																			H G F				H GF F					H F GT					101						
102	Explosives	H E	H E	H E				H E		H E			H E									H E	H E	H E	E	E					H E	H E		H E	H E	H E	102					
103	Polymerizable Compounds	P H	P H					P H		P H	P H	U										F H	F H	F H	F H	F H					F H			F H			H E	103				
104	Oxidizing Agents, Strong	H GT		H GT	H F	H F	H F GT	H P GT	H E	H P GT		H F GT	H F GT	H F			H F	H GT	H F GT	H P	H P GT	H F E	H E	H F		H F E	H E GT	H E	H F	F	H G	H F	H P GT	H F G	H F G	H E	H P GT	H F E	104		
105	Reducing Agents, Strong	H GF	H P GF	H F GF	H F GF	H P GF	G H	H GF	H G				H GT	H F				H E	GF H	GF H	GF H					H GF	H E				H E	GF H	GT GE H		H	GF H	H E	H P GT	H F E	105		
106	Water and Mixtures Containing Water	H	H						G										H G			GF H	GF H	H	S	GF H								GT GF								106	
107	Water Reactive Substances	EXTREMELY REACTIVE! DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL! EXTREMELY REACTIVE!																																								107
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107

Reactivity Code	Consequences
H	Heat Generation
F	Fire
G	Innocuous
GT	Toxic gas generation
GF	Flammable gas generation
E	Explosive
P	Violent polymerization
S	Solubilization of toxic substances
U	May be hazardous but unknown

Example:

H F GT — Heat generation, fire, and toxic gas generation

[1] Determine the reactivity group numbers of the waste being evaluated. Locate the higher number using the left column "Reactivity Group No." and locate the other number on the stair-stepped columns on the right.

Locate the square at the intersection of the two group numbers, then consult the legend to match the reactivity code(s) with the consequences.

5. Procedures to Prevent Hazards

This section provides information on the prevention of hazards to both the public and the environment. Specific procedures for implementing those safeguards will be developed during the construction phase of the project and prior to Facility operations.

The engineered barriers for the mitigation of hazards discussed in this section are shown in design drawings contained in Permit Attachment L.

5.1 Security Procedures to Prevent Hazards

Security at the Facility will be provided by security guards, fences surrounding the Facility and warning signs. Each of these is described in the following sections.

5.1.1 Barrier and Means to Control Entrance

The Facility will be bounded by a barbed-wire fence. The active portion of the Facility (i.e. the processing area) will be bounded by an additional fence with two access gates located in the northern portion of the Facility. The northwest gate will remain locked at all times and will serve as a secondary or emergency entrance/exit. Access into the Facility will be controlled by means of the primary gate, located in the northeast corner of the Facility. The gate will be fitted with a cattle guard to prevent livestock from entering the Facility. A security guard post will be located at this entrance gate and will be attended 24 hours a day. The fence, gates, and guard will provide adequate access control and will prevent unwitting entry of persons or livestock to the active portion of the Facility.

Visitors will be required to sign a visitors log prior to movement in or around the Facility. Each visitor will be issued a security badge, which will be worn while the visitor is on-site. The badge will be worn on the visitor's outermost garment in a clearly visible location above the waist. The security guard will be responsible for ensuring that all visitors comply with these requirements. Visitors will be escorted unless other arrangements are made with Facility personnel.

5.1.2 Warning Signs

Warning signs stating "Danger - Unauthorized Personnel Keep Out" will be posted at the site entrance and every 50 feet along the perimeter fence. The signs will be posted in English and Spanish and will be legible from a distance of at least 25 feet. If ignitable wastes are stored or treated in the area, a "No Smoking" sign will also be posted.

5.2 Inspection Procedures

This section of the permit application provides written inspection guidelines and an inspection schedule for the Facility in accordance with 20.4.1 NMAC.

5.2.1 General Inspection Procedures

Facility personnel will conduct inspections of all equipment and structures as frequently as necessary to prevent, detect, or respond to environmental or human health hazards. Inspection records describing malfunctions, deteriorations, operator errors, and discharges that may cause or contribute to a release of hazardous waste constituents to the environment or that may be a threat to human health will be kept at the

Facility administration building for three years from the date of the inspection. Specific inspection procedures are outlined in Sections 5.2.2 through 5.2.10.

Personnel will receive general training about hazardous waste inspections as part of the Facility hazardous waste training program. Personnel responsible for inspecting particular equipment or areas of the Facility will receive classroom and/or on-the-job training in inspection procedures. Inspection procedures will be described in the operating manual, which will be located in the EC's office.

Facility guards will make rounds of the Facility at least once daily to detect any unauthorized entry to the Facility or any other abnormalities. The guards will not use inspection checklists, but they will notify the EC and/or emergency response personnel of any spills or other emergencies. Requirements for the EC and/or emergency response personnel, subsequent to an inspection notification, are outlined in the Contingency Plan in Section 6.

5.2.1.1 Inspection Checklist

Inspection checklists and an inspection schedule have been developed to ensure that inspections occur at appropriate frequencies. An inspection schedule matrix is provided in Table 5-1. This matrix will be expanded, as necessary, to reflect new equipment or changes to existing equipment inspection frequencies.

Inspection frequencies will vary according to the type and age of the equipment, the frequency of its use, and its importance in preventing environmental incidents. The inspection frequencies provided in Table 5-1 show that inspections will occur frequently so that problems can be identified in time to correct them before harm is done to human health or the environment.

The inspection checklists will identify the name of the inspector, date and time of the inspection, frequency of inspection, specific items to be checked, any notations or observations of abnormalities, and the nature and date of any corrective actions taken. Checklists are provided in Appendix I of the Permit Application dated October 2000. The inspection schedules will be kept in the EC's office.

When new or modified equipment is installed or used at the Facility, the inspection procedures, forms, and schedule will be revised to reflect these changes and submitted to NMED.

5.2.1.2 Remedial Action

Facility personnel or contract personnel will remedy any deterioration or malfunction of equipment or structures encountered during inspections. The remedy will be completed in sufficient time to ensure that the problem does not result in an environmental or human health hazard.

All repairs to permitted portions of the Facility will be made in accordance with the original construction specifications and CQA plan.

If a hazardous or potentially hazardous condition is identified, the EC, as specified in the Contingency Plan (Section 6), will be notified immediately to assess the situation and determine how to correct the situation and whether the Contingency Plan should be implemented.

5.2.2 Landfill Inspection Procedures

Landfill liners and the cover will be inspected during and immediately after installation in accordance with the CQA Plan, which is discussed in Section 2.5.2.3.

The landfill and associated equipment will be inspected weekly and after storms unless otherwise specified. Records of the inspections will be maintained in the operating record, which will be kept in the administration building.

If deterioration or any other abnormalities are noted during inspection of the landfill or associated components, the inspector's supervisor will be notified and will determine the appropriate course of action for correction. If the supervisor is not available, the EC will be summoned to make the determination.

The landfill will be inspected by properly-trained personnel weekly and after storms for such items as spills, leaks, odors, wind-blown particulate matter, any evidence of deterioration of the landfill itself, and any malfunction or improper operation of the run-on/runoff control systems. All inspections will be documented on the landfill inspection checklist, described in Section 5.2.1.1 and found in Appendix I of the Permit Application dated October 2000. Inspection checklists will be kept for at least 3 years, in accordance with 40 CFR 264.15(d).

During the active life and during closure of the landfill, the LCRS and LDRS will be checked daily for the presence of liquid. The amount of water in the system can be used to determine if the system is functioning properly. The system will either be inspected through the cleanout pipe, which is connected to the primary collection pipe and the sump riser pipe, or with magnehelic gages or other liquid detection devices, if they are installed. The leachate collection tank will be inspected in accordance with the procedures outlined in Section 5.2.5.

During the operational phase of the landfill, periodic checks will be made within the landfill to detect the presence of hazardous gases and volatile organics. Surveys of the active landfill surface area and the riser pipes with an OVM or comparable device will be performed quarterly to detect the presence of organic compounds.

If it is evident that particulate matter from the landfill is subject to dispersal by the wind, the active portion of the landfill will either be covered or managed to control the dispersal (see Section 2.5.1.7). Adding water to prevent wind erosion will be limited so that ponding in the landfill does not occur. If the dispersion is noted during an inspection, the landfill supervisor will notify the sprayer truck operator to rectify the situation.

The stormwater collection basin within the Phase 1A landfill and associated with the runoff/run-on control systems will be inspected following storm events to determine whether water has accumulated. Stormwater collected within the landfill that has the potential to have contacted waste will be managed by enhanced evaporation through recirculation on the landfill soil cover. The recirculation system is described in the Engineering Report in Permit Attachment L. The stormwater collection basin will be emptied as quickly as possible to ensure that the design capacity of the system is not exceeded. Details of the landfill stormwater control system are included in the Engineering Report (Permit Attachment L).

5.2.7 Security Equipment Inspection Procedures

Security inspections will be conducted daily and will include the following elements:

- visual inspection of the warning signs at all approaches to the Facility to ensure that the signs are present, legible, and securely attached to the fence;
- inspection of the Facility perimeter to ensure the integrity of the fence and gate by looking for signs of erosion of soil at the fence posts and corrosion or vandalism to the fence, fence posts, or locks;
- inspection and replacement, as necessary, of lights for the purpose of illuminating the Facility at night;

- inspection of structures for signs of erosion, tampering, or vandalism; and
- records of inspections will be maintained in the administration building.

5.2.8 Safety and Emergency Response Equipment Inspection Procedures

Safety and emergency response equipment inspections will occur monthly. This category of equipment includes first aid supplies; respiratory protection equipment (other than personally issued respirators, which will be each employee's responsibility); protective clothing, including hard hats, gloves, and suits; fire extinguishers; eye wash stations; safety showers; empty 55-gallon drums; shovels; and spill cleanup and decontamination kits.

A monthly inventory of safety-related supplies and equipment will be performed to ensure that the items are available, in good condition, and at designated locations. Inadequate or missing items will be replaced or repaired.

Fire protection equipment, including fire extinguishers and fire hoses, will be inspected monthly and after each use to ensure that the equipment is capable of functioning properly and that access to the equipment is not blocked. Each fire extinguisher will be inspected to ensure that the seal around the handle is intact, that the pressure gauge indicates that the unit is adequately charged, and that an Underwriter's Laboratory listing label is attached to each unit. Building sprinkler systems will be inspected according to manufacturer specifications. Chemical fire-suppression systems will be checked to ensure that adequate quantities of the chemical and water exist. The fire-suppression vehicles will also be tuned up at least annually and inspected monthly. Records of inspections will be maintained in the administration building for each unit.

The public address (PA) system will be tested daily to ensure proper operation. In lieu of daily testing, the Facility may opt to broadcast music 24 hours a day, which ensures proper operation of the unit at all times.

Hand-held radios will be tested prior to use each day and periodically throughout the day. The units will be recharged after each shift to ensure that they are operating properly.

5.2.9 Loading and Unloading Area Inspection Procedures

Waste loading and unloading areas will be inspected daily when in use. The inspections will focus on safety-related issues that could lead to hazards or waste spills. Signs will be located at each loading and unloading area indicating that equipment or materials should not be left unattended as they could be obstructions for the loading and unloading operation.

On-site roadways and vehicle traffic areas will be inspected on a preventive maintenance order (PMO) schedule to ensure that potential safety hazards, such as road surface deterioration, are minimized or avoided. Records of inspections will be maintained in the administration building for each unit.

5.3 Preparedness and Prevention Procedures

Preparedness and prevention encompass a wide range of procedures, from communication to equipment to arrangements with local authorities. These procedures are discussed in the following sections.

5.3.1 Internal Communications

Internal communication will be established to meet the needs for each building and area at the Facility. Three forms of internal communication systems will be implemented: (1) a PA system will be used in the main

buildings to alert employees of potential or actual emergencies; (2) in noisy, temporary buildings or remote areas of the Facility, hand-held two-way radios will be used to communicate emergencies; (3) an audible fire alarm will be located in the permanent buildings. The alarm will be used to alert employees of fires but may also be used for alerting them to other emergencies in the event that the two other systems described above are malfunctioning. Equipment tests will be conducted to assure that internal communication systems are functioning properly according to manufacturers' specifications.

5.3.2 External Communications

A telephone will be available for operations that occur inside the main buildings. For outdoor processing areas without a telephone nearby, hand-held two-way radios capable of summoning emergency assistance from local police departments, fire departments, and state or local emergency response teams will be available.

A map identifying the location of telephones at the Facility will be provided to NMED prior to acceptance of waste at the Facility.

5.3.3 Emergency Equipment

Emergency response equipment at the Facility includes fire extinguishers and other fire control equipment, spill cleanup kits, and decontamination kits. Each processing area regulated storage unit will be equipped with fire control and spill response equipment. Equipment in the stabilization unit will be used for the tank storage area and roll-off storage area because of their close proximity. A detailed description of this equipment, including the content and type, is included in Appendix M in the Permit Application dated October 2000 and is discussed in the Contingency Plan contained in Section 6.

A complete list of the contents and location of the various types of kits will be maintained in the EC's office at the Facility.

5.3.4 Water for Fire Control

Permanent buildings at the Facility will be equipped with automatic sprinkler systems and fire extinguishers, as required by the National Fire Protection Association (NFPA) code. The sprinkler systems will be designed according to NFPA guidelines. Water storage to fight fires outside of buildings and the landfill will meet minimum requirements of the New Mexico State Fire Marshal's Office and be transported by water truck(s). It is expected that landfill fires, in the unlikely event that they occur, will be extinguished with a dirt cover. A ready supply of dirt will be available at the excavation stockpile and landfill and general facility equipment (dozers, loaders and scrapers) will be available to load, haul and place dirt.

5.3.6 Arrangements with Local Authorities

The Facility will make arrangements with local authorities as described in the Contingency Plan (see Section 6).

5.4 Preventive Procedures, Structures, and Equipment

To prevent accidents at the Facility, all individuals responsible for material and waste handling will receive classroom and on-the-job instruction in safety awareness, recognition of potential hazards in the work place, environmental procedures and policies, and fire prevention and control procedures.

Individuals who may come in contact with hazardous waste will receive Occupational Safety and Health Administration (OSHA) 40-hour training and annual 8-hour refresher courses. These individuals also will be trained in the operation of the equipment and vehicles they will be using to perform their duties.

Safety meetings will be conducted as necessary to discuss safety issues, fire prevention and control, good housekeeping and any problems relating to specific areas of the site.

5.4.1 Loading, Unloading, and Waste Transfer Operations

To prevent accidents during loading, unloading, and waste transfer, hazardous waste will be handled only by those individuals who have been properly trained in correct handling procedures and proper spill response procedures. The emergency brakes of transport vehicles will be engaged and the wheels chocked during all loading and unloading operations. Inspection of loading and unloading areas is discussed in Section 5.2.9.

Waste containers will always remain closed, except when it is necessary to add or remove waste (e.g. for sampling). This practice will minimize the potential for accidental releases of waste. Wastes will be transferred in approved vehicles over approved routes and the maximum capacity of the truck will not be exceeded. Ramps will be installed where necessary to enable fork lifts, dollies, or hand trucks to move into or out of secondary containment areas surrounded by berms or curbing.

If ignitable wastes are handled, special precautions will be instituted, including the use of special non-sparking bung wrenches or other tools for opening drums or otherwise handling the waste containers, grounding waste containers during waste transfer, and other special handling requirements. These precautions, coupled with the procedures for management of ignitable waste contained in Section 2, will minimize the hazards associated with ignitable wastes.

5.4.2 Runoff and Run-On

The landfill run-on control system will be capable of preventing flow onto the active portion of the landfill during peak discharge from at least a 24-hour, 25-year storm. The run-on control system will consist of unlined ditches for diverting run-on from off-site around the landfill. Water from outside the landfill will be prevented from entering the active portion of the landfill by the waste processing corridor drainage ditch.

The runoff management system will be capable of collecting the water volume resulting from at least a 24-hour, 25-year storm. Runoff in the active portion of the landfill will be collected in the lined stormwater collection basin within the landfill and the LCRS. The run-on and runoff control system for the landfill is described in greater detail in Section 2.5.1.6.

Inspection of the runoff and run-on ditches will be made during weekly site inspections and after storms. Maintenance and repair of the ditches will be performed as necessary and in accordance with the Operations and Maintenance Manual (Permit Attachment N) and the Design Drawings (Permit Attachment L1).

5.4.3 Wind Dispersal Control System

The active portion of the landfill will either be covered or managed to control the wind dispersal. In general, dust control will be accomplished by spraying water on the active portion of the landfill and any road or area subject to wind dispersal. Adding water to prevent wind erosion will be limited so that ponding in the landfill does not occur. Additional detail about wind dispersal procedures can be found in Section 2.5.1.7.

5.4.4 Water Protection

There is an existing underground water line from a spring located approximately one mile east of the Facility in the Ogallala formation, which is used for domestic water supply. This water source, and any others in the Caprock area, will not be used for facility operations and will be protected through the following measures: (1) natural means because of its location; (2) the design of the landfill; (3) the type of waste that will be accepted at the Facility; and (4) the method of response to releases to soil. Each is discussed in more detail below.

Natural geologic and hydrologic conditions in the area include the following characteristics.

- The Upper Dockum unit is unsaturated beneath the selected site.
- The Lower Dockum consists of a 600-foot thickness of homogeneous, lacustrine mudstone. This sequence of unsaturated, low permeability mudstones represents a geologic barrier to potential downward migration of contaminants from the landfill (see Section 3).
- The nearest surface water is the Pecos River, approximately 30 miles to the west of the Facility.

The landfill design includes removal of the 10-feet deep layer of alluvial material on the surface of the disposal site prior to construction of the cells, thus eliminating the possibility of hazardous constituents entering the alluvium and migrating away from the Facility.

Free liquid hazardous waste will be placed in the landfill only in accordance with 40 CFR 264.314(d). In addition, no non-hazardous liquid waste will be placed in the landfill. These limitations on the introduction of liquids into the landfill will minimize the generation of leachates and the potential for the migration of any hazardous constituents from the Facility.

Finally, any releases to the soil will be immediately cleaned up to prevent the spread of contamination. The Contingency Plan in Section 6 describes the equipment and personnel available to ensure prompt cleanup of any spill.

5.4.5 Mitigation of Effects of Equipment Failure and Power Outages

The Facility will use a PMO schedule, based on manufacturer's recommendations for various pieces of equipment, to ensure proper operation of the equipment. In addition to the items replaced or changed as part of the PMO schedule, any item(s) found to be deficient during the PMO inspection will be replaced or repaired as soon as possible.

Spare parts critical to ensuring continuation of equipment and safety systems may be stored on-site to facilitate immediate repairs. Other items that require long ordering periods also may be stored on-site.

In the event of a power failure, at least one backup generator will be used for emergency backup power. The generator will be started within 30 minutes of a power failure.

On-the-job training will provide personnel with appropriate instruction in emergency response procedures so that proper actions will be taken in the event of equipment or power failure.

The emergency power system is described in Section 6.3.5.4 of the Contingency Plan.

5.4.6 Prevention of Undue Exposure of Personnel to Hazardous Waste

All employees will be trained in the safe operating practices to be used in handling hazardous wastes. All employees will wear steel-toed shoes and safety glasses while in processing or active areas of the landfill. In some cases, additional PPE will be required, such as hearing protection, respiratory protection, and protective clothing. Employees will be trained in, and responsible for, proper inspection and use of their respirator and proper use and care of PPE. If a defect is noted in any of the equipment, the employee will be responsible for replacing or repairing it prior to use, in accordance with the applicable training. As previously stated, PPE, other than respiratory protection, will be located at or near each permitted unit, along with spill response equipment.

Routine tasks will require some PPE, as outlined in the site Health and Safety (HAS) Plan. In many cases, these requirements will include safety glasses, steel-toed shoes, and hardhats. The site HAS plan will be prepared prior to commencement of hazardous waste operations. This plan will be kept at the Facility, but is not considered part of this permit application.

Out-of-the-ordinary hazardous waste activities will be evaluated by the site HAS officer or a member of an emergency response team prior to responding to the incident. After the type of contaminants present has been determined, the HAS officer or the EC will specify the respiratory protection and/or PPE requirements necessary to safely handle the incident. All respiratory protection devices will be maintained in compliance with OSHA requirements and will be issued only to qualified personnel who have received medical approval and training for the proper use of respiratory protection devices.

For emergencies that are beyond the scope of the Facility personnel training program, areas of the Facility or the entire Facility may be evacuated, at the direction of the EC. In such cases, professional emergency response personnel will be notified to respond to the emergency (see Section 6).

5.4.7 Special Requirements for Bulk and Containerized Liquids Disposed of in Landfills

As previously stated, bulk or non-containerized liquids will not be disposed of in the landfill. Containers holding free liquids will be placed in the landfill only if (1) all free-standing liquid has been removed by decanting or other methods, mixed with non-biodegradable sorbent, solidified so that free-standing liquid is no longer observed, or otherwise eliminated; (2) the container is very small; (3) the container is designed to hold free liquids for use other than storage (e.g., a battery); or (4) the container is a lab pack disposed of in accordance with 40 CFR 264.316.

In the case of number (1) above, prior to placement in the landfill, the absence of free liquids will be verified using a paint filter test. I n addition, this waste will be analyzed for other parameters based upon the characterization of the waste before solidification. These requirements are a part of the Waste Analysis Plan presented in Section 4.

5.4.8 Special Requirements to Limit Releases to the Atmosphere

Operations at the Facility will be conducted to minimize the potential for releases to the atmosphere as required by 40 CFR 270.14(b)(8)(vi). This objective will be achieved by using a wind dispersal control system to limit or eliminate the dispersal of particulate matter from the landfill, roadways, and other areas of the Facility and by providing control equipment for operations that may produce air emission, if necessary. The dispersal of particulate matter from soil surfaces will be reduced by restricting traffic and applying small amounts of water spray to moisten the soil surface. Procedures will be developed to ensure that the landfill

and associated activities are managed to prevent particulate releases. The Contingency Plan will specify the methods to prevent and control spills and emissions related to spills.

5.5 Precautions to Prevent Ignition or Reaction of Ignitable, Reactive, or Incompatible Wastes

Hazardous wastes will be handled only by properly trained Facility personnel. The Facility training program is outlined in Section 7. Individuals will be instructed in identifying incompatible wastes, properly labeling them, and properly handling them. Proper handling includes segregation, avoidance of mixing the wastes, and carefully checking compatibility codes prior to the disposal of any wastes. Personnel also will be specifically trained in the proper handling of ignitable and reactive wastes.

This approach will ensure the proper handling of ignitable and reactive waste and will prevent mixing of incompatible waste. In addition, personnel training and Facility operational procedures will be developed to (1) ensure that wastes are properly identified; (2) ensure that general Facility requirements for the management of ignitable, reactive, and incompatible wastes are adequate; and (3) ensure that requirements for the management of these wastes are compatible with operations. The procedures for identifying these wastes are provided in Section 4.5 of the Waste Analysis Plan.

The local fire department or a qualified organization will inspect all of the permitted units on an annual basis to assure continued compliance with all applicable NFPA codes.

Ignitable and reactive waste handling are generally described in Section 5.5.1. More specific requirements for the landfill are described in Section 5.5.2. Handling of incompatible waste is described in Section 5.5.3.

5.5.1 General Requirements

Precautions will be taken to avoid (1) accidental ignition or reaction of ignitable or reactive wastes; (2) reactions that generate extreme heat or pressure, fire or explosions, or violent reactions; (3) reactions that produce uncontrolled toxic or flammable fumes, dusts or gases, in quantities large enough to threaten human health and the environment; and (4) any other reactions that threaten human health or the environment.

Ignitable or reactive wastes accepted at the Facility will be separated and protected from any sources of ignition or reaction, including open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks, spontaneous ignition, and radiant heat. All smoking will be confined to specifically designated areas when ignitable or reactive wastes are being handled. "No Smoking" signs will be conspicuously posted wherever there is a hazard from ignitable or reactive waste. Ignitable or reactive wastes will be located in the active portion of the Facility, which is more than 50 feet from the Facility property line.

5.5.2 Requirements for the Landfill

Ignitable or reactive wastes will not be placed in the landfill unless the waste has been treated and no longer meets the definition of ignitable or reactive waste under 40 CFR 261.21 or 261.23, or unless the general requirements outlined above for ignitable, reactive, or incompatible wastes are complied with. Additional information for the management of these wastes in the landfill is contained in Section 2.5.3.6.

5.5.3 Incompatible Waste Handling

Generator waste profile forms (see Permit Attachment F2) will provide Facility waste handlers with the necessary information to avoid mixing containers of incompatible wastes. Facility employees will be trained to

recognize incompatible wastes and to prevent the mixing of such wastes. Incompatible wastes will not be placed in the same area of the landfill, but separated adequately to avoid all possibility of commingling in the landfill.

By the time any leachate generated from the landfill reaches the LCRS it will be sufficiently diluted, therefore, problems associated with incompatibles in the LCRS sump are not anticipated. Wastes will be solidified and stabilized prior to their placement into the landfill. These processes are performed to bind liquids and prevent leaching of any of the wastes' constituents. Therefore, any leachate generated within the landfill is not expected to contain significant levels of hazardous constituents. Due to the anticipated low concentrations of hazardous constituents in the leachate and the geographic separation of incompatible waste types, incompatibility problems within the landfill will be negligible.

Table 5-1. Triassic Park Waste Disposal Facility Inspection Schedule

Inspection Item - Problem or Problem Area	Inspection Time
General Facility	
Security equipment - signs, perimeter fences, lights	Daily
Stormwater detention basin - liner	Weekly and after storms
Surface water diversion ditches to stormwater detention basin	Weekly and after storms
Landfill	
Liner and cover systems - uniformity, damage and imperfections	During construction and installation
Liners and cover deterioration and malfunction	During and immediately after construction
Spills, leaks, odors, windblown particulate	Weekly and after storms
Run-on/runoff control system - uniformity, damage and imperfections	Weekly and after storms
LCRS/LDRS presence of liquid and volume of liquid pumped	Daily and after storms
Leachate collection tank (while holding waste) for condition and proper function	Daily
Hazardous and organic gases	Quarterly
Ancillary equipment	Manufacturer recommended
Sump pumping and instrumentation	Annually

6. Contingency Plan

The purpose of the Contingency Plan is to minimize potential hazards to human health and/or the environment in the event of a fire, explosion, or unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or water. Should any of these unplanned events occur, the procedures in this Contingency Plan will be immediately implemented. When these procedures are followed, the possibility of additional occurrences, recurrences, or spread of the initial emergency in such a way as to require additional emergency response measures will be minimized.

This Contingency Plan was specifically developed for the Facility. A final Contingency Plan will be provided to NMED and other response agencies 60 days prior to initiation of operations. The plan will be kept at the Facility, and controlled copies will be submitted to and updated at all police and fire departments, hospitals, and state and local emergency response organizations that may be called upon to provide emergency services. A list of these organizations is provided in Appendix J of the Permit Application dated October 2000. Initial site tours with all local emergency response organizations will be conducted to familiarize them with the facility prior to the start of operations.

The plan specifies Facility personnel who will be responsible for implementation of the plan. The plan also specifies the actions these individuals will take in the event of an emergency at the Facility. The plan includes (1) a description of the Facility layout; (2) the location of possible hazards; (3) the location of emergency and decontamination equipment; (4) evacuation plans and routes; (5) agreements with local emergency personnel; and (6) an up-to-date list of names, addresses, and telephone numbers of Facility personnel qualified to act as EC.

6.1 General Responsibilities of the Emergency Coordinator

The Facility will train a minimum of five employees to serve as the EC for the Facility. Only one individual at a time will be designated as the primary (on-duty or on-call) EC. Others will be specified as alternate ECs. An updated list of personnel qualified as ECs (see Permit Attachment C2, Emergency Coordinators) will be provided to NMED prior to waste receipt. Individuals will be listed by name, address, and telephone number. The list will also indicate the order in which each will assume responsibility as ECs. In accordance with 40 CFR 264.52(d), which states, "For new facilities, this information must be supplied to the Regional Administrator at the time of certification, rather than at the time of permit application", the list will be provided to the director of the NMED or designee (NMED Director) prior to receipt of waste and will be kept current both at the Facility and with emergency response organizations.

An acting EC will be either physically at the Facility or on call 24 hours a day, 365 days a year. Each EC will have authority to commit resources needed to carry out the provisions of the Contingency Plan.

The EC will be responsible for implementing the Contingency Plan, coordinating all emergency response efforts, determining the extent of the emergency, assessing hazards to human health and the environment, and completing necessary reports associated with the incident. Each EC will be thoroughly familiar with (1) the Facility layout and operations; (2) all aspects of the Facility's Contingency Plan; (3) the location and characteristics of hazardous materials, hazardous waste, and waste handling activities at the Facility; (4) the location and operation of emergency response equipment; (5) evacuation plans and routes; and (6) the location of all Facility records.

After an emergency has been brought under control, the EC will assume responsibility for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that is generated as a result of the release, fire, or explosion at the Facility.

If the EC becomes injured or is otherwise unable to serve as EC during an emergency, a designated operations manager will assume the role of EC until an alternate EC is notified and arrives on the scene.

6.2 Circumstances Dictating Implementation of the Plan

The Contingency Plan must be immediately implemented under any of the following circumstances:

- a fire or explosion occurs resulting in the release of a hazardous waste or involving an active hazardous waste management unit;
- a spill, leak, or other release of hazardous waste or hazardous waste constituents to the air, soil, or surface water occurs that could threaten human health or the environment;
- an indoor spill, leak, or other release of hazardous waste occurs to a secondary containment area that is not removed within 24 hours; and/or
- a hazardous waste incident occurs resulting in an injury requiring more than basic first aid.

The plan will be implemented any time the EC believes that an event occurring at the Facility has the potential to adversely affect human health or the environment. The plan may also be implemented for other reasons at the discretion of the EC.

During the initial discovery and assessment phase of an incident, the EC will obtain information, including the type and quantity of released material and/or injuries that have occurred. At this time, the EC may consult with environmental specialists and other appropriate personnel to determine whether the incident warrants implementation of the Contingency Plan.

6.3 Implementation Procedures

Response procedures for emergencies often vary significantly, depending on the specific details of the incident. However, several response procedures are common to all incidents and include the following elements, which are further detailed in this section:

- discovery of incident and request for assistance from emergency response personnel;
- identification and characterization of released or suspected released material;
- assessment of hazard;
- off-site notification and evacuation criteria;
- response and control procedures;
- measures to prevent recurrence or spread; and
- storage and treatment of released hazardous waste.

6.3.1 Discovery of Incident and Request for Assistance from Emergency Response Personnel

The individual who first discovers an incident or emergency will quickly determine whether the situation is immediately life threatening or non-life threatening. The steps taken in each of these scenarios are briefly described below, although they are likely to vary based on occurrence.

6.3.1.a Life-Threatening Situations

All Facility employees will be instructed and trained on response to a life-threatening situation or life-threatening release of materials. Employees will first relocate to a safe area, if necessary, then immediately notify the EC and/or emergency response personnel as the situation warrants, using the methods described below.

Verbal—In some cases, verbal communication within a building or between buildings will be the fastest way to disseminate emergency information and/or evacuate the area of an emergency.

Telephone—Employees will be instructed to immediately relocate to a safe area, if necessary; appropriate emergency response personnel can be notified by dialing 911 (without first notifying the EC if a particular situation appears to be immediately life-threatening or serious). The EC must be immediately notified of the actions taken.

Fire-Pull Station—The fire-pull station may also be used to alert the fire department and Facility personnel of an emergency. Although this type of alarm does not allow verbal communication with the fire department, it does activate a local fire alarm bell at the Facility and a remote alarm signal at the fire department.

Facility personnel will be trained for initial response to on-site fires. When the alarm is activated, on-site personnel may use fire extinguishers or the application of soil and/or water to suppress fires, when appropriate. The Roswell Fire Department will respond to fires beyond the control of site personnel. Response time for the Roswell Fire Department is approximately 30-45 minutes.

Fire-pull stations will be located at the administration building and the entrance to the landfill. Other possible locations of fire-pull stations may be established.

Automatic Fire Detection/Sprinkler System—All permanent Facility buildings will be equipped with automatic fire detection/sprinkler systems, which, when activated, will transmit an alarm directly to the security gate guard shack and the Roswell Fire Department. The fire department will immediately respond to any alarms.

Public Address (PA) or Paging System—Each of the main buildings will be equipped with a PA or paging system, which will be used to inform employees of adverse conditions at the site and emergency response instructions.

Hand-Held Radios—Hand-held radios will be used to communicate with personnel who are out of range of voice communications, PA, or are working in areas with noise levels such that render the PA system inaudible in emergency situations.

During non-operational hours, the EC will be notified by pager, radio, cellular telephone, or regular telephone. The EC will be at the scene as soon as possible to direct and coordinate emergency response activities.

If the EC determines that additional assistance from an off-site agency or emergency response organization is needed or if immediate action is required to protect a local community population or to protect any visitors using the Mescalero Sands recreation complex and travelers at the rest stop on Highway 380 north of the Facility, the EC will contact the appropriate agencies or organizations. A list of these organizations is provided in Permit Attachment C3. During response activities, two-way radios will be used for communication between responding groups and the EC.

6.3.1.b Non-Life Threatening Situations

Upon discovery of a non-life-threatening release of materials or other non-life-threatening but potentially serious emergency situation, all Facility employees will be instructed and trained to immediately notify the EC or their supervisor. The EC will evaluate the situation, notify appropriate personnel, and if necessary implement the Contingency Plan.

6.3.2 Identification and Characterization of Released or Suspected Released Material

After the emergency situation has been discovered and appropriate response personnel have been contacted for assistance, the EC will immediately obtain the following information by process knowledge (his own or that of another employee): (1) observation; (2) review of Facility records, including material safety data sheets (MSDSs) and manifests; and/or (3) chemical analysis of the material, if this becomes necessary. This information will determine the following:

- the character and amount of released waste;
- the exact source and extent of any released material;
- whether the release could move off-site; if it is determined that the release could move off-site, the EC must determine if any containment procedures have been implemented or whether such procedures should be implemented; and
- any injuries or potential injuries resulting from the incident.

All containers of waste and material at the Facility will be labeled. Therefore, the identification and characterization work generally will be accomplished through visual inspection and process knowledge. Manifests and lists of the waste and locations of waste being stored at the Facility prior to disposal or treatment will be maintained at the Facility. This information will be used in lieu of the visual inspection noted above in cases where the danger of entering the incident area is high or the container labels have been obscured as a result of the incident.

Copies of the MSDSs for raw materials used at the site will be located in the administration building, in the EC's office, and at appropriate operations locations throughout the site. The information in these documents will be used to prepare a course of action.

6.3.3 Assessment of Hazard

Concurrent with the waste identification and characterization phase of the emergency response, the EC will assess possible hazards to human health or the environment that may result from the emergency situation. Indirect and direct effects of the release, fire, or explosion will be considered during this assessment. Examples of direct and indirect effects include the impacts of any toxic, irritating, or asphyxiating gases that are generated or the effects of any hazardous surface water runoff from water or chemical agents used to control a fire.

During this phase of the emergency response, the EC will consider the following information to determine potential risk to human health or the environment:

- the location from which the material or waste is emanating;
- the weather patterns and wind direction at the time of the release; and

- the characteristics of the released material, including physical, reactive, and human or animal toxicity.

The EC may choose to obtain emergency response guidance by contacting one or more of the emergency response organizations listed in Permit Attachment C3 or by utilizing various spill control reference textbooks and MSDSs located in the EC's office.

6.3.4 Off-Site Notification and Evacuation Criteria

If the EC determines that a release, fire, or explosion has occurred at the Facility that poses an immediate threat to on-site or off-site human health and/or the environment, the findings will be reported to appropriate response personnel as follows:

- Local authorities will be immediately notified if an emergency incident at the Facility could affect local areas and if evacuation of these areas is necessary. The EC will be available to assist appropriate officials in deciding whether local areas should be evacuated (evacuation procedures and a site-wide emergency evacuation plan are provided in Permit Attachment C4, *Evacuation Plans*).

- Local authorities will be notified with the following information:
  - the name and telephone number of the reporter;
  - the name and address of the Facility;
  - the time and type of incident that occurred;
  - the name and quantity of material(s) involved, to the extent that this is known;
  - the extent of injuries, if any; and
  - the possible hazards to human health or the environment.

Coordinating agreements will be signed with federal, state, and local emergency response organizations. The agencies with which the Facility will enter these agreements are listed in Permit Attachment C3. The agreements outline the conditions under which the agencies will be contacted and the roles they will assume during various emergency scenarios at the Facility. The agreements establish the EC as the lead coordinator of all emergency response activities at the Facility. The details of these agreements will be located in the EC's office and with each of the participating organizations. The agreements will be considered controlled documents and will be kept current by updating all copies each time a change is made. This ensures a coordinated response to all emergency situations.

The EC may contact one or more of the agencies, such as police, fire departments, or hospitals, as listed in Attachment C3, if additional assistance is needed at the site to protect community populations.

6.3.5 Response and Control Procedures

Following proper notification of agencies and/or evacuation of the Facility, the EC will initiate response and control procedures. This effort will involve the use of emergency equipment, which is listed in Permit Attachment C1, Emergency Equipment. This list also includes equipment descriptions and locations.

Potential incidents for which response and control procedures are necessary will be grouped into three broad categories: (1) fires and/or explosions; (2) spills, leaks, or other releases; and (3) power failures. A brief discussion of emergency training requirements and the general procedures for handling each of these situations are described in the following sections.

Facility personnel and supervisors will receive safety training to enable them to respond to and handle various emergency situations that are not of a serious nature. In addition to this training, employees will participate in emergency response drills on a periodic basis. These drills will involve both internal responses and those response actions taken in conjunction with external emergency response personnel. Key personnel will be familiar with the use of emergency equipment and fire control structures available to prevent the spread of fires in their areas. To prevent recurrence of an incident, any faulty or defective monitoring equipment, valves, pumps, alarms, or other equipment will be repaired. If repair is not possible, the equipment will be replaced. The unit will not receive hazardous waste until the minimum required equipment for safe operation is fully functional.

Procedures for ensuring that incompatible wastes are not treated, stored, or located in areas where a spill has occurred are addressed in Section 6.3.7.

6.3.5.a Fire and/or Explosion Control Procedure

If a fire or explosion occurs at the Facility that may impact an active hazardous waste management unit or hazardous material storage area, the Contingency Plan will be immediately implemented, as outlined in Section 6.3. The EC will assess the situation and direct the emergency response effort. The EC will also be responsible for advising emergency response personnel of the hazards associated with released materials and other areas that should be protected from the effects of the incident.

In the event that a fire cannot be brought immediately under control and hazardous waste or material are located in the path of the fire or in an otherwise dangerous place, the waste or materials will be relocated to a safer area, if possible. If this is not possible, the material may be sprayed with an appropriate fire suppressant, at the direction of the EC or under the advisement of fire department personnel.

If an explosion is likely to occur, for example because a fire threatens to envelop ignitable waste, the EC may choose to evacuate the area, as described in the Evacuation Plan in Appendix L of Volume II in the Permit Application dated October 2000. A site-wide evacuation plan is presented in Drawing L-1 in the Evacuation Plan.

Facility employees will be trained and advised to stay in their work areas during emergency situations, unless they are in immediate danger, until they receive further direction via the PA system or other method of communication. If evacuation is necessary, the EC will communicate this via the PA system and by other means, as necessary, and all employees will assemble at the administration building. If anyone is unaccounted for, emergency response personnel will conduct searches.

After the affected areas have been evacuated, re-entry will be authorized by the EC only after the fire has been extinguished and when the emergency has been resolved.

Any equipment used during the incident will be checked for contamination and cleaned and/or replaced prior to resumption of plant operations in the affected area. Any solutions or materials used to decontaminate the equipment will be managed as RCRA-regulated waste.

6.3.5.b Spills, Leaks, or Other Releases Control Procedure

This section describes the procedures for responding to spills, leaks, or other releases to containment areas or to the environment.

If Facility employees observe a spill, leak, or other release, whether during a formal inspection or during routine work, they will be instructed to contact the EC immediately and describe the situation in as much detail as possible, giving the following information, at a minimum:

- the location;
- material composition;
- approximate quantity; and
- estimated extent of the release.

Based on this information (and additional investigation by the EC as necessary), the EC will determine whether to evacuate the area and/or implement the Contingency Plan.

As previously stated, if the EC is not available and if the situation is serious or life threatening, employees will be instructed to dial 911 for emergency assistance. In a life threatening situation personnel may call 911 without first notifying the EC. The EC will then be notified of the employee's actions. Upon notification, the EC will conduct a visual inspection of the release and will then implement immediate containment measures.

6.3.5.b.i Releases to the Environment

The EC will implement, in addition to the applicable permit conditions of Permit Parts 9 and 10, the following procedures for responding to leaks or spills from units that are likely to reach the environment:

- As previously stated, if uncontrolled releases of ignitable, corrosive, reactive, or toxic materials are involved in the incident, the affected area will be evacuated.

- Response personnel will be directed to the incident location to aid in preventing further migration of the leak or spill to soils or surface water, provided that this can be accomplished safely. This effort will involve the use of industrial absorbents, sorbent dams, or other similar materials. If the release is determined to be beyond the capabilities of Facility personnel, the EC will contact one of the emergency response organizations listed in Permit Attachment C3 for assistance.

- The EC will monitor the status of the incident and direct emergency response personnel until the emergency condition no longer exists.

- When the incident has been brought under control, the EC will coordinate and instruct response personnel to begin cleanup and decontamination operations. These will involve containing and collecting any released material, including liquid releases, contaminated sorbent materials, visibly contaminated soils, and any other waste materials generated during cleanup or decontamination. These items will be removed and properly disposed of, generally by placing the wastes into DOT-approved containers (such as 55-gallon drums), sampling the waste or otherwise determining its constituents, and handling the waste accordingly. All liquids, including the originally released material and any liquids generated during cleanup (unless other circumstances or knowledge preclude this effort) will be pumped into drums and samples taken and analyzed to determine an appropriate course of action.

- If soils or surface water are visibly affected, they will be removed until the contaminant concentration in the remaining soil or water is at or below appropriate levels for the contaminants of concern.

- The EC will then use whatever means are necessary to determine if the released material is a hazardous substance as defined in 40 CFR 302. The EC will then determine whether the amount of

released material is a reportable quantity. If the amount is a reportable quantity, the following steps will be taken:

- o
- o the EC will report the release to NMED within 24 hours of detection;
- o the National Response Center will be advised of the situation within 24 hours of the incident;
- o an internal report describing the situation and corrective measures necessary to prevent a recurrence will be prepared; and
- o a written report will be filed with NMED within 30 days of detection, as described in Section 6.4.2.

- If the quantity of the spill or leak is less than or equal to 1 pound and is immediately contained and cleaned up or is less than a reportable quantity of material, a Facility employee will be assigned to report on the situation and determine what, if any, follow-up actions are necessary after cleanup.

6.3.5.d Power or Equipment Failure Control Procedure

The Facility will be equipped with at least one backup generator for emergency power generation to critical equipment only, which may include the laboratory, stabilization unit and administrative equipment. The generators may also be used to power safety equipment, such as smoke detectors and tank emergency cut-off or bypass mechanisms. The details of this system will be made available as the Facility design is completed. This emergency system will be started within 30 minutes of a power failure.

Equipment that fails but does not result in an emergency incident, such as a fire or explosion, will be promptly repaired or replaced. If emergencies arise as a result of the equipment failure, they will be handled as described in previous sections.

6.3.6 Measures to Prevent Recurrence or Spread

During an emergency, the EC will take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste areas at the Facility. These measures will include the following, where applicable:

- stopping processes and operations in specific areas of the plant or the entire plant itself; shut-down procedures for processing operations will be maintained in the administration building as well as at specific operating locations;
- collecting and containing released waste as described in Section 6.3.5.2; and
- removing or isolating containers from the emergency at hand, as described in Section 6.3.5.1; if a material cannot be moved because of danger associated with a fire, the material may be sprayed with an appropriate fire suppressant, as directed by the EC or authorized fire official.

If the Facility ceases operations because of an emergency, the EC or a designated individual will monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

A preventive maintenance order schedule will be prepared to ensure that monitoring equipment, valves, pumps, alarms, and other equipment will be maintained in good working order. If any of the equipment is found to be faulty or defective, it will be repaired or replaced.

6.3.7 Storage and Treatment of Released Hazardous Waste

Concurrently or immediately after the emergency has been addressed and cleanup procedures have been completed, the EC will make arrangements for the containerization and storage, treatment, or disposal of any waste generated during the incident. The waste will be assumed to be RCRA-regulated until process knowledge or sampling and analysis can be used to determine the actual nature of the waste. Sampling and analysis will be accomplished in accordance with the Waste Analysis Plan in Section 4.0. The material will be placed in DOT-approved containers and stored as RCRA-regulated waste until a determination is made. If the waste is determined to be RCRA-regulated, it will be labeled and stored accordingly until it is disposed of in accordance with applicable RCRA regulations and permit conditions.

If the waste generated during the cleanup is determined to be incompatible with other wastes stored or treated at the Facility, the incompatible waste will be labeled as such and physically separated from other incompatible waste. In addition, existing waste at the Facility that may be incompatible with the waste generated during cleanup will not be disposed of until cleanup activities are completed and the cleanup waste is safely containerized and segregated from the existing waste.

6.3.8 Equipment and Personnel Decontamination

A personnel decontamination zone (PDZ) will be set up a safe distance away from the material release area by a team designated the EC. The PDZ's location relative to the release area will be determined by the EC. The PDZ will be comprised of a support zone, contamination reduction zone, and exclusion zone.

The PDZ will be set up to sequentially decontaminate equipment and personnel. The first level of decontamination will involve equipment or personnel containing the highest level of contamination. Final equipment and personnel decontamination will be verified by visual inspection. The decontamination procedure within the PDZ will generally comprise progressing through the contamination reduction zone and corridor followed by redress of personnel. The Contamination Reduction Corridor will be designed to control access into and out of the exclusion zone and will confine responding personnel to a limited area.

Also included in the Contamination Reduction Corridor will be the decontamination of monitoring devices and waste samples. Non-reusable items such as latex gloves, Tyvek suits and duct tape, and respirators will be properly collected and disposed of at an approved facility. Decontamination of equipment, monitoring devices, and waste samples is presented below in Section 6.3.8.2, Equipment Decontamination. Decontamination efforts regarding personnel will be recorded including personnel identification, emergency response function, and date and time of day entering and leaving the PDZ. The PDZ will be decommissioned when the emergency has been addressed and cleanup measures have been completed.

Sampling equipment including waste sample collection hardware, personal protective equipment, and monitoring devices will be decontaminated in the Contamination Reduction Corridor prior to returning these items to their respective storage locations at the facility. Decontamination will involve scrubbing each item with a biodegradable detergent solution followed by thorough rinsing with deionized water. This process will be repeated at least one time. Additional scrubbing/rinsing will be performed depending on the extent of contamination. The PDZ supervisor will conduct all recordkeeping with regard to decontamination efforts. He will note equipment, waste sample containers, and monitoring devices that were decontaminated. He will also note the number of detergent scrubbing/rinsing steps that were conducted. The PDZ supervisor will verify that all equipment, sample containers, and monitoring devices have been properly decontaminated prior to these items being returned to their respective storage areas for reuse. This verification will be based on a visual inspection of each item prior to its leaving the PDZ. All wastewater that was generated and collected during operation of the PDZ will be properly treated and/or disposed of as directed by the EC.

6.4 Post-Implementation Procedures

Following implementation of the Contingency Plan and resolution of the incident, all emergency equipment used during the effort will be made ready for future use. Necessary reports will be prepared and filed at the Facility and with regulatory agencies. These post-implementation procedures are detailed in the following sections.

6.4.1 Post-Emergency Equipment Maintenance

All emergency equipment listed in Permit Attachment C1 will be cleaned, repaired, or replaced so that it is fit to use before plant operations in the affected area are resumed. If the equipment cannot be adequately cleaned, it will be disposed of as hazardous waste. If it cannot be repaired and is not contaminated, it will be disposed of as non-hazardous waste.

Documentation of post-emergency equipment maintenance will be provided to NMED prior to resumption of operations in the affected area of the plant.

6.4.2 Required Reports and Notification

During and after certain emergency situations, as described in previous sections of this plan, specific types of reports or notification will be required. The EC will determine when or if off-site notification and reporting are required for certain scenarios. The various reporting and notification requirements are mentioned in the appropriate sections of the Contingency Plan but are detailed here for purposes of clarity.

After the plan has been implemented, if the EC determines that the Facility has had a release, fire, or explosion that could threaten human health or the environment outside the Facility, the EC must immediately notify either the government official designated as the on-scene coordinator for the geographical area or the National Response Center. The report must include the following information: (1) the name and telephone number of the reporter; (2) the time and type of incident; (3) the name and quantity of material(s) involved, to the extent that this information is known; (4) the extent of injuries, if any; and (5) the possible hazards to human health, or the environment outside the Facility.

If the EC determines that evacuation of local areas may be advisable, appropriate local authorities will be immediately notified. The EC must be available to help appropriate officials decide whether local areas should be evacuated.

Any release to the environment which threatens human health or the environment must be reported to the NMED Director within 24 hours of detection. If the release is reported pursuant to 40 CFR Part 302, that report will satisfy this requirement. Any release involving a reportable quantity of a hazardous waste as defined in 40 CFR 302.4 will be reported to the National Response Center within 24 hours.

Within 24 hours of implementing the Contingency Plan, the EC must notify NMED. The owner or operator must note in the operating record the time, date, and details of any incident that requires implementation of the Contingency Plan.

As required by 40 CFR 264.56(j), within 15 days of the incident, the EC must submit to the NMED Director a written report on the incident. The report must include the following information: (1) the name, address, and telephone number of the owner or operator; (2) the name, address, and telephone number of the Facility; (3) the date, time, and type of incident; (4) the source and cause of any release to the environment; (5) the name and quantity of material(s) involved; (6) actions taken to mitigate damage due to the release; (7) the extent of injuries, if any; (8) an assessment of actual or potential hazards to human health or the environment,

where this is applicable; and (9) the estimated quantity and disposition of recovered material that resulted from the incident.

Within 30 days of detection of a release to the environment, a report containing the following information will be submitted to the NMED Director: (1) the likely route of migration of the release; (2) the characteristics of the surrounding soil (soil composition, geology, hydrogeology, climate); (3) the results of any monitoring or sampling conducted in connection with the release, if available (if sampling or monitoring data relating to the release are not available within 30 days, these data must be submitted to the NMED Director as soon as they become available); (4) the proximity of the incident to downgradient drinking water, surface water, and populated areas; and (5) a description of response actions that were taken or are planned.

The NMED Secretary and state and local authorities will be notified when the Facility is in compliance with 40 CFR 264.56(h), which states that no waste that is incompatible with the released material can be treated, stored, or disposed of until cleanup procedures are completed, and all equipment must be fit for its intended use prior to resuming operations.

6.5 Documents to be Maintained On-Site as Part of the Permit

Following the resolution of emergencies, various documents must be prepared and maintained on-site as part of the operating record. These documents are discussed in previous sections of this plan and are summarized below.

Copies of the Facility- and building-specific evacuation plans will be maintained in the administration building and at each location for which evacuation plans will be prepared. These documents will be submitted to the NMED within 30 days of the effective date of this permit.

An up-to-date list of all satellite and 90-day accumulation areas, if any are utilized at the Facility, will be maintained at the Facility and provided to the NMED inspectors upon request. Prior to accepting waste at a satellite or 90-day accumulation area for the first time, NMED will be provided with a description and location map.

A list of authorized ECs and their home telephone numbers will be maintained in the administration building, in all other buildings and emergency stations at the site, and in all controlled copies of the Contingency Plan.

A list of coordinating agreements that outline the situations and criteria under which outside help is needed will be maintained in the administration building and in all controlled copies of the Contingency Plan. This list will include the role of each emergency response authority in an emergency.

Coordinating Agreements will be put in place with local, state, and federal agencies for responding to emergency incidents that may occur at the Facility. The Facility will formalize Coordinating Agreements with those organizations listed in Permit Attachment C3 no later than 60 days prior to receipt of first waste.

A current evacuation plan will be maintained in the EC's office. Permit Attachment C4 provides a general Evacuation Plan for the Facility. The Facility will finalize this Evacuation Plan with details of building-specific evacuations after the Facility design has received final approval from NMED. It is proposed that the Facility will submit the criteria for determining when site evacuations are necessary within 30 days of the effective date of the permit and that final evacuation plans and procedures be submitted following final NMED approval of the Facility design.

A current version of the emergency and spill response equipment list presented in Permit Attachment C1 will be maintained in the EC's office and in each of the controlled copies of the Contingency Plan.

The operating record for the facility will be updated with the time, date, and details of any incidents that require implementation of the Contingency Plan.

6.6 Amendment of Contingency Plan

If the Contingency Plan is implemented, the circumstances under which it was implemented will be thoroughly reviewed to investigate the following:

- why the incident occurred and the cause for the occurrence;
- what measures were taken to prevent a recurrence; and
- what measures will be taken to reduce the risk of having a similar occurrence in the future.

The Contingency Plan itself will be reviewed by the EC and/or the Facility owner and immediately amended, if necessary, whenever any of the following events occur:

- the Facility permit is revised;
- the plan fails in an emergency;
- changes occur to the Facility design, construction, operation, maintenance, or other circumstance that materially increase the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or that change the response necessary in an emergency;
- the list of ECs changes; or
- the list of emergency equipment changes.

Because the Contingency Plan is a controlled document, any changes will be made in the following manner: (1) inaccurate or out-of-date pages will be directly replaced with new pages containing the modified or additional information; (2) the corrected pages will be issued to all agencies and organizations that have controlled copies of the plan; and (3) old pages will be removed from copies of the plan and discarded. These steps will ensure that each organization has a current version of the plan.

7. Personnel Training

The personnel training program for the Facility will be developed in accordance with 40 CFR 264.16 as adopted by the State of New Mexico in the New Mexico Hazardous Waste Management Regulations, Part V. This plan documents training procedures to be used by the Facility for all new employees and refresher training for experienced workers to ensure that all employees perform their work in full compliance with 40 CFR 264.16.

As illustrated in Figure 7-1, personnel will be divided into three categories for the purposes of the RCRA training: Facility personnel, visitors, and off-site emergency response personnel. Facility personnel will be further categorized based on whether or not they will handle hazardous waste. Personnel will receive training appropriate to their specific job responsibilities. All Facility personnel will be required to complete classroom training within six months of employment and annually according to the requirements of the CFR 264.16. Employees who will handle hazardous waste and supervisors of employees who will handle hazardous waste will be required to complete on-the-job training (OJT) and OSHA 40-hour training and annual refreshers. Employees assigned to the Facility will not be allowed to work without direct supervision until completing the training program relevant to the positions in which they are employed. New personnel will be required to complete their training program as soon as practicable, but no later than six months, following their effective date of employment at the Facility.

Section 7.1 describes job titles, qualifications, and duties; Section 7.2 describes training content and frequency; and Section 7.3 describes record keeping procedures.

7.1 Job Titles and Duties

To facilitate safe and effective Facility operation, the training program is designed to provide training commensurate with job responsibilities. A list of qualifications, duties, and special training required for appropriate personnel will be developed and maintained on-site prior to commencement of operations. This section includes a description of the qualifications and responsibilities of the RCRA training officer, the EC, waste handlers, the site security officer, laboratory specialists, and maintenance personnel. Although other categories of personnel may work at the site, these six categories include key personnel with respect to ensuring safety and compliance and therefore are included in this section. It is important to note that one person may fulfill the responsibilities of more than one of the job categories outlined below.

7.1.1 RCRA Training Officer

The RCRA training officer will be responsible for developing and implementing a RCRA training program that is in compliance with 40 CFR 264.16, Personnel Training.

The RCRA training officer will possess the following qualifications:

- a four-year science or engineering degree or sufficient experience in hazardous waste management to oversee the training program;
- working knowledge of the New Mexico Hazardous Waste Act and the New Mexico Hazardous Waste Management Regulations;
- knowledge of site-specific hazardous waste management procedures;
- a thorough understanding of the purpose of the Contingency Plan and emergency procedures and the ability to implement them; and

- 40-hour OSHA and annual refresher training.

The RCRA training officer will have the following responsibilities:

- developing and implementing the RCRA training program, including classroom training development and revision;
- establishing course curricula;
- conducting training;
- maintaining and updating, as needed, a list of all employees requiring training; this list will provide a personalized training history for each employee, which includes job title, training schedule, course attendance, and test results;
- reviewing any new job classifications to determine if OJT is required (supervisors may also request that employees receive OJT);
- scheduling training;
- ensuring that all personnel with RCRA responsibilities are trained as soon as practicable following the effective date in a position and are annually updated; and
- conducting an annual review to determine which personnel require OJT.

7.1.2 Emergency Coordinator

The EC will coordinate all emergency response activities and will have the authority to commit the resources necessary to implement the Contingency Plan contained in Section 6.0. The Facility will appoint a primary EC as well as secondary ECs to ensure that someone is always available to serve as the EC. The secondary ECs must meet the same qualifications and responsibilities, outlined below, as the primary coordinator.

The EC will possess the following qualifications:

- a four-year science or engineering degree or sufficient experience in hazardous waste management and emergency response to coordinate all aspects of emergency response;
- working knowledge of the New Mexico Hazardous Waste Act and the New Mexico Hazardous Waste Regulations;
- familiarity with all aspects of the Contingency Plan and emergency procedures, all operations and activities at the Facility, the location and characteristics of waste handled, the location of records within the Facility, and the Facility layout prior to acting as EC; and
- 40-hour OSHA training, annual refreshers, and OSHA supervisor training.

The EC will have the following responsibilities:

- either being on the Facility premises or being available to respond to an emergency by reaching the Facility within a short period of time;
- notifying all appropriate Facility personnel upon awareness of an emergency situation;
- notifying all appropriate state or local agencies with designated response roles;
- identifying the character, exact source, amount, and extent of any released materials;

- assessing possible hazards to human health and the environment that may result from a release, fire, or explosion;
- notifying local authorities if a release, fire, or explosion has occurred that could threaten human health or the environment;
- notifying the National Response Center if a release, fire, or explosion occurs that could threaten human health or the environment;
- taking all reasonable measures during an emergency to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the Facility;
- if appropriate, when the Facility ceases operations in response to a release, fire, or explosion, monitoring for leaks, pressure build-up, gas generation, or ruptures in equipment;
- providing for the treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the Facility;
- ensuring that no waste that may be incompatible with the released material is treated, stored, or disposed until cleanup procedures are completed and that emergency equipment is cleaned and fit for its intended use prior to resumption of operations;
- notifying NMED and appropriate local authorities before operations are resumed;
- noting in the operating record the time, date, and details of any incident that requires implementing the Contingency Plan; and
- submitting a written report to the NMED within 15 days of implementing the Contingency Plan.

7.1.3 Waste Handlers

Waste handlers will perform sampling, screening, unloading, transfer, and loading of material.

The waste handlers will possess the following qualifications:

- high school diploma or equivalent; and
- two years of experience in hazardous waste operations.

The waste handlers will have the following responsibilities:

- verifying waste received;
- testing emergency equipment;
- inspecting Facility and emergency equipment;
- managing containers in such a way as to prevent leaks, spills, and ruptures;
- inspecting the landfill;
- inspecting roll-off containers and drums for cracks or holes;
- repair of defects on roll-off containers and drums;
- inspection of non-regulated but potential SWMU units;
- maintaining runoff management system, control wind dispersal, and ensuring compliance with other operational requirements specific to the RCRA permit;
- assisting in maintaining the operating record; and

- preparing biennial reports, unmanifested waste reports, and other reports as necessary.

7.1.4 Site Security Officers

The site security officers will control access to the Facility, ensure site security, and possess high school diplomas or equivalent.

The site security officers will have the following responsibilities:

- controlling entry, at all times, through gates or other entrances to the active portion of the Facility;
- ensuring site security;
- inspecting the perimeter fence to prevent unknowing entry and prevent the unauthorized entry of persons or livestock onto the active portion of the Facility; and
- initially locating and then maintaining warning signs that indicate "Danger - Unauthorized Personnel Keep Out" in both English and Spanish, which will be posted on the perimeter fence and will be legible from a distance of 25 feet.

7.1.5 Laboratory Specialist

The laboratory specialist will help to assure that wastes received at the Facility are consistent with waste profiles supplied by generators.

The laboratory specialist will possess the following qualifications:

- a four-year science degree or sufficient experience to adequately perform acceptance testing;
- working knowledge of the New Mexico Hazardous Waste Act and the New Mexico Hazardous Waste Regulations; and
- familiarity with the Waste Analysis Plan and waste analysis practices and procedures.

The laboratory specialist will have the following responsibilities:

- developing sampling, characterization, and testing procedures for waste received and generated at the Facility;
- directing or performing sampling, characterization, and testing for the Facility;
- determining if waste is acceptable for disposal according to waste profile information submitted by the generator;
- determining if the initial and annual full chemical analysis and fingerprint analysis confirm generator information provided on the waste profile and manifest; and
- implementing the laboratory QA/QC program.

7.1.6 Maintenance Personnel

Maintenance personnel will maintain all equipment, buildings, roads and ditches.

Maintenance personnel will possess the following qualifications:

- high school diploma or equivalent; and
- two years experience in an industrial setting.

Maintenance personnel will have the following responsibilities:

- developing maintenance procedures; and
- performing maintenance-type activities, including repairs, preventive maintenance, and corrective actions associated with RCRA inspections.

7.2 Training Content and Frequency

Section 7.2.1 describes the training program for Facility personnel, Section 7.2.2 describes training for visitors, and Section 7.2.3 describes training for off-site emergency response organizations.

7.2.1 Training Program for Facility Personnel

All new employees will be required to successfully complete the training program related to their position. Training programs will include RCRA classroom training, job-specific training, OSHA 40-hour training, and annual refresher training for all three programs. OJT and OSHA 40-hour training sessions will be required only for those personnel who will handle hazardous waste and the supervisors of personnel who will handle hazardous waste. Employees will not be permitted to assume unsupervised job duties until successful completion of all the required elements of their training program. As soon as practicable following a new employee's hire date, successful completion of the training program specific to his or her position must be accomplished, and certification of the completion will be recorded and kept on file by the RCRA training officer.

7.2.1.1 Classroom Training

The initial classroom training will consist of at least one 8-hour session. Annual refresher training will consist of at least one 4-hour session. The outline of the annual refresher is the same as the outline for the initial classroom training; however, the refresher training will be an abbreviated version of the initial training at an accelerated pace. The RCRA classroom training will include the following goals:

- developing a basic understanding of the regulatory requirements for a treatment, storage, and disposal facility;
- promoting understanding of policies and procedures necessary to protect human health and the environment;
- ensuring proper management of hazardous waste; and
- educating employees regarding response to emergencies.

The outline for the RCRA training class will consist of the following elements:

- an introduction to RCRA, including a general description of RCRA and Hazardous and Solid Waste Amendments (HSWA); the definition of hazardous waste; waste generator requirements; disposal requirements; and labeling, inspection, record keeping, and reporting requirements;
- requirements associated with the RCRA permit for the Facility;
- Facility-specific waste management, including general procedures for receipt and handling of waste from off-site as well as management of waste generated on-site;

- decontamination procedures;
- emergency procedures, including response to fires, explosions, and releases, and shutdown of operations;
- emergency equipment location and use;
- emergency systems, such as the communication and alarm systems and the fire suppression system;
- Contingency Plan;
- evacuation plan;
- waste minimization;
- occupational health and safety, including items such as personal protective clothing and equipment, general industrial safety, and employee right-to-know (the Hazard Communication Standard);
- transportation of hazardous waste, including marking, labeling, placarding, loading, use of shipping papers, record keeping, and other DOT requirements; and
- maintenance of documentation.

Facility tours and audio-visual aids in conjunction with lectures and procedure manuals will be utilized in the classroom training. A written test will be administered at the completion of classroom training. A grade of 80 percent or better will be required to demonstrate mastery of the course material. The course curriculum will be reviewed at least annually by the RCRA training officer to ensure that it is current and appropriate.

7.2.1.2 Job-Specific Training

The RCRA classroom training will be supplemented with job-specific training tailored to each employee's actual job responsibilities. Job-specific training may include additional classroom training and/or OJT. All employees who handle hazardous waste and supervisors of personnel who handle hazardous waste will be required to complete OJT. The purpose of OJT is not to demonstrate to personnel how to perform their duties, but rather to demonstrate how to perform their duties safely and in compliance with RCRA. OJT will be conducted in the work area by the line supervisor or foreman subsequent to classroom training. The length and complexity of the OJT will vary according to the employee's responsibilities. These minimum OJT sessions will be documented by both the employee and the supervisor by signing and dating a form. The form will also indicate the length of time spent on OJT training. The signed forms will be maintained as part of the Operating Record as discussed in Section 7.3.

A checklist developed by the work area supervisor will be used for job-specific training. Prior to initial use of the checklist, it must be reviewed and approved by the RCRA training officer. All employees performing similar duties will have consistent job-specific training. The job-specific training checklist will be reviewed at least annually to ensure that it is current and appropriate for the subject job classification.

The job-specific training checklist will include the following elements:

- information about procedures relevant to the individual's position, where these procedures are located, and which personnel have the authority to implement the procedures, key operating parameters, and waste feed cut-off systems;
- location and use of communications or alarm systems;
- response to releases;
- emergency and routine shutdown of operations;
- Facility Contingency Plan and emergency procedures;
- evacuation procedures and location of emergency exits;

- response to leaks, spills, and overflows;
- Waste Analysis Plan procedures; and
- inspection and maintenance procedures.

Based on the checklist, Gandy Marley, Inc. (GMI) will develop a training outline specifically for each job-specific training program. The training programs specific to incident response positions, laboratory positions, waste handling positions, maintenance positions, emergency coordinators and site security officers are discussed below.

Incident Response Personnel

Specific classroom training and OJT for on-site individuals involved in incident response will focus on the emergency response equipment present at the facility. The training will address the use, maintenance, operation, purpose and limitations of the following specific equipment:

- fire-specific control equipment,
- personal protective equipment (PPE),
- spill control and decontamination equipment,
- emergency equipment,
- monitoring and communications equipment,
- shutdown operations,
- safety equipment,
- lock out/tag out program, and
- continuous air monitors.

Laboratory Personnel

Specific classroom training and OJT elements for laboratory personnel involved in analysis of hazardous waste will include:

- waste tracking procedures and profile forms,
- laboratory waste acceptance procedures,
- laboratory recordkeeping,
- waste pre-acceptance,
- waste discrepancy and rejection procedures,
- operation of on-site laboratory,
- proper analytical methods,
- laboratory quality assurance and quality control,
- laboratory safety and waste handling within the laboratory,
- laboratory and environmental monitoring equipment calibration,
- basic chemical concepts, and
- toxicology overview and exposure pathways.

Waste Handlers and Maintenance Personnel

Specific classroom training and OJT elements received by waste handlers and maintenance personnel will include:

- proper field sampling and testing procedures (waste handlers only),
- heavy equipment operations,
- waste handling precautions including chemical and physical hazards associated with each waste that will be handled on-site,
- drum and roll-off container handling,
- safety equipment,
- basic chemical concepts,
- hand and power tool safety and operation (maintenance personnel only),
- lock out/tag out procedures,
- waste compatibility issues,
- waste tracking procedures and profile forms, and
- sampling recordkeeping procedure.

Emergency Coordinator

Specific classroom training and OJT elements for emergency coordinators will include:

- site emergency communications procedures,
- federal, state, and local agency emergency and all-clear notification procedures,
- qualitative and quantitative assessment of released materials,
- human health and environmental hazard recognition,
- release containment procedures,
- Facility-wide fire, explosion, and leak detection procedures during emergency responses and normal operations,
- procedures for recovering, treating, storing, and disposing of recovered waste, soil, organic liquid, and water resulting from an emergency response,
- emergency equipment decontamination and reuse procedures,
- emergency response recordkeeping plan, and
- written reporting requirements to the agencies.

Site Security Officers

Specific classroom training and OJT elements for site security officers will include:

- procedures for controlling entry to the facility,
- maintaining overall facility security including perimeter fence inspections, and
- maintenance of all warning signs.

7.2.1.3 OSHA 40-Hour Training

All personnel who handle hazardous waste and the supervisors of personnel who handle hazardous waste will complete OSHA 40-hour training as required by 29 CFR 1910.120. It is anticipated that, at least initially, the OSHA 40-hour training will be provided by an outside vendor. Personnel who have documentation of course completion for the 40-hour and refresher training will not be required to retake the 40-hour training.

All personnel who handle hazardous waste and the supervisors of personnel who handle hazardous waste will complete OSHA 40-hour training as required by 29 CFR 1910.120. It is anticipated that, at least initially, the OSHA 40-hour training will be provided by an outside vendor. Personnel who have documentation of course completion for the 40-hour and refresher training will not be required to retake the 40-hour training.

7.2.2 Training for Visitors

Visitors who are expected to be in the Facility for only a short period of time and who will not be handling hazardous waste will be provided a short briefing on basic emergency procedures such as decontamination, emergency signals and alarms, and evacuation routes. Visitors will not be allowed on-site unless they are escorted by Facility personnel or unless other arrangements have been made with Facility personnel. The briefing will include the following information:

- what hazards that may be encountered at the Facility;
- how emergencies are signaled or announced, how help is summoned , what information is to be given, and to whom the information is given;
- where to report during an emergency;
- how to safely evacuate from the Facility;
- what standard operating procedures for visitors are;
- where check-in/check out locations are; and
- what safety equipment is required.

7.2.3 Training for Off-Site Emergency Response Organizations

Training will be established for off-site emergency response organizations through agreements with local agencies and contracts with vendors. This training will include, as appropriate, the following:

- site layout and site-specific hazards;
- the Contingency Plan;
- Facility emergency procedures;
- Facility decontamination procedures; and
- appropriate response techniques.

7.3 Record Keeping

In accordance with 40 CFR 264.16, records regarding job title, job description, training, and other appropriate documentation will be kept by the RCRA training officer.

7.3.1 Job Titles, Descriptions, and Duties

Job titles will be designated for each position at the Facility related to hazardous waste management and the name of each employee filling each job. Job descriptions will detail job duties and responsibilities for that position. The description will include the skills, education, and qualifications required for each position. A written description for each position will be maintained to determine the types and amounts of both introductory and continuing training to be given to each employee at the Facility.

7.3.2 Training Documentation

Records that document RCRA classroom training and OJT given to and completed by Facility personnel will be kept by the RCRA training officer. Training records on current employees will be kept until closure of the Facility. Training records on former employees will be kept for at least three years from the date the employee last worked at the Facility.

7.3.3 Other Documentation

Other documentation to be maintained at the Facility includes the following:

- documentation of the annual review of the curriculum for RCRA classroom training;
- documentation of the annual review of the OJT checklists; and
- RCRA classroom training test results.

Facility Personnel

- Those who handle hazardous waste
  - classroom training
  - on-the-job training
  - OSHA 40-hour
- Those who do not handle hazardous waste
  - classroom training

Visitors

- Expected to be onsite briefly of infrequently
  - basic training on actions to be taken during an emergency; does not allow visitors to attempt to respond to emergencies except in very limited circumstances

Offsite Emergency Responders

- May be different for different organizations
  - training tailored to their role
  - familiarization with site

FACILITY RCRA TRAINING PROGRAM

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 7-1

8. Closure and Post-Closure of Permitted Units

This closure plan describes specific activities required for closure of the landfill, in compliance with RCRA closure requirements. The closure activities are designed to minimize the need for further maintenance and any potential impacts to human health and the environment. Closure activities are described in Section 8.1. A post-closure care plan for the landfill is included in Section 8.2. Section 8.3 presents the closure performance standard; and Section 8.4 discusses the closure schedule. Closure certification and modifications are discussed in Sections 8.5 and 8.6, respectively. Closure and post-closure cost estimates are discussed in Section 8.7 and compliance with financial assurance requirements is discussed in Section 8.8.

8.1 Closure Activities

At the end of the active life of the Facility, the landfill and all structures of the Facility will be closed and dismantled in compliance with 40 CFR 264, Subpart G. Any solid hazardous waste and debris will be placed in the landfill, and non-hazardous waste will be sent off site for reuse, recycle, or disposal in compliance with 40 CFR 264, Subpart G. Liquids generated during closure (decontamination solutions and leachates) will be treated off-site. The landfill will be capped with a final cover, and post-closure care will be initiated for the landfill. These closure activities are described in detail in the following sections.

An off-site laboratory will be used for analysis of hazardous waste and soil samples at closure. The off-site laboratory will be an EPA-approved laboratory with an internal QA/QC program and specific procedures for each analytical method. All laboratory samples will be analyzed for the hazardous constituents specified in 40 CFR Part 261, Appendix VIII and all other constituents considered by NMED to be a threat to human health and the environment.

Prior to the commencement of closure activities, GMI will notify the Secretary of NMED at least 60 days prior to the date GMI expects to begin closure. The schedule for closure is described in more detail in Section 8.4.

8.1.6 Landfill

This Part B Permit Application only includes the Phase 1A portion of the landfill. Therefore, this Closure Plan only addresses Phase 1A. If future expansions are required, they will be addressed in future permit modifications and will include revised closure plans.

At closure of the landfill, a final cover will be constructed with a permeability that is less than or equal to the permeability of the bottom liner. The final cover will consist of a three-layer cap design consisting of a vegetative cover, a geocomposite drainage layer, and a geomembrane and GCL barrier layer over a prepared subgrade, as described in Section 3.1.5. The final cover will meet the following requirements:

- The vegetative cover will have a minimum thickness of 2.5 feet and final upper slopes of between 3 and 5 percent after settlement and subsidence of the waste. Native grasses will be planted.

- The drainage layer will have a transmissivity of greater than or equal to 2.2×10^{-4} square meters per second (m^2/s) and consist of an HDPE geonet sandwiched between two geotextile layers (generally referred to as a geocomposite) and will be designed to allow lateral flow and discharge of liquids.

- The bottom layer will consist of a 60-mil HDPE geomembrane layer and GCL with permeability of less than or equal to 5×10^{-9} cm/s underlain by 6 inches of prepared subgrade and 1.5 feet of protective soil.

- The cover will be designed to function with minimum maintenance, including minimal erosion. The vegetative cover will be designed with a surface drainage system capable of conducting runoff across the cap without forming rills and gullies.

In addition, remaining water in the contaminated water basin (as shown on Drawing 10, Filling Plan - Phase 1A), if the water cannot be eliminated through evaporation) will be removed, tested, and disposed of appropriately. Then, the contaminated water basin will be filled with soil and the cover will be constructed across this area. This will ensure that all lined areas of the landfill will be covered.

Prior to closure of the landfill, an assessment will be made of the landfill waste gas generating potential. This will be made from the quarterly landfill gas monitoring data that will be collected over the life of the landfill. Following closure, if it is concluded that gas generation may result in gas buildups beneath the barrier layer of the cover or releases that exceed regulatory air quality standards, then provisions will be made to collect and monitor gas generation and release during the post-closure period. If this occurs, the best available technology available will be implemented into the construction of the cover system. In this case, the NMED Secretary will be informed and shall approve a monitoring plan and any changes in the construction of the cover system.

Any leachate from the landfill will be pumped from the primary and secondary collection systems and, if detected, from the vadose zone monitoring sumps throughout the closure period and will continue throughout post-closure care. The leachate will be collected, sampled, and managed as hazardous waste, as appropriate. The leachate will be collected at a frequency appropriate to the rate at which it collects in the sump. As indicated in Permit Attachment P, Post-Closure Care, the collection sump will be inspected monthly until the sump remains dry for six months. Thereafter, the sump will be inspected semiannually. Details of the leachate sampling and analysis program will be specified in a sampling and analysis plan.

After the landfill cap is completed, soil samples will be collected from outside the perimeter of the landfill cap to determine if any soil contamination is present. The sampling locations will primarily correspond to the transportation corridor used by waste hauling trucks during the active life of the landfill. In addition, samples will be collected at the landfill stormwater retention basin and within ditches directing flow to the basin.

It is proposed that individual samples be obtained along the haul roads at 100-foot intervals and at locations where visible staining is observed. Because the stormwater detention basin (Drawing 25, Surface Water Control Features) is lined with geomembrane, individual samples will be collected from there and its associated drainage ditches at a frequency equivalent to 1 per 40,000 square feet over the entire area (i.e., one sample to be taken at the center of each 40,000-square-foot grid). However, if the liner in the stormwater runoff basin is observed to be damaged, additional sampling may be required. Sample results will be compared against the closure performance standards presented in Section 8.3. If any contaminated materials are identified they will be excavated and removed to the landfill prior to placement of the final cover.

No later than the submission of the certification of closure of the landfill in compliance with 40 CFR §264.115, the Facility will submit to the local zoning authority and to the NMED, a survey plat indicating the location and dimensions of the landfill with respect to permanently surveyed benchmarks in compliance with 40 CFR §264.116. This plat will be prepared and certified by a professional land surveyor. The survey plat will contain a prominent note that asserts the Facility's obligation to restrict disturbance of the hazardous waste disposal unit. The Facility will also record a notation on the deed to the Facility property in compliance with 40 CFR §264.119(b)(1), to notify any potential purchasers of the property that (1) the land has been used to manage hazardous wastes; (2) use of the land is restricted to activities that will not disturb integrity of the final cover system or monitoring system during the post-closure care period; and (3) the survey plat and record of waste disposal have been submitted to the local zoning authority and to NMED.

A record of the type, location, and quantity of hazardous wastes disposed of within the disposal unit will be submitted to the local zoning authority and to the NMED no later than 60 days after certification of closure of the landfill in compliance with 40 CFR §264.119(a).

The vadose zone monitoring wells will be sampled and analyzed in accordance with the procedures that are presented in Section 3 of the permit application. The frequency of sampling and parameters to be tested are outlined in Section 3.

8.1.7 Closure of Non-Waste Management Units

Other areas within the facility boundary which have the potential to become SWMUs during the operational life of the facility will be closed in accordance with the requirements of the closure sampling and analysis plan. Those non-waste management units, such as the maintenance shop and stormwater detention basin will be sampled to verify the absence of contamination prior to closure and removal. If the non-waste management units' structures or liners show contamination they will be managed in accordance with the requirements of this closure plan. If contamination is not present they will be disposed of as solid waste.

After removal of the structures, other appurtenances, and liner the areas will be contoured and revegetated as necessary.

8.2 Post-Closure Activities

Post-closure care involves long-term maintenance, monitoring, and reporting of activities that are carried out after closure is completed. Post-closure care is anticipated to be needed only for the landfill after closure. The post-closure care period for the landfill will begin after completion of closure activities and continue for an anticipated 30 years. Inspection, maintenance, and repair activities to be conducted during post-closure are described in the following sections. The schedule for performing inspections is shown in Table 8-2, Post-Closure Inspection Schedule.

8.2.1 Security Systems

As shown in Facility Drawing Number 4, the Facility perimeter fence encloses the entire 480 acres of the Facility. The fence and warning signs mounted on the fence will be inspected and maintained throughout the post-closure period. Monthly inspections will include checking the condition of fencing, locks, gates, and warning signs. Any signs of unauthorized entry will be reported to the local sheriff's office and NMED. Routine maintenance will be performed based on inspection findings to repair or replace damaged or deteriorating items.

8.2.2 Landfill Final Cover

The integrity and effectiveness of the landfill final cover will be maintained, including making necessary repairs to correct the effects of settling, erosion, water damage, animal damage, or other events. The landfill cover will be inspected quarterly. Inspections will include checking for signs of cracking, subsidence, ponding water, erosion, burrowing animals, or deep-rooted vegetation. Repairs will be scheduled in a timely manner upon noting deficiencies in order to ensure that the final cover maintains its effectiveness.

General maintenance will include the following activities:

- fertilizing the vegetation periodically;
- re-establishing damaged or sparse vegetative cover, including seeding and fertilizing;

- conducting erosion damage repair, including soil excavation, transport and placement, seeding and fertilizing;
- regrading as needed to overcome the effects of subsidence or to repair areas where ponding is occurring; and
- providing rodent control as needed, including trapping and relocating animals and repairing damage caused by burrowing.

Soil for erosion repair and regrading will be excavated from unused on-site areas and transported to the cap area for use in maintenance activities.

8.2.3 Perimeter Diversion Ditch

The perimeter diversion ditch (as shown in Permit Attachment L1 on Drawings 22 and 25) will be inspected and maintained throughout the post-closure period to ensure its designed functions to divert precipitation and run-on from the landfill area are met. Inspections will be conducted quarterly and will include checking for accumulated sediments and debris, and signs of erosion. Repairs will be scheduled in a timely manner, upon deficiencies being noted, to ensure that the diversion ditch maintains its effectiveness.

General maintenance activities will include diversion ditch cleaning to remove accumulated sediments and debris, and regrading, as needed, to repair the effects of erosion.

8.2.4 Leachate Management System

8.2.4.1 Leachate Collection System

The leachate collection system will be operated when necessary to ensure leachate depth over the liner does not exceed 30 centimeters (cm) (1 foot) until the completion of post-closure care. Leachate pumps will be operated at least quarterly. The site log will be kept on-site or at a location approved by the NMED Secretary. The volume of leachate pumped will be recorded in a site log. After records indicate that the sump has remained dry for six months, the frequency of inspection and operation of the sump pumps will be changed to semiannually. Any leachate collected will be pumped to an aboveground storage tank.

The leachate collection system will be inspected quarterly or semiannually as described in the preceding paragraph. Pumps will be inspected for proper operation. The riser pipes, grout seals, and other visible aboveground portions of the system will be inspected for integrity. The level of liquid in the sumps will be measured prior to pumping out accumulated leachate.

Routine maintenance will be conducted to ensure that the leachate collection system remains operable. Locking caps and standpipe grouting will be repaired or replaced as necessary. Accumulated sediments or sand in the standpipes will be removed as necessary to enable the system to function properly. Based on the amount of leachate collected over time, a determination will be made about the integrity of the collection system. If a system is suspected of being clogged, an assessment by a New Mexico registered professional engineer will be made. All repairs will be made according to the New Mexico registered professional engineer's assessment and upon approval by NMED.

8.2.4.2 Management of Leachate

During the post-closure care period, leachate pumped from the collection system will be temporarily stored in an aboveground tank. The leachate will be sampled and managed at an off-site facility as hazardous waste, as appropriate. Details of the leachate sampling and analysis program will be specified in a sampling and analysis plan.

8.2.4.3 Leak Detection System

During the post-closure care period, the leak detection system beneath the landfill primary liner will initially be monitored and inspected quarterly to ensure that it is operating correctly and that any leachate that has migrated through the primary liner is collected and removed. As with the primary leachate system, the volume of leachate pumped from the secondary leak detection system will be recorded in a site log. After records indicate that the sump has remained dry for six months, the frequency of inspection and operation of the leak detection system will be changed to semi-annually.

Inspections and maintenance will be equivalent to those described for the leachate collection system (see Section 8.2.4.1).

8.2.5 Vadose Zone Monitoring System

The VZMS will be maintained and monitored throughout the post-closure care period. The following sections outline the post-closure monitoring plan for this system. The VZMS is described in Permit Attachment I, Vadose Zone Monitoring System Work Plan, and consists of a vadose zone sump in the landfill and vadose zone monitoring well network.

8.2.5.1 Sampling and Analysis

Vadose zone monitoring will be conducted semiannually to test for the presence of contaminants in the unsaturated sediments hosting the landfill. Sampling procedures and analytical parameters will be defined according to the Vadose Zone Monitoring System Work Plan (Permit Attachment I) and will follow the same guidelines used during the active life of the Facility.

8.2.5.2 Inspection and Maintenance

The visible aboveground portions of the vadose zone monitoring system will be inspected semiannually for integrity. Routine maintenance will be conducted to ensure that the vadose zone monitoring system remains in operable condition. System equipment will be repaired or replaced as necessary.

8.2.6 Recordkeeping

A post-closure Facility record will be maintained. This record will include the dates and times of inspections, inspection findings, name of inspector, volumes of leachate pumped, disposition of leachate, sampling results of leachate and vadose zone samples, and dates and nature of any corrective actions taken.

8.2.7 Certification of Post-Closure

Within 60 days after completion of the established post-closure care period for the Facility, the permittee will submit to NMED a certification that the post-closure operations were performed in accordance with the approved post-closure plan in compliance with 40 CFR 264.120. The certification will be signed by the permittee and an independent New Mexico registered professional engineer.

8.2.8 Amendment of Plan

The permittee will submit a permit modification request for changes to the post-closure plan if changes in operating plans or Facility design, or events that occur during the active life of the Facility, affect the approved post-closure plan. The owner or operator may also request a modification to the post-closure plan at any time during the active life of the Facility or during the post-closure care period. Permit modification

requests will be submitted at least 60 days prior to a proposed change in Facility design, or no later than 60 days after an unexpected event which affects the post-closure plan.

If clean closure cannot be certified for any non-waste management unit components, then the post-closure care permit will be amended to include those portions of the units that do not meet the closure performance standard. The post-closure care plan amendments will be submitted to NMED no later than 90 days after the owner or operator determines that the non-waste management unit must be closed as a regulated unit.

8.2.9 Facility Post-Closure Contact

During the post-closure care period, the Facility contact organization will be the following:

Gandy Marley, Inc.
P.O. Box 1658
Roswell, New Mexico 88202
(575) 347-0434

8.3 Closure Performance Standard

The RCRA closure performance standard (40 CFR 264.111) specifies that hazardous waste facilities are to be closed in such a way as to minimize the need for further maintenance at the Facility and protect human health and the environment by controlling, minimizing, or eliminating potential releases of hazardous waste to the environment. The Facility will meet a clean-closure performance standard for all non-waste management units except the landfill and will not impact any environmental media in excess of agency-approved background levels or pose a threat to human health or the environment.. The landfill will not be clean-closed; therefore, the Facility-specific, clean-closure performance standard is not applicable.

Indicator parameters will be selected and approved by NMED at closure. These parameters will be representative of the wastes disposed of during the Facility operating life. The waste information used to make these selections will be based upon the Facility operating record. For soil, analytical results that show that these concentrations of contaminants of concern are within a statistically significant range relative to clean background soil as determined by NMED will constitute demonstration of clean closure. Clean background samples will be obtained from the alluvium unit and from the Upper and Lower Dockum units from each of the vadose zone monitoring well borings, for a total of six background samples per stratigraphic unit. If the alluvium is not present at a specific vadose zone monitoring well boring location, a surface sample from the southern portion of the site shall be substituted for the sample. Each sample will be submitted to an analytical laboratory for chemical analysis of metals listed in 40 CFR 264, Appendix VIII, using EPA SW-846 analytical methods or equivalent methods approved by NMED.

8.5 Certification of Closure

Within 60 days of completion of closure, the Facility will submit to NMED a certification that the hazardous waste management unit has been closed in accordance with the approved closure plan in compliance with 40 CFR 264.115. The closure certification will be signed by the owner/operator and by an independent New Mexico registered professional engineer.

8.6 Modifications to the Closure Plan

After this closure plan is approved, it will be amended whenever it is affected by changes in operating plans or Facility design. While conducting partial or final closure activities, unexpected events may be identified

that also require amendment of the approved closure plan. Requests for modification will be made within 30 days of identifying an event that justifies plan modification.

8.7 Closure Cost Estimate

The closure costs are described in the following sections.

8.7.1 Closure Costs

A landfill closure cost estimate is provided in Permit Attachment O2. The original landfill closure cost estimate included in the March 2002 Triassic Park Waste Disposal Facility permit was based on 2000 dollars. The landfill closure cost estimate presented in this permit modification has been updated to account for inflation using the change in the Consumer Price Index (CPI) between 2000 and 2011 (U.S. Department of Labor CPI, 2011). Using the CPI, the 2011 costs are 32 percent higher than those from 2000. After the Facility is constructed and operations begin, the landfill closure cost estimate will be updated annually as required in 40 CFR Part 264.142(b).

Table 8-3 summarizes the closure cost estimate. The landfill closure cost estimate is based on costs for closure when the Facility is at maximum capacity, which is the point in the Facility's active life when the extent and manner of its operation would make closure the most expensive. As required in 40 CFR Part 264.142(a)(2), landfill closure cost estimate is based on the costs of hiring a third party to close the Facility.

8.7.2 Post-Closure Costs

Table 8-4 summarizes the post-closure cost estimate for the landfill. The costs include 30 years of monitoring and maintenance activities, as described in Section 8.2 and Permit Attachment P, Post-Closure Care. The original post-closure cost estimate included in the March 2002 Triassic Park Waste Disposal Facility permit estimates are was based on 2000 dollars. The post-closure cost estimate presented in this permit renewal application has been updated to account for inflation using the change in the Consumer Price Index (CPI) between 2000 and 2011 (U.S. Department of Labor CPI, 2011). Using the CPI, the 2011 costs are 32 percent higher than those from 2000. All 2000 costs were increased by 32 percent for purposes of this analysis. After the Facility is constructed and operations begin, the post-closure cost estimate will be updated annually as required in 40 CFR Part 264.144(b).

8.8 Financial Assurance

The treatment, storage and disposal facility standards found in 40 CFR 264 require facilities to establish and maintain financial assurance for three areas prior to operation. 40 CFR 264.143 defines the standards for financial assurance for closure, 40 CFR 264.145 defines the standards for post- closure care, and 40 CFR 264.147 defines the liability requirements for coverage of accidental occurrences. The financial instruments selected to provide coverage for these three requirements must be implemented and submitted to the NMED at least 60 days prior to the initial receipt of waste.

8.8.1 Financial Assurance for Closure

40 CFR 264.143 defines the standards for financial assurance for closure. The financial instrument selected to provide coverage for this requirement must be implemented and submitted to the NMED at least 60 days prior to the initial receipt of waste.

Upon receipt of the final permit for the Facility, GMI will evaluate and select one of the financial instruments defined in 40 CFR 264.143 to provide financial assurance for the closure of the Facility. Selection of one of the following six financial instruments will consider the effectiveness and economics of the particular options. The instruments defined in the regulations are:

- Financial test and corporate guarantee for closure
- Closure trust fund
- Surety bond guaranteeing payment into a closure trust fund
- Surety bond guaranteeing performance of closure
- Closure letter of credit
- Closure insurance

The appropriate instrument will be selected, implemented, and submitted a minimum of 60 days prior to the initial receipt of waste as required by 40 CFR 264, Subpart H.

8.8.2 Financial Assurance for Post-Closure Care

Similar to the financial assurance requirements for closure activities, the Facility is required to provide assurances for the post-closure care of the Facility. Upon receipt of the final permit, and 60 days prior to the initial receipt of waste, the owner/operators will provide the appropriate financial instrument to fulfill this requirement. Selection of the instrument to be used will be based upon economic and performance considerations. The financial instruments allowed by this subpart of the regulations are listed in Section 8.8.1.

8.8.3 Liability Requirements

As stated in 40 CFR 264.147, an owner or operator of a hazardous waste treatment, storage, or disposal facility must demonstrate financial responsibility for bodily injury and property damage to third parties caused by sudden accidental occurrences which arise from the operation of the facility. This section of the regulations requires that the owner/operator of such a facility provide the administrator one of the following instruments at least 60 days prior to the initial receipt of waste:

1. Liability insurance
2. Financial test
3. Letter of credit
4. Surety bond
5. Trust fund
6. Combination of the above

GMI will submit required documentation demonstrating financial assurance to meet the liability requirements at least 60 days prior to receiving the first hazardous waste at the Facility. The financial assurance mechanism will comply with requirements in 40 CFR Part 264.147.

Table 8-2. Post-Closure Inspection Schedule

Inspection Item — Problem Or Problem Area	Inspection Time
Facility	
Fence	Monthly
Locks and gates	Monthly
Warning signs	Monthly
Landfill cover	
Cracking, subsidence, ponding water, erosion, burrowing animals, deep-rooted vegetation	Quarterly
Perimeter diversion ditch	
Sediment and debris accumulation	Quarterly
Leachate collection system	
Sump	Quarterly until the sump remains dry for 6 months, then semiannually
Pumps	Quarterly
Riser pipes, grout seals, other visible portions of the system	Quarterly
Leak detection system	Quarterly until the sump remains dry for 6 months, then semiannually
Vadose zone monitoring system	Quarterly

Table 8-3. Landfill Closure Cost Estimate

Landfill Item	Cost	
	Approved Permit ($ in 2000)	Permit Renewal ($ in 2011)
Landfill Excavation Backfill	4,120,000	5,438,400
Cover Engineering Design	30,000	39,600
Landfill Cover	3,374,432	4,454,250
Demolition of Tanks, Concrete and Liner System	2,426	3,202
Leachate Treatment Facility Construction	0	0
Leachate Treatment Facility Operations	0	0
Leachate Pumping and Disposal (volume = 133,000 Gallons [551 tons])	98,021	129,388
Sump Vadose Zone Sampling and Analysis	8,000	10,560
Well Vadose Zone Monitoring System Sampling and Analysis	48,000	63,360
Soil Sampling and Analysis	104,040	137,333
Final Plat Survey	2,400	3,168
Certification of Closure Inspection	3,000	3,960
Certification of Closure Report	15,000	19,800
Subtotal	7,805,319	10,303,021
Total from unit closures	$2,710,595	
Water Rights and Application	114,000	150,480
Total Closure Cost	10,599,914	10,453,501

Table 8-4. Landfill Post-Closure Cost Estimate

Item	Cost	
	Approved Permit ($ in 2000)	Permit Renewal ($ in 2011)
Facility Inspection	201,600	266,112
Routine Landfill Cover Maintenance and Repair	600,000	792,000
Severe Landfill Cover Erosion Damage Repair	300,000	396,000
Perimeter Diversion Ditch Maintenance and Repair	300,000	396,000
Leachate Pumping and Treatment	239,476	316,108
Leachate Collection System Maintenance	67,200	88,704
Well and Sump Vadose Zone Maintenance	67,200	88,704
Sump Vadose Zone Sampling and Analysis	240,000	316,800
Vadose Zone Monitoring Wells Sampling and Analysis	1,440,000	1,900,800
Notation of Property Deed	2,500	3,300
Certification of Post-Closure Inspection	3,000	3,960
Certification of Post-Closure Report	150,000	198,000
Total Post-Closure Costs	3,610,976	4,766,488
Total Closure Cost + Post-Closure Costs	12,899,323	15,219,989

9. Waste Management

The purpose of this section is to describe the Facility Waste Minimization (WM)/ Pollution Prevention (P2) Program, which will be an organized, comprehensive, and continuous effort to systematically reduce waste generation during the life of the Facility. As such, the program will be ever-changing and expanding to incorporate new or more effective WM/P2 opportunities as they are developed. The level of detail in this description of the WM/P2 Program is commensurate with the level of detail currently available with respect to day-to-day operation of the Facility.

The Facility is committed to the prevention of all forms of pollution and the minimization of all wastes generated at its hazardous waste landfill. Source reduction of waste is the company's highest waste minimization priority, followed by recycling and reuse.

For an industrial facility, such as the Facility, a Waste Minimization Program is an important link to providing increased protection of public health, employee health, and the environment. As part of its WM/P2 Program, the Facility will develop a detailed WM/P2 Program Plan as soon as the intricate details of Facility operation are more clearly defined.

It is anticipated that only insignificant amounts of waste will be generated from site operations. Leachate and wastewater may be generated from the wastes placed in the landfill and from precipitation events. Other wastes that may be generated include waste oils and other maintenance wastes, office wastes, soil and debris from spills, personal protective equipment, excess chemicals, and freon. Not all of these wastes are expected to be hazardous. All site-generated waste will be stored, treated, recycled, reused, and/or disposed of in accordance with applicable regulations. Waste minimization/pollution prevention efforts will be focused on all forms of waste, not just those wastes defined as hazardous in the New Mexico Hazardous Waste Management Regulations.

Waste minimization focuses on reducing the amounts and toxicity of waste materials generated from any process or other plant activity and on reusing, recycling, or reclaiming waste materials for future use and benefit. It should be noted that the terms waste minimization and pollution prevention will be used somewhat interchangeably throughout this section. However, the terms have distinctly different meanings, as defined below:

Waste Minimization

Waste minimization is the reduction, to the extent feasible, of the amounts and toxicity of waste materials after they are generated from any process or other activity. Primary waste minimization techniques include reuse, recycling, or reclamation of waste materials for future use and benefit.

Pollution Prevention

Pollution prevention is the use of any process, practice, or procedure to prevent the generation of waste. Examples of primary pollution prevention techniques include material substitutions (e.g., nonhazardous materials used in place of hazardous materials), process changes, and procedural improvements.

9.1 Brief History of WM/P2 in the United States

Current trends in environmental policy and regulation indicate a move from pollution control to pollution prevention and waste minimization in the private sector. Throughout the 1980s, the United States became increasingly aware of the environmental damage and restoration costs associated with past improper disposal of hazardous wastes. In the 1984 HSWA to RCRA, Congress declared that it is:

> . . . the national policy of the United States that; wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated should be treated, stored, or disposed of so as to minimize present and future threat to human health and the environment. From HSWA, Congress clearly intended a hierarchy of actions for managing the nation's waste problems, with priority given to reduction or elimination of waste over treatment, storage, and deposal of waste after it has been generated.

The Pollution Prevention Act of 1990 expanded this concept to include all forms of environmental pollution. This statute calls pollution prevention a "National Objective" and establishes a hierarchy of environmental protection priorities as national policy. The order of priority is summarized as follows:

1. Reduction or elimination of waste prior to generation (source reduction) is the best option.
2. Recycling and reuse of waste that is generated is the second best option in cases when pollution cannot be prevented.
3. Treatment (reclamation or toxicity reduction) of waste that is generated is the next best option in cases where feasible prevention and recycling opportunities are not available or possible.
4. Disposal of generated waste is the least desirable option.

9.2 Purpose and Objectives of the Facility WM/P2 Program

The purpose of this section is to describe the Facility WM/P2 Program. This Program will establish the strategic framework for integrating waste minimization and pollution prevention into all Facility activities. The objectives of the Program are the following:

- raising employee awareness about the reasons for and benefits of a WM/P2 Program and instilling a desire to minimize waste at the lowest organizational levels possible;
- describing planned initiatives that support and promote WM/P2 through various training opportunities, including recycling, reuse, and recovery programs, and good housekeeping practices;
- adapting and implementing existing technologies as rapidly as possible to reduce waste generation at the source and to recycle waste products; and
- reducing all forms and categories of waste to the lowest extent practical.

9.3 Benefits of the Facility WM/P2 Program

The Facility WM/P2 Program, like all effective waste minimization programs, will yield numerous benefits and advantages, which are either tangible or intangible. Some of these benefits are listed below:

- reduced waste management costs, including labor and disposal costs;
- reduced regulatory compliance costs, including inspection costs and possible fines;
- reduced raw material costs;
- reduced potential for releases of hazardous chemicals and wastes;
- increased worker safety; and
- reduced civil and criminal liabilities under environmental laws.

9.4 Elements and Goals of the Facility WM/P2 Program

As previously mentioned, the Facility will continue to expand and refine its WM/P2 Program during the life of the Facility. The elements of the Program include those methods commonly used to form the baseline, or starting point, for effective WM/P2 Programs. The elements and goals of the Program are listed below as action-items to be completed during the initial phases of Facility operations. Such listings are standard practice in the industry since many of the elements, waste generation levels for example, cannot be determined until after the Facility begins operation. The personnel tasked with oversight of this program will also oversee the planning, development, and implementation of the WM/P2 reduction methods and activities outlined below.

- Develop and establish a written policy statement that describes why the WM/P2 Program is being implemented, how it will be implemented, and who will implement it. The policy statement will be issued from the highest level of management. The policy will be provided to each employee at the start of employment and will be reviewed during RCRA training and annual refresher training.
- Assign Facility personnel to oversee, plan, develop, and implement the elements of the WM/P2 Program.
- Establish support for the program at all levels in the company.
- Determine a waste generation baseline at the site and establish a tracking method and waste minimization goals.
- Establish a procurement control program to ensure the purchase of environmentally friendly materials and products while preventing the procurement of prohibited items from the site; the Facility will endeavor to reduce or eliminate the use of hazardous materials from its operations.
- Establish reuse, recycling, recovery, and conservation programs to minimize the volume of generated waste requiring disposal or treatment; examples of such programs include paper, aluminum cans, cardboard, scrap metals, oil, batteries, and surplus materials and chemicals.
- Establish good-housekeeping practices that promote WM/P2; an example of this type of practice is the requirement to remove packaging materials from chemicals, products, and equipment before they are introduced into the disposal area or contamination-control areas to avoid cross contamination.
- Establish a WM/P2 awareness program and train employees, as appropriate.
- Prepare a WM/P2 plan and update it annually or as appropriate.
- Perform an assessment of waste minimization/pollution prevention opportunities; an example of this type of opportunity is: installation of air conditioning refrigerant reclamation systems.
- Determine the feasibility of implementing the WM/P2 projects and proceed as appropriate with project implementation.

9.5 Proposed Elements of the Facility WM/P2 Program Plan

The Facility will establish a WM/P2 Program Plan when operational details of the Facility, such as the chemical and equipment procurement processes and the actual level of waste generation, are determined. The WM/P2 plan will include the following elements, as appropriate:

- the written policy statement for WM/P2;

- a description of the roles and responsibilities of Facility personnel with respect to WM/P2 and a brief description of how Facility groups will work together to reduce waste generation and energy consumption;
- a plan or method for publicizing and gaining support for the program and communicating the successes and failures of waste minimization efforts (i.e., employee awareness program);
- a description of how employees will be informed about WM/P2 requirements and expectations (possibly within the context of other Facility training courses);
- a description of waste-generating processes, including a clear definition of the types and quantities of materials generated from each process;
- a description of recycling, reclamation, treatment, and disposal programs used by the Facility and the types of wastes and materials that are included in these programs;
- descriptions of other WM/P2 programs and initiatives;
- reporting requirements;
- a description of WM/P2 goals for the Facility;
- a description of the Facility's chemical and material procurement process;
- a review of the costs of waste management and disposal, both on-site and at other facilities;
- criteria for prioritizing candidate WM/P2 processes, activities, and waste streams for future implementation; and
- an evaluation of the effectiveness of the WM/P2 Program and activities.

10. Corrective Action

It is unlikely that releases of hazardous waste or hazardous waste constituents have occurred on the site of the proposed Facility. This is based on an evaluation of (1) the site history; (2) reconnaissance of the site conducted as part of site characterization activities; and (3) a records review, which are described in the following paragraphs.

The current property owner is GMI, who has owned the property since 2000. The prior owner was Marley Ranches Inc., who owned the property since 1967 and used it primarily for grazing of livestock.

The primary site characterization activities included drilling programs conducted in July 1993, September 1993, and July 1994. Supplemental investigations were also carried out in July 1995 and August 1999. Reconnaissance of the site was conducted as part of the site characterization activities and no evidence found of hazardous waste releases or hazardous constituents.

New Mexico Oil Control Division records were reviewed. An intermittent land use in the area is exploratory drilling for oil and gas wells. The record review indicated that there are no abandoned wells within the proposed Facility boundary, and the nearest production well is approximately 3 miles from the proposed site. In addition, aerial photographs of the site were reviewed. The review did not provide any indication of releases or structures or activities that could be a source of releases.

The NMED conducted a RCRA Facility Assessment (RFA) in 1995. An RFA Report was prepared in September 1995. The RFA report identified several potential future SWMUs, including:

- the landfill;
- the maintenance shop;
- the chemical laboratory;
- the stormwater detention basin;
- the untarping, sampling, and weigh scales area;
- the truck staging area;
- all roads, including those leading to the Facility;
- the clay processing area; and
- the dust control/clay processing water basin.

No releases have occurred at these areas of concern because the structures do not exist and no Facility activities have occurred. The corrective action requirements, as specified in 40 CFR 264 Subpart F and the requirements specified in the corrective action module of the permit will not be implemented unless evidence of a release from a waste management unit is identified in the course of future groundwater or vadose zone monitoring, field investigation, environmental audits, or other means.

The Facility will respond to any emergency in accordance with the Contingency Plan provided in Section 6, including notification and reporting. Specifically, any release which threatens human health or the environment must be reported to NMED within 24 hours of its detection, and any time the Contingency Plan is implemented. However, in some cases, such as small amounts of materials being released from SWMUs into contained buildings or onto impervious surfaces that are immediately cleaned up, a release from a SWMU will not trigger reporting under the Contingency Plan.

All releases and response actions will be documented in the Facility operating record. Corrective action in response to any release will be implemented in accordance with the corrective action module of the permit.

11. 40 CFR 264 Subpart AA, BB & CC Regulations

This section provides a brief summary of the air requirements, as presented in 40 CFR 264 subpart AA and BB. In addition, this section provides a brief summary of other regulations which may be applicable to the Facility.

11.1 40 CFR 264 Subpart AA - Air Emissions for Progress Units

The Facility will not be subject to the 40 CFR 264 Subpart AA regulations because the Facility will not utilize distillation, fractionation, thin-film evaporation, solvent extraction, air or steam stripping operations.

11.2 40 CFR 264 Subpart BB – Air Emission Standards for Equipment Leaks

No wastes with organic concentrations greater than 10 percent by weight shall be placed in the landfill. Units in compliance with this provision will not be subject to 40 CFR 264 Subpart BB regulations. Equipment such as pumps, compressors, pressure relief devices, sampling equipment, connecting system, and valves shall not contain or contact hazardous wastes with organic concentrations of 10 percent or greater by weight.

11.4 Other Applicable Regulations

There are a number of other federal regulations which will apply to the Facility. Once the Facility has received a final permit and the configuration and operational aspects are finalized (it is possible that some minor changes to the Facility configuration and operation will occur as a result of the final permit) other regulations will be evaluated. Some of the regulations that will be evaluated are:

- National Pollution Discharge Elimination System;
- Clean Water Act;
- Clean Air Act; and
- Occupational Safety and Health Administration regulations.

The regulations listed above will be evaluated for their applicability to the Facility. In addition to these federal regulations, the Facility will evaluate numerous state, county, and local regulations. GMI will ensure that the Facility is designed, constructed, and operated in compliance with all applicable regulations.

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PERMIT PART 1

GENERAL PERMIT CONDITIONS

HIGHLIGHTS

This Part sets forth the standards and conditions that every owner/operator of a hazardous waste storage, treatment, and/or disposal facility (TSDF) is required to meet, in order to manage, store, and dispose hazardous waste in a manner protective of human health and the environment under the New Mexico Hazardous Waste Act (the HWA) and the Resource Conservation and Recovery Act (RCRA).

1.1 EFFECT OF PERMIT

The Secretary of the New Mexico Environment Department —(the Secretary) issues this permit to Gandy Marley, Inc., the owner and operator of the Triassic Park Waste Disposal Facility (Environmental Protection Agency (EPA) I.D. No. NM0001002484). This Permit authorizes Gandy Marley (the Permittee) to ~~treat, store, and~~ dispose of off-site hazardous waste at the Triassic Park Waste Disposal Facility (the Facility), and establishes the general and specific standards for these activities, pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, 74-4-1 to 74-4-14 (Repl. Pamp. 2000) and the New Mexico Hazardous Waste Management Regulations, 20.4.1. NMAC.

Compliance with this Permit during its term shall constitute compliance, for purposes of enforcement, with Subtitle C of RCRA, and/or the HWA, and/or their implementing regulations. Compliance with this Permit shall not constitute a defense to any order issued or any action brought under Sections 74-4-10.E, 74-4-10.1, or 74-4-13 of the HWA; Sections 3008(a), 3013, 7002(a)(1)(B), or 7003 of RCRA; the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601 et seq.; or any other law providing for protection of public health or the environment. This Permit does not convey any property rights or any exclusive privilege, nor authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations. [20.4.1.900 NMAC (incorporating 40 CFR 270.4(a) and 270.30(g))]n

1.2 PERMIT ACTIONS

1.2.1 Term of Permit

This Permit shall be effective for a fixed term not to exceed ten years from the effective date of issuance as specified in the Permit certificate. [20.4.1.900 NMAC (incorporating 40 CFR 270.50(a))]

1.2.2 Permit Renewal

The Permittee may request a renewal of this Permit by submitting an application for a new Permit at least 180 calendar days before the expiration date of this Permit. In reviewing any application for a Permit renewal, the Secretary shall consider improvements in the state of control and measurement technology and changes in applicable regulations. [20.4.1.900 NMAC (incorporating 40 CFR 270.10(h) and 270.30(b))]

1.2.3 Permit Modification, Suspension, and Revocation

This Permit may be modified, suspended, and/or revoked for cause as specified at Section 74-4-4.2 of the HWA and 20.4.1.900 NMAC (incorporating 40 CFR 270.41, 270.42, and 270.43). The filing of a request by the Permittee for a Permit modification, suspension, or revocation, or the notification of planned changes or anticipated noncompliance, shall not stay any Permit Condition. [20.4.1.900 NMAC (incorporating 40 CFR 270.41)]

1.2.4 Transfer of Permit

The Permittee shall not transfer this Permit to any person except after providing notice to the Secretary and receiving approval from the Secretary for this action. The prospective new owner or operator shall file a disclosure statement with the Secretary prior to the transfer as required by Section 74-4-4.7 of the HWA and 20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(3)). The Secretary may require modification or revocation and reissuance of this Permit in accordance with 20.4.1.900 and 20.4.1.901 NMAC (incorporating 40 CFR 270.40(b) and 270.41(b)(2)).

Before transferring ownership or operation of the Facility during its active life or post-closure care period, the Permittee shall notify the new owner or operator in writing of the requirements of 20.4.1.900 NMAC (incorporating 40 CFR Part 270). [20.4.1.500 NMAC (incorporating 40 CFR 264.12(c))]

1.2.5 Permit Review

The Secretary shall review this Permit no later than five years after the effective date of the Permit, and shall modify the Permit as necessary, pursuant to Section 74-4-4.2 of the HWA and 20.4.1.900 NMAC (incorporating 40 CFR 270.41 and 270.50(d)). Such modification shall not extend the effective term of the Permit as specified at Permit Condition 1.2.1.

1.3 SEVERABILITY

The provisions of this Permit are severable, and if any provision of this Permit or the application of any provision of this Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this Permit shall not be affected thereby. [40 CFR 124.16(a)(1) and (a)(2)]

1.4 DEFINITIONS

If, subsequent to the issuance of this Permit, federal or State regulations are promulgated which redefine any of the terms defined below, the Secretary may, at his or her discretion, apply the new definition to this Permit by modifying the Permit. [20.4.1.900 NMAC (incorporating 40 CFR 270.41(a)(3))]

For purposes of this Permit, terms used herein shall have the same meanings as those in the HWA, RCRA, and their implementing regulations unless this Permit specifically provides otherwise. Where a term is not defined in the HWA, RCRA, pursuant regulations, EPA guidelines or publications, or this Permit, the meaning associated with such a term is defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

- *Action leakage rate (ALR)* means the maximum design flow rate that a leak detection system can remove without the fluid head on the bottom liner exceeding one foot. [20.4.1.500 NMAC (incorporating 40 CFR 264.222(a) and 264.302(a))]

- *Area of Concern (AOC)* means any area may have a release of hazardous waste or hazardous constituents, which is not from a solid waste management unit and is suspected or determined by the Secretary to pose a threat to human health or the environment.

- *Debris* means solid material exceeding a 60 millimeter particle size that is intended for disposal and that is: a manufactured object; or plant or animal matter; or natural geologic material. However, the following materials are not debris: any material for which a specific treatment standard is provided in 20.4.1.800 NMAC (incorporating 40 CFR 268, Subpart D), namely, lead acid batteries, cadmium batteries, and radioactive lead solids; process residuals such as smelter slag and residues from the treatment of waste, wastewater, sludges, or air emission residues; and intact containers of hazardous waste that are not ruptured and that retain at least 75 percent of their original volume. A mixture of debris that has not been treated to the standards provided by 20.4.1.800 NMAC (incorporating 40 CFR 268.45) and other material is subject to regulation as debris if the mixture is comprised primarily of debris, by volume, based on visual inspection. [20.4.1.800 NMAC (incorporating 40 CFR 268.2(g))]

- ~~*Evaporation pond* for purposes of this Permit means the Surface Impoundment at the Triassic Park Waste Disposal Facility.~~

- *Facility* for purposes of this Permit means the Triassic Park Waste Disposal Facility, including all contiguous land, and structures, other appurtenances, and improvements on the land used for the management of hazardous waste.

- *Free liquids* means liquids that readily separate from the solid portion of a waste under ambient temperature and pressure. [20.4.1.100 NMAC (incorporating 40 CFR 260.10]

- *Hazardous constituent or constituents* means those constituents listed at 20.4.1.200 NMAC (incorporating 40 CFR 261, Appendix VIII). [20.4.1.800 NMAC (incorporating 40 CFR 268.2(b)]

- *Hazardous waste* means any hazardous waste identified at 20.4.1.200 NMAC (incorporating 40 CFR 261.3).

- *HWA* means the New Mexico Hazardous Waste Act, NMSA 1978, 74-4-1 to 74-4-14, the state statute governing hazardous waste management.

- ~~*In light liquid service* (in light material service) means that the piece of equipment contains or contacts a waste stream where the vapor pressure of one or more of the organic components in the stream is greater than 0.3 kilopascals (kPa) at 20° C, the total concentration of the pure organic components having a vapor pressure greater than 0.3 kPa at 20° C is equal to or greater than 20 percent by weight, and the fluid is a liquid at operating conditions. [20.4.1.500 NMAC (incorporating 40 CFR 264.1031)]~~

- *Land Disposal Restrictions* (*LDR*) means the restrictions on the land disposal of hazardous waste in section 3004(b) through (m) of RCRA, 42 U.S.C. § 6924(b) through (m), and the NMAC 20.4.1.800 (incorporating 40 C.F.R. part 268).

- *Leachate* means any liquid, including any suspended components in the liquid that has percolated through or drained from hazardous waste. [20.4.1.100 NMAC (incorporating 40 CFR 260.10)]

- *Leak detection system (LDS)* means a system capable of detecting the failure of either the primary or secondary containment structure or the presence of a release of hazardous waste or accumulated liquid in the secondary containment structure. Such a system must employ operational controls (e.g., daily visual inspections for releases into the secondary containment system of aboveground tanks) or consist of an interstitial monitoring device designed to detect continuously and automatically the failure of the primary or secondary containment structure or the presence of a release of hazardous waste into the secondary containment structure. [20.4.1.100 NMAC (incorporating 40 CFR 260.10)]

- ~~*Nonwastewaters* mean wastes that do not meet the criteria for wastewaters provided at 20.4.1.500~~

~~NMAC (incorporating 40 CFR 268.2(f)).~~
~~[20.4.1.800 NMAC (incorporating 40 CFR 268.2(d))]~~

- *Permittee* means Gandy Marley, Inc., 1109 East Broadway, P.O. Box 1658, Roswell, 88202~~827, Tatum~~, Chaves County, New Mexico 8820267.

- *Permitted unit* means any unit treating, storing or disposing of hazardous wastes and required to have a permit. [20.4.1.900 NMAC (incorporating 40 CFR 270.1(c))]

- *RCRA* means the federal Resource Conservation and Recovery Act, 42 U.S.C. 6901 to 6992k, the federal statute governing hazardous waste management.

- *Regulated unit* means a surface impoundment, waste pile, land treatment unit, or landfill that receives hazardous waste after July 26, 1982. Regulated units must undergo monitoring for the purposes of detecting, characterizing and responding to releases to the uppermost aquifer. [20.4.1.500 NMAC (incorporating 40 CFR 264.90(a)(2))]

- *Release* means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of any hazardous waste or hazardous constituent into the environment, including the abandonment or discarding of barrels, containers, and other closed receptacles containing a hazardous waste or hazardous constituent. [61 FR 19442]

- *Remediation waste* means all solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris which contain listed hazardous wastes, or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements in compliance with RCRA, Sections 3004(v) and 3005(c)(3), and 20.4.1.500 NMAC (incorporating 40 CFR 264.101).

- *Secretary* means the Secretary of the New Mexico Environment Department or his or her designee. [20.4.1.101.B.8 NMAC]

- *Soil* means unconsolidated earth material composing the superficial geologic strata (material overlying bedrock), consisting of clay, silt, sand, or gravel size particles as classified by the U.S. Natural Resources Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up primarily of soil by volume based on visual inspection. Any deliberate mixing of prohibited hazardous waste with soil that changes its treatment classification (i.e., from waste to contaminated soil) is not allowed under the dilution prohibition of 20.4.1.800 NMAC (incorporating 40 CFR 268.3). [20.4.1.800 NMAC (incorporating 40 CFR 268.2(k))]

- *Solid Waste Management Unit (SWMU)* means any discernable unit at which solid wastes have been placed at any time, and from which the Secretary determines there may be a risk of a release of hazardous constituents, irrespective of whether the unit was intended for the management of solid or hazardous wastes. Placement of solid waste includes one time and accidental events that were not remediated, as well as any unit or area at which solid waste has been routinely and systematically placed.

- *Underlying hazardous constituent (UHC)* means any constituent listed in 20.4.1.800 NMAC (incorporating 40 CFR 268.48, Table UTS - Universal Treatment Standards), except fluoride, selenium, sulfides, vanadium, and zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standards. [20.4.1.800 NMAC (incorporating 40 CFR 268.2(i))]

- *Unit* means, but is not limited to, for purposes of this Permit, ~~any hazardous waste container~~

~~area, tank storage area, tank treatment area, surface impoundment, or~~ a landfill.

- *Vadose zone* means the geologic profile extending from the ground surface to the upper surface of the uppermost water-bearing formation and includes localized areas of saturation such as perched water and capillary fringe regions. [20.9.1.105.CH NMAC]

- ~~*Wastewaters* means wastes that contain less than one percent by weight total organic carbon (TOC) and less than one percent by weight total suspended solids (TSS). [20.4.1.800 NMAC (incorporating 40 CFR 268.2(f))]~~

1.5 DUTIES AND REQUIREMENTS

1.5.1 Duty to Comply

The Permittee shall comply with all conditions in this Permit, except to the extent and for the duration such noncompliance is authorized in an Emergency Permit, as specified at 20.4.1.900 NMAC (incorporating 40 CFR 270.61). Any Permit noncompliance, except under the terms of an Emergency Permit, constitutes a violation of the HWA and/or RCRA and may subject the Permittee, its successors and assigns, officers, directors, employees, parents, or subsidiaries, to an administrative or civil enforcement action, including civil penalties and injunctive relief under Sections 74-4-10 or 74-4-10.1 of the HWA, or Sections 3008(a) and (g) or 7002(a)(1)(A) of RCRA; to Permit modification, suspension, or revocation, or denial of a Permit application or modification request under Section 74-4-4.2 of the HWA; to citizen suit under Section 7002(a) of RCRA; to criminal fines or imprisonment under Section 74-4-11 of the HWA, or Sections 3008(d), (e), or (f) of RCRA; or to a combination of the foregoing. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(a))]

1.5.2 Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(c))]

1.5.3 Continuation of Expiring Permit

If the Permittee has submitted a timely and complete application for renewal of this Permit in accordance with Permit Condition 1.2.2 and 20.4.1.900 NMAC (incorporating 40 CFR 270.10 and 270.13 through 270.27), and, through no fault of the Permittee, the Secretary has not issued a new Permit on or before the expiration date of this Permit, the terms and conditions of this Permit remain in effect until the effective date of the Secretary's issuance or denial of the new Permit. [20.4.1.900 NMAC (incorporating 40 CFR 270.51)]

1.5.4 Duty to Mitigate

In the event of noncompliance with this Permit, the Permittee shall take all reasonable steps to minimize releases of hazardous waste or hazardous constituents to the environment, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(d))]

1.5.5 Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all units and systems of ~~treatment and~~ control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance/quality control procedures. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(e))] This provision requires the operation of back-up or auxiliary units or similar systems only when necessary to achieve compliance with the conditions of this Permit.

1.5.6 Duty to Provide Information

The Permittee shall furnish to the Secretary, within a reasonable time as specified by the Secretary, any relevant information which the Secretary may request to determine whether cause exists for modifying, suspending, or revoking this Permit, to determine compliance with this Permit, to determine whether corrective action may be necessary, or otherwise to enforce the provisions of the HWA or RCRA. [NMSA 74-4-4.3; 20.4.1.500 NMAC (incorporating 40 CFR 264.74(a))]

The Permittee shall also furnish to the Secretary, upon request, copies of records required to be kept by this Permit. [NMSA 74-4-4.3; 20.4.1.900 NMAC (incorporating 40 CFR 270.30(h))]

Permit Condition 1.5.6 shall not be construed to limit, in any manner, the Secretary's authority under Section 74-4-4.3 of the HWA, Section 3007(a) of RCRA, or other applicable laws.

1.5.7 Disclosure Statement

If any information required to be included in the disclosure statement provided by the Permittee to comply with Section 74-4-4.7 of the HWA changes, or if any information is added after filing the statement, the Permittee shall provide that information to the Secretary within 30 calendar days after the change or addition. Failure to provide such information in a timely manner may constitute the basis for the revocation of this Permit.

1.5.8 Inspection and Entry

The Permittee shall allow the Secretary, or his or her authorized representatives, upon the presentation of credentials and other documents as may be required by law, the following entry and inspection authority, as required by NMSA 47-4-4.3 and 20.4.1.900 NMAC (incorporating 40 CFR 270.30(i)):

1.5.8.a Entrance to Premises

To enter at reasonable times into the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Permit;

1.5.8.b Access to Records

To have access to and copy, at reasonable times, any records that shall be kept under the conditions of this Permit;

1.5.8.c Inspection

To inspect at reasonable times any units, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

1.5.8.d Sampling

To sample or monitor at reasonable times, for the purposes of assuring Permit compliance, determining the need for corrective action, or as otherwise authorized by the HWA or RCRA, any substances or parameters, including wastes, soil, and groundwater, at any location.

Permit Condition 1.5.8 shall not be construed to limit, in any manner, the Secretary's authority under Section 74-4-4.3 of the HWA, Section 3007(a) of RCRA, or other applicable laws.

1.5.9 Reporting Requirements

1.5.9.a Reporting Planned Changes

The Permittee shall give notice to the Secretary, as soon as possible, of any planned physical alterations or additions to the Facility. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(1))]

1.5.9.b Reporting Anticipated Noncompliance

The Permittee shall give advance written notice to the Secretary of any planned physical changes to the Facility or any permitted activities that may result in noncompliance with Permit requirements. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(2))]

1.5.9.c Certification of Construction or Modification

The Permittee shall not accept hazardous waste at the Facility, or, if the Facility is being modified, the Permittee shall not accept~~, treat, store,~~ or dispose of hazardous waste in the modified portion of the Facility, until the following conditions have been satisfied:

1.5.9.c.i Submittal of Construction Certification and As-Built Specifications

The Permittee has submitted to the Secretary, by certified mail, hand delivery, or special delivery service, a letter signed by the Permittee and an independent professional engineer registered in New Mexico stating that the Facility has been constructed or modified as required by this Permit, in accordance with Permit Condition 1.10; and

1.5.9.c.ii Inspection by the Secretary

The Secretary has inspected the newly constructed Facility or the modified portion of the Facility and:

- finds it is in compliance with the conditions of this Permit; or
- has waived the inspection; or,
- within 15 calendar days from the date of submission of the letter required under Permit Condition 1.5.9.c.i, has not notified the Permittee of his or her intent to inspect. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(2))]

1.5.9.d Twenty-Four Hour and Subsequent Reporting

1.5.9.d.i Oral Report

As required by 20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(6)), within 24 hours from the time the Permittee becomes aware of any noncompliance that may endanger human health or the environment, the Permittee shall report orally to the Secretary the following:

- information concerning release of any hazardous waste that may cause an endangerment to public drinking water supplies; and
- any information of a release or discharge of hazardous waste, or of a fire or explosion from the Facility, which could threaten the environment or human health outside the Facility.

1.5.9.d.ii Description of Occurrence

The description of the occurrence and its cause shall include, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(6)(ii)):

- name, address, and telephone number of the Permittee;
- name, address, and telephone number of the Facility;

- date, time, and type of incident;
- name and quantity of materials involved;
- the extent of injuries, if any;
- an assessment of actual or potential hazards to the environment and human health outside the Facility, where this is applicable; and
- the estimated quantity and disposition of recovered material that resulted from the incident.

1.5.9.d.iii Written Submission

The Permittee shall provide a written submission within five calendar days from the time the Permittee becomes aware of the noncompliance. The written submission shall contain, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(6)(iii)):

- a description of the noncompliance and its cause;
- the period(s) of the noncompliance, including exact date(s) and time(s), and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
- steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

The Secretary may extend the time for submission of a written report to 15 days.

1.5.9.e Contingency Plan Implementation

If Permit Attachment C, *Contingency Plan*, is implemented, the Permittee shall comply with the reporting requirements of Permit Condition 2.11.6 and 20.4.1.500 NMAC (incorporating 40 CFR 264.56(j)).

1.5.9.f Other Noncompliance

The Permittee shall report to the Secretary all other instances of noncompliance not otherwise required to be reported in Permit Condition 1.5.9 in the Quarterly Report required at Permit Condition 2.12.2.b. The report shall contain the information

listed at Permit Condition 1.5.9.d. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(10))]

1.5.9.g Other Information

Whenever the Permittee becomes aware that the Permittee failed to submit any relevant facts in the Permit Application, or submitted incorrect information in the Permit Application or in any report to the Secretary, the Permittee shall promptly submit such facts or information in writing to the Secretary. [20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(11))]

1.5.10 Obligation for Corrective Action

Corrective action required pursuant to 20.4.1.500 NMAC (incorporating 40 CFR 264.101) shall continue under this Permit for any period necessary to comply with the requirements specified at Parts 9 and 10 of this Permit.

1.6 SIGNATORY REQUIREMENT

The Permittee shall sign and certify all applications or reports submitted to or requested by the Secretary, or required by this Permit, in accordance with and using the certification language specified in 20.4.1.900 NMAC (incorporating 40 CFR 270.11 and 270.30(k)).

1.7 REPORTS AND NOTIFICATIONS SUBMITTED TO THE SECRETARY

The Permittee shall submit two copies of all reports and notifications required by this Permit by certified mail, hand delivery, or special delivery service. Submissions shall be sent to:

Chief, Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East Building 1
Santa Fe, New Mexico 87505-6303

Telephone Number: 505/428-2512
Facsimile Number: 505/428-2567

1.8 CONFIDENTIAL INFORMATION

The Permittee may claim confidentiality for any information submitted to or requested by the Secretary or required by this Permit to the extent authorized by Section 74-4-4.3(D) of the HWA and 20.4.1.900 NMAC (incorporating 40 CFR 270.12).

1.9 DOCUMENTS TO BE MAINTAINED AT THE FACILITY

1.9.1 Documents to be Maintained until Completion of Closure

The Permittee shall maintain at the Facility, until final completion of closure as specified at Permit Part 8 has been approved by the Secretary, the following documents and all current amendments, revisions, and modifications to these documents:

- Permit Attachment B, *Procedures to Prevent Hazards* (Permit Condition 2.10)

- Permit Attachments C, *Contingency Plan*, including summary reports and details of all incidents that require implementation of the Contingency Plan; C1, *Emergency Equipment*; C2, *Emergency Coordinators*; C3, *Cooperating Local* Authorities; and C4, *Evacuation Plans*. [20.4.1.500 NMAC (incorporating 40 CFR 264.53(a)) and Permit Condition 2.11.2]

- Permit Attachments D, *Inspection Procedures*; and D1, *Inspection Schedules and Checklists*. [20.4.1.500 NMAC (incorporating 40 CFR 264.15(b)(2)) and Permit Condition 2.7]

- Permit Attachment E, *Personnel Training*, and personnel training documents and records. [20.4.1.500 NMAC (incorporating 40 CFR 264.16(d) and (e)) and Permit Condition 2.8]

- Permit Attachments F, *Waste Analysis Plan*; F1, *Rationale for Analytical Parameter Selection*; F2, *Waste Profile Form*; and F3, *Chain-of-Custody Form*. [20.4.1.500 NMAC (incorporating 40 CFR 264.13(b)) and Permit Condition 2.5.1]

- The Operating Record. [20.4.1.500 NMAC (incorporating 40 CFR 264.73) and Permit Condition 2.12.1.a]

- Permit Attachment J, *Action Leakage Rate and Response Action Plan*. (Permit Condition 2.10.7)

- Permit Attachment N, *Operations and Maintenance Plan*. (Permit Condition 2.10.8)

- Permit Attachments O, *Closure Plan*; O1, *Compliance Schedules for Closure*; and O2, *Financial Assurance for Closure*. (Permit Conditions 8.1.1 and 8.3.1(d))

1.9.2 Documents to be Maintained until Completion of Post-Closure Care

The Permittee shall maintain at the Facility or other appropriate location approved by the Secretary, until completion of post-closure care as specified at Permit Part 8 has been approved by the Secretary, the following documents and all amendments, revisions, and modifications to these documents:

- Permit Attachments P, *Post-Closure Care Plan*; and P1, *Financial Assurance for Post-Closure Care*. (Permit Conditions 8.2.1 and 8.3.1.d)

1.10 COMPLIANCE SCHEDULE

The Permittee shall submit documents, plans, certifications, and as-built specifications under this Permit to the Secretary for approval in accordance with the schedule provided in Table 1-1, *Compliance Schedule*, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.33). Written notification of compliance or noncompliance with any item identified in the schedule shall be submitted according to the schedule date. Submittal of a required item according to the schedule constitutes notification of compliance.

All plans and schedules required to be submitted by the conditions of this Permit are, upon approval of the Secretary, incorporated into this Schedule of Compliance by reference and become an enforceable part of this Permit. Any noncompliance with such approved plans shall be termed noncompliance with this Permit. Extension of the due dates for submittals may be granted by the Secretary in accordance with 20.4.1.900 NMAC (incorporating 40 CFR 270.41 and/or 270.42).

TABLE 1-1

COMPLIANCE SCHEDULE

PERMIT CONDITION	DOCUMENT/INFORMATION	DUE DATE
1.5.9.c.i	Submittal of Construction Certification and As-Built Specifications	30 days prior to first receipt of waste
2.10.6	Notification of Agreements with Local Authorities	30 days prior to first receipt of waste
2.11.5	Updated Contingency Plan	15 days prior to first receipt of waste
2.11.5.a	List of Emergency Coordinators	15 days prior to first receipt of waste
2.11.5.c	Evacuation Plan	15 days prior to first receipt of waste
2.18.1.b	Documentation of Liability Coverage for Sudden Accidental Occurrences	60 days prior to first receipt of waste
2.18.2.b	Documentation of Liability Coverage for Nonsudden Accidental Occurrences	60 days prior to first receipt of waste
~~4.7.3.a~~	~~Tank Installation Certification~~	~~30 days prior to first receipt of waste~~
~~5.7.3.a~~	~~Surface Impoundment CQA Certification~~	~~30 days prior to the first receipt of waste~~
7.2.1	Vadose Zone Monitoring Wells	Prior to the first receipt of waste

10.2	Facility Corrective Action Work Plan	Within 180 days of the effective date of this Permit
10.3.2.a	Background Soil Concentrations Work Plan	30 calendar days prior to the first receipt of waste

PERMIT PART 2

GENERAL FACILITY CONDITIONS

HIGHLIGHTS

This Part contains the standards and conditions covering general Facility requirements for the Triassic Park Waste Disposal Facility (the Facility). The Facility is located on approximately 480 acres in Chaves County, New Mexico, T11S, R31E, Sections 17 and 18. By road, it is approximately 43 miles east of Roswell and 36 miles west of Tatum.

The Facility is a commercial Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste ~~treatment, storage, and~~ disposal operation. The Facility is permitted to ~~store hazardous waste in the Drum Handling Unit, the Roll-Off Container Storage Unit, and the Liquid Waste Storage Tanks; treat hazardous waste by evaporation in the Surface Impoundment and by solidification in the Stabilization Bins; and~~ dispose of hazardous waste in the Landfill. Permit Conditions for ~~these~~ this permitted unit~~s~~ ~~are~~ is contained at Permit Part~~s 3 through 6~~6 . Other units at the Facility are operated as 90-day generator storage units or satellite accumulation points. These units are not permitted under this Permit but are regulated under RCRA. These units are identified at Permit Part 10, Table 10-1.

Permit Conditions for vadose zone monitoring in lieu of ground water monitoring are contained at Permit Part 7. Conditions for closure of the Facility and for post-closure care for the Landfill are contained at Permit Part 8. Permit Parts 9 and 10 contain conditions for corrective action.

General information regarding the Facility and Facility operations is contained at Permit Attachments A, *General Facility Description and Process Information;* L, *Engineering Report*, Section 2.1, *General Facility Design Elements;* and L1, *Engineering Drawings*. The Facility layout is provided at Permit Attachment L1, Drawing No. 4.

Hazardous wastes which may be ~~managed, treated, stored, and~~ disposed by the Permittee at this Facility are listed at Permit Part 2, Table 2-1, *Permitted Hazardous Wastes*, by U.S. Environmental Protection Agency (EPA) Hazardous Waste Number as identified at 20.4.1.200 NMAC (incorporating 40 CFR 261,

Subparts C and D). The Facility may also manage certain polychlorinated biphenyl (PCB)-contaminated wastes.

2.1 CONSTRUCTION AND OPERATION

The Permittee shall construct, maintain, and operate the Facility as specified at Permit Attachments A, Section 2.0, ~~*Treatment, Storage, and*~~ *Disposal*; L; L1; L2, *Specifications for the Landfill*~~*, Surface Impoundment and*~~ *and Associated Facilities Liner and Cover System Construction*; M, *Construction Quality Assurance Plan for the Landfill*~~*, Surface Impoundment and*~~ *and Associated Facilities Construction*; and N, *Operations and Maintenance Plan*; and as required by 20.4.1 NMAC (incorporating 40 CFR 260 through 273) and this Permit. The Permittee shall follow the specifications contained at Permit Attachments ~~L; L1;~~ L2; and M; for construction of ~~the Surface Impoundment and~~ the Landfill, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.19) and this Permit. The Permittee shall ensure that the construction, maintenance, and operation of the Facility minimizes the possibility of a fire, explosion, or any unplanned, sudden, or nonsudden release of hazardous waste to air, soil, ground water, or surface water which could threaten human health or the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.31).

2.2 RUN-ON/RUNOFF CONTROLS

The Permittee shall construct the Stormwater Detention Basin and Facility run-on diversion ditches and runoff collection ditches as specified at Permit Attachments L, Section 2.1.4, *Facility Storm Water Control*; and L1.

2.3 PERMITTED AND PROHIBITED WASTE SOURCES

2.3.1 Hazardous Waste from Sources Located Outside of the United States

The Permittee shall accept hazardous waste from a generator of hazardous waste located outside of the United States of America (i.e., foreign waste) in accordance with Permit Condition 2.3.2, *Hazardous Waste from an Off-site Source,* Permit Condition 2.5.3.e, Waste Acceptance from Foreign Generators, and shall notify both the Regional Administrator of the U.S. Environmental Protection Agency and the Secretary in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.12(a)(1).

2.3.2 Hazardous Waste from an Off-Site Source

The Permittee shall accept hazardous waste from off-site sources [i.e., generators of hazardous waste located within the United States of America, but outside the boundary of the Facility, as defined at 20.4.1.900 NMAC (incorporating 40 CFR 270.2)], in accordance with Permit Attachment F, *Waste Analysis Plan*, Sections 4.3, *Pre-Acceptance Procedures for Off-Site Waste*, and 4.4, *Procedures for Incoming Waste Acceptance*.

2.3.3 Hazardous Waste Generated at the Facility

The Permittee shall manage hazardous waste generated at the Facility in accordance with Permit Attachments A, Section 2.0; F, Section 4.5.6, *Waste Analysis Requirements for Waste Generated On-Site*; and L; and this Permit.

2.4 PERMITTED AND PROHIBITED WASTE

2.4.1 Permitted Waste

2.4.1.a Permit Application, Part A

The Permittee shall accept only ~~the~~ LDR hazardous wastes at the Landfill~~-~~ identified at Permit Attachment K, *Permit Application - Part A;* and listed at Table 2-1 of this Permit Part.

2.4.1.b Other Permitted Waste

2.4.1.b.i Certain PCB-Contaminated Liquids

~~The Permittee may accept non-ignitable liquids containing PCBs in concentrations of less than 50 parts per million (ppm) in accordance with 20.4.1.800 NMAC (incorporating 40 CFR 268.5(h)(2)(vi) and 268.50(f)).~~

2.4.1.b.ii Certain PCB-Contaminated Soils

The Permittee may accept soils containing PCBs in concentrations of less than 50 ppm.

2.4.1.b.iii Bulk PCB-Contaminated Remediation waste

The Permittee may accept bulk PCB-contaminated remediation waste subject to concentration limits described in Part Condition 2.4.1.b.ii. PCB-contaminated remediation waste includes, but is not limited to, the following non-liquid PCB-contaminated remediation wastes: soil, sediments, dredged materials, muds,

PCB sewage sludge, and industrial sludge. (40 CFR 761.61(a)(4)(i) and 761.3)

2.4.1.c Acceptance of Waste on an Emergency Basis

The Permittee may accept hazardous waste that is not identified at Permit Conditions 2.4.1.a or 2.4.1.b or that is prohibited at Permit Condition 2.4.2 only if the waste has been approved for receipt by the Secretary on an emergency basis and the Facility has obtained an Emergency Permit in accordance with Permit Condition 1.5.1 and as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.61).

2.4.2 Prohibited Waste Streams

2.4.2.a General Prohibition

The Permittee is prohibited from accepting or ~~accepting, storing, treating, or~~ disposing the following wastes at the Facility: the wastes not listed in Permit Attachment K, *Permit Application - Part A;* and the wastes specified at Permit Attachment F, Section 4.1.2, *Prohibited Waste*.

Wastes prohibited from acceptance at the Facility include, but are not limited to:

- **certain hazardous debris.** - Hazardous debris means debris that contains a hazardous waste listed in 20.4.1.200 NMAC (incorporating 40 CFR 261, Subpart D), or that exhibits a characteristic of hazardous waste identified in 20.4.1.200 NMAC (incorporating 40 CFR, 261 Subpart C). The Permittee shall not accept hazardous debris that does not meet the LDR treatment standards;

- **certain lab packs.** - Lab packs which contain wastes [identified at 20.4.1.800 NMAC (incorporating 40 CFR 268, Appendix IV)] excluded from lab packs under the alternative treatment standards contained at 20.4.1.800 NMAC (incorporating 40 CFR 268.42(c));

- ~~**certain liquids containing PCBs.** - Ignitable liquids containing PCBs or liquids with PCB concentrations greater than or equal to 50 ppm;~~

- **certain soils containing PCBs.** - Soils with PCB concentrations greater than or equal to 50 ppm, except for those soils (and other solids) defined as bulk PCB-contaminated remediation waste;

- **compressed gases.** - Gases stored at pressures higher than atmospheric;

- **dioxin-contaminated waste.** - Dioxin-containing wastes listed at 20.4.1.800 NMAC (incorporating 40 CFR 268.31) (i.e., wastes with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, F027, and F028);

- **explosives.** - Any substance or article, including a device, which is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or which, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion;

- **infectious waste.** - Infectious waste, defined at 20.9.1.105.AL NMAC (Oct. 1995), means a limited class of substances that carry a probable risk of transmitting disease to humans, including but not limited to:

  (1) microbiological laboratory wastes, including cultures and stocks of infectious agents from clinical research and industrial laboratories, and disposable culture dishes and devices used to transfer, inoculate and mix cultures;

  (2) pathological wastes, including human or animal tissues, organs, and body parts, removed during surgery, autopsy, or biopsy;

  (3) disposable equipment, instruments, utensils, and other disposable materials which require special precautions because of contamination by highly contagious diseases;

  (4) human blood and blood products, including waste blood, blood serum, and plasma;

(5) used sharps, including hypodermic needles, syringes, scalpel blades, Pasteur pipettes and broken glass; and

(6) contaminated animal carcasses, body parts, and bedding, especially those intentionally exposed to pathogens in research, in the production of biologicals or the "in vitro" testing of pharmaceuticals;

- **medical wastes.** - Medical wastes include infectious/biologic/pathogenic solid waste generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals;

- **radioactive/nuclear wastes.** - Radioactive/ nuclear wastes mean naturally-occurring radioactive materials (NORM) defined in 20.3.1.14 NMAC; or other naturally-occurring materials which contain radioactivity concentrations, as specified at Permit Attachment F1, *Rationale for Analytical Parameter Selection*, above the concentration levels regulated under 20.3.1.14 NMAC; or materials regulated under the Atomic Energy Act of 1954, as amended (including source, special nuclear materials, and byproduct materials as defined in 10 CFR 1003);

- **uncharacterized wastes.** - Uncharacterized wastes cannot be accepted at the Facility except by special provision and direction from the Secretary (e.g., emergency clean-up operations) under an Emergency Permit, or until full characterization has been performed.

2.4.2.b Prohibited Waste at Specific Units

~~2.4.2.b.i 40 CFR, Subparts BB and CC~~

~~The Permittee is prohibited from managing, treating, storing, or disposing of hazardous wastes subject to the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subparts BB and CC), in the Liquid Waste Storage Tank Area, the Stabilization Building, and the Surface Impoundment.~~

~~The Permittee is prohibited from storing hazardous wastes subject to the Container Level 3 standards contained at 20.4.1.500 NMAC (incorporating 40 CFR 264.1086(c)) in the Container Storage Areas.~~

2.4.2.b.i Land Disposal Restrictions

The Permittee is prohibited from ~~treating or~~ disposing any hazardous waste in ~~the Surface Impoundment or~~ the Landfill ~~respectively~~ that does not meet the Land Disposal Restrictions (LDR) treatment standards contained at 20.4.1.800 NMAC (incorporating 40 CFR Part 268).

2.5 WASTE ANALYSIS PLAN

2.5.1 General Waste Analysis Requirements

The Permittee shall keep a copy of Permit Attachments F; F1; F2, *Waste Profile Form;* and F3, *Chain-of-Custody Form;* at the Facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.13), until the completion of closure has been approved by the Secretary.

The Permittee shall follow the waste analysis procedures required by 20.4.1.500 NMAC (incorporating 40 CFR 264.13) and 20.4.1.800 NMAC (incorporating 40 CFR 268.7), and specified at Permit Attachment F. The Permittee shall use analytical methods contained at Permit Attachment F; or methods contained in *Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods* (EPA Publication SW-846, latest edition). Alternative SW-846 methods may be approved by the Secretary through permit modification under 20.4.1.900 NMAC (incorporating 40 CFR 270.42).

At a minimum, the Permittee shall maintain proper functional instruments, use approved sampling and analytical methods, verify the validity of sampling and analytical procedures, and perform correct calculations.

2.5.2 Specific Waste Analysis Requirements

The Permittee shall perform the following waste analyses as presented at Permit Attachment F, Section 4.5, *Waste Analysis*:

- pre-shipment characterization of a representative sample from each waste stream prior to shipment as described at Permit Condition 2.5.2.a;

- fingerprint analysis of a select portion of waste upon arrival and continued fingerprint analysis of waste as specified at Permit Condition 2.5.2.b;

- annual re-analysis as specified at Permit Condition 2.5.2.c;

- additional analysis as specified at Permit Condition 2.5.2.d; and

- characterization of waste generated on-site as specified at Permit Condition 2.5.2.e.

Analytical parameters for each waste analysis requirement are specified at Permit Conditions 2.5.2.a through 2.5.2.e and shall be selected, as applicable, to meet waste characterization requirements, and to ensure compliance with LDR treatment standards and with regulations and operational limits as specified at Permit Attachment F.

The Permittee shall use analytical methods contained at Permit Attachment F, Tables 4-1 through 4-3; or in EPA publication SW-846. If the Permittee wishes to use an alternative method, the Permittee shall demonstrate to the Secretary that such alternative method is equivalent to the approved method contained in Permit Attachment F or EPA publication SW-846.

2.5.2.a Representative Sample Analysis

Following Permittee approval of the Waste Profile Form and associated characterization information and prior to initial acceptance of a waste stream, the Permittee shall obtain a representative waste stream sample from the generator for each waste stream. The Permittee shall submit the representative sample to a qualified laboratory other than that used by the generator for analysis as described at Permit Attachment F, Sections 4.3.3, *Representative Sample Assessment*, and 4.5.2, *Representative Sample Analysis*. Representative sample analysis shall include, at a minimum, testing for each hazardous waste code contained in the waste stream and parameters listed in Permit Attachment F, Table 4-1, *Parameters and Methods for Pre-Acceptance Representative Sample Analysis*; as well as applicable parameters listed in Tables 4-2, *Tests and Analytical Methods for Fingerprint Samples* and 4-3, *Additional Tests and Analytical Methods*; as required to ensure complete analysis. Additional parameters not listed in Tables 4-2 and 4-3 may also be

selected. The Permittee shall assess these data as required at Permit Condition 2.5.3.a.ii.

2.5.2.b Fingerprint Sampling and Analysis

Fingerprint sampling and analysis shall be performed upon acceptance of each waste stream shipment ~~and~~ prior to ~~storage, treatment, or~~ disposal, as specified at Permit Attachment F, Sections 4.4.3.1, *Fingerprint Test Procedure*, and 4.5.4, *Fingerprint Analysis*. All waste, except for debris waste, is subject to fingerprint sampling and analysis upon waste acceptance. Fingerprint analyses shall include, at a minimum, the parameters listed at Permit Attachment F, Table 4-2, and shall be sampled and analyzed following protocols and analytical frequencies specified at Permit Attachment F, Section 4.4.3.1. Reduction in fingerprint sampling and analysis frequency shall occur in accordance with waiver provisions presented at Permit Attachment F, Section 4.4.3.1, or through Permit modification. If discrepancies between fingerprint analysis and waste stream characterization information exist upon completion of discrepancy resolution as presented at Permit Attachment F, Section 4.4.4.1, *Discrepancy Resolution*, the waste shall be rejected by the Permittee. The Permittee shall ensure that the generator re-assumes responsibility for the rejected waste or shall ensure proper disposal of the waste at an appropriate facility within 30 days of the waste rejection.

2.5.2.c Annual Sampling and Analysis

The Permittee shall obtain a representative sample analysis from each off-site generator prior to initial acceptance of a waste stream, in accordance with Permit Condition 2.5.2.a, and annually thereafter, as specified at Permit Attachment F, Section 4.5.3, *Annual Analysis*. The annual analysis shall include, at a minimum, parameters presented at Permit Attachment F, Table 4-1, in addition to any parameters included during analysis of the pre-shipment representative sample of the waste stream and additional parameters identified by the Permittee. If the annual analysis indicates waste stream changes such that the hazardous waste code assignment and/or LDR determination is modified, a new Waste Profile Form shall be obtained from the generator. The annual analysis shall be conducted as part of the Facility quality assurance program, as specified at Permit Attachment F, Section 4.4.3.2, *Annual Analysis Procedure*.

2.5.2.d Additional Sampling and Analysis

Additional sampling and analysis shall be performed to assess chemical characteristics of wastes in ~~specific~~ the Landfill management unit~~s~~ as specified at Permit Attachment F, Section 4.5.5, *Additional Analysis for ~~Specific~~ the Landfill Management Unit~~s~~*. Sampling and analysis required for ~~specific~~ the Landfill management unit~~s~~ includes, but ~~are~~ is not limited to, the following:

- ~~**storage units**. – Wastes managed in the Drum Storage Building, Roll-Off Container Storage Area, and the Liquid Waste Storage Tanks shall undergo pre-acceptance representative sample analysis, annual analysis, and initial and on-going fingerprint sample analysis as described at Permit Attachment F, Section 4.5.5.2, *Waste Analysis Requirements Specific to Storage Units*. Ignitability, reactivity, and incompatibility of each waste stream shall be determined using procedures listed at Permit Attachment F, Table 4-2; and as addressed at Permit Attachment F1;~~

- ~~**Surface Impoundment**. – Wastes placed in the Surface Impoundment shall undergo pre-acceptance representative sample analysis as specified at Permit Attachment F, Section 4.5.5.3, *Waste Analysis Requirements Specific to the Surface Impoundment*. Compatibility, ignitability, and reactivity determination shall also be performed for wastes placed in the Surface Impoundment, as specified at Permit Attachment F, Section 4.5.5.3; and as addressed at Permit Attachment F1. Waste removed from the Surface Impoundment shall undergo analysis to ensure continued LDR compliance as specified at Permit Attachment F, Section 4.5.5.3.;~~

- ~~**Stabilization Tanks**. – Wastes placed in the Stabilization Tanks shall be analyzed as specified at Permit Attachment F, Section 4.5.5.4, *Waste Analysis Requirements Specific to the Stabilization Tanks*, and shall be characterized to ensure compatibility with the tank liner and previous wastes placed in the Stabilization Tanks. This may be accomplished through pre-acceptance representative sample~~

~~analysis for wastes placed directly into the Stabilization Tanks, or through analysis performed on waste removed from the Surface Impoundment.~~

~~A second representative sample of any waste requiring stabilization shall be collected and shall be used for bench-scale testing to determine treatability. Bench-scale tests shall also be conducted as part of the representative sample analysis for incoming waste streams that are directly placed in the Stabilization Tanks. After stabilization, wastes shall be re-tested to ensure LDR requirements are met prior to placement into the Landfill. Compatibility, ignitability, and reactivity determination shall also be performed as specified at Permit Attachment F1; and~~

- **Landfill.** - Waste analysis for landfilled wastes is specified at Attachment F, Section 4.5.5.5, *Waste Analysis Requirements Specific to the Landfill*. All waste placed ~~directly~~ into the Landfill shall undergo pre-acceptance representative sample analysis as specified at Permit Condition 2.5.2.a. In addition to fingerprint analysis performed on all incoming waste as required at Permit Condition 2.5.2.b, a minimum of 10 percent of incoming wastes ~~that are to be directly landfilled~~ shall be sampled to verify conformance with LDR requirements, as specified at Permit Attachment F1, Section 4.5.5.5.

2.5.2.e Waste Analysis Requirements for Waste Generated On-Site

The Permittee shall comply with the waste analysis requirements for waste generated on-site specified at Permit Attachment F, Section 4.5.6.

2.5.2.f Compatibility Analysis

The Permittee shall include a compatibility determination on all pre-acceptance representative sample analyses, annual analyses, and additional sampling analyses conducted as required at Permit Conditions 2.5.2.a, 2.5.2.c, and 2.5.2.d; and at Permit

Attachment F1; to ensure that potentially incompatible wastes are not ~~stored, treated, or~~ disposed in the same location.

2.5.3 Waste Acceptance Criteria

The Permittee shall ensure that all waste managed at the Facility meets the criteria for acceptance and management specified at Permit Attachment F, Section 4.2, *Criteria for Waste Management at the Facility*; these criteria include characterization to acquire all the information that must be known to ~~treat, store, or~~ dispose of the waste as required by 20.4.1.500 NMAC (incorporating 40 CFR 264) and 20.4.1.800 NMAC (incorporating 40 CFR 268).

2.5.3.a Waste Acceptance from Off-Site Generators

The Permittee shall accept hazardous waste from off-site generators only in accordance with Permit Attachment F, Sections 4.3 and 4.4; and Permit Attachment N, Section 3.0, *Operations*.

2.5.3.a.i Waste Profile Form

The Permittee shall use the Waste Profile Form contained at Permit Attachment F2. The Permittee shall acquire a completed Waste Profile Form and accompanying characterization information from the generator for each new waste stream, as specified at Permit Attachment F, Section 4.3.1, *Waste Characterization Information Provided by the Generator*. The Permittee shall ensure that the generator submits a new Waste Profile Form for each new waste stream and for an existing waste stream if it is significantly modified.

The Permittee shall evaluate information provided by the generator as specified at Permit Attachment F, Sections 4.3, and 4.3.2, *Paperwork Evaluation*. If acceptable knowledge information is used, the information provided must be traceable (e.g., the information provided for a selected drum must be traceable back to the process which produced it) and auditable (i.e., "auditable" records mean those records that are readily available, that can be correlated to specific waste shipments or specific containers of waste, and that verify the characterization of such wastes).

Any revision of the Waste Profile Form and associated characterization information shall be accomplished through Permit modification.

2.5.3.a.ii Representative Sample Evaluation

Following Permittee approval of the Waste Profile Form and associated characterization information, the Permittee shall obtain a representative waste stream sample, which the Permittee shall submit to a qualified laboratory other than that used by the generator for analysis. The Permittee shall assess these data with respect to the Waste Profile Form and characterization information, as specified at Permit Attachment F, Section 4.3.3.

Discrepancy analysis shall include, but not be limited to, items listed at Permit Attachment F, Section 4.3.3.1, *Major Discrepancies*. If a major discrepancy is identified, the Permittee shall require the generator to submit a sampling plan for generator analysis of the waste. The generator's sampling plan must be consistent with EPA guidance, as specified at Permit Attachment F, Section 4.3.3.1, and must address the discrepant information in accordance with Permit Attachment F, Sections 4.3.3.1, *Major Discrepancies*, and 4.3.3.2, *Minor Discrepancies*. The sampling plan shall be documented in the Facility Operating Record within 15 days after receipt and approval by the Facility. The Permittee shall determine whether additional sampling is necessary to ensure that the elements listed at Permit Attachment F, Section 4.3.3.3, *Additional Waste Acceptance Conditions*, are appropriately addressed.

2.5.3.b Incoming Waste Acceptance

Incoming waste shipments shall be evaluated in accordance with Permit Attachment F, Section 4.4. If manifest discrepancies or discrepancies noted during visual examination are not resolved within 90 days of identifying the discrepancy, waste will not be accepted for ~~storage or~~ disposal, and the waste will either be returned to the sender or disposed at an appropriate permitted Facility by the Permittee.

The Permittee shall ensure that a generator shipping hazardous debris or contaminated soil to the Facility has first complied with the certification requirements identified in the Table contained at 20.4.1.800 NMAC (incorporating 40 CFR 268.7).

2.5.3.c Air Emissions Requirements

The Permittee shall comply with the air emissions testing requirements contained at Permit Conditions 2.15.1.b, 2.15.2.b, and 2.15.2.c.

2.5.3.d Other Waste Management Requirements

The Permittee shall ensure that all waste analyses, reports, documentation, notifications, and certifications required under 20.4.1.800 NMAC (incorporating 40 CFR 268.7) are provided by off-site generators or off-site treatment facilities that ship waste to the Facility, including, where appropriate, the certification requirement for treatment of hazardous debris.

2.5.3.e Waste Acceptance from Foreign Generators

The Permittee shall accept hazardous waste from foreign generators in accordance with, in addition to all of the requirements for off-site generators, Permit Attachment F4, *Waste Characterization Using Acceptable Knowledge*, and Permit Attachment F, Section 4.7.4, *Laboratory Requirements for Foreign Generators* as required in part by the Final Order from the Secretary dated March 18, 2002, through his authority stipulated at 20.4.1.900 (incorporating 40 CFR 270.32(b)(2)).

2.5.4 Sampling Plan

2.5.4.a Facility Sampling Plan

The Permittee shall follow the procedures specified at Permit Attachment F, Section 4.6, *Sampling Plan*. Modifications to this Sampling Plan are expected to be necessary, and revised sampling methods shall be EPA-approved methodologies included in the EPA publication, SW-846. Alternative SW-846 methods may be approved by the Secretary through permit modification under 20.4.1.900 NMAC (incorporating 40 CFR 270.42).

The modification may also include changes to the individual sampling and analysis protocols specific to individual waste streams presented in Attachment F, Section 4.6, which identify the fingerprint analysis to be used and sampling and analytical requirements prior to acceptance of an individual waste stream, as specified at Permit Attachment F, Section 4.3.4, *Notification and Approval of Waste Shipment*.

2.5.5 Laboratory Quality Assurance/Quality Control Plan

The Permittee shall follow the Laboratory QA/QC Plan described at Permit Attachment F, Section 4.7.2, *Facility Laboratory QA/QC Plan*.

2.5.6 Individual Sampling and Analysis Protocols

The Permittee shall also develop and place into the Operating Record individual sampling and analysis protocols specific to individual waste streams identifying the fingerprint analysis to be used and sampling and analytical requirements prior to acceptance of an individual waste stream, as specified at Permit Attachment F, Section 4.3.4.

2.5.7 Quality Assurance Objectives

The Permittee shall review, validate, and verify all analytical data; reconcile analytical results with data quality objectives; satisfy data reporting requirements; and identify, document, and report all nonconformances and operational variances to the Secretary.

2.5.8 Quality Control Checks

The Permittee shall take additional samples as quality control checks as specified at Permit Attachment F, Section 4.7.2.3, *Laboratory QA/QC Samples*. Upon request, the Permittee shall split samples with NMED.

2.5.9 Disposal of Laboratory Samples

The Permittee shall dispose of on-site laboratory samples with compatible waste batches.

2.5.10 Contract Laboratory Requirements

The Permittee shall inform each contract laboratory in writing that it shall operate under the waste analysis conditions set forth at Permit Attachment F, Section 4.7.3, *Requirements for Off-Site Laboratories*.

2.6 SECURITY

The Permittee shall comply with the security provisions specified at Permit Attachment B, *Procedures to Prevent Hazards*, Section 5.1, *Security Provisions to Prevent Hazards*. [20.4.1.500 NMAC (incorporating 40 CFR 264.14)]

2.6.1 Means to Control Entry

Access to the Facility shall be only through a controlled access point that is manned by security guards, as specified at Permit Attachment B, Section 5.1.1, *Barrier and Means to Control*

Entrance; as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.14(b)(2)(ii)).

2.6.2 Barriers

In order to prevent unknowing entry and minimize the possibility for unauthorized entry of persons, livestock or wildlife, the Facility shall have the following barrier as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.14(b)(2)(i)). The active portion of the Facility shall be bounded by a six-foot chain link fence topped with a three strand barbed wire access barrier with two access gates located in the northern portion of the Facility. The fence shall have metal flashing around its base constructed to protrude a minimum of 18-inches above ground and a minimum of 10-inches below ground. The fence shall be regularly maintained to ensure proper barriers..

2.6.3 Warning Signs

Warning signs in English and Spanish, e.g., "DANGER, NO UNAUTHORIZED PERSONNEL, KEEP OUT", and "PELIGRO, NO PERMITIDA LA ENTRADA SIN AUTORIZACION", shall be posted at the road entry point to the Facility and every 50 feet along the perimeter fence, as specified at Permit Attachment B, Section 5.1.2, *Warning Signs*. These bilingual signs shall be legible from a distance of 25 feet and shall also be visible from any approach to the Facility. In addition, the warning signs shall be posted at each entrance to an active portion of the Facility, and in sufficient numbers to be seen from any approach to each active portion, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.14(c)).

2.7 GENERAL INSPECTION REQUIREMENTS

The Permittee shall keep Permit Attachments D, *Inspection Procedures;* and D1; at the Facility until final closure of the Facility.

2.7.1 Inspection Frequencies

2.7.1.a Inspection Schedules

The Permittee shall implement the Inspection Schedules contained at Permit Attachment D1, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.15(b)).

2.7.1.b Additional Inspection Requirements

The Permittee shall inspect areas subject to spills, such as loading and unloading areas, daily when in use, as required by 20.1.500 NMAC (incorporating 40 CFR 264.15(b)(4)).

2.7.1.c Testing and Maintenance of Emergency Equipment

The Permittee shall inspect the monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment identified at Permit Attachment C1, *Emergency Equipment*, to detect any malfunctions and deterioration, operator errors, and discharges, as specified at Permit Attachment D, *Inspection Procedures*, Section 5.2.8, *Safety and Emergency Response Equipment Inspection Procedures;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.33); in order to assure proper operation in time of emergency.

2.7.1.d Inspection Logs and Checklists

The Permittee shall use the inspection logs or checklists contained at Permit Attachment D1. The Permittee shall ensure that inspectors record the date and time of the inspection, the status of items inspected (items not inspected shall be marked "NI"), the date and nature of any repairs or other remedial actions needed, and sign the checklist, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.15(d)).

2.7.2 Remedial Action

The Permittee shall remedy any deterioration or malfunction of equipment or structures which an inspection reveals on a schedule which ensures that the problem does not lead to an environmental or human health hazard, as specified at Permit Attachment D, Section 5.2.1.2, *Remedial Action;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.15(c)). When the hazard is imminent or has already occurred, the Permittee shall take remedial action immediately.

2.7.3 Recordkeeping - Inspection Logs

The Permittee shall maintain all inspection logs in the Operating Record required under Permit Condition 2.12.1.a. Inspection logs need be retained only for a period of three years, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.15(d) and 264.73(b)(5)).

2.8 PERSONNEL TRAINING

The Permittee shall keep a copy of Permit Attachment E, *Personnel Training*, at the Facility, and shall maintain a Personnel Training Program as specified at Permit Attachment E, Section 7.0, *Personnel Training*; as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.14(b)(12)) and 20.4.1.500 NMAC (incorporating 40 CFR 264.16).

2.8.1 Personnel Training Requirements

The Permittee shall train all persons involved in the management of hazardous waste in procedures relevant to the positions in which they are employed, as specified at Permit Attachments E and F, Section4.6.5.1, *Training Requirements for Personnel Responsible for Sampling Collection* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.16).

2.8.2 Personnel Training Procedures

The Personnel Training Program shall include the material and procedures outlined at Permit Attachment E, Section 7.2, *Training Content and Frequency*, and shall otherwise comply with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.16(a)(3)).

The Permittee shall ensure that Facility personnel successfully complete the Personnel Training Program within six months after their employment at the Facility, or to their assignment to a new position at the Facility, whichever is later. Employees shall not work in unsupervised positions until they have successfully completed the training requirements for their positions, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.16(b)).

Facility personnel shall take part in an annual review of the initial training required for their positions, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.16(c)).

2.8.3 Recordkeeping - Personnel Training Documents and Records

The Permittee shall maintain training documents and personnel training records, as specified at Permit Attachment E, Section 7.3, *Record Keeping*, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.16(d)). Training documents and personnel training records shall be kept until completion of closure or for at least three years from the date an employee

last worked at the Facility, whichever is earlier, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.16(e)).

2.9 SPECIAL PROVISIONS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE

2.9.1 Precautions

The Permittee shall manage ignitable, reactive, or incompatible wastes as specified at Permit Attachment B, Section 5.5, *Precautions to Prevent Ignition or Reaction of Ignitable, Reactive, or Incompatible Wastes*; and shall otherwise comply with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.17(a) and (b)).

2.9.2 Recordkeeping - Precautions for Ignitable, Reactive, or Incompatible Waste

The Permittee shall document compliance with Permit Condition 2.9.1 in the Operating Record, in accordance with Permit Condition 2.12.1.a; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.73(b)(3)).

2.10 PREPAREDNESS AND PREVENTION

The Permittee shall maintain Permit Attachment B at the Facility until final completion of closure, as specified by Permit Part 8, has been approved by the Secretary.

2.10.1 Required Equipment

At a minimum, the Permittee shall maintain at the Facility the equipment identified at Permit Attachment C1, *Emergency Equipment*, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.32).

2.10.2 Access to Communications or Alarm System

The Permittee shall maintain access to the communications or alarm system as specified at Permit Attachment B, Section 5.3, *Preparedness and Prevention Procedures*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.34).

2.10.3 Roadways

The Permittee shall maintain roadways within the Facility as specified at Permit Attachment L, Section 2.1.3, *Facility Traffic Plan*, to allow the unobstructed movement of personnel,

fire protection equipment, spill control equipment, and decontamination equipment in an emergency.

2.10.4 Arrangements with Local Authorities

The Permittee shall maintain preparedness and prevention arrangements with State and local authorities, contractors, and other governmental agencies, at a minimum as specified at Permit Attachment C, *Contingency Plan*, Sections 6.3.1.1, *Life-Threatening Situations*, and 6.3.4, *Off Site Notification and Evacuation Criteria*, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.37(a) and 264.52(c)). The Permittee shall maintain these documents at appropriate locations at the Facility.

2.10.5 Notification of Agreements with Local Authorities

The Permittee shall submit signed copies of the preparedness and prevention agreements with local authorities listed at Permit Attachment C3, *Cooperating Local Authorities*, or documentation of refusal to enter into preparedness and prevention agreements, to the Secretary 30 days prior to initiation of operations at the Facility, in accordance with Permit Condition 1.10, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.37(b)).

If a local authority with which the Permittee has an agreement terminates the agreement, Permittee shall document the termination in the Operating Record and shall provide a copy of this documentation and alternative emergency response arrangements to the Secretary within 15 days.

2.10.6 Response Action Plan

The Permittee shall keep Permit Attachment J, *Action Leakage Rate and Response Action Plan*, at the Facility until completion of closure for the Facility is approved by the Secretary.

2.10.7 Operations and Maintenance Plan

The Permittee shall keep Permit Attachment N, *Operations and Maintenance Plan*, at the Facility until completion of closure is approved by the Secretary.

~~a.~~2.11 CONTINGENCY PLAN

2.11.1 Implementation of Contingency Plan

The Permittee shall immediately implement Permit Attachment C, *Contingency Plan*, whenever there is a fire, explosion, or

release of hazardous waste or hazardous constituents that could threaten human health or the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.51(b)).

If the Permittee implements the Contingency Plan as a result of a spill or release to the environment and after 30 calendar days the Permittee has not been able to remove all contaminated soil or water to appropriate action levels, in accordance with Permit Condition 9.2, the Permittee shall comply with the requirements of either Permit Part 9 or 10, as appropriate. The Permittee may submit for the Secretary's approval a one time, 30 day extension to the above 30 calendar days compliance period.

2.11.2 Copies of the Contingency Plan

The Permittee shall maintain copies of the Contingency Plan and all revisions and amendments to the Contingency Plan at all document locations throughout the Facility until the completion of closure for the Facility is approved by the Secretary. The Permittee shall also submit a copy of the Contingency Plan and current revisions and amendments thereto to all federal, State, and local entities that may be called upon to provide emergency services and/or with which the Permittee has preparedness and prevention arrangements, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.53). As a part of the submittal to all federal, State, and local entities, the Permittee shall also submit Permit Attachment A, *General Facility Description and Information*.

2.11.3 Amendments to the Contingency Plan

The Permittee shall review and immediately amend, when necessary, the Contingency Plan as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.54). The Permittee shall submit all revisions and amendments to the Plan to the Secretary through a Permit modification before implementation of such revisions and amendments as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.42).

2.11.4 Emergency Coordinator

A trained Emergency Coordinator (EC) or an alternate EC, as identified at Permit Attachment C, Section 6.1, *General Responsibilities of the Emergency Coordinator*, shall be available 24 hours a day, seven days a week, in case of an emergency. The EC or alternate EC shall be thoroughly familiar with the Contingency Plan and shall have the authority to commit

the resources needed to implement the Contingency Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.55).

In the event of an imminent or actual emergency, the EC shall implement the emergency procedures specified at 20.4.1.500 NMAC (incorporating 40 CFR 264.56) and Permit Attachment C.

2.11.5 Updated Contingency Plan

The Permittee shall submit an updated Contingency Plan to the Secretary for approval at the time of Facility certification, as specified at Permit Attachment C and in accordance with Permit Condition 1.10. The updated Contingency Plan shall include, at a minimum, the following.

2.11.5.a List of Emergency Coordinators

The Permittee shall submit to the Secretary an updated list of the names, addresses, and phone numbers of all persons designated to act as ECs 15 days prior to initiation of operations, in accordance with Permit Condition 1.10; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.52(d)).

This updated list of ECs shall be inserted as replacement pages into this Permit at Permit Attachment C2, *Emergency Coordinators*.

The Permittee shall inform the Secretary in writing of changes to the list of ECs and telephone numbers within 15 calendar days from the date of the changes, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.52(d)).

2.11.5.b Emergency Response Team Members

The Permittee shall submit to the Secretary a list of the names and qualifications of all individuals qualified as members of the on-site emergency response team discussed at Permit Attachment B, *Procedures to Prevent Hazards*, Section 5.4.6. This list shall be provided to the Secretary 15 days prior to initiation of operations at the site.

2.11.5.c Evacuation Plan

The Permittee shall include in the updated Contingency Plan a finalized, building- or unit-specific evacuation plan for Facility personnel where there is a possibility that evacuation could be necessary. This plan shall describe evacuation routes, and alternate evacuation routes in cases where the primary

routes could be blocked by releases of hazardous waste or fires. The plan shall include a clear map of the evacuation routes, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.52(f)).

This plan shall be inserted as replacement pages at Permit Attachment C4, *Evacuation Plans*.

2.11.6 Reporting and Recordkeeping - Contingency Plan Implementation

Whenever the Contingency Plan is implemented, the Permittee shall note the time, date, and details of the incident in the Operating Record and submit a written report to the Secretary within 15 calendar days, as specified at Permit Attachment C, Section 6.4.2, *Required Reports and Notification;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.56(j)).

2.12 RECORDKEEPING AND REPORTING

2.12.1 Recordkeeping Requirements

The Permittee shall maintain at the Facility all the records, data, certifications, and other information listed at Table 2-2, *Recordkeeping Requirements*. Records kept shall include, but are not limited to, the following.

2.12.1.a Operating Record

The Permittee shall maintain a written Operating Record at the Facility as required by this Permit and 20.4.1.500 NMAC (incorporating 40 CFR 264.73). The Operating Record shall include all information required at 20.4.1.500 NMAC (incorporating 40 CFR 264.73(b)). Information placed in the Operating Record shall be kept until final closure of the Facility is approved by the Secretary, except as noted elsewhere in this Permit.

2.12.1.b Facility Notification to Off-Site Generators

The Permittee shall keep a copy of the written notice to off-site generators that the Facility has the appropriate permit(s), and will accept the waste the generator is shipping, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.12(b)).

2.12.1.c Generator Notifications and Certifications

The Permittee shall keep copies of the notices, and the certifications and demonstrations if applicable, required of the

generator or the Permittee, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.73(b)(11) through (b)(16)).

2.12.1.d Manifest Records

The Permittee shall retain at the Facility a copy of each manifest received from an off-site generator of hazardous waste accepted at the Facility for a period of at least three years, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.71(b)(5)).

2.12.1.e Waste Analysis for Waste Acceptance

The Permittee shall maintain waste analysis records and copies of all certifications, demonstrations, and other documents relevant to waste analyses required for waste acceptance (including both pertinent Facility records and records from off-site generators) in the Operating Record, as required by 20.4.1.500 NMAC (incorporating CFR 264.73(b)(3)) and 20.4.1.800 NMAC (incorporating 40 CFR 268.4(a) and 268.7).

2.12.1.f Recordkeeping - 40 CFR 264, Subpart BB Exemption

The Permittee shall record in a log, for use in determining exemption from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart BB), all the information required at 20.4.1.500 NMAC (incorporating 40 CFR 264.1064(k)). The documentation to determine exemption shall be kept with, or made readily available with, the Operating Record for a period of three years.

2.12.1.g Recordkeeping - 40 CFR 264, Subpart CC Exemption

The Permittee shall record in a log, for use in determining exemption from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), all the information required at 20.4.1.500 NMAC (incorporating 40 CFR 264.1089(f)). The documentation to determine exemption shall be kept with or made readily available with the Operating Record for a period of three years.

2.12.1.h Recordkeeping - 40 CFR 264, Subpart CC Compliance

The Permittee shall maintain at the Facility the information required under Permit Condition 3.4.

2.12.1.i Waste Stream Tracking

Information on each hazardous waste stream (including underlying hazardous constituents) managed at the Facility shall be recorded in the Waste Tracking System described at Permit Attachment F1, Section 4.8, *Waste Tracking*, and maintained in the Operating Record or at another location approved by the Secretary until completion of post-closure care has been approved by the Secretary, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.73(b)(1)).

The information to be maintained shall describe the waste, the hazard characteristics, the basis for hazard designation, and the date deposited in the Landfill, the grid location within the landfill, and shall include the laboratory report results (if chemical analysis is used) detailing the chemical and physical analysis of the waste. The information provided for each waste stream shall be complete for each movement of the waste from acceptance through ~~storage, treatment, and~~to disposal at the Facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264, Appendix I);

2.12.1.j Waste Minimization Program

The Permittee shall annually, by December 1 for the previous year ending September 30, enter into the Operating Record a certified statement specifying that the Permittee has a program in place, in accordance with Permit Condition 2.13, to reduce the volume and toxicity of hazardous wastes generated by the Facility's operation to the degree determined by the Permittee to be economically practicable; and the proposed method of ~~treatment, storage, or~~ disposal is that practicable method currently available to the Permittee which minimizes the present and future threat to human health and the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.73(b)(9)).

A current description of the program shall also be maintained in the Operating Record;

2.12.1.k Monitoring Records

2.12.1.k.i Monitoring Information

The Permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, for a period of at least three years from the date of the sample, measurement, or record, as required

by 20.4.1.900 NMAC (incorporating 40 CFR 270.30(j)(2)). This period may be extended by the Secretary at any time.

~~The Permittee shall retain monitoring records for the Surface Impoundment Leak Detection and Removal System (LDRS) and Vadose Zone Monitoring System (VZMS) and associated water level elevations until the completion of Surface Impoundment closure, or if necessary post-closure, is approved by the Secretary, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.226(d)(1)).~~

The Permittee shall retain records for the Landfill Leachate Collection and Removal System (LCRS), LDRS, and VZMS until the completion of post-closure care for the Landfill is approved by the Secretary, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.303(c)(1));

2.12.1.k.ii Record Information

Records for monitoring information shall include, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270(30)(j)(3)):

- the date, exact place, and time of sampling or measurements;
- the name of the individual(s) who perform the sampling or measurements;
- the date(s) analyses are performed;
- the name and address of the laboratory that performed the analyses;
- the name of the individual(s) who perform the analyses;
- the analytical techniques or methods used; and
- the result of such analyses;

2.12.1.l Corrective Action Records

For a unit undergoing corrective action under Permit Parts 9 or 10, the Permittee shall retain, until completion of the corrective action has been approved by the Secretary, records of all monitoring information, waste analyses, and all other pertinent data and information used to prepare the appropriate documents required for the action by this Permit, as required by

20.4.1.900 NMAC (incorporating 40 CFR 270.30(j)(2) and 270.31(b)).

2.12.1.m Grid "Cell" Map

The Permittee shall maintain the grid "cell" map of the Landfill and location identification of the waste placed in the Landfill in the Operating Record, in accordance with Permit Conditions 6.7.1.a; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.73(b)(2) and 264.309).

2.12.1.n Other Records

The Permittee shall retain records of all other data used to prepare documents required by this Permit, copies of all other reports and records required by this Permit, and records of all data used to complete the Permit Application, for a period of three years from the date of the report, record, certification, or application, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.30(j)(2)).

2.12.2 Reporting Requirements

In addition to the documents, certifications, and other information required before the initiation of operations at the Facility under Permit Condition 1.10, the Permittee shall submit to the Secretary as applicable during the operating life and closure and post-closure care periods of the Facility all the reports, documents, certifications, notifications, and other submittals as applicable, required at Table 2-3, *Reporting/Notification/Certification Requirements*. Reports which shall be submitted include, but are not limited to, the reports identified at Permit Conditions 2.12.2.a through 2.12.2.d.

2.12.2.a Biennial Report

The Permittee shall submit to the Secretary a single copy of the biennial report by March 1 of each even-numbered year. The biennial report shall include the information required at 20.4.1.500 NMAC (incorporating 40 CFR 264.75), and shall be submitted on EPA form 8700-13B. The biennial report shall include a copy of the annual certified statement regarding the Waste Minimization Program required at Permit Condition 2.13, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.75(h) through 40 CFR 264.75(j)).

2.12.2.b Quarterly Report

The Permittee shall submit a quarterly report on the status of operations for the previous three months at the Facility to the Secretary. The report shall be due 60 days after the reporting period has ended. The report shall provide an update on activities carried out during the reporting period, including:

- quantities of hazardous wastes ~~stored, treated, and/or~~ disposed in the Landfill ~~(including waste generated on-site),~~ by EPA Hazardous Waste Number;
- a discussion of spills and releases which have occurred during the reporting period, and subsequent actions taken;
- any variances or discrepancies from this Permit;
- monitoring results, including raw data, of the monitoring of the LCRS and LDRS at the ~~Surface Impoundment and~~ Landfill, of the monitoring of the VZMS, and all other monitoring requirements of this Permit, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.30(l)(4) and 270.31(c)); and
- a summary of operation and maintenance activities for the VZMS, in accordance with Permit Condition 7.6, and for the LCRS and LDRS, at the ~~Surface Impoundment and~~ Landfill.

The report shall also include a discussion of planned activities for the upcoming three-month period, including any necessary changes or modifications in operating activities approved under this Permit.

2.12.2.c Waste Minimization Program Certification

The Permittee shall submit a copy of the annual certified statement regarding the Waste Minimization Program required at Permit Condition 2.13 to the Secretary by December 1 for the previous year ending September 30, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.75(i)).

2.12.2.d Reporting - Noncompliance with the 40 CFR 264, CC Exemption

The Permittee shall report to the Secretary each occurrence, within 15 calendar days of the time the Permittee becomes aware of the occurrence, whenever hazardous waste is placed in a waste management unit, the Landfill, in noncompliance with the exemption from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC) provided at Permit Condition 2.15.2.a; as specified at Permit Attachment G, *Air Quality;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1090(a)).

2.13 WASTE MINIMIZATION PROGRAM

The Permittee shall institute a program, as specified at Permit Attachment A, Section 9.0, *Waste Management*, to reduce the volume and toxicity of hazardous wastes generated at the Facility to the degree determined by the Permittee to be economically feasible. Suggested criteria for the program include:

~~1~~(1) any written policy or statement that outlines goals, objectives, and/or methods for source reduction and recycling of hazardous waste at the Facility;

~~2~~(2) any employee training or incentive program designed to identify and implement source reduction and recycling opportunities;

~~3~~(3) any source reduction and/or recycling measures implemented in the last five years or planned for the near future;

~~4~~(4) an itemized list of the dollar amounts of capital expenditure (plant and equipment) and operating costs devoted to source reduction and recycling of hazardous waste;

~~5~~(5) factors that have prevented source reduction and/or recycling;

~~6~~(6) an investigation of additional waste minimization efforts that could be implemented at the Facility. This investigation would analyze the potential for reducing the quantity and toxicity of each waste stream through recycling and all

other appropriate means. The analysis would include an assessment of the technical feasibility, cost, and potential waste reduction for each option;

~~7~~(7) a flow chart or matrix detailing all hazardous wastes produced by quantity, type, and building or area;

~~8~~(8) a demonstration of the need to use those processes which produce a particular hazardous waste due to a lack of alternative processes or available technology which would produce less hazardous waste;

~~9~~(9) a description of the waste minimization methodology employed for each related process at the Facility which shows whether source reduction or recycling is being employed; and

~~10~~(10) a description of the changes in volume and toxicity of waste actually achieved during the year in comparison to previous years.

2.14 TRANSPORTATION OF HAZARDOUS WASTE

2.14.1 Transportation of Hazardous Waste to the Facility

2.14.1.a Manifest Requirements

The Permittee shall comply with the manifest requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.71).

2.14.1.b Manifest Discrepancies

Upon discovering a significant discrepancy, as identified at Permit Attachment F, Section 4.4, and at 20.4.1.500 NMAC (incorporating 40 CFR 264.72(a)), between the quantity or type of waste designated on the manifest and the quantity or type of waste actually received at the Facility, the Permittee shall attempt to reconcile the discrepancy with the generator or transporter. If the discrepancy is not resolved within 90 days after receiving the waste, the Permittee shall immediately submit to the Secretary a letter describing the discrepancy and attempts to resolve it, and a copy of the manifest, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.72(b)).

2.14.1.c Unmanifested Waste Report

If the Permittee accepts for ~~treatment, storage, or~~ disposal any hazardous waste from an off-site source without an accompanying manifest, and if the waste is not excluded from the manifest requirements by the conditionally exempt small quantity generator exclusions contained at 20.4.1.500 NMAC (incorporating 40 CFR 261.5), then the Permittee shall prepare and submit to the Secretary a single report within 15 calendar days after receipt of the waste. The unmanifested waste report shall contain the information required at 20.4.1.500 NMAC (incorporating 40 CFR 264.76).

2.14.2 Transportation of Hazardous Waste On-Site at the Facility

2.14.2.a Traffic Control Procedures

The Permittee shall transport hazardous waste on-site using the traffic control procedures and traffic patterns specified at Permit Attachment A, Section 1.4, *Traffic Patterns*. All vehicles carrying hazardous waste shall use only the entrance, access, and perimeter roads depicted at Permit Attachment L1, Drawing No. 26 (2 of 2).

2.14.2.b Dust Control Procedures

2.14.2.b.i Dust Suppression

The Permittee shall not use waste or used oil or any other material which is contaminated with dioxins, PCBs, or any other hazardous waste, other than a waste identified solely on the basis of ignitability, for dust suppression or road treatment, as required by 20.4.1.700 NMAC (incorporating 40 CFR 266.23(b)).

2.14.2.b.ii Other Dust Control Procedures

The Permittee shall apply the dust control procedures specified at Permit Attachment A, Section 2.5.1.7, *Wind Dispersal Control Procedures*, to control the dust generated from the surface of the daily landfill soil cover.

2.14.3 Decontamination of Equipment and Vehicles

The Permittee shall ensure that any vehicles or equipment which have come in contact with hazardous waste in any storage or treatment area and/or which have been in contact with hazardous waste in the Landfill are sufficiently decontaminated prior to

their further movement to prevent contamination of uncontaminated areas of the Facility as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.31)). Wash water generated from truck or equipment decontamination shall be collected, tested, and treated, and disposed as specified at Permit Attachment F, Section 4.5.6.

2.15 AIR QUALITY PROTECTION

2.15.1 40 CFR, Subpart BB

2.15.1.a Compliance and Exemption

The Permittee shall manage waste with an organic concentration of at least 10 percent by weight in compliance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.1050(b)(1)). Waste with an organic concentration of less than 10 percent by weight is exempt from the requirement to comply with 20.4.1.500 NMAC (incorporating 40 CFR, Subpart BB).

Alternatively, the Permittee may elect to demonstrate compliance with this Permit Condition through compliance with a New Source Air Emissions Permit, to the extent that the documentation required under the New Source Air Emissions Permit duplicates the documentation required under this Permit Condition, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1064(m)).

2.15.1.b Waste Determination

The Permittee shall use the test methods contained at 20.4.1.500 NMAC (incorporating 40 CFR 264.1063(d)), to make a determination of compliance with Permit Conditions 2.4.2.b.i and 2.15.1.a for each waste stream managed at the Facility, as specified at Permit Attachment F1, Section 4.5.1.3, *Additional Analysis to Ensure Compliance with Regulatory and Operational Limits*.

2.15.2 40 CFR, Subpart CC

2.15.2.a Compliance and Exemption

The Permittee shall manage waste with an average volatile organic concentration equal to or greater than 500 parts per million by weight (ppmw) at the point of waste origination in compliance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC). Waste with an average

volatile organic concentration less than 500 ppmw at the point of waste origination is exempt from the requirement to comply with 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(1)).

Alternatively, the Permittee may elect to demonstrate compliance with this Permit Condition by documentation of compliance with a New Source Air Emissions Permit, to the extent that the documentation required under the New Source Air Emissions Permit duplicates the documentation required under this Permit Condition, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1089(h)).

2.15.2.b Initial Waste Determination

The Permittee shall use the test methods contained at 20.4.1.500 NMAC (incorporating 40 CFR 264.1083) to make an initial determination of compliance with Permit Conditions 2.4.2.b.i and 2.15.2.a for each waste stream managed at the Facility, as specified at Permit Attachment F1, Section 4.5.1.3. The initial determination shall be made before the first time a waste stream is placed in a permitted unit, and thereafter the determination for that waste stream shall be reviewed as necessary once every 12 months following the date of the initial determination, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(1)).

2.15.2.c Waste Determination after Process Change

The Permittee shall perform a new waste determination of compliance with Permit Conditions 2.4.2.b.i and 2.15.2.a for any waste stream whenever changes to the source generating the waste stream are reasonably likely to cause the average volatile concentration of the waste stream to increase to a level that is equal to or greater than the applicable volatile organic limit, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1083(b)(1)(ii)).

2.15.2.d Waste Determination by the Secretary

The Secretary may at any time perform or request the Permittee to perform a waste determination for the average volatile organic concentration at the point of waste origination for a hazardous waste that is exempted from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1082(d)).

2.16 GENERAL CLOSURE REQUIREMENTS

The Permittee shall close the Facility, or any permitted unit at the Facility, as specified at Permit Attachment O, *Closure Plan;* and as required by Permit Part 8 and 20.4.1.500 NMAC (incorporating 40 CFR 264.110 through 264.116).

2.17 GENERAL POST-CLOSURE CARE REQUIREMENTS

The Permittee shall conduct post-closure care for the Landfill, or any other permitted unit that must be closed as a landfill, as specified at Permit Attachment P, *Post-Closure Care;* and as required by Permit Part 8 and 20.4.1.500 NMAC (incorporating 40 CFR 264.117 through 264.120).

2.18 LIABILITY COVERAGE

2.18.1 Sudden Accidental Occurrences

2.18.1.a Liability Coverage Requirements for Sudden Accidental Occurrences

The Permittee shall have and maintain liability coverage for sudden accidental occurrences in the amount of one million dollars ($1,000,000) per occurrence, with an annual aggregate of at least two million dollars ($2,000,000), exclusive of legal defense costs, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.147(a)).

2.18.1.b Documentation of Liability Coverage for Sudden Accidental Occurrences

The Permittee shall demonstrate to the Secretary, for approval, continuous compliance with the liability coverage required under Permit Condition 2.18.1.a, in accordance with Permit Condition 1.10, at least 60 days before receiving hazardous waste for ~~management, treatment, storage, or~~ disposal at the Facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.147(f)(4)). This liability coverage shall be effective before the first receipt of hazardous waste at the Facility.

2.18.2 Nonsudden Accidental Occurrences

2.18.2.a Liability Coverage Requirements for Nonsudden Accidental Occurrences

The Permittee shall have and maintain liability coverage for nonsudden accidental occurrences in the amount of three million dollars ($3,000,000) per occurrence, with an annual aggregate of

at least six million dollars ($6,000,000), exclusive of legal defense costs, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.147(b)).

2.18.2.b Documentation of Liability Coverage for Nonsudden Accidental Occurrences

The Permittee shall demonstrate to the Secretary, for approval, continuous compliance with the liability coverage required under Permit Condition 2.18.2.a, at least 60 days before receiving hazardous waste for ~~management, treatment, storage, or~~ disposal at the Facility, in accordance with Permit Condition 1.10. The liability coverage shall be as required at 20.4.1.500 NMAC (incorporating 40 CFR 264.147(b)).

This liability coverage shall be effective before the first receipt of hazardous waste at the Facility, in accordance with Permit Condition 1.10.

2.19 FINANCIAL INCAPACITY OF OWNERS OR OPERATORS, GUARANTORS, OR FINANCIAL INSTITUTIONS

2.19.1 Bankruptcy

The Permittee shall notify the Secretary by certified mail of the commencement of bankruptcy, and the name of any guarantor, within ten days after commencement of the proceeding, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.148(a)).

2.19.2 Other Financial Assurance

The Permittee shall establish other financial assurance or liability coverage within 60 days from the date the trustee or institution issuing the surety bond, letter of credit, or insurance policy declares bankruptcy; otherwise the Permittee shall be deemed to be without the required financial assurance, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.148(b)).

2.20 FINANCIAL RESPONSIBILITY

The Permittee shall maintain financial assurance for both closure and post-closure costs and comply with all applicable requirements of 20 4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart H), and Permit Condition 8.3.

TABLE 2-1

PERMITTED HAZARDOUS WASTES

D Codes[1]	F Codes[2]	K Codes[3]	P Codes[4]	U Codes[5]
D001 - Ignitability[6]	F001-F012	K001-K011	P001-P018	U001-U012
D002 - Corrosivity[6]	F019	K013-K052	P020-P024	U014-U039
D003 - Reactivity[6]	F024-F025	K060-K062	P026-P031	U041-U053
D004-D043	F032	K064-K066	P33-P034	U055-U064
	F034-F035	K069	P036-P051	U066-U099
	F037-F039	K073	P056-P060	U105-U138
		K083-K088	P062-P078	U140-U174
		K090-K091	P081-P082	U176-U194
		K093-K118	P084-P085	U196-U197
		K123-K126	P087-P089	U200-U211
		K131-K132	P092-P099	U213-U223
		K136	P101-P106	U225-U228
		K141-K145	P108-P116	U234-U240
		K147-K151	P118-P123	U243-U244
				U246-U249
				U328
				U353
				U359

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1 Wastes exhibiting the characteristics of ignitability, reactivity, corrosivity, and/or toxicity

2 Wastes from non-specific sources

3 Wastes from specific sources

4 Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof

5 P Code wastes identified as toxic wastes

6 Only those ignitable, corrosive, or reactive wastes that have~~can~~ been treated by permitted methods ~~at the Facility~~ prior to placement in the Landfill shall be accepted.

TABLE 2-2

RECORDKEEPING REQUIREMENTS

PERMIT NUMBER	PERMIT CONDITION
1.9.1	Documents to be Maintained until Completion of Closure
1.9.2	Documents to be Maintained until Completion of Post-Closure Care
2.5.1	General Waste Analysis Requirements
2.5.3.a.ii	Representative Sample Evaluation
2.5.6	Individual Sampling and Analysis Protocols
2.7.3	Recordkeeping - Inspection Logs
2.8.3	Recordkeeping - Personnel Training Documents and Records
2.9.2	Recordkeeping - Precautions for Ignitable, Reactive, or Incompatible Waste
2.10.5	Arrangements with Local Authorities
2.11.2	Copies of the Contingency Plan
2.11.6	Reporting and Recordkeeping - Contingency Plan Implementation
2.12.1	Recordkeeping Requirements
2.12.1.a	Operating Record
2.12.1.b	Facility Notification to Off-Site Generators
2.12.1.c	Generator Notifications and Certifications
2.12.1.d	Manifest Records
2.12.1.e	Waste Analysis for Waste Acceptance

PERMIT NUMBER	PERMIT CONDITION
2.12.1.f	Recordkeeping - 40 CFR 264, Subpart BB Exemption
2.12.1.g	Recordkeeping - 40 CFR 264, Subpart CC Exemption
2.12.1.h	Recordkeeping - 40 CFR 264, Subpart CC Compliance
2.12.1.i	Waste Stream Tracking
2.12.1.j	Waste Minimization Program
2.12.1.k.i	Monitoring Information
2.12.1.l	Corrective Action Records
2.12.1.m	Grid Map
2.12.1.n	Other Records
	~~CONTAINERS~~
~~3.7.1.a~~	~~General Recordkeeping Requirements~~
~~3.7.1.b~~	~~Ignitable or Reactive Wastes~~
~~3.7.1.c~~	~~40 CFR Part 264, Subpart BB and CC Exemptions~~
~~3.7.1.d~~	~~40 CFR 264, Subpart CC Compliance~~
~~3.7.1.e~~	~~40 CFR 264, Subpart CC~~
	~~TANKS~~
~~4.2.6~~	~~Required Certification~~
~~4.7.1.a~~	~~Inspection Records~~
~~4.7.1.b~~	~~Ignitable, Reactive, or Incompatible Wastes~~
~~4.7.1.c~~	~~40 CFR 264, Subpart BB Records~~
~~4.7.1.d~~	~~40 CFR 264, Subpart CC Records~~
	~~SURFACE IMPOUNDMENT~~

PERMIT NUMBER	PERMIT CONDITION
~~5.5.3~~	~~Action Leakage Rate~~
~~5.7.1~~	~~Recordkeeping Requirements~~
~~5.7.1.a~~	~~Inspection Logs~~
~~5.7.1.b~~	~~Ignitable, Reactive, or Incompatible Waste~~
~~5.7.1.c~~	~~LDRS and VZMS Data~~
~~5.7.1.d~~	~~40 CFR 264, Subpart BB Records~~
~~5.7.1.e~~	~~40 CFR 264, Subpart CC Records~~
	LANDFILL
6.7.1	Recordkeeping Requirements
6.7.1.a	Grid "Cell" Location
6.7.1.b	Inspection Logs
6.7.1.c	LDRS, LCRS, and VZMS Monitoring Data
	VADOSE ZONE MONITORING
7.2.4	Well Surveys
7.2.6	Continuous Core
7.2.9	Well Completion Logs
7.3.2	Leachates
7.4.10	Sampling Record
7.7.1	Recordkeeping - General
	CLOSURE / POST-CLOSURE
8.1.11.d	Landfill VZMS Monitoring

PERMIT NUMBER	PERMIT CONDITION
8.3.1.d	Recordkeeping - Cost Estimates for Closure and Post-Closure Care
	CORRECTIVE ACTION FOR REGULATED UNITS
9.5	Recordkeeping - General

TABLE 2-3

REPORTING/CERTIFICATION/NOTIFICATION REQUIREMENTS

PERMIT NUMBER	PERMIT CONDITION
1.2.2	Permit Renewal
1.2.4	Transfer of Permit
1.5.6	Duty to Provide Information
1.5.7	Disclosure Statement
1.5.9.a	Reporting Planned Changes
1.5.9.b	Reporting Anticipated Noncompliance
1.5.9.c.i	Submittal of Construction Certification and As-Built Specifications
1.5.9.d	Twenty-Four Hour and Subsequent Reporting
1.5.9.d.i	Oral Report
1.5.9.d.iii	Written Submission
1.5.9.e	Contingency Plan Implementation
1.5.9.f	Other Noncompliance
1.5.9.g	Other Information
2.3.1	Imported Waste Notification
2.10.5	Notification of Agreements with Local Authorities
2.11.2	Copies of the Contingency Plan
2.11.3	Amendments to the Contingency Plan
2.11.5	Updated Contingency Plan
2.11.5.a	List of Emergency Coordinators
2.11.5.b	Emergency Response Team Members

PERMIT NUMBER	PERMIT CONDITION
2.11.5.c	Evacuation Plan
~~2.11.5.d~~	~~Procedures in Case of Surface Impoundment Failure~~
2.11.5.e	Decontamination of Personnel and Equipment
~~2.11.5.f~~	~~Loss of Electrical Power in the Stabilization Building~~
2.11.6	Reporting and Recordkeeping - Contingency Plan Implementation
2.12.2	Reporting Requirements
2.12.2.a	Biennial Report
2.12.2.b	Quarterly Report
2.12.2.c	Waste Minimization Program Certification
2.12.2.d	Reporting - Noncompliance with the 40 CFR 264, Subpart CC Exemption
2.14.1.b	Manifest Discrepancies
2.14.1.c	Unmanifested Waste Report
2.18	Liability Coverage
2.19	Financial Incapacity
	~~CONTAINERS~~
~~3.7.2.a~~	~~40 CFR 264, Subpart CC Noncompliance~~
	~~TANKS~~
~~4.5.1.b~~	~~Containment of Visible Releases~~
~~4.7.2.a~~	~~Leak or Spill Reporting~~
~~4.7.2.a.i~~	~~Oral Report~~
~~4.7.2.a.ii~~	~~Written Report~~

PERMIT NUMBER	PERMIT CONDITION
~~4.7.2.b~~	~~Reporting Noncompliance - 40 CFR 264, Subpart CC~~
~~4.7.3.b~~	~~Certification Reporting after Major Repairs~~
	~~SURFACE IMPOUNDMENT~~
~~5.7.2.a~~	~~Notification of Sudden Drop in a Pond Liquid Level~~
~~5.7.2.a.i~~	~~Oral Report~~
~~5.7.2.a.ii~~	~~Written Report~~
~~5.7.2.b~~	~~Submittals after ALR Exceedance~~
~~5.7.2.b.i~~	~~Written Notification of ALR exceedance~~
~~5.7.2.b.ii~~	~~Preliminary Assessment~~
~~5.7.2.b.iii~~	~~Data submittal~~
~~5.7.2.c~~	~~Noncompliance with the 40 CFR 264, Subpart CC Exemption Requirements~~
~~5.7.3.b~~	~~Dike Recertification~~
~~5.7.3.c~~	~~Liner Recertification~~
	LANDFILL
6.2.1.f	Access Ramps
6.2.1.g.i	Landfill Stormwater Collection Basin
6.2.1.g.ii	Landfill Contaminated Water Collection Basin Construction and Removal
6.7.2.a	Waste Identification and Location within the Landfill
6.7.2.c	Response Actions
	VADOSE ZONE MONITORING
7.1.2	Duty to Initiate Corrective Action

PERMIT NUMBER	PERMIT CONDITION
7.1.3	Duty to Remove Non-Leachates
7.3.1.a	Time-Frame for Establishment of a Non-Leachate Indicator Parameter List and Baseline Concentrations
7.3.1.b	Reporting - Baseline Values for Non-Leachates
7.3.2.a	Monthly Sampling
7.3.2.b	Biennial Sampling
7.5	Release Assessment
7.6	VZMS Maintenance
7.7.2.a	First Quarterly Report
7.7.2.b	Quarterly Reports
7.7.2.c	Biennial Report
7.7.2.d	Special Reports
	CLOSURE / POST-CLOSURE
8.1.3.a	Notification of Closure
8.1.5	Closure Certification
8.1.6	Survey Plat
8.1.7.a	Sampling Records
8.1.7.b	Quarterly Reports
8.1.7.c	Final Closure Report
~~8.1.10.b~~	~~Surface Impoundment Permit Modification~~

PERMIT NUMBER	PERMIT CONDITION
8.1.10.c	Permit Modification for Closure as a Landfill
8.1.11.b	Landfill Permit Modification
8.2.2	Post-Closure Care Plan Modification
8.2.2.a	Amendment When necessary
~~8.2.2.b~~	~~Surface Impoundment Post-Closure Care Plan Modification~~
~~8.2.2.c~~	~~Tank System post-Closure Care Plan Modification~~
8.2.8	Annual Reports
8.2.9	Certification of Post-Closure Care Completion
8.2.11	Post-Closure Notices
8.2.11.b.i	Record of Notation
8.2.11.b.ii	Certification of Deed Notification
8.2.12	Removal of Hazardous Materials
8.3.1.a	Latest Closure Cost Estimates
8.3.2	Financial Assurance for Closure and Post-Closure Care
	CORRECTIVE ACTION FOR REGULATED UNITS
9.3.1	Notification of Release
9.3.2	Verification Sampling Report
9.3.3.a	Immediate Response Action Report
9.3.3.b	Response Action Effectiveness Report
9.3.4	Independent Assessment
9.3.6	Monthly Corrective Action Progress Report
9.3.7	Regulated Unit Investigation Work Plan

PERMIT NUMBER	PERMIT CONDITION
9.3.8	Ground Water Monitoring Work Plan
	CORRECTIVE ACTION FOR SWMUs
10.1.2	Notification of Newly Discovered SWMUs and AOCs
10.2	Facility Corrective Action Work Plan
10.3.2	Background Soil Concentrations Work Plan
10.4.1	Notification of Newly Discovered SWMUs and AOCs
10.4.2	Notification of a Release From a SWMU or AOC
10.4.3	SWMU Assessment Report
10.5.1	Notification of a Release
10.6.1	Confirmatory Sampling Work Plan
10.6.4	Confirmatory Sampling Report
10.7.1	RCRA Facility Investigation Work Plan
10.7.3.a	RCRA Facility Investigation Report
10.7.5	Quarterly Reports
10.8.1	Interim Measures Work Plan
10.8.3.a	Interim Measures Progress Report
10.8.3.b	Interim Measures Final Report
10.9.1	Corrective Measures Study Work Plan
10.9.3	Corrective Measures Study Final Report
10.10.2	Financial Assurance Report
10.10.4	Permit Modification for Completion of Corrective Action
10.11	Ground Water Monitoring Work Plan

~~Permit Part 3~~

~~HAZARDOUS WASTE STORAGE IN CONTAINERS~~

~~HIGHLIGHTS~~

~~This Part contains conditions for storage of hazardous waste in containers at the Triassic Park Waste Disposal Facility (the Facility). Conditions are included for the maximum volumes and kinds of waste that can be stored in containers and for management and closure of the container storage units. Standards for construction and for operation and maintenance of the storage units are also included.~~

~~Container storage consists of two permitted areas: the Drum Handling Unit and the Roll-Off Container Storage Area. The location of the container storage units within the Facility is provided at Permit Attachment L1, *Engineering Drawings*, Drawing No. 4. Information on construction and management of hazardous waste in the container storage areas is provided at Permit Attachments A, *General Facility Description and Information*, Section 2.2, *Container Storage Areas*; and L, *Engineering Report*, Sections 5.0, *Truck Roll-Off Area*, and 7.0, *Drum Handling Facility*.~~

~~The Drum Handling Unit is an open-sided building with a roof that extends over the entire floor and truck docking area. The 49,265 square feet total floor area contains 7 drum storage cells, with each cell capable of storing 160 55-gallon drums. Ignitable, reactive, or incompatible wastes are segregated in separate cells as specified at Permit Attachment A, Section 2.2. Two of the cells are designated for storage of polychlorinated biphenyl (PCB)-contaminated waste and are isolated from the other drum storage cells by a 6-inch high by 41-inch wide berm that surrounds the PCB cells. The remaining five cells are also separated by berm walkways. The drums are placed in four rows, two drums deep, and two 12-foot wide aisles provide access for the forklift to place and remove drums.~~

~~The base of the Drum Handling Unit consists of a compacted subgrade of non-swelling soils, a 60-mil high-density polyethylene (HDPE) geomembrane liner, cushion geotextile, and one foot of foundation sand underlying the building floor. The floor is constructed of steel-reinforced cast-in-place concrete covered by a chemical-resistant epoxy coating. The floor serves as the primary containment system.~~

~~The floor of each cell slopes towards a trench covered by steel grating. Each trench leads to a dual sump system for that cell where any spilled liquids can be collected and removed. The trench and sump system incorporates a geomembrane liner, leak detection and removal system (LDRS), and leachate collection and removal system (LCRS). The leachate collection sump and drain system has a total fluid capacity of 2,110 gallons, which exceeds the required ten percent (880 gallons) of allowable container volume (160 55-gallon drums or 8,800 gallons) for each cell.~~

~~The Roll-Off Container Storage Area is an uncovered, single-lined system consisting of a prepared subgrade, a geomembrane underliner, a geonet drainage layer, a geotextile filter layer, a soil subbase layer, and a surface gravel layer. The Area is surrounded by a berm with a height ranging from two to eight feet. This berm diverts run-on surface water around the perimeter of the truck roll-off area. The storage areas are accessed by 20-foot-wide compacted soil ramps at the center of each cell. Culverts under each of the access ramps allow surface water flow to the west toward the run-off Stormwater Detention Basin. The Area consists of two cells that are separated by a berm with a minimum interior height of two feet. Each cell is approximately 310 feet long by 180 feet wide and can stage 66 40-cubic yards roll-off containers.~~

~~The west cell (the Incoming Waste Cell), approximately one-half of the area, holds tarped, U.S. Department of Transportation (DOT)-approved, lined roll-off containers holding non-stabilized hazardous waste prior to treatment. Each container and its plastic bed liner comprise a double-lined system.~~

~~Secondary containment consists of a berm surrounding the Incoming Waste Cell, sloping floor, and sump incorporated into the drainage layer for leak detection and removal. The sump system has a total fluid capacity of 1,406 gallons, which exceeds the required ten percent of allowable container volume. The Roll-Off Storage Area drainage sump is monitored visually to determine whether pumping is required. Precipitation collected in the sump is removed by vacuum truck.~~

~~Waste is characterized and screened as part of the waste acceptance procedures. Roll-off containers are inspected for free liquids prior to acceptance at the Incoming Waste Cell. Free liquids detected are removed and stabilized. Roll-Offs containing free liquids are not stored in the Truck Roll-Off Area.~~

~~The east cell (the Stabilized Waste Cell) serves as a staging area for roll-off bins containing post-treatment stabilized waste awaiting landfill disposal approval. Construction is identical for the west and east cells.~~

~~Waste is transferred to both cells by generator or Facility trucks. After delivery, the trucks are decontaminated, if necessary, at the Truck Wash Area, which is operated as a RCRA 90-day storage area.~~

~~Hazardous waste containing volatile organic concentrations equal to or greater than 500 parts per million by weight (ppmw) is permitted for storage in containers, provided that these containers are managed in compliance with the Container Level 1 or Level 2 standards required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1086). This waste goes directly from the storage areas to the Landfill for final disposal; therefore, waste containing volatile organics which are permitted to be stored in this area is restricted to waste that, upon acceptance at the Facility, already meets the Land Disposal Restrictions (LDR) treatment standards and that does not contain free liquids. Wastes requiring Container Level 3 management are not permitted for management at the Facility.~~

~~3.1 GENERAL REQUIREMENTS FOR CONTAINER STORAGE~~

~~3.1.1 Permitted Storage in Drums~~

~~The Permittee shall store hazardous waste in drums only in cells at the Drum Handling Unit, as identified at Table 3-1, *Permitted Drum Storage Unit*, and as specified at Permit Attachment A, Section 2.2.1.3, *Storage Limits*. The volume of hazardous waste that may be stored in the Drum Handling Unit is limited to the maximum capacity identified at Table 3-1, and as specified at Permit Attachment A, Section 2.2.1.3.~~

~~The Drum Handling Unit, as identified in Table 3-1, is one permitted unit.~~

~~3.1.2 Permitted Storage in Roll-Off Containers~~

~~The Permittee shall store hazardous waste in roll-off containers or roll-off container equivalents only in the Roll-Off Container Storage Unit, as identified at Table 3-2, *Permitted Roll-Off Container Storage Unit*, and as specified at Permit Attachment A, Section 2.2.2.3, *Storage Limits*. The volume of hazardous waste that may be stored in the Roll-Off Container Storage Unit is~~

~~limited to the maximum capacity identified at Table 3-2, and as specified at Permit Attachment A, Section 2.2.2.3.~~

~~The Roll-Off Container Storage Unit, as identified in Table 3-2, is one permitted unit.~~

~~3.1.3 Permitted Wastes in Containers~~

~~The Permittee shall store in containers only those hazardous wastes identified at Table 2-1, *Permitted Hazardous Wastes*, subject to the prohibitions contained at Permit Condition 3.1.4.~~

~~3.1.4 Prohibited Wastes in Containers~~

~~3.1.4.a General Waste Prohibition~~

~~The Permittee is prohibited from storing in containers those wastes identified at Permit Condition 2.4.2 and Permit Attachment F, *Waste Analysis Plan*, Section 4.1.2, *Prohibited Waste*.~~

~~3.1.4.b Polychlorinated Biphenyl-Contaminated Waste~~

~~The Permittee may store PCB-contaminated waste, as identified at Permit Condition 2.4.1.b, in the Container Storage Areas.~~

~~3.2 CONTAINER STORAGE AREAS CONSTRUCTION~~

~~3.2.1 Construction Requirements~~

~~The Permittee shall construct the Drum Handling Unit and loading dock area, and the Roll-Off Container Storage Area, as specified at Permit Attachments A, Sections 2.2.1, *Drum Handling Unit*, and 2.2.2, *Roll-Off Storage Area*; L, Sections 5.0 and 7.0; L1, Drawings Nos. 37 through 39 and 41 through 43; and L2, *Specifications for Landfill, Surface Impoundment and Associated Facilities Liner and Cover System Construction*.~~

~~3.2.2 Secondary Containment~~

~~The Permittee shall construct and operate the secondary containment systems for each cell in the Drum Handling Unit, including the LDRSs and LCRSs, and the secondary containment system, including the LDRS, for the Roll-Off Container Storage Unit, as specified at Permit Attachments A, Sections 2.2.1.1, *Containment and Detection of Releases [Drums]*, and 2.2.2.1, *Containment and Detection of Releases [Roll-Off Containers]*; L, Sections 5.0 and 7.0; L1, Drawings Nos. 39 and 43; and L2; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.175).~~

~~3.2.3 Berms~~

~~The Permittee shall construct and maintain the earthen berms surrounding the Truck Roll-Off Storage Area so that there are no cracks or gaps that could adversely impact the integrity of the secondary containment system, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.175). The Permittee shall construct the perimeter berm so that the berm is from 2 to 10 feet high and slopes at 3H:1V to the floor of the Roll-Off Storage Area, as specified at Permit Attachments L, Sections 5.1.1, *General*, and 5.1.2, *Truck Roll-Off Area Layout*; and L1, Drawing No. 41. The Permittee shall construct this berm and the separator berm between the two storage cells as shown at Permit Attachment L1, Drawing No. 41 (1 and 2 of 2), and using the appropriate construction specifications contained at Permit Attachment L2.~~

~~3.3 GENERAL OPERATING REQUIREMENTS FOR CONTAINERS~~

~~The Permittee shall manage containers as specified at Permit Attachment A, Section 2.2; and as required by 20.4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart I).~~

~~3.3.1 DOT Requirements~~

~~The Permittee shall use only containers that comply with the requirements for DOT shipping container regulations, 49 CFR Part 173, *Shippers – General Requirements for Shipment and Packaging*, and 49 CFR Part 178, *Specifications for Packagings*, for container storage of hazardous waste.~~

~~3.3.2 Acceptable Storage Containers~~

~~The Permittee is prohibited from storing hazardous waste in any container other than the following, as specified at Permit Attachment A, Section 2.2.8, *Types of Containers*.~~

~~3.3.2.a Drums~~

~~The Permittee shall use standard 55-gallon drums with a gross internal volume of 7.3 cubic feet, 35-gallon (4.64 cubic feet) drums, or 10-gallon (1.23 cubic feet) drums. Overpack drums may be used as necessary.~~

~~3.3.2.b Roll-Off Boxes~~

~~The Permittee shall use only 40 cubic yards or similar roll-off boxes.~~

~~3.3.3 Condition of Containers~~

~~The Permittee shall manage containers as specified at Permit Attachment A, Section 2.2.10, *Condition of Containers*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.171). If a container holding hazardous waste is not in good condition (e.g., has severe rusting or apparent structural defects) or if it begins to leak, the Permittee shall transfer the hazardous waste from such a container to a container that is in good condition.~~

~~3.3.4 Compatibility of Wastes with Containers~~

~~The Permittee shall use containers made of, or lined with, materials that shall not react with, and are otherwise compatible with, the hazardous waste to be stored, so that the ability of the container to contain waste is not impaired, as specified at Permit Attachment A, Section 2.2.11, *Compatibility with the Container*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.172).~~

~~3.3.5 Management of Containers~~

~~The Permittee shall keep all containers closed during storage, except when it is necessary to add or remove waste. The Permittee shall not open, handle, or store containers in a manner that may rupture the container or cause it to leak, as specified at Permit Attachment A, Section 2.2.10; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.173).~~

~~3.3.6 Placement of Containers~~

~~3.3.6.a Drum Handling Facility~~

~~The Permittee shall store containers in the Drum Storage Unit in four rows, no more than two drums deep, as specified at Permit Attachments L, Section 7.1.2, *Facility Layout*; and L1, Drawing No. 37.~~

~~3.3.6.b Placement Limitations~~

~~The Permittee shall ensure that containers are not placed in the Roll-Off Container Storage Area within the limits potentially inundated by the 25-year, 24-hour storm event, or within four feet of the edge of the berm, as specified at Permit Attachment A, Section 2.2.2; and as shown at Permit Attachment L1, Drawing No. 41.~~

~~The Permittee shall remove any accumulated water from the Roll-Off Container Storage Area after each rainfall event, as specified at Permit Attachment L, Section 5.1.1.~~

~~3.3.7 Minimum Aisle Space~~

~~The Permittee shall maintain a minimum 2.5-foot aisle space between the double rows of drums in the Drum Handling Building such that each drum can be visually inspected. Drums shall be stored in single rows if they are placed against a wall or other barrier that prohibits inspection from all sides. The Permittee shall place roll-off containers four feet apart and four feet from the edge of the berm, as specified at Permit Attachment A, Section 2.2.13, *Aisle Space*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.35).~~

~~3.3.8 Labeling of Containers~~

~~The Permittee shall label each storage container with a hazardous waste label identifying the contents, as specified at Permit Attachment A, Section 2.2.9, *Labels*. The label shall be clearly marked to indicate the date of receipt or accumulation. The label shall not be obscured from view during storage.~~

~~3.3.9 Cell Identification~~

~~The permitted Facility storage cells shall be clearly identified. At a minimum, storage cell information signs shall be posted to be clearly visible on the storage cells, indicating "RCRA PERMIT CELL X". The Permittee shall ensure that drum storage cells and roll-off containers holding ignitable, reactive, or incompatible wastes, or PCB-contaminated wastes, are clearly identified.~~

~~3.3.10 Storage Time Limit~~

~~The Permittee shall not store wastes restricted from land disposal in containers for longer than one year unless the Permittee can demonstrate that such storage is solely for the purpose of accumulating such quantities of hazardous waste as are necessary to facilitate proper treatment or disposal, as specified at Permit Attachment A, Section 2.1.3, *Waste Staging/Storage*; and as required by 20.4.1.800 NMAC (incorporating 40 CFR 268.50(c)).~~

~~3.3.11 PCB-Contaminated Wastes~~

~~Drums holding wastes contaminated with PCBs shall be stored only in the two cells in the Drum Handling Building designated for that purpose, as specified at Permit Attachment A, Section 2.2.1.3; and as identified at Permit Attachment L1, Drawing No. 37.~~

~~3.3.12 40 CFR 264, Subpart CC~~

~~3.3.12.a Repair - Containers Using Container Level 1 Standards~~

~~If a defect is detected in a container using Container Level 1 standards in accordance with Permit Condition 3.11.2.c, then the Permittee shall repair the defect as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1086(c)(4)(iii)).~~

~~3.3.12.b Repair - Containers Using Container Level 2 Standards~~

~~If a defect is detected in a container that is being managed using Container Level 2 standards in accordance with Permit Condition 3.11.2.d, then the Permittee shall repair the defect as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1086(d)(4)(iii)).~~

~~3.4 WASTE ANALYSIS - COMPLIANCE WITH 40 CFR 264, SUBPARTS BB AND CC DETERMINATION~~

~~The Permittee shall comply with the requirements of Permit Conditions 2.5 (*Waste Analysis Plan*), 2.15.1.b (*Waste Determination*), 2.15.2.b (*Initial Waste Determination*), and 2.15.2.c (*Waste Determination After Process Change*) for each waste stream in each container. This determination may include documentation that the waste is exempt from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subparts BB and CC), as provided at 20.4.1.500 (incorporating 40 CFR 264.1063(d) and 264.1082(c)). When waste testing for average volatile organic concentration has not been performed or has not been completed, the Permittee shall manage the container in accordance with Permit Condition 3.11 until the waste average volatile organic concentration is determined.~~

~~3.5 MANAGEMENT OF LEAKS OR SPILLS~~

~~Upon detection of a spill or release at the Container Storage Units to either the surface environment or a leak detection~~

~~system, the Permittee shall respond as specified at Permit Attachment C, *Contingency Plan*, Section 6.3.5.2, *Spills, Leaks, or Other Releases Control Procedure*, and shall make a determination in accordance with Permit Attachment F, *Waste Analysis Plan*, Sections 4.6, *Sampling Plan*, and 4.5.6, *Waste Analysis Requirements for Waste Generated On Site*, to identify the nature and concentration of all waste constituents. The Permittee shall select an appropriate method of treatment and/or disposal, and shall initiate procedures for removal in a timely manner, as specified at Permit Attachment A, Sections 2.2.1.1 and 2.2.2.1.~~

~~3.6 INSPECTION SCHEDULES AND PROCEDURES~~

~~3.6.1 Inspection Procedures~~

~~The Permittee shall inspect the Container Storage Units and loading dock area to ascertain the condition of containers and secondary containment, safety equipment, and aisle space at least weekly, as specified at Permit Attachments D, *Inspection Procedures*, Section 5.2.4, *Container Storage Area Inspection Procedures*; and D1, *Inspection Schedules and Checklists*; to detect leaking containers and deterioration of the containment system caused by corrosion and other factors, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.174).~~

~~3.6.2 LDRS/LCRS at the Drum Handling Unit~~

~~The Permittee shall inspect the LDRS and LCRS sumps at the Drum Handling Unit at least weekly for the presence of liquid, and shall otherwise manage any liquids present in the sumps, as specified at Permit Attachments A, Section 2.2.1.1; D, Section 5.2.4; and D1. Pumpable quantities of liquid shall be removed by vacuum truck in a timely manner.~~

~~3.6.3 LDRS at the Roll-Off Container Storage Unit~~

~~The Permittee shall inspect the LDRS sumps at the Roll-Off Container Storage Unit at least weekly for the presence of liquid, and shall otherwise manage any liquids present in the sumps as specified at Permit Attachments A, Section 2.2.2.1; D, Section 5.2.4; and D1. Pumpable quantities of liquid shall be removed in a timely manner.~~

~~3.6.4 Inspection for Compliance with 40 CFR 264, Subpart CC~~

~~3.6.4.a Inspection for Containers Using Container Level 1 Standards~~

~~The Permittee shall inspect containers that use Container Level 1 controls, and their covers and closure devices, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1086(c)(4)(i) and (c)(4)(ii). Inspection shall be at first acceptance of containers if the container is not emptied within 24 hours of acceptance. Inspection shall include determination of the existence of any visible cracks, holes, gaps, or other open spaces. Defects shall be repaired by the Permittee in accordance with the requirements of Permit Condition 3.3.12.a.~~

~~3.6.4.b Inspection for Containers Using Container Level 2 Standards~~

~~The Permittee shall inspect containers that use Container Level 2 controls, and their covers and control devices, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1086(d)(4)(i) and (d)(4)(ii)). Inspection shall be at first acceptance of containers if the container is not emptied within 24 hours of acceptance. Inspection shall include determination of the existence of any visible cracks, holes, gaps, or other open spaces. Defects shall be repaired by the Permittee in accordance with the requirements of Permit Condition 3.3.12.b.~~

~~3.7 RECORDKEEPING AND REPORTING~~

~~3.7.1 Recordkeeping~~

~~3.7.1.a General Recordkeeping Requirements~~

~~The Permittee shall keep inspection records, container storage waste analyses and other documentation pertaining to compliance, and records of maintenance performed, in the Operating Record, as specified at Permit Attachment N, *Operations and Maintenance Plan*, Section 3.8.1, *Records*; and in accordance with Permit Condition 2.7.3.~~

~~3.7.1.b Ignitable, Reactive, or Incompatible Waste~~

~~The Permittee shall document and place in the Operating Record evidence of compliance with the requirements for ignitable, reactive, or incompatible wastes contained at Permit Conditions 3.8 and 3.9, including the results of all waste analyses, trial~~

~~tests, and any other documentation showing compliance, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(c) and 264.73(b)(3)).~~

~~3.7.1.c 40 CFR 264, Subparts BB and CC Exemptions~~

~~The Permittee shall maintain in a log kept at the Facility all the information necessary to determine exemption from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subparts BB and CC), in accordance with Permit Conditions 2.12.1.f and 2.12.1.g.~~

~~3.7.1.d 40 CFR 264, Subpart CC Compliance~~

~~For containers that fall under Container Level 1 standards in accordance with Permit Condition 3.11.2.c.ii that do not meet the applicable DOT regulations on packaging hazardous materials for transportation specified at 20.4.1.500 NMAC (incorporating 40 CFR 264.1086(f)), the Permittee shall maintain at the Facility a copy of the procedures used to determine that these containers are not managing hazardous waste in light material service, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1086(c)(5).~~

~~3.7.1.e 40 CFR 264, Subpart CC~~

~~The Permittee shall prepare and maintain in the Operating Record for a minimum of three years the information used for each waste determination required at Permit Condition 2.12.1.g (e.g., test results, measurements, calculations, and other documentation), as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1089(a), (f)(1), and/or (h)).~~

~~3.7.2 Reporting~~

~~3.7.2.a 40 CFR 264, Subpart CC Noncompliance~~

~~The Permittee shall report to the Secretary each occurrence when hazardous waste is stored in a storage area in noncompliance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), in accordance with Permit Condition 2.12.2.d.~~

~~3.8 SPECIAL PROVISIONS FOR IGNITABLE OR REACTIVE WASTE~~

~~3.8.1 Procedures for Ignitable or Reactive Waste~~

~~The Permittee shall not store ignitable or reactive waste in a container unless the procedures specified at Permit~~

~~Attachments A, Section 2.2.5, *Ignitable/Reactive Wastes*; and B, *Procedures to Prevent Hazards*, Section 5.5, *Precautions to Prevent Ignition or Reaction of Ignitable, Reactive, or Incompatible Wastes*; are followed, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(a) and (b)).~~

~~3.8.2 Protective Distances~~

~~Ignitable or reactive waste in drums stored in the Drum Handling Unit shall be stored only in a cell clearly marked for ignitable or reactive waste. Containers holding ignitable or reactive waste shall not be located within 50 feet of the Facility's property line, as specified at Permit Attachment A, Section 2.2.5, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.176).~~

~~3.9 SPECIAL PROVISIONS FOR INCOMPATIBLE WASTE~~

~~3.9.1 Separation of Incompatible Wastes~~

~~The Permittee shall not place incompatible wastes, or incompatible wastes and materials, in the same container, as specified at Permit Attachment B, Section 5.5.3, *Incompatible Waste Handling*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.177(a)).~~

~~3.9.2 Unwashed Containers~~

~~The Permittee shall not place hazardous waste in an unwashed container that previously held an incompatible waste or material, as specified at Permit Attachment A, Section 2.2.11; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.177(b)).~~

~~3.9.3 Segregation of Containers with Incompatible Wastes~~

~~Hazardous waste containers in Container Storage Areas shall be segregated by waste type and compatibility, as specified at Permit Attachment B, Section 5.5.3; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.177(c)).~~

~~3.10 HEALTH AND SAFETY~~

~~The Permittee shall ensure that supplied air respirator systems are available for use as necessary for Facility personnel involved with drum sampling and decanting activities at the Drum~~

~~Handling Unit, as specified at Permit Attachment L, Section 7.1.2.~~

~~3.11 40 CFR 264, SUBPARTS BB AND CC~~

~~3.11.1 Wastes Containing Concentrations of Organic Compounds Greater than Ten Percent by Weight~~

~~The Permittee shall not manage in any equipment such as pumps, compressors, pressure relief devices, sampling equipment, connecting systems, and valves, any hazardous waste with organic concentrations equal to or greater than ten percent by weight, as specified at Permit Attachment G, *Air Quality*, Section 11.2, *40 CFR 264 Subpart BB – Air Emission Standards for Equipment Leaks*; and in accordance with Permit Condition 2.4.2.a.~~

~~3.11.2 40 CFR 264, Subpart CC~~

~~3.11.2.a Compliance~~

~~The Permittee shall manage containers containing hazardous wastes with an average volatile organic concentration at the point of waste origination equal to or greater than 500 ppmw, or with an unknown or undocumented concentration, as required by 4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC).~~

~~3.11.2.b Exemptions~~

~~3.11.2.b.i Volatile Organic Concentration~~

~~Containers containing hazardous waste with an average volatile organic concentration at the point of waste origination of less than 500 ppmw are exempt from compliance with the standards set forth in 20.4.1.500 NMAC (incorporating 40 CFR 264.1084 through 1087), in accordance with 4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(1)). Hazardous wastes with unknown or undocumented average volatile organic concentration at the point of waste origination are not exempt from compliance under these requirements.~~

~~3.11.2.b.ii Compliance with LDR Treatment Standards~~

~~Containers containing any of the following waste are exempt from compliance with 4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), in accordance with 4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(4)):~~

- ~~organic waste that meets the numerical concentration limits for organic hazardous constituents, applicable to the hazardous waste, as specified under the Table "Treatment Standards for Hazardous Wastes" contained in 4.1.800 NMAC (incorporating 40 CFR 268.40);~~

- ~~organic waste that has been treated by the treatment technology established for the waste in 4.1.800 NMAC (incorporating 40 CFR 268.42(a); or~~

- ~~organic waste that has been treated by an equivalent method approved by the Secretary.~~

~~3.11.2.b.iii Design Capacity~~

~~Containers that have a design capacity less than or equal to 0.1 cubic meter (approximately 26 gallons) are exempt from compliance with 4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), as set forth in 4.1.500 NMAC (incorporating 40 CFR 264.1080(a) and (b)(2)).~~

~~3.11.2.c Container Level 1 standards~~

~~3.11.2.c.i Design Capacity Less than or Equal to 0.46 Cubic Meter~~

~~Containers having a design capacity greater than 0.1 cubic meter and less than or equal to 0.46 cubic meter (approximately 120 gallons) and containing waste with either undocumented volatile organic concentrations or having a measured average volatile organic concentration at the point of waste origination of equal to or greater than 500 ppmw shall be managed in accordance with the Container Level 1 standards specified at 4.1.500 NMAC (incorporating 40 CFR 264.1086(c)); and as required by 4.1.500 NMAC (incorporating 40 CFR 264.1086(b)(1)(i)).~~

~~3.11.2.c.ii Design Capacity Greater than 0.46 Cubic Meter~~

~~Containers having a design capacity greater than 0.46 cubic meter that are not in light material service and that contain waste with an average volatile organic concentration at the point of waste origination equal to or greater than 500 ppmw shall be managed in accordance with the Container Level 1 standards specified at 4.1.500 NMAC (incorporating 40 CFR 264.1086(c)); and as required by 4.1.500 NMAC (incorporating 40 CFR 264.1086(b)(1)(ii)).~~

~~3.11.2.d 40 CFR Part 264, Subpart CC Level 2 Standards~~

~~Containers having a design capacity greater than 0.46 cubic meter that are in light material service and that contain waste with an average volatile organic concentration at the point of waste origination equal to or greater than 500 ppmw shall be managed in accordance with the Container Level 2 standards specified at 4.1.500 NMAC (incorporating 40 CFR 264.1086(d)); and as required by 4.1.500 NMAC (incorporating 40 CFR 264.1086(b)(1)(iii)). Containers having a design capacity greater than 0.46 cubic meter that contain waste for which the condition of light material service is unknown or undocumented shall be managed by the Permittee as though the waste were in light material service, until analysis of the waste demonstrates otherwise.~~

~~3.12 CLOSURE~~

~~The Permittee shall conduct closure activities for the Drum Handling Unit and/or the Roll-Off Container Storage Unit as specified at Permit Attachment O, *Closure Plan*, Sections 8.1.1, *Drum Handling Unit*, and 8.1.5, *Roll-Off Storage Area*, and other pertinent sections; and in accordance with Permit Part 8; and as required by 20.4.1.500 NMAC, (incorporating 40 CFR 264.178). The Permittee shall follow the time frame for closure specified at Permit Attachment O1, *Compliance Schedules for Closure*.~~

~~**TABLE 3-1**~~

~~**PERMITTED DRUM STORAGE UNIT**~~

~~**CELL**~~	~~**DIMENSIONS**~~	~~**MAXIMUM ALLOWABLE CAPACITY**~~
~~Cell 1; secondary containment; sump; Drum Handling Building; loading dock area~~	~~52 feet by 63 feet~~	~~160 55-gallon drums or equivalent (8,800 gallons)~~
~~Cell 2; secondary containment; sump~~	~~52 feet by 63 feet~~	~~160 55-gallon drums or equivalent (8,800 gallons)~~
~~Cell 3; secondary containment; sump~~	~~52 feet by 63 feet~~	~~160 55-gallon drums or equivalent (8,800 gallons)~~
~~Cell 4; secondary containment; sump~~	~~52 feet by 63 feet~~	~~160 55-gallon drums or equivalent (8,800 gallon)~~
~~Cell 5; secondary containment; sump~~	~~52 feet by 63 feet~~	~~160 55-gallon drums or equivalent (8,800 gallon)~~
~~Cell 6; secondary containment; sump~~	~~52 feet by 63 feet~~	~~160 55-gallon drums or equivalent (8,800 gallon)~~
~~Cell 7; secondary containment;~~	~~52 feet by 63 feet~~	~~160 55-gallon drums or equivalent (8,800~~

~~CELL~~	~~DIMENSIONS~~	~~MAXIMUM ALLOWABLE CAPACITY~~
~~sump~~		~~gallon)~~
~~TOTAL~~		~~1,120 55-gallon drums or equivalent (61,600 gallons)~~

~~**TABLE 3-2**~~

~~**PERMITTED ROLL-OFF CONTAINER STORAGE UNIT**~~

~~**CELL**~~	~~**DIMENSIONS**~~	~~**MAXIMUM ALLOWABLE CAPACITY**~~
~~Incoming Waste Cell; secondary containment; sump, cell base; berms~~	~~180 feet by 310 feet (inside dimensions)~~	~~66 40-cubic yard roll-off containers or roll-off container equivalent~~
~~Stabilized Waste Cell; secondary containment; sump; cell base~~	~~180 feet by 310 feet (inside dimensions)~~	~~66 40-cubic yard roll-off containers or roll-off container equivalent~~
~~**TOTAL**~~		~~**132 40-cubic yard roll-off containers or roll-off container equivalents**~~

~~Permit Part 4~~

~~HAZARDOUS WASTE STORAGE AND TREATMENT IN TANKS~~

~~HIGHLIGHTS~~

~~This Part contains conditions for storage and treatment of hazardous waste in tanks at the Triassic Park Waste Disposal Facility (the Facility). Permitted waste that can be stored or treated in tanks is identified at Permit Condition 2.4.1 and Table 2-1, *Permitted Waste*. Waste that is prohibited is identified at Permit Condition 2.4.2.~~

~~Hazardous waste at the Facility is stored in tanks located in the Liquid Waste Receiving and Storage Tank Area. Hazardous waste is treated in tanks located in the Stabilization Tank Building. The location of these units within the Facility is provided at Permit Attachment L1, *Engineering Drawings*, Drawing No. 4, *Facility Layout*.~~

~~Tank storage consists of four aboveground tanks. Only liquids are stored in tanks. Each of the four tanks is double-walled and constructed of high-density polyethylene materials. The outer wall provides secondary containment for the tank. Each outer tank has sufficient capacity to contain 100 percent of the contents of the inner tank in the event of tank failure. The Liquid Waste Tank Storage Area has a coated concrete pad beneath the tanks and has no roof or walls. The concrete floor for each tank slopes to a collection sump. Spill prevention is maintained by hard-plumbed piping, dry disconnect coupling, and/or overfill prevention controls. Storage in tanks is discussed at Permit Attachment A, *General Facility Description and Information*, Section 2.3, *Storage in Tanks*.~~

~~Liquids are transferred directly from off-site tanker trucks, or from the Drum Handling Unit or the Roll-Off Container Storage Area (Incoming Waste Cell), to the Storage Tanks. Liquids are transferred by transfer truck from the Liquid Waste Storage Tanks to a Stabilization Tank or the Surface Impoundment for treatment.~~

~~The Stabilization Area consists of a building containing four in-ground double-lined steel Stabilization Tanks and a control room. The tanks are double-walled steel tanks contained in a concrete vault for additional support. The outer wall of the vault provides additional containment for the tanks. Corrosion protection consists of cathodic grounding of the tanks. Outside~~

~~the building are two dry reagent silos, a water tank, and exhaust air bag house. Air particulates are removed and collected into the bag house prior to venting air emissions from the building. Treatment in tanks is discussed at Permit Attachment A, Section 2.4, *Stabilization.*~~

~~Treatment consists of solidification of the waste by mixing with dry or liquid reagents. Wastes are tested prior to stabilization in the tanks to determine the appropriate reagent and compatibility with the tanks. Reagent is added to the tank by a backhoe. Bulk liquids, sludges, and solids that do not meet Land Disposal Restriction (LDR) standards, as well as solids that may contain free liquids, are treated.~~

~~Hazardous waste is off-loaded directly from off-site transport trucks, or from trucks coming from the Container Storage Areas or Liquid Waste Storage Tanks, into the Stabilization Tanks. After stabilization, the waste is transferred to a roll-off container and either stored in the Roll-Off Container Storage Area (Stabilized Waste Cell) to cure or transferred directly to the Landfill.~~

~~In order to maintain exemption for the Liquid Waste Storage Tanks and Stabilization Tanks from compliance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart BB), as specified at Permit Attachment G, *Air Quality*, Section 11.2, *40 CFR 264 Subpart BB – Air Emission Standards for Equipment Leaks*, no hazardous waste with an organic concentration equal to or greater than ten percent by weight is permitted to be placed in the Liquid Waste Storage Tanks or Stabilization Tanks.~~

~~In order to maintain exemption for the Liquid Waste Storage Tanks and Stabilization Tanks from compliance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), as specified at Permit Attachment G, Section 11.3, *40 CFR Subpart CC – Air Emissions Standards for Tanks, Surface Impoundments and Containers*, no hazardous waste that has an average volatile concentration at the point of waste origination equal to or greater than 500 parts per million by weight (ppmw) is permitted to be placed in the Liquid Waste Storage Tanks or Stabilization Tanks.~~

~~4.1 GENERAL REQUIREMENTS FOR TANKS~~

~~4.1.1 Permitted Storage in Tanks~~

~~The Permittee shall store liquid hazardous wastes in tanks only in the four Liquid Waste Storage Tanks identified at Table 4-1, *Permitted Liquid Waste Storage Tanks*, as specified at Permit Attachment A, Section 2.3. The volume of liquid hazardous waste stored in each tank is limited to the capacity identified at Table 4-1, as specified at Permit Attachment A, Section 2.3.~~

~~Each Liquid Waste Storage Tank is one permitted unit, as identified at Table 4-1.~~

~~4.1.2 Permitted Treatment in Tanks~~

~~The Permittee shall treat hazardous waste in tanks only in the four Stabilization Tanks, identified at Table 4-2, *Permitted Treatment Tanks*, as specified at Permit Attachment A, Section 2.4. Quantities of hazardous waste treated in each bin are limited to the maximum capacities identified at Table 4-2, as further specified at Permit Attachment A, Section 2.4.~~

~~Each Stabilization Tank is one permitted unit, as identified at Table 4-2.~~

~~4.1.3 Permitted Wastes in Tanks~~

~~The Permittee shall store or treat in tanks only those wastes identified at Permit Condition 2.4.1, subject to the prohibitions contained at Permit Condition 4.1.4.~~

~~4.1.4 Prohibited Wastes in Tanks~~

~~4.1.4.a General Waste Prohibition~~

~~The Permittee is prohibited from storing or treating in tanks those wastes identified at Permit Condition 2.4.2 and Permit Attachment F, *Waste Analysis Plan*, Section 4.1.2, *Prohibited Waste*.~~

~~4.1.4.b Wastes Containing Concentrations of Organic Compounds Greater than Ten Percent by Weight (40 CFR 264, Subpart BB)~~

~~The Permittee shall not manage in any equipment, tanks, or piping any hazardous waste with organic concentrations equal to or greater than ten percent by weight, pursuant to 4.1.500 NMAC (incorporating 40 CFR 264.1050(b)).~~

~~4.1.4.c Wastes Containing Concentrations of Volatile Organic Compounds Greater than 500 ppmw (40 CFR 264, Subpart CC)~~

~~The Permittee shall not manage in tanks hazardous wastes which have an average volatile organic concentration at the point of waste origination equal to or greater than 500 ppmw or with an unknown or undocumented concentration, as required by 4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(1)), unless the waste is one of the following, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(4)):~~

- ~~organic waste that meets the numeric concentration limits for organic hazardous constituents, applicable to the hazardous waste, as specified at the Table contained at 20.4.1.800 NMAC (incorporating 40 CFR 268.40);~~
- ~~organic waste that has been treated by the treatment technology established for the waste at 20. 4.1.800 NMAC (incorporating 40 CFR 268.42(a)); or~~
- ~~organic waste that has been treated by an equivalent method approved by the Secretary pursuant to a Permit modification.~~

~~4.2 TANK CONSTRUCTION REQUIREMENTS~~

~~4.2.1 Requirements for Storage Tanks~~

~~The Permittee shall construct the Liquid Waste Storage Tanks, concrete pad, ancillary equipment, and receiving area, as specified at Permit Attachments A, Section 2.3.1, *Containment and Detection of Releases;* L, *Engineering Report*, Section 8.0, *Liquid Waste Storage Facility;* L1, Drawing No. 40; and L2, *Specifications for Landfill, Surface Impoundment and Associated Facilities Liner and Cover System Construction;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.192). The Permittee shall ensure that the tanks meet the design standards contained at Permit Attachment L3, *Tank Integrity Assessment Certification*, submitted by the Permittee as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.192).~~

~~4.2.2 Requirements for Treatment Tanks~~

~~The Permittee shall construct the Stabilization Tanks, ancillary equipment, vault, receiving area, and Stabilization Building as~~

~~specified at Permit Attachments A, Section 2.4.1, *Contaminant and Detection of Releases*; L, Section 6.0, *Stabilization Facility*; L1, Drawings Nos. 33 through 36; and L2; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.192). The Permittee shall ensure that the tanks meet the design standards contained at Permit Attachment L3, submitted by the Permittee as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.192).~~

~~4.2.3 Secondary Containment for Storage Tanks~~

~~The Permittee shall construct and operate the secondary containment system for the Liquid Waste Storage Tanks as specified at Permit Attachments A, Section 2.3.1; L, Section 8.0; and L1, Drawing No. 40; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.193(b) through (f)).~~

~~4.2.4 Secondary Containment for Treatment Tanks~~

~~The Permittee shall construct and operate the secondary containment systems for the Stabilization Tanks as specified at Permit Attachments A, Section 2.4.1; L, Section 6.0; and L1, Drawings Nos. 33 through 36; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.193(b) through (f)).~~

~~4.2.5 Ancillary Equipment~~

~~The Permittee shall construct secondary containment for ancillary equipment as specified at Permit Attachments A, Sections 2.3.1, 2.4.1, 2.3.9, *Ancillary Equipment [Liquid Waste Storage Tanks]*, and 2.4.9, *Ancillary Equipment [Stabilization Tanks]*; L, Sections 6.0 and 8.0; and L1, Drawings Nos. 33 through 40; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.193(f)).~~

~~4.2.6 Required Certification~~

~~The Permittee shall install the Liquid Waste Storage Tank and the Stabilization Tank systems in such a manner as to insure that the systems are not damaged during installation. Prior to placing the tank systems in use, the tank systems shall be inspected and certified by an independent installation inspector or an independent professional engineer registered in New Mexico with the qualifications set forth at 20.4.1.500 NMAC (incorporating 40 CFR 264.192 (b)). The certification shall state that the tank systems were properly designed and installed as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.192(b) and 264.193(d)); as specified at Permit Attachment A, Sections 2.3.10, *Installation and Tightness Testing [Liquid Waste Storage Tanks]*, and 2.4.10, *Installation Inspection and Tightness*~~

~~*Testing [Stabilization Tanks]*; and as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.11(d)).~~

~~The Permittee shall keep this certification on file at the Facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.192(g)).~~

~~4.2.7 As-Built Specifications~~

~~The Permittee shall submit to the Secretary as-built specifications for the tank systems in accordance with Permit Conditions 1.5.9.c and 1.10.~~

~~4.3 GENERAL OPERATING REQUIREMENTS FOR TANKS~~

~~4.3.1 Compatibility with Tanks~~

~~The Permittee shall not place hazardous wastes or treatment reagents in a tank system if they could cause the tank, its ancillary equipment, or containment system to rupture, leak, corrode, or otherwise fail, as specified at Permit Attachment A, Section 2.3.2, *Management of Incompatible Wastes [Liquid Waste Storage Tanks]*, and 2.4.2, *Management of Incompatible Wastes [Stabilization Tanks]*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.194(a) and 264.199).~~

~~4.3.2 Spill and Overflow Prevention~~

~~The Permittee shall use appropriate controls and practices to prevent spills and overflows from tanks or containment systems as specified at Permit Attachment A, Sections 2.3.3, *Spill and Overflow Prevention [Liquid Waste Storage Tanks]*, and 2.4.3, *Spill and Overflow Prevention [Stabilization Tanks]*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.194(b)).~~

~~4.3.3 Storage Time Limit~~

~~The Permittee shall not store waste in a tank for longer than one year unless the Permittee can demonstrate that such storage is solely for the purpose of accumulation of such quantities of hazardous waste as are necessary to facilitate proper treatment or disposal; as required by 20.4.1.800 NMAC (incorporating 40 CFR 268.50(b) and 268.50(c)).~~

~~4.3.4 Necessary Treatment in Tanks~~

~~The Permittee shall stabilize all bulk liquids, semi-solids, sludges, solids that may contain free liquids, and solids that do not meet the LDR treatment standards contained at 20.4.1.800~~

~~NMAC (incorporating 40 CFR, Part 268), prior to their disposal in the Landfill.~~

~~4.4 WASTE ANALYSIS~~

~~4.4.1 Waste Characterization~~

~~The Permittee shall characterize waste entering and leaving hazardous waste storage and treatment tanks as specified at Permit Attachment F, *Waste Analysis Plan*, Sections 4.4, *Procedures for Incoming Waste Acceptance*, 4.5.5.2, *Waste Analysis Requirements Specific to Storage Units*, and 4.5.5.4, *Waste Analysis Requirements Specific to the Stabilization Tanks*, to ensure that the waste management requirements specified at Permit Attachment F, Section 4.2, *Criteria for Waste Management at the Facility*, are met.~~

~~4.4.2 Waste Analysis to Determine 40 CFR 264, Subpart BB Exemption~~

~~The Permittee shall make a determination of compliance with Permit Condition 4.1.4.b in accordance with the test methods specified at Permit Condition 2.15.1.b; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1063(d)).~~

~~4.4.3 Waste Analysis to Determine 40 CFR 264, Subpart CC Exemption~~

~~The Permittee shall make determinations of compliance with Permit Condition 4.1.4.c in accordance with Permit Conditions 2.15.2.b and 2.15.2.c, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1083(a)).~~

~~4.5 MANAGEMENT OF LEAKS OR SPILLS~~

~~4.5.1 Removal of Tank System from Use~~

~~In the event of a release or spill from a tank system or surrounding area, or if a system becomes unfit for further use, the Permittee shall remove the system from service immediately and complete the actions required at Permit Conditions 4.5.1.a through 4.5.1.c, as specified at Permit Attachments A, Sections 2.3.1, 2.4.1, 2.3.11, *Repair and Certification of Tank Systems [Liquid Waste Storage Tanks]*, and 2.4.11, *Repair and Certification of Tank Systems [Stabilization Tanks]*; and C, *Contingency Plan*, Section 6.3.5.2, *Spills, Leaks, or Other Releases Control Procedure*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196).~~

~~4.5.1.a Management of Hazardous Waste~~

~~In the event of a release or spill from a tank system, the Permittee shall immediately stop the flow of hazardous waste into the tank system and inspect the system to determine the cause of the release, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196).~~

~~4.5.1.b Containment of Visible Releases~~

~~In the event of a release or spill from a tank system, the Permittee shall immediately conduct a visual inspection of all releases to the environment, and, based on that inspection, shall (1) prevent further migration of the leak or spill, and (2) remove and properly dispose of any visible contamination from the system within 24 hours of detection to prevent further release and to allow inspection and repairs of the system, as specified at Permit Attachment A, Sections 2.3.11 and 2.4.11. If the Permittee finds that it is not possible to meet this time period, the Permittee shall notify the Secretary and demonstrate that a longer time period is required to select an appropriate method of treatment and/or disposal, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(c)).~~

~~4.5.1.c Spill or Release Waste Analysis~~

~~Upon detection of a spill or release at the Liquid Waste Storage Tank Area or the Stabilization Building, the Permittee shall conduct a waste analysis as specified at Permit Attachment F, Section 4.5.6, *Waste Analysis Requirements for Waste Generated On-Site*, to determine the nature and concentration of any waste constituents.~~

~~4.5.2 Conditions in Lieu of Closure~~

~~In the event of a spill or release, the Permittee shall close the tank system as specified at Permit Attachment O, *Closure Plan*, unless the appropriate steps required at Permit Condition 4.5.2.a through 4.5.2.d are taken.~~

~~4.5.2.a Integrity of System~~

~~For a release caused by a spill that has not damaged the integrity of the system, the Permittee shall remove the waste and make any necessary repairs to fully restore the integrity of the system before returning the tank system to service, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(c)(2)).~~

~~**4.5.2.b Release from Primary Tank System**~~

~~For a release caused by a leak from the primary tank system to the secondary containment system, the Permittee shall repair the primary system prior to returning it to service, as specified at Permit Attachment A, Sections 2.3.11 and 2.4.11; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(c)(3)).~~

~~**4.5.2.c Secondary Containment Requirement**~~

~~For a release to the environment caused by a leak from a component of the tank system that is not fitted with secondary containment, the Permittee shall provide secondary containment for the component that meets the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.193) before the component can be returned to service, unless the source of the leak is an aboveground portion of a tank system that can be inspected visually. If the source is an aboveground component that can be inspected visually, the component must be repaired to satisfy the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.192 and 193) and may be returned to service without secondary containment as long as the repair is certified and the certification submitted to the Secretary as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(f)). If a leak has occurred in any portion of a tank system component that is not readily accessible for visual inspection, the entire component must be provided with secondary containment in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.193). [20.4.1.500 NMAC incorporating 40 CFR 264.196(c)(4))]~~

~~**4.5.3 Certification**~~

~~For all major repairs to eliminate leaks or restore the integrity of the tank system (e.g., installation of an internal liner, repair of a ruptured tank, or repair or replacement of a secondary containment vault), the Permittee shall, before returning the system to service, obtain a certification by an independent professional engineer registered in New Mexico that the repaired system is capable of handling hazardous wastes without release for the intended life of the system, as specified at Permit Attachment A, Section 2.4.11; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(f)).~~

~~4.6 INSPECTION SCHEDULES AND PROCEDURES~~

~~4.6.1 Inspection Procedures~~

~~The Permittee shall inspect the tank systems (including secondary containment and LDRSs), overfill controls, as specified at Permit Attachment A, Section 2.3.6, *Inspections*, Permit Attachment A, Section 2.4.6, *Inspections*; Permit Attachment D, *Inspection Procedures*, Section 5.2, *Inspection Procedures*; and using the appropriate inspection schedules and checklists contained at Permit Attachment D1, *Inspection Schedules and Checklists*. The inspection shall include, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.195(b)):~~

- ~~Above ground portions of the tank system, to detect corrosion or releases of waste;~~
- ~~data gathered from monitoring and leak detection equipment (e.g., level indicators or pressure or temperature gauges), to ensure that the tank system is being operated according to its design; and~~
- ~~construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the dikes, to detect erosion or signs of releases of hazardous waste (e.g., wet spots, dead vegetation), as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.15(a)).~~

~~4.6.2 Overfill~~

~~The Permittee shall inspect the overfill controls identified at Permit Attachment A, Sections 2.3.3 and 2.4.3, daily, in accordance with Permit Condition 4.6.1; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.195(b)).~~

~~4.6.3 Cathodic Protection Systems~~

~~As required by 20.4.1.500 NMAC (incorporating 40 CFR 264.195(c)), the Permittee shall inspect the cathodic protection systems for the Stabilization Tanks in accordance with the following schedule:~~

- ~~The proper operation of the cathodic protection system shall be confirmed within six months from initial installation and annually thereafter.~~

- ~~All sources of impressed current shall be inspected and/or tested, as appropriate, every other month.~~

~~4.6.4 Tank Integrity~~

~~At least once a month, the Permittee shall inspect the Stabilization Tanks when empty to ensure the integrity of the tanks and welds, and shall annually conduct a sonic test on the Stabilization Tanks to ensure that the thickness of the inner tank and outer shell is maintained, as specified at Permit Attachments A, Section 2.4.6; and N, *Operations and Maintenance Plan*, Section 3.7.4, *Inspection and Monitoring*.~~

~~4.6.5 Ancillary Equipment Integrity~~

~~The Permittee shall conduct a leak test or other integrity assessment of all tank system ancillary equipment annually, as required by 40.4.1.500 NMAC (incorporating 40 CFR 264.193(i)(3)).~~

~~4.7 RECORDKEEPING AND REPORTING~~

~~4.7.1 Recordkeeping~~

~~4.7.1.a Inspection Records~~

~~The Permittee shall record inspections in an inspection log or summary, and shall keep these records in the Operating Record, as specified at Permit Attachment N, Section 3.8.1, *Records*; and as required by Permit Condition 2.7.3 and 20.4.1.500 NMAC (incorporating 40 CFR 264.15(d) and 264.195(d)).~~

~~4.7.1.b Ignitable, Reactive, or Incompatible Wastes~~

~~The Permittee shall document and place in the Operating Record the evidence of compliance with the requirements for ignitable, reactive, and incompatible waste contained at Permit Condition 4.8.1 and 4.9.1, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(c) and 264.73(b)(3), using data from trial tests, waste analyses, and/or the results of the treatment of similar wastes by similar treatment processes.~~

~~4.7.1.c 40 CFR 264, Subpart BB Records~~

~~The Permittee shall record in a log that is kept in the Operating Record the results of the determination of exemption from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR~~

~~264, Subpart BB), in accordance with Permit Condition 2.12.1.f; and other information required as set forth at 20.4.1.500 NMAC (incorporating 40 CFR 264.1064(k) and/or (m)).~~

~~4.7.1.d 40 CFR 264, Subpart CC Records~~

~~The Permittee shall prepare and maintain in the Operating Record for a minimum of three years the information used for each waste determination of exemption from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC), in accordance with Permit Condition 2.12.1.g (e.g., test results, measurements, calculations, and other documentation); and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1089(a), (f)(1), and/or (h)).~~

~~4.7.2 Reporting~~

~~4.7.2.a Leak or Spill Reporting~~

~~4.7.2.a.i Oral Report~~

~~The Permittee shall report to the Secretary, within 24 hours of detection, any leak or spill of hazardous wastes that occurs from a tank treatment system or secondary containment system to the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(d)(1)).~~

~~A leak or spill of one pound or less of hazardous waste that is immediately contained and cleaned up need not be reported, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.196(d)(2)).~~

~~4.7.2.a.ii Written Report~~

~~Within 30 days of detecting a release to the environment from a tank storage system or tank secondary containment system required to be reported to the Secretary in accordance with Permit Condition 4.7.2.a.i, the Permittee shall submit a written report to the Secretary. The report shall contain, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(d)(3)):~~

- ~~the likely route of migration;~~
- ~~as appropriate, characteristics of the surrounding soil, including soil composition, geology, hydrogeology, and climate;~~

- ~~results of any monitoring or sampling conducted in connection with the release. If the Permittee is unable to meet this time period, the Permittee shall provide the Secretary with a schedule of when the results will be available. This schedule shall be provided before the required 30-day submittal period expires;~~

- ~~as appropriate, proximity of down gradient drinking water, surface water, and populated areas; and~~

- ~~description of response actions planned or taken.~~

~~4.7.2.b 40 CFR 264, Subpart CC Noncompliance~~

~~The Permittee shall report to the Secretary each occurrence when the average volatile organic concentration of any hazardous waste placed in a tank is in noncompliance with the requirements of Permit Condition 4.1.4.c; as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1090(a)).~~

~~4.7.3 Certification~~

~~4.7.3.a Tank Installation Certification~~

~~The Permittee shall submit a copy of the tank installation certification required at Permit Condition 4.2.6 to the Secretary 30 days prior to the first receipt of waste at the Facility, in accordance with Permit Condition 1.10.~~

~~4.7.3.b Certification Reporting after Major Repairs~~

~~The Permittee shall submit to the Secretary, within seven days after returning a tank storage system to use, the certification of major repairs to correct leaks required at Permit Condition 4.5.3, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.196(f)).~~

~~4.8 SPECIAL PROVISIONS FOR IGNITABLE OR REACTIVE WASTES~~

~~4.8.1 Procedures for Ignitable and Reactive Waste =~~

~~The Permittee shall not place ignitable or reactive waste in a tank storage system unless the procedures specified at Permit Attachments A, Sections 2.3.5, *Management of Ignitable or Reactive Wastes [Liquid Waste Storage Tanks]*, and 2.4.5,~~

~~*Management of Ignitable or Reactive Waste [Stabilization Tanks]*; and B, *Procedures to Prevent Hazards*, Section 5.5.1, *General Requirements*; are followed, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(b) and 264.198(a)).~~

~~4.8.2 Protective Distances~~

~~The Permittee shall comply with the requirements for the maintenance of protective distances between a tank and any adjoining property line that can be built upon, as specified at Permit Attachment A, and as required at Tables 2-1 through 2-6 of the National Fire Protection Association's *Flammable and Combustible Liquids Code* (latest edition); as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.198(b)).~~

~~4.9 SPECIAL PROVISIONS FOR INCOMPATIBLE WASTES~~

~~4.9.1 Separation of Incompatible Wastes~~

~~The Permittee shall not place incompatible wastes, or incompatible wastes and materials, in the same tank system, nor allow incompatible wastes to commingle in the same secondary containment system, unless the compatibility of the new waste type with the prior contents of the tank has been determined by testing or process knowledge and documented in the Operating Record, as specified at Permit Attachments A, Sections 2.3.2, *Management of Incompatible Wastes [Liquid Waste Storage Tanks]*, and 2.4.2, *Management of Incompatible Wastes [Stabilization Tanks]*; B, Section 5.5.3, *Incompatible Waste Handling*; and F, Section 4.5.5.4, *Waste Analysis Requirements Specific to the Stabilization Tanks*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(b) and 264.199(a)).~~

~~4.9.2 Tank Decontamination~~

~~The Permittee shall not place hazardous waste in a tank system that previously held an incompatible waste or material and which has not been decontaminated, unless the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.17(b)) are met, as specified at Permit Attachment A, Sections 2.3.2 and 2.4.2; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.199(b)).~~

~~4.10 CLOSURE~~

~~At closure of the Liquid Waste Storage Area, the Stabilization Building or any individual tank system, the Permittee shall remove all hazardous waste and hazardous waste residues from the~~

~~unit or area being closed and shall follow the procedures for clean closure contained at Permit Attachment O, *Closure Plan*, Sections 8.1.3, *Liquid Waste Receiving and Storage Unit*, and/or 8.1.4, *Stabilization Unit*, as appropriate; and in accordance with Permit Part 8, Sections 8.1.3, *Liquid Waste Storage Facility*, and 8.1.4, *Stabilization Treatment Unit*, and other pertinent sections; and shall otherwise comply with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.197).~~

~~The Permittee shall follow the time schedules for closure specified at Permit Attachment O1, *Compliance Schedules for Closure*.~~

~~**TABLE 4-1**~~

~~**PERMITTED LIQUID WASTE STORAGE TANKS**~~

~~**UNIT**~~	~~**DIMENSIONS**~~	~~**MAXIMUM ALLOWABLE CAPACITY**~~
~~Liquid Waste Storage Tank No. 1, including secondary containment; concrete pad and berm; sump; ancillary equipment; and receiving area~~	~~10 feet by 16 feet (diameter)~~	~~9,000 gallons~~
~~Liquid Waste Storage Tank No. 2, including secondary containment; concrete pad; sump; ancillary equipment~~	~~10 feet by 16 feet (diameter)~~	~~9,000 gallons~~
~~Liquid Waste Storage Tank No. 3, including secondary containment; concrete pad; sump; ancillary equipment~~	~~10 feet by 16 feet (diameter)~~	~~9,000 gallons~~
~~Liquid Waste~~	~~10 feet by 16~~	

~~UNIT~~	~~DIMENSIONS~~	~~MAXIMUM ALLOWABLE CAPACITY~~
~~Storage Tank No. 4, including secondary containment; concrete pad; sump; ancillary equipment~~	~~feet (diameter)~~	~~9,000 gallons~~
~~TOTAL~~		~~36,000 gallons~~

~~TABLE 4-2~~

~~PERMITTED TREATMENT TANKS~~

~~UNIT~~	~~DIMENSIONS~~	~~MAXIMUM ALLOWABLE CAPACITY~~
~~Stabilization Building; Stabilization Bin No. 1; ancillary equipment; vault; and receiving area~~	~~25 feet by 10 feet by 10 feet~~	~~2,500 cubic feet~~
~~Stabilization Bin No. 2; secondary containment; ancillary equipment~~	~~25 feet by 10 feet by 10 feet~~	~~2,500 cubic feet~~
~~Stabilization Bin No. 3; secondary containment; ancillary equipment~~	~~25 feet by 10 feet by 10 feet~~	~~2,500 cubic feet~~

~~UNIT~~	~~DIMENSIONS~~	~~MAXIMUM ALLOWABLE CAPACITY~~
~~Stabilization Bin No. 4; secondary containment; ancillary equipment~~	~~25 feet by 10 feet by 10 feet~~	~~2,500 cubic feet~~
~~**TOTAL**~~		~~**10,000 cubic feet**~~

~~Permit Part 5~~

~~TREATMENT IN THE SURFACE IMPOUNDMENT~~

~~HIGHLIGHTS~~

~~This Part contains conditions for treatment by evaporation of hazardous waste in the Surface Impoundment at the Triassic Park Waste Disposal Facility (the Facility). Evaporation is the only treatment method permitted in the Surface Impoundment (Pond 1). The location of the Surface Impoundment within the Facility is shown at Permit Attachment L1, *Engineering Drawings*, Drawing No. 4. Surface Impoundment operations are described at Permit Attachments A, *General Facility Description and Information*, Section 2.6.4, *Operation of the Evaporation Pond*; and L, *Engineering Report*, Section 4.0, *Evaporation Pond*.~~

~~The universe of permitted waste that can be treated in the Surface Impoundment is identified at Table 2-1, *Permitted Hazardous Wastes*, unless specifically excluded below. The Surface Impoundment may treat non-ignitable liquids and solids with polychlorinated biphenyl (PCB) concentrations of less than 50 parts per million (ppm); these wastes are not regulated under the Toxic Substances Control Act (TSCA). The Surface Impoundment may also treat, under certain conditions, bulk PCB-contaminated remediation waste. Waste that is specifically prohibited from treatment in the Surface Impoundment is identified at Permit Condition 5.1.3. Hazardous waste that does not meet Land Disposal Restrictions (LDR) treatment standards will not be placed in the Surface Impoundment. In addition, the Facility will not treat waste in the Surface Impoundment that would require compliance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subparts BB and CC).~~

~~This Permit authorizes only one Surface Impoundment (Pond 1), identified at Permit Attachment L1, Drawing No. 28, for treatment by evaporation. As shown in Table 5-1, Pond 1 is comprised of two cells, cells 1A and 1B, with a combined approximate capacity of 5.2 million gallons and an area of approximately 75,240 square feet. This Surface Impoundment is considered one permitted unit.~~

~~Two additional ponds may be constructed in the future to provide additional leachate storage and treatment capacity if demand for pond treatment capacity increases beyond that provided in the initial phase of construction. These two additional ponds are not authorized by this Permit.~~

~~The depth of cells 1A and 1B are approximately 12 feet maximum, with a bottom slope of approximately two percent toward a leakage collection sump located in the center of each cell. The two cells are separated by a dike (berm) and can be independently filled or drained. A transfer pump is located on the separator berm, and the contents of one cell can be transferred to the other cell if necessary in order to locate and repair a liner leak. Each cell is equipped with its own discharge station.~~

~~The Surface Impoundment receives waste from off-site generators, from on-site leachate collection systems, and from other activities at the Facility that may generate hazardous waste.~~

~~The Surface Impoundment liner system consists of a primary geomembrane liner above a geonet layer and a secondary geomembrane liner. A leak detection and removal system (LDRS) for detecting and removing leachate is located in the geonet layer between the two liners. One LDRS sump is located in the center of each cell. Leachate collected in the sump may be pumped to a tanker truck and returned to the Surface Impoundment, stored in a Liquid Waste Storage Tank, or transferred directly to the Stabilization Unit prior to disposal in the Landfill.~~

~~The vadose zone monitoring system (VZMS) for the Surface Impoundment consists of the following: Two vadose zone sumps, one for each cell, located below the secondary liner. The sumps contain pressure transducers to measure the presence and volume of fluids and pumping systems capable of removing any fluids. Two deep vadose zone monitoring wells shown at Permit Attachment I, *Vadose Zone Monitoring System Work Plan*, Figure No. 2, are located east of the Surface Impoundment. These wells monitor the accumulations of any escaped fluids down-gradient from the Surface Impoundment. A neutron probe access tube located northwest of the Surface Impoundment and three suction lysimeters located in association with the wells and probe holes. These technologies will monitor unsaturated flow.~~

~~The VZMS is described at Permit Part 7. Corrective Action requirements for leachate from the Surface Impoundment to the VZMS are contained at Permit Part 9.~~

~~5.1 GENERAL REQUIREMENTS FOR THE SURFACE IMPOUNDMENT~~

~~5.1.1 Permitted Treatment in the Surface Impoundment~~

~~The Permittee shall treat hazardous waste only by evaporation in the Surface Impoundment, as identified at Table 5-1, *Permitted Surface Impoundment*; and as specified at Permit Attachment A, Sections 2.6, *Treatment in Evaporation Pond*, and 2.6.3, *Nature of Waste*; and subject to the terms of this Permit Part. The volume of hazardous waste that may be treated is limited to the maximum capacity identified at Table 5-1; and as specified at Permit Attachment A, Section 2.6.1, *Design of Evaporation Pond*.~~

~~The Surface Impoundment, consisting of cells 1A and 1B, is one permitted unit.~~

~~5.1.2 Permitted Wastes in the Surface Impoundment~~

~~The Permittee shall treat only those hazardous wastes identified at Permit Condition 2.4.1 in the Surface Impoundment, subject to the prohibitions contained at Permit Condition 5.1.3.~~

~~5.1.3 Prohibited Wastes in the Surface Impoundment~~

~~5.1.3.a General Waste Prohibition~~

~~The Permittee is prohibited from treating in the Surface Impoundment those wastes identified at Permit Condition 2.4.2 and Permit Attachment F, *Waste Analysis Plan*, Section 4.1.2, *Prohibited Waste*.~~

~~5.1.3.b Land Disposal Restrictions~~

~~The Permittee is prohibited from treating any hazardous waste in the Surface Impoundment that does not meet the LDR treatment standards contained in the Table at 20.4.1.800 NMAC, (incorporating 40 CFRSubpart D), as specified at Permit Attachment A, Section 2.6.3.~~

~~5.1.3.c Wastes Containing Concentrations of Organic Compounds Greater than Ten Percent by Weight (40 CFR 264, Subpart BB)~~

~~The Permittee shall not place any hazardous waste in the Surface Impoundment that contains or contacts hazardous wastes with an organic concentration greater than or equal to ten percent by weight, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1050(b)).~~

~~5.1.3.d Wastes Containing Concentrations of Volatile Organic Compounds Greater than 500 ppmw (40 CFR 264, Subpart CC)~~

~~The Permittee shall not place any hazardous waste in the Surface Impoundment that has an average volatile organic concentration at the point of waste origination equal to or greater than 500 parts per million by weight (ppmw), in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(1)), unless the waste is one of the following, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.1082(c)(4)):~~

- ~~organic waste that meets the numerical concentration limits for organic hazardous constituents, applicable to the hazardous waste, as specified at the Table contained at 20.4.1.800 NMAC (incorporating 40 CFR 268.40);~~
- ~~organic waste that has been treated by the treatment technology established for the waste at 20.4.1.500 NMAC (incorporating 40 CFR 268.42(a)); or~~
- ~~organic waste that has been treated by an equivalent method approved by the Secretary pursuant to a Permit modification.~~

~~5.2 SURFACE IMPOUNDMENT CONSTRUCTION REQUIREMENTS~~

~~5.2.1 Construction Requirements~~

~~The Permittee shall construct the Surface Impoundment and liner systems, truck transfer pad, and ancillary equipment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.221(c)); and as follows:~~

~~5.2.1.a Liner System~~

~~The Permittee shall install and maintain two liners, separated by a geonet layer containing an LDRS, to prevent releases from the Surface Impoundment, as specified at Permit Attachments A, Sections 2.6.1, *Design of Evaporation Pond*, and 2.6.2, *Construction;* L, Section 4.0; L1, Drawings Nos. 28 through 32; L2, *Specifications for Landfill, Surface Impoundment and Associated Facilities Liner and Cover System Construction;* and M, *Construction Quality Assurance Plan;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.221(c)(1)).~~

~~The Surface Impoundment liners shall include the following components, from top to bottom, constructed to prevent migration of hazardous constituents outside of the liner system:~~

- ~~a 60-mil thick high density polyethylene (HDPE) geomembrane primary top liner, as specified at Permit Attachment L2, Section 02775, *Geomembrane Liners;*~~

- ~~a geonet leak detection and removal layer with transmissivity greater than or equal to 5 x 10^{-3} m^2/sec, as specified at Permit Attachment L2, Section 02712, *Geonet;*~~

- ~~a 60-mil thick HDPE secondary geomembrane liner as specified at Permit Attachment L2, Section 02775, *Geomembrane Liners;* and~~

- ~~a minimum 3-foot thick compacted clay liner with a hydraulic conductivity, as constructed, of less than or equal to 1 x 10^{-7} cm/sec, as specified at Permit Attachment L2, Section 02221, *Clay Liner.*~~

~~5.2.1.b Leak Detection and Removal System (LDRS)~~

~~The Permittee shall install and maintain an LDRS in the geonet layer to detect and remove leakage through all areas of the primary liner, as specified at Permit Attachments A, Sections 2.6.1.2, *Leak Detection and Removal System/Vadose Monitoring System*, and 2.6.2.4, *Liner, LDRS, and Vadose System Installation*; L, Section 4.1.3, *Subgrade Excavation, Liner System, LDS Sump Design and Vadose Monitoring Sump Design*; L1, Drawing No. 32; L2; and M; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.221(c)(2)).~~

~~The LDRS shall include, for each Surface Impoundment cell, a centrally located sump positioned in the geonet layer between the primary and secondary geomembrane layers. The sumps shall consist of gravel with 12 inch piping and a 50 gallons per minute (gpm) pump with sufficient capacity to maintain less than 12 inches of head on the secondary liner, as specified at Permit Attachments A, Section 2.6.1.2; L, Section 4.1.3; and L1, Drawing No. 32.~~

~~5.2.1.c Dikes~~

~~The Permittee shall construct the perimeter dikes and earthen separator dike with sufficient structural integrity to prevent~~

~~massive failure, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.221(h)). The Permittee shall construct all dikes so that the dike height will allow at least two feet of freeboard above the design water elevation of 4,121 feet above sea level.~~

~~5.2.1.c.i Separator Dike~~

~~The Permittee shall construct the separator dike with sideslopes of 2H:1V, as specified at Permit Attachments L, Section 4.1.2, *Evaporation Pond Layout and Phasing*; and L1, Drawing No. 28. The separator dike shall be constructed as specified at Permit Attachment L2, Section No. 02110, *Site Preparation and Earthwork*, and Section 02119, *Prepared Subgrade*.~~

~~5.2.1.c.ii Perimeter Dike~~

~~The Permittee shall construct the perimeter dikes with sideslopes of 3H:1V and shall be of height and width as specified at Permit Attachment L1, Drawing No. 30. They shall be constructed in accordance with appropriate specifications contained at Permit Attachment L2.~~

~~5.2.1.d Discharge Pads~~

~~The Permittee shall construct the Surface Impoundment discharge pads as specified at Permit Attachments A, Section 2.6.4.2, *Placement of Wastewater into the Evaporation Pond*; L, Section 4.1.4, *Evaporation Pond Discharge Pad Arrangement*; L1, Drawing No. 31; and L2.~~

~~5.2.1.e Vadose Zone Monitoring System Sumps~~

~~The Permittee shall install and maintain sumps below the Surface Impoundment liners to detect and remove leakage through all areas of the secondary liner, in accordance with Permit Condition 7.2.1.c; and as specified at Permit Attachments A, Section 2.6.2.4; I, Section 2.0, *Vadose Zone Monitoring System Installation*; L, Section 4.1.3; and L1, Drawing No. 32.~~

~~5.2.1.f Vadose Zone Monitoring Wells~~

~~The Permittee shall construct the Vadose Zone Monitoring Wells in accordance with Permit Conditions 7.2.1.a and 7.2.1.b; and as specified at Permit Attachment I, Section 2.2.2, *Vadose Zone Monitoring Well Construction*.~~

~~5.2.1.g Neutron Probe Access Probe Holes~~

~~The Permittee shall construct the neutron probe access probe holes in accordance with Permit Conditions 7.2.1.d.~~

~~5.2.1.h Suction Lysimeters~~

~~The Permittee shall construct the suction lysimeters in accordance with Permit Conditions 7.2.1.e.~~

~~5.2.1.i Run-On/Run-Off Control~~

~~The Permittee shall construct and maintain run-on/run-off controls for the Surface Impoundment as specified at Permit Attachments B, *Procedures to Prevent Hazards*, Section 5.4.2.2, *The Landfill and Evaporation Pond*; L, Section 2.1.4, *Facility Storm Water Control*; L1, Drawing No. 25; and N, *Operations and Maintenance Plan*, Section 2.2, *Evaporation Pond*.~~

~~5.2.2 Construction Quality Assurance Plan~~

~~The Permittee shall implement Permit Attachment M under the direction of a Construction Quality Assurance (CQA) officer who is a professional engineer registered in New Mexico to ensure that all construction required under Permit Condition 5.2.1 meets or exceeds all design criteria and specifications of this Permit, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.19(a) through 264.19(d)).~~

~~5.2.3 As-Built Specifications~~

~~The Permittee shall submit to the Secretary as-built specifications for the Surface Impoundment in accordance with Permit Conditions 1.5.9.c and 1.10.~~

~~5.3 GENERAL OPERATING REQUIREMENTS FOR THE SURFACE IMPOUNDMENT~~

~~The Permittee shall operate and maintain the Surface Impoundment as specified at Permit Attachments A, Section 2.6.4.3, *Inspections, Monitoring, and Repairs*; L, Section 4.1.2; and N, Section 3.5, *Evaporation Pond Operation*. Operation and maintenance shall comply with 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart K), and the conditions set forth in this Permit.~~

~~5.3.1 Overtopping Prevention~~

~~The Permittee shall operate and maintain the Surface Impoundment to prevent overtopping, as specified at Permit Attachments A, Section 2.6.4.3; and L, Section 4.1.2; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.221(g)).~~

~~5.3.2 Dike Maintenance~~

~~The Permittee shall maintain the separator dike and the area around the Surface Impoundment, including the perimeter dikes, as specified at Permit Attachments A, Section 2.6.4.3; and N, Section 3.5.5, *Inspection and Monitoring*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.221(h)).~~

~~5.3.3 Protective Netting~~

~~The Permittee shall ensure that protective netting in good condition is maintained over the Surface Impoundment to protect the bird life of the area, as specified at Permit Attachment A, Section 1.2, *Site Environment and Climate*; and as shown at Permit Attachment L1, Drawing No. 30.~~

~~5.3.4 Waste Placement and Removal~~

~~The Permittee shall ensure that waste is placed in and removed from the Surface Impoundment as specified at Permit Attachments L, Section 4.1.4; and N, Section 3.5.3, *Waste Placement*.~~

~~5.3.5 Leachate Management~~

~~Leachate collected from the leak detection systems at the Surface Impoundment may be retreated in the Surface Impoundment. Collected leachate that does not meet LDR treatment standards shall receive additional treatment by stabilization before it can be placed in the surface impoundment. If, after treatment by stabilization, the leachate cannot meet LDR standards, the Permittee shall ship the leachate off-site to an appropriate permitted hazardous waste management facility in compliance with all applicable regulations for generation and transport of hazardous waste.~~

~~5.4 WASTE ANALYSIS~~

~~5.4.1 Waste Characterization~~

~~The Permittee shall characterize waste entering and leaving the Surface Impoundment as specified at Permit Attachment F, *Waste Analysis Plan*, Sections 4.4, *Procedures for Incoming Waste*~~

~~*Acceptance*, and 4.5.5.3, *Waste Analysis Requirements Specific to the Evaporation Pond*, to ensure that the waste management requirements specified at Permit Attachment F, Section 4.2, *Criteria for Waste Management at the Facility*, are met.~~

~~**5.4.2 Waste Analysis to Determine 40 CFR 264, Subpart BB Exemption**~~

~~The Permittee shall make a determination of compliance with Permit Condition 5.1.3.c in accordance with the test methods specified at Permit Condition 2.15.1.b; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1063(d)).~~

~~**5.4.3 Waste Analysis to Determine 40 CFR 264, Subpart CC Exemption**~~

~~The Permittee shall make a determination of compliance with Permit Condition 5.1.3.d in accordance with the test methods specified at Permit Conditions 2.15.2.b and 2.15.2.c; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1083(a)(2)).~~

~~**5.4.4 Leachate**~~

~~**5.4.4.a LDRS and VZMS Sumps Sampling and Analysis**~~

~~The Permittee shall sample and analyze the leachate collected from the Surface Impoundment LDRS and VZMS sumps in accordance with Permit Attachment F, Section 4.5.6, *Waste Analysis Requirements for Waste Generated On-Site*, for all the multi-source leachate (EPA Hazardous Waste Number F039) constituents listed in the Table contained at 20.4.1.800 NMAC (incorporating 40 CFR 268.40).~~

~~**5.4.4.b VZMS Sampling and Analysis**~~

~~The Permittee shall sample and analyze any fluid collected from the VZMS in accordance with the appropriate conditions within Permit Part 7.~~

~~**5.5 MANAGEMENT OF LEAKS OR SPILLS**~~

~~**5.5.1 Spills and Releases to the Land Surface**~~

~~The Permittee shall ensure that spills and releases to the land surface are contained and remediated in a timely manner. Upon detection of a spill or release from the Surface Impoundment to the land surface, the Permittee shall determine the appropriate response in accordance with Permit Attachments A, Section~~

~~2.6.4.3; and C, *Contingency Plan*, Section 6.3.5.2, *Spills, Leaks, or Other Releases Control Procedure*.~~

~~If, in responding to a spill or release, the Permittee determines that the Contingency Plan should be implemented, implementation shall be conducted as specified at Permit Attachment C, Section 6.3, *Implementation Procedures*.~~

~~All analyses to determine the nature and concentration of the spilled or released waste constituents shall be performed as specified at Permit Attachment F, Section 4.5.6. All recovered spilled or released material along with other hazardous wastes generated in addressing the release shall be managed as specified at Permit Attachment C, Section 6.3.7, *Storage and Treatment of Released Hazardous Waste*.~~

~~5.5.2 Leachate Management~~

~~The Permittee shall completely remove all fluids from each sump in the LDRS and from the VZMS sump in a timely manner, as specified at Permit Attachments I, Section 4.0, *Monitoring Procedures*; and N, Section 3.5.4, *Operation of Leachate Detection and Vadose Zone Monitoring Systems*. The Permittee shall conduct a waste analysis of the removed fluids as specified at Permit Condition 5.4.4.a.~~

~~5.5.3 Action Leakage Rate~~

~~The Action Leakage Rate (ALR) for the Surface Impoundment, as approved by the Secretary in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.222(a)), is 1,000 gallons per acre per day (gpad) as measured in the LDRS sumps for both cells; and as specified at Permit Attachments A, Section2.6.4.7, *Action Leakage Rate*; and J, *Action Leakage Rate and Response Action Plan*, Section 5.3.4, *Discussion of Proposed Action Leakage Rates*.~~

~~To determine if the ALR has been exceeded, the Permittee shall calculate and record the average daily flow rate to each LDRS sump on a weekly basis during the active life and closure period of the Surface Impoundment, as specified at Permit Attachments A, Section 2.6.4.7, *Action Leakage Rate*; and J, Section 5.4, *Determination If the Action Leakage Rate Is Exceeded*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.222(b)).~~

~~**5.5.4 Flow Rates Less than or Equal to the ALR**~~

~~The Permittee shall respond to leakage less than or equal to the ALR as specified at Permit Attachment A, Section 2.6.4.8, *Response Action Plan*.~~

~~**5.5.5 Flow Rates Greater than the ALR**~~

~~The Permittee shall respond to leakage greater than the ALR as specified at Permit Attachments A, Section 2.6.4.8; and J, Section 7.0, *Response Actions*; and shall meet all requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.223(b)(3) through (b)(5) and (c)). In addition, the Permittee shall respond to leakage greater than the ALR by complying with the following conditions, as specified at Permit Attachment I, Section 4.2:~~

~~**5.5.5.a Removal of Cell from Service**~~

~~The Permittee shall immediately remove from use the cell that is leaking in exceedance of the ALR; and~~

~~**5.5.5.b VZMS Sampling**~~

~~The Permittee shall immediately inspect each monitoring point in the VZMS for fluids in accordance with Permit Condition 7.4.1.b.~~

~~In addition, the Permittee shall increase the frequency of inspection of the VZMS wells from monthly to weekly in accordance with Permit Condition 7.4.1.b.~~

~~**5.5.6 Response to Sudden Drop of Liquid Level**~~

~~In the event of a sudden drop in the liquid level of one of the Surface Impoundment cells that is not known to be caused by changes in the flow into or out of that cell, expected evaporation rates, or dike leaks, the Permittee shall remove the leaking (or impacted) cell from service immediately and complete the following actions, as specified at Permit Attachment C, *Contingency Plan*, Section 6.3.5.3, *Evaporation Pond Failure Control Procedure*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.227(a) and (b)):~~

- ~~immediately shut off the flow or stop the addition of wastes into the leaking (or impacted) cell;~~
- ~~immediately contain any surface leakage which has occurred or is occurring;~~

- ~~immediately stop the leak;~~
- ~~take any necessary steps to stop or prevent catastrophic failure; and~~
- ~~if a leak cannot be stopped by any other means, empty the leaking (or impacted) cell.~~

~~5.5.7 Return of Surface Impoundment to Service~~

~~If one of the Surface Impoundment cells has been removed from service pursuant to Permit Conditions 5.5.5.a or 5.5.6, it may be returned to service only if the portion of the cell that was failing has been repaired and the repair recertified in accordance with Permit Condition 5.7.3.c.~~

~~5.5.8 Closure in Lieu of Repair~~

~~If one of the Surface Impoundment cells has been removed from service in accordance with Permit Condition 5.5.6 and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.227), and is not being repaired, the Surface Impoundment shall be closed as specified at Permit Attachment O, *Closure Plan*, Section 8.1.2, *Evaporation Pond*, and other applicable sections. Closure shall be in accordance with Permit Condition 5.10; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.228).~~

~~5.6 INSPECTION SCHEDULES AND PROCEDURES~~

~~5.6.1 Inspection Requirements~~

~~5.6.1.a General Inspection Requirements~~

~~The Permittee shall inspect the Surface Impoundment, liner and leachate systems, and ancillary equipment as specified at Permit Attachments D, *Inspection Procedures*, Section 5.2.3, *Evaporation Pond Inspection Procedures*; and D1, *Inspection Schedules and Checklists*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.226).~~

~~5.6.1.b Inspection during Construction~~

~~The Permittee shall inspect the Surface Impoundment liners and cover systems during construction and installation for uniformity, damage, and imperfections (e.g., holes, cracks, thin spots, or foreign materials), as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.226(a)).~~

~~5.6.1.c Inspection after Construction~~

~~The Permittee shall inspect the Surface Impoundment immediately after construction. This inspection shall include the following, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.226(a)):~~

- ~~synthetic liners and cover systems (e.g., membranes, sheets or coatings) to ensure tight seams and joints and the absence of tears, punctures, or blisters; and~~
- ~~soil-based and admixed liners and cover systems for imperfections including lenses, cracks, channels, root holes, or other structural non-uniformities that may cause an increase in the permeability of the liner or cover system.~~

~~5.6.1.d Inspections during Facility Operation~~

~~The Permittee shall inspect the Surface Impoundment, discharge pads, dikes, and ancillary equipment weekly and after storms, as specified at Permit Attachments A, Section 2.6.4.3; D, Section 5.2.3; D1; and N, Section 3.5.5; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.226(b)).~~

~~5.6.2 LDRS and VZMS Monitoring Requirements~~

~~The Permittee shall monitor each sump in the LDRS and VZMS daily and the vadose zone wells monthly for the presence of liquids during the active life and closure period of the Surface Impoundment, as specified at Permit Attachments A, Section 2.6.1.2; I, Sections 4.1, *Monitoring Frequency*, and 4.3, *Monitoring Method*, and Table 2; and N, Section 3.5.4.~~

~~The Permittee shall probe or inspect the neutron probe access tube for the presence of liquids twice annually during the active life and closure period of the Surface Impoundment as specified at Permit Part 7.4.1.b. The Permittee shall sample the appropriate suction lysimeters for the presence of liquids as specified at Permit Part 7.4.1.b during the active life and closure period of the Surface Impoundment.~~

~~The vadose zone wells shall continue to be monitored semi-annually for the presence of liquids during the post-closure care period, as specified at Permit Attachment P, *Post-Closure Care*, Section 8.2.5, *Vadose Zone Monitoring System*; and in accordance with Permit Condition 7.4.~~

~~If liquids are present, the Permittee shall sample and analyze the liquids as specified at Permit Attachment F, Section 4.5.6. The Permittee shall remove and properly dispose of all remaining liquids, as specified at Permit Attachment I, Section 4.2, *Response Actions*.~~

~~5.7 RECORDKEEPING AND REPORTING~~

~~5.7.1 Recordkeeping Requirements~~

~~The Permittee shall follow the recordkeeping requirements for the Surface Impoundment specified at Permit Attachment N, Section 3.5.1, *Records*. Records kept shall include, but are not limited to:~~

~~5.7.1.a Inspection Logs~~

~~In accordance with Permit Condition 2.7.3, the Permittee shall keep in the Operating Record for a minimum of three years the inspection logs and other records for the inspections conducted in accordance with Permit Condition 5.6.1; as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.15(d) and 40 CFR 264.73(b)(5)).~~

~~5.7.1.b Ignitable, Reactive, or Incompatible Waste~~

~~The Permittee shall document and place in the Operating Record the evidence of compliance with the requirements for ignitable, reactive, and incompatible waste contained at Permit Conditions 5.8 and 5.9; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(c) and 264.73(b)(3)), making references to published scientific or engineering literature, using data from trial tests, waste analyses, and/or the results of the treatment of similar wastes by similar treatment processes.~~

~~5.7.1.c LDRS and VZMS Data~~

~~The Permittee shall keep records for the LDRS and VZMS monitoring conducted in accordance with Permit Condition 5.6.2, including a record of the amount of liquids removed during the active life and closure period of the Surface Impoundment, in~~

~~accordance with Permit Condition 2.12.1.k.i; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.226(d)(1)).~~

~~5.7.1.d 40 CFR 264, Subpart BB Records~~

~~The Permittee shall record in a log that is kept in the Operating Record the results of the determination of exemption from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264,Subpart BB), conducted in accordance with Permit Condition 5.4.2, and other information required under 20.4.1.500 NMAC (incorporating 40 CFR 264.1064(k) and (m)).~~

~~5.7.1.e 40 CFR 264, Subpart CC Records~~

~~The Permittee shall prepare and maintain in the Operating Record for a minimum of three years the information used for each waste determination required in accordance with Permit Condition 5.4.3 (e.g., test results, measurements, calculations, and other documentation).~~

~~5.7.2 Reporting and Notification Requirements~~

~~5.7.2.a Notification of Sudden Drop in a Cell Liquid Level~~

~~The Permittee shall submit the following information to the Secretary upon determination of a sudden drop in the liquid level of a Surface Impoundment cell that is not caused by changes in intentional flows into and out of the surface impoundment or expected evaporation rates:~~

~~5.7.2.a.i Oral Report~~

~~The Permittee shall make an oral report to the Secretary within 24 hours of becoming aware of a sudden drop in the liquid level of a Surface Impoundment cell, as specified at Permit Attachment C, *Contingency Plan, Section* 6.3.5.3; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 270.30(l)(6)(i) and (ii)); and~~

~~5.7.2.a.ii Written Report~~

~~The Permittee shall notify the Secretary in writing, within seven days of detecting either a leak in the Surface Impoundment dikes or a sudden drop in the liquid level, if the drop is not caused by changes in the flows into or out of the Surface Impoundment or expected evaporation rates, as specified at~~

~~Permit Attachment C, Section 6.3.5.3; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.227(b)(6)).~~

~~5.7.2.b Submittals after ALR Exceedance~~

~~The Permittee shall submit the following information to the Secretary after becoming aware of an exceedance of the ALR for the Surface Impoundment:~~

~~5.7.2.b.i Written Notification of ALR Exceedance~~

~~The Permittee shall notify the Secretary in writing of an exceedance of the ALR at the Surface Impoundment within seven days of determination of the exceedance, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.223(b)(1));~~

~~5.7.2.b.ii Preliminary Assessment~~

~~The Permittee shall submit a preliminary written assessment to the Secretary within 14 days after determination of the exceedance, as to the amount of liquids, possible location, size, and cause of any leaks, and short-term actions taken and planned, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.223(b)(2)); and~~

~~5.7.2.b.iii Data Submittal~~

~~The Permittee shall submit to the Secretary the results of analyses required under 20.4.1.500 NMAC (incorporating 40 CFR 264.223(b)(6)), the results of actions taken, and actions planned, within 30 days after the written notification required in accordance with Permit Condition 5.7.2.b.i. Monthly thereafter, as long as the flow rate in the leak detection system exceeds the action leakage rate, the Permittee shall submit to the Secretary a report summarizing the results of any remedial actions taken and actions planned.~~

~~5.7.2.c Noncompliance with the 40 CFR 264, Subpart CC Exemption Requirements~~

~~The Permittee shall report to the Secretary each occurrence, within 15 calendar days of the time that the Permittee becomes aware of the occurrence, of the placement of hazardous waste in the Surface Impoundment that does not comply with the exemption contained at Permit Condition 5.1.3.d from the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart CC); as specified at Permit Attachment G, *Air Quality*, Section 11.3.7.2,~~

~~*Reporting*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.1090(a)).~~

~~5.7.3 Certifications~~

~~5.7.3.a Surface Impoundment CQA Certification~~

~~As required by 20.4.1.500 NMAC (incorporating 40 CFR 264.19(d)), the Permittee shall submit a certification to the Secretary at least 60 days prior to the initiation of operations at the Facility in accordance with Permit Condition 1.10. The certification shall show that the approved CQA Plan has been successfully carried out and that the Surface Impoundment meets all regulatory requirements in accordance with Permit Condition 1.5.9.c.i. The certification shall be signed by the CQA officer and shall also attest that the Secretary's inspection, provided for at Permit Condition 1.5.9.c.ii, has been either completed or waived. The Permittee shall furnish documentation supporting this certification to the Secretary upon request.~~

~~5.7.3.b Dike Recertification~~

~~If one of the Surface Impoundment cells is removed from service for more than six months, the Permittee shall, prior to returning the cell to service, obtain a certification from a qualified, professional engineer registered in New Mexico that the Surface Impoundment dikes, including that portion of the dikes that provides freeboard, has structural integrity, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.226(c)). The Permittee shall submit the certification to the Secretary.~~

~~The certification shall establish that the dike:~~

- ~~shall withstand the stress of the pressure exerted by the types and amounts of wastes to be placed in that cell; and~~
- ~~shall not fail due to scouring or piping, without dependence on any liner system included in the Surface Impoundment construction.~~

~~5.7.3.c Liner Recertification~~

~~If one of the Surface Impoundment cells is removed from service as the result of a sudden drop in the liquid level due to liner failure and the liner has been repaired, the Permittee shall not return that cell to service until the repaired liner system has been recertified by a qualified, professional engineer~~

~~registered in New Mexico, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.227(d)(2)), and the recertification has been submitted to the Secretary.~~

~~5.8 SPECIAL PROVISIONS FOR IGNITABLE OR REACTIVE WASTES~~

~~The Permittee shall not place ignitable and reactive waste in the Surface Impoundment at the same time, as specified at Permit Attachments A, Section 2.6.4.4, *Specific Requirements for Ignitable, Reactive, and/or Incompatible Wastes*, and B, *Procedures to Prevent Hazards*, Section 5.5, *Procedures to Prevent Ignition or Reaction of Ignitable, Reactive, or Incompatible Waste*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17 and 40 CFR 264.229).~~

~~5.9 SPECIAL PROVISIONS FOR INCOMPATIBLE WASTES~~

~~The Permittee shall ensure that incompatible wastes, or incompatible wastes and materials, are not placed in the Surface Impoundment at the same time, as specified at Permit Attachments A, Section 2.6.4.4, and B, Section 5.5; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(b) and (c) and 264.230).~~

~~5.10 CLOSURE~~

~~The Permittee shall follow the procedures for clean closure specified at Permit Attachment O, Section 8.1.2, *Evaporation Pond*, and other pertinent sections; and shall conduct closure activities in accordance with pertinent sections of Permit Part 8; and shall otherwise comply with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.228). The Permittee shall follow the time frame for closure specified at Permit Attachment O1, *Compliance Schedules for Closure*.~~

~~**TABLE 5-1**~~

~~**PERMITTED SURFACE IMPOUNDMENT**~~

~~**CELL**~~	~~**DIMENSIONS**~~	~~**TOTAL CAPACITY**~~
~~IA~~	~~285 feet long by 132 feet wide by 12 feet deep~~	~~2.6 million gallons~~
~~IB~~	~~285 feet long by 132 feet wide by 12 feet deep~~	~~2.6 million gallons~~
~~**TOTAL**~~		~~**5.2 million gallons**~~

PERMIT PART 6

HAZARDOUS WASTE DISPOSAL IN THE LANDFILL

HIGHLIGHTS

This Part contains conditions for disposal of hazardous waste in the Landfill at the Triassic Park Waste Disposal Facility (the Facility). Conditions include requirements for the kinds of hazardous waste that can be placed in the Landfill, Landfill capacity, liner systems, and leak detection systems. Requirements for engineering designs, Landfill operation, and response to leaks from the Landfill are also included.

The location of the Landfill is shown at Permit Attachment L1, *Engineering Drawings*, Drawing No. 4. Landfill operations and design are discussed at Permit Attachments A, *General Facility Description and Information*, Section 2.5, *Landfill*; and L, *Engineering Report*, Section 3.0, *Landfill*.

This Permit authorizes only Phase 1~~I~~A of the Landfill, shown at Per_mit Attachment L1, Drawing No. 8. Phase 1~~I~~A includes approximately 47 acres (outside dimensions) with a fill area of 35 acres, and a capacity of approximately 553,200 cubic yards.

Phase 1~~I~~B, Phase 2~~II~~ and Phase 3~~III~~ of the Landfill, shown at Permit Attachment L1, Drawing No. 25 or described in Permit Attachment L, Section 3.1.4, are planned for future development. Reference to the Landfill in this Permit means Phase 1~~I~~A only. The Landfill Phase 1~~I~~A is considered one permitted unit. This permit does not authorize Phase 1~~I~~B, Phase 2~~II~~ and Phase 3~~III~~ of the Landfill.

The Landfill is permitted to receive all hazardous waste accepted at the Facility; however, all waste placed in the Landfill must meet the Land Disposal Restrictions (LDR) treatment standards contained at 20.4.1.800 NMAC (incorporating 40 CFR, Subpart 268). Waste may be received from off-site generators, from the on-site leachate and leak collection systems, and from other activities at the Facility that generate hazardous waste.

A lined Contaminated Water Collection Basin and a lined Stormwater Collection Basin are located immediately south of the Landfill floor, as shown at Permit Attachment L1, Drawing No. 10, to collect runoff from slope areas. Both basins are considered part of the permitted Landfill unit.

The Landfill liner systems cover the entire north slope of the Landfill, the slopes below the access ramps, and most of the Landfill floor. The liners shall be installed in stages as the Landfill expands to cover all surrounding earth that may contact waste or leachate.

The Landfill liner consists of primary and secondary systems. The primary system consists of, from top to bottom, a two-foot layer of protective soil, a geocomposite drainage layer, and a high-density polyethylene (HDPE) geomembrane liner. The geocomposite drainage layer drains to a sump consisting of a pump and leachate collection piping in drainage gravel, providing a Leachate Collection and Removal System (LCRS) to remove leachate from the Landfill. The sump is located in the floor of the geocomposite layer near the center of the Landfill.

The secondary system consists of, from top to bottom, a geocomposite drainage layer, an HDPE geomembrane liner, a geosynthetic clay liner, and six inches of prepared subgrade. A Leak Detection and Removal System (LDRS), similar in design to the LCRS, is located below the primary geomembrane and is designed to detect and remove leachate that passes through the primary liner system. The LDRS sump lies under the LCRS sump.

A vadose zone monitoring system (VZMS) includes a sump located on a geomembrane liner. It is located below the secondary liner and under the LDRS sump. All of the sumps contain pressure transducers to measure the presence and volume of fluids. The LCRS, LDRS, and VZMS are shown at Permit Attachment L1, Drawing No. 17.

Leachate collected in the sumps is pumped to the Leachate Storage Tank, shown at Permit Attachment L1, Drawing No. 19, analyzed, and treated as necessary prior to being disposed in the Landfill.

The VZMS also includes 15~~four~~ vadose zone monitoring wells and two neutron probe access tubes, shown at Permit Attachment I, *Vadose Zone Monitoring System Work Plan*, Figure No. 2. The wells are located east and west of the Landfill and locations outside the facility to~~and~~ monitor the accumulations of any escaped fluids down gradient from the Landfill. Neutron probe access tubes are located on both the north and west boundaries of the Landfill and monitor releases migrating as unsaturated flow.

The VZMS is described at Permit Part 7. Corrective Action requirements for leakage from the Landfill to the VZMS are described at Permit Part 9.

6.1 GENERAL REQUIREMENTS FOR THE LANDFILL

6.1.1 Permitted Disposal in the Landfill

6.1.1.a Hazardous Waste Disposal

The Permittee shall dispose of hazardous waste only in the Landfill, as identified at Table 6-1, *Permitted Landfill Unit*, and as specified at Permit Attachment A, *General Facility Description and Information*, Section 2.5. The volume of hazardous waste that may be disposed in the Landfill is limited to the maximum capacity identified at Table 6-1, and as specified in Permit Attachment A, Section 2.5.1.1, *Nature and Quantity of Waste*.

6.1.1.b Polychlorinated Biphenyls

The Permittee may dispose of ~~non-ignitable liquids with polychlorinated biphenyl (PCB) concentrations of less than 50 parts per million (ppm),~~ soils with PCB concentrations of less than 50 ppm~~,~~ and bulk PCB-contaminated remediation waste in the Landfill.

6.1.2 Prohibited Wastes in the Landfill

The Permittee is prohibited from placing in the Landfill any hazardous waste that does not meet the LDR treatment standards contained at 20.4.1.800 NMAC (incorporating 40 Subpart D).

6.2 LANDFILL CONSTRUCTION

6.2.1 Construction Requirements

The Permittee shall construct, operate, and maintain the Landfill, including liner systems, water collection basins and ditches, access ramps, and ancillary equipment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301) and this Permit, and as follows:

6.2.1.a Landfill Excavation

The Permittee shall excavate and prepare the Landfill floor and subsurface sides as specified at Permit Attachment A, Section 2.5.2.2, *Excavation and Preparation of Landfill Bottom and Subsurface Sides;* and Permit Attachment L1, Drawings 7 and 8.

6.2.1.b Liner Systems

The Permittee shall install and maintain two liners, constructed to prevent any migration of wastes out of the Landfill to the adjacent subsurface soil or ground water, as specified at Permit Attachments A, Section 2.5.1.2, *Liner Systems*; L, Section 3.~~0~~1.3.2; L1, Drawings No. 5 through 12 and 15 through 20; L2, *Specifications for Landfill~~, Surface Impoundment and Associated Facilities~~ Facility Liner and Cover System Construction*; and M, *Construction Quality Assurance Plan for Landfill~~, Surface Impoundment and Associated Facilities~~ Facility Construction*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(c)(1) and 264.301(d)(1)).

The Landfill liner systems shall include the following components, from top to bottom:

- a two foot layer of protective soil;
- a geocomposite drainage layer;
- a 60-mil HDPE geomembrane liner;
- a geocomposite drainage layer;
- a 60-mil HDPE geomembrane liner;
- a geosynthetic clay liner, consisting of at least three feet of compacted clay having a permeability not greater than 10^{-7} cm/sec; and
- six inches of prepared subgrade.

The Permittee shall stage construction of the Landfill liner as specified at Permit Attachment L, Section 3.1.4, *Waste Filling Sequence*.

6.2.1.c LCRS

The Permittee shall install and maintain an LCRS above the primary system HDPE geomembrane liner, to consist of the geocomposite LCRS drainage layer and sump, pump, and piping, to collect and remove leachate, as specified at Permit Attachments A, Section 2.5.1.3, *Leachate Collection and Removal System (LCRS)*; L, Sections 3.1.~~3~~4, *Subgrade Excavation, Liner System, LCRS, LDRS, and Vadose Sump Design*, and 3.2, *Landfill Design Analyses*; L1, Drawings Nos. 12 and 15 through 20; L2; and M; and

as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(c)(2)).

The sump, sump piping, slope riser pipes, crest riser pad, and vertical riser shall be constructed as specified at Permit Attachment L, Sections 3.1.~~3~~4 and 3.2. The sump and pump shall have the capacity identified at Permit Attachment L, Section 3.1.~~3~~4, Table L-2, *Landfill Sump Arrangement Summary*.

6.2.1.d LDRS

The Permittee shall install and maintain an LDRS between the primary and secondary HDPE geomembrane liners, to consist of the geocomposite LDRS drainage layer and sump, pump, and piping, to detect and remove leachate that may pass through all areas of the primary liner, as specified at Permit Attachments A, Section 2.5.1.4, *Leak Detection and Removal System (LDRS)*; L, Sections 3.1.~~3~~4 and 3.2; L1, Drawings Nos. 12 and 15 through 20; L2; and M; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(c)(3)). The sump and pump shall have the capacity identified at Permit Attachment L, Section 3.1.3, Table 2.

6.2.1.e VZMS Sump

The Permittee shall install and maintain a vadose zone sump system below the Landfill liners to serve as a detection system for leakage of the LDRS, as specified at Permit Attachments A, Section 2.5.1.5, *Vadose Zone Monitoring System (VZMS)*; L, Sections 3.1.~~3~~4 and 3.2; L1, Drawings Nos. 16 through 18; and M. The sump and pump shall have the capacity identified at Permit Attachment L, Section 3.1.~~3~~4, Table L-2.

6.2.1.f Access Ramps

The Permittee shall construct two 30 feet wide, 10 percent grade, access ramps on the east and west sides of the Landfill to the floor surface as specified at Permit Attachments L, Sections 2.1.3, *Facility Traffic Plan*, 3.1.2, *Landfill Layout and Phasing*, 3.2, and 3.2.6, *Access Ramp Design*; and L1, Drawings Nos. 10 and 14.

The Permittee shall construct an access ramp in the south slope, in accordance with Permit Attachment L, Section 3.1.~~4~~5, *Waste Filling Sequence*; and as shown at Permit Attachment L1, Drawing No. 8; with the approximate same dimensions and slope as the access ramps constructed on the east and west slopes, when needed to provide access to the south end of the Landfill Phase

IA (i.e., when lining of the south end of the Landfill Phase IA begins).

The Permittee shall notify the Secretary in writing 60 days prior to initiating construction of the south access ramp.

6.2.1.g Run-On/RunOff Controls

6.2.1.g.i Landfill Stormwater Collection Basin

The Permittee shall construct a Stormwater Collection Basin near the toe of the cut slope of the Landfill floor, as specified at Permit Attachments A, Section 2.5.1.6, *Run-On/Runoff Control;* L, Sections 3.1.~~6~~7, *Landfill Clean Storm Water Control Features,* and 3.2.10, *Surface Water Drainage Analysis;* and L1, Drawings Nos. 13, 14, and 25; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(g)). The Stormwater Collection Basin shall be lined with an HDPE liner, as shown at Permit Attachment L1, Drawing No. 13.

The Permittee shall provide the Secretary with 60 days prior written notice if the Stormwater Collection Basin is removed preparatory to the disposal of waste in the southern part of the Landfill during Phase IA of Facility operations.

6.2.1.g.ii Landfill Contaminated Water Collection Basin

The Permittee shall construct a Contaminated Water Collection Basin north of the Stormwater Collection Basin on the floor of the Landfill, as discussed at Permit Attachments A, Section 2.5.1.6; and L, Section 3.2.10; and as shown at Permit Attachment L1, Drawing No. 10; to collect possible contaminated runoff from the Landfill. The Contaminated Water Collection Basin shall be located on the Landfill liner systems.

The Permittee shall provide the Secretary with 60 days prior written notice if the Contaminated Water Collection Basin is removed preparatory to the disposal of waste in the southern part of the Landfill during Phase 1A of Facility operations.

6.2.1.g.iii Stormwater Collection Basin Berms

The Permittee shall construct the berm separating the Stormwater Collection Basin and the Contaminated Water Collection Basin, and the berm on the south slope of the Landfill, as shown at Permit Attachment L1, Drawings Nos. 9 and 13, with sufficient structural integrity to prevent failure, and using the construction specifications contained at Permit Attachment L2.

6.2.1.g.iv Perimeter Ditches

The Permittee shall construct perimeter ditches located on either side of the Landfill perimeter road to intercept runoff from areas outside of the Landfill and to divert this water to the Facility Stormwater Detention Basin located west of the Surface Impoundment (see Permit Attachment L1, Drawing No. 4), as specified at Permit Attachment L, Section 3.1.~~6~~7; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(h)). The perimeter ditches shall be constructed as specified at Permit Attachment L1, Drawing No. 25 (2 of 2).

6.2.1.g.v Run-On Diversion

The Permittee shall construct HDPE-lined ditches on the side of the access ramps to divert runoff from the slope areas above the access ramps and from the cut slope area to the Stormwater Collection Basin, as described at Permit Attachments A, Section 2.5.1.6; and L, Section 3.1.~~6~~7; and as shown at Permit Attachment L1, Drawings 10 and 14. The ditches shall be constructed as shown at Permit Attachment L1, Drawings 13, 14, and 25 (2 of 2). The Permittee shall operate the Landfill so that any runoff from the active waste filling area will drain to the Contaminated Water Collection Basin located within the Landfill as shown at Permit Attachment L1, Drawing 10.

6.2.1.h Vadose Zone Monitoring Wells

The Permittee shall construct ~~four deep~~15 vadose zone monitoring wells and two neutron probe access tubes to monitor fluids released from the Landfill in accordance with Permit Condition 7.2.1.a and 7.2.1.d; and as specified at Permit Attachment I, Section 2.2.2, *Vadose Zone Monitoring Well Construction*.

6.2.2 CQA Program

The Permittee shall implement the Construction Quality Assurance Plan contained at Permit Attachment M under the direction of a Construction Quality Assurance (CQA) officer who is a professional engineer registered in New Mexico to ensure that all construction required under Permit Condition 6.2 meets or exceeds all design criteria and specifications of this Permit, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.19(a)).

6.3 GENERAL LANDFILL OPERATING REQUIREMENTS

6.3.1 Operation and Maintenance of the Landfill

The Permittee shall operate and maintain the Landfill as specified at Permit Attachments A, Section 2.5.3, *Operation;* L, Sections ~~3.1.4~~2.2.3~~ and 3.1.5~~, *Final Cover;* and N, *Operations and Maintenance Plan*, Sections 3.4, *Landfill Operation*, and 4.1, *Landfill;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart N) and this Permit.

6.3.2 Placement of Waste in the Landfill

The Permittee shall manage the Landfill waste placement operation based on a series of grids along the north end of the Landfill and along both the east and west sides of the Landfill, as specified at Permit Attachment A, Sections 2.1.5, 2.2.10, and 2.5.3.7, *Procedures for Protecting Wastes*. This two-dimensional grid system, together with a vertical waste tracking system that counts the number of lifts between potentially incompatible wastes, and the thickness of those lifts, shall be used to ensure that the minimum spacing of incompatible waste is at least the 50 feet required by Permit Condition 6.9.

6.3.3 Daily Cover

The Permittee shall ensure that a daily soil cover with a minimum thickness of 0.5 foot is placed on the active waste placement area of the Landfill to control wind dispersal of particulate matter, as specified at Permit Attachments A, Section 2.5.1.7, *Wind Dispersal Control Procedures;* and N, *Operations and Maintenance Plan*, Section 3.4.3, *Waste Placement;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(j)).

6.3.4 Management of Run-On/Runoff

6.3.4.a Collection Basins

The Permittee shall ensure that run-on and runoff is pumped out of the Stormwater Collection Basin and the Contaminated Water Collection Basin ~~within 24 hours~~ after a storm event, or otherwise manage these basins to maintain the design capacity of the systems, as specified at Permit Attachment A, Section 2.5.1.6, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(i)).

6.3.4.b Standing Water

The Permittee shall ensure that standing water that collects on the Landfill floor is pumped out ~~within 24 hours~~ after a storm event, as specified at Permit Attachment A, Section 2.5.1.6; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(g)).

6.3.5 Leachate

If leachate collected from the Landfill leak detection systems, which includes the LCRS, the LDRS, and possibly the VZMS, meets LDR treatment standards, then the Permittee shall manage leachate by recirculating the liquid and applying it to the landfill soil cover for enhanced evaporation. Management of leachate by recirculation has been evaluated through calculations that provided with the Engineering Report in Permit Attachment L and modeling results and calculations in Permit Attachment L5. Management of leachate by recirculation for enhanced evaporation shall keep all leachate and potential contaminants within the lined landfill cell.~~treat the leachate in the Surface Impoundment or Stabilization Tank to remove all free liquids, as appropriate, and, if the leachate residue continues to meet LDR treatment standards, dispose of the treated leachate residue in the Landfill. If the leachate does not meet LDR treatment standards, the Permittee shall either treat the leachate in the Stabilization Tank to remove all free liquids and attain the LDR Treatment Standards as specified in Permit Part 4, or shall ship the leachate off-site to an appropriate permitted hazardous waste management facility, in compliance with all applicable regulations for generation and transport of hazardous waste.~~

6.4 WASTE ANALYSIS

6.4.1 Waste Characterization

The Permittee shall ensure that all waste placed in the Landfill meets the waste analysis requirements specified at Permit Attachment F, *Waste Analysis Plan*, Section 4.5.5.5, *Waste Analysis Requirements Specific to the Landfill*; and Permit Conditions 6.8 through 6.10.

6.4.2 Annual Analysis

At least annually, the Permittee shall randomly sample and analyze a minimum of 10 percent of incoming waste streams that are to be directly landfilled to verify compliance with the LDR treatment standards, as specified at Permit Attachment F, Section 4.5.5.5.

6.4.3 Leachate

6.4.3.a Leak Detection Systems Sampling and Analysis

The Permittee shall sample and analyze the leachate collected from the Landfill LDRS, LCRS, and VZMS sump in accordance with Permit Conditions 6.5.2.d and Permit Attachment F, Section 4.5.6, *Waste Analysis Requirements for Waste Generated On-Site*, for all the multisource leachate (EPA Hazardous Waste Number F039) constituents listed in the Table contained at 20.4.1.800 NMAC (incorporating 40 CFR 268.40).

6.4.3.b VZMS Well Sampling and Analysis

The Permittee shall sample and analyze any fluid collected from the VZMS monitoring wells in accordance with Permit Conditions 6.6.2, 7.3.2.a, and 7.3.2.b. Sampling and analysis shall be performed over the time period specified at Permit Condition 7.1.4.

6.5 LEAKS, SPILLS, AND LEACHATE MANAGEMENT

6.5.1 Spills and Releases

The Permittee shall ensure that spills and releases to the surface environment are contained and remediated in a timely manner.

6.5.2 Leachate Removal

6.5.2.a Removal of Leachate from the LCRS and LDRS

The Permittee shall remove pumpable liquids from the LCRS and LDRS sumps whenever monitoring indicates the presence of liquid to prevent the hydraulic head on the bottom liner from exceeding 12 inches, as specified at Permit Attachment N, Section 3.4.4, *Operation of Leachate Collection and Detection Systems;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.301(c)(4)).

6.5.2.b Removal of Leachate from the VZMS Sump

The Permittee shall remove pumpable quantities of leachate (if any) from the VZMS sump as specified at Permit Attachment I, Section 4.0, *Monitoring Procedures*.

6.5.2.c Leachate Storage

Leachate removed from the Landfill LCRS, LDRS, and VZMS sump shall be stored in the Leachate Storage Tank, as specified at Permit Attachment F, Section 4.5.6, *Waste Analysis Requirements for Waste Generated On-site*.

6.5.2.d Leachate Sampling

The Permittee shall ensure that sampling and analysis of leachates removed from the LCRS, LDRS, and the VZMS sump at the base of the Landfill ~~occurs before this leachate is commingled with fluids from any other unit, including VZMS wells and the Surface Impoundment~~, to ensure representative samples for the purpose of establishing the indicator parameters required at Permit Condition 7.3.2. Leachate from the Landfill LDRS, LCRS, and the VZMS sump at the base of the Landfill may be commingled before sampling and analysis, unless it is necessary to identify the location of the source of the fluids entering the LDRS and the VZMS sump.

6.5.3 Action Leakage Rate

The Action Leakage Rate (ALR) for the Landfill, as approved by the Secretary in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.302(a)), is 900 gallons per acre per day (gpad) as measured in the LDRS sump, as specified at Permit Attachment A, Section 2.5.3.8, *Action Leakage Rate;* Permit Attachment J, *Action Leakage Rate and Response Action Plan*, Section 5.2, *Determination of Action Leakage Rate: Landfill*.

To determine if the ALR has been exceeded, the Permittee shall determine the average daily flow rate on a weekly basis during the active life and closure period of the Landfill, and monthly during the post-closure care period, as specified at Permit Attachment J, Section 5.4, *Determination If the Action Leakage Rate Is Exceeded;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.302(b)).

6.5.4 Flow Rates Less than or Equal to the ALR

The Permittee shall respond to leakage less than or equal to the ALR as specified at Permit Attachment A, Section 2.5.3.9, *Response Action Plan*.

6.5.5 Flow Rates Greater than the ALR

The Permittee shall respond to leakage greater than the ALR as specified at Permit Attachment J, Section 7.0, *Response Actions;* and as required by 20.4.1.500 NMAC, (incorporating 40 CFR 264.304(b)(3) through (b)(5) and (c)). The Permittee shall also immediately inspect each monitoring point in the VZMS for fluids in accordance with Permit Condition 7.4.1.b, as specified at Permit Attachment I, Section 4.2, *Response Actions*, and shall increase the frequency of inspection of the VZMS wells from monthly to weekly in accordance with Permit Condition 7.4.1.b.

6.6 INSPECTION AND MONITORING PROCEDURES

6.6.1 Inspection Requirements

6.6.1.a General Inspection Requirements

The Permittee shall inspect the Landfill, including the liner and leachate collection systems, and ancillary equipment, as specified at Permit Attachments D, Section 5.2.2, *Landfill Inspection Procedures;* and D1, *Inspection Schedules and Checklists;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.303).

6.6.1.b Inspections during Construction

The Permittee shall inspect the liners and cover systems of the Landfill during construction and installation for uniformity, damage, and imperfections (e.g., holes, cracks, thin spots, or foreign materials), as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.303(a)).

6.6.1.c Inspections after Construction

The Permittee shall inspect the liners and cover systems of the Landfill immediately after installation or construction as required by 20.4.1.500 NMAC, (incorporating 40 CFR 264.303(a)(1) and (2)), as follows:

- the Permittee shall inspect all synthetic liners and covers to ensure tight seams and joints and the absence of tears, punctures, or blisters; and

- the Permittee shall inspect soil-based and admixed liners and covers for imperfections including lenses, cracks, channels, root holes, or other structural nonuniformities that may

cause an increase in the permeability of the liner or cover.

6.6.1.d Inspections during Operation

The Permittee shall inspect the Landfill weekly and after storms, as specified at Permit Attachment D1, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.303(b)), to detect evidence of any of the following:

- deterioration, malfunctions, or improper operation of run-on and runoff systems; and
- improper functioning of wind dispersal control systems.

6.6.2 Monitoring Requirements

The Permittee shall monitor the Landfill LCRS, LDRS, and VZMS daily, the Landfill vadose zone monitoring wells monthly, and the Landfill neutron probe access tubes twice annually for the presence of liquids and to detect evidence of deterioration or malfunction of the systems during the active life of the Landfill in accordance with Permit Condition 7.4.1. The Permittee shall monitor and record the Landfill sumps during the post-closure care period according to the schedule specified at Permit Attachment J, Section 6.0, *Leak Detection and Removal System Monitoring*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.303(c)(2)); and shall monitor the vadose zone monitoring wells and neutron probe access probes semi-annually, as specified at Permit Attachment I, Section 4.1, Table 2, *Monitoring Frequency*.

If liquids are present, the Permittee shall implement Permit Condition 7.4.2 and sample and analyze the liquids as specified at Permit Attachments F, Section 4.5.6; and I, Section 4.4, *Sample Collection*. The Permittee shall remove and properly dispose of all liquids collected, as specified at Permit Attachment I, Section 4.2.

6.7 RECORDKEEPING AND REPORTING

6.7.1 Recordkeeping Requirements

The Permittee shall follow the recordkeeping requirements for the Landfill specified at Permit Attachment N, Section 3.4.1, *Records*. Records kept shall include, but are not limited to:

6.7.1.a Grid "Cell" Location

The Permittee shall maintain the following items in the Operating Record, in accordance with Permit Condition 2.12.1.m; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.73(b)(2) and 40 CFR 264.309):

- a map with the exact location and dimensions including depth, of each grid "cell" in the three-dimensional grid system required under Permit Condition 6.3.2, with respect to permanently surveyed benchmarks; and

- the contents in each grid "cell" and the approximate location of each hazardous waste type within each grid "cell".

6.7.1.b Inspection Logs

The Permittee shall keep in the Operating Record the inspection logs and other records for the inspections conducted in accordance with Permit Condition 6.6.1 for a minimum of three years, in accordance with Permit Condition 2.7.3, and as required by 20.4.1.500 NMAC, (incorporating 40 CFR 264.15(d) and 264.73(b)(5)).

6.7.1.c LDRS, LCRS, and VZMS Monitoring Data

The Permittee shall keep records for the LDRS, LCRS, and VZMS monitoring conducted in accordance with Permit Condition 6.6.2, including a record of the amount of liquids removed during the active life, closure, and post-closure care periods of the Landfill, in accordance with Permit Condition 2.12.1.k.i; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.303(c)(1)). These records shall be retained until the Secretary has approved the completion of post-closure care for the Landfill.

6.7.2 Reporting Requirements

6.7.2.a Waste Identification and Location within the Landfill

The Permittee shall submit current information on the grid "cell" map, required under Permit Condition 6.7.1.a, to the Secretary quarterly. The Permittee shall submit the identification of waste placed in each cell in terms of the grid coordinates, to the Secretary. This information shall be

included in the Quarterly Report required under Permit Condition 2.12.2.b.

6.7.2.b Ignitable, Reactive, or Incompatible Waste

The Permittee shall document and place in the Operating Record the evidence of compliance with the requirements for ignitable, reactive, and incompatible waste contained at Permit Conditions 6.8 and 6.9; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.17(c) and 264.73(b)(3)), using references to published scientific or engineering literature, using data for trial tests, waste analyses, and/or the results of the treatment of similar wastes by similar treatment processes.

6.7.2.c Response Actions

If the flow rate into any leak detection system exceeds the ALR, the Permittee shall, as specified at Permit Attachment J, Section 7.0, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.304(b)(1), (b)(2), and (b)(6)):

- notify the Secretary in writing of the exceedance within seven calendar days of the determination;
- submit a preliminary written assessment to the Secretary within 14 calendar days of the determination as to the amount of liquids, likely source of liquids, possible location, size, and cause of any leaks, and short-term actions taken and planned; and
- submit to the Secretary the results of the analysis required under Permit Condition 6.5.5, the results of actions taken, and actions planned within 45 calendar days of the determination. Monthly thereafter, the Permittee shall, as long as the flow rate in the LDRS exceeds the ALR, submit to the Secretary a report summarizing the results of any remedial actions taken and actions planned.

6.7.3 Landfill CQA Certification

Prior to the initiation of operations at the Facility, the Permittee shall submit a certification to the Secretary signed by the CQA officer that the approved CQA Plan has been successfully carried out and that the Landfill meets all regulatory requirements, in accordance with Permit Conditions

1.5.9.c.i and 1.10; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.19(d)). The certification shall also attest that the Secretary's inspection, provided for at Permit Condition 1.5.9.c.ii, has been either completed or waived. The Permittee shall furnish documentation supporting this certification to the Secretary upon request.

6.8 SPECIAL LANDFILL PROVISIONS FOR IGNITABLE OR REACTIVE WASTES

The Permittee shall not place ignitable or reactive waste in the Landfill, unless the waste meets all applicable requirements contained at 20.4.1.500 NMAC (incorporating 40 CFR 264.17(b)) and 20.4.1.800 NMAC (incorporating 40 CFR Part 268), and the ignitable or reactive waste has been treated so that it no longer meets the definition of ignitable or reactive waste contained at 20.4.1.200 NMAC (incorporating 40 CFR 261.21 or 261.23), as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.312). The Permittee shall also comply with the procedures for managing ignitable or reactive waste contained at Permit Attachment A, Section 2.5.3.6, *Specific Requirements for Ignitable/Reactive Wastes*.

6.9 SPECIAL LANDFILL PROVISIONS FOR INCOMPATIBLE WASTES

The Permittee shall not place incompatible wastes, or incompatible wastes and materials, in the same Landfill grid "cell", in accordance with the procedures specified at Permit Attachment A, Section 2.5.3.7, *Procedures for Protecting Wastes*, and at 20.4.1.500 NMAC (incorporating 40 CFR 264.17(b)), as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.313). Incompatible waste shall be placed with a minimum of one grid distance (50 feet) horizontally, vertically, and diagonally between the wastes, as specified at Permit Attachment A, Section 2.5.3.7.

6.10 DISPOSAL REQUIREMENTS FOR SPECIFIC WASTE TYPES

6.10.1 Free Liquids

6.10.1.a Bulk or Non-Containerized Free Liquids

The Permittee shall not place bulk or non-containerized free liquids or waste containing free liquids (e.g., Leachate) in the Landfill, as specified at Permit Attachment F, Section 4.5.5.5, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.314(b)).

6.10.1.b Containers Holding Free Liquids

The Permittee shall not place containers holding free liquid in the Landfill, unless one of the following conditions is met, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.314(d)):

- all free-standing liquid~~: (i) has been removed by decanting or other methods; (ii) has been mixed with absorbent or solidified so that free-standing liquid is no longer observed; or (iii)~~ has been removed or otherwise eliminated prior to waste receipt at the Facility;
- the container is no larger than an ampule;
- the container is designed to hold free liquids for use other than storage (e.g., a battery or capacitor); or
- the container is a lab pack as defined at 20.4.1.500 NMAC (incorporating 40 CFR 264.316), and is disposed in accordance with Permit Condition 6.10.2.

6.10.2 Lab Packs

The Permittee shall ensure that small containers of hazardous waste in overpacked drums (lab packs) are disposed in the Landfill as specified at Permit Attachment A, Section 2.5.3.7, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.316).

6.10.3 Hazardous Debris

The Permittee shall not place hazardous debris in the Landfill unless it has been treated by the generator and the generator has certified that the debris meets the LDR treatment standards specified at 20.4.1.800 NMAC (incorporating 40 CFR 268.45), as specified at Permit Attachment F, Section 4.5.5.5.

6.10.4 Contaminated Soil

The Permittee shall place contaminated soil in the Landfill only in accordance with all the requirements of 20.4.1.800 NMAC (incorporating 40 CFR 268.49).

6.11 SPECIFIC PROVISIONS FOR EMPTY CONTAINERS

The Permittee shall not dispose of any containers that are larger than ampules in the Landfill unless they are at least 90 percent full when placed in the Landfill or they are crushed~~, shredded, or similarly~~ and reduced in volume to the maximum practical extent by compaction~~before placement~~ in the Landfill prior to permanent burial, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.315).

6.12 CLOSURE

The Permittee shall conduct closure activities for the Landfill as specified at Permit Attachment O, *Closure Plan*, Section 8.1.6, *Landfill*, and other pertinent sections; and in accordance with Permit Part 8; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.310). The Permittee shall follow the time frame for closure specified at Permit Attachment O1, *Compliance Schedules for Closure*.

6.13 POST-CLOSURE CARE PLAN

The Permittee shall conduct post-closure care activities for the Landfill as specified at Permit Attachment P, *Post-Closure Care*, Section 8.2, *Post-Closure Activities*, and other applicable sections; and in accordance with Permit Part 8; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart G and 40 CFR 264.310).

TABLE 6-1

PERMITTED LANDFILL UNIT

Unit	Dimensions (feet)	Capacity (Cubic Yards)	Surface Area (Acres)
Landfill Phase IA	1,050 long x 1,050 wide x 100 deep	553,200	35

PERMIT PART 7

VADOSE ZONE MONITORING

HIGHLIGHTS

Introduction

This Part contains conditions to ensure the earliest possible detection of contaminant leakage from the Landfill~~ and the Surface Impoundment~~. Permit Conditions include the location, design, construction, operation, and maintenance of the Vadose Zone Monitoring System (VZMS); the methodology for sampling and characterizing the fluids that may accumulate in the system; a methodology for distinguishing between leachates and non-leachates; monitoring frequency; laboratory analysis; and data reporting and recording requirements.

The Landfill ~~and Surface Impoundment are~~ is referred to as a "regulated unit~~s~~" in this Part. The VZMS consists of a sump~~s~~ located directly below ~~be~~the regulated unit~~s~~, and a total of eith~~eleven~~ monitoring wells located immediately adjacent to the regulated units, seven~~six~~ monitoring wells on the periphery of the facility, ~~three suction lysimeters associated with the Surface Impoundment,~~ and two~~three~~ neutron probe access tubes adjacent to the regulated unit~~s~~. The VZMS monitors the accumulation and migration of fluids below the ground surface and above the uppermost aquifer. Together with the Leachate Detection and Removal System (LDRS) and Leak Collection and Removal System (LCRS) sumps (see Permit Parts 5 and 6), the VZMS distinguishes between leachates originating within the regulated unit~~s~~ and non-leachate fluids that may originate outside the unit~~s~~.

Regulatory Background

The New Mexico Hazardous Waste Act and Regulations under 20.4.1.500 NMAC (incorporating 40 CFR 264.90 through 264.99) and 20.4.1.900 NMAC (incorporating 40 CFR 270.32(b)(2)) require owners and operators of facilities that treat, store and dispose of hazardous waste to monitor the ground water of the uppermost aquifer for possible contaminant releases and to operate under the necessary permit conditions to be protective of human health and the environment. The Secretary has approved a waiver of the requirements for ground water monitoring at the facility in accordance with 20.4.1.500 (incorporating 40 CFR 264.90(b)(4)). In lieu of ground water monitoring, and as a part of a Final

Order dated March 18, 2002, the Secretary is requiring vadose Zone monitoring. The Secretary has determined that vadose zone monitoring is more appropriate, and more protective of health and the environment, than ground water monitoring at this Facility, given the depth to ground water and the distance that hazardous constituents would have to travel to contaminate ground water. The upper zone of ground water is approximately 700 feet beneath the Facility. The Ogallala Aquifer is a minimum of 3600 feet east of the Facility. Moreover, contaminant flow modeling, based on conservative assumptions, predicts that any contaminants released from the Facility would not reach ground water within 800 years. The vadose zone monitoring system is designed to detect contaminants released from the Facility long before they reach ground water. Once detected, any contamination in the vadose zone will be addressed under the corrective action conditions of this Permit, or under other authority. The bases for the ground water monitoring waiver are specified in greater detail in Permit Attachment H, *Ground Water Monitoring Request and Approval.*

A ground water monitoring waiver for the Facility has been approved by the Secretary for reasons specified at Permit Attachment H, *Ground Water Monitoring Waiver Request and Approval,* in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.90(b)(4)). Those reasons include contaminant flow model predictions that conservatively demonstrate that fluids will not migrate from ~~a~~ the Regulated Unit to either the first zone of saturation approximately 700 feet below the facility, or to saturation associated with the Ogallala Aquifer a minimum of 3600 feet east of the facility, within 800 years. It is pursuant to the above regulations, and as a condition of the waiver approval, that vadose zone monitoring is required in lieu of groundwater monitoring under this Permit.

Other Monitoring Requirements

Monitoring requirements for the regulated unit~~s~~ contained in this Part ~~are~~ is in addition to the LDRS monitoring requirements specified at Permit Conditions 5.6.2 and 6.6.2.

Regulated Unit~~s~~

Regulated units are defined at 20.4.1.500 NMAC (incorporating 40 CFR 264.90(a)(2)) as those land-based units that receive hazardous wastes after July 26, 1982. The Facility has ~~two~~ one regulated unit~~s~~, the Landfill ~~and the Surface Impoundment~~. The Landfill is described at Permit Part 6, *Highlights*. The Landfill is a disposal unit where wastes will remain

indefinitely and will therefore be subject to vadose zone monitoring Permit Conditions established in this Part that will extend through the Post-Closure Care Period (see Permit Part 8).

Potential releases from the Landfill are anticipated to be in the form of liquids escaping through a breach in the liner system. Though no free liquids will be placed in the Landfill, fluids will enter the Landfill in the form of precipitation, which will invariably leach hazardous constituents and accumulate in the Landfill sumps. Engineered controls to address the accumulated fluids and to preclude a release outside the Landfill liner system include an LCRS and an LDRS. The LCRS and LDRS are not considered part of the VZMS, but LCRS and LDRS fluid samples are used to establish indicator parameters indicative of Landfill leachate against which VZMS sample analyses are compared to determine whether a release to the vadose zone has occurred.

~~The Surface Impoundment is described at Permit Part 5, *Highlights*. Although the Surface Impoundment is a treatment unit that will undergo clean closure, its associated vadose zone monitoring wells will continue to be monitored through the post-closure care period due to their proximity to the Landfill (see Permit Part 8). Potential releases from the Surface Impoundment are anticipated to be in the form of liquids escaping through a breach in the liner system. Fluids that escape through the primary liner will be detected and removed by the Surface Impoundment LDRS.~~

7.1 GENERAL REQUIREMENTS

7.1.1 Duty to Monitor

The Permittee shall conduct vadose zone monitoring in accordance with the requirements of this Permit Part and as specified at Permit Attachment I, *Vadose Zone Monitoring System Work Plan*, and as required by 20.4.1.500 (incorporating 40 CFR 264.91, 264.97, and 264.98)).

7.1.2 Duty to Initiate Corrective Action

If at any time a release, generally in the form of a leachate escaping through a liner system, is detected from a regulated unit through the release assessment required at Permit Condition 7.5, the Permittee shall notify the Secretary within 24 hours and shall initiate corrective action in accordance with Permit Part 9.

7.1.3 Duty to Remove Non-Leachates

If the VZMS contains non-leachate fluids as identified at Permit Condition 7.3.1, the Permittee shall identify and remove, where possible, both the source and the non-leachate fluids as required by 20.4.1.500 (incorporating 40 CFR 264.97(a)(2)). If removal is implemented, the Permittee shall report the progress of that removal to the Secretary monthly.

7.1.4 Duration of Monitoring

The Permittee shall conduct vadose zone monitoring through the active life, including the closure period~~,~~ of ~~both~~ the Landfill ~~and the Surface Impoundment,~~ and through the post-closure care period of the Landfill, in accordance with this Permit Part as required by 20.4.1.500 (incorporating 40 CFR 264.90(c)).

7.2 VZMS LOCATION AND CONSTRUCTION

7.2.1 VZMS Construction and Locations

The VZMS shall consist of ~~three~~ one vadose zone sump~~s~~, ~~seventeen~~ fifteen vadose zone monitoring wells, and ~~three~~ two neutron probe access tubes.~~, and three suction lysimeters~~ installed at locations and depths as required at Permit Conditions 7.2.1.a, 7.2.1.b, 7.2.1.c, 7.2.1.d, and 7.2.1.e; and as specified at Permit Attachment I, Section 2.0, *Vadose Zone Monitoring System Installation.* The vadose zone monitoring wells shall be capable of yielding fluid samples from the vadose zone below the Landfill and Surface Impoundment where fluids are likely to accumulate in the future. The Permittee shall construct and maintain these monitoring points to yield sufficient fluid samples that are representative of the various fluid sources, as required by 20.4.1.500 (incorporating 40 CFR 264.95(a) and 40 CFR 264.97(a)(2)). The vadose zone monitoring system shall be installed prior to the initial acceptance of waste at the Facility, in accordance with the schedule presented at Table 1-1, *Compliance Schedule*, of this Permit. See a map of the VZMS at Permit Attachment I, Figure 2.

7.2.1.a Deep Vadose Zone Monitoring Wells

The Permittee shall install and maintain a total of ~~eleven~~ nine deep vadose zone monitoring wells as required by 20.4.1.500 (incorporating 40 CFR 264.95(a) and 264.97(a)(2)).

~~Ten~~ Nine deep vadose zone wells capable of collecting representative samples of any fluid that may accumulate at or

above the stratigraphic boundary between the Upper and Lower Dockum stratigraphic units, and below the stratigraphic boundary between the alluvium and the Upper Dockum, shall be constructed. The specific location of ~~six of~~ the ~~ten~~ nine deep vadose zone monitoring wells is specified at Permit Attachment I, Section 2.2, *Vadose Zone Monitoring Wells*.

The nine deep and very deep vadose zone monitoring wells will be installed at the following locations:

- four deep monitoring wells will be located in a line along the eastern boundary of the Phase 1A landfill, spaced at approximately 350-foot intervals.
- one deep monitoring well will be located at the northeast corner of the facility.
- one deep monitoring well will be located at the midpoint between the northeast corner of the Phase 1A landfill and the northeast corner of the facility.
- one off-site deep monitoring well will be installed approximately 3,300 feet northeast of the facility, within 15 feet of the location of boring WW-1.
- one off-site monitoring well will be installed approximately 550 feet west of the facility, near the southwest facility corner, within 15 feet of the location of boring PB-14.
- one very deep monitoring well will be installed at the southeast corner of the stormwater detention basin.

These wells shall be installed at the locations specified as Nos. VZMW-1D~~1~~, 2D~~2~~, 3D~~3~~, 4D~~4~~, 5D~~5~~, ~~and~~ 6D~~6~~, 7D, 8D, and 9D in Permit Attachment I, Figure 2, *Location of Sumps and Monitoring Wells*.

One deep monitoring well (VZMW-9D~~9~~) shall be located within fifteen feet of borehole location WW-1. The purpose of this deep vadose zone monitoring well is to measure potential changes in fluid chemistry and water level for a location where shallow groundwater is currently known to exist.

Two of the nine~~ten~~ deep vadose zone monitoring wells will be located northeast of the regulated units. One well will be located at the northeast corner of the facility boundary, and another one-half the distance from the northeast corner of the facility boundary to the northeast corner of the landfill on a line that intersects the two points. The purpose of these two

wells is to identify the lateral extent of Upper Dockum saturation, and to monitor any possible contaminants that may potentially migrate toward the saturated zone.

Also, one of the nine~~ten~~ deep vadose zone monitoring wells will be located west of the facility boundary within fifteen feet of borehole location PB-14. This well will measure changes in fluid chemistry and water level at a location where shallow groundwater is currently known to exist.

One deep vadose zone monitoring well shall be installed and operated to determine the presence and quality of groundwater within the Lower Dockum Unit above the lower sandstone formation (Santa Rosa Sandstone). This well shall be constructed at the southeast corner of the stormwater detention basin. This well shall be screened from fifty feet below the top of the Lower Dockum Unit, down to one hundred feet above the top of the Santa Rosa Sandstone. The well shall be properly constructed to prevent fluid migration and infiltration between different stratigraphic units or zones.

These wells shall be constructed as specified in Permit Attachment I, Section 2.2.2, *Vadose Zone Monitoring Well Construction;* and as required by 20.4.1.500 (incorporating 40 CFR 264.97(c)).

7.2.1.b Shallow Vadose Zone Monitoring Wells

The Permittee shall install and maintain a total of six shallow vadose zone monitoring wells that are capable of collecting a representative sample of fluids that may accumulate at or above the stratigraphic boundary between the alluvial material and the Upper Dockum stratigraphic units, and below the ground surface as required by 20.4.1.500 (incorporating 40 CFR 264.95(a) and 264.97(a)(2)). Four shallow vadose zone monitoring wells shall be constructed and operated in the alluvial sediments west of the waste management units and east of the Stormwater Detention Basin. These wells shall be constructed on a north-south line spaced at approximately 330-foot intervals. The purpose of these wells is to monitor the possible near surface migration of regulated fluids toward the western boundary of the facility.

One shallow vadose zone monitoring well shall be constructed and operated within fifteen feet of the deep vadose zone monitoring well located near borehole WW-1. A second shallow vadose zone monitoring well shall be constructed and operated within fifteen feet of the deep vadose zone monitoring well located near

borehole PB-14. The purpose of the two monitoring wells is to monitor the accumulation of fluids in the alluvial materials.

7.2.1.c Vadose Zone Monitoring Sumps

The Permittee shall install ~~three~~ a vadose zone monitoring sump~~s~~, ~~two below the Surface Impoundment and one~~ below the Landfill, that is~~are~~ capable of collecting a representative sample of any fluids that may accumulate below the Surface Impoundment and the Landfill, respectively, in accordance with Permit Conditions 5.2.1.e and 6.2.1.e.

Vadose Zone Sumps shall be designed and constructed in accordance with the following engineering design drawings contained at Permit Attachment L1, *Engineering Drawings*:

Drawing 15: Sump Plan View - Phase 1a

Drawing 16: Sump Cross-Sections - Phase 1a

Drawing 17: Typical Sump Detail Cross-Section

Drawing 18: Vadose, LDRS, LCRS Cross-Sections and Details

~~Drawing 28: Evaporation Pond Subgrade Contours - Phase 1~~

~~Drawing 29: Evaporation Pond Clay Liner Contours - Phase 1~~

~~Drawing 30: Evaporation Pond Cross-Sections~~

~~Drawing 32: Evaporation Pond LDRS and Vadose Plan and Details~~

~~Drawing 39: Drum Handling Unit Sump Details (sheet 1 and sheet 2)~~

~~Drawing 41: Truck Roll Off Area Drainage Surface Contours (plan)~~

~~Drawing 43: Truck Roll Off Area Liner Details (section and details)~~

~~Drawing 44: Truck Wash Layout and Details (sheet 1 and sheet 2)~~

7.2.1.d Neutron Probe Access Tubes

The Permittee shall install and maintain a total of ~~three~~ two deep neutron probe access tubes capable of detecting a release

from the regulated units migrating in the subsurface as unsaturated flow. The neutron probe access tubes shall also be constructed to enable collection of a representative sample of any fluid that may accumulate at or above the stratigraphic boundary between the Upper and Lower Dockum stratigraphic units, and below the stratigraphic boundary between the alluvium and the Upper Dockum. Installation of neutron probe access tubes designed to detect unsaturated flow partially fulfills the Final Order from the Secretary dated March 18, 2002, through his authority stipulated at 20.4.1.900 (incorporating 40 CFR 270.32(b)(2)).

One neutron probe access tube shall be located at the center of the north boundary of the Phase 1A~~I~~ Landfill. Another access tube shall be located at the center of the west boundary of the Phase 1~~I~~A Landfill. ~~The third access tube shall be located at the northwest corner of the North Surface Impoundment.Suction~~

~~**7.2.1.e Lysimeters**~~

~~The Permittee shall install and maintain a total of three shallow suction lysimeters capable of detecting a release from the Surface Impoundment migrating in the subsurface as unsaturated flow. Installation of suction lysimeters designed to detect unsaturated flow partially fulfills the Final Order from the Secretary dated March 18, 2002, through his authority stipulated at 20.4.1.900 (incorporating 40 CFR 270.32(b)(2)).~~

~~The lysimeters shall be placed in vertical boreholes at a depth of five feet below the Surface Impoundment vadose zone monitoring sumps. The lysimeters shall be located at the surface a distance of fifteen feet away from VZMW 1, VZMW 2, and the neutron probe access tube at the northwest corner of the North Surface Impoundment.~~

7.2.2 Additional Vadose Zone Monitoring Points

If, after Permit issuance, the Secretary's or the Permittee's knowledge of subsurface conditions indicate that the VZMS Permit Conditions are insufficient to detect a release from a regulated unit, the Secretary may require the Permittee to install additional vadose zone monitoring points in accordance with Permit Condition 7.2.1. Such changes may include, but are not limited to, detection of fluid in previously dry locations, or the discovery of previously unknown permeable strata during Facility construction or operation. The Permittee shall initiate a Permit modification to incorporate required

additional monitoring point(s), in accordance with 20.4.1.900 (incorporating 40 CFR 270.42).

7.2.3 Location of Replacement Wells

Should existing monitoring wells fail or otherwise cease to perform their intended function, replacement wells shall be installed as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.95(a) and 264.97(a)(2)). Replacement vadose zone monitoring wells shall be located within 15 feet of an original well.

7.2.4 Well Surveys

All vadose zone monitoring points shall be surveyed for both vertical and horizontal coordinates by a professional land surveyor registered in New Mexico. Horizontal coordinates shall be to plus or minus 0.1 foot with respect to the State Plane Coordinate System (NMSA 47-1-49 to 56) (Repl. Pamp. 1993) and a Facility benchmark. Vertical coordinates shall be to the top of the well casing (marked), the top of the concrete apron (marked), and the ground surface to plus or minus 0.01 foot with respect to mean sea level and a benchmark. This survey information shall be entered into and maintained in the Operating Record in accordance with Permit Condition 7.7.1.

7.2.5 Supervision of Construction

An experienced professional geologist or engineer shall supervise and document all VZMS construction.

7.2.6 Continuous Core

Well bores VZMW-1D, VZMS-~~5~~4D, and VZMS-~~6~~7D, as identified in Permit Attachment I, ~~Table 2~~Section 2.2.2.5, VZMS Construction Information, shall be drilled so as to provide continuous core so as to substantially be in accordance with 20.45.1.900 NMAC (incorporating 40 CFR 270.14(c)(2)). One deep borehole required in Permit Condition 7.2.1.a shall be continuously cored from 15 feet below the Upper/Lower Dockum contact to the total depth. The primary purpose of the coring is to evaluate the possible existence of paleofractures or faults beneath the facility. Should these well bores yield insufficient core to accurately determine the lithology and geologic structure of the locations, the Secretary may require additional attempts to obtain the required core from proximal locations. All geologic core shall be labeled as to depth, photographed, boxed, stored, and made available for inspection for the operating life of the Facility. Selected samples shall be sealed and stored for future

inspection. These samples shall be considered part of the Operating Record and maintained in accordance with Permit Condition 7.7.1.

7.2.7 Compatibility of Well Construction Materials

The Permittee shall ensure that vadose zone fluids are not adversely affected by well construction materials, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.97(a)). A compatibility demonstration shall be provided within six months of well construction, provided that sufficient vadose zone fluids are available to perform said assessment.

7.2.8 Drilling Equipment Air Supply

Borings shall be drilled using air rotary drilling methods as specified at Permit Attachment I, Section 2.2.2, and the air supply shall be filtered or provided with an efficient separator to minimize the introduction of water or compressor oil into the well bore, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.97(a)).

7.2.9 Well Completion Logs

Well completion logs for each VZMS well shall include, in addition to those items listed at Permit Attachment I, Section 2.2.2.~~3~~5, *Well Construction Information*, the following information:

- date(s) of drilling, completion, and any well development that may be necessary;
- explanation for any introduced water and a reference to its source and its chemical analysis;
- well location horizontal and vertical coordinates;
- total boring depth to within 0.1 foot with respect to ground surface, and well depth to within 0.01 foot with respect to top of casing (marked);
- boring and well casing(s) diameters;
- drilling and lithologic logs;

- well casing material specifications and size, and reference material certifications;
- well screen slot size and depth to both top and bottom of screen interval;
- casing and screen joint type;
- filter pack material source and grain size analysis;
- filter pack placement methodology;
- sealant material sources, types and mix design;
- surface seal design;
- reference to any non-anthropogenic fluids encountered during construction;
- well development procedures, should they be required, including equipment and methods used, total daily amounts of fluids removed, recovery rates, turbidity, and static fluid surface elevation measurements, if applicable;
- description of protective cap;
- detailed well construction drawing presenting depth of well construction material emplacement and well dimensions; and
- aquifer test results, including hydraulic conductivity, for any well containing groundwater at construction.

Well Completion Logs shall be entered into and maintained in the Operating Record in accordance with Permit Condition 7.7.1. The Well Completion Logs shall be submitted to the Secretary in the first Quarterly Report after completion of well construction, in accordance with Permit Condition 7.7.2.

7.2.10 Decontamination of Material Introduced into the Well Bore

All materials (except filter pack and sealants) introduced into the well bore shall be steam cleaned or washed with hot water

and anionic detergent (e.g., Alconox or equivalent) and thoroughly rinsed with distilled water prior to introduction, unless the material is supplied from the manufacturer certified clean and has remained sealed in a protective wrapping, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.97(a)). Wash/—decontamination water shall be collected in 55-gallon drums, labeled, and stored on site for later disposal in accordance with applicable regulations.

7.2.11 Decontamination of Drilling Equipment

Drilling equipment shall be decontaminated as specified at Permit Attachment I, Section 2.2.3, *Decontamination;* and in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.97(a)).

7.3 INDICATOR PARAMETERS

The Permittee shall create and maintain a list of chemical constituents and other parameters for use in monitoring the VZMS as specified below and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(a)). Monitored constituents are hereafter referred to as indicator parameters. Permit Attachments U2, *Background Values for Non-Leachates*, and V, *Vadose Zone Monitoring Indicator Parameters;* shall be developed, against which VZMS sample analysis shall be compared to assess potential releases to the vadose zone, in accordance with Permit Condition 7.

Potential sources of vadose zone fluids include two major categories: leachates originating from within the regulated units and containing the contaminants of concern; and non-leachates that originate outside the regulated units which are generally considered to not be contaminated. The non-leachate chemical constituents will be combined with the chemicals measured in leachates to establish the complete list of indicator parameters.

7.3.1 Non-Leachate Fluids

The Permittee shall establish and maintain a list of indicator parameters and their "baseline" chemical concentrations for the following non-leachate fluids according to the procedures specified at Permit Attachment I, Section 3.0, *Baseline Liquid Characterization;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(a)):

- precipitation;

- consolidation water from prepared regulated unit subgrade or geosynthetic clay liner;
- Facility water supply; and
- Stormwater Detention Pond fluids.

Non-leachate fluids are anticipated to contain only major ions and metals, but shall also be analyzed for those parameters identified at Permit Attachment I, Table 1, *Baseline Chemical Analyses*, including sulfides and sulfates, radionuclides, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), perchlorate, and total petroleum hydrocarbons (TPH). Non-leachate water samples from the four sources listed above and drill cuttings from three representative Dockum lithologies (i.e. mudstone, siltstone, and sandy siltstone) will be used in the Meteoric Water Mobility Procedure to determine non-leachate water quality (see Permit Attachment I, Appendix A, *Meteoric Water Mobility Procedure*). The result of this procedure and the non-leachate water quality analysis, as described at Attachment I, Section 3.0, shall be used to determine the non-leachate indicator parameter list at Permit Attachment V and the baseline chemical concentrations at Attachment U2.

A tolerance interval statistical procedure, as described at Permit Attachment Q, *Statistics for Release Determination*, shall be used to determine statistically significant changes from non-leachate baseline concentrations, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)).

7.3.1.a Time Frame for Establishing Non-leachate Fluid Indicator Parameter List and Baseline Concentrations

Both parameters on the indicator parameter list and their chemical constituent baseline concentrations for non-leachate fluids, excluding data acquired from Stormwater Detention Pond fluids, shall be established within three months of activating the Facility water supply and before acceptance of waste, in accordance with the procedures specified in Permit Attachment I, Section 3.0; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(a)).

Fluids in the Stormwater Detention Pond shall be measured annually for the constituents listed at 20.4.1.500 NMAC (incorporating 40 CFR 264, Appendix IX) and reported to the

Secretary. A list of these constituents shall be maintained in both the Operating Record and at Permit Attachment V.

7.3.1.b Reporting – Baseline Values for Non-Leachate Fluids

The indicator parameter list and the baseline chemical concentration values for non-leachate fluids, tolerance intervals required at Permit Condition 7.3.1, and the computations necessary to determine these parameters, shall be submitted by the Permittee in a separate report to the Secretary for approval in accordance with Permit Condition 7.7.2.a; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(a)).

7.3.1.c Additional Non-Leachate Fluids

The Permittee shall establish and record a list of indicator parameters and their chemical constituent baseline for any new sources of non-leachate fluid in a manner consistent with the procedure identified in Permit Condition 7.3.1; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(a)).

7.3.2 Leachates

The Permittee shall establish indicator parameters for leachates generated at ~~both~~ the Landfill ~~and the Surface Impoundment~~ as specified below; and as required by 20.4.1.500 (incorporating 40 CFR 264.98(a)). These lists shall be maintained in both the Operating Record and at Permit Attachment V. The leachate indicator parameters determined through monthly and biennial sampling shall be combined into a single leachate indicator parameter list maintained at Attachment V, which presents those parameters detected and which shall be updated as new indicator parameters are detected in subsequent sampling rounds. Parameters shall not be removed from the listing if subsequent sampling events do not detect a parameter present in previous sampling events.

7.3.2.a Monthly Sampling

The Permittee shall analyze ~~both~~ the Landfill ~~and Surface Impoundment~~ leachate (i.e., samples from the LCRS and LDRS) monthly, as specified at Permit Attachment F, *Waste Analysis Plan*, Section 4.5.6, *Waste Analysis Requirements for Waste Generated On-Site*, for the underlying hazardous constituents listed at the Table referenced at 20.4.1.800 NMAC (incorporating 40 CFR 268.40), for EPA Hazardous Waste Number F039 listed wastes (leachates); and as required by 20.4.1.500 (incorporating

40 CFR 264.98(a)). The results of these analyses shall be reported to the Secretary in the Quarterly Report, in accordance with Permit Conditions 2.12.2.b and 7.7.2.

7.3.2.b Biennial Sampling

The Permittee shall analyze ~~both~~ the Landfill ~~and Surface Impoundment~~ leachate biennially for the hazardous constituents referenced at 20.4.1.500 NMAC (incorporating 40 CFR 264, Appendix IX), as specified at Permit Attachment F, Section 4.5.6; and as required by 20.4.1.500 (incorporating 40 CFR 264.98(a)). The results of the test shall be reported to the Secretary in the Biennial Report and the samples shall be collected no sooner than 45 calendar days prior to the Biennial Report due date. Constituents previously undetected in the Appendix IX analysis shall be identified and reported. Constituents detected but not previously reported in accordance with Permit Condition 7.3.2.a and this Permit Condition shall also be reported.

7.4 MONITORING PROGRAM

The Permittee shall inspect and sample the VZMS at each monitoring point during the active life and closure period of the Facility, as specified at Permit Condition 7.1.4, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98). The Permittee shall inspect and sample vadose zone monitoring wells VZMW-1D, 2D, 3D, and 4D~~3, 4, 5, and 6~~ at the Landfill~~, and vadose zone monitoring wells 1 and 2 at the surface Impoundment~~ during the post-closure care period of the Facility. The Permittee shall use the following techniques and procedures when inspecting and sampling the vadose zone monitoring points required under Permit Condition 7.2.1. This information shall be recorded and reported in accordance with Permit Condition 7.7. Investigation-derived waste (IDW) generated during monitoring shall be managed as specified at Permit Attachment F, Section 4.5.6.1, *Overview of Wastes Generated On-site*.

7.4.1 Requirement to Inspect

7.4.1.a Inspection Schedule for Vadose Zone Fluids

The Permittee shall inspect each VZMS sump daily and each VZMS well monthly for the presence of vadose zone fluids. Inspection of Landfill VZMS sumps and Landfill and Surface Impoundment wells shall occur semi-annually during the post-closure period, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(d)).

7.4.1.b Inspection Schedule for Neutron Probe Access Tubes

The Permittee shall inspect each neutron probe access tube~~, plus Vadose Zone Monitoring Wells 1, 2 and 3,~~ every six months. The Permittee shall probe the above inspection locations with a neutron geophysical logging tool calibrated to optimally distinguish between dry and partially saturated lithologies at the Facility. Baseline neutron logs shall be established in both open and cased holes for the above inspection locations. Subsequent inspections will produce logs that will be compared to the baselines. If a neutron log shows a 0.25 change over established baseline API readings over a two-foot interval anywhere in the column, the Permittee shall immediately inspect the appropriate monitoring point for the presence of vadose zone fluids. ~~If a neutron log shows a 0.25 change over established baseline API readings over a two-foot interval within a depth range of five feet above or below the depth of the suction lysimeters, the Permittee shall immediately inspect the appropriate suction lysimeter for the presence of vadose zone fluids.~~ If vadose zone fluids are detected during any of the above inspections, the Permittee shall implement Permit Condition 7.4.2.

7.4.1.c Inspection Due to Exceedance of the ALR

If the Action Leakage Rate (ALR) is exceeded, the Permittee shall inspect each VZMS monitoring point associated with the impacted regulated unit immediately, and the Permittee shall increase the frequency of inspection of the monitoring wells from monthly to weekly at the impacted regulated unit; as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(d), 264.223, and 264.304). The inspection frequency shall remain weekly as long as the ALR continues to be exceeded.

7.4.2 Requirement to Sample

If fluids are detected in a VZMS monitoring well, sump, or neutron probe access tube, ~~or lysimeter~~ upon the inspection required in Permit Condition 7.4.1., the Permittee shall collect a sample of vadose zone fluid monthly at each monitoring point containing fluid, as detailed at Attachment I, Sections 4.1 *Monitoring Frequency*, and 4.3, *Monitoring Method;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)). A sample shall be collected immediately when fluids are first detected at each monitoring point.

7.4.3 Fluid Elevation Measurement

The Permittee shall determine fluid elevation at each well and VZMS sump, referenced to mean sea level, each time fluid is detected, as specified at Permit Attachment I, Section 4.4, *Sample Collection*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(e)).

7.4.4 Fluid Purging

The Permittee shall evacuate fluids in the monitoring points to the surface, as specified at Permit Attachment I, Section 4.4; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)).

7.4.5 Decontamination

The Permittee shall ensure that reusable sampling equipment is decontaminated as specified at Permit Attachment I, Section 4.9, *Decontamination*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)).

7.4.6 Equipment Calibration

The Permittee shall ensure that field measuring instruments are calibrated as specified at Permit Attachment I, Section 4.8, *Field Equipment*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)).

7.4.7 Sample Containerization

The Permittee shall place fluid samples in containers as specified at Permit Attachment I, Section 4.4; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)).

7.4.8 Quality Assurance Samples

The Permittee shall assure sample quality as specified at Permit Attachment I, Section 4.6, *Quality Assurance Samples*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)).

7.4.9 Sample Preservation

The Permittee shall preserve samples as specified at Permit Attachment I, Section 4.5, *Sample Preservation and Transportation*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)).

7.4.10 Sampling Record

The Permittee shall ensure that sampling activities as specified at Permit Attachment I, Section 6.1, *Field Documentation*, are recorded in the Operating Record, in accordance with Permit Condition 7.7.1; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)). The sampling record shall include the Quarterly Well Inspection Logs (containing information required under Permit Condition 7.4.1) and Monitoring Field Logs (containing information required under Permit Conditions 7.4.2 through 7.4.9).

7.5 RELEASE ASSESSMENT

The Permittee shall conduct a release assessment on all fluid samples collected in accordance with Permit Condition 7.4.2 and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)) to determine whether fluids may have originated from within a regulated unit. If the data analysis specified at Permit Condition 7.5.1.a indicates that a release has occurred, the Permittee shall notify the Secretary within 24 hours of detection, as specified in Permit Attachment C (*Contingency Plan*), Section 6.~~5.3.2~~4.2, and initiate the corrective action requirements of Permit Part 9, including the verification sampling requirements of Permit Condition 9.3.2. The fluid constituent concentrations indicative of a release shall be referred to as "action levels". The release assessment shall be performed using the following techniques and procedures:

7.5.1 VZMS Sample Analysis

The Permittee shall analyze VZMS samples in accordance with all conditions of this Permit Part for all indicator parameters specified at Permit Attachment V and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)). It is presumed that the number of VZMS analytes will increase as additional waste streams are placed into the regulated unit.

7.5.1.a Release Determination

The Permittee shall determine whether a VZMS release has occurred, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)), by evaluating monitoring data for two criteria: 1) a significant change in non-leachate indicator parameter chemical concentrations, and 2) the detection of any leachate indicator parameters. The Permittee shall measure leachate constituents using the detection limits specified in Permit Condition 7.5.4.

The Permittee shall use trilinear diagrams to graphically determine any significant changes in the following non-leachate parameters: bicarbonate, chloride, dissolved major cations (Na, K, Mg, Ca, Fe), total dissolved solids (TDS), and sulfate. Trilinear diagrams will be compared after consecutive sampling events and over time. A tolerance interval statistical procedure, as described at Permit Attachment Q, shall be used to determine statistically significant changes in the following non-leachate parameters: dissolved and total metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Ti, Zn) and radionuclides (gross alpha, gross beta, gamma emitters, total uranium, radium 226/228, radon). TDS, sulfates and all detected leachate indicator parameters shall be presented in a tabular format and will be compared after consecutive sampling events and over time.

The Permittee shall initiate corrective action under Permit Part 9 and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(g)) for any release defined as (a) any significant change in the shape of the trilinear diagram (i.e., a change in major ion ratio); (b) any statistically significant change in non-leachate dissolved or total metals or radionuclides; or (c) any detection of an anthropogenic hazardous constituent in VZMS samples.

7.5.1.b Analytical Methods

The Permittee shall utilize the appropriate analytical methods for baseline constituents as specified at Permit Attachment I, Table 1. Analytical methods for leachate constituents shall be chosen from *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods* (EPA publication SW-846, most current edition).

7.5.2 Evaluation Frequency

The release assessment shall be conducted each time fluid samples are collected, in accordance with Permit Condition 7.4.2 and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(d)), at each monitoring point required under Permit Condition 7.2.1, and as specified at Permit Attachment I, Section 6.4, *Data Analysis*.

7.5.3 Evaluation Schedule

The Permittee shall perform the evaluations specified at Permit Condition 7.5.1, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)(2)), within 30 calendar days after completion of sampling. The 30-day evaluation period includes the time

required to perform laboratory analysis. The Permittee may petition the Secretary in writing for an extension to the 30-day evaluation period. The reasons for extending the 30-day evaluation period shall be presented in the petition. The Secretary will approve or disapprove the extension petition in writing within ten calendar days of receipt of the petition.

7.5.4 Detection Limits

Analytical detection limits shall in all cases be below the most stringent of the following three criteria, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)):

- applicable State or federal drinking water standards;
- the universal treatment standards (UTS) contained at 20.4.1.800 NMAC (incorporating 40 CFR 268,Subpart D); or
- the lowest detection limits specified at EPA publication SW-846, Third Edition, Update IV 2008~~1986~~.

7.5.5 Laboratory Quality Assurance/Quality Control

The Permittee shall ensure that waste analyses are performed using the laboratory quality assurance/quality control (QA/QC) measures specified at Permit Attachment I, Section 5.2, *Laboratory Quality Assurance/Quality Control;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)).

7.5.6 Data Validation

The Permittee shall ensure that all laboratory analytical data is presented in accordance with the most current version of EPA publication SW-846, Third Edition, documentation packages. Data validation shall be conducted as specified at Permit Attachment I, Section 5.3, *Data Review, Validation, and Verification Requirements*, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(f)).

7.5.7 Data Reporting

The Permittee shall report the VZMS analytical data to the Secretary within 15 calendar days of sample evaluation schedule specified in Permit Condition 7.5.3. Data shall be reported in a form that is conducive to determining the presence of a release.

The analytical information shall be presented as specified at Permit Condition 7.5.1.a and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.97(j) and 264.98(c)).

7.5.8 Alternate Indicator Parameters

The Permittee may propose to the Secretary an alternate list of indicator parameters that could be used to analyze vadose zone fluids and that shows contamination by leachates through a Permit modification pursuant to 20.4.1.900 (incorporating 40 CFR 270.42).

7.6 VZMS MAINTENANCE

The Permittee shall maintain the VZMS as specified at Permit Attachment N, *Operations and Maintenance Plan*, Sections 3.4.4, *Operation of Leachate Collection and Detection Systems*, and 3.5.4, *Operation of Leachate Detection and Vadose Zone Monitoring Systems*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.96). A summary of operation and maintenance activities shall be reported to the Secretary in the Quarterly Report in accordance with Permit Conditions 2.12.2.b and 7.7.2.

7.7 RECORDKEEPING AND REPORTING

7.7.1 Recordkeeping

The Permittee shall enter, at a minimum, the following VZMS information into the Operating Record in accordance with Permit Condition 2.12.1; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.98(c)):

- well survey information (Permit Condition 7.2.4);
- geologic core (Permit Condition 7.2.6);
- Well Completion and Lithologic Logs (Permit Condition 7.2.9);
- leachate chemistry (Permit Condition 7.3.2);
- 40 CFR 264 Appendix IX analysis (Permit Condition 7.3.2.b);
- sampling activities (Permit Condition 7.4.2);

- fluid elevation measurements (Permit Condition 7.4.3);
- VZMS inspection reports (Permit Condition 7.4.1.a);
- VZMS analytical results (Permit Condition 7.5.1);
- sample collection and preservation (Permit Condition 7.4);
- data evaluation (Permit Condition 7.5); and
- non-leachate removal (Permit Condition 7.1.3).

7.7.2 Reporting

The Permittee shall report the following information to the Secretary, as specified at Permit Attachment I, Section 6.5, *Data Reporting;* and as required by 20.4.1.500 (incorporating 40 CFR 264.98(c)):

7.7.2.a First Quarterly Report

The following information shall be submitted in the first Quarterly Report:

- Well Completion and Lithologic Logs (Permit Condition 7.2.9);
- A list of indicator parameters for non-leachate fluids and associated computations (Permit Condition 7.3.1.b);
- A list of indicator parameter for initial leachates (Permit Condition 7.3.2) based on F-039 and the first Appendix IX analysis; and
- VZMS analytical results collected during the first quarter, and associated Well Inspection Logs and Monitoring Field Logs sampling information (Permit Conditions 7.4.1, 7.4.10, and 7.5.3).

7.7.2.b Quarterly Reports

The following information shall be submitted in all Quarterly Reports:

- leachate chemistry (Permit Condition 7.3.2.a);
- fluid elevation data for each well (Permit Condition 7.4.3);
- vadose zone system inspection reports (Permit Condition 7.4);
- vadose zone system analytical results (Permit Condition 7.5.1);
- sample collection and preservation procedures (Permit Conditions 7.4.3, 7.4.4, 7.4.5, 7.4.6, 7.4.7, 7.4.8, and 7.4.9);
- release assessment information in the form of a summary of the data reports (Permit Condition 7.5);
- operation and maintenance report (Permit Condition 7.6);
- non-leachate fluid removal summary (Permit Condition 7.1.3);
- Indicator Parameter List, including non-leachate parameters and leachate parameters, revisions to the list based on quarterly/biennial leachate sampling results, and evaluations used to derive this list (Permit Condition 7.3);
- monthly leachate sampling results for that quarter (Permit Condition 7.3.2.a); and
- summary of Appendix IX results included in the previous biennial sampling event (Permit Condition 7.3.2.b)

7.7.2.c Biennial Report

The following information shall be submitted in the Biennial Report required under Permit Condition 2.12.2.a:

- Appendix IX analysis (Permit Condition 7.3.2.b); and

- Indicator Parameter List modification based on Appendix IX analysis, and evaluations used to derive this list (Permit Condition 7.3)

7.7.2.d Special Reports

The following information shall be submitted in special reports:

- release information (Permit Condition 7.1.2);

- monthly reports as long as there are fluids in the VZMS; and

- non-leachate parameter list and computations necessary to determine non-leachate parameter list (Permit Condition 7.3.1.b)

7.7.3 VZMS Report Supervision

A professional geologist or engineer shall supervise all VZMS report preparation.

PERMIT PART 8

CLOSURE AND POST-CLOSURE CARE

HIGHLIGHTS

This Permit Part contains closure and post-closure care conditions for ~~each the permitted unit at~~ the Facility. Also included are financial responsibility requirements for the Permittee for closure and post-closure care.

The Permittee may close the entire Facility ~~(final closure) or any permitted unit at the Facility (partial closure)~~ after notification to the Secretary. The Permittee will update Permit Attachment O, *Closure Plan*, ~~for the Surface Impoundment and the Landfill~~ through Permit modification prior to closure ~~of these this units~~ to more accurately reflect unit conditions existing at the time of closure. The Permit modification may also include modification of Permit Attachment P, *Post-Closure Care Plan*.

~~All permitted units except the The Landfill are is expected to clean close. The term "clean closure" is defined as a closure performance standard requiring removal of hazardous waste and/or hazardous constituents to statistically-based background concentrations, rather than to health-based risk concentrations. Any unit that cannot be clean closed must be closed as a landfill through Permit modification of Permit Attachments O and P. Remediation activities that may be necessary at any the permitted unit will be regulated under Permit Parts 9 and 10.~~

Post-closure care requirements at the completion of closure include maintenance and monitoring of the Landfill Phase 1A cap, the storm water collection system, leak and leachate detection and collection systems, and Vadose Zone Monitoring System (VZMS); site inspections and security; and, if necessary, a ground water monitoring system. The Permittee must modify the Permit to include post-closure care requirements, including maintenance, monitoring, reporting, and, if necessary, corrective action, at any other permitted unit(s) at the Facility that cannot be clean closed by removal and decontamination in accordance with Permit Attachment O.

8.1 CLOSURE

8.1.1 Performance Standards for Closure

The Permittee shall close the Facility~~, or any permitted unit at the Facility,~~ as specified at Permit Attachment O; and as required by this Permit Part and 20.4.1.500 NMAC (incorporating 40 CFR 264.110 through 264.116); and in accordance with the time schedules contained at Permit Attachment O1, *Compliance Schedules for Closure*. The Permittee shall keep Permit Attachments O; O1, *Compliance Schedules for Closure*; and O2, *Financial Assurance for Closure*; at the Facility or at another location approved by the Secretary until the completion of Facility closure has been approved by the Secretary.

8.1.1.a General Performance Standard

At closure of the Facility~~ or any unit at the Facility~~, the Permittee shall, as required by the performance standard contained at 20.4.1.500 NMAC (incorporating 40 CFR 264.111):

- minimize the need for further maintenance; and
- control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to surface or subsurface soils, ground or surface waters, or the atmosphere.

8.1.1.b Clean Closure Performance Standard

~~At closure, the Permittee shall ensure that all of the permitted units, with the exception of the Landfill, shall close in accordance with the clean closure performance standard specified at Permit Attachment O, Section 8.3, *Closure Performance Standard*.~~

~~Clean closure is achieved for a permitted unit when chemical analysis of potentially contaminated materials, soils, or leachate does not detect the presence of hazardous waste or hazardous constituents, or when any hazardous waste or hazardous constituent contained in soils or fluids removed from, below, or adjacent to a permitted unit is not above background concentrations identified at Permit Attachment U, *Action Levels for Corrective Action*; Appendix U1, *Background Concentrations*~~

~~*for Soil*; and Appendix U3, Background Concentrations for Ground Water; in statistically significant concentrations, as determined using the methodology contained at Permit Attachment Q, *Statistics for Release Determination*, or as determined by the Secretary.~~

8.1.2 Closure Plan Modification

8.1.2.a Amendment When Necessary

The Permittee shall amend the Closure Plan through Permit modification, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.112(c)(2)), whenever:

- changes in operating plans or Facility design affect the Closure Plan;
- there is a change in the expected year of closure;
- unexpected events during partial or final closure require a modification of the approved Closure Plan;
- changes in statutory or regulatory requirements; or
- changes in available technology.

The modified Closure Plan shall identify the steps necessary to perform closure ~~of a the permitted unit or~~ of the Facility at any point during its active life, in accordance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.112(b)).

The modified Closure Plan shall be approved by the Secretary, in writing, prior to implementation. If the Secretary does not approve the modified Closure Plan submitted by the Permittee, the Secretary will notify the Permittee, in writing, of Closure Plan deficiencies and will specify a due date for submission of a revised Closure Plan. Upon approval by the Secretary, the modified Closure Plan, including revised schedules of implementations and revised cost estimates, shall be incorporated into this Permit by replacement or modification, as appropriate, of Permit Attachments O and O1 and made an enforceable part of this Permit.

8.1.2.b Landfill ~~and Surface Impoundment~~ Closure Plan Modification Prior to Closure

The Permittee shall amend the Closure Plan for the Landfill ~~and, if necessary, the Surface Impoundment~~ through Permit modification, and shall submit the amended Plan to the Secretary for approval 60 calendar days prior to the commencement of partial or final closure activities. The Permit modification must provide revised implementation schedules and cost estimates, a discussion of closure activities in accordance with appropriate parts of Permit Conditions 8.1.10, 8.1.11, and 8.3, and detailed plans and specifications for the Landfill cover ~~and, if necessary, the Surface Impoundment cover,~~ and revegetation of the Landfill ~~and Surface Impoundment~~ area~~s~~. In its submittal on the re-vegetation of the Landfill ~~and Surface Impoundment~~ area~~s~~, Permittee shall address soil quality, the seed mix planned in order to establish native grasses, the maintenance of the vegetation, and plans for re-seeding in the event the original vegetation planted fails.

~~8.1.2.c Storage and Treatment Units, Closure Plan Modification~~

~~If, at closure, the Permittee determines that the clean closure performance standard contained at Permit Condition 8.1.1.b cannot be met at any of the hazardous waste storage or treatment units, the Permittee shall prepare and submit to the Secretary for approval a Permit modification request to amend Permit Attachment O, as it pertains to the affected area or unit, in accordance with all the closure, post-closure, and financial responsibility requirements that apply to landfills, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.310), pursuant to 20.4.1.500 NMAC (incorporating 40 CFR 264.112(c)(3) and 264.197(b)).~~

~~This Permit modification request shall be submitted no later than 60 calendar days after the Permittee or Secretary has determined that the affected unit must close as a landfill, or no later than 30 calendar days if the determination is made during partial or final closure of the affected unit.~~

8.1.2.c Receipt of Non-Hazardous Waste

The Permittee may request a modification to receive nonhazardous waste for disposal in the Landfill ~~or the Surface Impoundment~~ after the final receipt of hazardous waste ~~at either unit~~, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.113(d)).

8.1.2.d Modification Required by the Secretary

The Secretary may require Closure Plan modification under the conditions described at Permit Condition 8.1.2.a, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.112(c)(4)).

8.1.3 Closure Schedule

8.1.3.a Notification of Closure

The Permittee shall notify the Secretary of the start of Closure Plan implementation at least 60 calendar days prior to the date on which the Permittee expects to commence closure of ~~any the~~the ~~f~~Facility ~~unit~~ as specified at Permit Attachment O, Section 8.1, *Closure Activities*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.112(d)(1)).

8.1.3.b Time Schedule for Closure

Within 90 calendar days after receiving the final volume of hazardous wastes, or the final volume of non-hazardous wastes if receipt of non-hazardous wastes is approved by the Secretary in accordance with Permit Condition 8.1.2.d, the Permittee shall ~~remove all hazardous wastes from the unit to be clean closed and shall~~ meet the conditions for closure contained at 20.4.1.500 NMAC (incorporating 40 CFR 264.113). ~~Such removed hazardous wastes shall be treated, if appropriate, and properly disposed of in the Landfill or at an off-site permitted hazardous waste disposal facility.~~

The Secretary may approve a longer closure period if the Permittee complies with all applicable requirements for requesting a Permit modification for this purpose and submits the demonstrations to justify a time extension required at 20.4.1.500 NMAC (incorporating 40 CFR 264.113(a)(1) and 264.113(a)(2)).

8.1.4 Closure Activities

8.1.4.a Proper Disposal of Equipment, Structures, and Soils

During closure, ~~the partial and/or final closure periods,~~ the Permittee shall properly dispose of or decontaminate all contaminated equipment, structures, and soils as specified at Permit Attachment O, Section 8.1; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.114).

By removing any hazardous wastes or hazardous constituents during closure activities, the Permittee may become a generator of hazardous waste, and shall handle that waste in accordance with all applicable requirements of 20.4.1.300 NMAC (incorporating 40 CFR Part 262). ~~Closure of the Facility units by removal or decontamination shall include removal of all hazardous waste and contaminated media.~~

The soil performance standard for closure shall be based upon background analyte soil concentrations.

8.1.4.b Clean Closure Confirmation

~~The Permittee shall confirm that contamination is no longer present at, beneath, or outside the boundaries of any the permitted unit(s) undergoing clean closure in accordance with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR Part 264.115). Confirmation of the removal of all waste and contaminated media shall include sampling of surface water, ground water, and other fluids beneath or outside the boundaries of the Facility or the unit(s) being closed; and collecting surface soil samples within the unit(s) at intervals of one per every 500 square feet and one per every 20 linear feet and/or at unit-specific intervals, depths, and locations specified by the Secretary. Sampling shall be conducted at the locations specified at Permit Attachment O and at any additional locations that may be required under Permit Parts 9 and 10.~~

8.1.4.c Updated Sampling Plan

Ninety days prior to implementation of the Closure Plan ~~for the Facility or for anyand the permitted unit at the Facility undergoing closure~~, the Permittee shall submit to the Secretary for approval, as part of the Closure Plan, an updated Sampling and Analysis Plan, as specified at Permit Attachment O, Section 8.1.1.2, *Decontamination of equipment and Dismantling of Building Structure*. The Sampling Plan shall meet the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.112(b)(4)).

8.1.5 Closure Certification

Within 60 calendar days following completion of closure, ~~of the Facility or of anythe permitted unit at the Facility,~~ the Permittee shall submit to the Secretary, by registered mail, hand delivery, or special delivery service, a certification that the Facility ~~or and the permitted unit undergoing closure~~ has been closed in accordance with the specifications contained in

Permit Attachment O, this Permit Part, and 20.4.1.500 NMAC (incorporating 40 CFR 264.110 through 116). The certification shall be signed by the Permittee and by an independent professional engineer registered in New Mexico, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.115). Documentation supporting the independent registered professional engineer's certification, in the form of a Final Closure Report specified at Permit Condition 8.1.7.c, must be furnished to the Secretary concurrent with the certification. The closure certification and the Final Closure Report must be delivered to the Secretary, and the Secretary must verify the closure certification before he releases the Permittee from the financial assurance requirements for closure under 20.4.1.500 NMAC (incorporating 40 CFR 264.143(i)).

8.1.6 Survey Plat

No later than the date of submission of the closure certification, ~~of each the permitted unit that has not attained clean closure,~~ the Permittee shall submit a survey plat of the closed permitted unit to the local zoning authority or the authority with jurisdiction over local land use, and to the Secretary, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.116). The survey plat shall indicate the location and dimensions of Landfill cells or any other waste disposal units with respect to permanently surveyed benchmarks. This plat must be prepared and certified by a New Mexico registered, professional land surveyor. The plat filed with the local zoning authority, or the authority with jurisdiction over local land use, must contain a note, prominently displayed, which states the Permittee's obligation to restrict disturbance of any hazardous waste disposal unit which is not clean closed, in accordance with the applicable regulations found at 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart G).

8.1.7 Recordkeeping and Reporting Requirements

8.1.7.a Sampling Records

The Permittee shall ensure that the records for sampling and analysis activities of all media required in accordance with Permit Conditions 8.1.4.b and 8.1.4.c are maintained by the Facility. This documentation must include records for sampling of soil, surface water, and groundwater (including vadose zone). Vadose zone monitoring records shall be maintained as specified at Permit Attachment I, *Vadose Zone Monitoring System Work Plan*, Section 6.1, *Field Documentation*. The sampling record shall

include the monthly Well Inspection Logs and Monitoring Field Logs.

8.1.7.b Quarterly Reports

During closure, ~~the partial and final closure periods,~~ the Permittee shall submit Quarterly Status Reports on closure activities for the Facility ~~or a permitted unit undergoing closure~~ until closure certification for the Facility or the permitted unit undergoing closure is submitted to the Secretary in accordance with Permit Condition 8.1.5. These reports are in addition to the applicable Quarterly Reports requirements at Permit Condition 2.12.2.b. The reports must summarize:

- closure activities during the previous quarter;
- activities planned for the next quarter; and
- any variance from the approved Closure Plan and the reason for the variance.

8.1.7.c Final Closure Report

Within 60 calendar days following completion of closure of the ~~Facility or any~~ permitted unit at the facility, the Permittee shall submit a Final Closure Report to the Secretary, with submittal of the closure certification required under Permit Condition 8.1.5, as required by 20.4.1.500 NMAC, (incorporating 40 CFR 264.115). The Report must contain, at a minimum:

- a summary of activities conducted under closure;
- a summary of variances from the approved Closure Plan;
- laboratory sample analysis sheets for all analysis conducted during closure, including raw data;
- laboratory analysis summary tables;
- site plans displaying the locations where all media samples were obtained during closure activities;
- sampling and analysis quality assurance/quality control (QA/QC) documentation; and

- types, amounts, and disposal locations of all hazardous wastes placed in the Landfill.

~~8.1.8 Closure Requirements for Containers~~

~~The Permittee shall conduct closure activities for the Drum Handling Unit and the Roll-Off Container Storage Unit as specified at Permit Attachment O, Sections 8.1.1, *Drum Handling Unit*, and 8.1.5, *Roll-Off Storage Area*, and other pertinent sections; and as required by this Permit Part and 20.4.1.500 NMAC (incorporating 40 CFR 264.111 through 264.116 and 264.178). The Drum Handling Unit and the Roll-Off Storage Area shall be clean closed as specified at Permit Attachment O, Section 8.3 through removal, decontamination, and proper disposal of remaining containers, liners, bases, buildings, ancillary equipment and soil, in accordance with Permit Condition 8.1.1.b.~~

~~8.1.9 Closure Requirements for Tanks~~

~~The Permittee shall conduct closure activities for the hazardous waste storage and treatment units, as specified at Permit Attachment O, Sections 8.1.3, *Liquid Waste Receiving and Storage Unit*, and 8.1.4, *Stabilization Unit*, and other pertinent sections; and as required by this Permit Part and 20.4.1.500 NMAC (incorporating 40 CFR 264.111 through 264.116 and 264.197).~~

~~The Permittee shall achieve the clean closure performance standard specified at Permit Attachment O, Section 8.3, for all tank areas or tank units, in accordance with Permit Condition 8.1.1.b, through removal or decontamination of all waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment contaminated with waste. If a tank storage or treatment area or a tank system cannot be clean closed, the Permittee shall submit a request for Permit modification to the Secretary to close the unit as a landfill, in accordance with Permit Condition 8.1.2.c. The Permit modification must contain plans and specifications for a final cover, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.310(a)).~~

~~8.1.10 Closure Requirements for the Surface Impoundment~~

~~8.1.10.a Surface Impoundment Closure Activities~~

~~The Permittee shall conduct closure activities for the Surface Impoundment in compliance with Permit Attachment O, Section 8.1.2, *Evaporation Pond*, and other pertinent sections; and the~~

~~modified Closure Plan required at Permit Condition 8.1.10.b; and as required by this Permit Part and 20.4.1.500 NMAC, (incorporating 40 CFR 264.111 through 264.116 and 264.228). The Permittee shall achieve the clean closure performance standard identified at Permit Condition 8.1.1.b.~~

~~8.1.10.b Surface Impoundment Permit Modification~~

~~Prior to closure, the Permittee shall submit a request for Permit modification of the Closure Plan as it pertains to the Surface Impoundment to the Secretary in accordance with Permit Condition 8.1.2.b. The Permit modification must describe closure activities to meet the clean closure standard specified at Permit Condition 8.1.1.b.~~

~~8.1.10.c Permit Modification for Closure as a Landfill~~

~~If the Surface Impoundment cannot be clean closed, the Permit modification required in accordance with Permit Condition 8.1.10.b must include closure and post-closure care activities and financial responsibility requirements to close the Surface Impoundment as a Landfill, in accordance with Permit Condition 8.1.2.c. This Permit modification request shall be submitted no later than 90 days after the Permittee or Secretary has determined that the Surface Impoundment must close as a landfill.~~

~~8.1.10.d Removal of Hazardous Waste~~

~~At clean closure of the Surface Impoundment, the Permittee shall eliminate free liquids by evaporation of the liquid wastes and solidification of all remaining hazardous wastes and hazardous waste residues, as specified at Permit Attachment O, Section 8.1.2, *Evaporation Pond;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.228(a)).~~

~~8.1.10.e Decontamination~~

~~At closure of the Surface Impoundment, the Permittee shall remove or decontaminate all waste residue, contaminated containment systems and LDRS and VZMS sump components, contaminated subsoils, and any contaminated structures and equipment at the Surface Impoundment, as specified at Permit Attachment O, Section 8.1.2.3, *Removal and Disposal of Liner and Leachate Collection System;* and in accordance with Permit Condition 8.1.4.a; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.228(a)). Liners and sump systems may be disposed of as hazardous debris.~~

~~**8.1.10.f Restoration**~~

~~At closure, the Permittee shall ensure that the Surface Impoundment area is restored to the approximate original grade, and revegetated, as specified at Permit Attachment O, Section 8.1.2.5, *Filling and Revegetating*; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.228).~~

~~**8.1.10.g Surface Impoundment Well Monitoring**~~

~~The Permittee shall continue the Surface Impoundment vadose zone well monitoring required at Permit Condition 5.6.2 on a monthly basis during the closure period, as specified at Permit Attachment I, Section 4.1, *Monitoring Frequency*. The Permittee shall sample at each monitoring point containing fluid, and shall otherwise comply with the requirements of Permit Conditions 7.4.3 through 7.4.9. If a release has occurred, the Permittee shall comply with all the release assessment requirements contained at Permit Condition 7.5.~~

8.1.8 Closure Requirements for the Landfill

8.1.8.a Landfill Closure Activities

The Permittee shall conduct closure activities as specified at Permit Attachment O, Section 8.1.6, *Landfill*, and other pertinent sections; and the modified Closure Plan required at Permit Condition 8.1.11.b; and as required by this Permit Part and 20.4.1.500 NMAC (incorporating 40 CFR 264.111 through 264.116 and 264.310).

8.1.8.b Landfill Permit Modification

Prior to closure, the Permittee shall submit a request for Permit modification of the Closure Plan as it pertains to the Landfill to the Secretary, in accordance with Permit Condition 8.1.2.b. The Permit modification shall provide details on a final Landfill cover and revegetation that meet all the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.310(a)).

8.1.8.c Landfill Cover

The Permittee shall cover the Landfill at closure with a final cover as specified at Permit Attachments L, *Engineering Report*, Section 3.1.~~5~~6, *Final Cover*; and O, Section 8.1.6; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.310(a)).

8.1.8.d Landfill VZMS Monitoring

The Permittee shall continue the vadose zone monitoring required at Permit Condition 6.6.2 on a monthly basis during the closure period, as specified at Permit Attachment I, Section 4.0, *Monitoring Procedures*. The Permittee shall sample at each monitoring point containing fluid, and shall otherwise comply with the requirements of Permit Conditions 7.4.2. If waste analysis shows that a release has occurred, the Permittee shall comply with the release assessment requirements contained at Permit Condition 7.5. Recordkeeping shall be performed in accordance with Permit Condition 2.12.1.k.i.

8.2 POST-CLOSURE CARE

8.2.1 General Post-Closure Care Requirements

8.2.1.a Landfill

The Permittee shall ensure that post-closure care activities at the Landfill are conducted as specified at Permit Attachment P, *Post-Closure Care Plan*, Section 8.2, *Post-closure Activities;* and as required by this Permit Part and 20.4.1.500 NMAC (incorporating 40 CFR 264.117 through 264.120). The Permittee shall keep Permit Attachments P, and P1, *Financial Assurance for Post-Closure Care*, at the Facility or at a location approved by the Secretary until the completion of post-closure care has been approved by the Secretary.

8.2.1.b Other Permitted Units Which Cannot Clean Close

~~The Permittee shall provide post-closure care through Permit modification, in accordance with Permit Condition 8.2.2, for any permitted unit where clean closure of the units by decontamination and removal is not accomplished.~~

8.2.2 Post-Closure Care Plan Modification

8.2.2.a Amendment When Necessary

The Permittee shall submit an updated or amended Post-Closure Care Plan to the Secretary for approval, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.118(d)), whenever:

- changes in operating plans or Facility design affect the Post-Closure Care Plan;

- there is a change in the expected year of final closure;
- events that occur during the active life of the Facility, including partial and final closures, affect the approved Post-Closure Care Plan;
- changes in statutory or regulatory requirements; or
- changes in available technology.

The Permittee shall submit a written request for a Permit modification at least 60 calendar days prior to the proposed change in Facility design or operation, or no later than 60 calendar days after an unexpected event has occurred which has affected the Post-Closure Care Plan, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.118(d)(3)).

The updated Post-Closure Care Plan shall be approved by the Secretary, in writing, prior to implementation, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.118(d)(3)). If the Secretary does not approve the updated Post-Closure Care Plan, the Secretary will notify the Permittee, in writing, of the Post-Closure Care Plan deficiencies, and will specify a due date for submittal of a revised Post-Closure Care Plan. Upon approval by the Secretary, the updated or amended Post-Closure Care Plan will be incorporated into this Permit by modification or replacement of Permit Attachment P, and made an enforceable part of this Permit.

~~**8.2.2.b Surface Impoundment Post-Closure Care Plan Modification**~~

~~If the Permittee or the Secretary determines that the Surface Impoundment must be closed as a landfill, the Permittee shall, within 90 days of such determination, submit to the Secretary for approval a revised Post-Closure Care Plan detailing post-closure care requirements for the Surface Impoundment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.117 through 264.120, 264.228(b), and 264.310); and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.118(a)).~~

~~**8.2.2.c Tank System Post-Closure Care Plan Modification**~~

~~If the Permittee determines that any hazardous waste tank treatment or storage units cannot clean close in accordance with Permit Condition 8.1.1.a, the Permittee shall submit to the~~

~~Secretary for approval a revised Post-Closure Care Plan detailing post-closure care requirements, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.117 through 264.120, 264.197, and 264.310), for the affected tank area or unit, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.197(b)). The Permittee shall initiate the Permit modification process required by Permit Condition 8.2.1.b.~~

8.2.2.b Modification Requested by the Secretary

The Secretary may request Post-Closure Care Plan modification under the conditions described at Permit Condition 8.2.2.a, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.118(d)(4)).

8.2.3 Post-Closure Care Time Schedules

The Permittee shall implement post-closure care requirements for 30 years after completion of closure of the Landfill~~ or any permitted unit(s) closed with contamination in place,~~ as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.117(a)(1)).

At any time, the Secretary may, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.117(a)(2)):

- shorten the post-closure period if the Secretary finds that human health and the environment are protected sufficiently (e.g., leachate or ground water monitoring results, characteristics of the hazardous wastes, application of advanced technology, or alternative disposal, treatment or re-use techniques indicate that the unit or Facility is secure); or

- extend the post-closure care period if the Secretary determines that this is necessary to protect human health and the environment (e.g., leachate or ground water monitoring results indicate a potential for migration of hazardous wastes at levels which may be harmful to human health or the environment).

8.2.4 Post-Closure Care Requirements for the Landfill

The Permittee shall comply with the post-closure care requirements for the Landfill specified at Permit Attachment P, Section 8.2.2, *Landfill Final Cover*, and 20.4.1.500 NMAC

(incorporating 40 CFR 264.310(b)). The Permittee shall maintain and monitor the leachate and vadose zone monitoring systems (and ground water monitoring system, if one is required by the Secretary), the Landfill cover, and the storm water collection system, and shall comply with all other applicable requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart F and 264.310(b)), during the post-closure care period, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.117(a)(1)).

8.2.4.a Cover Maintenance

The Permittee shall maintain the integrity and effectiveness of the final Landfill cover, including making repairs to the cover as necessary to correct the effects of settling, subsidence, erosion, or other events, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.310(b)(1)).

8.2.4.b Leak Detection Systems Monitoring

The Permittee shall continue to operate the LDRS and LCRS until leachate is no longer detected, as determined by the Secretary, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.310(b)(2)).

8.2.4.c Landfill VZMS Monitoring

The Permittee shall maintain and monitor the Landfill VZMS sump and wells semi-annually throughout the post-closure period, as specified at Permit Attachment I, Section 4.1, *Monitoring Frequency*, and comply with all other applicable requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart F and 264.310(b)).

8.2.4.d Run-On/Runoff Control

Surface water diversions or surface drainage ditches shall be installed as necessary to prevent gullies from forming. The Permittee shall maintain the run-on and runoff control system for the Landfill to prevent erosion or other damage to the final cover, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.310(b)(4)).

8.2.4.e Surveyed Benchmarks

The Permittee shall protect and maintain surveyed benchmarks used in complying with the surveying and recordkeeping requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.309),

and pursuant to 20.4.1.500 NMAC (incorporating 40 CFR 264.310(b)(6)).

~~**8.2.5 Surface Impoundment VZMS Monitoring**~~

~~The Permittee shall maintain and monitor the Surface Impoundment VZMS sump and wells semi-annually throughout the post-closure care period, as specified at Permit Attachment I, Section 4.1.~~

8.2.5 Security

8.2.5.a Security Requirements

The Permittee shall comply with all security requirements during the post-closure care period specified at Permit Attachment P, Section 8.2.1, *Security Systems*, and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.117(b)).

8.2.5.b Property Use

The Permittee shall not allow any use of the Facility property that will disturb the integrity of the final cover, liners, any components of the containment system, or the function of the Facility's monitoring systems, during the post-closure care period, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.117(c)).

8.2.6 Inspections

The Permittee shall inspect the Landfill cover, run-on/runoff controls, the LDRS, LCRS, and VZMS sumps at the Landfill, and the Landfill ~~and Surface Impoundment~~ monitoring wells during the post-closure care period in accordance with the inspection schedules contained at Permit Attachments D, *Inspection Procedures;* D1, *Inspection Schedules and Checklists;* O, Section 8.1.6,; and P, Sections 8.2.1, *Security Systems*, 8.2.4.3, *Leak Detection System*, and 8.2.5.2, *Inspection and Maintenance;* and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.117(a)(1)).

8.2.7 Reporting

The Permittee shall submit annual reports to the Secretary throughout the post-closure care period that summarize inspection and maintenance activities and monitoring results, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.31(b)).

8.2.8 Certification of Post-Closure Care Completion

No later than 60 calendar days after completion of the established post-closure care period for the Facility~~ or any unit undergoing post-closure care~~, the Permittee shall submit to the Secretary, by registered mail, hand delivery, or special delivery service, a certification that the post-closure care for the hazardous waste unit was performed in accordance with the specifications contained in the approved Post-closure Plan. The certification shall be signed by the Permittee and an independent, professional engineer registered in New Mexico. Documentation supporting the engineer's certification shall be furnished to the Secretary upon request, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.120), until the Secretary releases the Permittee from the financial assurance requirements for post-closure care contained at Permit Condition 8.3.2, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.145(i)).

8.2.9 Verification of Post-Closure Care Completion

The Secretary will, within 60 calendar days of receipt of the certification of post-closure care completion from the Permittee, verify through a site visit and examination of documents that post-closure care was completed as required under the approved Post-Closure Care Plan, in accordance with 20.4.1.900 NMAC (incorporating 40 CFR 270.32(b)(2)).

8.2.10 Post-Closure Notices

8.2.10.a Hazardous Waste Records

No later than 60 days after certification of closure of ~~each~~ the hazardous waste disposal unit, the Permittee must submit to the local zoning authority, or the authority with jurisdiction over local land use, and to the Secretary a record of the type, location, and quantity of hazardous wastes disposed of within each cell ~~or other~~of the disposal unit of the facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.119(a)).

8.2.10.b Notation on Property Deed

8.2.10.b.i Record of Notation

Within 60 days of certification of closure of the ~~first~~ hazardous waste disposal unit~~ and within 60 days of certification of closure of the last hazardous waste disposal unit~~, the Permittee must record, as required by 20.4.1.500 NMAC

(incorporating 40 CFR 264.119(b)(1)), a notation on the deed to the facility property, or on some other instrument which is normally examined during title search, that will in perpetuity notify any potential purchaser of the property that:

- the land has been used to manage hazardous wastes;
- its use is restricted, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264 Subpart G) regulations; and
- the survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.116 and 264.119(a)), have been filed with the local zoning authority or the authority with jurisdiction over local land use and with the Secretary.

8.2.10.b.ii Certification of Deed Notification

Within 60 days of certification of closure of the ~~first~~ hazardous waste disposal unit~~ and within 60 days of certification of closure of the last hazardous waste disposal unit~~, the Permittee must submit a certification, signed by the Permittee, that he has recorded the notation specified in Permit Condition 8.2.11.b.i, including a copy of the document in which the notation has been placed, to the Secretary, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.119(b)(2)).

8.2.11 Removal of Hazardous Materials

If the Permittee or any subsequent owner or operator of the land upon which a hazardous waste disposal unit is located wishes to remove hazardous wastes and hazardous waste residues, the liner, (if any), or contaminated soils, then the Permittee or the subsequent owner or operator shall request a modification to this Permit in accordance with the applicable requirements contained at 20.4.1.900 and 901 NMAC (incorporating 40 CFR Parts 124 and 270).

The Permittee or the subsequent owner or operator, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.119(c)), shall demonstrate that the removal of hazardous wastes will satisfy all HWA and RCRA requirements for generation and transport of

hazardous waste, and that such an action, in accordance with 20.4.1.500 NMAC (incorporating 40 CFR 264.117(c)):

- is necessary to the proposed use of the property and will not increase the potential hazard to human health and the environment; or
- is necessary to reduce a threat to human health or the environment.

8.3 FINANCIAL RESPONSIBILITY

8.3.1 Cost Estimates for Closure and Post-Closure Care

The Permittee shall maintain financial assurance for both closure and post-closure care costs, and comply with all applicable requirements of 20 4.1.500 NMAC (incorporating 40 CFR Part 264, Subpart H). The Permittee shall demonstrate continuous compliance with financial assurance requirements by providing documentation of financial assurance as required by 20 4.1.500 NMAC (incorporating 40 CFR 264.143, 264.145 and 264.151), in at least the amount of the closure and post-closure care cost estimate required by 20 4.1.500 NMAC (incorporating 40 CFR 264.142 and 264.144). Changes in financial assurance mechanisms must be approved by the Secretary pursuant to 20 4.1.500 NMAC (incorporating 40 CFR 264.145). The closure and post-closure cost estimates, prepared in accordance with 20 4.1.500 NMAC (incorporating 40 CFR 264.142 and 144), are specified at Attachments O2, *Financial Assurance for Closure*, and P1, *Financial Assurance for Post-Closure Care*, respectively.

8.3.1.a Most Recent Cost Estimates

The NMED's cost estimates for closure and post-closure care, prepared in accordance with 20.4.1.500 NMAC, (incorporating 40 CFR 264.142 and 264.144), respectively, are specified at Permit Attachment O2, and Permit Attachment P1, respectively. When closure or post-closure care cost estimates are adjusted or revised in accordance with Permit Conditions 8.3.1.b and 8.3.1.c, respectively, the Permittee shall submit these adjusted or revised cost estimates to the Secretary by the anniversary date of the establishment of the financial instrument(s) used to comply with Permit Condition 8.3.2.

The latest closure cost estimates will be inserted as replacement pages in Attachment O2. The latest post-closure care cost estimates will be inserted as replacement pages in Attachment P1.

8.3.1.b Adjustment for Inflation

The Permittee shall adjust the closure and post-closure care cost estimates for inflation within 60 days prior to the anniversary date of the establishment of the financial instrument(s) used to comply with Permit Condition 8.3.2, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.142(b) and 264.144(b)).

8.3.1.c Cost Estimate Revisions

No later than 30 days after the Secretary has approved a request to modify the Closure Plan or Post-Closure Care Plan, the applicable cost estimate shall be revised if the change increases the cost of closure or of post-closure care, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.142(c) and 264.144(c)), respectively.

8.3.1.d Recordkeeping - Cost Estimates for Closure and Post-Closure Care

The Permittee shall keep at the Facility the latest closure and post-closure care cost estimates during the operating life of the Facility, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.142(d) and 264.144(d)).

8.3.2 Financial Assurance for Closure and Post-Closure Care

8.3.2.a Continuous Compliance with Financial Assurance Requirements

The Permittee shall demonstrate continuous compliance with 20.4.1.500 NMAC (incorporating 40 CFR 264.143, 264.145, and 264.146) by providing documentation of financial assurance, in at least the amount of the cost estimates required by Permit Condition 8.3.1.d, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.143 and 264.151). This demonstration shall be submitted to the Secretary for approval so that it may be implemented at least 60 days prior to the initial receipt of waste at the Facility as specified at Permit Attachments O2, Section 8.8.1, *Financial Assurance for Closure*, and P1, Section 8.8.2, *Financial Assurance for Post-Closure Care*; and in accordance with Permit Condition 1.10; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.143(f)(3), 264.143(f)(5), 264.145(f)(3), and 264.145(f)(5)).

Changes in financial assurance mechanisms for closure and/or post-closure care must be approved by the Secretary, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.143(f)(6) and 264.145(f)(6)).

PERMIT PART 9

CORRECTIVE ACTION FOR REGULATED UNITS

HIGHLIGHTS

Introduction

This Part contains permit conditions that ensure an appropriate response in the event of a release of hazardous wastes or constituents from a regulated unit at the Triassic Park Hazardous Waste Disposal Facility (the Facility). Nothing herein shall be construed to prevent or limit the Secretary from requiring corrective action at the Facility pursuant to an administrative order or other authority.

Corrective action permit conditions in this Permit Part include initial response actions, notification requirements, release verification procedures, ground water monitoring requirements, and recordkeeping and reporting requirements for regulated units. Longer-term response actions, such as release investigation, remedy selection, interim measures, and others, are also required under this Permit Part.

The principal method of detecting a release of waste from a regulated unit is the Vadose Zone Monitoring System (VZMS). Permit conditions associated with the VZMS are described in Permit Part 7.

The corrective action permit conditions of this Permit Part address significant contaminant releases from regulated units that generally originate subsurface or escape secondary containment and cannot be appropriately managed and ultimately resolved through Permit Attachment C, *Contingency Plan*, and/or Permit Attachment J, *Action Leakage Rate and Response Action Plan*.

Regulated Units

Regulated units are those land-based units that received hazardous wastes after July 26, 1982. There ~~are two~~is one regulated unit~~s~~ at the Facility, the Landfill ~~and the Surface Impoundment~~.

The Landfill is a final disposal unit for hazardous wastes and is therefore subject to corrective action permit conditions throughout the post-closure care period addressed at Permit Part

8. Potential releases from the Landfill are anticipated to be in the form of leachates escaping through a breach in the liner system. Although no free liquids will be placed in the Landfill, fluids will enter the Landfill in the form of precipitation that will inevitably leach hazardous constituents and accumulate in a Landfill sump. Engineered controls to address the accumulated leachates and to preclude a release outside the Landfill liner system include a Leachate Collection and Removal System (LCRS) and a Leak Detection and Removal System (LDRS). Requirements for these controls are contained at Permit Part 6.

~~The Surface Impoundment is a treatment unit that is not expected to leave hazardous wastes in place after closure and will therefore not be subject to corrective action permit conditions under this Part after the closure period if the clean closure performance standard identified at Permit Part 8 is attained. Potential releases from the Surface Impoundment are anticipated to be in the form of leachates escaping through a breach in the liner system. The engineered control to address accumulated fluids and to preclude a release outside the Surface Impoundment's primary liner is a Leak Detection and Removal System (LDRS). Requirements for these controls are contained at Permit Part 5.~~

Regulatory Background

Corrective action for all solid waste management units (SWMUs) is required in New Mexico's Hazardous Waste Management Regulations, 20.4.1.500 NMAC, (incorporating 40 CFR Part 264, Subpart F) (*Releases from Solid Waste Management Units*). The regulated unit~~s~~ of this Permit Part ~~are~~ is considered a subset of SWMUs, and as such ~~are~~ is subject to the corrective action requirements contained at 20.4.1.500 NMAC (incorporating 40 CFR 264.101). Regulated units must comply also with the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.91 through 264.101) for purposes of detecting, characterizing, and responding to releases from any solid waste management unit. Ground water monitoring is conditionally waived at the Facility for reasons specified at Permit Attachment H, *Ground water Monitoring Waiver Request and Approval*. The corrective action requirements for the regulated unit~~s~~ stipulated in this Permit Part are also conditions of the Ground Water Monitoring Waiver approval.

9.1 APPLICABILITY

Permit Conditions in this Part apply to regulated unit~~s~~ (i.e., ~~the Surface Impoundment and~~ the Landfill).

9.2 ACTION LEVELS

Vadose zone fluid action levels shall be used by the Permittee to determine when the corrective action requirements of this Permit Part will be both initiated and terminated. Upon significant exceedance of a vadose zone fluid action level, the Permittee shall initiate the corrective actions contained in this Permit Part. Significance shall be determined, unless otherwise specified, using the procedures at Permit Attachment Q, *Statistics for Release Determination*. The Permittee shall continue to implement corrective action to ensure that released contaminants are removed or otherwise mitigated to below action levels.

Vadose zone fluid action levels are established in this Permit for both anthropogenic hazardous constituents and non-anthropogenic constituents. The methods of establishing and monitoring for vadose zone fluid action levels are described at Permit Part 7, *Vadose Zone Monitoring*, Permit Condition 7.5, *Release Assessment*. Action levels will be incorporated into this Permit as they are developed at Permit Attachment U, *Action Levels for Corrective Action*. Baseline chemical concentrations (i.e., action levels) for non-leachates are maintained in Permit Appendix U2, *Background Values for Non-Leachates*.

9.3 IMMEDIATE RESPONSE ACTIONS UPON DETERMINATION OF A RELEASE

When the Permittee identifies evidence of a release (i.e., exceedance of an action level) in accordance with Permit Condition 9.2, the Permittee shall comply with the requirements of Permit Conditions 9.3.1 through 9.3.8.

9.3.1 Notification of Release

The Permittee shall notify the Secretary verbally within 24 hours and shall provide the Secretary a written report within seven calendar days of discovery of a release.

9.3.2 Verification Sampling

For any substances found in an original analysis obtained in accordance with Permit Condition 7.4, the Permittee shall resample and repeat the analysis using the same methodology used for the original analysis. If evidence of an obvious release exists, the Permittee shall immediately initiate the response actions required at Permit Condition 9.3.3, and shall proceed

with verification sampling. The Permittee shall furthermore comply with the following requirements:

- a written Verification Sampling Report shall be submitted to the Secretary as soon as possible, but in no case shall the verification sampling results be reported to the Secretary later than 15 calendar days after the Permittee's receipt of the original results. The report must describe the sampling and analysis procedures and must include all pertinent laboratory analytical and quality assurance documentation;

- if the results of the second analysis confirm the original analysis, the verified constituents, as well as all other constituents listed at 20.4.1.500 NMAC (incorporating 40 CFR 264, Appendix IX) detected in accordance with Permit Condition 9.3.5, shall form the basis for further corrective action in accordance with the requirements contained in this Permit Part;

- if the results of the second analysis do not confirm the original analysis, a third sampling and analysis of the impacted medium shall be performed. The Permittee shall provide the Secretary an opportunity to be present during the third sampling event through advance notice as soon as the second analysis results are received, so that the New Mexico Environment Department (NMED) may obtain split samples;

- if the results of the third analysis do not confirm the existence of contamination as demonstrated by the original analysis, the Secretary will assume that the original analysis was in error and the Permittee shall return to the original monitoring process and schedule identified in Permit Condition 7.4.2; and

- if the results of the third analysis do confirm the existence of a release as demonstrated by the original analysis, the verified constituents, as well as all other constituents listed at 20.4.1.500 NMAC (incorporating 40 CFR 264, Appendix IX) detected in accordance with Permit Condition 9.3.5, shall form the basis for further

corrective action in accordance with this Permit Part.

9.3.3 Response Actions

When the Permittee identifies evidence of a release, the Permittee shall immediately (i.e., within 24 hours after the release is first detected and before verification sampling has been completed) initiate the following response actions at the unit associated with the release:

- determine whether the contamination can be attributed to some operational disturbance such as an equipment or power failure;
- verify that the VZMS is working as designed;
- verify that the associated leak detection system(s) is working as designed;
- evaluate the need to increase the pumping rate on the LDRS and LCRS pumps, as appropriate;
- repair any damage to exposed portions of the liner;
- investigate alternative sources of liquids, leachates, or contamination; and
- ~~(Landfill only)~~ review the analysis of the contamination, compare it to the Landfill Operating Record for the previous five years, and attempt to match fingerprint or indicator parameters, generator analyses, and waste placement records, to determine the source of the leaks.

9.3.3.a Immediate Response Action Report

The Permittee shall submit a written assessment of the immediate response actions to the Secretary within 14 days of the Permittee's verification of the release. The report shall contain, at a minimum, the amount and nature of the contamination; available information on size, location, and cause of the leak; and any immediate and short-term actions to be taken.

9.3.3.b Response Action Effectiveness Report

The Permittee shall submit a follow-up Response Action Effectiveness Report to the Secretary within 30 calendar days of the Permittee's determination of the release. The Report shall describe how effective the response actions have been in stopping the migration of hazardous wastes or constituents out of the associated regulated unit. This report shall also describe the verification sampling required at Permit Condition 9.3.2.

9.3.4 Independent Assessment

The Permittee shall have a third-party assessment of the immediate response actions conducted by an independent professional engineer registered in New Mexico, or other qualified professional approved by the Secretary. Should the verification sampling determine that a release has occurred, the assessment shall include a determination of whether waste receipt should be temporarily discontinued, or if waste should be removed for liner inspection, repair, or controls.

A written summary of the assessment shall be submitted to the Secretary within 45 days following the initiation of the immediate response actions.

9.3.5 40 CFR, Part 264, Appendix IX Sampling

Upon verification of a release from a regulated unit in accordance with Permit Condition 9.3.2, but no later than 30 calendar days after the verification, the Permittee shall analyze the fluids in all VZMS wells for concentrations of the constituents identified at 20.4.1.500 NMAC (incorporating 40 CFR 264, Appendix IX).

9.3.6 Monthly Progress Reports

The Permittee shall, upon verification of a release, initiate the submittal of monthly Corrective Action Progress Reports.

9.3.7 Submittal of Regulated Unit Investigation Work Plan

The Permittee shall, within 45 calendar days of the verification of a release from a regulated unit as specified at Permit Condition 9.3.2, submit to the Secretary an Investigation Work Plan that conforms with the investigation requirements of Permit Condition 10.7.

9.3.8 Submittal of Ground Water Monitoring Work Plan

The Permittee shall, within 90 calendar days of the verification of a release as specified at Permit Condition 9.3.2, submit to the Secretary an application for a Permit modification to establish a ground water monitoring program meeting the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.97) and the detection monitoring requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264.98), and shall establish the ground water action levels as specified at Permit Condition 10.3.3.

9.4 CORRECTIVE MEASURES STUDY

Based on the results of the reports submitted in accordance with Permit Conditions 9.3.3.b, 9.3.4, 9.3.5 and 9.3.7, the Secretary will determine the need for a Corrective Measures Study. The Secretary will inform the Permittee of his decision in writing. If the Secretary determines that further action is necessary, the Permittee may be required to comply with the requirements of Permit Condition 10.9, *Corrective Measures Study*.

9.4.1 Financial Assurance

If the Secretary requires a Corrective Measures Study in accordance with Permit Condition 9.4, the Permittee shall submit to the Secretary evidence of financial responsibility for completing the corrective actions in Permit Condition 10.10.2; and as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.90(a)(2)).

9.5 RECORDKEEPING

For a unit undergoing corrective action under this Part, the Permittee shall retain, until completion of the corrective action has been approved by the Secretary, records of all monitoring information and all other pertinent data and information used to prepare the appropriate documents required by this Part.

9.6 REPORTING

The Permittee shall submit reports to the Secretary for approval in accordance with the schedule contained at Table 9-1, *Compliance Schedule for Regulated Units*.

9.7 DISPUTE RESOLUTION

The dispute resolution procedure contained at Permit Condition 10.14 shall apply to this Permit Part.

9.8 INTERIM MEASURES

If the Secretary determines that a release or potential release of hazardous wastes or constituents poses a threat to human health and the environment, the Secretary may require interim measures that shall conform to the requirements of Permit Condition 10.8. The Secretary shall determine the specific measure(s) or require the Permittee to propose a measure(s). The Secretary shall notify the Permittee in writing of the requirement to perform interim measures. The Permittee may propose interim measures at any time.

TABLE 9-1

COMPLIANCE SCHEDULE FOR REGULATED UNITS

DOCUMENT OR INFORMATION	DUE DATE
Release - Oral report (Permit Condition 9.3.1)	24 hours following Permittee's determination of a release above action levels
Release - Written report (Permit Condition 9.3.1)	Seven days following Permittee's determination of a release above action levels
Verification Sampling Report (Permit Condition 9.3.2)	15 days following the Permittee's receipt of original analysis results for sample above action levels
Immediate Response Action Report (Permit Condition 9.3.3.a)	14 days following verification of a release
Response Action Effectiveness Report (Permit Condition 9.3.3.b)	30 days following Permittee's determination of a release
Third Party Immediate Response Assessment (Permit Condition 9.3.4)	45 days following initiation of immediate response actions
Regulated Unit Investigation Work Plan (Permit Condition 9.3.7)	45 days following Permittee's verification of a release
Permit modification request to initiate Ground Water Monitoring Program (Permit Condition 9.3.8)	90 days following verification of a release

PERMIT PART 10

CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS

HIGHLIGHTS

This Permit Part contains conditions for necessary corrective action for hazardous waste or hazardous constituent releases that occur at solid waste management units (SWMUs) and areas of concern (AOCs) at the Triassic Park Waste Disposal Facility (the Facility). Permit conditions include the development of action levels, release identification, notification and investigation requirements, interim measures, remedy selection and implementation, ground water monitoring, and recordkeeping and reporting requirements.

The corrective action permit conditions of this Permit Part address significant contaminant releases from SWMUs that generally extend to greater depths and cannot be appropriately managed through Permit Attachment C, *Contingency Plan*. The corrective action process is a phased process and the Permittee may petition the Secretary to alter the sequence of the phases or omit a phase.

Regulatory Background

Section 3004(u) of the Resource Conservation and Recovery Act (RCRA), Sections 74-4-4.A.5.h and 74-4-4.2 of the New Mexico Hazardous Waste Act (HWA), and 20.4.1.500 NMAC (incorporating 40 CFR 264.101), require that RCRA permits issued after April 8, 1987, address corrective action as necessary to protect human health and the environment for all releases of hazardous waste or hazardous constituents from any SWMU at a treatment, storage, or disposal facility, regardless of the time at which the waste was placed in the SWMU.

Section 3004(v) of RCRA, Section 74-4-4.A.5.i of the HWA, and 20.4.1.500 NMAC (incorporating 40 CFR 264.101(c)), require corrective action beyond the Facility border where necessary to protect human health and the environment unless the Permittee demonstrates to the satisfaction of the Secretary that, despite the Permittee's best efforts, the Permittee was unable to obtain the necessary permission to undertake such actions.

10.1 APPLICABILITY

This Permit Part applies to the following:

10.1.1 Existing SWMUs and AOCs

The Permittee shall implement corrective actions at existing SWMUs and AOCs when the Secretary determines the need for investigations at the SWMU or AOC as specified in Permit Condition 10.4.4, or as otherwise specified by this Permit. Existing SWMUs and AOCs at the Facility are identified at Table 10-1, *Solid Waste Management Units and Areas of Concern at the Triassic Park Waste Disposal Facility*. Table 10-1 identifies SWMUs (permitted and non-permitted) and AOCs currently planned for construction at the Facility under Phase IA. Regulated units (i.e., the Landfill~~ and Surface Impoundment~~) are SWMUs and are thus subject to the conditions of this Permit Part in addition to the regulated unit specific conditions of Permit Part 9. The SWMUs and AOCs identified in Table 10-1 require no corrective action at the time of Permit issuance.

10.1.2 Newly Discovered SWMUs and AOCs

The Permittee shall implement corrective actions at newly discovered SWMUs and AOCs when the Secretary determines the need for investigations at the SWMU or AOC as specified in Permit Condition 10.4.4, or as otherwise specified by this Permit. The Permittee shall notify the Secretary in writing in accordance with Permit Condition 10.4 of any additional SWMUs or AOCs discovered during the course of ground water monitoring, field investigations, environmental audits, or other means. As used in this Permit Part, the terms "discover", "a discovery", or "discovered" refer to the date on which the Permittee (1) visually observes evidence of a new SWMU or AOC, (2) visually observes evidence of a previously unidentified release of hazardous waste or hazardous constituents to the environment, or (3) receives information which suggests the presence of a new release of hazardous waste or hazardous constituents to the environment.

10.1.3 Contamination Beyond the Facility Boundary

The Permittee shall implement corrective actions beyond the Facility boundary where necessary to protect human health and the environment, unless the Permittee demonstrates to the satisfaction of the Secretary that, despite the Permittee's best efforts, the Permittee was unable to obtain the necessary permission to undertake such actions, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.101(c)).

The Permittee is not relieved of responsibility to clean up a release that has migrated beyond the Facility boundary where

off-site access is denied. On-site measures to address such releases shall be determined on a case-by-case basis. The Permittee shall provide assurances of financial responsibility for completion of such off-site corrective action.

10.2 FACILITY CORRECTIVE ACTION WORK PLAN

The Permittee shall have in place standard procedures for conducting an investigation of the nature, rate, and extent of a hazardous waste or hazardous constituent release. To document these procedures, the Permittee shall submit a Facility Corrective Action Work Plan (FCAWP) to the Secretary for approval within 180 calendar days of the effective date of this Permit, in accordance with Permit Condition 1.10. Development of the FCAWP shall be based on Attachment R, *Facility Corrective Action Work Plan Outline*. The approved FCAWP will be inserted into Permit Attachment R.

The Permittee shall submit to the Secretary all appropriate revisions to the FCAWP on an annual basis within 90 calendar days after the anniversary date of this Permit. After approval, these revisions will be inserted into Permit Attachment R as replacement pages.

10.3 ACTION LEVELS

Action levels shall be used by the Permittee to determine when the corrective action requirements of this Permit will be both initiated and terminated. Upon significant exceedance of an action level, the Permittee shall initiate the corrective actions contained in this Permit Part. Significance shall be determined, unless otherwise specified, using the procedures at Permit Attachment Q, *Statistics for Release Determination*. The Permittee shall continue to implement corrective action to ensure that released contaminants are removed or otherwise mitigated to below action levels.

Action levels are established in this Permit for three media: vadose zone fluids, soils, and ground water. Action levels shall be incorporated into this Permit as they are developed at Permit Attachment U, *Action Levels for Corrective Action*.

10.3.1 Vadose Zone Fluids Action Levels

Vadose zone fluid action levels shall be used by the Permittee to both initiate and terminate corrective action associated with vadose zone fluids. It is anticipated that vadose zone fluids are most apt to be impacted by a release from a regulated unit

and detected in the vadose zone monitoring system. The methods of establishing and monitoring for vadose zone fluid action levels are described at Permit Part 7, *Vadose Zone Monitoring*, Permit Condition 7.5, *Release Assessment*. Vadose zone fluid action levels are established in this Permit for both anthropogenic hazardous constituents and non-anthropogenic constituents. Baseline chemical concentrations (i.e., action levels) for non-leachate fluids shall be maintained in Permit Attachment U2, *Vadose Zone Baseline Values for Non-Leachates*.

10.3.2 Soil Action Levels

Soil action levels shall be used by the Permittee to both initiate and terminate corrective action associated with surface and subsurface soils. Any detection of an anthropogenic hazardous constituent in soil, or any significant increase over approved background inorganic soil constituent concentrations, shall be considered indicative of a release and a soil action level.

10.3.2.a Background Soil Concentrations Work Plan

The Permittee shall submit a Background Soil Concentrations Work Plan to establish background concentrations (i.e., action levels) for metals and radionuclides in soil to the Secretary for approval in accordance with Permit Condition 1.10. The background soil concentrations shall be established as specified at Permit Attachment O, *Closure Plan*, Section 8.3, *Closure Performance Standard*. The Permittee shall notify the Secretary at least 15 calendar days prior to the implementation of the Background Soil Concentrations Work Plan.

10.3.2.b Approval for Background Soil Concentrations

The Permittee shall submit the background soil concentrations to the Secretary for approval no less than 30 calendar days prior to acceptance of waste at the Facility, in accordance with Permit Condition 1.10. The approved background soil concentrations will be incorporated into this Permit at Permit Attachment U, *Action Levels for Corrective Action,* Appendix U1, *Background Concentrations for Soil.*

10.3.3 Ground Water Action Levels

Ground water action levels shall be used by the Permittee to both initiate and terminate corrective action associated with ground water. Any detection of an anthropogenic hazardous constituent in ground water, or any significant increase over

approved background inorganic ground water constituent concentrations, shall be considered indicative of a release and a ground water action level.

The regulatory requirement to monitor ground water is currently waived by the Secretary for the reasons specified in Permit Attachment H, *Ground Water Monitoring Waiver Request and Approval*. If either a release from a regulated unit is verified as specified at Permit Condition 9.3.2, or a release from a SWMU results in the presence of hazardous constituents in the vadose zone monitoring system, the Secretary will revoke the Ground Water Monitoring Waiver. Upon revocation of the Ground Water Monitoring Waiver, the Permittee shall submit a Permit modification request to the Secretary for approval to initiate compliance with 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart F), and shall establish background ground water concentrations (i.e., action levels).

10.3.4 Detection Limits

Analytical detection limits shall in all cases be below the more stringent of the following two criteria: 1) universal treatment standards (UTS) contained at 20.4.1.800 NMAC, (incorporating 40 CFR 268.40); or 2) lowest detection limits specified in *Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods: (SW-846), Third Edition, Update IV 2008~~1986~~*, or the most recent edition.

10.4 NOTIFICATION AND ASSESSMENT REQUIREMENTS FOR NEWLY IDENTIFIED SWMUS AND AOCS

10.4.1 Notification of Newly Discovered SWMUs or AOCs

The Permittee shall notify the Secretary in writing, within 15 calendar days of discovery, of any new SWMU or suspected AOC discovered as described at Permit Condition 10.1.2. The notification shall include, at a minimum, the location of the SWMU or AOC and all available information pertaining to the nature of the release (e.g., media affected, hazardous constituents released, magnitude of release). The Secretary may conduct, or require the Permittee to conduct, further assessment (i.e., confirmatory sampling), in order to determine the status of the SWMU or suspected AOC.

The Secretary will notify the Permittee in writing of the final determination as to the status of the SWMU or suspected AOC. If the Secretary determines that further investigation of the SWMU or AOC is required, the Permit will be modified in accordance

with 20.4.1.900 NMAC (incorporating 40 CFR 270.41) to include the SWMU or suspected AOC in this Permit and to place the SWMU or suspected AOC on Table 10-2, *Solid Waste Management Units and Areas of Concern Requiring Corrective Action*.

10.4.2 Notification of Release

The Permittee shall notify the Secretary orally of the discovery of a SWMU or AOC and its associated release within 24 hours, and shall notify the Secretary in writing within 15 calendar days of discovery of any contamination identified at a newly discovered SWMU or suspected AOC.

10.4.3 SWMU Assessment Report

The Permittee shall prepare and submit to the Secretary, within 90 calendar days of the notification required in Permit Condition 10.4.1, a SWMU Assessment Report (SAR) for each SWMU or suspected AOC identified under Permit Condition 10.4. At a minimum, the SAR shall provide the following information:

- location of unit(s) on a topographic map of appropriate scale, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.14(b)(19));
- designation of type and function of unit(s);
- general dimensions, capacities, and structural description of unit(s). Any available plans/drawings shall be included;
- dates that the unit(s) was operated;
- specification of all wastes that have been managed at/in the unit(s), to the extent available. Any available data on hazardous constituents in the wastes shall be included; and
- all available information pertaining to any release of hazardous waste or hazardous constituents from such unit(s) (e.g., ground water data, soil analyses, air quality data, and surface water quality data).

10.4.4 Requirement to Proceed

Based on the information contained in the SAR, the Secretary will determine the need for further investigations at the SWMU

or AOC covered in the SAR. If the Secretary determines that such investigations are needed, the Permittee shall prepare a Work Plan for such investigations in accordance with Permit Conditions 10.6 and/or 10.7.

10.5 NOTIFICATION REQUIREMENTS FOR NEWLY DISCOVERED RELEASES

10.5.1 Notification of Newly Discovered Releases

The Permittee shall notify the Secretary verbally of any newly discovered release(s) of hazardous waste or hazardous constituents discovered during the course of ground water monitoring, field investigations, environmental audits, or other means. The Permittee shall notify the Secretary in writing within 15 calendar days of the discovery. Such newly discovered releases may be from newly identified SWMUs or AOCs, newly constructed SWMUs, or from SWMUs or AOCs for which, based on the findings of the RFA, completed RFI, or investigation of an AOC(s), the Secretary had previously determined no further investigation was necessary.

10.5.2 Requirement to Proceed

If the Secretary determines that further investigation of the SWMU or AOC is needed, the Permittee shall prepare a plan for such investigation, as outlined at Permit Condition 10.7.

10.6 CONFIRMATORY SAMPLING

10.6.1 CS Work Plan Submittal

Upon the notification by the Secretary specified at Permit Condition 10.4.4, the Permittee shall prepare and submit a Confirmatory Sampling (CS) Work Plan for each unit identified as required under Permit Condition 10.4.1 or newly identified SWMU or AOC identified as specified at Permit Condition 10.4.4. The CS Work Plan shall be submitted within 45 calendar days of notification by the Secretary that a CS Work Plan is required. The CS Work Plan shall include schedules of implementation and completion of specific actions necessary to determine whether a release has occurred. It shall also address applicable requirements and affected media. In order to partly or wholly satisfy the CS requirement, previously existing data may be submitted with the Work Plan for the Secretary's consideration.

10.6.2 CS Work Plan Approval by the Secretary

The CS Work Plan must be approved by the Secretary in writing prior to implementation. The Secretary will specify the start date of the CS Work Plan schedule in a letter approving the CS Work Plan. The Secretary will approve, disapprove, or modify and approve the Work Plan in accordance with the procedures contained at Permit Condition 10.13.6.

10.6.3 CS Implementation

The Permittee shall implement confirmatory sampling in accordance with the approved CS Work Plan.

10.6.4 CS Report Submittal

The Permittee shall prepare and submit to the Secretary for approval, in accordance with the schedule in the approved CS Work Plan, a CS Report identifying all SWMUs or AOCs that have released hazardous waste or hazardous constituents into the environment. The CS Report shall include all data, including raw data, and a summary and analysis of the data that support the above determination. If submittal of the CS Report coincides with submittal of the RCRA Facility Investigation (RFI) Report required at Permit Condition 10.7.3.a, the CS Report and the RFI Report may be combined into one submittal.

10.6.5 Requirement to Proceed

The Secretary will approve, disapprove, or modify and approve the CS Report in accordance with Permit Condition 10.13.2. Based on the results of the CS Report, the Secretary will determine the need for further investigations at the SWMU(s) or AOC(s) covered in the CS Report. If the Secretary determines that such investigations are needed, the Permittee shall prepare an RFI Work Plan for such investigations in accordance with Permit Condition 10.7. The Secretary will notify the Permittee of any no further action decision.

10.7 RCRA FACILITY INVESTIGATION

10.7.1 RFI Work Plan Submittal

If the Secretary determines that an RFI Work Plan is necessary in accordance with Permit Conditions 10.4.4, 10.5.2, and/or 10.6.5, the Permittee shall prepare and submit to the Secretary, within 90 calendar days of notification by the Secretary, an RFI Work Plan for the required unit(s).

The primary purpose of the RFI Work Plan is to specify the procedure for determining the nature, rate, and extent of all released constituents and to determine the source location. The Permittee shall develop the RFI Work Plan to meet the requirements of Permit Condition 10.7.1.a.

10.7.1.a RFI Work Plan Requirements

The RFI Work Plan shall meet the requirements specified at Permit Attachment S, *RCRA Facility Investigation - Scope of Work*, Task I, *RFI Work Plan*, and shall reference Permit Attachment R, *Facility Corrective Action Work Plan Outline*, as appropriate. The RFI Work Plan shall describe the objectives of the investigation and the overall technical and analytical approach to completing all actions necessary to characterize the source, movement, and concentrations of released hazardous wastes and hazardous constituents; provide details of all proposed activities and procedures to be conducted; include the qualifications of personnel (including contractors) performing or directing the investigations; and the overall management of the investigations.

The RFI Work Plan shall include schedules of implementation and completion of specific actions necessary to determine the nature and extent of contamination and the potential pathways of contaminant releases to the air, soil, surface water, and ground water. If a unit, or a medium/pathway associated with a unit (ground water, surface water, soil, subsurface gas, or air), is not included in the RFI Work Plan, the Permittee shall provide sufficient justification and associated documentation that a release is not probable or has already been characterized. Such deletion of a unit, medium, or pathway from the RFI Work Plan is subject to the approval of the Secretary. The Permittee shall provide sufficient written justification for any omissions or deviations from the minimum requirements of Permit Attachment S, Task I. Such omissions or deviations are subject to the approval of the Secretary. In addition, the scope of the RFI Work Plan shall include all investigations necessary to ensure compliance with 20.4.1.500 NMAC (incorporating 40 CFR 264.101(c)).

Development of the RFI Work Plan and reporting of the associated data shall be consistent with the latest editions of the following US Environmental Protection Agency (EPA) guidance documents or the equivalents:

- RCRA Facility Investigation Guidance Document, EPA/SW-89-031, Vols. I-IV, May 1989;

- RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA, /530-R-93-001, November 1992;

- RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, EPA, Office of Solid Waste and Emergency Response (OSWER) Directive 9950.1, September 1986;

- Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, EPA publication SW-846, 3rd edition, update IV 2008~~1996~~;

- RCRA Corrective Action Plan, Final, EPA, OSWER Directive 9902.3-2A, May 1994; and

- Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA 600/4-89/034.

10.7.1.b RFI Work Plan Approval by the Secretary

The RFI Work Plan must be approved by the Secretary in writing prior to implementation. The Secretary will specify the start date of the RFI Work Plan schedule in the letter approving the RFI Work Plan. The Secretary will approve, disapprove, or modify and approve the RFI Work Plan in accordance with Permit Condition 10.13.6.

10.7.2 RFI Work Plan Implementation

The Permittee shall implement the RFI Work Plan in accordance with the approved RFI Work Plan. The Permittee shall notify the Secretary at least 15 calendar days prior to any field sampling, field-testing, or field monitoring, to provide NMED personnel the opportunity to observe investigation procedures and/or to split samples.

10.7.3 RFI Reports

10.7.3.a RFI Report Submittal

The Permittee shall prepare and submit to the Secretary an RFI Report and Summary for the investigations conducted in accordance with the RFI Work Plan. The RFI Report shall meet the requirements of Permit Attachment S, Task III, *RCRA Facility Investigation Final Report and Summary*. The RFI Report shall be submitted to the Secretary for review in accordance with the schedule in the approved RFI Work Plan.

The RFI Report must include an analysis and summary of all required investigations and their results. The summary must describe the type and extent of contamination, including sources and migration pathways; identify all hazardous constituents present in all media; and describe actual or potential receptors. The RFI Report must also describe the extent of contamination (qualitative/quantitative) in relation to action levels specified at Permit Condition 10.3. The Report must contain adequate information to support further corrective action decisions. The Summary shall summarize the RFI Report.

If the RFI is phased, an Interim RFI Report shall be submitted to the Secretary for approval. The Interim RFI Report must include a summary of the initial phase investigatory work and a Work Plan for the final phase investigatory actions required, based on the initial findings. The objective of this report must be to ensure that the investigation data are sufficient in quality (e.g., quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination in relation to action levels and the potential threat to human health and/or the environment, and to support a Corrective Measures Study (CMS), if necessary.

If the Secretary determines that the RFI Report and Summary do not fully meet the objectives of the approved RFI Work Plan and Permit Attachment S, Task III, *Report*, the Secretary may disapprove the Report and/or Summary in accordance with Permit Condition 10.13.6. Once approved, the Permittee shall mail the Executive Summary to all individuals, organizations, and agencies on the Facility mailing list as required by 20.4.1.1102 NMAC (incorporating 40 CFR 124.10(c)(1)(ix)), within 15 calendar days of receipt of approval.

10.7.4 Requirement to Proceed

After review of the RFI Report, the Secretary will notify the Permittee of the need for further investigative action, if necessary, and, if appropriate at this time, inform the Permittee, if not already notified, of the need for a CMS which meets the requirements of Permit Condition 10.9.1.b and 20.4.1.500 NMAC (incorporating 40 CFR 264.101). If the Secretary determines that no further action is necessary, the Secretary will notify the Permittee.

The Permittee shall prepare and submit a work plan for any further investigative action required by the Secretary in accordance with a schedule specified by the Secretary and approved in accordance with Permit Condition 10.7.1.b.

10.7.5 Quarterly Reports

If the time required to conduct the RFI is greater than 180 calendar days, the Permittee shall provide the Secretary with quarterly RFI Progress Reports, beginning 90 calendar days from the start date specified by the Secretary in the RFI Work Plan approval letter. The Progress Reports shall contain the following information at a minimum:

- a description of the portion of the RFI completed;
- a summary of findings;
- a summary of any deviations from the approved RFI Work Plan during the reporting period;
- a summary of any significant contacts with local community public interest groups, the New Mexico Environment Department (NMED), or other federal or State agencies;
- a summary of any problems or potential problems encountered during the reporting period;
- actions taken to rectify problems;
- changes in relevant personnel;
- projected work for the next reporting period; and
- copies of reports, inspection reports, data, including raw data, and other pertinent information.

10.8 INTERIM MEASURES

10.8.1 Interim Measures Work Plan

10.8.1.a Interim Measures Required by the Secretary

If the Secretary determines that a release or potential release of hazardous wastes or constituents poses a threat to human health or the environment, the Secretary may require interim measures (IM). IM may be necessary to minimize or prevent the further migration of contaminants or potential human and environmental exposure to contaminants while long-term corrective actions are evaluated and, if necessary, implemented.

The IM Work Plan shall be submitted within 30 calendar days of such notification and shall include the elements listed at Permit Condition 10.8.1.c. Such IM may be conducted concurrently with other investigations required under this Permit.

The following factors will be considered by the Secretary in determining the need for IM:

- the time required developing and implementing a final corrective measure;
- actual and potential exposure to human and environmental receptors;
- actual and potential contamination of drinking water supplies and sensitive ecosystems;
- the potential for further degradation of the impacted medium in the absence of IM;
- the presence of hazardous wastes in containers that may pose a threat of release;
- the presence and concentration of hazardous wastes, including soil contaminated with hazardous constituents, that have the potential to migrate to ground water or surface water;
- weather conditions that may affect the current levels of contamination;
- the risk of fire, explosion, or accident; and
- other situations that may pose or aggravate threats to human health or the environment.

10.8.1.b Permittee-Initiated IM

The Permittee may initiate IM at a SWMU or AOC by submitting an IM Work Plan to the Secretary. The Secretary will process Permittee-initiated IM by approving or conditionally approving the IM, or imposing an IM Work Plan in accordance with Permit Condition 10.8.1.a. A Permittee-initiated IM is considered conditionally approved unless the Secretary specifically imposes an IM Work Plan within 30 calendar days of receipt of the IM Work Plan submitted by the Permittee.

The scope and success of conditionally approved Permittee-initiated IM is subject to subsequent in-depth review; the Secretary will then approve, disapprove, or approve with conditions the IM in accordance with Permit Condition 10.15.

A Permittee-initiated IM must follow the progress and final reporting requirements of Permit Condition 10.8.3.

10.8.1.c IM Work Plan Requirements

The IM Work Plan shall ensure that the IM are designed to mitigate any current or potential threat to human health or the environment and are consistent with and integrated into any long-term solution at the Facility, including attainment of action levels in all media. The IM Work Plan shall include the IM objectives; procedures for implementation, including any designs, plans, or specifications; and schedules for implementation.

10.8.1.d IM Work Plan Approval

The IM Work Plan imposed under Permit Condition 10.8.1.a must be approved by the Secretary in writing prior to implementation. The Secretary will specify the start date of the IM Work Plan schedule in the letter approving the IM Work Plan. The Secretary will approve, approve with conditions, or disapprove the IM Work Plan in accordance with Permit Condition 10.13.6.

10.8.2 IM Implementation

10.8.2.a Implementation of Approved IM Work Plan

The Permittee shall implement the IM imposed under Permit Condition 10.8.1.a in accordance with the approved IM Work Plan.

10.8.2.b Notification of Changes

The Permittee shall give notice to the Secretary as soon as possible of any planned changes, reductions, or additions to the approved IM Work Plan imposed under Permit Conditions 10.8.1.a or initiated by the Permittee under 10.8.1.b.

10.8.3 IM Reports

10.8.3.a Progress Reports

If the time required for completion of IM is greater than one year, the Permittee shall provide the Secretary with Progress Reports at intervals specified in the approved IM Work Plan

required by the Secretary, or semi-annually for Permittee-initiated IM. The Progress Reports shall contain the following information, at a minimum:

- a description of the portion of the IM completed;
- a summary of findings;
- a summary of any deviations from the IM Work Plan during the reporting period;
- a summary of any problems or potential problems encountered during the reporting period; and
- projected work for the next reporting period.

10.8.3.b Final IM Report

The Permittee shall prepare and submit an IM Report to the Secretary within 90 calendar days following completion of IM conducted in accordance with Permit Condition 10.8.2. The IM Report shall contain, at a minimum, the following information:

- a description of IM implemented;
- a summary of results;
- a summary of all problems encountered;
- a summary of accomplishments and/or effectiveness of IM; and
- copies of all relevant laboratory/monitoring data.

10.8.4 Permit Modification

If the Secretary determines that the interim action completes corrective action required at 20.4.1.500 NMAC, (incorporating 40 CFR 264.101), and the Secretary determines that no further action is necessary, the Permittee shall submit a Permit modification in accordance with 20.4.1.900 NMAC (incorporating 40 CFR 270.41) to remove the unit undergoing corrective action from Table 10-2 of this Permit.

10.9 CORRECTIVE MEASURES STUDY

10.9.1 CMS Work Plan

10.9.1.a Submittal of CMS Work Plan

The Permittee shall prepare and submit a Corrective Measures Study (CMS) Work Plan for those units requiring a CMS within 90 calendar days of notification by the Secretary that a CMS is required. The CMS Work Plan shall be developed to meet the requirements of Permit Condition 10.9.1.b. The Permittee may seek approval from the Secretary for concurrent RFI/CMS. The CMS may be performed concurrently with the RFI process if the Secretary determines that sufficient investigative details are available to allow concurrent action.

10.9.1.b CMS Work Plan Requirements

The scope of the CMS Work Plan shall include the identification of all possible remedial alternatives, and the Permittee's recommended alternative that ensures protection of human health and the environment, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.101) and 20.4.1.900 NMAC (incorporating 40 CFR 270.32(b)(2)). The Permittee shall, when necessary, expand the scope of the CMS Work Plan beyond the Facility boundary in accordance with Permit Condition 10.1.3.

The CMS Work Plan shall meet, at a minimum, the requirements of Permit Attachment T, *Corrective Measures Study Outline*, Task I, *Corrective Measures Study Work Plan*. The CMS Work Plan shall include schedules of implementation and completion of specific actions necessary to complete the CMS.

The Permittee shall provide sufficient written justification and documentation for any unit deleted, or any omissions or deviations from the minimum requirements of Permit Attachment T, Task I. Such omissions or deviations are subject to the approval of the Secretary.

The scope of the CMS Work Plan shall include:

- a description of current conditions;
- a definition of the objectives of the study;
- specific plans for evaluating remedies, to ensure compliance with corrective measure standards; and

- the proposed format for the presentation of information.

10.9.1.c CMS Work Plan Approval

The Secretary will approve, disapprove, or modify and approve the CMS Work Plan in writing in accordance with Permit Condition 10.13.6.

10.9.2 Corrective Measures Study Implementation

The Permittee shall begin to implement the CMS according to the schedule specified at the CMS Work Plan no later than 15 calendar days after the Permittee has received written approval from the Secretary for the CMS Work Plan. The CMS shall be conducted in accordance with the approved CMS Work Plan.

10.9.3 CMS Report

10.9.3.a Submittal of CMS Report

The Permittee shall prepare and submit to the Secretary for approval a CMS Report and Executive Summary for the study conducted in accordance with the approved CMS Work Plan. The report shall be prepared in accordance with Permit Attachment T, Task III, *Corrective Measures Study Final Report and Summary*. The CMS Report shall be submitted to the Secretary in accordance with the schedule in the approved CMS Work Plan.

The CMS Report shall, at a minimum:

- summarize any bench-scale or pilot tests conducted;
- present all information gathered under the approved CMS Work Plan;
- include an evaluation of each remedial alternative;
- recommend a remedial alternative in accordance with Permit Condition 10.10; and
- contain adequate information to support the Secretary's decision on the recommended remedy.

In the CMS Report, the Permittee shall propose a corrective action program that attains the following:

- compliance with action levels for hazardous constituents in each medium, as established in Permit Condition 10.3;
- control of the source of the release;
- acceptable waste management requirements; and
- protection of human health and the environment.

10.9.3.b CMS Report Approval

Based on preliminary results and the CMS Final Report, the Secretary may require the Permittee to evaluate additional remedies or particular elements of one or more proposed remedies.

If the Secretary determines that the CMS Final Report and Summary do not fully satisfy the information requirements specified under Permit Condition 10.9.3.a, the Secretary may disapprove the CMS Final Report in accordance with Permit Condition 10.13.6. If the Secretary determines that no further action is necessary, the Secretary will notify the Permittee.

Once approved, the Permittee shall mail the Summary to all individuals, organizations, and agencies on the Facility mailing list, as required by 20.4.1.1102 NMAC, (incorporating 40 CFR 124.10(c)(1)(ix)), within 15 calendar days of receipt of approval.

10.10 REMEDY APPROVAL AND PERMIT MODIFICATION

10.10.1 Remedy Selection

The Secretary shall select a remedy from the remedial alternatives evaluated in the CMS. The remedy shall be based at a minimum on protection of human health and the environment, and shall result in hazardous waste and hazardous constituent concentrations at or below action levels, in accordance with specific site conditions and existing regulations. The selected remedy may include any IM implemented to date.

10.10.2 Financial Assurance for Corrective Action

The Permittee shall submit to the Secretary evidence of financial responsibility for completing the corrective actions identified in the approved CMS Final Report, as required by 20.4.1.500 NMAC (incorporating 40 CFR 264.101(b) and (c)). A

Financial Assurance Report shall be submitted to the Secretary within 120 calendar days of completion of the Permit modification incorporating the approved remedy. The Financial Assurance Report shall address the corrective action cost considerations provided at Permit Attachment T, Task II.d.2, *Cost Estimate*.

10.10.3 Permit Modification for Remedy Identification

As required by 20.4.1.900 NMAC (incorporating 40 CFR 270.41), a Permit modification will be initiated by the Secretary after recommendation of a remedy under Permit Condition 10.10.1. This modification will serve to incorporate a final remedy into this Permit and to establish the financial cost of the remedy.

10.10.4 Permit Modification for Completion of Corrective Action

Upon completion of the approved remedial alternative, the Permittee shall submit a Permit modification request to remove the affected unit from the requirements of this Permit Part to the Secretary for approval, as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.42).

10.11 GROUND WATER MONITORING

If a release from a SWMU results in the presence of fluids containing hazardous constituents in the vadose zone monitoring system, the Ground Water Monitoring Waiver will be revoked by the Secretary. Within 90 days of revocation of the Ground Water Monitoring Waiver, the Permittee shall submit a Ground Water Monitoring Work Plan to the Secretary for approval to initiate compliance with 20.4.1.500 NMAC (incorporating 40 CFR 264.97), *General ground-water monitoring requirements*, and 40 CFR 264.98, *Detection monitoring program*. The Permittee shall establish background ground water concentrations in accordance with Permit Condition 10.3.3.

10.12 RECORDKEEPING

For each unit undergoing corrective action under this Part, the Permittee shall retain, until completion of the corrective action for that unit has been approved by the Secretary, records of all monitoring information and all other pertinent data and information used to prepare the appropriate documents required by this Part.

10.13 PROCEDURES

10.13.1 Modification of the Corrective Action Compliance Schedule

If at any time the Secretary determines that modification of Table 10-3, *Corrective Action Compliance Schedule for Solid Waste Management Units and Areas of Concern,* is necessary, the Secretary may initiate a modification to Table 10-3. The Permittee may also request a Permit modification to change Table 10-3.

Modifications to change Table 10-3 will be in accordance with the applicable provisions of 20.4.1.900 NMAC (incorporating 40 CFR 270.41 or 270.42).

10.13.2 Modification for Necessary Change

If the Permittee or the Secretary determines that this Permit Part no longer satisfies the requirements of 20.4.1.500 NMAC (incorporating 40 CFR 264, Subpart F), the Permittee shall, within 90 calendar days of determination, submit an application for a Permit modification to make any appropriate changes to this Permit Part as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.42).

10.13.3 Work Plan and Report Requirements

The Permittee shall submit work plans and reports to the Secretary according to the schedule contained at Table 10-3.

Work plans and reports listed at Table 10-3 shall be signed and certified as required by 20.4.1.900 NMAC (incorporating 40 CFR 270.11).

10.13.3.a Approval of the Secretary for Work Plans and Schedules

All work plans and schedules shall be subject to approval by the Secretary prior to implementation to assure that such work plans and schedules are consistent with the requirements of this Permit and with applicable regulations. The Permittee shall revise all submittals and schedules as specified by the Secretary. Upon approval, the Permittee shall implement all work plans and schedules as written.

10.13.3.b Schedule for Submittals

All work plans and reports shall be submitted in accordance with the schedule contained at Table 10-3. Extensions of the due date for submittals may be granted by the Secretary in writing based on the Permittee's written request and demonstration that sufficient justification for the extension exists. The Permittee must request the change at least 15 days before the due date contained in the schedule.

10.13.4 Work Plan Amendment

If the Permittee at any time determines that the work plans required under this Part no longer satisfy the requirements of 20.4.1.500 NMAC, (incorporating 40 CFR 264.101), or this Permit, for prior or continuing releases of hazardous waste or hazardous constituents from SWMUs and/or AOCs, the Permittee shall submit an amended Work Plan to the Secretary within 90 calendar days of such determination. The submittal of an amended Work Plan does not alleviate the Permittee from abiding with any Work Plan schedule previously approved by the Secretary.

10.13.5 Submittals to the Secretary

The Permittee shall provide two copies of all reports and work plans to the Secretary in accordance with Permit Condition 1.7.

10.13.6 Approval/Disapproval of Submittals

The Secretary will review all submittals (e.g., work plans, reports, schedules, and other documents which require the Secretary's approval) in accordance with the conditions of this Permit. If the Secretary does not approve the submittal, he or she may issue a Request for Supplemental Information (RSI), which will detail the document's deficiencies. The Permittee shall respond to the RSI within 60 calendar days. If the Secretary has further concerns after reviewing the Permittee's response, he or she may issue a Notice of Deficiency (NOD), which will detail the document's remaining deficiencies. The Permittee shall respond to the NOD within 60 calendar days. The Secretary will then approve, approve with conditions, modify and approve, or disapprove each submittal in writing.

If the Secretary approves the submittal with conditions or modifies the submittal, the Secretary will provide justification for the conditions or modifications in writing. If the Secretary disapproves a document, he or she will notify the Permittee in writing of the basis for the disapproval.

10.14 DISPUTE RESOLUTION

This Permit Condition shall apply only to submittals that have been disapproved and revised by the Secretary, or that have been disapproved by the Secretary, then revised and resubmitted by the Permittee, and again disapproved by the Secretary.

Notwithstanding any other provision of this Permit, in the event the Permittee disagrees, in whole or in part, with the Secretary's revision of a submittal or disapproval of any revised submittal required by the Secretary, the following may, at the Permittee's discretion, apply:

10.14.1 Notification to the Secretary

In the event that the Permittee chooses to invoke the provisions of Permit Condition 10.14, the Permittee shall notify the Secretary in writing within 30 calendar days of receipt of the Secretary's revision or disapproval of a submittal or revised submittal. Such notice shall set forth the specific matters in dispute, the position the Permittee asserts should be adopted as consistent with the requirements of the Permit, the basis for the Permittee's position, and any matters considered necessary for the Secretary's determination.

10.14.2 Resolution Conference

The Secretary and the Permittee shall have an additional 30 calendar days from the Secretary's receipt of the notification provided for at Permit Condition 10.14.1 to meet or confer to resolve any disagreement.

In the event agreement is reached, the Permittee shall comply with the terms of such agreement, or, if appropriate, submit a revised submittal and implement the same in accordance with and within the time frame specified in such agreement.

10.14.3 Decision by the Secretary

If agreement is not reached within the 30-day period specified at Permit Condition 10.14.2, the Secretary will notify the Permittee in writing of his or her decision on the dispute, and the Permittee shall comply with the terms and conditions of the Secretary's decision in the dispute. For the purposes of this provision, the responsibility for making this decision shall not be delegated below the NMED Director of Water and Waste Management Division.

10.14.4 Compliance with Requirements Not in Dispute

With the exception of those conditions under dispute, the Permittee shall proceed to take any action required by those portions of the submittal and of the Permit that the Secretary determines are not affected by the dispute.

TABLE 10-1

SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN[1]

AT THE TRIASSIC PARK WASTE DISPOSAL FACILITY

SWMU/AOC[1]	DESCRIPTION	COMMENTS
~~SWMU 1~~	~~Drum Storage Unit~~	~~Permitted unit~~
~~SWMU 2~~	~~Roll-Off Container Storage Unit~~	~~Permitted unit~~
~~SWMU 3a~~	~~Liquid Waste Tank~~	~~Permitted unit~~
~~SWMU 3b~~	~~Liquid Waste Tank~~	~~Permitted unit~~
~~SWMU 3c~~	~~Liquid Waste Tank~~	~~Permitted unit~~
~~SWMU 3d~~	~~Liquid Waste Tank~~	~~Permitted unit~~
~~SWMU 4a~~	~~Stabilization Tank~~	~~Permitted unit~~
~~SWMU 4b~~	~~Stabilization Tank~~	~~Permitted unit~~
~~SWMU 4c~~	~~Stabilization Tank~~	~~Permitted unit~~
~~SWMU 4d~~	~~Stabilization Tank~~	~~Permitted unit~~
~~SWMU 5~~	~~Surface Impoundment - Ponds IA and IB~~	~~Permitted unit~~
SWMU 6	Landfill Phase 1A	Permitted unit
~~SWMU 7~~	~~Truck Wash Facility~~	
SWMU 8	Maintenance Shop	
SWMU 9	Chemical Laboratory	
SWMU 10	Stormwater Retention Basin	
SWMU 13	Untarping, Sampling and Weigh Scales Area	

SWMU/AOC[1]	DESCRIPTION	COMMENTS
SWMU 14	Truck Staging Area	
AOC 1	Roads	
AOC 2	Clay processing area	
AOC 3	Dust control/clay processing area water basin	

1. SWMUs 6~~1~~-14 and AOCs 1-3 were originally identified in the 1995 RCRA Facility Assessment.

TABLE 10-2

SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

REQUIRING CORRECTIVE ACTION[1]

SWMU/AOC	DESCRIPTION	COMMENTS

[1] At the time of permit issuance, no SWMUs or AOCs requiring corrective action have been identified.

TABLE 10-3

CORRECTIVE ACTION COMPLIANCE SCHEDULE

FOR SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

SCHEDULE OF COMPLIANCE	DUE DATE
Notification of newly identified SWMUs and AOCs (Permit Conditions 10.4.1)	Within 15 calendar days of discovery
SWMU Assessment Report (Permit Condition 10.4.3)	Within 90 calendar days of notification
Notification for newly discovered releases at previously identified SWMUs and AOCs (Permit Condition 10.4.2)	Within 15 calendar days of discovery
Confirmatory Sampling Work Plan for SWMUs or AOCs (Permit Condition 10.6.1)	Within 45 calendar days after effective date of Permit
Confirmatory Sampling Report (Permit Condition 10.6.4)	In accordance with the approved CS Work Plan
RFI Work Plan (Permit Condition 10.7.1)	Within 90 calendar days from effective date of Permit
RFI Report (Permit Condition 10.7.3)	In accordance with the approved RFI Work Plan
RFI Progress Reports (Permit Condition 10.7.5)	Quarterly, beginning 90 calendar days from the start date specified by the Secretary[1]
Interim Measures Work Plan (Permit Condition 10.8.1.a)	Within 30 calendar days of notification by the Secretary
Interim Measures Progress Reports (Permit Condition 10.6.3.a)	In accordance with the approved Interim Measures Work Plan[2] or semi-annually for Permittee-initiated IM

SCHEDULE OF COMPLIANCE	DUE DATE
Final Interim Measures Report (Permit Condition 10.8.3.a)	Within 90 calendar days of completion
CMS Work Plan (Permit Condition 10.9.1.a)	Within 90 calendar days of notification by the Secretary that a CMS is required
Implementation of CMS Work Plan (Permit Condition 10.9.2)	Within 15 calendar days after receipt of the Secretary's approval of CMW Work Plan
CMS Report (Permit Condition 10.9.3.a)	In accordance with the schedule in the approved CMS Work Plan
Demonstration of Financial Assurance (Permit Condition 10.10.2).	Within 120 calendar days after Permit modification for remedy

1 This applies to Work Plan execution that requires more than 180 calendar days.

2 This applies to Work Plan execution that requires more than one year.

TO VIEW THE MAP AND/OR MAPS WITH THIS DOCUMENT, PLEASE CALL THE HAZARDOUS WASTE BUREAU AT 505-476-6000 TO MAKE AN APPOINTMENT

Part A and Part B Permit Renewal Application for the

TRIASSIC PARK
WASTE DISPOSAL FACILITY

RCRA Permit No. NM0001002484

Chaves County, New Mexico

Volume 2
Permit Attachments

October 17, 2011

Prepared for:

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All attachments indicated as included are in Volume 2 except Attachment L1, which comprises Volume 3. Attachments indicated as not included are unchanged from the 2002 permit.

Attachment			Included? Yes	Included? No
A		General Facility Description and Information	X	
B		Procedures to Prevent Hazards	X	
C		Contingency Plan	X	
	C1	Emergency Equipment		X
	C2	Emergency Coordinators		X
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	F2	Example Waste Profile Form		X
	F3	Example Chain-of-Custody Form		X
	F4	Waste Characterization Using Acceptable Knowledge		X
G		Air Quality	X	
H		Ground Water Monitoring Waiver Request and Approval		X
I		Vadose Zone Monitoring System Work Plan	X	
J		Action Leakage Rate and Response Action Plan	X	
K		Part A Permit Application (included at beginning of application rather than as attachment)	X	
L		Engineering Report	X	
	L1	Engineering Drawings **(Volume 3)**	X	
	L2	Specifications for Landfill, Surface Impoundment and Associated Facilities Liner and Cover System Construction		X
	L3	Tank Integrity Assessment Certification		X
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	P1	Financial Assurance for Post-Closure Care	X	
Q		Statistics for Release Determination	X	
R		Facility Corrective Action Work Plan Outline		X

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Attachment			Included? Yes	Included? No
S		RCRA Facility Investigation - Scope of Work		X
T		Corrective Measures Study - Scope of Work		X
U		Action Levels for Corrective Action (completed after permit approval)		X
	U1	Background Concentrations for Soil (completed after permit approval)		X
	U2	Vadose Zone Baseline Concentrations for Non-Leachates (completed after permit approval)		X
	U3	Background Concentrations for Ground Water (completed after permit approval)		X
V		Vadose Zone Monitoring Indicator Parameters (completed after permit approval)		X
W		Facility Corrective Action Work Plan (DRAFT)	X	

VOLUME 3

Attachment			Included? Yes	Included? No
	L1	Engineering Drawings	X	

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OCTOBER 2000 PERMIT APPLICATION APPENDICES

Itemized list of appendices that have been updated for the October 2011 Permit Application

Appendix (from Permit Application dated October 2000)		Included? Yes	Included? No
Volume II			
A	RCRA Permit Application Checklist *(included as Regulatory Crosswalk in the Application Introduction)*	X	
B	Oil Well Log		X
C	Lithology Logs and Plugging Logs		X
D	Geophysical Logs		X
E	Geotechnical Laboratory Results		X
F	Grain Size Analyses		X
G	Cross-Sections *(included as figures in the Part B Application)*	X	
H	Example Waste Profile Sheet		X
I	Tank Certification Statement and Example		X
J	Inspection Sheet *(included in Attachment D1)*	X	
K	Coordinating Agreement		X
L	List of Emergency Coordinators		X
M	Evacuation Plans		X
N	Location, Description, and Capabilities of Emergency Equipment		X
O	Vadose Zone Monitoring System Work Plan *(included as Attachment I)*	X	
Volume III			
A	Design Drawings *(included as Attachment L1)*	X	
Volume IV			
B	Construction Quality Assurance Plan *(included as Attachment M)*	X	
C	Construction Specifications		X
D	Laboratory Test Results		X
E	Engineering Calculations *(new landfill engineering calculations in Attachment L4)*	X	
Volume V			
E	Engineering Calculations		X
Volume VI			
E	Engineering Calculations		X
F	Surface Water Control Plan		X
G	Action Leakage Rate and Response Action Plan *(included as Attachment J)*	X	
H	Manufacturer Information		X

Permit Renewal Application
October 17, 2011

Attachment A

General Facility Description and Information

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March 2002

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Attachment A. General Facility Description and Information

1. General Facility Standards

This section provides a general description of the Triassic Park Waste Disposal Facility (Facility), including waste management practices, site environment and climate, location information, emergency management, and traffic patterns.

1.1 General Description

The Facility will be a full-service Resource Conservation and Recovery Act (RCRA) Subtitle C waste ~~treatment, storage, and~~ disposal operation. The Facility will be located in Southeastern New Mexico on approximately 480 acres of privately owned land in Chaves County, New Mexico (~~see~~ Figure 1-1 ~~at the end of this section~~). By road, this location is approximately 43 miles east of Roswell and 36 miles west of Tatum, as shown on Figure 1-2.

All waste placed in the Facility will meet land disposal restrictions (LDRs) prior to disposal. The Facility will accept polychlorinated biphenyl (PCB) wastes at concentrations of less than 500 parts per million (ppm) ~~in liquids and~~ in soils~~,~~ and bulk PCB-contaminated remediation waste. The Facility will offer the following RCRA-regulated services, which are described in this permit application.

~~1.1.1 Treatment~~

~~Two treatment processes will be used at the Facility, including an evaporation pond for managing wastewaters that meet LDR standards and a stabilization process for treating liquids, sludges, and solids to ensure that no free liquids are present and that LDR standards are met prior to placing wastes in the landfill. Dilution of restricted waste will not be used as a substitute for adequate treatment. All stabilized wastes will be tested, as a final step in the stabilization process, to ensure that no free liquids are present. The Paint Filter Liquids Test, U.S. Environmental Protection Agency (EPA) Method 9095, will be used to make this evaluation. Prior to treating wastes in the stabilization unit, waste characteristics will be analyzed to ensure that proper measures can be taken to safely manage ignitable, reactive, and incompatible wastes. Procedures for properly identifying and verifying ignitable, reactive, and incompatible wastes are described in Section 4.5 of the Waste Analysis Plan. Once these wastes are identified, they will be managed in accordance with applicable regulatory requirements and permit conditions (see Permit Attachment B, *Procedures to Prevent Hazards*, Section 5.5).~~

~~1.1.2 Solid Waste Storage~~

~~Two container storage areas (roll-off storage area and drum handling unit) will be used to stage waste at the Facility for treatment or disposal. These units will ensure that waste is stored in compliance with RCRA requirements for permitted storage. Neither of the units will be used for long-term storage of waste. All containers being stored will be clearly marked with hazardous waste labels which identify the contents of each container as well as the date of receipt (accumulation date). All labels will be clearly visible while containers are being stored. All containers will remain closed during storage, except when waste is removed or added. Further, container storage and handling procedures will be developed to ensure that containers are not opened, handled, or stored in a manner that may cause them to rupture or leak.~~

~~1.1.3 Liquid Waste Storage~~

~~Four aboveground storage tanks will be utilized to accumulate regulated bulk liquid hazardous wastes prior to stabilization. Handling of reactive materials, tank corrosion, tank assessments, tank inspection and tightness testing, and repair and certification of tank systems is discussed in Section 5.0. Description of contents, quantity of hazardous waste received, and the date each period of accumulation begins will be documented in the facility records and will be included on labels for each storage tank. Design, dimensions, capacity, and other tank specifications are included in Permit Attachments L, *Engineering Report*; L1, Engineering Drawings; L2, *Specifications for the Landfill, Surface Impoundment and Associated Liner and Cover Systems Construction*; and M *Construction Quality Assurance Plan.*~~

1.1.4 Land Disposal

A landfill will be utilized for the disposal of waste that meets LDRs~~ standards~~. Support units and structures include a chemical laboratory, administration building, weigh scale area, maintenance shop, ~~truck wash unit,~~ clay processing area, clay liner material stockpiles, daily cover stockpiles, and a stormwater d~~r~~etention basin.

Because the Facility has not yet been constructed or operated, there are no solid waste management units (SWMUs) requiring corrective action at this time. Satellite and/or 90-day accumulation areas may possibly be located at the chemical laboratory~~, the truck wash unit,~~ and the maintenance shop. Other areas at the Facility that may be designated as SWMUs include the untarping, sampling, and weigh scales area, the truck staging area, and the stormwater d~~r~~etention basin. Detailed information on location, unit type and dimensions, and a structural description of these units is provided in the design of the Facility contained in Permit Attachments L, L1, L2 (Engineering Report and attachments)~~;~~ and M (Construction Quality Assurance Plan)~~; and Volumes IV through VI of the permit application~~.

~~The future debris encapsulation area and the future waste processing area identified in the Facility layout are possible future RCRA treatment units envisioned for the Facility that are not being designed at this time. Prior to construction of these units, a RCRA permit modification request will be submitted.~~

1.1.5 Facility Name

Gandy Marley, Inc. (GMI) owns the Facility. The waste disposal operations covered by this permit will operate under the name of the Triassic Park Waste Disposal Facility.

1.1.6 Facility Contact

Larry Gandy, Vice President
Gandy Marley, Inc.
P.O. Box 1658
Roswell~~Tatum~~, New Mexico 88202
575-347-0434~~505/398-4960~~

1.1.7 Facility Address

P.O. Box 1658
Roswell, New Mexico 88202
~~1109 East Broadway~~
~~P. O. Box 827~~
~~Tatum, New Mexico 88267~~

1.1.8 Purpose of Facility

The purpose of the Facility will be the ~~treatment and~~ permanent disposal of hazardous wastes in a manner protective of human health and the environment. Wastes that do not meet LDRs ~~standards~~ will not be accepted for placement into the landfill. ~~or evaporation pond until appropriate treatment is performed.~~ Infectious wastes and radioactive wastes will be prohibited at this Facility. The Waste Analysis Plan (Permit Attachment F) contains more details regarding wastes that can be accepted at the Facility and wastes that are prohibited.

1.1.9 Facility Location

The Facility will be located in Southeastern New Mexico on approximately 480 acres of privately owned land in Chaves County, New Mexico, Sections 17 and 18 of R31E, T11S (~~see~~ Figure 1-1[RF1]). By road, this location is approximately 43 miles east of Roswell and 36 miles west of Tatum, as shown on Figure 1-2[RF2]. The only major road in the vicinity is U.S. Highway 380, which runs east and west approximately 4 miles north of the proposed site. State Highway 172, which runs north and south, is approximately 4 miles east of the proposed site. State Highway 172 is not a major thoroughfare and does not provide access to the proposed site.

1.1.10 Hazardous Waste Generation

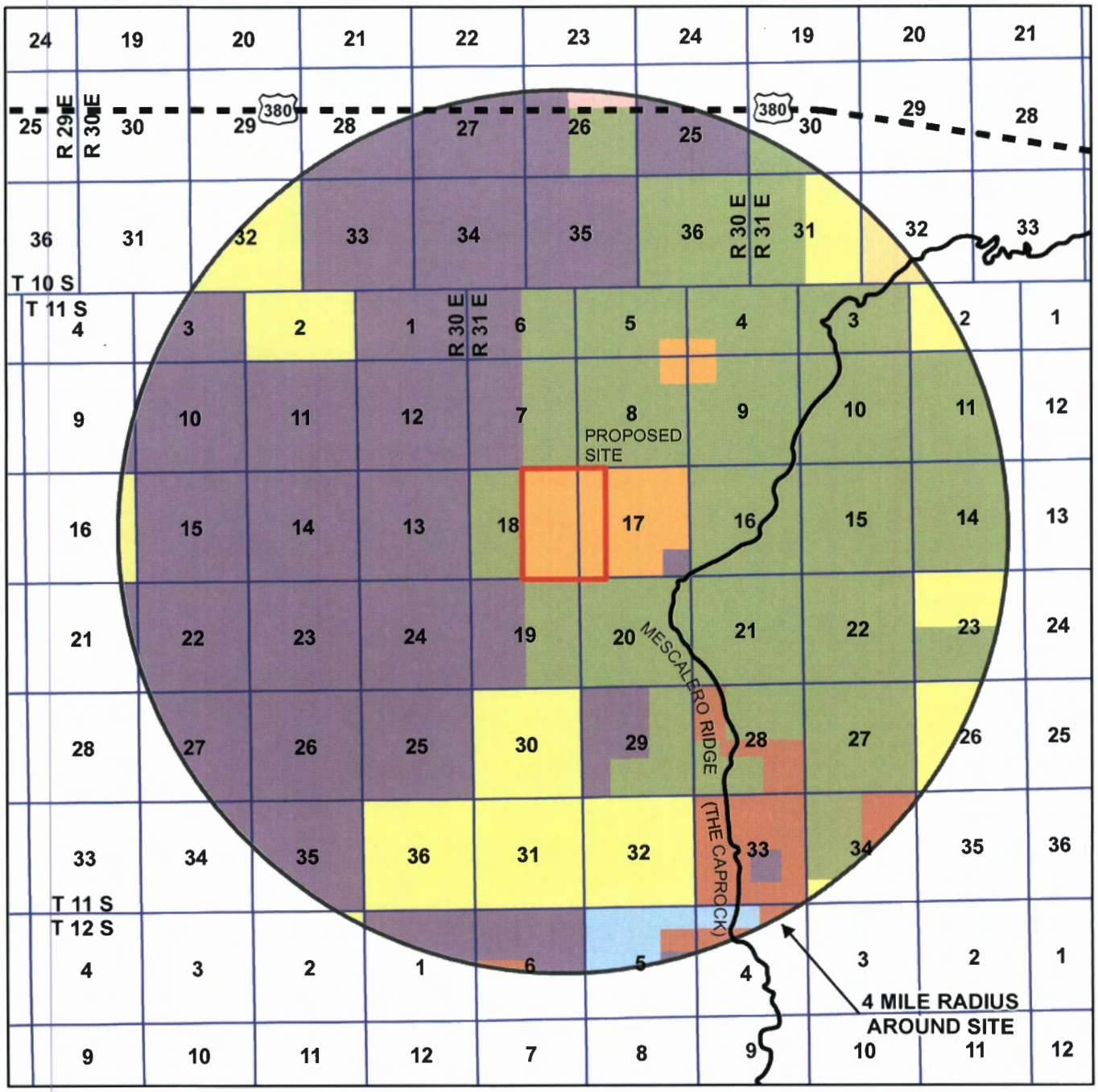
Some hazardous waste will be generated as a result of normal Facility operations. Various ~~treatment and handling processes,~~ support operations and collected leachate will likely generate such wastes. Examples of typical hazardous waste forms likely to be generated during normal Facility operations include solvents, oils, acids and bases, laboratory chemicals and equipment, paint and paint strippers, sludges, solvent contaminated solids, and personal protective equipment. Non-recyclable hazardous wastes, excluding liquids, will be disposed of on-site in accordance with the requirements outlined in Permit Attachment F, Waste Analysis Plan, Section 4.5.6. Any waste not meeting LDRs will be managed through off-site disposal at a facility permitted to accept the material.

1.1.11 Sanitary Waste Generation

Sanitary liquid wastes will be generated in most Facility buildings. This waste form consists primarily of shower water, janitorial wastes, rest room wastes, and liquid wastes generated from cleaning operations. Non-hazardous liquid wastes will be managed as sewage and disposed of off-site.

1.1.12 Non-Hazardous Refuse Generation

Non-hazardous municipal solid waste (MSW) and construction and demolition (C&D) waste will be generated during building and normal operations at the Facility. These wastes will include such things as cardboard packing containers, garbage, paper refuse, and construction debris. Collection, transportation, and disposal of non-recyclable waste will be contracted to a MSW and C&D waste disposal company. Recyclable wastes, such as office paper, will be sent off-site for usable materials recovery. The disposal of non-routine waste materials will be administratively controlled on a case-by-case basis in accordance with applicable regulatory requirements.



United States of America
Robert W. Marley
Katerina, Inc.
State of New Mexico
Gandy Marley Inc.
Luce Living Trust
Roy F. Pearce
KaRo Trust

N

0 1 2 Miles

LAND OWNERSHIP WITHIN 4 MILE RADIUS

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 1-1

S:/PROJECTS/E 0141 TRIASSIC PARK PERMIT RENEWAL/GIS/MXDS/LAND OWNERSHIP 4 MXD 114101

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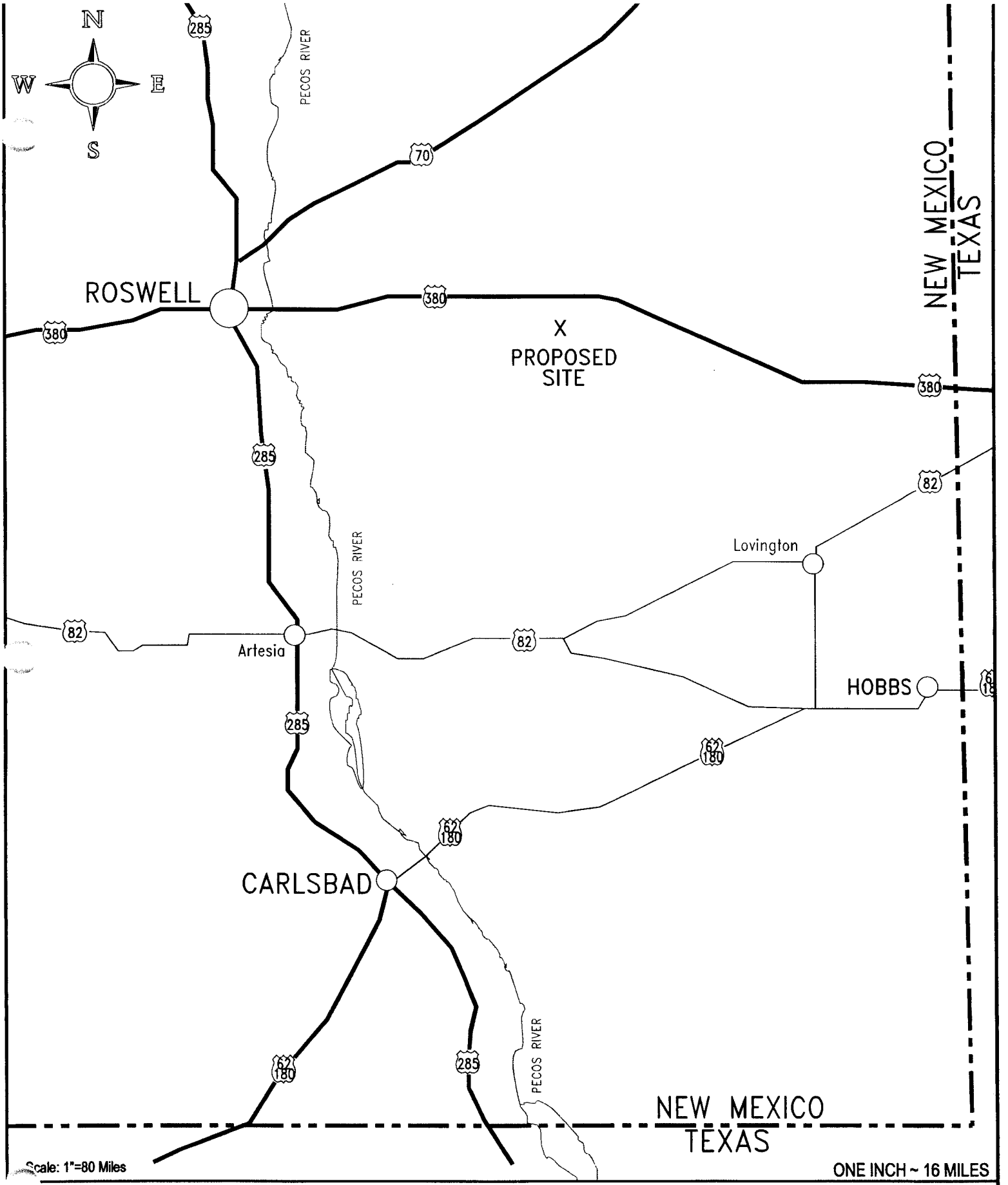

SITE LOCATION MAP

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 1-2

1.2 Site Environment and Climate

The selected site for the Facility is on the western edge of a geological bench known locally as the Caprock. The Caprock is characterized by rocky terrain which runs north and south. Detailed information about the geologic characteristics of the site is contained in Section 3.0 of the permit application.

The site is approximately 4,150 feet above sea level. Climatic conditions of the area are typical of semiarid regions and are characterized by dry, warm winters with minimal snow cover and hot, somewhat moister summers. The frost-free season averages from 190 to 215 days per year. The mean annual soil temperature ranges from 59 to 65 degrees Fahrenheit (°F). The average annual precipitation rate for Roswell for a 118-year record of data from 1894 to 2011 is 11.6 inches per year~~ranges from 10 to 13 inches~~. Winter precipitation usually consists of occasional snowfall from November through April. Snowfall typically melts within a short period of time. Most precipitation (approximately 80 percent of the annual total) occurs between June and September.

Normally, two-thirds of the summer days reach temperatures in excess of 90°F, with maximum temperatures commonly 100°F or higher. Night temperatures during the winter months commonly fall below freezing, occasionally reaching below 0°F. ~~The average annual temperature is 62°F.~~Moderate temperatures at the ~~Triassic Park~~ Facility are typical throughout the year with annual average high and low temperatures of 75°F and 45°F, respectively

The prevailing wind is from the south. Winds of up to 40 miles per hour are common during the spring and in association with summer thunderstorms.

Area vegetation consists primarily of Tobosa, Buffalo Grass, Vine-Mesquite, Mesquite, Cactus, Sand Dropseed, Little Bluestem, Sand Bluestem, Sandbur, Three-Awn, Shinnery Oak, Yucca, and Sand Sagebrush. According to the New Mexico Forestry and Resources Conservation Division of the State Department of Energy, Minerals, and Natural Resources, there are no rare or endangered plant species located in either Section 17 or 18.

According to the Bureau of Land Management (BLM) - Roswell Resource Area, there are 54 bird species, 33 species of mammals, and 36 species of reptiles and amphibians in what is designated as the Caprock Wildlife Habitat Area. The Facility location is within that wildlife habitat designation.

Pursuant to the U.S. Endangered Species Act, there are 35 listed and sensitive species in Chaves County and 17 species of concern, which are identified for planning purposes only. As of February 28, 1996, the ferruginous hawk (*Buteo regalis*) is no longer listed as a candidate species but does remain a species of management concern.

~~One bird species, the ferruginous hawk (*Buteo regalis*), is classified as a "Category 2" candidate for listing as threatened or endangered by the United States Fish and Wildlife Service of the U.S. Department of Interior. Currently, it is not listed. The Prairie Chicken is a state-listed species and is a candidate for federal listing under the category of Warranted but precluded. No other documented species in the area of the proposed Facility site are federally protected or candidates for federal protection.~~

~~The sand dune sagebrush lizard (*Sceloporus graciosus arenicolous*) is currently listed as a threatened species by the State of New Mexico. Population and habitat studies are ongoing for use by the state in determining whether to give the species protected status. The sand dune sagebrush lizard is not classified for federal protection.~~The sand dune lizard (formerly the sand dune sagebrush lizard) (*Sceloporus graciosus arenicolous*) and the lesser prairie chicken are currently listed as candidate species. In 2008, the U.S. Bureau of Land

Management adopted a Special Status Resource Management Plan for both the sand dune lizard and the lesser prairie chicken.

GMI will continue to monitor the existence of threatened or endangered species in the area. Should any threatened or endangered species be identified within the Facility area, GMI will take measures to ensure that these species are protected. GMI will implement protective measures for the wildlife population in the area.~~.~~ ~~These measures~~ includinge the use of restrictive fencing around the operational portions of the Facility.~~ and the use of protective netting over the evaporation pond.~~

1.3 Location Information

A topographic map of the site has been developed from a 1997 aerial photograph and U.S. Geological Survey (USGS) 7.5 minute series map (Mescalero Point, New Mexico, 1973) and is presented in Permit Attachment L1, Engineering Drawings, Drawing 3. The Facility layout is presented at Drawing 4 in Permit Attachment L1. This drawing illustrates Facility boundaries, access roads, access control locations, internal roads, and site fences.

The site is located in eastern Chaves County, in an area that has historically been utilized primarily as range land for livestock grazing and for limited oil and gas activities. The residence nearest the site is owned by Marley Ranches, Ltd. and is located approximately 2.9 miles to the east-southeast. Land ownership for a 4-mile radius around the site is shown in Figure 1-~~2~~1. All of the residences within a 10-mile radius of the site are listed in Figure 1-3[RF3].

The site will encompass 480 acres and will be enclosed by a 6-foot chain link fence. Gates to the same height as the perimeter fence will be constructed. The area will be secured and monitored so that only authorized personnel or personnel being accompanied and supervised by authorized personnel are allowed on-site. Employees responsible for site security will be present at all times to prevent unauthorized entry and to report unusual events and/or emergencies. Site security personnel will be responsible for conducting regular inspections and routine maintenance of the perimeter area (see Permit Attachment D, Inspection Procedures).

Land use plans and/or zoning maps have not been developed for Chaves County. All areas within the county, except those within municipal boundaries, are designated as Zone A (agricultural). The eastern half of the county is further designated as Area 1 and the western half as Area 2. Area 1 and Area 2 are zoning Land Use Areas, whose boundaries have been determined by a joint-powers agreement between the Board of Chaves County Commissioners and the Roswell City Council. Existing uses in Area 1 are livestock grazing, mineral exploration and production, wildlife habitat, and extensive recreation. Single-family dwellings require permits in Area 1. Area 2 covers an important part of the recharge area of the Roswell Artesian Basin. Existing uses in Area 2 are livestock grazing, mineral exploration and production, extensive recreation, wildlife habitat, and flood control structures and floodways. Any new parcels created in the area must be 5 acres or larger.

Approximately 2 miles northwest of the Facility location, the Mescalero Sands recreational "complex" has been established for use by off-road vehicles. The South Dunes area of Mescalero Sands has been designated as an "Outstanding Natural Area" (ONA) and is utilized by the public primarily for wildlife observation activities.

The land in the area of the Facility is used predominantly for grazing cattle and to a much lesser extent for oil and gas exploration activities. The nearest production well is 3 miles from the site. Additional information about the drilling activities in the area is contained in Section 3.0 of the Permit Application.

OWNER	DISTANCE	DIRECTION
Marley Ranch	Approximately 2.9 Miles	East-Southeast
Bill Kolb - KOBR TV Towers	Approximately 4.5 Miles	East
KOBR TV - two dwellings	Approximately 4.5 Miles	East
Pearce Ranch	Approximately 4.5 Miles	Southeast
Sand Ranch	Approximately 6.3 Miles	Northeast
Jack Luce Ranch	Approximately 6.5 Miles	Northeast
Pearce Ranch	Approximately 7 Miles	West
Buddy Fort Ranch	Approximately 7 Miles	East-Southeast
Sand Ranch	Approximately 7.2 Miles	Northwest
Bill Rushing	Approximately 8 Miles	Northeast
Tivis Ranch	Approximately 8.2 Miles	Southeast
Johnson Ranch	Approximately 9.7 Miles	North

RESIDENCES WITHIN A TEN MILE RADIUS

Figure 1-3

TRIASSIC PARK WASTE DISPOSAL FACILITY

AutoCAD FILE: GANDY-FIG1-3

All abandoned wells in the area have been plugged in accordance with New Mexico Oil Conservation Division (OCD) regulations. These regulations require the use of mud-laden fluids, cement, and plugs in the well "in a way to confine crude petroleum oil, natural gas, or water in the strata in which it is found and to prevent it from escaping into other strata." Surface reclamation of abandoned wells prevents surface water from entering and contaminating subsurface strata.

1.3.1 Flood Plain Information

Sections 17 and 18, T11S, R31E are included on Federal Insurance Rate Map 35005C1775D~~#350125~~. This map has not been printed because this is a non-participating community, a status which generally indicates that the area is an area of minimal flood hazard.~~the National Flood Insurance Program has determined that this is an area of minimal flood hazards.~~ This information was originally provided to GMI by the Director of Planning and Environmental Services, Chaves County, New Mexico, and was confirmed with the National Flood Insurance Program at their website (www.msc.fema.gov) on October 11, 2011.

To confirm that this Facility is an area of minimal flood hazard~~Additionally~~, rainfall runoff calculations were performed to determine whether the site falls within the flood plain of a 100-year, 24-hour storm event. Based on information in the Precipitation Frequency Atlas published by the National Oceanic and Atmospheric Association, a rainfall amount of 5.75~~3~~ inches was used in the calculations. The nearest drainage to the site was determined from the USGS 7.5-minute series topographic map of the Mescalero Point Quadrangle (see Section 3.0 of the permit application). This drainage flows westerly from Mescalero Point, which is approximately 0.75 mile south of the site.

Storm runoff flows were calculated for the area using the Rational Method (see Appendix F-3 in Volume VI of the Permit Application dated October 2000). A runoff coefficient of 0.3 was used in the calculations. It was determined that the maximum flow could be accommodated in a triangular channel with~~section occupying~~ a width of 78~~6~~ feet at a water depth of 1.2 feet. It may be concluded from this calculation~~omparison~~ that a flood plain does not exist for the drainage and that there are no flood plains within 1 mile of the site. It may be further concluded that flood plain regulations are not applicable to this Facility.

1.3.2 Fire Control and Emergency Response

Fire control and emergency response will be the responsibility of the Emergency Coordinator (EC) who is on call or duty at the time of an incident. Each EC will be trained to handle emergencies and to notify appropriate authorities (see Permit Attachment C, Contingency Plan). Each EC will have the authority to commit resources necessary to implement the site Contingency Plan described in Permit Attachment C.

In addition to on-site emergency response capabilities, cooperative agreements will be established with local emergency response organizations in surrounding communities to respond to and assist in any emergencies that arise at the Facility (see Permit Attachment C).

1.4 Traffic Patterns

The flow of traffic within the Facility boundary will not be significant except during shift changes. The number of employee vehicles will not be substantial enough to require elaborate signage or other traffic control systems. All personnel will be given written instructions that will caution them to be alert to other vehicles and pedestrians. Each vehicle must enter and exit through the security gate at the northeast corner of the perimeter of the Facility boundary. ~~The arrival and departure of trucks transporting waste will not be scheduled during peak traffic times.~~ Drawing 26, Sheet 2 in Permit Attachment L1 illustrates traffic flow patterns for the operations and waste processing area, traffic control signage and truck staging areas.

1.4.1 Traffic Control

Access to the Facility will be gained through the security gate at the northeast corner of the perimeter fence (see Drawing 26, Sheet 2 in Permit Attachment L1). Authorization to enter the Facility will be verified for each vehicle.

Visitors will be required to sign in at the guard shack and will be escorted while on-site unless other arrangements are made with the Facility. Only authorized persons will be allowed past the security gate guard shack.

1.4.2 On-Site Transportation of Wastes

All trucks transporting wastes will be stopped at the security gate prior to entering the Facility. Security personnel will record the license number, transportation company, arrival time, and other pertinent information with regard to the vehicle and driver.

After being granted access to the Facility through the security gate entrance, waste transport vehicles will be directed to the untarping/sampling area. Here, a sample of the waste will be collected for fingerprint testing, along with the shipment manifest and other pertinent documentation. While the sample is being analyzed at the chemical laboratory, the truck will be directed to the weigh scales and finally to the truck staging area. The truck will remain at the staging area until laboratory analysis verifies that the waste meets acceptance criteria and the waste characteristics are consistent with profile information from the shipment manifest.

Following determination that waste acceptance criteria have been met, the truck will be directed ~~either~~ to the landfill, where the waste will be placed in the landfill for permanent disposal~~, in cases where wastes can be directly landfilled (for instance, when all LDR treatment standards are met), or to another station for staging/storage or further processing~~.

1.4.3 Routes

Transporters must use U.S. Highway 380 to reach the Facility. U.S. Highway 380 runs east and west between Roswell and Tatum, New Mexico as shown in Figure 1-2.

2. ~~Treatment, Storage, and~~ Disposal Process

This section provides a general description of the ~~storage, treatment, and~~ disposal process~~es and units~~ for the Facility. ~~For each of the operational units described in this section, d~~Detailed design drawings and associated engineering reports for the Facility are contained in Permit Attachments L, Engineering Report, and L1, Engineering Drawings. The drawings and specifications contained in Permit Attachment L2 present final designs for the RCRA permitted landfill~~facilities~~. Details on the non-RCRA components of the Facility~~facilities~~ will be supplemented during the bidding and construction phase. ~~Gandy Marley~~GMI will supply the additional details on the non-RCRA components of the design to the New Mexico Environment Department (NMED) for review and approval prior to the start of construction.

2.1 Facility Overview

An overview of the Facility layout is provided in Permit Attachment L1, Drawing 4 and identifies areas to be used for waste acceptance, waste receiving, and waste disposal activities. ~~This drawing shows the units used for the five general categories of waste disposal activities at the Facility. These five~~ four ~~waste disposal~~

~~operations are: (1) waste acceptance, (2) waste receiving, (3) waste staging/storage, (4) waste treatment, and (5~~1~~) waste disposal.~~ Each activity is described below.

2.1.1 Facility Waste Acceptance

Prior to initiation of a shipment of waste to the Facility, the generator of the waste must provide a full characterization of its waste and receive approval from the Facility to ship the waste. This process is more completely described in Permit Attachment F, Waste Analysis Plan. The Facility will use the waste characterization data to perform the following activities:

- ensure that the waste can be accepted in accordance with the RCRA permit;
- verify that the Facility has the capability to properly ~~treat and/or~~ dispose of the waste;
- identify any safety precautions that must be taken to properly manage the waste;
- use the physical characteristics and chemical composition of the waste to determine whether the waste may be accepted for disposal; ~~the most effective treatment and disposal methods for the waste;~~
- ~~select parameters to be tested to determine the formula for stabilization of appropriate wastes;~~
- select parameters to be tested upon arrival at the Facility to verify that the waste accepted is the waste characterized; and
- develop a cost estimate for ~~treatment and~~ disposal.

2.1.2 Waste Receiving

Once approved for acceptance at the Facility, the waste can be shipped. The Facility can be accessed only from New Mexico State Highway 380, as shown in Figure ~~2-1~~1-2. When a shipment arrives at the Facility, a Facility representative will verify that the shipment was scheduled. If unscheduled shipments arrive at the Facility, the Facility manager will be consulted to determine if the appropriate paperwork has been received and the shipment can be accepted.

The shipment and shipping papers will be inspected to ensure that the correct inventory has been received, that the hazardous waste manifest is properly completed, and that an LDR certification is attached. Any discrepancies will be resolved prior to acceptance of the shipment. If discrepancies cannot be resolved, the shipment will be rejected. Representative samples of the waste will be taken and fingerprint testing will be conducted. Fingerprint testing is described in Section 4.5 of the Waste Analysis Plan in Permit Attachment F. If the fingerprint test results are inconsistent with the generator's information, several actions can be taken (see Section 4.5). Waste will be received~~processed~~ only if fingerprint tests are consistent with information provided by the waste generator. Containers and drums will be inspected for visible cracks, holes or gaps.

~~2.1.3 Waste Staging/Storage~~

~~Containerized wastes will be moved to the drum handling unit or the roll-off storage area. The objectives of these container storage areas are to provide safe storage of waste prior to its introduction into the treatment or disposal system; to ensure that adequate accumulation space is available during intervals when the treatment or disposal system is temporarily unavailable; and to facilitate repackaging as necessary.~~

~~Solid waste will be transferred directly to the landfill for disposal if all applicable LDR requirements are met and, in the case of containerized material, if the container is at least 90 percent full.~~

~~Restricted waste at the Facility will be stored solely for the purpose of accumulating sufficient quantities to facilitate proper treatment, or disposal. Procedures will be in place at the Facility so that only that waste will be accepted that either (1) meets LDR treatment standards; or (2) is amenable to treatment using existing and available treatment capabilities at the Facility, such that restricted wastes will not be stored for longer than one year.~~

~~2.1.4 Waste Treatment~~

~~There are two treatment processes: stabilization and evaporation. Low concentration wastewater from off site generators and leachate from the landfill that meet LDR standards will be placed in the evaporation pond. Pond sludge, contaminated leachate from the landfill that does not meet LDR standards, and various wastes from generators will be treated in the stabilization process. Stabilized waste that meets LDR treatment standards and other operational criteria will be placed in the landfill.~~

~~Wastes that carry more than one characteristic or listed waste code must be treated to the most stringent treatment requirements for each hazardous waste constituent of concern. When wastes with different treatment standards are combined solely for treatment, the most stringent treatments standard specified will be met.~~

2.1.5 Waste Disposal

~~In general, w~~Wastes arriving at the Facility that meet LDRs ~~requirements~~ and contain no free liquids will be directly landfilled. When wastes are unable to be directly landfilled, such as during landfill equipment maintenance periods or extreme weather conditions, the waste will ~~be~~ not be unloaded and will be temporarily stored in the truck staging~~waste storage~~ area. ~~Wastes stabilized at the Facility that meet LDR requirements will be transferred to the landfill from the treatment or storage areas as necessary.~~

An access ramp will be constructed from the top of the landfill to the bottom of the active portion of the landfill (see Drawings 8 and 14 in Permit Attachment L1). Bulk hazardous wastes will be placed and compacted on the bottom of the landfill in 5-foot to 10-foot layers or lifts. Containers (drums) will be placed upright in the cell using a forklift or barrel snatcher. Sufficient space will be left around the containers for the placement and compaction of compatible bulk hazardous waste.

Materials in roll-off containers will be dumped with the bedliners at preselected locations. Containers or bulk waste can be placed adjacent to the roll-off material. A layer of cover soil sufficient to prevent wind dispersal of waste will be placed over the bulk hazardous wastes and containers following emplacement or before the end of each working day (see Section 2.5.1.7). The soil cover will be deposited on top of the waste placement face and then spread and compacted with a landfill compactor or tracked bulldozer. The minimum cover thickness will be 0.5 foot.

The landfill will be laid out in an engineered grid system consisting of blocks that are 50 feet wide, 50 feet in length, and 10 feet in depth. Grid stakes will be established by survey. A two-dimensional grid system along with lift elevation designation will provide a three-dimensional record of the location of all wastes placed in the landfill. Records of the location, date of placement, waste source, manifest, and profile numbers will be maintained at the Facility.

~~2.2 Container Storage Areas~~

~~The site will employ two container storage areas: a drum handling unit and roll-off storage area. Descriptions and conditions specific to these areas are presented in Section 2.2.1 and Section 2.2.2 for the drum handling unit and roll-off storage area, respectively. Sections 2.2.3 through 2.2.14 describe conditions common to~~

~~both units. Wastes which are either suspected or known to contain free liquids will be managed accordingly. A description of how these wastes will be managed is included in the following sections. More detailed information on the management of wastes containing free liquids can also be found in the Waste Analysis Plan presented in Section 4.0. Both the drum handling unit and the roll-off storage area will be constructed to meet the minimum requirements identified in the detailed design and associated engineering report (Permit Attachments L and L1).~~

~~2.2.1 Drum Handling Unit~~

~~Drawings 37, 38, and 39 presented in Permit Attachment L1 show the detailed design for the drum handling unit. The open-sided unit will be roofed to prevent run-on from precipitation. The roof of the building is designed to extend over the unloading dock area to ensure that precipitation does not enter the building or impact unloading operations.~~

~~The building will be equipped with fire extinguishers, a sprinkler system, telephones, fire alarm system, public address system, eye washes, safety showers, spill control equipment, and first aid equipment. An office for storing record-keeping information and for administrative functions within the drum handling unit will be located in the building.~~

~~The base of the drum handling unit will consist of a compacted subgrade of non-swelling soils placed at a moisture content and density capable of supporting projected loads comprised of the building's structural components, stored waste, and mobile equipment traffic inside the building. A 60-mil geomembrane liner, cushion geotextile, and 1 foot of foundation sand will overlie the subgrade. The steel reinforced concrete floor will be constructed on the prepared subgrade. Design details and the associated specifications are presented in Permit Attachments L1 and L2.~~

~~2.2.1.1 Containment and Detection of Releases~~

~~Wastes stored in the drum handling unit will be placed in individual storage cells segregated by waste type and compatibility. Individual storage cells are defined as groupings of drums as shown on Drawing 37 of Permit Attachment L1. The specific areas to be used for storage will depend on the volume and type of waste being processed at the site. Labels will be added to each section of the drum storage unit to identify the type of waste to be stored. The labels may change depending on the volume and type of waste being received. A chemically resistant epoxy coating (or an equivalent) will be applied to the concrete floor. Chemical resistant water stops and caulking will be installed in all joints. The floor is designed and will be maintained to be free of cracks and gaps and will be inspected regularly to determine if any cracks or gaps have developed or if the epoxy coating has been damaged. Should cracks or gaps develop in the concrete, repairs will be scheduled immediately. The nature of the repair will depend on the extent of the cracking and could range from the application of chemically resistant epoxy fillers or coatings to the replacement of portions of the concrete floor.~~

~~Each storage cell will have a concrete floor that slopes toward a trench covered by steel grating. Each trench will lead to a separate secondary containment sump for that cell where any spilled liquids will be accumulated. The trench and sump system design incorporates a double high-density polyethylene (HDPE) geomembrane liner in the leak detection and removal system (LDRS) and leachate collection removal system (LCRS). Both the LDRS and LCRS sumps incorporate drainage material surrounding a perforated pipe. The LCRS sump has been sized to contain at least 10 percent of the volume of the containers stored in the cell. The LCRS and LDRS sumps in the drum handling unit will be checked regularly for the presence of liquid. If liquids are present, samples will be obtained and chemically analyzed to determine the nature and concentration of any waste constituents. An appropriate treatment or disposal method will be selected in accordance with the Waste Analysis Plan presented in Section 4.0. Pumpable quantities of liquids will be removed with a vacuum truck. Leaks and spills will be removed from the sump in as timely a manner as possible. Because the~~

~~building is covered, precipitation and the consequent accumulation of liquid are not considered in the design or operation of the drum handling unit.~~

~~The cells that will contain PCB-contaminated waste will be surrounded by a 6-inch concrete berm, in addition to the floor trench and sump.~~

~~2.2.1.2 Dimensions~~

~~The drum handling unit is 418 feet long by 118 feet wide (see Drawing 37 in Permit Attachment L1). The building floor and loading dock will be 5 feet above ground level to facilitate the loading and unloading of trucks and prevent run-on from precipitation. An adjustable hydraulic loading platform will align the truck beds with the building floor to allow for the smooth transition of forklifts in and out of the trucks from the floor. An overhang on the front of the building will prevent precipitation from getting on the drums and into the front area.~~

~~2.2.1.3 Storage Limits~~

~~The drum handling unit will contain seven separate containment areas, each 52 by 63 feet as shown on Drawings 37 and 38 in Permit Attachment L1. Each of the seven areas will have its own floor drain and containment sump, allowing incompatible wastes to be placed in separate cells. Two of the cells will be designed to accommodate only PCB wastes. Aprons on the ends of the cells that store PCB-contaminated waste will be tapered to allow for forklift access over the concrete berms. The total capacity of the drum handling unit will be 1,120 drums (160 drums per containment cell). The drain and sump for each drum cell is dimensioned such that the storage capacity will be a minimum of 118 cubic feet, 10% of the capacity of the drums in each cell. A typical drum layout is shown in Drawing 37 of Permit Attachment L1.~~

~~2.2.2 Roll-Off Storage Area~~

~~Roll-off containers will be stored on an open pad, as shown in Drawings 41 through 43 presented in Permit Attachment L1. This unit will not be covered or enclosed by walls. The pad will be divided into two sections. One section will hold tarped, U.S. Department of Transportation (DOT) approved, lined, roll-off containers with non-stabilized waste awaiting treatment at the stabilization unit. The other section of the pad is intended as a staging area for roll-off containers containing stabilized waste awaiting Toxicity Characteristic Leaching Procedure (TCLP) test results and landfill disposal approval.~~

~~Waste will be characterized and screened as part of the waste acceptance procedures. This procedure will prevent incompatible waste from being stored in the same roll-off containers that are delivered to the site. After the materials have been stabilized, material from a single stabilization batch will not be mixed with material from a different batch, therefore eliminating the potential for incompatible waste to be stored in the same roll-off bin. The individual steel roll-off bins will be stored in the HDPE-lined roll-off storage unit and physically separated from each other by 4 feet side to side and 2.5 feet end to end. In addition, containers will not be placed within the limits of the roll-off storage area inundated by the rainfall that accumulates for the 25 year, 24 hour storm (see Appendix E-38 in Volume VI of the permit application) or within 4 feet of the edge of the berm.~~

~~This area is restricted to wastes that do not contain free liquids. Prior to exiting the stabilization unit, stabilized waste loads will be tested for free liquids using the paint filter test. Stabilized waste loads that do not pass the paint filter test will be reprocessed using a modified treatment mixture and re-tested before being allowed to exit the stabilization unit. Roll-off containers which hold stabilized wastes that pass the paint filter test will be covered before exiting the stabilization unit and will remain covered while they are staged in the roll-off storage area.~~

~~Roll-off containers will be inspected for free liquids prior to acceptance at the unit. Containers which are received for disposal, but are found to contain free liquids upon inspection will be managed in accordance with stabilization procedures described in Section 2.4. If the waste generator will not allow the Facility to prioritize handling of the load to eliminate free liquid, the load will not be admitted to the Facility. Otherwise, free liquids will be removed with a vacuum truck, characterized, and managed in accordance with stabilization procedures described in Section 2.4. The volume of free liquids in the roll-off containers is expected to be minimal. Following the removal of free liquids, the waste (in the roll-off container) will either be managed through the stabilization process or landfilled, whichever is appropriate. Section 2.2.12 describes the methods that will be used to separate incompatible wastes. The area will be equipped with fire extinguishers, a telephone, alarm systems, spill control, and first aid kits.~~

~~Waste in the roll-off containers that meet the requirements for free liquids (or lack thereof) will be placed in the landfill. Other wastes in roll-off containers that do not pass the appropriate acceptance testing (i.e. paint filter test) will be transferred to the stabilization area for treatment. Upon completion of the stabilization process, the waste will once again be tested to ensure that it meets the landfill criteria.~~

~~2.2.2.1 Containment and Detection of Releases~~

~~The roll-off storage area is designed to store non-stabilized and stabilized waste. Secondary containment of the roll-off storage area is shown in Drawing 41 through 43 in Permit Attachment L1.~~

~~The floor and slopes of the lined cell will consist of, from bottom to top, a prepared subgrade; a geomembrane liner that will be composed of a component material compatible with the anticipated waste; a geocomposite drainage layer; a structural fill; and a roadbase surface. A sump will be incorporated into the drainage layer. To accommodate this installation, the floor will be sloped to a sump located in the corner of the storage area. Any liquids would collect in the containment sump, which is designed to have the pumping capacity to remove liquids resulting from the 25-year, 24-hour storm event.~~

~~The roll-off containment area is surrounded by a berm with a minimum height of 2.0 feet (Drawing 41 of Permit Attachment L1). This berm will divert run-on surface water around the perimeter of the truck roll-off area. Culverts will be placed under each of the access ramps to allow surface water flow to the west towards the run-off detension basin.~~

~~The containment sump is designed to collect precipitation falling inside the bermed area of the truck roll-off storage area. During heavy rain events, a portion of the water will drain along the roadbase surface to the sump area located in the corner of the cell. The remaining volume will percolate through the roadbase and structural fill and will be collected in the geocomposite drainage layer. Water collecting on the surface of the sump or in the sump drainage gravel will be removed by vacuum truck. Samples of sump liquids will be chemically analyzed to determine the presence and concentration of any waste constituent. After this determination, an appropriate method of treatment or disposal will be selected in accordance with the criteria prescribed in the Waste Acceptance Plan (see Section 4.0). Leaks, spills, and precipitation will be removed from the sump as soon as possible. The entire roll-off storage area will be surrounded by a berm which ranges in height from 4 feet to 8 feet.~~

~~The purpose of the drainage system below the storage area surface is to allow rainfall to be collected and removed from the contained area. This will reduce ponding and mud formation on the storage area surface and will allow the surface to support truck traffic almost immediately following a rainstorm. The presence of free liquids inside the roll-off container/bed liner system can occur if liquids are inadvertently loaded in the container, rainfall enters a hole in the roll-off container cover during transportation, or liquids separate from solids during transport. These free liquids will be identified when the roll-off container is visually inspected at the untarping station.~~

~~It is possible, but unlikely, that free liquids could be generated after inspection in the staged roll-off containers. For example, if a faulty roll-off container cover allows rainfall to enter the container and both the plastic and containment fail, a leak can occur on the surface of the roll-off storage area. A leak will appear as a drop or a stain on the storage area surface. In the case of a leak, the liquids in the roll-off container will be handled as described in Section 2.2.2 and the stained soil will be excavated and handled as a potential hazardous waste.~~

~~2.2.2.2 Dimensions~~

~~The entire roll-off storage area (including both halves) will measure approximately 410 feet by 330 feet from the outer edge of the berms. The berm height surrounding the area will range from 4 feet to 8 feet. The storage areas will be accessed by 35-foot-wide compacted soil ramps at the center of each storage area. The halves will measure approximately 180 feet by 310 feet inside the berms.~~

~~2.2.2.3 Storage Limits~~

~~The permitted capacity of the incoming waste cell will be 66 roll-off containers. The stabilized waste cell also will have a capacity of 66 roll-off containers, for a total storage capacity of 132 containers. The actual number of roll-off containers placed in the roll-off storage area may vary slightly depending on placement arrangements as determined by operations.~~

~~2.2.3 Warning Signs~~

~~Signs containing the legend "Danger - Unauthorized Personnel Keep Out" will be conspicuously posted on the outside and at entrances to the storage areas. In the areas where ignitable or reactive wastes will be stored, "No Smoking" signs will be posted. All signs will be in both English and Spanish.~~

~~2.2.4 Proper Waste Storage~~

~~Compatibility codes established during the initial receipt of waste will be assigned to ensure the proper storage of containers within the Facility (see Permit Attachment F1). Containers which are discovered upon receipt to have free liquids will not be accepted, or will be handled at the stabilization unit as a priority load.~~

~~2.2.5 Ignitable/Reactive Wastes~~

~~Ignitable or reactive wastes will be protected from any sources of ignition or reaction. All containers storing ignitable or reactive waste will be stored at least 50 feet inside the fence around the Facility shown in Permit Attachment L1, Drawing 4. "No Smoking" rules will be enforced and open flames prohibited where ignitable or reactive waste is being handled.~~

~~2.2.6 Precautions to Prevent Reactions~~

~~Precautions to prevent reactions are described in Permit Attachment B, Procedures to Prevent Hazards.~~

~~2.2.7 Inspection Methods~~

~~As required in 40 CFR 164.174, all container storage areas will be visually inspected at least once a week for leaking containers and deterioration of the containers and containment area. Inspectors will enter the area and visually inspect the area and the containers. All inspection information will be recorded, and any problems noted during the inspection will be resolved in a timely manner (see Permit Attachment B). Workers will be instructed and trained on the procedures for identifying and reporting any signs of leaks or~~

~~deterioration that appear between the weekly inspections. Any identified leaks will be resolved as described in Section 2.2.2.1. Containers with more than 500 ppmw volatile organic compounds will be inspected at least once a month for cracks, holes or gaps in the container, cover or closure devices. Defects detected will be repaired according to CFR 264.1086 (d)(4)(iii).~~

~~2.2.8 Types of Containers~~

~~Hazardous wastes will be stored in 10 gallon, 35 gallon, or 55 gallon drums, in 40 cubic yard or similar roll-off containers, or in other DOT approved containers. Overpack drums will be used as necessary.~~

~~2.2.9 Labels~~

~~All containers of hazardous waste in storage will be labeled with a hazardous waste label identifying the contents of the container. The label will also be clearly marked to indicate the date of accumulation or the date of receipt. The label will not be obstructed from view during storage.~~

~~2.2.10 Condition of Containers~~

~~All containers of hazardous waste will be managed by the following conditions:~~

- ~~containers will be maintained in good condition. If a container is not in good condition (e.g. severe rust, apparent structural defects, or leaks), the hazardous waste will either be transferred to a container that is in good condition or be managed in some other way, such as direct placement in the landfill or stabilization unit;~~
- ~~containers of hazardous waste stored at the drum handling unit will be closed during storage, except when it is necessary to add or remove waste;~~
- ~~the container storage area will be inspected prior to placement of containers to ensure that no conditions exist which could damage the waste containers; and~~
- ~~all containers will be handled in a manner, and with equipment compatible to their design and construction, to minimize the potential for damage to the container.~~

~~The roll-off units to be placed in the roll-off area will be covered with a tarp. The covers will not be removed until the material is placed in the stabilization unit. Roll-off units used to store stabilized material will also be placed on the roll-off unit with covers. It is not expected that the tarps will be removed during storage except for re-sampling of the material, if required.~~

~~2.2.11 Compatibility with the Container~~

~~All hazardous waste will be compatible with the container or liner as defined by the following conditions:~~

- ~~all containers used to store hazardous waste will be made of, or lined with, material that will not react with, or otherwise be incompatible with, the waste being stored so that the ability of the container to hold waste is not impaired; and~~
- ~~hazardous waste will not be placed in an unwashed container that has previously held incompatible waste or material.~~

~~2.2.12 Compatibility with Other Waste~~

~~Incompatible liquid hazardous wastes stored within the units will be separated by a berm, catch pan, or other physical barrier which adequately prevents commingling of incompatible wastes. Incompatible solid hazardous wastes stored within the container storage areas will be separated by a distance of at least 10 feet unless separated by a berm, catch pan, or other physical barrier. Incompatible wastes will not be placed in the same container.~~

~~2.2.13 Aisle Space~~

~~Aisle spacing will be maintained to assure inspectability and accessibility for operational and emergency equipment to containers. The spacing will allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in the event of an emergency, as required by 40 CFR 264.35.~~

~~A minimum 2.5 foot aisle space will be maintained in the drum handling unit between rows of containers side by side. Containers will be stored in single rows only if they are against a wall or other barrier that prohibits inspection from all sides. Roll-off containers will be spaced 4 feet apart, side-to-side and 4 feet from the edge of the berm.~~

~~2.2.14 Record Keeping~~

~~The results of all container storage waste analyses, trial tests, waste compatibility analyses, and ignitable and reactive waste handling documentation pertaining to compliance will be maintained in the Facility operating record. Inspection records will be maintained in the inspection log for each unit.~~

~~2.3 Storage in Tanks~~

~~The liquid waste receiving and storage unit is shown in Permit Attachment L1, Drawing 10. It will house four aboveground tanks for the storage of regulated bulk liquid hazardous wastes prior to stabilization. The unit will not be covered by a roof or enclosed by walls.~~

~~Each tank will have a capacity of approximately 9,000 gallons. The tanks will be double-walled and constructed of high-density polyethylene materials that are compatible with the wastes to be placed in the tanks. Compatibility of the tanks with different types of waste has been provided by the manufacturer and is presented in Volume VI, Appendix H3, of the permit application. Facility procedures for waste acceptance and the associated criteria in the waste acceptance plan will ensure that wastes incompatible with the tank material are not placed in the storage tanks. The tanks will be placed on an imperviously coated reinforced concrete pad. All piping systems within the facility will comply with API Publication 1615 (November 1979) or ANSI Standard B31.2 and ANSI Standard B31.4. Waste will be transferred from the tanks to the stabilization unit by pumping into transfer tankers.~~

~~Each of the storage tanks will be clearly marked with a description of the contents and records will be kept documenting the quantity of waste received, and the date each period of accumulation begins. This information will be documented in the Facility operating record.~~

~~2.3.1 Containment and Detection of Releases~~

~~The outer tank of the double walled poly tank system will provide secondary containment of sufficient strength and thickness to prevent failure due to pressure gradients, physical contact with waste, climatic~~

~~conditions, or the stress of daily operations. The tank system will be placed on a concrete base capable of supporting the system, providing resistance to pressure gradients below the system, and preventing failure due to settlement, compression, or uplift. The secondary tank is designed to contain 100 percent of the tank contents.~~

~~Each tank will be surrounded by a concrete area which will be sloped to provide drainage to a sump. The floor and berm of the concrete area will be maintained in good condition and free of cracks and gaps, as described in Section 2.2.1.1, in order to protect the effectiveness of the containment.~~

~~All ancillary equipment will be provided with secondary containment except aboveground piping (exclusive of flanges, joints, valves, and other connections), welded flanges, welded joints, and welded connections that are visually inspected for leaks each operating day. Secondary containment will be provided by the concrete pad.~~

~~Daily visual inspection will be used to detect releases to the secondary containment. Response to releases from tank systems will be initiated immediately upon discovery, and regulations specified in 20 NMAC 4.1 Subpart V, 40 CFR 264.196(d) or 40 CFR 264.56 will be followed as appropriate (see Section 5.0), including notification of the Hazardous Materials Bureau (HMB) of the New Mexico Environment Department (NMED) and National Response Center (NRC). The secondary containment tank will be emptied by pumping fluids from the drainage port located near the base of the tank or by the use of a vacuum truck.~~

~~2.3.2 Management of Incompatible Wastes~~

~~Only the waste types approved for a tank system will be placed in the tank. No new waste types will be placed into an existing tank system unless: (1) the compatibility of the new waste type with the prior contents of the tank is determined by testing or documentation; or (2) the existing tank system is cleaned or flushed to the extent necessary to ensure compatibility with the new waste type.~~

~~2.3.3 Spill and Overfill Prevention~~

~~Appropriate controls and practices will be used to prevent spills from and overfills of the tank or containment systems.~~

~~Spill prevention is primarily maintained by hard-plumbed piping. When transfer lines are not hard plumbed or when open-ended lines are used, one or more of the following spill prevention controls or an equivalent device will be used:~~

- ~~*Dry Disconnect Couplings* - a pipe connection designed to cap the flow of liquids as soon as the fitting is disconnected;~~
- ~~*Direct Monitoring* - the transfer is monitored continuously to prevent spills; and/or,~~
- ~~*Overfill Prevention* - one or more of the following spill prevention controls or an equivalent device will be used:~~
  - ~~◊ *Automatic Feed Cutoff* - a device used to stop flow into a tank when it is filled to operating capacity or another predetermined level;~~
  - ~~◊ *High Level Alarm* - a device used to detect the level in a tank, sounding an audible alarm or displaying a visual alarm when the operating capacity level or another predetermined level is reached;~~

- ~~*Level Indicator* - a device used to visually display the level of material in a tank; if a level indicator is used for overfill prevention, the indicator must be monitored during liquid transfers or checked prior to transfers to ensure that sufficient capacity exists in the receiving tank. Level indicators may include sight gauges, level meters, or graduations placed directly on opaque poly tanks; and/or;~~

- ~~*Bypass* - a device or plumbing arrangement used to divert flow from the tank being filled to a second tank of sufficient capacity after the operating or predetermined level has been reached.~~

~~2.3.4 Feed Mechanism, Pressure Controls, and Temperature Controls~~

~~The tanks will be operated at ambient pressure and temperature when storing liquids. One of the following feed mechanisms for tank systems or an equivalent transfer mechanism will be used:~~

- ~~*Pump Transfer* - liquids will be pumped into or out of the tank through permanent or temporary transfer lines; or;~~

- ~~*Gravity Drain* - liquids will be allowed to drain by gravity through permanent or temporary transfer lines.~~

~~2.3.5 Management of Ignitable or Reactive Wastes~~

~~Ignitable or reactive wastes will not be placed into any tank system unless the tank system is protected from sources of ignition by measures including, but not limited to, the following: signs prohibiting smoking, open flames or welding; an inert atmosphere blanket; enclosed vents isolated from sources of ignition.~~

~~2.3.6 Inspections~~

~~A visual inspection of tank systems will be conducted each operating day. Each tank system will be visually inspected, including, but not limited to, the tanks and ancillary equipment, monitoring and leak detection systems, and the construction materials and area immediately surrounding the tank system. The results of each inspection will be documented in the daily operating record. Inspections are further described in Permit Attachment D.~~

~~2.3.7 Corrosion Protection~~

~~All liquid hazardous waste materials will be stored in double walled poly tanks. Corrosion protection is not required for double walled poly tanks that do not come into contact with soil or water.~~

~~2.3.8 Tank Assessments~~

~~The tank system proposed has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment has been prepared by the engineer of record and is based on the tank design drawings (see Permit Attachment L3, *Tank Integrity Assessment Certification*). After construction of the tank, its integrity will be assessed by an independent New Mexico registered professional engineer in accordance with 20 NMAC 4.1.500 (incorporating 40 CFR 264.192(a)). The engineering report presented with the tank design drawings in Permit Attachments L and L1 includes a list of wastes to be excluded from storage in poly tanks due to their excessive corrosive effects.~~

~~2.3.9 Ancillary Equipment~~

~~All ancillary equipment will be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction, according to API Publication 1615 (November 1979) or ANSI Standard B31.2 and ANSI Standard B31.4.~~

~~Hazardous waste will be transferred from the tanks to the tankers through a limited piping system, as shown in Drawing 40 and discussed in Permit Attachment L, Section 8.2.2. This piping system will be considered part of the tanks and will be drained and dismantled as part of the tank closure.~~

~~2.3.10 Installation and Tightness Testing~~

~~Proper handling procedures will be developed and followed to prevent damage to the system during installation. A qualified installation inspector will inspect the installed system to ensure adequate construction/installation. Any discrepancies will be resolved before the system is placed in service.~~

~~The tanks and ancillary equipment will be tested for water tightness, and any necessary repairs will be performed prior to the system being placed in service.~~

~~Written statements by those who certify the design and supervise installation will be maintained in the operating record.~~

~~2.3.11 Repair and Certification of Tank Systems~~

~~If a release occurs from the primary tank system, the tank will be removed from service immediately. Wastes in the tank will be removed within 24 hours to the extent necessary to prevent further release and allow inspection and repair of the tank system. All released materials will be removed from the secondary containment as soon as possible and within 24 hours of detection.~~

~~The tank system will be repaired or replaced prior to returning it to service. An independent New Mexico registered professional engineer will certify major repairs. The certification will be submitted to the NMED within seven days after the tank system is returned to service. Major repairs include repair of a ruptured primary containment vessel and replacement of secondary containment.~~

~~2.3.12 Transfer of Liquids from Liquid Waste Storage to the Stabilization Unit and to the Evaporation Pond~~

~~Transfer of liquids from the liquid waste storage tanks to the stabilization unit will be accomplished by tanker trucks approved for liquid waste transfer. Approved tanker trucks, such as vacuum trucks or DOT approved tankers, will be used to transfer liquids from the storage tanks to the evaporation pond. Tanker trucks will be cleaned following a transfer operation to ensure that subsequent transfers do not result in mixing of incompatible or reactive wastes.~~

~~Personnel performing liquid waste transfer operations will comply with all personal protective equipment (PPE) requirements and transfer operation procedures, including spill cleanup. Impervious concrete coatings will be applied to the liquid waste storage tank containment area and the evaporation pond discharge station. Hose and pipe connections will be inside the concrete containment area boundaries.~~

~~2.4 Stabilization~~

~~Drawings 33 through 36 presented in Permit Attachment L1 show the stabilization building floor plan, a typical bin, and vault sections. The stabilization process will use four in-ground double lined stabilization bins, two dry reagent silos, two liquid reagent tanks, and a water tank. Trucks and other vehicles will access the unit via the gravel aprons. Additionally, there will be a control room from which operations will be directed and coordinated.~~

~~Bulk liquids, semi-solids, sludges, and solids that do not meet LDR treatment standards, as well as solids that may contain free liquids, will be treated in the stabilization unit. Dilution of restricted wastes will never be used as a substitute for adequate treatment. If toxic characteristic wastes and listed wastes are amenable to the same type of treatment and aggregation is a part of treatment, the aggregation step does not constitute impermissible dilution.~~

~~As discussed in the Waste Analysis Plan in Permit Attachment F, wastes will be tested prior to stabilization to determine the appropriate reagent formula. Both dry and liquid reagents may be used in the stabilization process. Waste may be offloaded directly from trucks into the stabilization bins or transferred from the drum handling unit or roll-off storage area. The bins will be covered while dry reagents are being added to control particulate air emissions. The cover will be removed and a backhoe positioned adjacent to the bin will mix the waste and reagents.~~

~~Wastes that are treated on site in the solidification unit will be tested after treatment and before disposal to verify that LDR standards have been met. The stabilized waste will be either transferred to the roll-off area for testing or taken directly to the landfill if testing has been completed. The stabilized waste will be stored temporarily at the roll-off unit while tests are conducted to determine how and if the material can be disposed of in the landfill.~~

~~The backhoe bucket and stabilization bin will be thoroughly cleaned before a load of waste which is not compatible with the waste previously stabilized in that bin is mixed. After the last bin load of a specific stabilization mixture has been loaded out, Facility personnel will use a high-pressure water hose located near the bins to rinse the backhoe bucket and the bin walls. This rinsing will cause residual clods of stabilized waste to fall to the bottom of the bin along with the rinse water. Reagents will then be added to the bin at the same mixture proportions and the remaining waste and rinse water will be stabilized, tested for free liquids, and loaded out before a different waste stabilization mixture is processed in that bin.~~

~~The nominal dimensions of the bins are 25 feet long by 10 feet wide by 10 feet deep, resulting in an approximate volume of 2,500 cubic feet. The volume of waste to be treated in each batch will be variable but less than 2,500 cubic feet, depending on the addition of stabilization materials. The overall process volume is based on four bins. However, the actual process design will be dependent on the characteristics of the incoming waste (time to mix each batch) and the volume of stabilization materials required. Assuming that 15 batches per bin are processed per day with 4 bins, a total of 150,000 cubic feet of waste are treated per day. The ends of the bins have been shaped to conform to the reach profile of the backhoe selected for mixing in the stabilization unit. The bins will be contained in a concrete vault, which will also provide support. All mixing bins will be equipped with ventilation and air pollution control systems to remove any air pollutants generated during the mixing process. Potential contaminants may include particulates, low concentration volatile organic compounds, or acid fumes.~~

~~2.4.1 Contaminant and Detection of Releases~~

~~The bins will be of steel construction. Waste which is incompatible with the steel used in construction will not be stabilized in the bins. An assessment of the compatibilities of the bin materials and waste, is contained~~

~~in the engineering report (Permit Attachment L). The design requirements and limitations will be incorporated into Facility procedures. The waste acceptance plan and associated criteria will ensure that waste which is incompatible with the bin construction material will not be introduced into the bins.~~

~~The bins will be double-walled steel tanks with the space between the walls serving as the LDRS. Shock absorbing coiled wire rope isolators will maintain separation between the bins.~~

~~The tank secondary containment (the outer shell) will be of sufficient volume to contain the contents of the inner tank, because the inner tank will be completely enclosed within the outer shell. The vault will not be used as secondary containment; therefore, it does not have to be lined or meet other requirements for secondary containment. Its purpose will be to isolate the tank system from the surrounding soil, provide a monitoring and collection point if leakage were to occur from both the primary and secondary systems, and means to inspect and repair the secondary containment.~~

~~Releases into the LDRS will be detected within 24 hours by liquid sensing instruments (e.g. a magnehelic gauge) or inspection. Accumulated liquids will be removed within 24 hours of detection. The secondary containment will be emptied by pumping accumulated liquids into a temporary storage tank or into another stabilization bin. Releases to the LDRS could occur if a breach occurred in the primary steel liner. In such a case, the bin will be removed from service and repaired.~~

~~All ancillary equipment will be provided with secondary containment unless it is aboveground piping (exclusive of flanges, joints, valves, and other connections), welded flanges, welded joints, and welded connections that can be visually inspected for leaks each operating day. Secondary containment will be provided by a concrete pad.~~

~~2.4.2 Management of Incompatible Wastes~~

~~New waste will not be placed in the bins unless (1) the compatibility of the new waste type with the prior contents of the bin is determined by testing or process knowledge documented in the operating record or (2) the existing tank system is cleaned or flushed to the extent necessary to ensure compatibility with the new waste type using procedures specified in Section 2.4.~~

~~2.4.3 Spill and Overfill Prevention~~

~~Spill and overfill prevention will be accomplished by continuous direct monitoring of transfer operations. Additionally, the delivery system will be computerized and will be designed to ensure that the mixture used for stabilization prevents overfilling.~~

~~2.4.4 Feed Mechanism, Pressure Controls, and Temperature Controls~~

~~The stabilization bins will be operated at ambient temperature and pressure. Reagents will either be pumped from reagent tanks or manually fed. Liquid hazardous wastes will be pumped from the liquid waste receiving and storage unit or from vacuum trucks or tanker trucks. Other wastes may be manually transferred directly from the incoming waste hauler truck or from the container storage areas.~~

~~2.4.5 Management of Ignitable or Reactive Waste~~

~~The stabilization bins will be protected from sources of ignition through the use of signs and procedures prohibiting smoking, open flames, or welding. If ignitable or reactive wastes are placed in the bins, they will be immediately mixed with sufficient quantities of fly ash and/or cement to render them non-ignitable or non-reactive.~~

~~2.4.6 Inspections~~

~~Each stabilization bin will be visually inspected once each operating day as described in Permit Attachment D, Inspection Procedures. At least once per month, the daily visual inspection will be conducted on empty bins to ensure the integrity of the bin and welds. An annual sonic test will be conducted to ensure that the thickness of the inner tank and outer shell is maintained.~~

~~2.4.7 Corrosion Protection~~

~~Corrosion is not anticipated to be a significant problem for the stabilization bins because of low humidity and the fact that the units are located indoors. No corrosion protection will be provided other than cathodic grounding. The thickness of the inner tank and outer shell compensates for the abrasion and impact forces of the backhoe bucket during waste stabilization mixing. The structural steel design of the bins is presented in the engineering report (Permit Attachment L).~~

~~Inspection of the bins is discussed in Sections 2.4.6 and 5.2.6. Visual inspection of the empty bins will be accomplished monthly, and sonic testing will be conducted annually. The system has been designed so that the inner tank and outer shell can be easily removed and replaced, if necessary.~~

~~2.4.8 Tank Assessments~~

~~The stabilization bins proposed have sufficient structural integrity and are acceptable for the storing and treating of hazardous waste. The assessment has been prepared by the engineer of record and is based on the design drawings (see Permit Attachment L3). After construction of the tank, it's its integrity will be assessed by an independent New Mexico registered professional engineer in accordance with 20 NMAC 4.1.500 (incorporating 40 CFR 264.192(a)). The engineering report presented with the tank design drawings in Permit Attachment L includes a discussion of wastes to be excluded from treatment in the bins due to their excessive corrosive effects. The engineering report presented with the tank design drawings in Permit Attachments L and L1 include a discussion of wastes to be excluded from storage or treatment in steel tanks due to their excessive corrosive effects.~~

~~2.4.9 Ancillary Equipment~~

~~All ancillary equipment will be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction; according to API Publication 1615 (November 1979) or ANSI Standard B31.2 and ANSI Standard B31.4.~~

~~2.4.10 Installation Inspection and Tightness Testing~~

~~Proper handling procedures will be developed and followed to prevent damage to the system during installation. A qualified installation inspector will inspect the installed system to ensure adequate construction/installation. Any discrepancies will be resolved before the system is placed in service. The bins and ancillary equipment will be tested for water tightness, and any necessary repairs will be performed prior to the system being placed in service. Written statements by those who certify the design and supervise installation will be maintained in the operating record.~~

~~2.4.11 Repair and Certification of Tank Systems~~

~~If a release occurs from a primary tank system, the tank will be removed from service and all materials will be removed from the tank or secondary containment within 24 hours or as soon as reasonably possible. The tank system will be repaired prior to return to service. Major repairs will be certified by an independent New Mexico registered professional engineer. The certification will be submitted to the NMED within seven days after the tank system is returned to service.~~

2.5 Landfill

This section describes the design, construction, and operation of the landfill. ~~As with the Facility units discussed previously in this section, t~~The detailed design for the landfill is contained in Permit Attachments L, Engineering Report, and L1, Engineering Drawings. ~~L.~~ The overall landfill will be constructed in phases, as shown on Drawing 4. The first phase to be considered will be Phase 1A. This permit application refers only to Phase 1A. However, potential expansions of the landfill in future phases have been included in the general layout drawing for completeness. Detailed design drawings are only submitted for Phase 1A. The landfill design is presented on Drawings 6 through 27 in Permit Attachment L1, and a list of these drawings is provided on Drawing 1, Sheet 2 (Permit Attachment L1).

2.5.1 Design of Landfill

The landfill design specifies a double-lined landfill with a leachate collection removal system (LCRS) above the primary liner and a leak detection and removal system (LDRS) between the primary and secondary liners. The detailed design presented in Permit Attachment L specifically describes the relationship between the existing site topography and the landfill subgrade.

2.5.1.1 Nature and Quantity of Waste

As specified in the Waste Analysis Plan in Permit Attachment F, the Facility will accept RCRA hazardous waste and PCB waste, excluding selected waste. The excluded waste is listed in the Waste Analysis Plan (Permit Attachment F).

The wastes which will be accepted for placement in the landfill include all wastes listed in Part A of the application ~~(~~presented in the Part A Permit Application~~Attachment K, *Permit Application – Part A*~~). All waste to be placed in the landfill must meet LDRs~~ treatment standards~~. Additional details on wastes to be accepted at the Facility can be found in Permit Attachment F1, Section 4.1.1, Waste Analysis Plan.

The total landfill will have an area of approximately 100 acres and a capacity of approximately 10 million cubic yards of waste. The Phase 1A area will include approximately 35 acres (estimated final cover area) and have a capacity of approximately 553,200 cubic yards.

2.5.1.2 Liner Systems

The liner system will be installed to cover all surrounding earth that may come in contact with waste or leachate (see Drawings 9 and 11 in Permit Attachment L1). The primary liner system will consist of, from top to bottom, a 2-foot layer of protective soil, a geocomposite drainage layer, and a high density polyethylene (HDPE) geomembrane liner.

The secondary liner system will consist of a geocomposite drainage layer, HDPE geomembrane liner, geosynthetic clay layer (GCL), and 6 inches of prepared subgrade. Both the primary and secondary liner systems will extend over the floor and slope areas of the landfill.

The primary and secondary geomembrane liners will be constructed of HDPE as defined in the construction specifications presented in Permit Attachment L2. This material will have sufficient strength and thickness to prevent failure as a result of pressure gradients, physical contact with waste or leachate, climatic conditions, stress of installation, and stress of daily operations. The liner systems and geosynthetic drainage layers will rest upon a prepared subgrade capable of providing support to the geosynthetics and preventing failure due to settlement, compression, or uplifting.

Initially, the Phase 1A liner system will be installed. As authorized in future permits, t~~T~~he liner system will be installed in stages as the landfill expands both in the vertical direction up slope and in the horizontal direction by phase. The three horizontal phases of landfill expansion are shown in Drawings 4, 6, and 7 in Permit Attachment L1. The benching technique considered for expansion of the landfill vertically up slope is shown in Drawings 8 through 11 (Permit Attachment L1) for Phase 1A. Geosynthetic liner component tie-ins for the vertical expansion will be made on the access ramps leading into the landfill.

Stresses to the liner system can result from consolidation settlement of the subgrade during waste filling and localized equipment loading during protective soil placement. The subgrade consists of the 6-inch thickness of prepared soil subgrade and the existing ground formations below the landfill (see Drawing 7, Permit Attachment L1). Because the existing ground formations have been prestressed by overburden forces prior to landfill excavation, additional consolidation settlement during waste filling will be minimal.

Consolidation settlement of the 6-inch prepared soil subgrade layer will also be minimal because it is limited by the thickness of this layer and because this material will be compacted during installation. Localized equipment loading to the liner during protective soil placement will be controlled by specifying maximum equipment ground pressures in the construction specifications and by monitoring the placement of this material. Monitoring can be performed by individuals operating the placement equipment or by grade checkers who will observe the material placement to assure that appropriate thicknesses have been installed.

2.5.1.3 Leachate Collection and Removal System (LCRS)

The LCRS will be located above the primary liner system. Drawing 12 in Permit Attachment L1 provides the design details of the LCRS. A filtered LCRS layer consisting of a geocomposite drainage material will be constructed. Within the floor area of the LCRS layer will be the primary leachate collection piping, which is used to remove leachate from the landfill during the active life and post-closure care period. The piping as shown in Drawing 12 (Permit Attachment L1) is nominally 8 inches in diameter.

As demonstrated in the engineering report (Permit Attachment L), the LCRS will be (1) constructed of materials that are chemically resistant to the waste managed in the landfill and the leachate expected to be generated; (2) of sufficient strength and thickness to prevent collapse under pressure exerted by overlying wastes, waste cover material, and equipment used in the landfill; and (3) designed and operated to minimize clogging during the active life and post-closure care period through selection of an appropriate geotextile for the filtration application (see Permit Attachment L, Section 3.1.3).

The LCRS is sloped so that any leachate above the primary liner will drain to ~~one of three~~the sump~~s~~. Phase 1A includes one sump as shown in Drawings 8, 15, 16, and 17 (Permit Attachment L1). The sump~~s~~ and liquid removal methods will be of sufficient size to collect and remove liquids from the sump~~s~~ and prevent liquids from backing up into the drainage layer.

The sump will be lined with the same liner system components as elsewhere in the landfill except that the drainage layer will expand to include gravel and a compacted clay liner material beneath the primary and secondary geomembranes in~~which will fill~~ the sump area. Leachate that collects in the sumps will be pumped through a pipe to the surface of the landfill where it will be collected in temporary storage tanks.

The leachate storage tanks will be chemically resistant, double lined poly tanks anchored to a concrete crest pad as shown in Sheets 1 and 2 of Drawing 19 (Permit Attachment L1). To prevent overfilling of the tanks, an individual tank will be installed for each landfill phase, and each tank will be equipped with high-level control switches, which will automatically shut down the leachate collection or leak detection sump pumps. In addition, an alarm will be activated that will notify personnel that the system requires maintenance. Pumps will be hard piped to the leachate storage tanks, and flow meters will be installed to monitor leachate pumping from the landfill should a catastrophic tank or pipe failure occur. All piping will be located within the concrete tank pad. The pump control panel will be located inside the tank pad with electrical wiring enclosed in waterproof conduits.

~~Because leachate is generated by the landfill, the leachate collection tanks will be used as 90-day storage units and managed accordingly. They are not required to be permitted.~~

The sump system will provide a method for measuring and recording the volume of liquid removed. Drainage materials will meet the minimum drainage requirements per the specifications. Sump design, filter fabric selection, floor pipe design, pump design, disposal system design, and action leakage rate (ALR) calculations involving removal of leachate flow from a 1-mm^2 hole/acre are discussed in the engineering report (Permit Attachment L). All pumpable liquid in the sump will be removed in a timely manner to prevent the head on the primary liner from exceeding 12 inches.

Leachate will be managed by recirculating the liquid and applying it to the landfill soil cover for enhanced evaporation. The leachate collection tanks will be used for temporary storage. A moveable piping and sprinkler system will be used to distribute the water onto the soil cover. Vacuum trucks with spray bars may also be used to apply leachate to the soil cover. Management of leachate has been evaluated through calculations that are provided with the Engineering Report in Attachment L. Calculations show that the leachate generation rate is much less than the potential evaporation rate within the Phase 1A landfill. Management of leachate by recirculation for enhanced evaporation keeps all leachate and potential contaminants within the lined landfill cell.

2.5.1.4 Leak Detection and Removal System (LDRS)

The design of the LDRS is similar to the design of the LCRS. The LDRS will be capable of detecting, collecting, and removing leaks of hazardous constituents through areas of the primary liner during the active life and post-closure care period. A filtered LDRS layer consisting of a geocomposite will be constructed below the primary geomembrane. Within the LDRS layer will be the LDRS piping, which will be used to detect and remove liquid from between the primary and secondary liners. The piping arrangement is shown on Drawing 18 in Permit Attachment L1.

As demonstrated in the engineering report (Permit Attachment L), the LDRS will be (1) constructed with a bottom slope of one percent or more; (2) constructed of a geocomposite with a hydraulic conductivity that exceeds 1 x 10^{-2} centimeters per second (cm/~~sec~~); (3) constructed of materials that are chemically resistant to the waste managed in the landfill and the leachate expected to be generated; (4) of sufficient strength and thickness to prevent collapse under pressure exerted by overlying wastes, waste cover material, and equipment used at the landfill; and (5) designed and operated to minimize clogging during the active life and post-closure care period.

In addition, the sump and liquid removal methods are designed to be of sufficient size to collect and remove liquid from the sump and prevent liquid from backing up into the drainage layer (see ALR calculations in Permit Attachment J, Action Leakage Rate and Response Action Plan). A method will be provided for measuring and recording the volume of liquid present in the sump and liquid removed. All pumpable liquid in the sump will be removed in a timely manner to maintain the head on the secondary liner at less than

12 inches. The pump for the LDRS sump is located at the sump's low point so that pumpable liquids can be removed to the maximum extent possible.

2.5.1.5 Vadose Zone Monitoring System

The vadose zone monitoring sump serves as a detection system for potential leakage from~~ing in~~ the secondary LDRS system. Located directly beneath the LDRS sump, leakage through the secondary liner system will flow into the vadose sump, allowing it to be detected and removed. The vadose pipe and gravel arrangement is similar to the LCRS and LDRS arrangements. Drawings 16 through 18 in Permit Attachment L1 show the vadose zone monitoring~~in the~~ sump.

2.5.1.6 Run-On/Runoff Control

The run-on/runoff system is designed to be constructed, operated and maintained to control at least the water volume resulting from a 24-hour, 25-year storm. The run-on/runoff control system design is provided in Permit Attachments L and L1 of this permit renewal application and Volume IV of the Permit Application dated October 2000. The purpose of the run-on/runoff control system is to prevent any contamination present on-site from migrating off-site by minimizing the volume of liquid entering the landfill and therefore limiting the potential to transport contaminants placed in the landfill.

Run-on/runoff will be collected in one of three different collection basins, depending on the source of the water. The collection basins are listed and discussed in detail below:

- The Facility Stormwater Detention Basin
- The Phase 1A Landfill Stormwater Collection Basin
- The Phase 1A Landfill Contaminated Water Basin

The Facility Stormwater Detention Basin is located northwest of the landfill area, as shown on Drawings 6 and 25 in Permit Attachment L1. Run-on originating from around the landfill will be directed away from the proposed landfill area using unlined landfill perimeter ditches (see Drawing 25, Permit Attachment L1). These ditches will prevent water from outside the landfill from entering the active portion of the landfill. Based on the topography of the site, the run-on is expected to move from the east/southeast to the west/northwest and be diverted to the Stormwater Detention Basin. The Stormwater Detention Basin is also intended to collect runoff from the rest of the Facility (not including the landfill) and will be lined with a single 60-mil HDPE liner as a precaution to prevent infiltration of ponded stormwater. ~~The detention basin will be pumped after rainfall events that result in the accumulation of water in the basin.~~

The Phase 1A Landfill Stormwater Collection Basin is located at the toe of the inter-phase cut slope in the landfill, as shown on Drawings 10 and 13 in Permit Attachment L1. This basin will collect runoff from the inactive portion of the Phase 1A landfill. During the initial stages of the landfill operation, runoff from the landfill side slopes above the liner system will be channeled away from the waste by the slope drainage interceptor ditch. The water in the Stormwater Collection Basin will be handled as clean water because it will not come in contact with the landfill waste. The basin is lined with a single 60 mil HDPE liner.

The Phase 1A Landfill Contaminated Water Basin is located at the bottom of the Phase 1A landfill, as shown on Drawing 10 in Permit Attachment L1. This basin overlies the ~~entire~~ landfill liner system. The contaminated water basin will be maintained to ensure that the adequate amount of protective cover soil (2 feet) is present over the liner system

Runoff from the active portion of the landfill, which does not infiltrate into the LCRS, will be collected in the landfill contaminated water~~is~~ basin. Runoff water collected within the contaminated water basin will be managed by pumping the water to remove the standing water in the basin and applying it to the landfill soil

cover for enhanced evaporation. A moveable piping and sprinkler system will be used to distribute the water onto the soil cover. Vacuum trucks with spray bars may also be used to apply water to the soil cover. Management of runoff water within the Phase 1A landfill has been evaluated through calculations that are provided with the Engineering Report in Attachment L. Because evaporation rates greatly exceed precipitation rates at the site, runoff water can be removed from the basin and eliminated by enhanced evaporation. Management of runoff water by recirculation for enhanced evaporation keeps all water that has a potential to contact waste within the lined landfill cell.~~ and will be pumped out of the landfill within 24 hours of a storm event. The water pumped out of the basin will be collected using vacuum trucks and sampled and analyzed for hazardous constituents. Contaminated water will be treated either in the stabilization process or the evaporation pond, and treatment residuals will be disposed of in compliance with appropriate regulations~~offsite~~. ~~The contaminated water basin will be maintained to ensure that the adequate amount of protective cover soil (2 feet) is present over the liner system.~~

2.5.1.7 Wind Dispersal Control Procedures

Wind dispersal control will consist of a daily soil cover obtained from excavation. Typically, the daily cover will consist of soil spread on top of the waste placement area to a depth of approximately 0.5 foot.

Depending on the local wind conditions, traffic, and the number of fine particles in the soil cover, dust may be generated from the surface. Typically, this dust generation is reduced by restricting traffic to predetermined haul roads on the surface of the daily cover and applying small amounts of water spray to moisten the soil surface. Water applied for dust control may include clean water supply, leachate, and runoff water collected within the landfill contaminated water basin. The water will be applied~~ with~~ using both a piping and sprinkler system and~~a~~ water trucks equipped with a pump, piping, and an array of nozzles that spray very small water droplets onto the soil cover.

The frequency of the water application depends on the climate and traffic. In areas on the daily cover surface where traffic is not present, an occasional water spray will cause a crust to form on the soil surface, inhibiting dust formation. Sufficient moisture will be applied to all soil surfaces, including roads, on an as needed basis to prevent wind erosion of the daily cover. However, the application of water will be limited so that ponding in the landfill does not occur. Because the water is a topical surface application, the majority of it will evaporate or be absorbed rather than seep through~~into~~ the waste to become leachate.

2.5.1.8 Gas Generation Management

The landfill will not receive MSW or C&D waste, limiting~~ and~~ the gas generated as a result of biological decomposition of organic wastes. Hazardous organic wastes placed in the landfill will meet LDRs, which will limit the organic gas generation potential. The hazardous waste acceptance procedures at the Facility will be designed to limit receipt of wastes with potential for significant gas generation. The waste acceptance program is described in Section 4.3 and outlines the procedures that will be used to test for reactive cyanides and sulfides, other reactive chemical groups, waste compatibility, and biodegradability of sorbents.

During the operational phase of the landfill, periodic checks will be made within the landfill to detect the presence of hazardous gases and volatile organics. Surveys of the active landfill surface area and the riser pipes with an organic vapor meter (OVM) or comparable device will be performed quarterly to detect the presence of organic compounds. PPE levels and respiratory protection levels will be modified accordingly, if necessary. This testing will be conducted in addition to the fingerprint testing conducted on incoming waste. The data from both tests will be evaluated to determine what steps are necessary to reduce the generation and/or release of these gases to levels which meet prescribed regulatory air quality standards.

Prior to closure of the landfill, an assessment will be made of the landfill waste gas generating potential. This assessment will be based on review of fingerprint test data and data gathered in the landfill during operations. Based on this assessment, if it is concluded that gas generation may result in gas build-ups beneath the barrier

layer of the cover or releases following closure exceeding regulatory air quality standards, then provisions will be made to collect and monitor gas generation and release during the post-closure period. If this occurs, the latest technology available will be implemented into the construction of the cover system, which may require a modification to the Permit.

2.5.1.9 Cover Design

The design of the final cover is described in Permit Attachment O, Closure ~~and Post-Closure Care~~Plan. Additional details of the final cover design are shown in the Engineering Report in Permit Attachments~~s~~ L and the Engineering Drawings in Permit Attachment L1.

2.5.1.10 Landfill Location Description

The proposed site is in eastern Chaves County, New Mexico.

Geographic Location

The proposed site is located in a remote, unpopulated portion of New Mexico, approximately 43 miles east of the City of Roswell and 36 miles west of~~from~~ the City of Tatum. The primary land use in the surrounding area is ranching, which will not be impacted by landfill operations.

Geologic Setting

The proposed site is to be developed within impermeable, geologically stable sediments of the Dockum Group of Triassic age (see Section 3.4 of the permit application). The base of the proposed landfill will be designed to rest on 600-foot thickness of unsaturated mudstone of the Lower Dockum. This thick sequence acts as a geologic barrier to potential vertical migration of contaminants. Potential lateral migration through unsaturated Upper Dockum sediments will be retarded by the low permeability of the host sediments (siltstones and mudstones) and engineered barriers such as the liner systems.

2.5.2 Construction

Construction activities will consist of site preparation; excavation and preparation of landfill bottoms and subsurface sides; and construction of the liner, LCRS, and LDRS in accordance with the specifications and Permit Attachment M, Construction Quality Assurance Plan.

2.5.2.1 Site Preparation

Existing site drainage will be modified to route any run-on away from the landfill area. Additionally, drainage of the landfill area itself will be modified to route water away from the initial fill area. Access roads and weighing units will be constructed. A fence will also be installed around the Facility. These components and installations are shown in Drawing 4 presented in Permit Attachment L1.

2.5.2.2 Excavation and Preparation of Landfill Bottom and Subsurface Sides

The landfill will be constructed and excavated in sections to allow a smaller portion of the landfill surface to be exposed to precipitation at any one time. The initial working area of the landfill will be excavated to design depth. The excavated material will be stockpiled on unexcavated soil near the active area for use as cover material. The landfill bottom will be sloped toward the central axis of each phase to provide drainage of leachate to the sump. The U.S. Environmental Protection Agency (EPA) minimum required slope of 1 percent has been exceeded in all cases. The upper 6 inches of the subgrade will consist of a soil material ~~which~~ that has been sized, moisture conditioned, compacted, and trimmed to provide a smooth stable surface for geosynthetic material placement.

2.5.2.3 Construction Quality Assurance Plan

Permit Attachment M contains the Construction Quality Assurance (CQA) Plan. Implementation of CQA procedures will result in increased leachate collection efficiency and reduced leakage through the landfill~~ and evaporation pond~~ liners. Additionally, use of CQA will result in fewer costly repairs to the landfill after wastes have been received, fewer occasions of exceeding the ALR, and a decreasing need for corrective action.

The CQA Plan describes the CQA procedures for the installation of the soil and geosynthetic components for the hazardous waste landfill~~, evaporation pond, and other units requiring subsurface containment systems comprised of~~which comprise soils and geosynthetic components constructed at the Facility. These procedures apply to construction of the lining systems and final cover systems, including the LCRS and LDRS systems.

The objectives of the CQA program include the following:

- development of a clearly defined organizational structure within which the project can be planned and completed;
- assurance that the methods, techniques, and procedures used to collect, analyze, verify, and report data will produce sound, documented, and defensible results;
- assurance that equipment or instrumentation used in field or laboratory testing activities has been properly maintained and calibrated as required;
- assurance that the required documentation of quality performance is properly generated and that such documentation is adequate and complete for the activity;
- development of permanent project CQA document files identifiable and traceable to each activity;
- systematic control of items, equipment, materials, or activities not in conformity with established requirements or methods, and assurance of prompt and effective corrective action when nonconforming conditions are identified;
- regular evaluation of the adequacy of the CQA program by means of quality audits coupled with the effective action necessary to correct deficiencies and prevent recurrence;
- assurance that technical and CQA personnel are qualified and trained to perform the work activities to which they have been assigned; and
- assurance that subcontractors and consultants used in assisting project activities have an acceptable CQA program or are participating in accordance with the Facility CQA program guidelines.

Upon completion of construction activities, the Facility will submit certification signed by the New Mexico registered professional engineer serving as the CQA certifying engineer, which states that the unit has been constructed in accordance with the design drawings, ~~Construction Quality Assurance~~CQA Plan, and Construction Specifications and meets the requirement of 40 CFR 264.19. Documentation supporting the certification will be maintained in the operating record and will be furnished to NMED upon request. Wastes will not be accepted at the constructed portion of the landfill until NMED either approves the certification or waives the approval requirement.

2.5.3 Operation

The landfill will be operated in a safe and proper manner, in accordance with the following requirements.

2.5.3.1 Inspections and Monitoring

Permit Attachment D contains information on inspections and monitoring.

2.5.3.2 Maintenance and Repairs

The landfill structure will be maintained through a routine preventive maintenance program, which will be fully defined in the final site operations plan. ~~Preventative~~ Preventive maintenance will involve regular visual inspections of the landfill liner (where feasible) and review of leachate collection and analysis results. Equipment, such as pumps, generators, electrical lighting, and warning systems, will be subject to manufacturer recommended programs. ~~Preventative~~ Preventive maintenance information will be documented and any deviation from normal conditions will be closely tracked and corrected as necessary.

2.5.3.3 Warning Signs

Permit Attachment B contains information about warning signs.

2.5.3.4 Record Keeping

All documentation pertaining to the results of waste analyses, waste compatibility analyses, and waste handling compliance will be maintained in the Facility operating record. The Facility will be capable of determining exactly where a waste has been placed within a three-dimensional grid system. Landfill inspection records will be maintained on file for at least 3 years, in accordance with 40 CFR 264.15(d) (see Section 5.2.2 of the Part B Permit Application).

2.5.3.5 List of Hazardous Wastes to be Placed in Landfill

The wastes to be placed in the landfill are described in Permit Attachment F.

2.5.3.6 Specific Requirements for Ignitable/Reactive Wastes

Wastes that do not meet LDRs, as defined in Section 4.5 of Permit Attachment F, will not be placed in the landfill. Therefore, untreated ignitable and reactive waste (as defined in 20 NMAC 4.1) will not be placed in the landfill.

~~**Procedures That Render Wastes Nonreactive**~~

~~Reactive waste will be treated or mixed prior to placement in the landfill so that the resulting waste mixture no longer meets the definition of reactive waste.~~

~~**Procedures for Preventing Reactions**~~

~~Reactive waste will be separated from sources of reaction, including but not limited to open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks, spontaneous ignition, and radiant heat. When reactive waste is being handled, smoking and open flames will not be permitted. "No Smoking" signs written in English and Spanish will be conspicuously placed wherever there is a hazard from ignitable or reactive waste.~~

~~**Procedures that Render Wastes Nonignitable**~~

~~Ignitable waste will be treated or mixed prior to placement in the landfill so that the resulting waste mixture no longer meets the definition of ignitable waste.~~

2.5.3.7 Procedures for Protecting Wastes

Procedures for the handling of incompatible wastes, lab packs, bulk and containerized liquids, and containers that are less than full are discussed below.

Procedures for Ensuring Safe Disposal of Incompatible Wastes

Procedures for identifying incompatible wastes are discussed in Permit Attachment F. At a minimum, incompatible wastes will be spaced a sufficient distance apart in the landfill to prevent commingling. The landfill placement operation will be based on a set of grids along the north end of the landfill and along both the east and west sides of the landfill. Incompatible waste will be placed with a minimum of one grid in between the loads. Grids are normally spaced at approximately 50- to 100-foot intervals. Therefore, the minimum spacing would be 50 feet.

Procedures for Identifying Contents and Ensuring Proper Landfilling of Incoming Lab Packs

Lab packs may be placed in the landfill only if they meet the requirements in 40 CFR 264.316. Containers must be non-leaking and appropriate to the waste being contained. Appropriate non-biodegradable sorbents will be used. The Waste Analysis Plan presented in Section 4.0 will ensure that lab packs meet all of the applicable requirements prior to disposal. As with all other waste, lab packs must be properly characterized prior to acceptance at the Facility and meet the LDR treatment criteria prior to disposal. Lab packs will not be accepted if incompatible wastes are placed within the same lab pack or if reactive wastes have not been treated to render them non-reactive, prior to receipt at the Facility. Lab packs will meet all applicable LDRs (40 CFR 268)~~ requirements~~.

Special Requirements for Bulk and Containerized Liquids

Bulk and containerized wastes will not be placed in the landfill unless they meet the requirements in 40 CFR 264.314. Containers holding bulk~~free~~ liquids will not be received at the Facility or placed in the landfill~~ unless all free liquid has been eliminated by absorption, decanting, solidification, or other method~~. Very small containers, such as ampules or containers designed to hold liquids for use other than storage, may be placed in the landfill (40 CFR 264.314[d]).

Special Requirements for Containers

Containers, except those that are very small such as ampules, will be 90 percent full when placed in tact in the landfill. Containers less than 90 percent full will be crushed~~, shredded, or otherwise reduced in volume~~ to the maximum extent possible though compaction when~~prior to~~ placed~~ment~~ in the landfill.

2.5.3.8 Action Leakage Rate

The ALR proposed for the landfill is 900 gallons per acre per day (gpad). This proposed ALR was selected based on a discussion in the preamble to the January 29, 1992, final rule for Liners and Leak Detection Systems for Hazardous Waste Land Disposal Units (57 FR 3462). A discussion of the proposed ALR and supporting calculations are presented in the engineering report in Permit Attachment L and in Volume VI of the Permit Application dated October 2000.

The average daily flow rate in the LDRS sump will be calculated in accordance with the Action Leakage Rate and Response Action Plan, which is ~~also~~ presented in Permit Attachment J.

2.5.3.9 Response Action Plan

The elements of the response action plan for the landfill ~~and evaporation pond~~ include (1) reducing the head on the liner to the maximum extent possible to aid in the prevention of leaks, (2) determining the failure mechanism of any leaks, and establish procedures to minimize the potential for reoccurrence of this failure mechanism, and (3) responding immediately and appropriately to a leak exceeding the ALR. Each of these

elements is described below. ~~The response action plan will apply to both the landfill and the evaporation pond. Activities that apply to the landfill only are specified.~~

Reducing the Head on the Landfill Liner

The head on the liner will be reduced by:

- monitoring the leachate collection system sumps weekly and after all significant precipitation events;
- removing pumpable liquids from the sumps when monitoring indicates the presence of liquid. A reasonable effort will be made to remove as much liquid as possible. As previously described, it is standard landfill design practice to locate a low point or sump box in the base of the landfill sump. The pump for the sump is located at this low point, and it is from here that pumpable liquids are removed to the maximum extent possible; ~~and~~
- waste material and soil cover will be placed in the landfill in a configuration to provide slopes that will prevent ponding and drain to the contaminated water collection basin within the Phase 1A landfill liner; and,
- if water ponds on the surface of the daily cover due to a heavy rain event, vacuum trucks will be utilized to remove as much of the standing water as possible before it can seep into the waste.

Leak Detected Below the Action Leakage Rate

Flow rates less than the ALR are expected under normal operating conditions. However, the following actions will be taken in response to a leak below the ALR:

- determine whether the leak can be attributed to some operational disturbance such as an equipment or power failure;
- verify that the sump pump is working as designed;
- increase the pump rate on the leachate collection system pumps;
- ~~for the landfill only:~~ remove all standing water, if any, from the surface of the landfill;
- assess operations to determine if waste receipt should be temporarily curtailed or waste should be removed for inspection, repair, or controls;
- determine if the flow rate varies with precipitation;
- ~~for the landfill only:~~ repair any damage to the exposed portion of the liner in a manner which conforms to original design specifications and by qualified technicians in accordance with the CQA Plan (see Permit Attachment M);
- document any damage and repairs in the Facility operating record; and
- investigate alternative sources of liquids.

Leak Detected Above Action Leakage Rate

If a leak is detected above the ALR, the following actions will be implemented in response:

- Notify NMED in writing of the exceedance within 7 days of the determination;

- Submit a preliminary written assessment to NMED within 14 days of the exceedance determination, as to the amounts of liquids, likely sources of liquids, possible location, size, and cause of any leaks, and short-term actions taken and planned;
- Determine, to the extent practicable, the location, size, and cause of any leak;
- Determine whether waste receipt should cease or be curtailed, whether any waste should be removed from the unit for inspection, repairs, or controls, and whether or not the unit should be closed;
- Determine any other short-term and long-term actions to be taken to mitigate or stop any leaks;
- Within 30 days after the notification that the action leakage rate has been exceeded, submit to NMED the results of the determinations described above, the results of the actions taken, a description of the actions planned;
- Monthly, as long as the action leakage rate continues to be exceeded, submit a report to NMED summarizing the results of any remedial actions taken and planned; and
- In making the determinations described in this section, either conduct the following investigation or document why such an investigation is not needed:
    - Assess the source and amount of liquid from each source collected in the sump.
    - Conduct a hazardous constituent analysis of the liquid collected in the sump and use the results to help identify the source(s) of the liquid and possible location of any leaks as well as the potential hazard associated with the liquid and its mobility.
    - Assess the seriousness of any leaks in terms of potential for escaping into the environment.

2.5.3.10 Closure

A description of landfill closure is provided in Permit Attachment O, Closure Plan.

~~2.6 Treatment in Evaporation Pond~~

~~Only waste that meets LDR treatment standards will be placed in the evaporation pond. Waste will be received from off site generators and from the leachate collection system associated with the landfill or other site units (i.e. waste storage areas). Evaporation will be the only treatment occurring in the evaporation pond.~~

~~2.6.1 Design of Evaporation Pond~~

~~The Facility is proposing design and operating practices for the evaporation pond in accordance with 40 CFR 264.221. The evaporation pond design is provided on Drawings 28 through 32 in Permit Attachment L1 and will have an approximate operating capacity of 5.2 million gallons over an approximate area of 78,600 square feet.~~

~~The evaporation pond has been designed as a double-lined unit with a LDRS between the primary and secondary liners. The unit is designed and will be constructed, maintained, and operated to prevent overtopping resulting from normal or abnormal operations; overfilling; wind and wave action; rainfall; run-on; malfunctions of level controllers, alarms, and other equipment; and human error.~~

~~2.6.1.1 Liner System~~

~~The liner system, shown in Drawings 29 and 32 of Permit Attachment L1, will include a primary (top) geomembrane liner above a geonet layer and a secondary (bottom) geomembrane liner, supported by 3 feet of compacted clay liner material with a hydraulic conductivity of no more than 1 x 10^{-7} cm/sec. Soil liner~~

~~leachate compatibility tests (two-stage permeability testing using ASTM D-5084) will be conducted prior to construction. In addition, a test fill will be constructed, as per the procedures outlined in the CQA Plan contained in Permit Attachment M. Soil liner compatibility is normally not a problem unless the leachate contains high concentrations of organics (Eklund, 1985; Peterson and Gee, 1985; Mitchell and Madsen, 1987; Finno and Schubert, 1986; Lo et al., 1994; Day, 1994; Shackel ford, 1994). Permit Attachment F1, the Waste Analysis Plan, does not allow the site to accept high concentrations of organics, therefore the soil and leachate compatibility is not expected to be a problem.~~

~~The compacted clay surface will provide a stable foundation for the liner and resistance to pressure gradients above and below the liner. The evaporation pond liner system will be located on top of the excavated subgrade which will be located approximately 15 feet below the existing ground surface. At this depth the basal portions of the evaporation pond will lie in either the Quaternary sand or Upper Dockum units. Settlement evaluations presented in the engineering report (see Appendix E in Volume V of the permit application) demonstrate that either of these units will adequately serve as a foundation for the evaporation pond. Near surface evaporation pond slope areas will be located on top of Quaternary soil materials. The engineering report also presents settlement evaluations for the evaporation pond subgrade within the Quaternary soil materials and stability evaluation of any load bearing embankments.~~

~~Design and operating practices, together with the geologic setting of the Facility, will prevent the migration of any hazardous constituent to adjacent subsurface soil, surface water, or groundwater. The top liner is designed to minimize the migration of hazardous constituents through the liner system during the active life and closure period of the evaporation pond. A 60-mil HDPE geomembrane material will be used for the primary liner component. HDPE liners have been shown to be chemically resistant to landfill leachates based on operational performance and on EPA 9090 compatibility tests conducted on actual landfill leachates and synthetically generated leachates. Calculations that define the stresses on the evaporation pond liner system due to thermal expansion and contraction are also provided in the engineering report (Appendix E, Volume VI of the permit application).~~

~~Drawing 32 in Permit Attachment L1 shows that the bottom liner will be a two-component system, including a geomembrane and a compacted clay liner. The lower component, the 3 feet of compacted clay, will minimize the migration of hazardous constituents if a breach through the upper components occurs.~~

~~Material for the evaporation pond compacted clay liner will be siltstone or mudstone obtained during landfill excavation within the Upper Dockum. During landfill excavation, appropriate siltstone and mudstone materials will be stockpiled and if necessary, conditioned such that compacted soil liner specifications are met. The test results presented in Appendices D and E (Volumes V and VI of the permit application) indicate that the unprocessed material has an intact permeability close to 1×10^{-7} cm/sec. Therefore, with processing, the material can be placed and compacted to meet the permeability specification of 1×10^{-7} cm/sec or less.~~

~~Additional laboratory tests will be conducted on processed siltstone and mudstone samples during the test fill program to confirm their permeability characteristics.~~

~~The liners will be constructed of materials that will be chemically resistant to the waste managed in the evaporation pond and any liquid that has accumulated in the leak detection system. The liner system materials will have appropriate chemical properties and sufficient strength and thickness to prevent failure as a result of pressure gradients, physical contact with the waste or leaked liquid to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation.~~

~~Information pertaining to the chemical properties and physical strength of the liner system materials was supplied by the manufacturer and is included in the construction specifications presented in Volume IV of the permit application.~~

~~The geonet drainage system is capable of effectively minimizing the head developing on the secondary evaporation pond liner. Geonet clogging, which reduces the overall drainage capacity, has been incorporated into the design of the drainage system as a factor of safety. This safety factor has been applied in the ALR calculation presented in the engineering report (Permit Attachments L and J). This approach is suggested in EPA guidance for determining the ALR in the preamble to the January 29, 1992, final rule for Liners and Leak Detection System for Hazardous Waste Land Disposal Units (57 FR 3462).~~

~~Stresses on geosynthetics during installation are likely to be negligible. The evaporation pond slope lengths will be less than 40 feet, and the slope ratio is relatively shallow, causing little tensile stress to be exerted in the liner. Also, there will be no horizontal seams in the geosynthetic liner material. Traditional anchoring methods will be used. 60-mil HDPE material will be used, which, when properly installed and welded, is of sufficient tensile strength to withstand the stresses of installation.~~

~~2.6.1.2 Leak Detection and Removal System/Vadose Monitoring System~~

~~The LDRS consists of a geonet layer of cross-linked ribbed HDPE, a sump, and associated detection and liquid removal pipes. A pump located in the LDRS pipe will be used to remove leachate accumulating in the leachate collection systems. When leachate accumulates, it will be pumped to a tanker truck and either returned to the evaporation pond, stabilized in the onsite treatment unit, or stored in one of the liquid waste storage tanks.~~

~~The LDRS unit will have the following characteristics:~~

- ~~be constructed with a bottom slope of 1% or more;~~
- ~~be constructed of synthetic or geonet drainage materials with a minimum transmissivity of 5 x 10^{-3} m^2/sec;~~
- ~~be constructed of materials that are chemically resistant to the waste managed in the evaporation pond and any leachate generated in the landfill;~~
- ~~of sufficient strength and thickness to prevent collapse under pressure exerted by overlying wastes, and equipment used at the evaporation pond;~~
- ~~designed and operated to minimize clogging during the active life and closure period of the evaporation pond; and,~~
- ~~constructed with sump and liquid removal methods.~~

~~LDRS details are presented in Drawing 32 in Permit Attachment L1. The LDRS will be sloped so that any leachate below the primary liner will drain to the centrally located sump. The sump pit design is also shown in the drawing.~~

~~The collection system has been designed to be of sufficient size to collect and remove liquids from the sump and prevent liquid from backing up into the drainage layer. A sump pump and associated piping will be installed in the lower portion of the sump. The sump system will be covered with gravel to bring the area to the level of the evaporation pond floor. The gravel will serve as an expanded drainage layer providing space for the piping.~~

~~The sump system will be provided with a method for measuring and recording the volume of liquids present and the volume of liquid removed. All pumpable liquids in the sump will be removed in a timely manner to maintain the head on the bottom liner below 12 inches.~~

~~A pump operating level will be established to ensure that backup into the drainage layer does not occur, and the head in the sump is maintained at less than 12 inches.~~

~~Methods and equipment to be used to measure and record liquid handling volumes during evaporation pond operation will include survey monuments and elevation rods, flow meters, and fluid level transducers. Elevation rods will be placed in the evaporation pond following pond construction. The rods will be fixed to a ballasted base, which will rest on the primary geomembrane liner. The rods will have graduated markings from which pond liquid elevations and critical freeboard levels can be observed and pond volumes can be determined. Rod elevations will be checked periodically by survey. Flow meters will be used to record volumes of liquid discharged into the pond and removed from the LDRS drainage system sump. The transducers located in the LDRS sump will provide a reading for the liquid levels in the sump at any time during operation. The evaporation pond vadose monitoring sump serves as a detection system for leakage of the LDRS sump. Leakage through the secondary liner system will flow into the vadose sump. This will allow the leakage to be detected and moved. The vadose pipe and gravel arrangement is similar to the LDRS arrangement.~~

~~2.6.1.3 Separator Berm System~~

~~The evaporation pond design incorporates a separator berm between the two pond sections, Pond 1A and Pond 1B (see Drawing 28 in Permit Attachment L1). This pond design provides two independent treatment areas. Thus, in the event that a leak should occur in one section of the pond, liquids could be pumped into the other section until repairs are completed. Two feet of freeboard will be maintained in the evaporation pond at all times. The evaporation pond design and ongoing proper maintenance of the unit will ensure sufficient structural integrity to prevent massive failure. The evaporation pond will be of sufficient volume and freeboard capacity to contain the 100-year 24-hour storm event. This design capacity, coupled with the management of surface water and routine inspections, will help prevent overtopping (see Section 2.6.4.3).~~

~~2.6.1.4 Run-On/Run-Off Control~~

~~The run-on/run-off system is designed to be constructed, operated and maintained to control at least the water volume resulting from a 24-hour, 25-year storm. Run-on originating off-site will be directed around the proposed evaporation pond into the site-wide surface diversion channels shown in Drawing 25 of Permit Attachment L1, using unlined ditches.~~

~~2.6.1.5 Evaporation Pond Location Description~~

~~As indicated in Drawing 4 presented in Permit Attachment L1, the evaporation pond, will be located in the northwest corner of the active portion of the Facility.~~

~~2.6.2 Construction~~

~~Construction activities will consist of site preparation; excavation, and preparation of the bottom and sides of the evaporation pond; construction of dikes; installation of the liners, LDRS and vadose system; and CQA.~~

~~2.6.2.1 Site Preparation~~

~~Existing site drainage will be modified to route any run-on away from the evaporation pond area. Access roads and a truck discharge station will be constructed. These engineered controls and components are shown on Drawings 4, 5, and 31 in Permit Attachment L1.~~

~~2.6.2.2 Excavation and Preparation of Evaporation Pond Bottom and Subsurface Sides~~

~~The evaporation pond will be constructed and excavated to a design depth of approximately 15 feet. The excavated material will be stockpiled for future use. The evaporation pond bottom will be constructed with a 2% (approximate) slope toward the central sump location.~~

~~2.6.2.3 Structural Fill Areas~~

~~Areas of the evaporation pond requiring structural fill will be constructed according to the specifications presented in Permit Application L2, Section 02110 Site Preparation and Earthwork.~~

~~2.6.2.4 Liner, LDRS, and Vadose System Installation~~

~~Three feet of clay will be installed directly on the excavated subgrade, forming the lower portion of the secondary liner. The clay will have a permeability of 1 x 10^{-7} cm/sec or less. A geomembrane liner will be placed over the entire clay liner, including the sump area and the separator berm. A geonet layer of cross-linked ribs, which will serve as the LDRS, will be installed next. The sump and associated piping will then be installed, and gravel will be placed in the depression to bring the surface level of the sump area to that of the evaporation pond floor. A filter geotextile will surround the gravel in the sump area to protect the geomembrane liner and to reduce the sediment clogging of the geonet.~~

~~The liners will be installed to cover all surrounding soils likely to be in contact with the waste or leachate.~~

~~The sump pump and pressure transducers (or other) liquid detection device will be installed next to the LDRS and vadose pipes during construction. These devices will be attached to a control panel. Any time liquids are detected at a specified level, the sump pump will be activated and the liquid will be removed. The pump activation level is related to the sump design and pump type selected. The wastewater will be sampled, analyzed and handled in accordance with the Facility requirements.~~

~~2.6.2.5 Construction Quality Assurance Plan~~

~~Section 2.5.2.3 contains information detailing the CQA Plan. In addition, the CQA plan is contained in Permit Attachment M.~~

~~2.6.3 Nature of Waste~~

~~Hazardous wastes which may be placed in the evaporation pond include all wastes listed in Part A of the application (Permit Attachment K), provided that LDR treatment standards are met prior to placement of the wastes. Potential contaminants in the wastewater will include those found in wastes accepted at the landfill and in other wastes as specified in Permit Attachment F1. In general, these wastes include RCRA hazardous wastes and PCB wastes (less than 50 ppm), excluding the waste types listed in Section 2.5.1.1 and the wastes covered by 20 NMAC 4.1.500 (including 40 CFR 264, Subparts BB and CC).~~

~~2.6.4 Operation of the Evaporation Pond~~

~~Operation of the evaporation pond will involve three main activities: (1) waste acceptance and receiving; (2) placement of wastewater into the evaporation pond; and (3) inspection, monitoring, and repair of the unit. Each of these activities is described below.~~

~~2.6.4.1 Waste Acceptance and Receiving~~

~~Off-site generators must provide a full characterization of their waste to the Facility prior to receiving approval to ship the waste to the Facility. After approval has been received, shipment of waste to the Facility~~

~~will proceed as described in Section 2.1.2. Tanker trucks will then transport their waste to the tanker discharge pad at the evaporation pond.~~

~~Once the waste is received onsite, it will be sampled and fingerprint tested to verify that it is the same waste that was previously characterized. Landfill leachate waste must also be sampled and analyzed prior to being placed in the evaporation pond. Waste analysis and fingerprint testing are more fully described in Permit Attachment F1. This waste analysis and characterization data will be used to ensure that the waste acceptance criteria specified in the RCRA permit are met and to identify any safety precautions that must be taken to properly manage the waste.~~

~~Following a determination that the leachate from the landfill meets the acceptance criteria, the waste will be pumped from the leachate collection tank to a tanker truck. Approved leachate trucks and off-site waste trucks will transport the waste to the tanker discharge pad at the evaporation pond.~~

~~Landfill leachate collection waste and off-site waste that is determined not to meet LDR treatment standards will be treated in the stabilization unit or shipped to other appropriate treatment facilities.~~

~~2.6.4.2 Placement of Wastewater into the Evaporation Pond~~

~~Tanker trucks will be unloaded directly into the evaporation pond through a series of hoses, valves and pipes. The tanker discharge pad will be constructed of concrete and will be sloped toward the evaporation pond to drain any spills or leaks into the pond. Details of the tanker discharge pad are provided in Sheets 1 and 2 of Drawing 31 (Permit Attachment L1).~~

~~2.6.4.3 Inspections, Monitoring, and Repairs~~

~~The evaporation pond structure and dikes will be maintained through a routine inspection program. The volume of liquids in the ponds will be dependent on the waste market. Net evaporation (total evaporation minus rainfall) for the site is in the range of 80 inches per year. The freeboard level will be routinely inspected to ensure that approved or acceptable freeboard levels are maintained and that overtopping does not occur. Pond overtopping will be controlled operationally by maintaining evaporation pond fluid levels below the freeboard elevation and by ensuring that any storm water run-on from surrounding areas is diverted around the evaporation pond. Sludge will be removed by vacuum trucks and treated in the stabilization bins. Sludge will be removed on a routine basis to maintain the operational level in the pond. The vacuum trucks will park on a concrete pad during sludge removal. Sludge will be removed by means of pumps and flexible hoses. Vacuum trucks will be washed thoroughly in the truck wash unit after sludge removal and transporation to the stabilization bins. Grading of the surrounding surface area has been included as a part of the surface water management. Inspections will occur on a weekly basis and after storms to detect evidence of deterioration, malfunction, improper operation of overtopping control systems or sudden drops in the liquid level. The liner exposed above the operating pond level will be inspected to make sure that the liner is not damaged.~~

~~The engineering report includes a discussion of the evaporation pond LDRS ALR (see Section 4.0 in Permit Attachment L). LDRS drainage layer flow capacity, LDRS sump capacity, fluid head calculations, and flow rate conversions are included, as well as response actions for ALR exceedance.~~

~~The two evaporation pond sections allow for one section of the pond to be removed from service if the liquid level suddenly drops for an unknown reason. If liquid losses exceed daily evaporation losses and no other reasonable explanation is found, then that section of the evaporation pond will be shut down and authorities at the NMED will be notified immediately. If a section of the evaporation pond must be removed from service, flow of waste to that section will be stopped, leakage will be stopped by draining the pond to below the level of the leak, surface leakage will be contained, and all necessary steps will be taken to repair the~~

~~liner system and prevent a future failure. Responses to such situations, including NMED notification, are described in Permit Attachment E, Contingency Plan.~~

~~Additional inspection and monitoring information is provided in Permit Attachment B, Procedures to Prevent Hazards.~~

~~2.6.4.4 Specific Requirements for Ignitable, Reactive, and/or Incompatible Wastes~~

~~Wastes that are ignitable, reactive, and/or incompatible will not be placed in the evaporation pond at the same time. Waste acceptance procedures, described in Permit Attachment F1, Waste Analysis Plan, will ensure that such wastes are not inadvertently placed together in the evaporation pond.~~

~~2.6.4.5 Warning Signs~~

~~Permit Attachment B, Procedures to Prevent Hazards, contains information on warning signs.~~

~~2.6.4.6 Record Keeping~~

~~All documentation pertaining to the results of waste analyses or waste compatibility analyses will be maintained in the Facility operating record. Inspection records will be maintained in the inspection log for the evaporation pond.~~

~~2.6.4.7 Action Leakage Rate~~

~~The proposed ALR for the evaporation pond is 1,000 gpad. This ALR was selected based on a discussion in the preamble to the final rule for Liners and Leak Detection Systems for Hazardous Waste Land Disposal Units (57 FR 3462), in which the EPA indicates that an ALR below 1,000 gpad should not be required.~~

~~The average daily flow rate to the sump system will be calculated and recorded weekly during the active life and closure period of the evaporation pond to ensure that the ALR is not exceeded.~~

~~2.6.4.8 Response Action Plan~~

~~The response action plan is described in Section 2.5.3.9 and Permit Attachment J.~~

~~2.6.4.9 Closure~~

~~A description of how hazardous waste residues will be removed from the evaporation pond at closure is provided in Permit Attachment O, Closure.~~

2.7 Operations and Maintenance

~~All of t~~The regulated landfill unit~~facilities~~ will be constructed in accordance with the Design Drawings, Specifications, and ~~Construction Quality Assurance~~CQA Plan presented in Permit Attachments L1, L2, and M, respectively. The operations and maintenance of the landfill units will be in accordance with the Operations and Maintenance Plan presented in Permit Attachment N. In general, all maintenance and repairs to the facilities will be completed to meet the requirements of the original Design Drawings and Specifications and will be monitored in compliance with the ~~Construction Quality Assurance~~CQA ~~manual.~~Plan.

8.8.3 Liability Requirements

As stated in 40 CFR 264.147, an owner or operator of a hazardous waste treatment, storage, or disposal facility must demonstrate financial responsibility for bodily injury and property damage to third parties caused by sudden accidental occurrences which arise from the operation of the facility. This section of the regulations requires that the owner/operator of such a facility provide the administrator one of the following instruments at least 60 days prior to the initial receipt of waste:

1. Liability insurance
2. Financial test
3. Letter of credit
4. Surety bond
5. Trust fund
6. Combination of the above

GMI will submit required documentation demonstrating financial assurance to meet the liability requirements at least 60 days prior to receiving the first hazardous waste at the Facility. The financial assurance mechanism will comply with requirements in 40 CFR Part 264.147.

9. Waste Management

The purpose of this section is to describe the Facility Waste Minimization (WM)/ Pollution Prevention (P2) Program, which will be an organized, comprehensive, and continuous effort to systematically reduce waste generation during the life of the Facility. As such, the program will be ever-changing and expanding to incorporate new or more effective WM/P2 opportunities as they are developed. The level of detail in this description of the WM/P2 Program is commensurate with the level of detail currently available with respect to day-to-day operation of the Facility.

The Facility is committed to the prevention of all forms of pollution and the minimization of all wastes generated at its hazardous waste landfill. Source reduction of waste is the company's highest waste minimization priority, followed by recycling and reuse.

For an industrial facility, such as the Facility, a Waste Minimization Program is an important link to providing increased protection of public health, employee health, and the environment. As part of its WM/P2 Program, the Facility will develop a detailed WM/P2 Program Plan as soon as the intricate details of Facility operation are more clearly defined.

It is anticipated that only insignificant amounts of waste will be generated from site operations. Leachate and wastewater may be generated from the wastes placed in the landfill and from precipitation events. Other wastes that may be generated include waste oils and other maintenance wastes, office wastes, soil and debris from spills, personal protective equipment, excess chemicals, and freon. Not all of these wastes are expected to be hazardous. All site-generated waste will be stored, treated, recycled, reused, and/or disposed of in accordance with applicable regulations. Waste minimization/pollution prevention efforts will be focused on all forms of waste, not just those wastes defined as hazardous in the New Mexico Hazardous Waste Management Regulations.

Waste minimization focuses on reducing the amounts and toxicity of waste materials generated from any process or other plant activity and on reusing, recycling, or reclaiming waste materials for future use and benefit. It should be noted that the terms waste minimization and pollution prevention will be used somewhat interchangeably throughout this section. However, the terms have distinctly different meanings, as defined below:

Waste Minimization

Waste minimization is the reduction, to the extent feasible, of the amounts and toxicity of waste materials after they are generated from any process or other activity. Primary waste minimization techniques include reuse, recycling, or reclamation of waste materials for future use and benefit.

Pollution Prevention

Pollution prevention is the use of any process, practice, or procedure to prevent the generation of waste. Examples of primary pollution prevention techniques include material substitutions (e.g., nonhazardous materials used in place of hazardous materials), process changes, and procedural improvements.

9.1 Brief History of WM/P2 in the United States

Current trends in environmental policy and regulation indicate a move from pollution control to pollution prevention and waste minimization in the private sector. Throughout the 1980s, the United States became increasingly aware of the environmental damage and restoration costs associated with past improper disposal of hazardous wastes. In the 1984 HSWA to RCRA, Congress declared that it is:

> . . . the national policy of the United States that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible. Waste that is nevertheless generated, should be treated, stored, or disposed of so as to minimize present and future threat to human health and the environment. From HSWA, Congress clearly intended a hierarchy of actions for managing the nation's waste problems, with priority given to reduction or elimination of waste over treatment, storage, and disposal of waste after it has been generated.

The Pollution Prevention Act of 1990 expanded this concept to include all forms of environmental pollution. This statute calls pollution prevention a "National Objective" and establishes a hierarchy of environmental protection priorities as national policy. The order of priority is summarized as follows:

1. Reduction or elimination of waste prior to generation (source reduction) is the best option.
2. Recycling and reuse of waste that is generated is the second best option in cases when pollution cannot be prevented.
3. Treatment (reclamation or toxicity reduction) of waste that is generated is the next best option in cases where feasible prevention and recycling opportunities are not available or possible.
4. Disposal of generated waste is the least desirable option.

9.2 Purpose and Objectives of the Facility Waste Minimization/ Pollution Prevention Program

The purpose of this section is to describe the Facility WM/P2 Program. This Program will establish the strategic framework for integrating waste minimization and pollution prevention into all Facility activities. The objectives of the Program are the following:

- raising employee awareness about the reasons for and benefits of a WM/P2 Program and instilling a desire to minimize waste at the lowest organizational levels possible;
- describing planned initiatives that support and promote WM/P2 through various training opportunities, including recycling, reuse, and recovery programs, and good housekeeping practices;
- adapting and implementing existing technologies as rapidly as possible to reduce waste generation at the source and to recycle waste products; and
- reducing all forms and categories of waste to the lowest extent practical.

9.3 Benefits of the Facility Waste Minimization/Pollution

The Facility WM/P2 Program, like all effective waste minimization programs, will yield numerous benefits and advantages, which are either tangible or intangible. Some of these benefits are listed below:

- reduced waste management costs, including labor and disposal costs;
- reduced regulatory compliance costs, including inspection costs and possible fines;
- reduced raw material costs;
- reduced potential for releases of hazardous chemicals and wastes;
- increased worker safety; and
- reduced civil and criminal liabilities under environmental laws.

9.4 Elements and Goals of the Facility WM/P2 Program

As previously mentioned, the Facility will continue to expand and refine its WM/P2 Program during the life of the Facility. The elements of the Program include those methods commonly used to form the baseline, or starting point, for effective WM/P2 Programs. The elements and goals of the Program are listed below as action-items to be completed during the initial phases of Facility operations. Such listings are standard practice in the industry since many of the elements, waste generation levels for example, cannot be determined until after the Facility begins operation. The personnel tasked with oversight of this program will also oversee the planning, development, and implementation of the WM/P2 reduction methods and activities outlined below.

- develop and establish a written policy statement that describes why the WM/P2 Program is being implemented, how it will be implemented, and who will implement it. The policy statement will be issued from the highest level of management. The policy will be provided to each employee at the start of employment and will be reviewed during RCRA training and annual refresher training;
- assign Facility personnel to oversee, plan, develop, and implement the elements of the WM/P2 Program;
- establish support for the program at all levels in the company;
- determine a waste generation baseline at the site and establish a tracking method and waste minimization goals;
- establish a procurement control program to ensure the purchase of environmentally friendly materials and products while preventing the procurement of prohibited items from the site; the Facility will endeavor to reduce or eliminate the use of hazardous materials from its operations;
- ~~minimize the quantities of virgin products and raw materials allowed such as sorbents and other materials used in the stabilization process into the landfill. The Facility will endeavor to utilize other wastes (e.g., fly ash) in the stabilization process rather than virgin materials;~~
- establish reuse, recycling, recovery, and conservation programs to minimize the volume of generated waste requiring disposal or treatment; examples of such programs include paper, aluminum cans, cardboard, scrap metals, oil, batteries, and surplus materials and chemicals;
- establish good-housekeeping practices that promote WM/P2; an example of this type of practice is the requirement to remove packaging materials from chemicals, products, and equipment before they are introduced into the disposal area or contamination-control areas to avoid cross contamination;
- establish a WM/P2 awareness program and train employees, as appropriate;
- prepare a WM/P2 plan and update it annually or as appropriate;
- perform an assessment of waste minimization/pollution prevention opportunities; an example of this type of opportunity is: installation of air conditioning refrigerant reclamation systems; and
- determine the feasibility of implementing the WM/P2 projects and proceed as appropriate with project implementation.

9.5 Proposed Elements of the Facility WM/P2 Program Plan

The Facility will establish a WM/P2 Program Plan when operational details of the Facility, such as the chemical and equipment procurement processes and the actual level of waste generation, are determined. The WM/P2 plan will include the following elements, as appropriate:

- the written policy statement for WM/P2;
- a description of the roles and responsibilities of Facility personnel with respect to WM/P2 and a brief description of how Facility groups will work together to reduce waste generation and energy consumption;
- a plan or method for publicizing and gaining support for the program and communicating the successes and failures of waste minimization efforts (i.e., employee awareness program);
- a description of how employees will be informed about WM/P2 requirements and expectations (possibly within the context of other Facility training courses);
- a description of waste-generating processes, including a clear definition of the types and quantities of materials generated from each process;
- a description of recycling, reclamation, treatment, and disposal programs used by the Facility and the types of wastes and materials that are included in these programs;
- descriptions of other WM/P2 programs and initiatives;
- reporting requirements;
- a description of WM/P2 goals for the Facility;
- a description of the Facility's chemical and material procurement process;
- a review of the costs of waste management and disposal, both onsite and at other facilities;
- criteria for prioritizing candidate WM/P2 processes, activities, and waste streams for future implementation; and
- an evaluation of the effectiveness of the WM/P2 Program and activities.

Permit Renewal Application
October 17, 2011

Attachment B

Procedures to Prevent Hazards

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~~Permit~~ Attachment B. Procedures to Prevent Hazards

~~Modified from the Permit Application, Volume I, Sections 5.0 through 5.1.2 and 5.3 through 5.5.3~~

5. Procedures to Prevent Hazards

This section provides information on the prevention of hazards to both the public and the environment. Specific procedures for implementing those safeguards will be developed during the construction phase of the project and prior to Facility operations.

The engineered barriers for the mitigation of hazards discussed in this section are shown in design drawings contained in Permit Attachment L1~~Volume III~~.

5.1 Security Procedures to Prevent Hazards

Security at the Facility will be provided by security guards, fences surrounding the Facility and warning signs. Each of these is described in the following sections.

5.1.1 Barrier and Means to Control Entrance

The Facility will be bounded by a barbed-wire fence. The active portion of the Facility (i.e., the processing area) will be bounded by an additional fence with two access gates located in the northern portion of the Facility. The northwest gate will remain locked at all times and will serve as a secondary or emergency entrance/exit. Access into the Facility will be controlled by means of the primary gate, located in the northeast corner of the Facility. The gate will be fitted with a cattle guard to prevent livestock from entering the Facility. A security guard post will be located at this entrance gate and will be attended 24 hours a day. The fence, gates, and guard will provide adequate access control and will prevent unwitting entry of persons or livestock to the active portion of the Facility.

Visitors will be required to sign a visitors log prior to movement in or around the Facility. Each visitor will be issued a security badge, which will be worn while the visitor is onsite. The badge will be worn on the visitor's outermost garment in a clearly visible location above the waist. The security guard will be responsible for ensuring that all visitors comply with these requirements. Visitors will be escorted unless other arrangements are made with Facility personnel.

5.1.2 Warning Signs

Warning signs stating "Danger - Unauthorized Personnel Keep Out" will be posted at the site entrance and every 50 feet along the perimeter fence. The signs will be posted in English and Spanish and will be legible from a distance of at least 25 feet. If ignitable wastes are stored or treated in the area, a "No Smoking" sign will also be posted.

5.2 Inspection Procedures

This section of the permit application provides written inspection guidelines and an inspection schedule for the Facility in accordance with ~~20~~ NMAC 20.4.1.

5.2.1 General Inspection Procedures

Facility personnel will conduct inspections of all equipment and structures as frequently as necessary to prevent, detect, or respond to environmental or human health hazards. Inspection records describing malfunctions, deteriorations, operator errors, and discharges that may cause or contribute to a release of hazardous waste constituents to the environment or that may be a threat to human health will be kept at the Facility administration building for three years from the date of the inspection. Specific inspection procedures are outlined in Sections 5.2.2 through 5.2.10.

Personnel will receive general training about hazardous waste inspections as part of the Facility hazardous waste training program. Personnel responsible for inspecting particular equipment or areas of the Facility will receive classroom and/or on-the-job training in inspection procedures. Inspection procedures will be described in the operating manual, which will be located in the Emergency Coordinator's (EC's) office.

Facility guards will make rounds of the Facility at least once daily to detect any unauthorized entry to the Facility or any other abnormalities. The guards will not use inspection checklists, but they will notify the ~~Emergency Coordinator (~~EC~~)~~ and/or emergency response personnel of any spills or other emergencies. Requirements for the EC and/or emergency response personnel, subsequent to an inspection notification, are outlined in the Contingency Plan in Section 6.0.

5.2.1.1 Inspection Checklist

Inspection checklists and an inspection schedule have been developed to ensure that inspections occur at appropriate frequencies. An inspection schedule matrix is provided in Table ~~5~~B-1. This matrix will be expanded, as necessary, to reflect new equipment or changes to existing equipment inspection frequencies.

Inspection frequencies will vary according to the type and age of the equipment, the frequency of its use, and its importance in preventing environmental incidents. The inspection frequencies provided in Table ~~5~~B-1 show that inspections will occur frequently so that problems can be identified in time to correct them before harm is done to human health or the environment.

Table B-1. Triassic Park Waste Disposal Facility Inspection Schedule

Inspection Item - Problem or Problem Area	Inspection Time
General Facility	
Security equipment – signs, perimeter fences, lights	Daily
Stormwater detention basin – liner	Weekly and after storms
Surface water diversion ditches to stormwater detention basin	Weekly and after storms
Landfill	
Liner and cover systems - uniformity, damage and imperfections	During construction and installation
Liners and cover deterioration and malfunction	During and immediately after construction
Spills, leaks, odors, windblown particulate	Weekly and after storms
Run-on/~~run-off~~runoff control system - uniformity, damage and imperfections	Weekly and after storms
LCRS/LDRS presence of liquid and volume of liquid pumped	Daily and after storms
Leachate collection tank (while holding waste) for condition and proper function	Daily
Hazardous and organic gases	Quarterly
Ancillary equipment	Manufacturer recommended
Sump pumping and instrumentation	Annually

Table B-1. Triassic Park Waste Disposal Facility Inspection Schedule

Inspection Item - Problem or Problem Area	Inspection Time
~~***Evaporation Pond***~~	
~~Liners and cover systems for uniformity, damage, and imperfections~~	~~During construction and installation~~
~~Pond freeboard for level for changes~~	~~Daily and after storms~~
~~Area surrounding pond~~	~~Weekly~~
~~Run-on/run-off control system – uniformity, damage and imperfections~~	~~Weekly and after storms~~
~~LCRS/LDRS for presence of liquid and volume of liquid pumped~~	~~Daily and after storms~~
~~Berms~~	~~Weekly~~
~~Integrity of liners and associated system~~	~~Weekly~~
~~Concrete pad for tanker discharge~~	~~Weekly~~
~~***Container Storage Areas - Drum Handling Unit and Roll-off Unit***~~	
~~Condition of containers, signs, other safety equipment, aisle space~~	~~Weekly~~
~~Secondary containment condition, presence of liquid, and volume of liquid pumped~~	~~Weekly~~
~~Run-off/run-on ditches – uniformity, damage and imperfections~~	~~Weekly and after storms~~
~~Containers with >500ppmw volatile organic compounds~~	~~Monthly~~
~~Ancillary equipment~~	~~Manufacturer recommended~~
~~***Tanks***~~	
~~Condition of tanks, signs, other safety equipment, access routes, overfill control~~	~~Daily (when storing)~~
~~Secondary containment condition~~	~~Daily~~
~~Run-off/run-on ditches – uniformity, damage and imperfections~~	~~Weekly and after storms~~
~~Leak test on ancillary equipment~~	~~Annually~~
~~***Stabilization Unit***~~	
~~Condition of unit when in operation – bins, ancillary equipment, monitoring systems~~	~~Daily~~
~~Condition of unit when empty~~	~~Monthly~~
~~Secondary containment condition, presence of liquid, and volume of liquid removed~~	~~Daily~~
~~Concrete vault area – remove liquids if present~~	~~Monthly~~
~~Run-off/run-on ditches – uniformity, damage and imperfections~~	~~Weekly and after storms~~
~~Sonic test to ensure thickness of tanks~~	~~Annually~~

The inspection checklists will identify the name of the inspector, date and time of the inspection, frequency of inspection, specific items to be checked, any notations or observations of abnormalities, and the nature and date of any corrective actions taken. Checklists are provided in Appendix I in the Permit Application dated October 2000~~, Volume II~~. The inspection schedules will be kept in the EC's office.

When new or modified equipment is installed or used at the Facility, the inspection procedures, forms, and schedule will be revised to reflect these changes and submitted to NMED.

5.2.1.2 Remedial Action

Facility personnel or contract personnel will remedy any deterioration or malfunction of equipment or structures encountered during inspections. The remedy will be completed in sufficient time to ensure that the problem does not result in an environmental or human health hazard.

All repairs to permitted portions of the Facility will be made in accordance with the original construction specifications and Construction Quality Assurance (CQA) plan.

If a hazardous or potentially hazardous condition is identified, the EC, as specified in the Contingency Plan (Section 6.0), will be notified immediately to assess the situation and determine how to correct the situation and whether the Contingency Plan should be implemented.

5.2.2 Landfill Inspection Procedures

Landfill liners and the cover will be inspected during and immediately after installation in accordance with the CQA Plan, which is discussed in Section 2.5.2.3.

The landfill and associated equipment will be inspected weekly and after storms unless otherwise specified. Records of the inspections will be maintained in the operating record, which will be kept in the administration building.

If deterioration or any other abnormalities are noted during inspection of the landfill or associated components, the inspector's supervisor will be notified and will determine the appropriate course of action for correction. If the supervisor is not available, the EC will be summoned to make the determination.

The landfill will be inspected by properly-trained personnel weekly and after storms for such items as spills, leaks, odors, wind-blown particulate matter, any evidence of deterioration of the landfill itself, and any malfunction or improper operation of the run-on/~~run-off~~runoff control systems. All inspections will be documented on the landfill inspection checklist, described in Section 5.2.1.1 and found in Appendix I ~~(Volume II)~~ of the Permit Application dated October 2000. Inspection checklists will be kept for at least 3 years, in accordance with 40 CFR 264.15(d).

During the active life and during closure of the landfill, the leachate collection and removal system (LCRS) and leak detection and removal system (LDRS) will be checked daily for the presence of liquid. The amount of water in the system can be used to determine if the system is functioning properly. The system will either be inspected through the cleanout pipe, which is connected to the primary collection pipe and the sump riser pipe, or with magnehelic gages or other liquid detection devices, if they are installed. The leachate collection tank will be inspected in accordance with the procedures outlined in Section 5.2.5.

During the operational phase of the landfill, periodic checks will be made within the landfill to detect the presence of hazardous gases and volatile organics. Surveys of the active landfill surface area and the riser pipes with an organic vapor meter (OVM) or comparable device will be performed quarterly to detect the presence of organic compounds.

If it is evident that particulate matter from the landfill is subject to dispersal by the wind, the active portion of the landfill will either be covered or managed to control the dispersal (see Section 2.5.1.7). Adding water to prevent wind erosion will be limited so that ponding in the landfill does not occur. If the dispersion is noted during an inspection, the landfill supervisor will notify the sprayer truck operator to rectify the situation.

The stormwater collection basin within the Phase 1A landfill and ~~holding unit~~ associated with the runoff/run-on control systems will be inspected to following storm event to check whether water~~ensure that liquid~~ has ~~not accidentally~~ accumulated. The collection basin~~system~~ will be emptied as quickly as possible to ensure that the design capacity of the system is not exceeded. Details of the landfill stormwater control system are included in the Engineering Report (Permit Attachment L).

~~5.2.3 Evaporation Pond Inspection Procedures~~

~~Evaporation pond liners will be inspected during and immediately after construction and installation in accordance with the CQA Plan, which is discussed in Section 2.5.2.3.~~

~~While the evaporation pond is in operation, it will be inspected daily to detect any sudden drops in the level of the pond's contents and to measure the volume of and remove any liquid that has accumulated in the leachate collection and leak detection sumps. The daily inspections will also serve to ensure that there is no potential for overtopping by wind or wave action. Since all discharges into the pond will be monitored, visual inspections will be adequate.~~

~~Other inspection items, such as condition of berms, warning signs, and surrounding area, will be checked weekly and after storms. Weekly visual inspections will also be conducted to verify the integrity of the liners and associated systems. Visible portions of the leachate collection pipes and pump will be visually inspected weekly for deterioration. The concrete pad for tanker discharge will be visually inspected weekly for accumulation of liquids. The area around the pond will be inspected weekly for any signs of deterioration, leaks, erosion, etc. The evaporation pond berms will be inspected for any sign of abnormal deterioration, which may include excessive sloughing or the development of significant cracks. All of the above inspections will be used to assess the integrity of the surface impoundments.~~

~~An inspection checklist for the evaporation pond is provided in Appendix I, Volume II.~~

~~5.2.4 Container Storage Area Inspection Procedures~~

~~Weekly visual inspections of container storage areas (drum storage area and roll-off storage area) will be performed to identify the status of warning signs, condition of containers and labels, availability and accessibility of spill control and PPE, and the adequacy of aisle space and access/egress routes. Containers will be inspected for any signs of excessive corrosion, buckles, dents, holes, other structural defects or deterioration, and over-pressurization. An inspection checklist for container areas is provided in Appendix I in Volume II.~~

~~If a container is found to be in poor condition, the inspector's supervisor will be notified, who will either arrange to transfer the hazardous waste to a new container, repair the existing container as specified by the manufacturer, or place the container in an overpack drum.~~

~~Containers used for storing liquids will be stored in a secondary containment area described in Section 2.2. These areas will be inspected weekly during the container storage area inspections. The inspections will focus on (1) the condition of sump pits and trenches to ensure that they are free of cracks or gaps and are sufficiently impervious to contain leaks, spills, and accumulated liquids until the collected material is detected and removed; (2) pump operation; and, (3) placement of containers to ensure that designed liquid flow paths are not obstructed. A record of the inspection will be maintained in the operating record, which will be kept in the administration building.~~

~~Spilled or leaked waste or accumulated precipitation that requires removal to prevent overflow of collection systems that is identified during inspection will be removed in a timely manner.~~

~~5.2.5 Tank Inspection Procedures~~

~~Tanks containing or treating waste will be inspected daily. Tanks containing waste include the liquid waste storage tanks and the leachate storage tanks for the landfill. These inspections will focus on~~

~~the status of warning signs, the adequacy and availability of spill control and PPE, the adequacy of access routes, and the condition of the tanks, ancillary equipment, and monitoring and leak detection systems. The inspection will focus on (1) overfill control; (2) equipment condition to detect any signs of corrosion or releases of waste from the tanks or ancillary equipment; (3) data gathered from monitoring and leak detection equipment to ensure that the tank system is being operated in accordance with design specifications; and, (4) the Cathodic Protection Systems, as installed.~~

~~Secondary containment areas in which tanks are located will be inspected daily during the tank inspections. These inspections will focus on the condition of the containment surface to ensure that it is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, or accumulated liquids until the collected material is detected and removed. Inspection records will be maintained in the Facility operating record, which will be kept in the administration building. An inspection checklist for tanks is provided in Appendix I in Volume II.~~

~~5.2.6 Stabilization Unit Inspection Procedures~~

~~Inspection of the stabilization unit will be conducted according to the procedures specified in Section 5.2.5. The inspections will be conducted on days when the unit is operating and daily when waste is in storage. Additional inspection requirements are described in Section 2.4.6. Inspection records will be maintained in the administration building. The concrete vault area will be inspected monthly. If liquids are found they will be removed with a portable pump and transported to the liquid waste unit.~~

5.2.7 Security Equipment Inspection Procedures

Security inspections will be conducted daily and will include the following elements:

- visual inspection of the warning signs at all approaches to the Facility to ensure that the signs are present, legible, and securely attached to the fence;
- inspection of the Facility perimeter to ensure the integrity of the fence and gate by looking for signs of erosion of soil at the fence posts and corrosion or vandalism to the fence, fence posts, or locks;
- inspection and replacement, as necessary, of lights for the purpose of illuminating the Facility at night;
- inspection of structures for signs of erosion, tampering, or vandalism; and
- records of inspections will be maintained in the administration building.

5.2.8 Safety and Emergency Response Equipment Inspection Procedures

Safety and emergency response equipment inspections will occur monthly. This category of equipment includes first aid supplies; respiratory protection equipment (other than personally issued respirators, which will be each employee's responsibility); protective clothing, including hard hats, gloves, and suits; fire extinguishers; eye wash stations; safety showers; empty 55-gallon drums; shovels; and spill cleanup and decontamination kits.

A monthly inventory of safety-related supplies and equipment will be performed to ensure that the items are available, in good condition, and at designated locations. Inadequate or missing items will be replaced or repaired.

Fire protection equipment, including fire extinguishers and fire hoses, will be inspected monthly and after each use to ensure that the equipment is capable of functioning properly and that access to the equipment is not blocked. Each fire extinguisher will be inspected to ensure that the seal around the handle is intact, that the pressure gauge indicates that the unit is adequately charged, and that an Underwriter's Laboratory listing label is attached to each unit. Building sprinkler systems will be inspected according to manufacturer specifications. Chemical fire-suppression systems will be checked to ensure that adequate quantities of the chemical and water exist. The fire-suppression vehicles will also be tuned up at least annually and inspected monthly. Records of inspections will be maintained in the administration building for each unit.

The public address (PA) system will be tested daily to ensure proper operation. In lieu of daily testing, the Facility may opt to broadcast music 24 hours a day, which ensures proper operation of the unit at all times.

Hand-held radios will be tested prior to use each day and periodically throughout the day. The units will be recharged after each shift to ensure that they are operating properly.

5.2.9 Loading and Unloading Area Inspection Procedures

Waste loading and unloading areas will be inspected daily when in use. The inspections will focus on ~~integrity of the containment structure and~~ safety-related issues that could lead to hazards or waste spills. Signs will be located at each loading and unloading area indicating that equipment or materials should not be left unattended as they could be obstructions for the loading and unloading operation.

Onsite roadways and vehicle traffic areas will be inspected on a preventive maintenance order (PMO) schedule to ensure that potential safety hazards, such as road surface deterioration, are minimized or avoided. Records of inspections will be maintained in the administration building for each unit.

~~5.2.10 Truck Wash Area Inspection Procedures~~

~~The sump and sediment bins will be inspected weekly for the accumulation of sediment and liquids in the sump and will be removed to the wash water storage tank. The wash water collected at the truck wash area will be sampled according to the Waste Analysis Plan, Section 4.6 and analyzed according to the Waste Analysis Plan, Section 4.5.6.~~

5.3 Preparedness and Prevention Procedures

Preparedness and prevention encompass a wide range of procedures, from communication to equipment to arrangements with local authorities. These procedures are discussed in the following sections.

5.3.1 Internal Communications

Internal communication will be established to meet the needs for each building and area at the Facility. Three forms of internal communication systems will be implemented; (1) a PA system will be used in the main buildings to alert employees of potential or actual emergencies; (2) in noisy, temporary buildings or remote areas of the Facility, hand-held two-way radios will be used to communicate emergencies; (3) an audible fire alarm will be located in the permanent buildings. The alarm will be used to alert employees of fires but may also be used for alerting them to other emergencies in the event that the two other systems described above are malfunctioning.

Equipment tests will be conducted to assure that internal communication systems are functioning properly according to manufacturer's specifications.

5.3.2 External Communications

A telephone will be available for operations that occur inside the main buildings. For outdoor processing areas without a telephone nearby, hand-held two-way radios capable of summoning emergency assistance from local police departments, fire departments, and state or local emergency response teams will be available.

A map identifying the location of telephones at the Facility will be provided to the NMED prior to acceptance of waste at the Facility.

5.3.3 Emergency Equipment

Emergency response equipment at the Facility includes fire extinguishers and other fire control equipment, spill cleanup kits, and decontamination kits. Each processing area regulated storage unit will be equipped with fire control and spill response equipment. Equipment in the stabilization unit will be used for the tank storage area and roll-off storage area because of their close proximity. A detailed description of this equipment, including the content and type, is included in Appendix M in the Permit Application dated October 2000, ~~Volume II~~ and is discussed in the Contingency Plan contained in Section 6.0.

A complete list of the contents and location of the various types of kits will be maintained in the EC's office at the Facility.

5.3.4 Water for Fire Control

Permanent buildings at the Facility will be equipped with automatic sprinkler systems and fire extinguishers, as required by the National Fire Protection Association (NFPA) code. The sprinkler systems will be designed according to NFPA guidelines. Water storage to fight fires outside of buildings and the landfill will meet minimum requirements of the New Mexico State Fire Marshal's Office and be transported by water truck(s). It is expected that landfill fires, in the unlikely event that they occur, will be extinguished with a dirt cover. A ready supply of dirt will be available at the excavation stockpile and landfill and general facility equipment (dozers, loaders and scrapers) will be available to load, haul and place dirt.

~~5.3.5 Required Aisle Space~~

~~The aisle between double rows of containers in the drum handling unit will be 30 inches wide, and roll-off containers will be placed 4 feet apart and 4 feet from the edge of the berm. Such spacing will allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in the event of an emergency. Drums will only be stacked one high.~~

5.3.6 Arrangements with Local Authorities

The Facility will make arrangements with local authorities as described in the Contingency Plan (see Section 6.0).

5.4 Preventive Procedures, Structures, and Equipment

To prevent accidents at the Facility, all individuals responsible for material and waste handling will receive classroom and on-the-job instruction in safety awareness, recognition of potential hazards in the work place, environmental procedures and policies, and fire prevention and control procedures. Individuals who may come in contact with hazardous waste will receive Occupational Safety and Health Administration (OSHA) 40-hour training and annual 8-hour refresher courses. These individuals also will be trained in the operation of the equipment and vehicles they will be using to perform their duties.

Safety meetings will be conducted as necessary to discuss safety issues, fire prevention and control, good housekeeping and any problems relating to specific areas of the site.

5.4.1 Loading, Unloading, and Waste Transfer Operations

To prevent accidents during loading, unloading, and waste transfer, hazardous waste will be handled only by those individuals who have been properly trained in correct handling procedures and proper spill response procedures. The emergency brakes of transport vehicles will be engaged and the wheels chocked during all loading and unloading operations. Inspection of loading and unloading areas is discussed in Section 5.2.9.

Wastes will be transferred in approved vehicles over approved routes and the maximum capacity of the truck will not be exceeded. Waste containers will always remain closed~~ during storage~~, except when it is necessary to add or remove waste (e.g., for sampling). This practice will minimize the potential for accidental releases of waste. ~~Waste containers will only be stacked one high, which will facilitate inspection, handling and storage.~~

~~Wastes will be transferred in approved vehicles over approved routes and the maximum capacity of the truck will not be exceeded. Ramps will be installed where necessary to enable fork lifts, dollies, or hand trucks to move into or out of secondary containment areas surrounded by berms or curbing.~~

~~Transferring waste from drums to tanks will be accomplished as expeditiously as possible to avoid having containers remain open for extended periods of time.~~

If ignitable wastes are handled, special precautions will be instituted, including the use of special non-sparking bung wrenches or other tools for opening drums or otherwise handling the waste containers, grounding waste containers during waste transfer, and other special handling requirements. These precautions, coupled with the procedures for management of ignitable waste contained in Section 2.0, will minimize the hazards associated with ignitable wastes.

5.4.2 Runoff and Run-On

~~Run-off and run-on for the major units are described in the following sections.~~

~~5.4.2.1 Tank Storage, Container Storage, and Treatment Areas~~

~~Run-off and run-on will be prevented in container and tank storage areas and the stabilization unit through exterior drainage systems located at the perimeters of these areas, outside of the containment systems. The layout of the perimeter drainage ditches is shown on Drawing 25.~~

~~All containment areas associated with tanks or containers will be sloped to remove accumulated liquids caused by spills, leaks, or precipitation (for outdoor units). Liquids that accumulate in any secondary containment area will be sampled to determine if the liquid is hazardous waste. If the liquid is hazardous, the waste will be pumped to a drum or tank and handled accordingly. If the liquid is not contaminated, it will be discharged to the storm drainage system.~~

~~Inspection of the run-off and run-on ditches for the above facilities will be made during weekly site inspections and after storms.~~

~~5.4.2.2 The Landfill and Evaporation Pond~~

The landfill run-on control system will be capable of preventing flow onto the active portion of the landfill during peak discharge from at least a 24-hour, 25-year storm. The run-on control system will consist of unlined ditches for diverting run-on from off site around the landfill. Water from outside the landfill will be prevented from entering the active portion of the landfill by the waste processing corridor drainage ditch.

The runoff management system will be capable of collecting the water volume resulting from at least a 24-hour, 25-year storm. Runoff in the active portion of the landfill will be collected in the lined stormwater collection basin within the landfill and the LCRS. The run-on and runoff control system for the landfill is described in greater detail in Section 2.5.1.6.

~~The area surrounding the evaporation pond will be graded to carry stormwater run-off towards the drainage ditch to the south of the evaporation pond area. This ditch will ultimately empty into the site stormwater detention pond. The perimeter of the evaporation pond is elevated to prevent stormwater run-on into the pond from surrounding areas.~~

Inspection of the runoff and run-on ditches ~~for the landfill and evaporation pond~~ will be made during weekly site inspections and after storms. Maintenance and repair of the ditches will be performed as necessary and in accordance with the Operations and Maintenance Manual (~~Volume II, Appendix O~~Permit Attachment N) and the Design Drawings (~~Volume III~~Permit Attachment L1).

5.4.3 Wind Dispersal Control System

The active portion of the landfill will either be covered or managed to control the wind dispersal. In general, dust control will be accomplished by spraying water on the active portion of the landfill and any road or area subject to wind dispersal. Adding water to prevent wind erosion will be limited so that ponding in the landfill does not occur. Additional detail about wind dispersal procedures can be found in Section 2.5.1.7.

5.4.4 Water Protection

There is an existing underground water line from a spring located approximately one mile east of the Facility in the Ogallala formation, which is used for domestic water supply. This water source, and any others in the Caprock area, will not be used for facility operations and will be protected through the following measures: (1) natural means because of its location; (2) the design of the landfill; (3) the type of waste that will be accepted at the Facility; and (4) the method of response to releases to soil. Each is discussed in more detail below.

Natural geologic and hydrologic conditions in the area include the following characteristics:

- the Upper Dockum unit is unsaturated beneath the selected site;

- the Lower Dockum consists of a 600-foot thickness of homogeneous, lacustrine mudstone. This sequence of unsaturated, low permeability mudstones represents a geologic barrier to potential downward migration of contaminants from the landfill (see Section 3.0); and
- the nearest surface water is the Pecos River, approximately 30 miles to the west of the Facility.

The landfill design includes removal of the 10-feet deep layer of alluvial material on the surface of the disposal site prior to construction of the cells, thus eliminating the possibility of hazardous constituents entering the alluvium and migrating away from the Facility.

Free liquid hazardous waste will be placed in the landfill only in accordance with 40 CFR 264.314(d). In addition, no non-hazardous liquid waste will be placed in the landfill. These limitations on the introduction of liquids into the landfill will minimize the generation of leachates and the potential for the migration of any hazardous constituents from the Facility.

Finally, any releases to the soil will be immediately cleaned up to prevent the spread of contamination. The Contingency Plan in Section 6.0 describes the equipment and personnel available to ensure prompt clean up of any spill.

5.4.5 Mitigation of Effects of Equipment Failure and Power Outages

The Facility will use a Preventive Maintenance Order (PMO) schedule, based on manufacturer's recommendations for various pieces of equipment, to ensure proper operation of the equipment. In addition to the items replaced or changed as part of the PMO schedule, any item(s) found to be deficient during the PMO inspection will be replaced or repaired as soon as possible.

Spare parts critical to ensuring continuation of equipment and safety systems may be stored onsite to facilitate immediate repairs. Other items that require long ordering periods also may be stored onsite.

In the event of a power failure, at least one backup generator will be used for emergency backup power. The generator will be started within 30 minutes of a power failure.

On-the-job training will provide personnel with appropriate instruction in emergency response procedures so that proper actions will be taken in the event of equipment or power failure.

The emergency power system is described in Section 6.3.5.4 of the Contingency Plan.

5.4.6 Prevention of Undue Exposure of Personnel to Hazardous Waste

All employees will be trained in the safe operating practices to be used in handling hazardous wastes. All employees will wear steel-toed shoes and safety glasses while in processing or active areas of the landfill. In some cases, additional personal protective equipment (PPE) will be required, such as hearing protection, respiratory protection, and protective clothing. Employees will be trained in, and responsible for, proper inspection and use of their respirator and proper use and care of PPE. If a defect is noted in any of the equipment, the employee will be responsible for replacing or repairing it prior to use, in accordance with the applicable training. As previously stated, PPE, other than respiratory protection, will be located at or near each permitted unit, along with spill response equipment.

Routine tasks will require some PPE, as outlined in the site Health and Safety (HAS) Plan. In many cases, these requirements will include safety glasses, steel-toed shoes, and hard hats. The site HAS plan will be prepared prior to commencement of hazardous waste operations. This plan will be kept at the Facility, but is not considered part of this permit application.

Out-of-the-ordinary hazardous waste activities will be evaluated by the site HAS officer or a member of an emergency response team prior to responding to the incident. After the type of contaminants present has been determined, the HAS officer or the EC will specify the respiratory protection and/or PPE requirements necessary to safely handle the incident. All respiratory protection devices will be maintained in compliance with OSHA requirements and will be issued only to qualified personnel who have received medical approval and training for the proper use of respiratory protection devices.

For emergencies that are beyond the scope of the Facility personnel training program, areas of the Facility or the entire Facility may be evacuated, at the direction of the EC. In such cases, professional emergency response personnel will be notified to respond to the emergency (see Section 6.0).

5.4.7 Special Requirements for Bulk and Containerized Liquids Disposed of in Landfills

As previously stated, bulk or non-containerized liquids will not be disposed of in the landfill. Containers holding free liquids will be placed in the landfill only if (1) all free-standing liquid has been removed by decanting or other methods, mixed with non-biodegradable sorbent, solidified so that free-standing liquid is no longer observed, or otherwise eliminated; (2) the container is very small; (3) the container is designed to hold free liquids for use other than storage (e.g., a battery); or (4) the container is a lab pack disposed in accordance with 40 CFR 264.316.

In the case of number (1) above, prior to placement in the landfill, the absence of free liquids will be verified using a paint filter test. In addition, this waste will be analyzed for other parameters based upon the characterization of the waste before solidification. These requirements are a part of the Waste Analysis Plan presented in Section 4.0.

5.4.8 Special Requirements to Limit Releases to the Atmosphere

Operations at the Facility will be conducted to minimize the potential for releases to the atmosphere as required by 40 CFR 270.14(b)(8)(vi). This objective will be achieved by using a wind dispersal control system to limit or eliminate the dispersal of particulate matter from the landfill, roadways, and other areas of the Facility and by providing control equipment for operations that may produce air emission, if necessary. The dispersal of particulate matter from soil surfaces will be reduced by restricting traffic and applying small amounts of water spray to moisten the soil surface. ~~A structural containment building housing the stabilization unit will be equipped with pollution control systems to minimize the release of particulates to the atmosphere. The bins and stabilization building will be equipped with an exhausting ventilation system which will maintain a negative pressure inside the building. Slotted ducts located around the perimeter of each bin will provide supply and return air in a push-pull arrangement to remove dust during the waste receiving, mixing and load-out operations. During reagent delivery operations, the bin cover, which will also be connected to the exhaust system, will control dust. Dust will be removed from the exhaust air at the bag house located on the west side of the building. Collected dust will be processed in the stabilization unit.~~ Procedures will be developed to ensure that the landfill and associated activities are managed to prevent particulate

releases. The Contingency Plan will specify the methods to prevent and control spills and emissions related to spills.

5.5 Precautions to Prevent Ignition or Reaction of Ignitable, Reactive, or Incompatible Wastes

Hazardous wastes will be handled only by properly trained Facility personnel. The Facility training program is outlined in Section 7.0. Individuals will be instructed in identifying incompatible wastes, properly labeling them, and properly handling them. Proper handling includes segregation, avoidance of mixing the wastes, and carefully checking compatibility codes prior to the ~~storage or~~ disposal of any wastes. Personnel also will be specifically trained in the proper handling of ignitable and reactive wastes.

This approach will ensure the proper handling of ignitable and reactive waste and will prevent mixing of incompatible waste. In addition, personnel training and Facility operational procedures will be developed to (1) ensure that wastes are properly identified; (2) ensure that general Facility requirements for the management of ignitable, reactive, and incompatible wastes are adequate; and (3) ensure that ~~unit-specific~~ requirements for the management of these wastes are compatible with operations. The procedures for identifying these wastes are provided in Section 4.5 of the Waste Analysis Plan.

The local fire department or a qualified organization will inspect all of the permitted units on an annual basis to assure continued compliance with all applicable NFPA codes.

Ignitable and reactive waste handling are generally described in Section 5.5.1. More specific requirements for the landfill ~~and stabilization unit~~ are described in Section 5.5.2. Handling of incompatible waste is described in Section 5.5.3.

5.5.1 General Requirements

Precautions will be taken to avoid (1) accidental ignition or reaction of ignitable or reactive wastes; (2) reactions that generate extreme heat or pressure, fire or explosions, or violent reactions; (3) reactions that produce uncontrolled toxic or flammable fumes, dusts or gases, in quantities large enough to threaten human health and the environment; ~~(4) reactions that cause damage to the structural integrity of the container or the unit;~~ and (~~5~~4) any other reactions that threaten human health or the environment.

Ignitable or reactive wastes accepted at the Facility will be separated and protected from any sources of ignition or reaction, including open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks, spontaneous ignition, and radiant heat. All smoking will be confined to specifically designated areas when ignitable or reactive wastes are being handled. "No Smoking" signs will be conspicuously posted wherever there is a hazard from ignitable or reactive waste. Ignitable or reactive wastes will be located in the active portion of the Facility, which is more than 50 feet from the Facility property line.

5.5.2 Requirements for the Landfill

Ignitable or reactive wastes will not be placed in the landfill unless the waste has been treated and no longer meets the definition of ignitable or reactive waste under 40 CFR 261.21 or 261.23, or unless the general requirements outlined above for ignitable, reactive, or incompatible wastes are complied

with. Additional information for the management of these wastes in the landfill is contained in Section 2.5.3.6.

5.5.3 Incompatible Waste Handling

Generator waste profile forms (see Permit Attachment F2~~Appendix H, Volume II~~) will provide Facility waste handlers with the necessary information to avoid mixing containers of incompatible wastes. Facility employees will be trained to recognize incompatible wastes and to prevent the mixing of such wastes. Incompatible wastes will not be placed in the same area of the landfill, but separated adequately to avoid all possibility of commingling in the landfill.

By the time any leachate generated from the landfill reaches the LCRS it will be sufficiently diluted~~,~~; therefore, problems associated with incompatibles in the LCRS sump are not anticipated. Wastes will be solidified and stabilized prior to their placement into the landfill. These processes are performed to bind liquids and prevent leaching of any of the wastes' constituents. Therefore, any leachate generated within the landfill is not expected to contain significant levels of hazardous constituents. Due to the anticipated low concentrations of hazardous constituents in the leachate and the geographic separation of incompatible waste types, incompatibility problems within the landfill will be negligible.

~~Containers of incompatible wastes will be stored in separate containment areas to prevent the potential for mixing. Incompatible wastes will be separated by the walkways and sloping floors towards the sumps that separate each cell. The drum handling unit will utilize seven separate cells for waste placement. Each cell is separated by a concrete berm/walkway and each bay has a separate sump. All incompatible wastes in drums will be stored in separate cells. These physical barriers along with defined operational procedures, will ensure that incompatible wastes will remain segregated. In addition, the design and operational procedures will ensure that incompatible materials will not be placed in the same container, nor will hazardous waste be placed in an unwashed container that previously held an incompatible waste (see Section 2.2.12).~~

Permit Renewal Application
October 17, 2011

Attachment C

Contingency Plan

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~~Permit~~ Attachment C. Contingency Plan

~~Modified from the Permit Application, Volume I,~~

~~Section 6.0~~

6. Contingency Plan

The purpose of the Contingency Plan is to minimize potential hazards to human health and/or the environment in the event of a fire, explosion, or unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or water. Should any of these unplanned events occur, the procedures in this Contingency Plan will be immediately implemented. When these procedures are followed, the possibility of additional occurrences, recurrences, or spread of the initial emergency in such a way as to require additional emergency response measures will be minimized.

This Contingency Plan was specifically developed for the Triassic Park Waste Disposal Facility (the Facility). A final Contingency Plan will be provided to the New Mexico Environment Department (NMED) and other response agencies 60 days prior to initiation of operations. The plan will be kept at the Facility, and controlled copies will be submitted to and updated at all police and fire departments, hospitals, and state and local emergency response organizations that may be called upon to provide emergency services. A list of these organizations is provided in Permit Attachment C3, Cooperating Local Authorities. Initial site tours with all local emergency response organizations will be conducted to familiarize them with the facility prior to the start of operations.

The plan specifies Facility personnel who will be responsible for implementation of the plan. The plan also specifies the actions these individuals will take in the event of an emergency at the Facility. The plan includes ~~a~~ (1) a description of the Facility layout; (2) the location of possible hazards; (3) the location of emergency and decontamination equipment; (4) evacuation plans and routes; (5) agreements with local emergency personnel; and (6) an up-to-date list of names, addresses, and telephone numbers of Facility personnel qualified to act as Emergency Coordinator (EC).

6.1 General Responsibilities of the Emergency Coordinator

The Facility will train a minimum of five employees to serve as the EC for the Facility. Only one individual at a time will be designated as the primary (on-duty or on-call) EC. Others will be specified as alternate ECs. An updated list of personnel qualified as ECs (see Permit Attachment C2, Emergency Coordinators) will be provided ~~in~~ to the ~~New Mexico Environment Department~~NMED prior to waste receipt. Individuals will be listed by name, address, and telephone number. The list will also indicate the order in which each will assume responsibility as EC~~s~~. In accordance with 40 CFR 264.52(d), which states, "For new facilities, this information must be supplied to the Regional Administrator at the time of certification, rather than at the time of permit application", the list will be provided to the director of the NMED or designee (NMED Director) prior to receipt of waste and will be kept current both at the Facility and with emergency response organizations.

An acting EC will be either physically at the Facility or on call 24 hours a day, 365 days a year. Each EC will have authority to commit resources needed to carry out the provisions of the Contingency Plan. The EC will be responsible for implementing the Contingency Plan, coordinating all emergency response efforts, determining the extent of the emergency, assessing hazards to human health and the environment, and completing necessary reports associated with the incident. Each EC will be thoroughly familiar with (1) the Facility layout and operations; (2) all aspects of the Facility's Contingency Plan; (3) the location and characteristics of hazardous materials, hazardous waste, and waste handling activities at the Facility; (4) the location and operation of emergency response equipment; (5) evacuation plans and routes; and (6) the location of all Facility records.

After an emergency has been brought under control, the EC will assume responsibility for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that is generated as a result of the release, fire, or explosion at the Facility.

If the EC becomes injured or is otherwise unable to serve as EC during an emergency, a designated operations manager will assume the role of EC until an alternate EC is notified and arrives on the scene.

6.2 Circumstances Dictating Implementation of the Plan

The Contingency Plan must be immediately implemented under any of the following circumstances:

- a fire or explosion occurs resulting in the release of a hazardous waste or involving an active hazardous waste management unit;
- a spill, leak, or other release of hazardous waste or hazardous waste constituents to the air, soil, or surface water occurs that could threaten human health or the environment;
- an indoor spill, leak, or other release of hazardous waste occurs to a secondary containment area that is not removed within 24 hours; and/or
- a hazardous waste incident occurs resulting in an injury requiring more than basic first aid.

The plan will be implemented any time the EC believes that an event occurring at the Facility has the potential to adversely affect human health or the environment. The plan may also be implemented for other reasons at the discretion of the EC.

During the initial discovery and assessment phase of an incident, the EC will obtain information, including the type and quantity of released material and/or injuries that have occurred. At this time, the EC may consult with environmental specialists and other appropriate personnel to determine whether the incident warrants implementation of the Contingency Plan.

6.3 Implementation Procedures

Response procedures for emergencies often vary significantly, depending on the specific details of the incident. However, several response procedures are common to all incidents and include the following elements, which are further detailed in this section:

- discovery of incident and request for assistance from emergency response personnel;
- identification and characterization of released or suspected released material;
- assessment of hazard;
- off-site notification and evacuation criteria;
- response and control procedures;
- measures to prevent recurrence or spread; and
- storage and treatment of released hazardous waste.

6.3.1 Discovery of Incident and Request for Assistance from Emergency Response Personnel

The individual who first discovers an incident or emergency will quickly determine whether the situation is immediately life threatening or non-life threatening. The steps taken in each of these scenarios are briefly described below, although they are likely to vary based on occurrence.

6.3.1.a Life-Threatening Situations

All Facility employees will be instructed and trained on response to a life-threatening situation or life-threatening release of materials. Employees will first relocate to a safe area, if necessary, then immediately notify the EC and/or emergency response personnel as the situation warrants, using the methods described below.

Verbal—In some cases, verbal communication within a building or between buildings will be the fastest way to disseminate emergency information and/or evacuate the area of an emergency.

Telephone—Employees will be instructed to immediately relocate to a safe area, if necessary; appropriate emergency response personnel can be notified by dialing 911 (without first notifying the EC if a particular situation appears to be immediately life-threatening or serious)~~;~~. ~~t~~The EC must be immediately notified of the actions taken.

Fire-Pull Station—The fire-pull station may also be used to alert the fire department and Facility personnel of an emergency. Although this type of alarm does not allow verbal communication with the fire department, it does activate a local fire alarm bell at the Facility and a remote alarm signal at the fire department.

Facility personnel will be trained for initial response to on-site fires. When the alarm is activated, on-site personnel may use fire extinguishers or the application of soil and/or water to suppress fires, when appropriate. The Roswell Fire Department will respond to fires beyond the control of site personnel. Response time for the Roswell Fire Department is approximately 30-45 minutes.

Fire-pull stations will be located at the administration building~~,~~ and the entrance to the landfill~~, the drum handling unit, and the stabilization unit~~. Other possible locations of fire-pull stations may be established.

Automatic Fire Detection/Sprinkler System—All permanent Facility buildings will be equipped with automatic fire detection/sprinkler systems, which, when activated, will transmit an alarm directly to the security gate guard shack and the Roswell Fire Department. The fire department will immediately respond to any alarms.

Public Address (PA) or Paging System—Each of the main buildings will be equipped with a PA or paging system, which will be used to inform employees of adverse conditions at the site and emergency response instructions.

Hand-Held Radios—Hand-held radios will be used to communicate with personnel who are out of range of voice communications, PA, or are working in areas with noise levels such that render the PA system inaudible in emergency situations.

During non-operational hours, the EC will be notified by pager, radio, cellular telephone, or regular telephone. The EC will be at the scene as soon as possible to direct and coordinate emergency response activities.

If the EC determines that additional assistance from an off-site agency or emergency response organization is needed or if immediate action is required to protect a local community population or to protect any visitors using the Mescalero Sands recreation complex and travelers at the rest stop on Highway 380 north of the Facility, the EC will contact the appropriate agencies or organizations. A list of these organizations is provided in Permit Attachment C3. During response activities, two-way radios will be used for communication between responding groups and the EC.

6.3.1.b Non-Life Threatening Situations

Upon discovery of a non-life-threatening release of materials or other non-life-threatening but potentially serious emergency situation, all Facility employees will be instructed and trained to immediately notify the EC or their supervisor. The EC will evaluate the situation, notify appropriate personnel, and if necessary implement the Contingency Plan.

6.3.2 Identification and Characterization of Released or Suspected Released Material

After the emergency situation has been discovered and appropriate response personnel have been contacted for assistance, the EC will immediately obtain the following information by process knowledge (his own or that of another employee): (1) observation; (2) review of Facility records, including material safety data sheets (MSDSs) and manifests; and/or (3) chemical analysis of the material, if this becomes necessary. This information will determine the following:

- the character and amount of released waste;
- the exact source and extent of any released material;
- whether the release could move off-site; if it is determined that the release could move off-site, the EC must determine if any containment procedures have been implemented or whether such procedures should be implemented; and
- any injuries or potential injuries resulting from the incident.

All containers of waste and material at the Facility will be labeled. Therefore, the identification and characterization work generally will be accomplished through visual inspection and process knowledge. Manifests and lists of the waste and locations of waste being stored at the Facility prior to disposal or treatment will be maintained at the Facility. This information will be used in lieu of the visual inspection noted above in cases where the danger of entering the incident area is high or the container labels have been obscured as a result of the incident.

Copies of the MSDSs for raw materials used at the site will be located in the administration building, in the EC's office, and at appropriate operations locations throughout the site. The information in these documents will be used to prepare a course of action.

6.3.3 Assessment of Hazard

Concurrent with the waste identification and characterization phase of the emergency response, the EC will assess possible hazards to human health or the environment that may result from the emergency situation. Indirect and direct effects of the release, fire, or explosion will be considered during this assessment. Examples of direct and indirect effects include the impacts of any toxic, irritating, or asphyxiating gases that are generated or the effects of any hazardous surface water runoff from water or chemical agents used to control a fire.

During this phase of the emergency response, the EC will consider the following information to determine potential risk to human health or the environment:

- the location from which the material or waste is emanating;
- the weather patterns and wind direction at the time of the release; and
- the characteristics of the released material, including physical, reactive, and human or animal toxicity.

The EC may choose to obtain emergency response guidance by contacting one or more of the emergency response organizations listed in Permit Attachment C3 or by utilizing various spill control reference textbooks and MSDSs located in the EC's office.

6.3.4 Off-Site Notification and Evacuation Criteria

If the EC determines that a release, fire, or explosion has occurred at the Facility that poses an immediate threat to on-site or off-site human health and/or the environment, the findings will be reported to appropriate response personnel as follows:

- Local authorities will be immediately notified if an emergency incident at the Facility could affect local areas and if evacuation of these areas is necessary. The EC will be available to assist appropriate officials in deciding whether local areas should be evacuated (evacuation procedures and a site-wide emergency evacuation plan are provided in Permit Attachment C4, *Evacuation Plans*).

- Local authorities will be notified with the following information:
  - the name and telephone number of the reporter;
  - the name and address of the Facility;
  - the time and type of incident that occurred;
  - the name and quantity of material(s) involved, to the extent that this is known;
  - the extent of injuries, if any; and
  - the possible hazards to human health or the environment.

Coordinating agreements will be signed with federal, state, and local emergency response organizations. The agencies with which the Facility will enter these agreements are listed in Permit Attachment C3. The agreements outline the conditions under which the agencies will be contacted and the roles they will assume during various emergency scenarios at the Facility. The agreements establish the EC as the lead coordinator of all emergency response activities at the Facility. The details of these agreements will be located in the EC's office and with each of the participating organizations. The agreements will be considered controlled documents and will be kept current by updating all copies each time a change is made. This ensures a coordinated response to all emergency situations.

The EC may contact one or more of the agencies, such as police, fire departments, or hospitals, as listed in ~~Appendix~~ Attachment C3, if additional assistance is needed at the site to protect community populations.

6.3.5 Response and Control Procedures

Following proper notification of agencies and/or evacuation of the Facility, the EC will initiate response and control procedures. This effort will involve the use of emergency equipment, which is listed in Permit Attachment C1, Emergency Equipment. This list also includes equipment descriptions and locations.

Potential incidents for which response and control procedures are necessary will be grouped into three broad categories: (1) fires and/or explosions; (2) spills, leaks, or other releases; and (3) power failures. A brief discussion of emergency training requirements and the general procedures for handling each of these situations are described in the following sections.

Facility personnel and supervisors will receive safety training to enable them to respond to and handle various emergency situations that are not of a serious nature. In addition to this training, employees will participate in emergency response drills on a periodic basis. These drills will involve both internal responses and those response actions taken in conjunction with external emergency response personnel. Key personnel will be familiar with the

use of emergency equipment and fire control structures available to prevent the spread of fires in their areas. To prevent recurrence of an incident, any faulty or defective monitoring equipment, valves, pumps, alarms, or other equipment will be repaired. If repair is not possible, the equipment will be replaced. The unit will not receive hazardous waste until the minimum required equipment for safe operation is fully functional.

Procedures for ensuring that incompatible wastes are not treated, stored, or located in areas where a spill has occurred are addressed in Section 6.3.7.

6.3.5.a Fire and/or Explosion Control Procedure

If a fire or explosion occurs at the Facility that may impact an active hazardous waste management unit or hazardous material storage area, the Contingency Plan will be immediately implemented, as outlined in Section 6.3. The EC will assess the situation and direct the emergency response effort. The EC will also be responsible for advising emergency response personnel of the hazards associated with released materials and other areas that should be protected from the effects of the incident.

In the event that a fire cannot be brought immediately under control and hazardous waste or material are located in the path of the fire or in an otherwise dangerous place, the waste or materials will be relocated to a safer area, if possible. If this is not possible, the material may be sprayed with an appropriate fire suppressant, at the direction of the EC or under the advisement of fire department personnel.

If an explosion is likely to occur, for example because a fire threatens to envelop ignitable waste, the EC may choose to evacuate the area, as described in the Evacuation Plan in Appendix L of~~presented in~~ Volume II in the Permit Application dated October 2000. A site-wide evacuation plan is presented in Drawing L-1 in the Evacuation Plan~~Appendix L, Volume II~~.

Facility employees will be trained and advised to stay in their work areas during emergency situations, unless they are in immediate danger, until they receive further direction via the PA system or other method of communication. If evacuation is necessary, the EC will communicate this via the PA system and by other means, as necessary, and all employees will assemble at the administration building. If anyone is unaccounted for, emergency response personnel will conduct searches.

After the affected areas have been evacuated, re-entry will be authorized by the EC only after the fire has been extinguished and when the emergency has been resolved.

Any equipment used during the incident will be checked for contamination and cleaned and/or replaced prior to resumption of plant operations in the affected area. Any solutions or materials used to decontaminate the equipment will be managed as RCRA-regulated waste.

6.3.5.b Spills, Leaks, or Other Releases Control Procedure

~~All areas in which liquids are stored, managed, or potentially encountered (including tanks, containers, or secondary containment areas) will be inspected regularly for leaks, spills, deterioration, or damage in order to reduce the likelihood of an incident. However, on occasion, such incidents may still occur.~~ This section describes the procedures for responding to spills, leaks, or other releases to containment areas or to the environment.

If Facility employees observe a spill, leak, or other release, whether during a formal inspection or during routine work, they will be instructed to contact the EC immediately and describe the situation in as much detail as possible, giving the following information, at a minimum:

- the location;

- material composition;
- approximate quantity; and
- estimated extent of the release.

Based on this information (and additional investigation by the EC as necessary), the EC will determine whether to evacuate the area and/or implement the Contingency Plan.

As previously stated, if the EC is not available and if the situation is serious or life threatening, employees will be instructed to dial 911 for emergency assistance. In a life threatening situation personnel may call 911 without first notifying the EC. The EC will then be notified of the employee's actions. Upon notification, the EC will conduct a visual inspection of the release and will then implement immediate containment measures.

~~**Releases Within Containment**~~

~~The EC will implement the following procedures for responding to leaks or spills from tank systems or containers into secondary containment areas that are not likely to reach the environment:~~

- ~~the tank system or secondary containment area will be removed from service and the flow of waste stopped;~~
- ~~the unit will be inspected to determine the apparent cause of the leak or spill;~~
- ~~all waste released to a secondary containment area will be removed from the secondary containment systems within 24 hours after detection of the leak, or as timely as possible, to prevent harm to human health and the environment;~~
- ~~leaking containers will be placed in an overpack drum or will have the contents transferred to another container; and,~~
- ~~affected tank systems will be repaired or replaced (if replaced, the old systems will be closed) prior to returning them to service. All released materials will be removed prior to returning the unit(s) to service. Extrusion repairs to geomembrane liners or metal welds to steel containers will be certified by a qualified registered professional engineer. This certification will be submitted to the NMED Secretary.~~

6.3.5.b.i Releases to the Environment

The EC will implement, in addition to the applicable permit conditions of Permit Parts 9 and 10, the following procedures for responding to leaks or spills from units that are likely to reach the environment:

- As previously stated, if uncontrolled releases of ignitable, corrosive, reactive, or toxic materials are involved in the incident, the affected area will be evacuated.

- Response personnel will be directed to the incident location to aid in preventing further migration of the leak or spill to soils or surface water, provided that this can be accomplished safely. This effort will involve the use of industrial absorbents, sorbent dams, or other similar materials. If the release is determined to be beyond the capabilities of Facility personnel, the EC will contact one of the emergency response organizations listed in Permit Attachment C3 for assistance.

- The EC will monitor the status of the incident and direct emergency response personnel until the emergency condition no longer exists.

- When the incident has been brought under control, the EC will coordinate and instruct response personnel to begin cleanup and decontamination operations. These will involve containing and collecting any released material, including liquid releases, contaminated sorbent materials, visibly contaminated soils,

and any other waste materials generated during cleanup or decontamination. These items will be removed and properly disposed of, generally by placing the wastes into DOT-approved containers (such as 55-gallon drums), sampling the waste or otherwise determining its constituents, and handling the waste accordingly. All liquids, including the originally released material and any liquids generated during cleanup (unless other circumstances or knowledge preclude this effort) will be pumped into drums and samples taken and analyzed to determine an appropriate course of action.

- If soils or surface water are visibly affected, they will be removed until the contaminant concentration in the remaining soil or water is at or below appropriate levels for the contaminants of concern.

- The EC will then use whatever means are necessary to determine if the released material is a hazardous substance as defined in 40 CFR 302. The EC will then determine whether the amount of released material is a reportable quantity. If the amount is a reportable quantity, the following steps will be taken:

  - ~~waste that could be released to the environment because of a leak in a tank system will be removed from the tank within 24 hours of the detection of the leak, or, if this is not possible (impracticability must be demonstrated to the NMED), it will be removed at the earliest practicable time. In such a case, as much waste as is necessary to prevent further releases to the environment will be removed from the tank system, enabling inspection and repair of the system;~~
  - the EC will report the release to ~~the~~ NMED ~~Director~~ within 24 hours of detection;
  - the National Response Center will be advised of the situation within 24 hours of the incident;
  - an internal report describing the situation and corrective measures necessary to prevent a recurrence will be prepared; and
  - a written report will be filed with ~~the~~ NMED ~~Director~~ within 30 days of detection, as described in Section 6.4.2.

- If the quantity of the spill or leak is less than or equal to 1 pound and is immediately contained and cleaned up or is less than a reportable quantity of material, a Facility employee will be assigned to report on the situation and determine what, if any, follow-up actions are necessary after cleanup.

~~6.3.5.cEvaporation Pond Failure Control Procedure~~

~~The evaporation pond will be removed from service if the level of liquids in the pond suddenly drops and the drop cannot be attributed to known flow rate changes into or out of the pond or if they are exceeded. The major source of volume reduction from the pond is anticipated to result from evaporation. Liquid may also be pumped out of the pond, for example if a heavy rainfall event causes the water level to rise above the required freeboard elevation. Liquid levels in the evaporation pond will be monitored using a measuring staff gauged either in inches or in tenths of a foot. Daily evaporation losses will be compared to daily evaporation rates obtained from the nearest NOAA weather station. Currently this is the Bitter Lakes Wildlife Refuge station, as evaporation rates are not measured at the Roswell and Tatum stations. If liquid losses exceed daily evaporation losses and no other reasonable explanation is found, then the evaporation pond will be shut down and the authorities at NMED will be notified immediately.~~

~~When a pond must be removed from service, the following steps will be taken:~~

- ~~the flow of waste into the pond will be immediately shut off;~~
- ~~any surface leakage that has occurred will be contained;~~
- ~~the leak will be stopped as soon as possible;~~
- ~~any other necessary steps will be taken to stop or prevent a catastrophic failure of the unit; and,~~

~~- in the event that the leak cannot be stopped by any other means, the pond will be emptied.~~

~~Notification will be made to the Chief of the Hazardous Materials Bureau. An oral report will be made within 24 hours. A written report will be submitted within 7 days. An unexplained drop in the level of the evaporation pond would qualify as a noncompliance that may endanger human health or the environment, and 40 CFR 270.30 (l)(6) requires 24-hour notification for such events.~~

~~If the evaporation pond is removed from service, it will not be put back into service until it is repaired. If the unit was removed from service as a result of a sudden drop in the liquid level, and the drop in the liquid level was caused by failure of the liner, then either a new liner (in compliance with 264.221[a]) must be installed, or the old liner must be repaired and certified by a qualified engineer that it meets the design specifications approved in the permit. If the pond is not to be repaired, or is not repairable, it will be closed in accordance with the provisions of 264.228 and the approved closure plan.~~

~~In the event that the evaporation pond is removed from service due to actual or imminent failure of any portion of the pond dike system, the evaporation pond will not be placed back in service until necessary repairs are completed and inspected, and the structural integrity of the dike is recertified by a New Mexico registered professional engineer. This recertification process will be done in accordance with 40 CFR 264 .226(c) and 40 CFR 264 .227(d)(1).~~

~~Several options are available to empty an evaporation pond. Due to the two-sided nature of the single evaporation pond, if a leak occurs in one side, liquid can be transferred to the other side while repairs are being made. Other options, if the leak is on both sides of the pond, include setting up temporary double-lined ponds, temporary double-lined bladders, temporary portable double-lined tanks, or using tanker trucks. These short-term storage measures are intended only to allow storage capacity during a major pond repair effort. The wastes would be transferred into and out of the tanks using existing or temporary pumps.~~

~~GM commits to having onsite at all times all required equipment for the emergency storage capability to remove all contents from the evaporation pond. This will include available storage capacity in one side of the pond that is not leaking as well as in temporary storage units (bladders, tanks, or tanker trucks). This equipment will be located at the facility and will be owned by GM. Personnel who notice an impending impoundment failure will notify the Emergency Coordinator immediately following the observation.~~

~~The Emergency Coordinator will respond by immediately mobilizing an emergency response team from the maintenance department who will bring in double-liner bladders, tanker trucks, and heavy equipment, if necessary, to the evaporation pond site. The team will endeavor to identify the source of the failure. If it is concluded that the impoundment failure is resulting in a release of water to the ground surface, an interim containment dike will be constructed of soil materials adjacent to the pond. Downstream receiving stream users, groundwater users, and local government authorities will be immediately notified. Bladders, pumps, and tanker trucks will then be mobilized to recover water that is being impounded by the dike. If it is concluded that the impoundment failure is impacting groundwater with no evidence of surface expression, the team will implement immediate drawdown of the pond until the source of the failure is located or until all of the contents have been removed, whichever occurs first.~~

~~A program for conducting accelerated water quality monitoring will be immediately instituted by the Emergency Coordinator. Grab samples will be collected by the maintenance department from the surface stream monitoring points and groundwater monitoring well(s) and analyzed according to the facility's environmental monitoring plan. These results will be reported to the local authorities and NMED within 24 hours of receipt of results.~~

~~A corrective action plan will be developed by the maintenance department to repair the impoundment. The plan will include provisions for recovery and treatment of soils and released water. If a groundwater pump and treat program is required based on sample results to restore groundwater quality, this program will be designed and~~

~~implemented by GM and approved by a New Mexico registered professional engineer and NMED prior to implementation.~~

~~A Personnel Decontamination Zone will be set-up near the evaporation pond. Field restoration of the evaporation pond will be conducted by maintenance department personnel who will be fitted with appropriate PPE.~~

~~Restoration activities including required construction quality assurance will be carried out under the supervision of the maintenance department supervisor. A New Mexico registered Professional Engineer will certify the completion of the pond repair. All environmental monitoring and remedial efforts will continue to be conducted until background water quality conditions are restored. All waters captured by containment dikes or tanker trucks will be placed back into the evaporation pond after restoration activities are completed and NMED's concurrence of successful completion of these activities.~~

~~Treatment and/or disposal of contaminated soils will be implemented by the maintenance department. The program for soil treatment/disposal will be developed by GM and approved by NMED prior to it implementation. Decontamination of all equipment used during these remedial activities will be conducted.~~

~~GM will report the results of these corrective action efforts and remedial progress to NMED on a regular basis until the evaporation pond is approved for operation or otherwise directed by NMED. GM will report to local authorities and NMED when all background environmental conditions have been restored.~~

6.3.5.d Power or Equipment Failure Control Procedure

The Facility will be equipped with at least one backup generator for emergency power generation to critical equipment only, which may include the laboratory, stabilization unit and administrative equipment. The generators may also be used to power safety equipment, such as smoke detectors and tank emergency cut-off or bypass mechanisms. The details of this system will be made available as the Facility design is completed. This emergency system will be started within 30 minutes of a power failure.

Equipment that fails but does not result in an emergency incident, such as a fire or explosion, will be promptly repaired or replaced. If emergencies arise as a result of the equipment failure, they will be handled as described in previous sections.

~~In the event of a power failure at the facility affecting the stabilization building, the facility will implement a series of response actions until power is restored. Power is expected to be restored within 30 minutes from the emergency generator which will be installed at the facility. The response actions will address personnel evacuations and waste receiving cessation. The personnel will evacuate to a pre-designated assembly area as outlined by this Contingency Plan in Section 6.3.4. Several of these personnel will be tasked by the Emergency Coordinator to then leave the assembly area and visually monitor the stabilization building from a location specified by him and conduct air quality monitoring. The Emergency Coordinator will notify the Waste Receiving Department to cease the receipt of waste materials from the offsite generator and subsequent transfer of the material to the stabilization building. The Emergency Coordinator will monitor the duration of the power failure and will provide guidance to maintenance personnel who may need to approach the stabilization building to reset electrical systems regarding any chemical and physical hazards. The Emergency Coordinator may elect to request securing of waste containers or other vessels in the stabilization building if the power failure is expected to be prolonged. If this is the case, he will organize a team of stabilization building personnel to re-enter the building while donning appropriate PPE to inspect, then, if necessary, secure any containers or containment vessels to minimize environmental hazards.~~

6.3.6 Measures to Prevent Recurrence or Spread

During an emergency, the EC will take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste areas at the Facility. These measures will include the following, where applicable:

- stopping processes and operations in specific areas of the plant or the entire plant itself; shut-down procedures for processing operations will be maintained in the administration building as well as at specific operating locations;
- collecting and containing released waste as described in Section 6.3.5.2; and
- removing or isolating containers from the emergency at hand, as described in Section 6.3.5.1; if a material cannot be moved because of danger associated with a fire, the material may be sprayed with an appropriate fire suppressant, as directed by the EC or authorized fire official.

If the Facility ceases operations because of an emergency, the EC or a designated individual will monitor for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment, wherever this is appropriate.

A preventive maintenance order schedule will be prepared to ensure that monitoring equipment, valves, pumps, alarms, and other equipment will be maintained in good working order. If any of the equipment is found to be faulty or defective, it will be repaired or replaced.

6.3.7 Storage and Treatment of Released Hazardous Waste

Concurrently or immediately after the emergency has been addressed and cleanup procedures have been completed, the EC will make arrangements for the containerization and storage, treatment, or disposal of any waste generated during the incident. The waste will be assumed to be RCRA-regulated until process knowledge or sampling and analysis can be used to determine the actual nature of the waste. Sampling and analysis will be accomplished in accordance with the Waste Analysis Plan in Section 4.0. The material will be placed in DOT-approved containers and stored as RCRA-regulated waste ~~in the drum handling unit or roll-off container area~~ until a determination is made. If the waste is determined to be RCRA-regulated, it will be labeled and stored accordingly until it is ~~treated or~~ disposed of in accordance with applicable RCRA regulations and permit conditions.

If the waste generated during the cleanup is determined to be incompatible with other wastes stored or treated at the Facility, the incompatible waste will be labeled as such and physically separated from other incompatible waste. In addition, existing waste at the Facility that may be incompatible with the waste generated during cleanup will not be ~~treated, stored, or~~ disposed of until cleanup activities are completed and the cleanup waste is safely containerized and segregated from the existing waste.

6.3.8 Equipment and Personnel Decontamination

A personnel decontamination zone (PDZ) will be set up a safe distance away from the material release area by a team designated the ~~Emergency Coordinator~~EC. The PDZ's location relative to the release area will be determined by the ~~Emergency Coordinator~~EC. The PDZ will be comprised of a support zone, contamination reduction zone, and exclusion zone.

The PDZ will be set up to sequentially decontaminate equipment and personnel. The first level of decontamination will involve equipment or personnel containing the highest level of contamination. Final equipment and personnel decontamination will be verified by visual inspection. The decontamination procedure within the PDZ will generally comprise progressing through the contamination reduction zone and corridor

followed by redress of personnel. The Contamination Reduction Corridor will be designed to control access into and out of the exclusion zone and will confine responding personnel to a limited area.

Also included in the Contamination Reduction Corridor will be the decontamination of monitoring devices and waste samples. Non-reusable items such as latex gloves, Tyvek suits and duct tape, and respirators will be properly collected and disposed of at an approved facility. Decontamination of equipment, monitoring devices, and waste samples is presented below in Section 6.3.8.2, Equipment Decontamination. Decontamination efforts regarding personnel will be recorded including personnel identification, emergency response function, and date and time of day entering and leaving the PDZ. The PDZ will be decommissioned when the emergency has been addressed and cleanup measures have been completed.

Sampling equipment including waste sample collection hardware, personal protective equipment, and monitoring devices will be decontaminated in the Contamination Reduction Corridor prior to returning these items to their respective storage locations at the facility. Decontamination will involve scrubbing each item with a biodegradable detergent solution followed by thorough rinsing with deionized water. This process will be repeated at least one time. Additional scrubbing/rinsing will be performed depending on the extent of contamination. The PDZ supervisor will conduct all recordkeeping with regard to decontamination efforts. He will note equipment, waste sample containers, and monitoring devices that were decontaminated. He will also note the number of detergent scrubbing/rinsing steps that were conducted. The PDZ supervisor will verify that all equipment, sample containers, and monitoring devices have been properly decontaminated prior to these items being returned to their respective storage areas for reuse. This verification will be based on a visual inspection of each item prior to its leaving the PDZ. All wastewater that was generated and collected during operation of the PDZ will be properly treated and/or disposed of as directed by the ~~Emergency Coordinator~~EC.

6.4 Post-Implementation Procedures

Following implementation of the Contingency Plan and resolution of the incident, all emergency equipment used during the effort will be made ready for future use. Necessary reports will be prepared and filed at the Facility and with regulatory agencies. These post-implementation procedures are detailed in the following sections.

6.4.1 Post-Emergency Equipment Maintenance

All emergency equipment listed in Permit Attachment C1 will be cleaned, repaired, or replaced so that it is fit to use before plant operations in the affected area are resumed. If the equipment cannot be adequately cleaned, it will be disposed of as hazardous waste. If it cannot be repaired and is not contaminated, it will be disposed of as non-hazardous waste.

Documentation of post-emergency equipment maintenance will be provided to NMED prior to resumption of operations in the affected area of the plant.

6.4.2 Required Reports and Notification

During and after certain emergency situations, as described in previous sections of this plan, specific types of reports or notification will be required. The EC will determine when or if off-site notification and reporting are required for certain scenarios. The various reporting and notification requirements are mentioned in the appropriate sections of the Contingency Plan but are detailed here for purposes of clarity.

After the plan has been implemented, if the EC determines that the Facility has had a release, fire, or explosion that could threaten human health or the environment outside the Facility, the EC must immediately notify either the government official designated as the on-scene coordinator for the geographical area or the National Response Center. The report must include the following information: (1) the name and telephone number of the reporter;

(2) the time and type of incident; (3) the name and quantity of material(s) involved, to the extent that this information is known; (4) the extent of injuries, if any; and (5) the possible hazards to human health, or the environment outside the Facility.

If the EC determines that evacuation of local areas may be advisable, appropriate local authorities will be immediately notified. The EC must be available to help appropriate officials decide whether local areas should be evacuated.

Any release to the environment which threatens human health or the environment must be reported to the NMED Director within 24 hours of detection. If the release is reported pursuant to 40 CFR Part 302, that report will satisfy this requirement. Any release involving a reportable quantity of a hazardous waste as defined in 40 CFR 302.4 will be reported to the National Response Center within 24 hours.

Within 24 hours of implementing the Contingency Plan, the EC must notify NMED. The owner or operator must note in the operating record the time, date, and details of any incident that requires implementation of the Contingency Plan.

As required by 40 CFR 264.56(j), within 15 days of the incident, the EC must submit to the NMED Director a written report on the incident. The report must include the following information: (1) the name, address, and telephone number of the owner or operator; (2) the name, address, and telephone number of the Facility; (3) the date, time, and type of incident; (4) the source and cause of any release to the environment; (5) the name and quantity of material(s) involved; (6) actions taken to mitigate damage due to the release; (7) the extent of injuries, if any; (8) an assessment of actual or potential hazards to human health or the environment, where this is applicable; and (9) the estimated quantity and disposition of recovered material that resulted from the incident.

Within 30 days of detection of a release to the environment, a report containing the following information will be submitted to the NMED Director: (1) the likely route of migration of the release; (2) the characteristics of the surrounding soil (soil composition, geology, hydrogeology, climate); (3) the results of any monitoring or sampling conducted in connection with the release, if available (if sampling or monitoring data relating to the release are not available within 30 days, these data must be submitted to the NMED Director as soon as they become available); (4) the proximity of the incident to downgradient drinking water, surface water, and populated areas; and (5) a description of response actions that were taken or are planned.

The NMED Secretary and state and local authorities will be notified when the Facility is in compliance with 40 CFR 264.56(h), which states that no waste that is incompatible with the released material can be treated, stored, or disposed of until cleanup procedures are completed, and all equipment must be fit for its intended use prior to resuming operations.

6.5 Documents to be Maintained On-Site as Part of the Permit

Following the resolution of emergencies, various documents must be prepared and maintained on-site as part of the operating record. These documents are discussed in previous sections of this plan and are summarized below.

Copies of the Facility- and building-specific evacuation plans will be maintained in the administration building and at each location for which evacuation plans will be prepared. These documents will be submitted to the NMED within 30 days of the effective date of this permit.

An up-to-date list of all satellite and 90-day accumulation areas, if any are utilized at the Facility, will be maintained at the Facility and provided to the NMED inspectors upon request. Prior to accepting waste at a satellite or 90-day accumulation area for the first time, NMED will be provided with a description and location map.

A list of authorized ECs and their home telephone numbers will be maintained in the administration building, in all other buildings and emergency stations at the site, and in all controlled copies of the Contingency Plan.

A list of coordinating agreements that outline the situations and criteria under which outside help is needed will be maintained in the administration building and in all controlled copies of the Contingency Plan. This list will include the role of each emergency response authority in an emergency.

Coordinating Agreements will be put in place with local, state, and federal agencies for responding to emergency incidents that may occur at the Facility. The Facility will formalize Coordinating Agreements with those organizations listed in Permit Attachment C3 no later than 60 days prior to receipt of first waste.

A current evacuation plan will be maintained in the EC's office. Permit Attachment C4 provides a general Evacuation Plan for the Facility. The Facility will finalize this Evacuation Plan with details of building-specific evacuations after the Facility design has received final approval from NMED. It is proposed that the Facility will submit the criteria for determining when site evacuations are necessary within 30 days of the effective date of the permit and that final evacuation plans and procedures be submitted following final NMED approval of the Facility design.

A current version of the emergency and spill response equipment list presented in Permit Attachment C1 will be maintained in the EC's office and in each of the controlled copies of the Contingency Plan.

The operating record for the facility will be updated with the time, date, and details of any incidents that require implementation of the Contingency Plan.

6.6 Amendment of Contingency Plan

If the Contingency Plan is implemented, the circumstances under which it was implemented will be thoroughly reviewed to investigate the following:

- why the incident occurred and the cause for the occurrence;
- what measures were taken to prevent a recurrence; and
- what measures will be taken to reduce the risk of having a similar occurrence in the future.

The Contingency Plan itself will be reviewed by the EC and/or the Facility owner and immediately amended, if necessary, whenever any of the following events occur:

- the Facility permit is revised;
- the plan fails in an emergency;
- changes occur to the Facility design, construction, operation, maintenance, or other circumstance that materially increase the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or that change the response necessary in an emergency;
- the list of ECs changes; or
- the list of emergency equipment changes.

Because the Contingency Plan is a controlled document, any changes will be made in the following manner: (1) inaccurate or out-of-date pages will be directly replaced with new pages containing the modified or additional information; (2) the corrected pages will be issued to all agencies and organizations that have controlled copies of

the plan; and (3) old pages will be removed from copies of the plan and discarded. These steps will ensure that each organization has a current version of the plan.

Permit Renewal Application
October 17, 2011

Attachment D

Inspection Procedures

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~~Permit~~ Attachment D. Inspection Procedures

~~Modified from the Permit Application, Volume I,~~

~~Section 5.2~~

5.2 Inspection Procedures

This section of the permit application provides written inspection guidelines and an inspection schedule for the Facility in accordance with ~~20~~ NMAC 20.4.1.

5.2.1 General Inspection Procedures

Facility personnel will conduct inspections of all equipment and structures as frequently as necessary to prevent, detect, or respond to environmental or human health hazards. Inspection records describing malfunctions, deteriorations, operator errors, and discharges that may cause or contribute to a release of hazardous waste constituents to the environment or that may be a threat to human health will be kept at the Facility administration building for three years from the date of the inspection. Specific inspection procedures are outlined in Sections 5.2.2 through 5.2.10.

Personnel will receive general training about hazardous waste inspections as part of the Facility hazardous waste training program. Personnel responsible for inspecting particular equipment or areas of the Facility will receive classroom and/or on-the-job training in inspection procedures. Inspection procedures will be described in the operating manual, which will be located in the Emergency Coordinator's~~EC's~~ office.

Facility guards will make rounds of the Facility at least once daily to detect any unauthorized entry to the Facility or any other abnormalities. The guards will not use inspection checklists, but they will notify the Emergency Coordinator (EC) and/or emergency response personnel of any spills or other emergencies. Requirements for the EC and/or emergency response personnel, subsequent to an inspection notification, are outlined in Permit Attachment C, Contingency Plan.

5.2.1.1 Inspection Checklist

Inspection checklists and an inspection schedule have been developed to ensure that inspections occur at appropriate frequencies. An inspection schedule matrix is provided as Table 5-1 in Permit Attachment D1, Inspection Schedules and Checklists~~, Table 5-1~~. This matrix will be expanded, as necessary, to reflect new equipment or changes to existing equipment inspection frequencies.

Inspection frequencies will vary according to the type and age of the equipment, the frequency of its use, and its importance in preventing environmental incidents. The inspection frequencies provided in Table 5-1 show that inspections will occur frequently so that problems can be identified in time to correct them before harm is done to human health or the environment.

The inspection checklists will identify the name of the inspector, date and time of the inspection, frequency of inspection, specific items to be checked, any notations or observations of abnormalities, and the nature and date of any corrective actions taken. Checklists are also provided in Permit Attachment D1. The inspection schedules will be kept in the office of the ~~Emergency Coordinator (~~EC~~)~~.

When new or modified equipment is installed or used at the Facility, the inspection procedures, forms, and schedule will be revised to reflect these changes and will be submitted to NMED.

5.2.1.2 Remedial Action

Facility personnel or contract personnel will remedy any deterioration or malfunction of equipment or structures encountered during inspections. The remedy will be completed in sufficient time to ensure that the problem does not result in an environmental or human health hazard.

All repairs to permitted portions of the Facility will be made in accordance with the original construction specifications and Construction Quality Assurance (CQA) Plan.

If a hazardous or potentially hazardous condition is identified, the EC, as specified in the Contingency Plan, will be notified immediately to assess the situation and determine how to correct the situation and whether the Contingency Plan should be implemented.

5.2.2 Landfill Inspection Procedures

Landfill liners and the cover will be inspected during and immediately after installation in accordance with the CQA Plan, which is discussed in Permit Attachment A, General Facility Description and Information, Section 2.5.2.3, and contained in Permit Attachment M, Construction Quality Assurance Plan.

The landfill and associated equipment will be inspected weekly and after storms unless otherwise specified. Records of the inspections will be maintained in the operating record, which will be kept in the administration building.

If deterioration or any other abnormalities are noted during inspection of the landfill or associated components, the inspector's supervisor will be notified and will determine the appropriate course of action for correction. If the supervisor is not available, the EC will be summoned to make the determination.

The landfill will be inspected by properly trained personnel weekly and after storms for such items as spills, leaks, odors, wind-blown particulate matter, any evidence of deterioration of the landfill itself, and any malfunction or improper operation of the run-on/runoff control systems. All inspections will be documented on the landfill inspection checklist, described in Section 5.2.1.1 and contained in Permit Attachment D1. Inspection checklists will be kept for at least 3 years, in accordance with 40 CFR 264.15(d).

During the active life and during closure of the landfill, the leachate collection and recovery system (LCRS) and leak detection and removal system (LDRS) will be checked daily for the presence of liquid. The amount of water in the system can be used to determine if the system is functioning properly. The system will either be inspected through the cleanout pipe, which is connected to the primary collection pipe and the sump riser pipe, or with magnehelic gages or other liquid detection devices, if they are installed. The leachate collection tank will be inspected in accordance with the procedures outlined in Section 5.2.5.

During the operational phase of the landfill, periodic checks will be made within the landfill to detect the presence of hazardous gases and volatile organics. Surveys of the active landfill surface area and the riser pipes with an organic vapor meter (OVM) or comparable device will be performed quarterly to detect the presence of organic compounds.

If it is evident that particulate matter from the landfill is subject to dispersal by the wind, the active portion of the landfill will either be covered or managed to control the dispersal (see Permit Attachment A, Section 2.5.1.7). Adding water to prevent wind erosion will be limited so that ponding in the landfill does not occur. If the dispersion is noted during an inspection, the landfill supervisor will notify the sprayer truck operator to rectify the situation.

The stormwater collection basin within the landfill~~and holding unit~~ associated with the runoff/run-on control systems will be inspected to monitor whether stormwater~~ensure that liquid has not accidentally~~ accumulated following storm events. Stormwater collected within the landfill that has the potential to have contacted waste with be managed by enhanced evaporation through recirculation on the landfill soil cover. The recirculation system is described in the Engineering Report in Permit Attachment L. The collection collection basin~~system~~ will be emptied as quickly as possible to ensure that the design capacity of the system is not exceeded.

~~5.2.3 Evaporation Pond Inspection Procedures~~

~~Evaporation pond liners will be inspected during and immediately after construction and installation in accordance with the CQA Plan, which is discussed in Permit Attachment A, Section 2.5.2.3, and contained in Permit Attachment M.~~

~~While the evaporation pond is in operation, it will be inspected daily to detect any sudden drops in the level of the pond's contents and to measure the volume of and remove any liquid that has accumulated in the leachate collection and leak detection sumps. The daily inspections will also serve to ensure that there is no potential for overtopping by wind or wave action. Since all discharges into the pond will be monitored, visual inspections will be adequate.~~

~~Other inspection items, such as condition of berms, warning signs, and surrounding area, will be checked weekly and after storms. Weekly visual inspections will also be conducted to verify the integrity of the liners and associated systems. Visible portions of the leachate collection pipes and pump will be visually inspected weekly for deterioration. The concrete pad for tanker discharge will be visually inspected weekly for accumulation of liquids. The area around the pond will be inspected weekly for any signs of deterioration, leaks, erosion, etc. The evaporation pond berms will be inspected for any sign of abnormal deterioration, which may include excessive sloughing or the development of significant cracks. All of the above inspections will be used to assess the integrity of the surface impoundments.~~

~~An inspection checklist for the evaporation pond is provided in Permit Attachment D1.~~

~~5.2.4 Container Storage Area Inspection Procedures~~

~~Weekly visual inspections of container storage areas (drum storage area and roll off storage area) will be performed to identify the status of warning signs, condition of containers and labels, availability and accessibility of spill control and PPE, and the adequacy of aisle space and access/egress routes. Containers will be inspected for any signs of excessive corrosion, buckles, dents, holes, other structural defects or deterioration, and over pressurization. An inspection checklist for container areas is provided in Permit Attachment D1.~~

~~If a container is found to be in poor condition, the inspector's supervisor will be notified, who will either arrange to transfer the hazardous waste to a new container, repair the existing container as specified by the manufacturer, or place the container in an overpack drum.~~

~~Containers used for storing liquids will be stored in a secondary containment area described in Permit Attachment A, Section 2.2. These areas will be inspected weekly during the container storage area inspections. The inspections will focus on (1) the condition of sump pits and trenches to ensure that they are free of cracks or gaps and are sufficiently impervious to contain leaks, spills, and accumulated liquids until the collected material is detected and removed; (2) pump operation; and, (3) placement of containers to ensure that designed liquid flow paths are not obstructed. A record of the inspection will be maintained in the operating record, which will be kept in the administration building.~~

~~Spilled or leaked waste or accumulated precipitation that requires removal to prevent overflow of collection systems that is identified during inspection will be removed in a timely manner.~~

~~5.2.5~~ Tank Inspection Procedures

The leachate storage tank~~Tanks containing or treating waste~~ will be inspected daily along with the daily inspection to check for leachate in the LCRS and LDRS. ~~Tanks containing stored waste include the liquid waste storage tanks and the leachate storage tanks for the landfill.~~ These inspections will focus on the status of warning signs, the adequacy and availability of spill control and personal protective equipment (PPE), the adequacy of access routes, and the condition of the tanks, ancillary equipment, and monitoring and leak detection systems. The inspection will focus on (1) overfill control; (2) equipment condition to detect any signs of corrosion or releases of waste from the tanks or ancillary equipment; (3) data gathered from monitoring and leak detection equipment to ensure that the tank system is being operated in accordance with design specifications; and (4) the Cathodic Protection Systems, as installed.

Secondary containment areas in which tanks are located will be inspected daily during the tank inspections. These inspections will focus on the condition of the containment surface to ensure that it is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, or accumulated liquids until the collected material is detected and removed. Inspection records will be maintained in the Facility operating record, which will be kept in the administration building. An inspection checklist for tanks is provided in Permit Attachment D1.

~~5.2.6 Stabilization Unit Inspection Procedures~~

~~Inspection of the stabilization unit will be conducted according to the procedures specified in Section 5.2.5. The inspections will be conducted on days when the unit is operating and daily when waste is in storage. Additional inspection requirements are described in Section 2.4.6. Inspection records will be maintained in the administration building. The concrete vault area will be inspected monthly. If liquids are found they will be removed with a portable pump and transported to the liquid waste unit.~~

5.2.7 Security Equipment Inspection Procedures

Security inspections will be conducted daily and will include the following elements:

- visual inspection of the warning signs at all approaches to the Facility to ensure that the signs are present, legible, and securely attached to the fence;
- inspection of the Facility perimeter to ensure the integrity of the fence and gate by looking for signs of erosion of soil at the fence posts and corrosion or vandalism to the fence, fence posts, or locks;
- inspection and replacement, as necessary, of lights for the purpose of illuminating the Facility at night;
- inspection of structures for signs of erosion, tampering, or vandalism; and
- records of inspections will be maintained in the administration building.

5.2.8 Safety and Emergency Response Equipment Inspection Procedures

Safety and emergency response equipment inspections will occur monthly. This category of equipment includes first aid supplies; respiratory protection equipment (other than personally issued respirators, which will be each employee's responsibility); protective clothing, including hard hats, gloves, and suits; fire

extinguishers; eye wash stations; safety showers; empty 55-gallon drums; shovels; and spill cleanup and decontamination kits.

A monthly inventory of safety-related supplies and equipment will be performed to ensure that the items are available, in good condition, and at designated locations. Inadequate or missing items will be replaced or repaired.

Fire protection equipment, including fire extinguishers and fire hoses, will be inspected monthly and after each use to ensure that the equipment is capable of functioning properly and that access to the equipment is not blocked. Each fire extinguisher will be inspected to ensure that the seal around the handle is intact, that the pressure gauge indicates that the unit is adequately charged, and that an Underwriter's Laboratory listing label is attached to each unit. Building sprinkler systems will be inspected according to manufacturer specifications. Chemical fire-suppression systems will be checked to ensure that adequate quantities of the chemical and water exist. The fire-suppression vehicles will also be tuned up at least annually and inspected monthly. Records of inspections will be maintained in the administration building for each unit.

The public address (PA) system will be tested daily to ensure proper operation. In lieu of daily testing, the Facility may opt to broadcast music 24 hours a day, which ensures proper operation of the unit at all times.

Hand-held radios will be tested prior to use each day and periodically throughout the day. The units will be recharged after each shift to ensure that they are operating properly.

5.2.9 Loading and Unloading Area Inspection Procedures

Waste loading and unloading areas will be inspected daily when in use. The inspections will focus on integrity of the containment structure and safety-related issues that could lead to hazards or waste spills. Signs will be located at each loading and unloading area indicating that equipment or materials should not be left unattended as they could be obstructions for the loading and unloading operation.

On-site roadways and vehicle traffic areas will be inspected on a preventive maintenance order (PMO) schedule to ensure that potential safety hazards, such as road surface deterioration, are minimized or avoided. Records of inspections will be maintained in the administration building for each unit.

~~5.2.10 Truck Wash Area Inspection Procedures~~

~~The sump and sediment bins will be inspected weekly for the accumulation of sediment and liquids in the sump and will be removed to the wash water storage tank. The wash water collected at the truck wash area will be sampled according to Permit Attachment F, *Waste Analysis Plan*, Section 4.6, and analyzed according to Permit Attachment F, Section 4.5.6.~~

~~Permit~~ Attachment D1. Inspection Schedules and Checklists

~~Modified from the Permit Application,~~
~~Volume I, Section 5.2, Table 5-1, and Volume II, Appendix I~~

Table 5-1. Triassic Park Waste Disposal Facility Inspection Schedule

Inspection Item - Problem or Problem Area	Inspection Time
General Facility	
Security equipment – signs, perimeter fences, lights	Daily
Stormwater detention basin – liner	Weekly and after storms
Surface water diversion ditches to stormwater detention basin	Weekly and after storms
Landfill	
Liner and cover systems - uniformity, damage and imperfections	During construction and installation
Liners and cover deterioration and malfunction	During and immediately after construction
Spills, leaks, odors, windblown particulate	Weekly and after storms
Run-on/run-off control system - uniformity, damage and imperfections	Weekly and after storms
LCRS/LDRS presence of liquid and volume of liquid pumped	Daily and after storms
Leachate collection tank (while holding waste) for condition and proper function	Daily
—Hazardous and organic gases	Quarterly
Ancillary equipment	Manufacturer recommended
Sump pumping and instrumentation	Annually
~~***Evaporation Pond***~~	
~~Liners and cover systems for uniformity, damage, and imperfections~~	~~During construction and installation~~
~~Pond freeboard for level for changes~~	~~Daily and after storms~~
~~Area surrounding pond~~	~~Weekly~~
~~Run-on/run-off control system - uniformity, damage and imperfections~~	~~Weekly and after storms~~
~~LCRS/LDRS for presence of liquid and volume of liquid pumped~~	~~Daily and after storms~~
~~Berms~~	~~Weekly~~
~~Integrity of liners and associated system~~	~~Weekly~~
~~Concrete pad for tanker discharge~~	~~Weekly~~
~~***Container Storage Areas - Drum Handling Unit and Roll-off Unit***~~	
~~Condition of containers, signs, other safety equipment, aisle space~~	~~Weekly~~
~~Secondary containment condition, presence of liquid, and volume of liquid pumped~~	~~Weekly~~
~~Run-off/run-on ditches – uniformity, damage and imperfections~~	~~Weekly and after storms~~
~~Containers with >500ppmw volatile organic compounds~~	~~Monthly~~
~~Ancillary equipment~~	~~Manufacturer recommended~~
Leachate Storage Tanks	
Condition of tanks, signs, other safety equipment, access routes,	Daily (when storing)

overfill control	
Secondary containment condition	Daily
————Runoff/run-on ditches – uniformity, damage and ————imperfections	Weekly and after storms
————Leak test on ancillary equipment	Annually
~~***Stabilization Unit***~~	
~~Condition of unit when in operation – bins, ancillary equipment, monitoring systems~~	~~Daily~~
~~Condition of unit when empty~~	~~Monthly~~
~~Secondary containment condition, presence of liquid, and volume of liquid removed~~	~~Daily~~
~~Concrete vault area – remove liquids if present~~	~~Monthly~~
~~Run-off/run-on ditches – uniformity, damage and imperfections~~	~~Weekly and after storms~~
~~Sonic test to ensure thickness of tanks~~	~~Annually~~

Inspection Checklist – Operational Days

Inspections shall be conducted once every operational day (except as noted). An operational day is defined as a day in which waste management activities occur at the site. For purposes of this definition, laboratory operations do not constitute an operational day.

The recording of liquid level readings for Leak Detection Systems, Leachate Collection Systems, collection tanks, and freeboard shall be maintained in Facility log books. Only the indication of a problem for each system shall be noted and recorded on the inspection checklist.

Inspectors are required to date and record the time of the inspection and sign their names on the Inspection Checklist that they complete. All items shall be responded to by indicating that an item is either a problem or is not a problem. If a problem is observed, a description of the problem will be recorded. If an item is not inspected, the Inspector shall respond by writing "NI" in the Problem column with an explanation of why it was not inspected. In the event the Inspector cannot complete a checklist, the new Inspector shall continue with the same inspection and shall date and sign his/her name to that checklist.

An Inspection Corrective Action Report, which will include the date and time of repairs and remedial actions taken shall be initiated and distributed by the Inspector. The remediator will retain the original copy until the item has been corrected. A second copy will be given to management and the third copy will remain with the Inspector. The signed original will then be filed with the originating checklist upon completion.

Inspection Corrective Action Report

Current Items	New Items	Corrected Items	Comments
1	1	1	Reference Corrective Action Report, (Title and Date) for any corrections.
2	2	2	
3	3	3	
4	4	4	
Reviewed by Manager of Environmental Affairs and Regulatory Compliance:			***Date:***

Precipitation and Wind Readings

1. **Precipitation**

Date and time recorded:_____

Amount and type since last daily inspection to the nearest 0.1 inch:_____

Gauge working: Yes____ No____

2. **Wind Readings**

Date and time recorded:_____

Wind Direction:_____

Wind speed in mph:_____

Recorder working: Yes____ No____

GENERAL SITE

1. **Drainage Ditches**
   Date and time inspected:_____

Ditches Checked	Description and General Condition
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Inspection Item	Problem Yes/-No	If Yes, Description and Ditch No.
Erosion	_____	_____
Obstructions	_____	_____
Overflow or Imminent overflow	_____	_____
Runoff Present	_____	_____
Windblown Debris	_____	_____
Spill Present	_____	_____

2. **Security Fencing and Gates**
   Date and time inspected:_____

a. Any unauthorized entry noted.	_____	_____
b. Repairs required	_____	_____

Inspection Item	Problem Yes/-No	If Yes, Description
3. **Sampling Station** Time Inspected: _____		
a. Spills, Leaks or unauthorized discharges	_____	_____
b. Obstructions in floor collection trenches	_____	_____
c. Spills or Ponding		
• On roadways	_____	_____
• On access ramps	_____	_____
• On loading and Unloading areas	_____	_____

4. **~~Tanker and~~ Truck Parking Area**
Date and time Inspected:_____

Inspection Item	Problem Yes No	If Yes, Description
a. Entry areas:		
• Deterioration	_____	_____
• Cracking	_____	_____
• Corrosion	_____	_____
b. Spills or Ponding		
• On roadways	_____	_____
• On loading and Unloading areas	_____	_____

~~HAZARDOUS WASTE MANAGEMENT UNITS~~

1. ~~DRUM HANDLING UNIT (WEEKLY)~~

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~Drums:~~		
~~•Leaks~~		
~~•Corrosion~~		
~~•Deterioration~~		
~~•Incompatibility with content.~~		
~~•Rows more than 2 drums wide~~		
~~•Lack of pallets for~~		
~~•Aisle space less than 2.5 feet~~		
~~•~~		

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~c. Compatibility group designation not visible on drums~~		
~~d. Spills or Ponding~~		
~~•On roadways~~		
~~•On access ramps~~		
~~•On loading and Unloading areas~~		
~~e. Presence of liquids or solids in:~~		
~~•Spill containment trenches~~		
~~•Sump System 1~~		
~~•Sump System 2~~		
~~•Sump System 3~~		
~~•Sump System 4~~		
~~•Sump System 5~~		
~~•Sump System 6~~		
~~•Sump System 7~~		
~~f. Incompatible waste in same segregation area.~~		

~~g. Unreadable or no signs posting PPE requirements at entry doors.~~

~~h. Does waste contain VO concentrations greater than 500 ppmw~~

~~(If yes, see inspection forms for Volatile organic waste.)~~

~~i. No cracks on concrete floor and epoxy coating not damaged.~~

~~1A. DRUM HANDLING UNIT (VOLATILE ORGANIC WASTES) (WEEKLY)~~

~~Date and time inspected:~~

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a. Cover and closure devices such as lids, bungs, caps etc. are secure~~		

- ~~If coverage closure device is not properly secured, then secure, repair or replace.~~
- ~~If volume is less then 0.1 m³, no additional inspection required.~~
- ~~If volume is between 0.1 m³ and 0.46 m³, then confirm requirements for air monitoring for level 1 containers (40 CFR 264.1086)~~
- ~~If volume is greater then 0.46 m³, then confirm requirements for air monitoring for level 1 or level 2 containers, depending on container type (40 CFR 264.1086).~~

~~2. Roll-Off Storage Unit – Non-Stabilized (Weekly)~~

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a.Containers:~~		
~~•Spills~~		
~~•Corrosion which affects structural integrity or Containment capability~~		
~~•Deterioration~~		
~~•Incompatibility with contents~~		
~~b. Open containers at time of inspection while not involved in sampling~~		
~~c. Compatibility group designation not visible on containers~~		
~~d. Incompatible waste in same segregation area.~~		
~~e.Spills or Ponding~~		
~~•On roadways~~		
~~•On access ramps~~		
~~•On loading and Unloading areas~~		
~~f. Presence of liquids in sump.~~		
~~g. Roll-off units within exclusion zone for storm water storage.~~		
~~h. Deterioration or leaks in containment berms.~~		
~~i. Columns less than 4 feet wide, rows less than 2.5 feet wide.~~		

~~Roll Off Unit Stabilized (Weekly)~~

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a.Containers:~~		
~~•Spills~~		
~~•Corrosion which affects structural integrity or Containment capability~~		
~~•Deterioration~~		
~~•Incompatibility with contents~~		
~~b. Open containers at time of inspection while not involved in sampling~~		
~~c. Compatibility group designation on containers.~~		
~~d. Incompatible waste in same segregation area~~		
~~e. Spills or Ponding~~		
~~•On roadways~~		
~~•On access ramps~~		
~~•On loading and Unloading areas~~		
~~f. Presence of liquids in sump.~~		
~~g. Roll-off units within exclusion zone for storm water storage.~~		
~~h. Deterioration or leaks in containment berms.~~		

~~3. Liquid Waste Receiving and Storage Unit (Daily)~~[1]

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a. Leaks or spills in area surrounding tanks.~~		
~~•Tank #1~~		
~~•Tank #2~~		
~~b. Evidence of excessive corrosion~~		
~~•Tank #1~~		
~~•Tank #2~~		
~~c. Leaks in above grade piping, hoses, valves and pumps~~		
~~d. Readings compared with operating log~~		
~~•Tank #1~~		
~~•Tank #2~~		
~~e. Proper operation: of tank vents of level indicators~~		
~~•Tank #1~~		
~~•Tank #2~~		
~~f. Liquids in concrete basin. .~~		
~~g. Liquid in secondary containment. .~~		
~~h. Spills or Ponding~~		
~~•On roadways~~		
~~•On access ramps~~		
~~•On loading and Unloading areas~~		

[1] Leak Test on Ancillary Equipment is Required Annually.

~~4. Stabilization Unit (Daily)~~

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a. Presence of unknown materials, fume or gas-producing reactions or excessive dust generation.~~		
~~b. Posted sign to the Stabilized Unit that denotes the protection level are unreadable or missing~~		
~~c. Spills or ponding on process area floor.~~		
~~d. Treatment Mixing Basin has a freeboard less than 2 feet~~		
~~e. Dust Suppression System:~~		
~~•Worn hoses or pipes~~		
~~•Loose fitting~~		
~~Hydraulic leaks~~		
~~f. Mechanical Mixing System:~~		
~~•Worn hoses or pipes~~		
~~•Loose fitting~~		
~~Hydraulic leaks~~		
~~•Conveyor belts not operating properly~~		
~~•Electric cutoff not functioning~~		
~~g. Steel Bins:~~		
~~•Cracks or dents~~		
~~•Punctures~~		
~~•Excessive wear~~		
~~h. Fluids in leak detection system~~		
~~i.. Damages to surface within concrete vault. system~~		

~~Stabilization Unit (Monthly)~~

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a. Steel bins (when empty)~~		
~~•Cracks~~	____	_____
~~•Punctures~~	____	_____
~~•Excessive wear~~	____	_____
~~b. Concrete frames for bins:~~		
~~•Spills or ponding on floor~~	____	_____
~~•Cracks in concrete~~	____	_____

~~5. Evaporation Pond Unit (Daily)~~

~~Date and time inspected:~~ _____

~~Average Daily flow rate~~ _____ ~~gallons/day~~
~~Daily Liquid Level~~ _____ ~~ft.~~

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a. Spills, discharges, leaks around perimeter.~~	____	_____
~~b. Staff gauge not visible.~~	____	_____
~~c. Liquid levels above max fill line~~	____	_____
~~d. Liquid levels above pumping levels in LDRS.~~	____	_____
~~e. Liquids levels above pumping levels in Vadose Zone System.~~	____	_____
~~f. Liquids present in secondary containment system.~~	____	_____
~~g. Liquid levels above max storage capacity in the pond.~~	____	_____

~~Evaporation Pond Unit (Weekly and after storms)~~

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a. Seeps around Pond perimeter.~~		
~~b. Sloughing or Damage to Berms.~~		
~~c. Damage to exposed liner system.~~		
~~d. Damage to protective netting.~~		
~~e. Sudden drop in impoundment contents.~~		
~~f. Amount of liquid removed from leak detection system.~~	_____ ~~gallons~~	

~~6. Truck Wash Facility~~

~~Date and time inspected:~~ _____

~~Inspection Item~~	~~Problem Yes No~~	~~If Yes, Description~~
~~a. Spills or leaks in or around surrounding area~~		
~~b. Tank leaking~~		
~~(Note which tank)~~		
~~c. Ancillary equipment leaking~~		
~~d. Collection trench overflowing~~		
~~e. Obstructions in drainage system~~		

~~f.~~	~~Liquids above high level point in collection tank~~		
	~~Note liquid levels~~		
~~g.~~	~~Deterioration, leaks or corrosion of the water recycling system~~		
	~~Note solid levels~~		
~~h.~~	~~Recycling System Not Operating Properly~~		

~~7.~~ Landfill (Daily)

Date and time inspected:_____

Inspection Item	Problem Yes/-No	If Yes, Description
a. Ponding or liquids inside cell	_____	_____
b. Erosion of protective soil level	_____	_____
c. Liquid above pumping level in LCRS	_____	_____
d. Liquid above pumping level in LDRS	_____	_____
e. Liquid above pumping level in Vadose Zone Monitoring Sump	_____	_____
f. Spills, discharge, leaks, around leachate storage tank	_____	_____
g. Liquids in secondary containment for leachate storage tank	_____	_____
h. Liquid levels above max storage capacity in leachate storage tanks	_____	_____
i. Spills or Ponding		
• On roadways	_____	_____
• On access ramps	_____	_____
• On loading and Unloading areas	_____	_____

Landfill (Weekly)

Date and time inspected:_____

Inspection Item		Problem Yes/-No	If Yes, Description
a.	Spills, discharge leaks, and/or wind blown debris around perimeter	_____	_____
b.	Excess dust generation on haul roads	_____	_____
c.	Blockage or damage to runoff/run-on control systems	____	_____
d.	Amount of liquid removed from the sump	_____	_____
	LCRS System #1	_____gallons	
	LDRS System #2	_____gallons	
	Vadose System #3	_____gallons	
e.	Depth of water in landfill contaminated~~ined~~ water collection basin	_____ft	
f.	Depth of water in landfill stormwater collection basin	_____ft	

Landfill (Quarterly)

Date and time inspected:_____

Inspection Item		Problem Yes No	If Yes, Description
a.	Organic gas present and need for air quality permit (above background)	_____	_____

Permit Renewal Application
October 17, 2011

Attachment E

Personnel Training

Prepared for:
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~~Permit~~ Attachment E. Personnel Training

~~Modified from the Permit Application, Volume I,~~

~~Section 7.0~~

7. Personnel Training

The personnel training program for the Facility will be developed in accordance with 40 CFR 264.16 as adopted by the State of New Mexico in the New Mexico Hazardous Waste Management Regulations, Part V. This plan documents training procedures to be used by the Facility for all new employees and refresher training for experienced workers to ensure that all employees perform their work in full compliance with 40 CFR 264.16.

As illustrated in Figure 7-1[RF1], personnel will be divided into three categories for the purposes of the Resource Conservation and Recovery Act (RCRA) training: Facility personnel, visitors, and off-site emergency response personnel. Facility personnel will be further categorized based on whether or not they will handle hazardous waste. Personnel will receive training appropriate to their specific job responsibilities. All Facility personnel will be required to complete classroom training within six months of employment and annually according to the requirements of ~~the~~40 CFR 264.16. Employees who will handle hazardous waste and supervisors of employees who will handle hazardous waste will be required to complete on-the-job training (OJT) and OSHA 40-hour training and annual refreshers. Employees assigned to the Facility will not be allowed to work without direct supervision until completing the training program relevant to the positions in which they are employed. New personnel will be required to complete their training program as soon as practicable, but no later than six months, following their effective date of employment at the Facility.

Section 7.1 describes job titles, qualifications, and duties; Section 7.2 describes training content and frequency; and Section 7.3 describes record keeping procedures.

7.1 Job Titles and Duties

To facilitate safe and effective Facility operation, the training program is designed to provide training commensurate with job responsibilities. A list of qualifications, duties, and special training required for appropriate personnel will be developed and maintained on-site prior to commencement of operations. This section includes a description of the qualifications and responsibilities of the RCRA training officer, the Emergency Coordinator (EC), waste handlers, the site security officer, laboratory specialists, and maintenance personnel. Although other categories of personnel may work at the site, these six categories include key personnel with respect to ensuring safety and compliance and therefore are included in this section. It is important to note that one person may fulfill the responsibilities of more than one of the job categories outlined below.

7.1.1 RCRA Training Officer

The RCRA training officer will be responsible for developing and implementing a RCRA training program that is in compliance with 40 CFR 264.16, Personnel Training.

The RCRA training officer will possess the following qualifications:

- a four-year science or engineering degree or sufficient experience in hazardous waste management to oversee the training program;

Facility Personnel

- Those who handle hazardous waste
  - classroom training
  - on-the-job training
  - OSHA 40-hour
- Those who do not handle hazardous waste
  - classroom training

Visitors

- Expected to be onsite briefly of infrequently
  - basic training on actions to be taken during an emergency; does not allow visitors to attempt to respond to emergencies except in very limited circumstances

Offsite Emergency Responders

- May be different for different organizations
  - training tailored to their role
  - familiarization with site

FACILITY RCRA TRAINING PROGRAM

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 7-1

- working knowledge of the New Mexico Hazardous Waste Act and the New Mexico Hazardous Waste Management Regulations;
- knowledge of site-specific hazardous waste management procedures;
- a thorough understanding of the purpose of the Contingency Plan and emergency procedures and the ability to implement them; and
- 40-hour OSHA and annual refresher training.

The RCRA training officer will have the following responsibilities:

- developing and implementing the RCRA training program, including classroom training development and revision;
- establishing course curricula;
- conducting training;
- maintaining and updating, as needed, a list of all employees requiring training; this list will provide a personalized training history for each employee, which includes job title, training schedule, course attendance, and test results;
- reviewing any new job classifications to determine if ~~on-the-job training (~~OJT~~)~~ is required (supervisors may also request that employees receive OJT);
- scheduling training;
- ensuring that all personnel with RCRA responsibilities are trained as soon as practicable following the effective date in a position and are annually updated; and
- conducting an annual review to determine which personnel require OJT.

7.1.2 Emergency Coordinator

The EC will coordinate all emergency response activities and will have the authority to commit the resources necessary to implement the Contingency Plan contained in Section 6.0. The Facility will appoint a primary EC as well as secondary ECs to ensure that someone is always available to serve as the EC. The secondary ECs must meet the same qualifications and responsibilities, outlined below, as the primary coordinator.

The EC will possess the following qualifications:

- a four-year science or engineering degree or sufficient experience in hazardous waste management and emergency response to coordinate all aspects of emergency response;
- working knowledge of the New Mexico Hazardous Waste Act and the New Mexico Hazardous Waste Regulations;
- familiarity with all aspects of the Contingency Plan and emergency procedures, all operations and activities at the Facility, the location and characteristics of waste handled, the location of records within the Facility, and the Facility layout prior to acting as EC; and
- 40-hour OSHA training, annual refreshers, and OSHA supervisor training.

The EC will have the following responsibilities:

- either being on the Facility premises or being available to respond to an emergency by reaching the Facility within a short period of time;
- notifying all appropriate Facility personnel upon awareness of an emergency situation;
- notifying all appropriate state or local agencies with designated response roles;
- identifying the character, exact source, amount, and extent of any released materials;
- assessing possible hazards to human health and the environment that may result from a release, fire, or explosion;
- notifying local authorities if a release, fire, or explosion has occurred that could threaten human health or the environment;
- notifying the National Response Center if a release, fire, or explosion occurs that could threaten human health or the environment;
- taking all reasonable measures during an emergency to ensure that fires, explosions, and releases do not occur, recur, or spread to other hazardous waste at the Facility;
- if appropriate, when the Facility ceases operations in response to a release, fire, or explosion, monitoring for leaks, pressure build-up, gas generation, or ruptures in equipment;
- providing for the treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the Facility;
- ensuring that no waste that may be incompatible with the released material is treated, stored, or disposed until cleanup procedures are completed and that emergency equipment is cleaned and fit for its intended use prior to resumption of operations;
- notifying NMED and appropriate local authorities before operations are resumed;
- noting in the operating record the time, date, and details of any incident that requires implementing the Contingency Plan; and
- submitting a written report to the NMED within 15 days of implementing the Contingency Plan.

7.1.3 Waste Handlers

Waste handlers will perform sampling, screening, unloading, transfer, ~~storage,~~ and loading of material.

The waste handlers will possess the following qualifications:

- high school diploma or equivalent; and
- two years of experience in hazardous waste operations.

The waste handlers will have the following responsibilities:

- verifying waste received;
- testing emergency equipment;
- inspecting Facility and emergency equipment;
- managing containers in such a way as to prevent leaks, spills, and ruptures;

- inspecting ~~container storage areas, tanks, the evaporation pond, and~~ the landfill;
- inspecting roll-off containers and drums for cracks or holes;
- repair of defects on roll-off containers and drums;
- inspection of non-regulated but potential SWMU units;
- maintaining runoff management system, control wind dispersal, and ensuring compliance with other operational requirements specific to the RCRA permit;
- assisting in maintaining the operating record; and
- preparing biennial reports, unmanifested waste reports, and other reports as necessary.

7.1.4 Site Security Officers

The site security officers will control access to the Facility, ensure site security, and possess high school diplomas or equivalent.

The site security officers will have the following responsibilities:

- controlling entry, at all times, through gates or other entrances to the active portion of the Facility;
- ensuring site security;
- inspecting the perimeter fence to prevent unknowing entry and prevent the unauthorized entry of persons or livestock onto the active portion of the Facility; and
- initially locating and then maintaining warning signs that indicate "Danger - Unauthorized Personnel Keep Out" in both English and Spanish, which will be posted on the perimeter fence and will be legible from a distance of 25 feet.

7.1.5 Laboratory Specialist

The laboratory specialist will help to assure that wastes received at the Facility are consistent with waste profiles supplied by generators.

The laboratory specialist will possess the following qualifications:

- a four-year science degree or sufficient experience to adequately perform acceptance testing;
- working knowledge of the New Mexico Hazardous Waste Act and the New Mexico Hazardous Waste Regulations; and
- familiarity with the Waste Analysis Plan and waste analysis practices and procedures.

The laboratory specialist will have the following responsibilities:

- developing sampling, characterization, and testing procedures for waste received and generated at the Facility;
- directing or performing sampling, characterization, and testing for the Facility;
- determining if waste is acceptable for ~~treatment, storage, and~~ disposal according to waste profile information submitted by the generator;

- determining if the initial and annual full chemical analysis and fingerprint analysis confirm generator information provided on the waste profile and manifest; and
- implementing the laboratory QA/QC program.

7.1.6 Maintenance Personnel

Maintenance personnel will maintain all equipment, buildings, roads and ditches.

Maintenance personnel will possess the following qualifications:

- high school diploma or equivalent; and
- two years experience in an industrial setting.

Maintenance personnel will have the following responsibilities:

- developing maintenance procedures; and
- performing maintenance-type activities, including repairs, preventive maintenance, and corrective actions associated with RCRA inspections.

7.2 Training Content and Frequency

Section 7.2.1 describes the training program for Facility personnel, Section 7.2.2 describes training for visitors, and Section 7.2.3 describes training for off-site emergency response organizations.

7.2.1 Training Program for Facility Personnel

All new employees will be required to successfully complete the training program related to their position. Training programs will include RCRA classroom training, job-specific training, OSHA 40-hour training, and annual refresher training for all three programs. OJT and OSHA 40-hour training sessions will be required only for those personnel who will handle hazardous waste and the supervisors of personnel who will handle hazardous waste. Employees will not be permitted to assume unsupervised job duties until successful completion of all the required elements of their training program. As soon as practicable following a new employee's hire date, successful completion of the training program specific to his or her position must be accomplished, and certification of the completion will be recorded and kept on file by the RCRA training officer.

7.2.1.1 Classroom Training

The initial classroom training will consist of at least one 8-hour session. Annual refresher training will consist of at least one 4-hour session. The outline of the annual refresher is the same as the outline for the initial classroom training; however, the refresher training will be an abbreviated version of the initial training at an accelerated pace. The RCRA classroom training will include the following goals:

- developing a basic understanding of the regulatory requirements for a treatment, storage, and disposal facility;
- promoting understanding of policies and procedures necessary to protect human health and the environment;
- ensuring proper management of hazardous waste; and

- educating employees regarding response to emergencies.

The outline for the RCRA training class will consist of the following elements:

- an introduction to RCRA, including a general description of RCRA and Hazardous and Solid Waste Amendments (HSWA); the definition of hazardous waste; waste generator requirements; ~~treatment, storage, and~~ disposal requirements; and labeling, inspection, record keeping, and reporting requirements;
- requirements associated with the RCRA permit for the Facility;
- Facility-specific waste management, including general procedures for receipt and handling of waste from off-site as well as management of waste generated on-site;
- decontamination procedures;
- emergency procedures, including response to fires, explosions, and releases, and shutdown of operations;
- emergency equipment location and use;
- emergency systems, such as the communication and alarm systems and the fire suppression system;
- Contingency Plan;
- evacuation plan;
- waste minimization;
- occupational health and safety, including items such as personal protective clothing and equipment, general industrial safety, and employee right-to-know (the Hazard Communication Standard);
- transportation of hazardous waste, including marking, labeling, placarding, loading, use of shipping papers, record keeping, and other DOT requirements; and
- maintenance of documentation.

Facility tours and audio-visual aids in conjunction with lectures and procedure manuals will be utilized in the classroom training. A written test will be administered at the completion of classroom training. A grade of 80 percent or better will be required to demonstrate mastery of the course material. The course curriculum will be reviewed at least annually by the RCRA training officer to ensure that it is current and appropriate.

7.2.1.2 Job-Specific Training

The RCRA classroom training will be supplemented with job-specific training tailored to each employee's actual job responsibilities. Job-specific training may include additional classroom training and/or OJT. All employees who handle hazardous waste and supervisors of personnel who handle hazardous waste will be required to complete OJT. The purpose of OJT is not to demonstrate to personnel how to perform their duties, but rather to demonstrate how to perform their duties safely and in compliance with RCRA. OJT will be conducted in the work area by the line supervisor or foreman subsequent to classroom training. The length and complexity of the OJT will vary according to the employee's responsibilities. These minimum OJT sessions will be documented by both the employee and the supervisor by signing and dating a form. The form will also indicate the length of time spent on OJT training. The signed forms will be maintained as part of the Operating Record as discussed in Section 7.3.

A checklist developed by the work area supervisor will be used for job-specific training. Prior to initial use of the checklist, it must be reviewed and approved by the RCRA training officer. All employees performing similar duties will have consistent job-specific training. The job-specific training checklist will be reviewed at least annually to ensure that it is current and appropriate for the subject job classification.

The job-specific training checklist will include the following elements:

- information about procedures relevant to the individual's position, where these procedures are located, and which personnel have the authority to implement the procedures, key operating parameters, and waste feed cut-off systems;
- location and use of communications or alarm systems;
- response to releases;
- emergency and routine shutdown of operations;
- Facility Contingency Plan and emergency procedures;
- evacuation procedures and location of emergency exits;
- response to leaks, spills, and overflows;
- Waste Analysis Plan procedures; and
- inspection and maintenance procedures.

Based on the checklist, Gandy Marley, Inc. (GMI) will develop a training outline specifically for each job-specific training program. The training programs specific to incident response positions, laboratory positions, waste handling positions, maintenance positions, emergency coordinators and site security officers are discussed below.

Incident Response Personnel

Specific classroom training and OJT for on-site individuals involved in incident response will focus on the emergency response equipment present at the facility. The training will address the use, maintenance, operation, purpose and limitations of the following specific equipment:

- fire-specific control equipment,
- personal protective equipment (PPE),
- spill control and decontamination equipment,
- emergency equipment,
- monitoring and communications equipment,
- shutdown operations,
- safety equipment,
- lock out/tag out program, and
- continuous air monitors.

Laboratory Personnel

Specific classroom training and OJT elements for laboratory personnel involved in analysis of hazardous waste will include:

- waste tracking procedures and profile forms,
- laboratory waste acceptance procedures,
- laboratory recordkeeping,
- waste pre-acceptance,

- waste discrepancy and rejection procedures,
- operation of on-site laboratory,
- proper analytical methods,
- laboratory quality assurance and quality control,
- laboratory safety and waste handling within the laboratory,
- laboratory and environmental monitoring equipment calibration,
- basic chemical concepts, and
- toxicology overview and exposure pathways.

Waste Handlers and Maintenance Personnel

Specific classroom training and OJT elements received by waste handlers and maintenance personnel will include:

- proper field sampling and testing procedures (waste handlers only),
- heavy equipment operations,
- waste handling precautions including chemical and physical hazards associated with each waste that will be handled on-site,
- drum and roll-off container handling,
- safety equipment,
- basic chemical concepts,
- hand and power tool safety and operation (maintenance personnel only),
- lock out/tag out procedures,
- waste compatibility issues,
- ~~waste segregation procedures in storage and during treatment,~~
- ~~storage area operations,~~
- ~~waste treatment selection procedures,~~
- waste tracking procedures and profile forms, and
- sampling recordkeeping procedure.~~, andtreatment data form procedure.~~

Emergency Coordinator

Specific classroom training and OJT elements for emergency coordinators will include:

- site emergency communications procedures,
- federal, state, and local agency emergency and all-clear notification procedures,
- qualitative and quantitative assessment of released materials,
- human health and environmental hazard recognition,
- release containment procedures,
- Facility-wide fire, explosion, and leak detection procedures during emergency responses and normal operations,

- procedures for recovering, treating, storing, and disposing of recovered waste, soil, organic liquid, and water resulting from an emergency response,
- emergency equipment decontamination and reuse procedures,
- emergency response recordkeeping plan, and
- written reporting requirements to the agencies.

Site Security Officers

Specific classroom training and OJT elements for site security officers will include:

- procedures for controlling entry to the facility,
- maintaining overall facility security including perimeter fence inspections, and
- maintenance of all warning signs.

7.2.1.3 OSHA 40-Hour Training

All personnel who handle hazardous waste and the supervisors of personnel who handle hazardous waste will complete OSHA 40-hour training as required by 29 CFR 1910.120. It is anticipated that, at least initially, the OSHA 40-hour training will be provided by an outside vendor. Personnel who have documentation of course completion for the 40-hour and refresher training will not be required to retake the 40-hour training.

7.2.2 Training for Visitors

Visitors who are expected to be in the Facility for only a short period of time and who will not be handling hazardous waste will be provided a short briefing on basic emergency procedures such as decontamination, emergency signals and alarms, and evacuation routes. Visitors will not be allowed on-site unless they are escorted by Facility personnel or unless other arrangements have been made with Facility personnel. The briefing will include the following information:

- what hazards that may be encountered at the Facility;
- how emergencies are signaled or announced, how help is summoned , what information is to be given, and to whom the information is given;
- where to report during an emergency;
- how to safely evacuate from the Facility;
- what standard operating procedures for visitors are;
- where check-in/check out locations are; and
- what safety equipment is required.

7.2.3 Training for Off-Site Emergency Response Organizations

Training will be established for off-site emergency response organizations through agreements with local agencies and contracts with vendors. This training will include, as appropriate, the following:

- site layout and site-specific hazards;
- the Contingency Plan;
- Facility emergency procedures;

- Facility decontamination procedures; and
- appropriate response techniques.

7.3 Record Keeping

In accordance with 40 CFR 264.16, records regarding job title, job description, training, and other appropriate documentation will be kept by the RCRA training officer.

7.3.1 Job Titles, Descriptions, and Duties

Job titles will be designated for each position at the Facility related to hazardous waste management and the name of each employee filling each job. Job descriptions will detail job duties and responsibilities for that position. The description will include the skills, education, and qualifications required for each position. A written description for each position will be maintained to determine the types and amounts of both introductory and continuing training to be given to each employee at the Facility.

7.3.2 Training Documentation

Records that document RCRA classroom training and OJT given to and completed by Facility personnel will be kept by the RCRA training officer. Training records on current employees will be kept until closure of the Facility. Training records on former employees will be kept for at least three years from the date the employee last worked at the Facility.

7.3.3 Other Documentation

Other documentation to be maintained at the Facility includes the following:

- documentation of the annual review of the curriculum for RCRA classroom training;
- documentation of the annual review of the OJT checklists; and
- RCRA classroom training test results.

Permit Renewal Application
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Attachment F

Waste Analysis Plan

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~~Permit~~ Attachment F. Waste Analysis Plan

~~Modified from the Permit Application, Volume I,~~

~~Sections 4.0 through 4.5 and 4.5.2 through 4.9~~

4. Waste Analysis Plan

The Triassic Park Hazardous Waste Disposal Facility (the Facility) is a commercial facility that receives hazardous waste generated off-site for~~ treatment, storage, and~~ disposal. This Waste Analysis Plan (WAP) establishes Facility requirements for accepting and characterizing hazardous waste generated both off-site and on-site. The ~~waste analysis plan~~WAP requirements are established in the 1995 New Mexico Hazardous Waste Management Regulations at 20 NMAC 4.1.500 incorporating 40 CFR 264.13, 20 NMAC 4.1.800 incorporating 40 CFR 268.7, and 20 NMAC 4.1.900 incorporating 40 CFR 270.14(b)(3). The most recent revision of this ~~Waste Analysis Plan~~WAP will be maintained at the Facility as part of the Facility Operating Record. The Facility will continually upgrade the ~~waste analysis plan~~WAP with regard to the land disposal restriction~~s~~ (LDR) regulations contained in 40 CFR 268.

Section 4.1 identifies wastes ~~which~~ that will be accepted at the Facility and wastes ~~which~~ that are prohibited. Section 4.2 lists criteria for waste acceptance and management. Sections 4.3 and 4.4 contain pre-acceptance procedures for initial acceptance of hazardous waste received from off-site generators and management procedures for incoming shipments of waste. The various waste analysis protocols that will be required at the Facility are contained in Section 4.5. Sampling and analytical methods and protocols for quality assurance/quality control (QA/QC) are discussed in Sections 4.6 and 4.7. Section 4.8 explains the Facility's waste tracking system. Section 4.9 summarizes notification, certification, and recordkeeping requirements related to waste analysis.

4.1 Permitted and Prohibited Waste

Section 4.1.1 identifies hazardous waste permitted for acceptance at the Facility. Hazardous waste prohibited at the Facility is identified in Section 4.1.2.

4.1.1 Permitted Waste

The Facility will ~~treat, store, and/or~~ dispose of only those hazardous wastes listed in Part A of the Facility Permit Application. Only hazardous waste which meets the Land Disposal Restrictions (LDR) treatment standards identified in 40 CFR 268, Subpart D~~, or can be treated at the facility to meet these standards,~~ will be accepted. These treatment standards are applicable to both primary contaminants and underlying constituents.

4.1.2 Prohibited Waste

The Facility will not accept the following wastes from off-site generators:

- *Dioxin-contaminated wastes:* Wastes listed in 40 CFR 268.31 as adopted by 20 NMAC 4.1.800.

- ~~*Certain PCB-contaminated liquids:* Ignitable polychlorinated biphenyl (PCB) contaminated liquids or liquids with PCB concentrations greater than or equal to 50 parts per million (ppm).~~

- *Certain PCB-contaminated soils:* Soils with PCB concentrations greater than or equal to 500 ppm will not be accepted at the Facility, except for those soils (or other wastes) ~~which~~ that are PCB bulk product waste or PCB remediation waste (40 CFR 761). The Facility may obtain a permit from the U.S. Environmental Protection Agency (EPA) for management of Toxic Substances Control Act (TSCA) wastes in order to accept other wastes containing PCB concentrations greater than 500 ppm. A copy of this permit will be transmitted to the New Mexico Environment Department (NMED) before such waste is accepted.

- *Organic liquids/sludges:* Liquids/sludges with organic concentrations at levels that make them subject to the treatment, storage, and disposal requirements described in 40 CFR 264 Subpart AA or CC; and that have not been treated, prior to receipt at the Facility, to applicable LDR treatment standards (40 CFR 264 Subpart AA and CC as adopted by 20 NMAC 4.1.500).

- *Explosives:* Any substance or article, including a device, ~~which~~ that is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or ~~which~~that, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion.

- *Radioactive/nuclear materials:* Materials regulated by NMED or the New Mexico Oil Conservation Division and defined in 20 NMAC 3.1 Subpart 14, or materials regulated under the Atomic Energy Act of 1954, as amended (including source, special nuclear materials and byproduct materials as defined in 10 CFR 20.1003).

- *Medical waste:* Waste including infectious/biologic/pathogenic solid waste generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals. This also includes infectious waste as defined in NMAC 9.1.105.AL.

- *Packing house and killing plant offal:* Defined as a special waste by 20 NMAC 9.1.105. BZ.

- *Certain hazardous debris:* Hazardous debris ~~which~~ that has not been treated, prior to receipt at the Facility, to meet the LDR treatment standards.

- *Certain lab packs:* Lab packs ~~which~~ that contain wastes [identified in 40 CFR 268, Appendix IV (adopted by reference in 20 NMAC 4.1.800)] excluded from lab packs under the alternative treatment standards of 40 CFR 268.42(c) (adopted by reference in 20 NMAC 4.1.800).

- *Compressed gases:* Gases stored at pressures higher than atmospheric.

- *Unknown or unidentified waste:* These wastes cannot be accepted at the Facility except by special provision and direction from the NMED Secretary (e.g., emergency clean-up operations) or until full characterization has been performed.

4.2. Criteria for Waste Management at the Facility

Waste managed at the Facility must meet the Facility's criteria for acceptance and management. Waste analysis (or, in some cases, acceptable process knowledge ~~(~~[AK~~)~~]) will be used to ensure determination of:

- Complete characterization of the waste.

- Compliance with LDR treatment standards, including, where applicable, underlying constituents. If the waste stream does not meet the LDR treatment standards, the waste will be rejected~~ if the Facility does not have the appropriate treatment capability to bring it into compliance~~.
- Compliance with the Facility's regulatory and operational limits (e.g., the waste is not included in the permitted wastes listed in Part A of this application or the waste does not meet other operational boundaries established by this WAP).

The criteria to be used to evaluate ~~acceptable knowledge (AK)~~ validity, appropriateness, and adequateness will include the following:

- Relationship of wastes generated to process information;
- Availability of supporting analytical data and results;
- Correlation of waste material with processes/product chemistry;
- Process line variability with respect to waste generation;
- Waste alteration/treatment activities and resulting waste characterization; and
- Any other relevant information to assess acceptability of information.

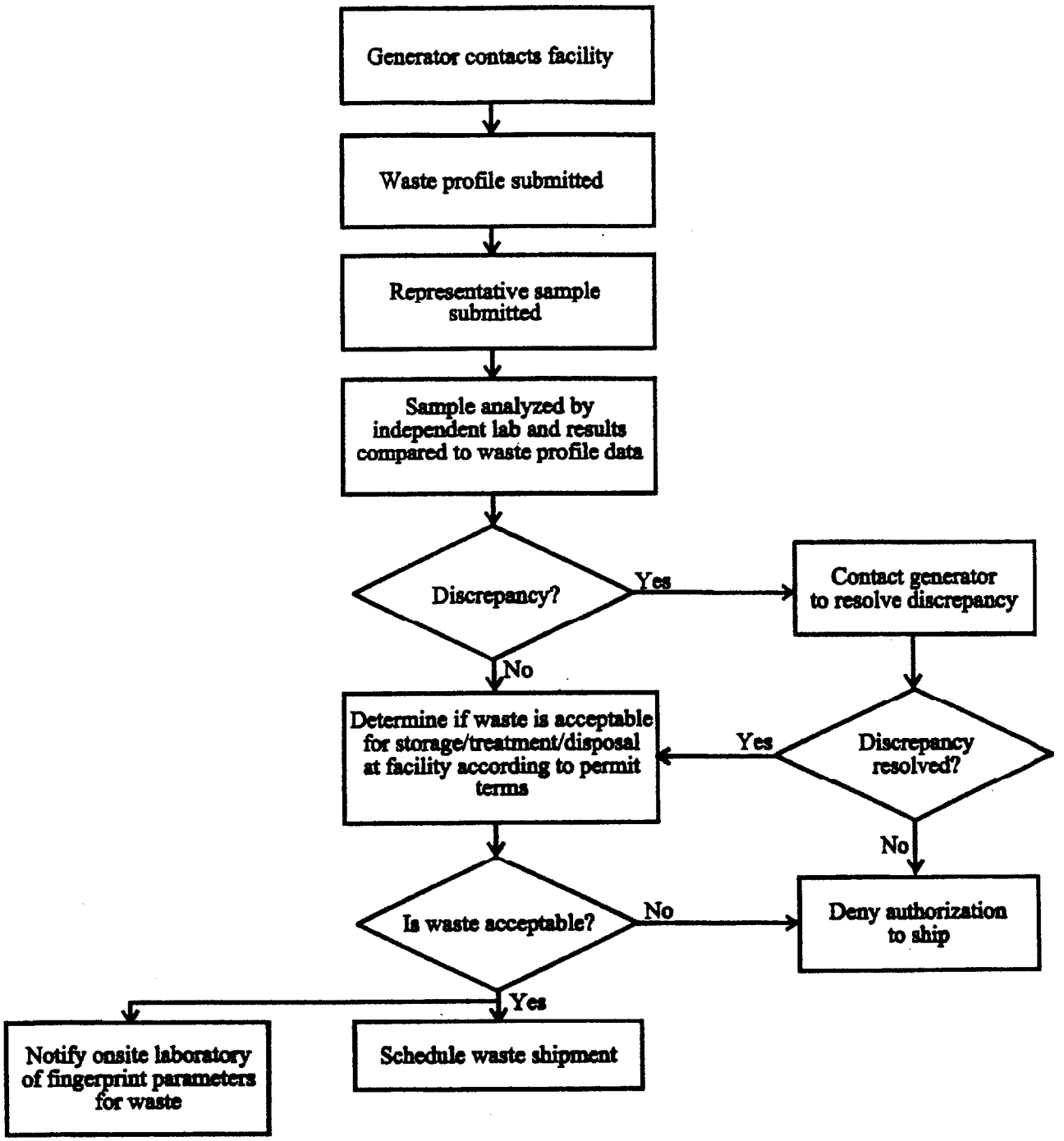
4.3 Pre-Acceptance Procedures for Off-Site Waste

Before a waste stream is accepted, all off-site generators will be required to provide a complete waste characterization (Section 4.3.1). After evaluating the paperwork supplied by the generator (Section 4.3.2), the Facility will send a representative sample of the waste to a laboratory for analysis and will evaluate the analytical results (Section 4.3.3). Finally, the Facility will notify the generator that the Facility will accept the waste stream (Section 4.3.4).

4.3.1 Waste Characterization Information Provided by the Generator

The activities associated with pre-acceptance of off-site waste streams are shown in Figure 4-1[RF1]. The generator must provide the following waste characterization information for each waste stream:

- A completed Waste Profile Form signed by an authorized agent of the generator. An example of a Waste Profile Form is contained in Permit Attachment F2. This form may be changed if the Facility believes that more information is warranted or if there are changes in regulations governing the Facility.
- Other documentation that supports the information presented on the Waste Profile Form (e.g., material safety data sheets [MSDSs]).
- A description of the process that generated the waste.
- A completed Land Disposal Restriction Notification.
- All other supporting data required by 40 CFR 268.7.
- All required certifications.
- Waste analysis data used to characterize the waste and/or process knowledge documentation.
- A representative sample of the waste, of adequate volume for analysis.



PRE-ACCEPTANCE PROCEDURE FOR FIRST TIME WASTE

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 4-1

~~Insert Figure 4-1, Pre-Acceptance Procedure for First Time Waste~~

If waste analysis is used to characterize the waste, the generator must supply, at a minimum, the following waste analysis data for each representative sample:

- identification of the sample medium (e.g.,~~ aqueous,~~ sludge, soil);
- information about waste stratification;
- brief description of the sampling strategy, including
  - a description of the sampling technique (i.e., biased or random);
  - rationale for selection of the number and location of samples;
  - a description of the statistical approach, if any; and
  - the sample type (i.e., grab or composite);
- identification of the analytical methods that were used and the rationale for the selection of these parameters;
- final laboratory reports including case narratives, waste analyses, and ~~quality assurance/quality control~~QA/QC analyses; and
- identification of the laboratory ~~which~~that performed the waste analyses.

The Facility will evaluate the way each representative sample was obtained in order to determine whether it is truly representative of the waste stream. The Facility will evaluate the information provided by the supplier and will use the documents listed below for guidance.

- The Sampling Plan, Section 4.6 of this document
- Standard Practice for Sampling Waste and Soil for Volatile Organics (American Society for Testing and Materials (ASTM) D4547-91)
- Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods, Part III (US Environmental Protection Agency Publication SW-846, latest edition)
- RCRA Sampling Procedures Handbook (EPA Region VI)

In certain cases, generators may meet waste analysis requirements by supplying ~~"acceptable knowledge". Acceptable knowledge~~AK, includinges process knowledge and waste analysis (Permit Attachment F4 identifies acceptable knowledge requirements for foreign generators). Process knowledge includes detailed information of a waste obtained from existing published or documented waste analysis data or studies on hazardous wastes generated by processes similar to that which generated the waste, or industry or trade association hazardous waste profile studies, or EPA documents. Examples of waste streams where process knowledge may be adequate for characterization are K-listed wastes (hazardous wastes from specific sources), which are identified by comparing the specific process that generated the waste to those processes listed in 40 CFR 261.32. The application of process knowledge is appropriate where the physical/chemical make-up of the waste is well known and consistent. Process knowledge is often used in conjunction with physical and analytical analysis.

Foreign Generators shall, in addition to all of the above requirements, ~~analysis~~ analyze wastes at an accredited laboratory in accordance with Section 4.7.4, Laboratory Requirements for Foreign Generators, and shall characterize all waste streams in accordance with Permit Attachment F4, Waste Characterization Using Acceptable Knowledge.

4.3.2 Paperwork Evaluation

The Facility will evaluate all of the waste characterization paperwork to determine if it adequately represents the physical and chemical characteristics of the waste stream and whether the waste stream is appropriate for management at the Facility. As part of the pre-shipment process, the Facility will work with the off-site waste generator to ensure that all necessary waste analyses and waste characterization information are provided to meet the applicable requirements for acceptance.

If waste analysis was used to characterize the waste, the Facility will evaluate the data to determine that:

- appropriate extraction and preservation techniques were used;
- appropriate sampling strategies were used;
- appropriate sample types were collected ~~(e.g., to demonstrate compliance with the LDR treatment standards, hazardous waste regulations require that grab samples be collected for non-wastewaters and composite samples be collected for wastewaters)~~;
- appropriate parameters were selected for analysis;
- appropriate analytical methods were used;
- recommended holding times were met;
- detection limits were below applicable standards (e.g., the LDR standards); and
- the quality of the analytical data is adequate for making a waste determination based on an evaluation of the final laboratory reports.

If the data supplied are not adequate to provide a complete characterization of the waste stream, the Facility will either require additional information from the generator or will not agree to accept the waste.

All of the waste characterization information supplied by the generator will be maintained in the Facility's Operating Record. In addition, the Facility's evaluation of this information and the results of the independent analysis will be maintained in the Operating Record.

4.3.3 Representative Sample Assessment

After evaluation and approval of the sample representativeness and waste characterization data paperwork, the representative sample submitted by the generator will be analyzed by a qualified laboratory other than the one used by the generator. Based upon the Facility evaluation of the information supplied by the generator, the Facility will inform the laboratory of the medium type (e.g., ~~liquid,~~ aqueous or~~,~~ solid) and appropriate parameters for analysis. The rationale for selection will be maintained in the Facility Operating Record.

The generator's Waste Profile Form will be compared with the results of the laboratory analysis of the representative sample and with the Facility's permit to ensure that the waste is acceptable for ~~storage, treatment, and/or~~ disposal at the Facility. Should there be a discrepancy between the analytical results and the generator information, the Facility will contact the generator to resolve the discrepancy. The generator will not be authorized to ship the waste until all discrepancies are resolved. If the discrepancies cannot be resolved with the information provided by the generator, the Facility will request a new Waste Profile Form and any additional information that may be required to characterize the waste adequately. In addition, the Facility may require the generator to submit additional samples of the waste for analysis. If the generator cannot supply adequate information to provide a complete characterization of the waste stream, the Facility

will not accept the waste. The generator will submit a new Waste Profile Form for each new waste stream and for an existing waste stream if it is modified significantly.

4.3.3.1 Major Discrepancies

Major discrepancies include the following:

- analytical results indicating that the generator applied an incomplete or wrong waste code to the waste stream;
- analytical results indicating that the generator submitted incomplete or wrong information on the LDR Notification Form;
- analytical results including constituents or underlying hazardous characteristics that are not explained by a description of the process; and
- other information indicating that the waste stream is not characterized properly.

In the event of a major discrepancy, the Facility will reject the paperwork and require the generator to analyze the waste in accordance with a sampling plan that is consistent with the guidance in EPA document SW-846, *Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods*, Chapter 9. The Facility will require the generator to resubmit the waste characterization information listed in Section 4.3.1 and one or more additional representative samples for analysis.

4.3.3.2 Minor Discrepancies

Minor discrepancies include any other waste characterization discrepancy (e.g., discrepancies ~~which~~ that do not question hazardous waste code assignments, waste treatment, or the presence of prohibited items). In the event of a minor discrepancy, the Facility will work with the generator to resolve the discrepancy. For example, uncertainties regarding whether sorbents are present will be handled as minor discrepancies. The Facility will contact the generator if the Waste Profile Form does not indicate whether a sorbent was added to the waste, or if it indicates that a sorbent was added but does not specify the name and type of sorbent and whether it is biodegradable. If the generator cannot provide this documentation, the waste must be tested to determine ~~if~~ whether it contains a biodegradable sorbent. If the waste is determined to contain a biodegradable sorbent, it will be ~~stabilized prior to disposal or~~ rejected.

4.3.3.3 Additional Waste Acceptance Conditions

In addition to complete characterization of the waste, the Facility will also evaluate the waste to ensure that it can be managed at the Facility. Waste analysis will be conducted where necessary to ensure that:

- the waste is not prohibited (e.g., the waste is included in Part A of this application, is not listed in Section 4.1 as a prohibited waste, or does not exceed allowable PCB concentrations or include dioxins);
- the LDR treatment standards contained in 40 CFR~~,~~ 268, Subpart D, including the standards for underlying hazardous constituents, are met;
- the general requirements contained in 40 CFR 264.17 for ignitable, reactive, and/or incompatible waste are met; and
- ~~the special requirements for bulk and containerized liquids contained in 40 CFR 264.314 are met; and~~
- the waste does not contain biodegradable sorbents, as required in 40 CFR 264.314(e).

All major and minor discrepancies, discrepancy resolutions, and compliance with the additional waste acceptance conditions listed above will be documented in writing and maintained in the Facility Operating Record.

4.3.4 Notification and Approval of Waste Shipment

After the Facility determines that the waste stream meets the pre-acceptance requirements, the Facility will send a written notification to the generator. This notification will include the following:

- a statement that the waste is acceptable for shipment;
- a unique identifier number for the waste stream, assigned by the Facility (see Section 4.10);
- instructions to put the unique identifier number on all shipment paperwork and all future waste characterization data that are submitted for the waste stream;
- a requirement to notify the Facility at least 24 hours before shipping, so that the Facility can ensure that there are sufficient resources and capacity to manage the shipment when it arrives;
- a statement that the Facility reserves the right to delay shipments beyond the 24-hour time frame;
- instructions to ensure safe management of the waste (e.g., packaging or labeling requirements not otherwise required by regulations);
- if the generator has treated the waste prior to shipment to meet applicable LDR treatment standards, a requirement that the generator develop and follow a written ~~waste analysis plan~~WAP that describes the procedures used; and
- a requirement that the generator retain on-site a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation produced pursuant to characterization of the waste stream for five years from the date that the waste was last sent to the Facility.

Once the Facility has completed pre-acceptance requirements and has determined that a waste stream is acceptable for shipment, the on-site laboratory will be notified in writing. The notification will include the waste type, waste stream identifier, physical form, packaging, and how the waste is to be managed. This information will be used by the laboratory as follows:

- the waste stream identifier will be used to track the samples in relation to the waste stream;
- the waste type ~~and management methods (storage, solidification, evaporation, and/or disposal)~~ will be used to help determine the analytical methods that will be employed for fingerprint analysis; and
- the physical form and packaging will determine the most applicable sampling methods.

Using this information, the on-site laboratory will designate a sampling and analytical protocol specific to each waste stream as described in Section 4.6. The unique identifier number for the waste stream will be used to track all activities for the waste stream. Individual shipments from within the waste stream will receive an additional identifier to enable the Facility to tie information back to the specific shipment as well as to the waste stream.

4.4 Procedures for Incoming Waste Acceptance

The activities associated with incoming waste shipments ~~(typically in drums, roll-off boxes, vacuum trucks, and tanker trucks)~~ are shown in Figure 4-2[RF2]. These procedures will be used for both initial shipment of a

(Figure)

4-2 Incoming Waste Shipment Procedures

waste stream and for waste streams that have previously been accepted by the Facility from the same generator and process. The Facility will review the waste shipment paperwork and resolve paperwork discrepancies (Section 4.4.1), and visually inspect the waste inside the containers and roll-off boxes (Section 4.4.2). Waste analyses for incoming shipments consist of fingerprint analysis and an annual analysis to update characterization of the waste stream (Section 4.4.3). Based on the Facility's evaluation of the waste stream, a determination to accept or reject the waste will be made (Section 4.4.4).

4.4.1 Paperwork Review

Upon receipt of a waste shipment, the truck will be routed to a parking area outside the Facility gate while documents are reviewed. The Facility will:

- review all paperwork for completeness to verify that all required documentation is present and signed as necessary;
- compare the information in the manifest, the Waste Profile Form, the LDR Notification Form, and pre-acceptance waste characterization information for consistency;
- compare the number of containers, the volume or weight of the waste, and the waste labels on each container with the manifest for consistency; and
- review all paperwork to verify that the unique identifier number for the waste stream is on all the waste shipment paperwork and all accompanying waste characterization data.

If the Facility determines that the paperwork is complete and consistent, the waste shipment will be routed to the truck sampling station, a staging area inside the Facility gate.

~~Insert Figure 4-2, Incoming Waste Shipment Procedures~~

If the Facility determines that the paperwork is incomplete or inconsistent, the waste shipment will be routed to a segregated, secure area inside the Facility gate pending resolution of the discrepancies. An attempt will be made to resolve discrepancies with the waste generator or transporter within 24 hours. In those instances where a discrepancy with the manifest cannot be resolved within 15 days of receiving the waste, a letter will be submitted to NMED describing the discrepancy and the attempts made to reconcile it. A copy of the manifest or shipping paper at issue also will be provided to NMED, as specified in 40 CFR 264.72(b). If the Facility is unable to resolve the manifest discrepancies, the waste will not be accepted.

The Facility will resolve significant manifest discrepancies in accordance with 40 CFR 264.72. Manifest discrepancies are differences between the quantity or type of hazardous waste designated on the manifest and the quantity or type of hazardous waste contained in the shipment received at the Facility.

Significant discrepancies in quantity are:

- *Bulk waste:* Variations greater than 10 percent in weight.
- *Batch waste:* Any variation in piece count, such as a discrepancy of one drum in a truckload.

Significant discrepancies in type are obvious differences which can be discovered by inspection or waste analysis, such as waste solvent substituted for waste acid, or toxic constituents not reported on the manifest or shipping paper.

All discrepancy resolutions will be documented in writing and maintained in the Facility Operating Record. If manifest discrepancies are not resolved within 90 days of identifying the discrepancy, waste will not be accepted for ~~storage or~~ disposal, and the waste will either be returned to the sender or disposed at an appropriate off-site facility.

4.4.2 Visual Inspection

After all paperwork discrepancies have been resolved, the Facility will physically open and inspect the waste inside drums and roll-off boxes for color, similar physical appearance (e.g., single phase, bi-layer, multi-layer), and physical state (e.g., solid or~~,~~ semi-solid~~, or liquid~~). This information will be compared with the waste characterization information provided by the generator and the physical appearance of the representative sample. If the color and/or viscosity of bulk wastes (solids and sludges) appear inconsistent, the Facility may elect to perform additional chemical tests (i.e., composite samples would be taken from within the different areas of coloration or viscosity).

The Facility will inspect a minimum of 10 percent of all drums of each waste stream per shipment (but not less than one drum per waste stream) and each roll-off container~~ or tanker truck~~.

The Facility will physically open all containers of hazardous debris and inspect the contents to ensure that the waste shipment matches the waste that is expected. Prior to acceptance of hazardous debris, the Facility will require the generator to provide a certification that the waste has been treated in accordance with the requirements defined for the treatment of hazardous debris in 40 CFR 268. Hazardous debris is visually inspected because it is exempted from the representative sample waste analysis requirements discussed in Section 4.7.2. This visual inspection will ensure that the waste stream matches the description provided by the generator.

Certain loads may not be sampled, at the discretion of the Facility manager or laboratory supervisor, for environmental and safety reasons (e.g., severe weather which causes unsafe working conditions). In these cases, the generator or his agent will be required to provide a signed certification that the load conforms to the Waste Profile Form. This variance from established procedure will be documented in the Facility Operating Record.

If a discrepancy is found, the Facility will contact the waste generator for resolution (see Section 4.4.1). The results of visual inspections and all discrepancy resolutions will be documented in writing and maintained in the Facility Operation Record. If discrepancies noted during visual examination are not resolved within 90 days of identifying the discrepancy, waste will not be accepted for ~~storage or~~ disposal, and the waste will either be returned to the sender or disposed off-site at an appropriate facility.

4.4.3 Waste Analysis for Incoming Shipments

Waste analysis for incoming shipments consists of fingerprint tests (Section 4.5.4) and an annual analysis to ensure correct characterization of each waste stream (Section 4.5.3).

4.4.3.1 Fingerprint Test Procedure

Fingerprint testing is an abbreviated analysis and is used to confirm that an incoming shipment of waste received at the Facility is the actual waste expected and that it matches the expected chemical content for that waste. Fingerprint analysis will be conducted on each waste stream in each shipment prior to shipment acceptance. Fingerprint analysis will be conducted generally for parameters that will give information that can

be used to help verify that a waste stream received from off-site matches the expected characteristics of the waste.

While the incoming shipment is staged at the sampling station, laboratory personnel or other trained personnel will review the sampling and laboratory requirements for the specific waste stream. After completion of this review, sampling personnel will obtain the necessary samples in the manner prescribed by the Sampling Plan and applicable laboratory requirements. Sampling will be conducted in accordance with approved site operating procedures. These procedures will detail the sampling requirements, sample labeling, chain-of-custody requirements, any necessary sample preservation requirements, and other sampling components (see Section 4.6).

Each waste stream in each shipment will be sampled in accordance with the following sampling rate, at a minimum:

- *Bulk waste:* One sample will be collected from each shipment of bulk waste (one shipment of bulk waste is considered to be one truck load or one roll-off box). If, upon visual inspection, the color and viscosity of solids or sludges appear inconsistent, the Facility may elect to obtain additional samples. These samples would be composites from within the different areas of color or viscosity.
- *Batch waste:* One sample will be collected from each 10 waste drums in each waste stream in each shipment. If there are less than 10 waste drums in the waste stream, one drum will be sampled. One sample will be collected from each drum if the waste appears to be inconsistent with the pre-acceptance waste characterization data.

The Facility can increase this sampling rate for any reason. For example, the Facility may decide to collect additional samples if the waste appears to be inconsistent with the pre-acceptance characterization data. In some instances, the Facility may elect to waive one or more analyses under the following conditions:

- The transported waste is a portion of a continuously shipped, well documented waste stream, such as waste produced from a consistent, non-variable process or contaminated soils from a specific remedial action.
- The waste has been approved for receipt by NMED on an emergency basis.
- Facility personnel at the point of generation sampled, or oversaw the sampling of, the waste, and the fingerprint test/supplemental analyses have been conducted. (In cases where a generator is sending very large or continual shipments, the Facility may elect to station personnel at the point of generation to obtain samples prior to or during loading of the waste).

Prior to waiving sampling and analysis requirements, however, the Facility will request a variance from NMED and will not dispose of the waste until NMED approval is received.

4.4.3.2 Annual Analysis Procedure

As part of the Facility's QA/QC procedures (see Section 4.7), the representative sample analysis for each waste stream from each generator will be repeated annually. Repeating this pre-acceptance procedure will ensure that the analysis is accurate and up-to-date and that the waste stream has remained within the operational bounds of the Facility. This annual analysis will be performed by an independent laboratory. This analysis will be repeated more frequently if the Facility believes, or has been informed by the generator, that the process generating the waste stream has changed. In the case of a change in the waste generation process the waste stream will be managed as a new waste stream in accordance with the requirements of this ~~waste analysis plan~~WAP.

4.4.4 Acceptance/Rejection Determination

4.4.4.1 Discrepancy Resolution

Upon completion of the fingerprint analysis, a determination will be made as to whether or not the wastes are consistent with the pre-acceptance waste characterization information and within acceptance limits of the Facility~~ and specific management units~~. If any of the analyses determine the waste is not within the operational acceptance limits for disposal, ~~a specific management unit,~~ the waste will not be accepted by the Facility.~~ for that unit.~~ If the results of the analysis conflict with the waste profile information, the Facility may take any or all of the following actions:

- Resample the waste, if necessary, and perform a second fingerprint test. The Facility manager has discretion to accept the waste if the second fingerprint results match those on the waste profile sheet. The discrepancy between results will be explained and included in the Facility Operating Record for that waste stream or shipment.
- Perform further characterization as necessary to verify the composition of the waste by sending a sample to a qualified independent analytical laboratory.
- Reject the entire waste shipment or the nonconforming portion of the shipment.

If discrepancies between fingerprint analysis and waste stream characterization information exist upon completion of discrepancy resolution, the waste will be rejected by the Facility. The Facility will return the rejected waste to the generator or ensure proper disposal of the waste at an appropriate off-site facility within 30 days of the waste rejection.

4.4.4.2 Shipment Acceptance Procedures

Once the decision has been made to accept a waste shipment, the appropriate papers will be signed for the generator, and the waste stream will be transported by truck to the landfill. ~~an appropriate management unit.~~

4.5 Waste Analysis

Tables 4F-1 through 4F-3 specify parameters which will be analyzed to ensure that all criteria for waste acceptance and management are met. The Facility will use approved SW-846 or ASTM analytical methods, or other approved method. If an alternative method not contained in SW-846 is to be used, the Facility will demonstrate that such alternative method is equivalent to the approved method contained in SW-846 or this ~~waste analysis plan~~WAP. Alternative methods will be submitted to the NMED Secretary at least 15 days prior to the sample collection event.

Permit Attachment F1, Section 4.5.1, identifies the rationale for selecting parameters and analytical methods which will be used to test hazardous waste managed at the Facility. Requirements for the pre-acceptance analysis of a representative sample of waste generated off-site and for the annual analysis are discussed in Sections 4.5.2 and 4.5.3, respectively. Section 4.5.4 contains requirements for fingerprint testing. Section 4.5.5 contains waste analysis requirements specific for the landfill.~~to storage, treatment, and disposal units.~~ Section 4.5.6 contains requirements for ~~waste~~ analysis of waste generated on-site.

Table 4F-1. Parameters and Methods for Pre-Acceptance Representative Sample Analysis

Waste Parameters	Extraction/Sample Preparation	Method[a]
Volatile organic compounds	5021 5031 5032 5035	8260
Semivolatile organic compounds	3510 3520	8270
Organochlorine pesticides	3510 3520	8081/8270
PCBs	3520	8082/8080
TCLP: Organics	1311	8260/8270/8080/8150
Chlorinated herbicides	8151[b]	8151
Reactive cyanide		9014
Reactive sulfide		9034
~~Water~~		~~ASTM C566~~
Ignitability		1010/1030
Flashpoint		1010/1020A
Corrosivity to metals		1110 pH paper pH electrometer 9040A/9041A/9045A
pH		9040A/9041A9045A
Dioxins		8280
Total metals	3000 1311	6000 series 7000 series
Liner compatibility tests		9090A
Extractable volatiles	3500	8260
Extractable semivolatiles	3500	8270
Physical appearance		ASTM D4979
Radioactivity		Industry standard survey technique (e.g., scintillation detector)

[a] Most current revision of SW-846 will be used.

[b] Method 8151 contains the extraction, cleanup, and determinative procedures for these analytes.

Table 4F-2. Tests and Analytical Methods for Fingerprint Samples

Test	Method and Description	Qualitative or Quantitative
Flammability potential screen	ASTM D4982	Qualitative
Free liquids	Paint filter test, penetrometer, or visual/9095	Qualitative
Ignitability	Match test, Pansky-Martens closed cup or Set-a-flash 1010/1020A	Qualitative

Test	Method and Description	Qualitative or Quantitative
Miscibility	50/50 mixture with water	Qualitative
~~Water mix~~	~~ASTM D5058 Test Method C~~	~~Qualitative~~
Chlorinated solvents	Colorimetric test or Beilsten test	Quantitative
Cyanide	Electrode or colorimetric test (ASTM D5049 Test Method B)	Quantitative
PCBs	Colorimetric test/8080	Quantitative
Specific gravity	Hydrometer/Method dependent on material composition and physical state	Quantitative
Sulfide screen	ASTM 4978	Quantitative

Table 4F-3. Additional Tests and Analytical Methods

Test	Reference	Description
Paint filter test	EPA 9095	This test will determine the free liquids that are contained within the waste matrix and will be used as a control parameter for wastes that are to be landfilled.
Heavy metals	6010A/7470	This test determines the concentration of heavy metals.
Free cyanides	APHA 412G, H	This test determines if cyanides could potentially be reactive under acidic conditions.
Toxicity characteristic leaching procedure[a]	Extraction Method 1311/3010A	Determines if waste, or stabilized waste, contains level of restricted constituents above BDAT treatment standards.
Total organic halogens	EPA 9020	Determines if the waste potentially contains LDR constituents above BDAT standards for California List wastes.
PCBs	Colorimetric test/EPA 8080	Determines if PCBs are contained in the waste matrix and determines the concentration.
IR scan	ASTM D2621, D4053	Determines the presence of organics and provides a rough estimate of their concentration.

[a]Analytical method chosen is dependent upon constituent being determined (i.e., Organics 8260, 8270, 8080).

4.5.2 Representative Sample Analysis

The Facility will select parameters for analysis to ensure that the criteria for waste acceptance identified in Section 4.2 are met. The analysis will include, at a minimum, testing for each hazardous waste contained in the waste stream, as identified by EPA hazardous waste code, and for each underlying hazardous constituent, as identified in 40 CFR 268.48, Table 4-1, Parameters and Methods for Representative Sample Analysis. Additionally, parameters on Tables 4-2, Tests and Analytical Methods for Fingerprint Analysis, and 4-3, Additional Tests and Analytical Methods, will be included, as applicable.

For foreign wastes, in addition to the conditions specified above, representative sample analysis for each waste stream shall include testing for all constituents listed in 40 CFR 268.48 using practical quantitation limits capable of measuring the standards specified in 268.48. The results of this test will be used to perform the comparison with the generator's Waste Profile Form specified in the Representative Sample Assessment Section (Waste Analysis Plan Condition 4.3.3). Testing for all constituents listed in 40 CFR 268.48 shall not be required for the annual analyses.

Hazardous debris, as defined in 40 CFR 268.2(g), that has already been treated to meet the LDR treatment standards as described in 40 CFR 268.45 does not have to meet the representative sample analysis requirements if the Facility determines that the generator provided waste characterization information that demonstrates that the proper EPA Hazardous Waste Numbers were applied and indicates whether or not the LDR treatment standards have been met.

4.5.3 Annual Analysis

The representative sample analysis for each waste stream from each generator will be repeated annually at an independent laboratory not used by the generator (see Section 4.4.3.2).

4.5.4 Fingerprint Analysis

Fingerprint samples will be analyzed for all parameters listed on Table 4E-2, and may include tests for physical appearance, pH, and radioactivity. Additional fingerprint parameters will be selected based on the pre-acceptance waste characterization data, shipment paperwork, physical form of the waste, and the visual inspection of the contents of containers and bulk waste. The Facility will follow the additional parameter selection process described in Section 2.2 of the EPA guidance document, *Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes* (EPA, OSWER 9938.4-03, April 1994).

Because the Facility already knows the detailed chemical and physical properties of a waste, additional necessary and appropriate fingerprint or spot check parameters can be chosen easily, as the purpose of the fingerprint is only to verify that the waste fingerprint analysis will include, at a minimum, the parameters received is the waste expected. These parameters will be analyzed at the on-site laboratory. Analyses which are not within the on-site laboratory's capability will be sent to an independent laboratory for analysis.

Fingerprint analysis will also include parameters as necessary to ensure that the waste is within the Facility regulatory and operational acceptance limits (see Table 4E-3). To select these additional sample parameters, the Facility will consider:

- compliance with applicable regulatory and permit requirements.– (This may require selection of parameters not reported by the generator);
- identification of incompatible and inappropriate wastes; and
- process and design considerations.

As noted, fingerprint analysis helps the Facility minimize the potential to receive waste that is unacceptable. Therefore, the level of additional analysis required for a waste shipment is a function of Facility knowledge about the waste generation process and the waste generator. The Facility may elect to perform additional fingerprint tests to achieve a higher level of confidence that a full waste characterization is achieved. If discrepancies are noted between the received waste and the Waste Profile Form, the waste will be further analyzed using additional fingerprint parameters. Discrepancies that can result in the Facility requiring

additional analysis include non-conformance with the results of required testing or a change in color, texture, liquid content, or other characteristics that can be observed upon receipt.

The Facility will follow the additional parameter selection process described in Section 2.2 of the EPA guidance document, *Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Wastes* (EPA, OSWER 9938.4-03, April 1994).

4.5.5 Additional Analysis for the Landfill ~~Specific~~ Management Units

4.5.5.1 Overview of Waste Management Procedures in the Permitted Hazardous Waste Management Units

Upon completion of the fingerprint analysis, and supplemental analyses if conducted, waste will be transferred to the appropriate staging area. Prior to ~~interim or~~ final disposition of the waste, however, additional analyses may be required to ensure that requirements for the landfill ~~permitted hazardous waste management units~~ are met.

Analysis necessary for disposal ~~specific management units~~ is generally conducted as part of the pre-acceptance procedure (see Section 4.7.2). Appropriate parameters will be selected from Tables ~~4~~F-2 and ~~4~~F-3. The Facility will use a combination of process knowledge and analytical results to obtain the information needed prior to placing waste in the landfill~~one of the management units~~. The Facility may elect to use other EPA~~-~~-approved analytical methods if it is felt that information other than that obtainable by these methods is needed to manage the waste safely.

~~All hazardous waste management units will have~~The landfill has specific ignitability, reactivity, and compatibility requirements ~~which~~ that must be met. Acceptable knowledge or waste analysis will be used to determine whether a waste stream is ignitable, reactive, or incompatible with other wastes to be placed in the landfill. ~~when stored or mingled.~~ In addition, acceptable knowledge or waste analysis will be used to determine whether the waste stream is compatible with the ~~container or tank in which it is placed, or with the liner of the evaporation pond or~~ landfill. Specific ignitability, reactivity, and compatibility tests will be conducted as part of the representative sample analysis, and may be repeated in the fingerprint test, for wastes assigned to specific management units. Management of these wastes is discussed in ~~Vol. I, Section 5.5~~Permit Attachment B, Section 5.5 ~~of this application~~. Ignitability, reactivity, and compatibility determination is discussed in Section 4.5.1.2.

The Facility will conduct compatibility tests as part of the representative sample analysis procedure on an incoming waste stream specific to ~~each management unit and specific to~~ other waste streams with which it may be combined. ~~Special requirements for specific management units are discussed in Sections 4.5.5.2 through 4.5.5.5.~~

~~4.5.5.2 Waste Analysis Requirements Specific to Storage Units.~~

~~Wastes will be stored in the drum storage building, the roll-off container storage area, and the liquid waste storage tanks. Waste characterization is accomplished through the representative sample analysis, the yearly update of the representative sample analysis, and on-going fingerprint analysis. The ignitability, reactivity, and incompatibility of each waste stream will be determined using procedures listed in Table 4-2 to ensure that stored waste is compatible with other wastes and with the container or tank in which it is placed. Spills or releases of hazardous waste and/or fluids removed from the leak detection systems will be tested to determine if the recovered material is hazardous.~~

~~Procedures from Table 4-3 will be used to determine whether a hazardous waste stored in containers must comply with the requirements of 40 CFR 264, Subpart CC. If it must comply, the container will be managed to meet Container Level 1 and Level 2 standards as appropriate. Waste which must comply with the requirements of 40 CFR 264, Subpart CC, will not be placed in storage tanks.~~

~~The facility will ensure that containers are either at least 90 percent full when placed in the landfill, or are crushed, shredded, or similarly reduced in volume to the maximum practical extent.~~

~~4.5.5.3 Waste Analysis Requirements Specific to the Evaporation Pond~~

~~Liquid waste streams may be placed in the evaporation pond for drying before they are sent to the stabilization tanks for solidification. Following evaporation of the pond liquids, sludge will be removed from the bottom with trash pumps or hand excavation equipment.~~

~~Waste will be characterized by representative sample analyses and fingerprint analyses, using the parameters listed on Tables 4-1 through 4-3, as applicable, before it is placed in the evaporation pond. A determination of ignitability, reactivity, and incompatibility with other wastes with which the waste may be combined and with the pond liner will be made. It will also be tested to ensure that the LDR standards are met and that the waste placed in the pond does not contain volatile organic concentrations equal to or greater than 500 ppmw.~~

~~Because evaporation in the pond may change the chemical composition of the waste, or different waste streams may be combined in the pond, analysis to ensure that the LDR standards are met will be conducted on a waste stream after it leaves the pond. Applicable knowledge will be used to determine appropriate parameters for analysis. If, after treatment, a waste displays a characteristic for the first time, the characteristic waste code will be added to the LDR Notification Form and facility records. The waste will be retreated, if necessary, to meet the characteristic treatment standard before land disposal.~~

~~Dilution of restricted wastes will not be used as a substitute for adequate treatment for non-toxic hazardous characteristic waste. If toxic characteristic wastes and listed wastes are amenable to the same type of treatment and aggregation is a part of treatment, then the aggregation step does not constitute impermissible dilution.~~

~~4.5.5.4 Waste Analysis Requirements Specific to the Stabilization Tanks~~

~~Waste treated in the stabilization tanks is characterized to determine the hazardous constituents contained in the waste and to ensure that waste placed in the stabilization tank is compatible with the tank liner and with the previous waste type treated. Acidic or caustic material may be neutralized by the stabilization process.~~

~~In addition to the representative sample provided by the generator during the pre-acceptance period, a second representative sample of any waste requiring stabilization prior to placement in the landfill (or a sample of waste coming from the evaporation pond for stabilization) must be supplied. This sample will be used for bench-scale testing to determine regulated constituent leaching based on varying admixtures and ratios (i.e., to determine treatability of wastes). The stabilization process will result in a dry and structurally stable material that is suitable for compaction and landfilling.~~

~~Bench-scale tests will be conducted as part of the representative sample analysis for incoming waste streams which will go directly to the stabilization tanks, or for a waste stream from the evaporation pond. Selection of treatment reagents and quantities will be established according to the waste profile and the post-treatment LDR requirements. Stabilization agents that will be tested include, but are not limited to, lime, fly ash, and Portland cement.~~

~~The waste will also be treated to ensure that it does not contain volatile organic concentrations equal to or greater than 500 ppmw.~~

~~The EPA universal treatment standard (see 40 CFR 268.48) will be met for wastes treated on-site. Waste streams that carry more than one characteristic or listed EPA Hazardous Waste Number will be treated to the most stringent treatment requirements for each hazardous waste constituent, including underlying hazardous constituents. When wastes with different treatment standards are combined solely for the purpose of treatment, the most stringent treatment specified will be met for each hazardous constituent in the combined waste.~~

~~After stabilization, wastes will be retested prior to placement in the landfill to determine whether they meet LDR requirements. If LDR requirements are not met, the waste will be retreated. After testing, stabilized waste will be placed in roll-off containers and placed on the roll-off pad until cured.~~

4.5.5.5 Waste Analysis Requirements Specific to the Landfill.

~~The stabilized waste will be retested p~~Prior to placement of waste in the landfill, it must be determined that the waste ~~to determine whether it~~ meets LDR standards as set forth in 40 CFR 268, Subpart D. 40 CFR 268.40 states that a waste identified in the table "Treatment Standards for Hazardous Wastes" may be land disposed only if it meets the requirements found in the table. For each waste, the table identifies one of three types of treatment standard requirements:

- All hazardous constituents in the waste or in the treatment residue must be at or below the values found in the table for that waste ("total waste standards"); or
- The hazardous constituents in the extract of the waste or in the extract of the treatment residue must be at or below the values found in the table ("waste extract standards"); or
- The waste must be treated using the technology specified in the table ("technology standard") which are described in detail in 40 CFR 268.42, Table 4-1.

In cases where treatment standards are based on concentrations in the waste extract, the generator ~~facility~~ will use toxicity characteristic leaching procedures (TCLP, see 40 CFR 261, Appendix II) to determine if the waste meets the standards. The sampling and analysis protocols outlined in Sections 4.5 through 4. 7 of this permit application will apply to all wastes to ensure compliance with LDR standards. Parameters for analysis will be determined by the characterization of the waste before analysis. All information obtained to document LDR compliance will be maintained in the Facility Operating Record.

In addition to other required procedures and analyses, on an annual basis the Facility will randomly sample and analyze a minimum of 10 percent of incoming waste streams that are to be directly landfilled to verify conformance with the LDR requirements. These additional samples will be analyzed for the specific regulated hazardous constituents contained in the hazardous waste stream. The data generated from these samples, in conjunction with the generator-supplied data, will be used to verify conformance with the LDR requirements.

Facility personnel, either at the Facility or at the point of generation, will collect these samples. The samples will be split into a minimum of two aliquots. One will be retained and the other analyzed for conformance with the applicable LDR requirements. If the results of the analysis indicate that the waste does not conform with the applicable LDR requirements, the retained sample will be analyzed, generator-supplied information re-evaluated, and an evaluation made of the potential for the waste's variability based on the process that generates the waste stream.

The retained sample will subsequently be analyzed, the generator-supplied information re-evaluated, and an evaluation made of the potential for the waste's variability based on the process that generated the waste stream. These factors, along with an evaluation of the QA/QC data from the laboratory (both the generator's and the Facility's), will be used to determine if the subject waste stream is eligible for continued disposal at the Facility or if additional treatment is necessary prior to disposal. Disposal of the waste stream will be discontinued until the discrepancy regarding compliance with the LDR requirements has been resolved and the generator has demonstrated that its on-going program for compliance with LDR requirements is adequate.

Procedures to meet LDR standards for specific wastes include the following:

- *Lab packs:* Prior to acceptance by the Facility for disposal, hazardous wastes contained in lab packs will be treated to meet applicable treatment standards for each waste type identified. ~~Procedures to determine applicable treatment requirements, and the subsequent treatment of lab wastes to applicable standards, will be consistent with procedures implemented for other waste types.~~ Lab packs will also be analyzed to ensure that they do not contain hazardous wastes listed in 40 CFR 264, Appendix IV. In cases where hazardous lab pack wastes are combined with non--hazardous lab pack wastes prior to or during treatment, the entire mixture will be treated to meet the most stringent treatment standard for each hazardous constituent before being disposed of in the landfill.

- *Ignitable or reactive wastes:* Ignitable or reactive hazardous waste will be tested to ensure that it will not be placed in the landfill until the waste has been rendered non-ignitable or non-reactive by treatment.

- *Characteristic wastes.* Generator process knowledge and/or analytical data will be used to determine whether characteristic wastes meet the applicable treatment standards or to demonstrate that the waste has been treated by the appropriate specified treatment technology. In accordance with 40 CFR 268.41, where treatment standards are based on concentrations in the waste extract, generators shipping waste to the Facility will determine if their wastes meet treatment standards.

- ~~*Bulk liquids:* All hazardous wastes will be tested for the presence of free liquids (paint filter test) to ensure that no free liquids are placed in the landfill. No containers holding free liquids will be placed in the landfill unless the container is in a lab pack, or the container was designed to hold liquid for use other than storage, such as a battery or capicitor, or the container is very small, such as an ampule.~~

- *Reactive wastes:* Reactive wastes will not be placed in the landfill until they have been rendered nonreactive by treatment.

- *Incompatible wastes:* Incompatible wastes will be sufficiently separated when placed in the landfill to ensure that they do not combine to cause adverse reactions. These wastes will be managed to ensure that they meet the requirements specified in 40 CFR 264.313 and 274.17. This management includes placing incompatible wastes in non-adjacent landfill grids and treatment of potentially noncompatible wastes prior to shipment of the waste to the Facility. ~~landfilling~~.

- *Hazardous debris:* ~~Hazardous debris will not be treated at the facility. Therefore, t~~The Facility will only accept hazardous debris that has been treated and certified to meet the LDR treatment standards specified in 40 CFR 268.45(b) or (c) by the generator prior to shipment to the Facility.

- *Listed waste:* Listed waste will not be placed in the landfill until it has been shown to meet the requirements of 40 CFR 268.40.

4.5.6 Waste Analysis Requirements for Waste Generated On-Site

4.5.6.1 Overview of Waste Generated On-Site

The Facility is expected to generate some waste on-site through ~~waste treatment,~~ day-to-day Facility operations, leachate, or releases of hazardous waste to the environment (see Table 4F-4).

Table 4F-4. Potential On-Site Waste Generation Areas/Activities

Area	Method of Generation	Waste Form [a]
Landfill	Leachate collected in the leachate collection system	L, SL
~~Evaporation Pond~~	~~Leachate collected in the leachate collection system~~	~~L, SL~~
~~Evaporation Pond~~	~~Sludges generated as a result of the cleaning and repair of the liner system~~	~~L, SL~~
~~Truck Wash~~	~~Decontamination rinse water~~	~~L, SL~~
Stormwater Retention Basin	Contaminated rain water	L, SL
~~Liquid Waste Storage Area~~	~~Decontamination rinse water~~	~~L~~
~~Stabilization Area~~	~~Decontamination rinse water~~	~~L, SL~~
Operations	Personal protective equipment (PPE) contaminated during routine and non-routine operations	S
Site Operations	Spill residues primarily from waste handling operations. Sampling activities.	L, SL, S

[a] L = Liquid, SL = Sludge, S = Solid

Waste generated on-site will be assumed to be RCRA-regulated until process knowledge and/or sampling and analysis can be used to determine the actual nature of the waste. Sampling and analysis will be accomplished in accordance with the requirements this ~~waste analysis plan~~WAP.

The Facility will select waste analysis parameters to confirm the identity of waste streams generated at the Facility. The selection of waste analysis parameters will typically be based on knowledge of the physical and chemical processes that produced the waste stream. If there is doubt as to the specific source, the Facility will use the waste tracking system to identify all possible sources and to develop a list of specific parameters for laboratory analysis. Acceptable knowledge and analytical testing as necessary will be used to ensure compliance with LDR requirements and provide waste compatibility and other information to determine appropriate waste management activities.

~~After analysis, the waste will be returned to the unit from which it came or sent to another appropriate unit.~~ The Facility will ensure that all on-site generated waste sent to the landfill meets all LDR treatment standards.

~~**Treated waste** is considered newly generated waste because hazardous waste treatment at the facility will result in a change in the physical and/or chemical character or composition of the waste. Treated waste will be recharacterized, using waste analysis or acceptable knowledge as appropriate and it will be tested to ensure that LDR treatment standards are met before disposal in the landfill. Waste analysis requirements are discussed in Section 4.5.5.5.~~

Day-to-day operations at the Facility will produce some waste on-site from day-to-day operations (e.g., paint and paint strippers, laboratory chemicals and equipment, vehicle maintenance). This waste will be characterized using acceptable knowledge, or waste analysis if the source cannot be definitively determined. If it is hazardous waste and meets all disposal requirements, it may be ~~sent to the evaporation pond or stabilization tanks for treatment as appropriate, and~~ disposed in the landfill. If it does not meet the requirements for disposal in the landfill or if it is not hazardous waste, it will be sent off-site for disposal.

A **release** is defined as "any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous waste (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents)". Management protocols for releases generated on-site are discussed below:

- *Spills and leaks:* Spills and leaks may occur during ordinary Facility operations (e.g., release of fluid from a leaking drum to the cell trench and sump in the drum handling unit, a spill at any loading or unloading area~~, or overtopping at the evaporation pond~~).

Provisions for the detection, characterization, and management of spills and leaks are discussed in ~~Vol. I,~~ Sections 2.0, 5.4.2, 6.3.5.2, and 6.3.7 of this Permit Application. If spills and/or leaks are identified during inspections, the materials will typically be removed from the system, characterized, and managed appropriately. If necessary, the contaminated area will be sampled to ensure that all contaminated materials are removed.

- *Decontamination rinse water:* Personal ~~protection~~ protective equipment (PPE), as well as other equipment (e.g., trucks, sampling equipment, industrial absorbents used during spill or leak clean-up, emergency equipment), may become contaminated during the course of site operations such as the handling of wastes, the transfer of waste to another unit, or emergency operations. The water used to rinse this equipment will be analyzed to determine if it is a hazardous waste and if the equipment has been adequately decontaminated. Provisions for the detection, characterization, and management of decontamination rinse water are discussed in ~~Vol. I,~~ Sections 5.2.5, ~~and~~ 5.2.10, and ~~Vol III, Section~~ 9.1.2~~;~~ of this Permit Application. ~~Rinse water will be removed to the truck wash area.~~ Rinse water and residues will be chemically analyzed and handled in an appropriate manner.

- *Run-on/run-off:* Facility stormwater control is provided by a network of surface run-on and run-off diversion channels and collection and detention basins (see ~~Vol III,~~ Drawing 25 of the Facility design drawings in Permit Attachment L1~~of this Permit Application~~). To control the runoff from the Facility, several collection channels and culverts will be built to divert discharges from storm events to a stormwater retention basin (see Section 2.7 of the Operations and Maintenance Plan, submitted separately). Procedures for management of run-on/runoff are discussed in ~~Volume I,~~ Sections 2.5.1.6, 2.6.1.4, and 5.4.2 of this Permit Application. ~~Contaminated water will be characterized, treated in the evaporation pond and/or stabilization bins, and disposed of in the landfill in compliance with appropriate regulations.~~ Sampling will be conducted upstream of the stormwater d~~r~~etention basin to determine the source of any~~the point where~~ hazardous constituents that could be~~were~~ introduced into the stormwater. Appropriate corrective actions will be implemented to prevent further contamination during future stormwater events.

- *Investigation derived wastes (IDW):* IDW may include drill muds and~~;~~ cuttings from~~, and~~ well installation ~~purge waters~~ associated with the investigation of spills and releases; ~~purge waters,~~ soils and other materials from regularly scheduled sampling activities associated with waste management units and the vadose zone monitoring system; and contaminated PPE. All IDW will be assumed to be

hazardous waste until site or material specific information becomes available. IDW will be stored near the point of generation in appropriately labeled containers for no greater than 90 days and will be appropriately analyzed to determine whether it is either a characteristic or listed hazardous waste. Analysis of materials associated with the IDW may be used also to characterize the IDW. An example of associated analysis for urge waters from the vadose zone monitoring system would be the final analytical results for the samples collected to satisfy regularly scheduled monitoring requirements.

- *Contaminated soil:* Soil means unconsolidated earthen material consisting of clay, silt, sand or gravel size particles as classified by the US Natural Resource Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made primarily of soil by volume based on visual inspection. Contaminated soil is soil impacted by a hazardous constituent release. Soil may become impacted by a release either at the surface or subsurface. If the contaminated soil exists at the surface, the appropriate response is described in the Contingency Plan in the Permit Application. If the contaminated soil exists subsurface, the appropriate response will be developed by NMED as permit conditions. Contaminated soils that are managed as hazardous wastes will be analyzed and managed in accordance with the alternative LDR treatment standards for contaminated soil contained in 40 CFR 268.49.

- *Air emissions:* Procedures for detection of hazardous gases and volatile organic at the landfill are discussed in ~~Vol. I,~~ Sections 2.5.1.8 and 6.2.2 of this Permit Application. Procedures to minimize wind dispersal of dust throughout the Facility are identified in Section 5.4.8. This section also discusses pollution control systems in the stabilization unit to minimize the release of particulate to the atmosphere. The Facility will apply to NMED for a new source air emissions permit before start-up of operations.

- *Leachate:* ~~Leachate collected from the storage units or the stabilization building is treated as a spill or release.~~ Leachate~~s,~~ as used here refers to landfill ~~and evaporation pond~~ fluids. The definition of leachate is in 40 CFR 260.10, collected from the leachate collection and removal system (LCRS), the leak detection and removal system (LCRS), or the vadose zone monitoring system (VZMS) sump~~s~~.

~~Leak detection and removal/vadose zone monitoring for evaporation pond leachate is discussed in Vol. 1, Sections 2.6.1.2 and 2.6.4.3 of this application. Procedures for the removal of evaporation pond leachate are discussed in Section 2.5.4.3. Leachate will be removed by vacuum truck on a regular basis, combined with leachate from the landfill and treated in the stabilization tanks to remove free liquids and to ensure that LDR treatment standards are met.~~

Leak detection and removal/vadose zone monitoring for landfill leachate is discussed in ~~Vol. 1,~~ Sections 2.5.1.3, 2.5.1.4, and 2.5.1.5 and in the Engineering Report in Permit Attachment L. Leachate generated from the landfill will be managed and removed by enhanced evaporation through leachate recirculation within the landfill~~pumped out of the unit sumps into the temporary leachate storage tank. It will then be tested to assure compliance with LDR requirements defined in 40 CFR 268 for F039 listed wastes.~~ All leachate will be contained within the lined landfill unit.

~~Leachate will be transferred daily from both the landfill and the surface impoundment sumps and combined in temporary storage tanks for management purposes. The combined leachate will be analyzed monthly for the F039 underlying hazardous constituents to determine whether it meets LDR treatment standards and can undergo evaporation in the surface impoundment prior to stabilization.~~

Leachate may also be collected from the vadose zone monitoring wells, but only in the unlikely event of a leachate release from the landfill. These wells will be monitored monthly; if any fluids are present, they will be sampled and analyzed for all F039 constituents. Biennially, the wells will be analyzed for all the Ground Waste Monitoring List constituents identified in 40 CFR 264, Appendix IX, if water is present.

Leachate sampling and analysis will follow the sampling and analytical procedures and recordkeeping requirements contained in the ~~Vadose Zone Monitoring System~~VZMS Work Plan (Attachment I) and this section.

4.6 Sampling Plan

The Sampling Plan is based upon the guidance provided in Chapter 9 of SW-846. The overall plan takes into account the regulatory and scientific objectives identified in this ~~waste analysis plan~~WAP. Based upon these objectives, the sampling strategy ensures that the data collected will minimize the potential for accepting waste that is unsuitable for management at the Facility. Modifications to the Sampling Plan to include detailed sampling protocols specific to the site activities will likely be required to reflect the sampling to be performed during operation of the Facility.

The sampling program will take into account the different types of waste constituents and the various waste matrices that may be encountered. By taking these variables into account, the Facility will identify the protocols by which sample locations will be selected and the methods most appropriate for collecting samples from the different waste streams.

The latest revision of SW-846 methods (ASTM) or other approved methods will be used, and site procedures will be revised as necessary to incorporate new requirements.

General sampling methods and collection techniques are discussed in section 4.6.1. Section 4.6.2 contains specific sampling procedures. Section 4.6.3 and 4.6.4 provide information on sample location and sample type, respectively. Section 4.6.5 discusses sampling ~~quality assurance/quality control (~~QA/QC~~)~~ procedures. Sections 4.6.6 and 4.6.7 present requirements regarding sample preservation, volume and holding times, and ~~for~~ equipment decontamination, respectively.

4.6.1 Sampling Methods

Sampling methods will follow Appendix I of 40 CFR, Part 261 unless a more appropriate method is identified. Table 4F-5~~, Sampling Methods,~~ lists general waste matrices and appropriate sampling methods that will be used at the Facility.

Matrices that will be sampled include containerized liquid, viscous liquids/sludges, crushed/powdered material, rock/rock-like material, soil, and fly-ash-like material. The methods and equipment used for sampling wastes will vary with the form and consistency of the material to be sampled. Also, these matrices will be sampled using a variety of sampling tools (see Table 4F-5), including the Coliwasa (containerized liquid/viscous liquid), dipper (containerized liquid/viscous liquid), thief (containerized liquid/viscous liquid), weighted bottle (containerized liquid), scoop (sludge, powdered material, rock/soil material, fly-ash material), shovel (powdered material, rock/soil material), auger (soil/fly-ash-like material) and tube sampler (fly-ash like material and liquids). The Facility will select the appropriate sampling method from Table 4F-5 based upon the sample matrices, chemical constituents within the sample, and sampling conditions. If a sampling method not presented on Table 4F-5 would be more appropriate for the specific matrices to be sampled given site-specific conditions or if the procedures presented below must be modified, an alternative method will be

used. If an alternative method is used, the sampling method will be well documented, justified, placed in the Operating Record, and approved by NMED prior to implementation.

Table 4F-5. Sampling Methods

Waste Matrix	Sampling Method	Sampling Equipment
~~Extremely viscous liquid or s~~Sludge	ASTM D140-70	~~Coliwasa, d~~Dipper, scoop, thief
Crushed or powdered material	ASTM D346-75	Scoop, shovel, tube sampler
Soil or rock-like material	ASTM D420-69	Scoop, shovel, auger
Soil-like material	ASTM D1452-65	Scoop, shovel, tube sampler
Fly ash-like material	ASTM D2234-76	Tube sampler, trier, auger, scoop, shovel
~~Containerized liquids~~	~~SW-846~~	~~Coliwasa, tube sampler, weighted bottle, dipper, thief~~

Sampling equipment will be compatible with waste, and are generally made of glass, steel, or Teflon. Stainless steel is more suitable for sampling solids and soils, while glass and Teflon are more suitable for liquids.

~~4.6.1.1 Sampling with a Coliwasa~~

~~The Coliwasa is used to collect extremely viscous liquid or sludge samples, as well as containerized liquid samples. The Coliwasa provides a representative sample of layered and homogenous liquid materials, and the sampler consists of glass, plastic, or metal tube with an end closure that can be opened and closed while the tube is submerged in the sample material. The following general process will be used to sample with the Coliwasa:~~

~~1.Clean/decontaminate Coliwasa.~~

~~2.Adjust sampler's mechanisms to ensure that the stopper provides tight closure. Open sampler.~~

~~3.Lower sampler into waste so that liquid level inside and outside the sampler remain the same.~~

~~4.When sampler hits the base of the material to be sampled, the sample tube is pushed down to close the sampler and lock the stopper.~~

~~5.Withdraw the Coliwasa from the waste and place sample into the appropriate sample container.~~

~~Note that only plastic Coliwasas constructed of Teflon should be used to sample organics. Glass coliwasas are not used to sample hydrofluoric acid liquids, and if solids are present at the base of the sampled matrix, an alternative sample device will be used to obtain a representative sample of the solid phase.~~

4.6.1.2 Sampling with a Dipper

Dippers are used to collect liquid samples and free-flowing slurries. The dipper consists of a glass, plastic, or stainless steel beaker or similar container typically clamped, as necessary, to the end of a pole which serves as a handle. The following process will be used to sample with the dipper:

1. Clean/decontaminate the dipper.

2. Insert dipper into the liquid to be sampled, preferably through the entire sample container, if possible.

3. Remove dipper and place sample into the appropriate sample container.

4.6.1.3 Sampling with a Thief Sampler

A thief sampler may be used to collect ~~viscous liquid/~~sludge samples or to sample small dry granules. Thief samplers typically consist of two slotted concentric tubes of stainless steel; the outer tub has a conical tip allowing the sampler to penetrate the sample material, while the inner tube is rotated to open/close the sampler. The following general process will be used to sample with a thief sampler:

1. Clean/decontaminate the sampler.

2. Insert closed thief into material to be sampled. Rotate the inner tube to open the thief; collect sample.

3. Withdraw the thief, and remove inner tube, transferring sample to sampler container.

~~4.6.1.4 Sampling with a Weighted Bottle~~

~~The weighted bottle is used to sample liquids and free-flowing slurries that are relatively homogeneous. The sampler consists of a glass or plastic bottle with a sinker, stopper, and line that is used to lower/raise the bottle within the sampler matrix. The following general process will be used to sample with a weighted bottle:~~

~~1.Clean/decontaminate the sampler.~~

~~2.Assemble weighted bottle sampler.~~

~~3.Lower the sampler to the desired depth and remove stopper.~~

~~4.Allow bottle to fill.~~

~~5.Raise sampler and cap (sampler can serve as the sample container).~~

~~Non-fluorocarbon plastic bottles should not be used to sample organics. Before sampling, ensure that sample line, sinker, and other equipment are compatible with waste materials (i.e. waste will not corrode sampling equipment).~~

4.6.1.5 Sampling with a Scoop/Shovel

Scoops/shovels are used to sample rock/soil-like, solid or powdered matrices. The following general process will be used to sample with scoops/shovels:

1. Clean/decontaminate the sampler.

2. Obtain a full cross section of the waste material using the scoop or shovel that is large enough to contain the waste collected in one cross sectional sweep.

4.6.1.6 Sampling with an Auger

Augers are used to sample relatively hard packed solid waste material or soils. Augers are spiral drilling blades attached to metal shafts which are "turned" downward through sample material, allowing sample to exit the

sample matrix by moving upward along the auger spirals. The following general process will be used to sample with an auger:

1. Clean/decontaminate the sampler.

2. Drill downward, using the auger, into the waste material, capturing waste moving upward along the auger blades in the appropriate sample container.

4.6.1.7 Sampling with a Tube Sampler

Tube samplers are used to collect soil/solid samples, and are generally glass or steel tubing that can be inserted into relatively compact matrix. (Modified tube samplers, however, can be used for liquid sampling.) Following insertion of the tube, and tube is extracted with the sample contained in the inserted tube. The following general process will be used to sample with the tube sampler:

1. Clean/decontaminate the sampler.

2. Lower/insert the tube into the waste to the desired depth.

3. When the desired depth is reached, slowly withdraw the tube, taking care to retain as much sample with the tube as possible.

4. Extract sample into the appropriate sample container.

4.6.2. Sample Collection Procedures

This section discusses the general sampling procedures for each type of sample to be collected at the Facility, as presented in Table ~~4~~F-6. It is recognized that the specific sampling that will take place at the Facility may differ from general procedures included herein, and approval by NMED is required before revisions are implemented. Additionally, selection of sample locations (Section 4.6.2.8) and sample types (Section 4.6.2.9) for on-site samples to be collected are addressed.

Table 4F-6. On-Site Sample Collection Activities

Sample Type	Matrix	Collection frequency	Comments
Fingerprint sample	All incoming ~~liquid,~~ sludge and solid; debris waste will not be fingerprinted	One/shipment for bulk shipments 1/10 drums for drummed waste	Table F~~4~~-2 defines base fingerprint analysis required
Annual sample	All incoming ~~liquid,~~ sludge and solid; debris waste will not be fingerprinted	One sample annually for each waste that underwent representative sampling prior to initial shipment	Table F~~4~~-1 defines base representative analysis required. Sampling will be performed at the generator site.
Spills/releases	Spilled waste and contaminated material (sludge, liquid, soil)	Each release	For Hazardous Waste determination
~~Evaporation pond output~~	~~Waste sludge and liquid as it is removed from pond~~	~~Each waste transferral~~	~~To determine LDR status~~
~~Stabilization tank input~~	~~Evaporation pond and offsite sludge and liquid leachate.~~	~~Each input~~	~~For bench scale testing to determine stabilization~~
~~Stabilization tank~~	~~All tank output (sludge, liquid~~	~~Each output~~	~~To determine LDR status~~

Sample Type	Matrix	Collection frequency	Comments
~~output~~	~~and solidified solid)~~		
Landfill input	All incoming sludge and solidified solid waste to landfill except debris	~~Each input to landfill from Stabilization Tank and Evaporation Pond~~ Random sampling of waste directly landfilled.	To determine LDR status~~. May use results from Stabilization Tank Output/Evaporation pond analysis.~~
On-site waste	1. Treated waste 2. Day-to-day ~~(Truck Wash, etc.)~~ operations 3. Releases 4. Run-on/runoff 5. Investigation-derived waste 6. Soil 7. Air 8. Leachate/sludges from ~~Evaporation Pond and~~ ~~L~~landfill	1,2. When acceptable knowledge is not available 3,4. See Vol. II Appendices (Permit Application October 2000) 5. Each container 6. Contingency Plan 7. See Vol. II Appendices (Permit Application October 2000) 8.~~ Placed in temporary leachate storing tanks; s~~Sampled monthly	To determine hazardous/LDR status. See Table ~~4~~F-5 for specific waste matrices generated by on-site activities

4.6.2.1 Fingerprint Sampling

Fingerprint sampling will be conducted for all in-coming waste, except for debris waste. E~~(~~each container of debris waste will be visually inspected, however, as will each drum and roll-off, regardless of waste matrix~~)~~. Matrices that will undergo fingerprint sampling include sludges and~~,~~ solids~~, and liquids,~~ arriving in containers such as ~~tanker trucks,~~ roll-offs~~,~~ and drums/containers. Refer to Table ~~4~~F-6 and Section 4.4.3.1 for sampling frequency and waste analysis.

~~Tanker trucks delivering bulk liquids will be sampled through an access hatch, with a vertical sample collected using a Coliwasa or other appropriate sampling devise (see Section 4.6.1).~~ Trucks delivering bulk solid material (e.g. in roll-offs) will be sampled using solid sampling equipment, such as a scoop (see Section 4.6.1). A surface sample will be collected from the front one-third area of the truck, middle one-third area, and rear one-third area of the bulk; samples will then be composited (see Section 4.6.4). Vertical waste composition will be determined, as possible, by collecting an additional sample from more than approximately 2 feet below the surface of the waste at each of the three sample locations using the appropriate sample collection tool (e.g., auger); these three samples will be composited with the first three samples. All loads will be visually inspected during unloading. If the load exhibits different color, texture, or wetness, samples from these areas will also be collected and included in the composite sample.

Sample methodology for drummed waste will depend on the sample matrix, but will likely include ~~liquid sample collection using a Coliwasa and~~ solid sampling using a scoop or auger. A single sample, collected through as much depth of the drummed waste as possible, will be collected. The location of samples collected is discussed in Section 4.6.3.

The Facility will detail the sampling method used for fingerprint waste sample collection, including but not limited to sample collection technique, sample type, sample representativeness, sample volume, sample containers, sample preservation, chain-of-custody, etc., and will place this information in the Operating Record.

4.6.2.2 Annual Sampling

Wastes that underwent representative sampling prior to initial waste shipment will undergo annual sampling to confirm waste composition. The Facility will assess the representative sampling procedure prior to initial waste acceptance, and this same representative sampling procedure will be used for annual sampling. Annual sampling will follow the representative sampling process performed prior to initial waste shipment; if the process is modified, the Facility will assess the sampling process to ensure collection of a representative sample, and place this assessment in the Operating Record.

4.6.2.3 Spills/Releases

See Section 4.6.2.7

~~4.6.2.4 Evaporation Pond Output~~

~~Evaporation Pond output will consist of liquids and sludges/solids of varying viscosity/degree of solidification. This waste is then transferred, as appropriate, to stabilization tanks, and/or the landfill. Each waste transfer will be sampled with a single grab sample selected from the waste transferred at the midpoint/middle of sample transfer, if the waste is homogenous. Alternatively, if the waste is heterogeneous, a composite sample may be collected in the transfer vessel using a tube sampler or other appropriate sample devise, with the extracted sample then composited. If modification to these sampling methods to meet waste/site-specific requirements occurs, all information pertaining to the modified method will be detailed in the Operating Record. Samples will be analyzed to assess continued waste LDR compliance. The facility will detail the sampling method used for each output waste, including but not limited to sample collection technique, sample type, sample representativeness, sample volume, sample containers, sample preservation, chain of custody, etc., and will place this information in the Operating Record. Note that leachate and waste sludge may be generated within/below the Evaporation Pond, however, these are considered "on-site" generated waste and are discussed in Section 4.6.2.7.~~

~~4.6.2.5 Stabilization Tank Input/Output~~

~~Stabilization Tank input wastes include liquid (e.g. leachate) and sludges. Output includes sludges, liquid, and solidified sludge. Input samples are to be sampled primarily for bench-scale testing to assess solidification techniques. Sampling methodology will be dependent upon the matrix sampled, but must include at least one grab sample from the input waste container/stream of sufficient volume to perform bench-scale assessments (assuming a homogenous waste stream). A composite sample will be collected if the stream is heterogeneous in nature. Output waste must be sampled to ensure continued compliance with LDR requirements; see Section 4.6.2.4 for output sampling methodologies. The facility will detail the sampling method used for each input/output waste, including but not limited to sample collection technique, sample type, sample representativeness, sample volume, sample containers, sample preservation, chain of custody, etc., and will place this information in the Operating Record.~~

4.6.2.6 Landfill Input

All incoming waste to the landfill will be sampled to ensure continued compliance with LDR requirements. ~~For waste originating from the stabilization tank or evaporation pond, output sampling will fulfill this requirement. For wastes directly placed in the Landfill from off-site sources, and o~~On an annual basis, the Facility will randomly sample and analyze a minimum of 10 percent of incoming waste streams that are to be directly landfilled to verify conformance with the LDR requirements. These additional samples will be analyzed for the specific regulated hazardous constituents contained in the hazardous waste stream. The data generated from these samples, in conjunction with the generator-supplied data, will be used to verify

conformance with the LDR requirements. Sampling procedures will follow those presented in Sections 4.6.2.1 and 4.6.2.4, as applicable.

4.6.2.7 On-Site Generated Waste

Several wastes may be generated on-site that require sampling and analysis (see Table ~~4~~F-4). Specifically, treated waste, day-to-day generated waste (e.g. ~~truck wash, liquid waste storage area, and stabilization area decontamination rinse,~~ personal protective equipment), releases of wastes, run-on/run-off, investigation-derived waste, contaminated soil, air emissions, and leachate/sludges from the~~ evaporation pond/~~ landfill are considered on-site generated waste.

~~Leachate/sludges from the evaporation pond and landfill will be placed in temporary storage tanks and/or the stabilization tank. Sampling of leachate/sludges must occur prior to emplacement in the stabilization tanks and/or evaporation pond, and will entail either sampling required of input to these units, or collection of a representative sample from the temporary holding tank using the appropriate sampling device (e.g. Coliwasa, weighted sampling bottle). Also see Sections 4.6.2.5 and 4.6.2.6.~~

4.6.3 Selection of Sample Locations

The Facility will collect samples from containers and roll-off boxes using either random (i.e., probability) or biased (i.e., authoritative) sampling methods. Random sampling methods will be used to select drummed containers for fingerprint analysis. All other on-site sampling, except for annual sampling of waste directly landfilled (i.e., 10 percent of the waste) requires sampling of each load, bulk container, or waste transfer, and random selection of waste containers to be sampled is therefore not applicable. However, the Facility will collect random samples from within the waste to be sampled for non-fingerprint or annual analysis (e.g., leachate, landfill input) if the wastes are expected to be fairly homogeneous waste streams. A biased sampling method will be used to select roll-off~~/tanker~~ waste sample locations. (Biased samples will be collected if the wastes are expected to be or are found to be heterogeneous.) For some waste streams, the Facility may use both sampling techniques, as determined appropriate by the facility and justified in the Operating Record.

With random sampling, every unit in a population (e.g., every drum from a given waste stream in a shipment) has a theoretically equal chance of being selected for sampling. Consequently, data generated by these samples are unbiased estimators of the range of concentrations in a population. If a sufficient number of samples are taken, they would be representative of the average concentrations within the entire population. For example, in the case of drums, those drums to be fingerprint sampled will be numbered, and numbers will be randomly drawn to determine those containers that will be sampled.

With biased sampling, a preference is given to selecting only certain units in a population. This technique requires the sampler to use discretion and to have knowledge of the waste. The sampler selects the sample locations from areas where contamination is known or suspected (e.g., the sampler could collect a biased sample from areas where there is layering or differences in color or consistency). Also, the Facility may use a field screening instrument to bias the sample location, (e.g., a photoionization detector could be used to select locations having higher volatile organic concentrations). EPA-approved ASTM method D140-70 identifies the procedure for estimating the number of containers that should be sampled. Samples collected from roll-offs, for example, may include biased sampling if areas of obvious discoloration, and other pertinent information, are noted.

The Facility will document the sampling technique that is used to locate each waste sample collected pursuant to this ~~waste analysis plan~~WAP. The Facility will maintain this information in the Facility Operating Record.

4.6.4 Sample Types

Samples of the waste will be collected as either composite or grab samples. It is possible that the Facility may modify or augment the procedures discussed below for the collection of composite and grab samples before the Facility becomes operational; if so, these revisions will be approved by NMED prior to implementation.

In composite sampling, a number of samples are initially collected from a waste and combined into a single sample which is then analyzed for the constituents of concern. Composite sampling is a valid method for homogeneous samples and tends to minimize the between-sample variation, much like the maximization of the physical size of a sample. This has the effect of reducing the number of samples that must be analyzed to verify the contents of a waste shipment. Composite samples can also be obtained from a waste that has stratified; however, a composite would only be made from samples obtained from the same strata within the waste. Composite samples will be taken with clean sampling equipment and samples will be blended before analysis. ~~Composite sampling will be used to obtain samples of wastewaters.~~ Grab sampling will be used to obtain samples of ~~non-wastewaters and~~ heterogeneous wastes.

4.6.5 Sampling QA/QC

QA sampling procedures will be conducted in accordance with the guidance provided in the EPA document SW-846 and EPA's waste analysis plan guidance manual, *Waste Analysis at Facilities that Generate, Treat, Store and Dispose of Hazardous Waste.* The QA requirements will be applicable to on-site sampling (e.g., leachate collection system samples~~, truck rinsate, waste removed from the evaporation pond~~) as well as to the sampling of incoming waste shipments. This program is necessary to ensure that decisions regarding the acceptance and disposition of waste are based on sound, statistically valid, and documented data. Additional QA procedures associated with sampling and analysis determined prior to initiation of on-site sampling will be included in the Operating Record.

The sampling QA program will include the following:

- training requirements for personnel responsible for sample collection;
- chain-of-custody protocols for tracking samples;
- QA review of procedures to ensure proper use of equipment;
- protocols for equipment maintenance;
- identification of required sampling techniques for specific media;
- field sampling QC procedures; and
- documentation of sampling locations.

Deviations from the approved sampling program, sampling methods, or chemical analytical methods will be documented and reviewed by personnel responsible for site QA. NMED will be notified in writing of the QA exceptions within seven days of the occurrence and measures will be taken to correct the problems as soon as practicable.

4.6.5.1 Training Requirements for Personnel Responsible for Sample Collection

All personnel and supervisory staff responsible for collecting waste samples for screening and chemical analysis will be trained in the use of all sampling methods and equipment used at the site.

4.6.5.2 Chain-of-Custody Protocols for Tracking Samples

The integrity of the sampling/analytical scheme will be maintained by following chain-of-custody procedures from the point of sample collection through analytical data reporting to sample disposal. The possession and handling of samples will be traceable from the time of collection through analysis and final disposition.

A sample is considered to be in a person's custody if it is:

- in a person's physical possession;
- in view of the person after taking possession; or
- secured in a container sealed by the responsible person so that it cannot be tampered with during transport to the designated destination or during storage after being secured by that person in an area of restricted access.

The sampler will place a sample label on each sample container. The label will include the following information:

- sample number, a unique identifier that is traceable to the waste stream and shipment;
- name of collector (sampler);
- date and time of collection; and
- place of collection.

Labels will be affixed to sample containers prior to or at the time of sampling and will be filled out at the time of collection.

Sample chain-of-custody seals will be required if the sample is designated to leave the possession of Facility personnel for transport to an analytical laboratory. The seal will include the same information as the sample label. The seal will be attached in such a way that it is necessary to break it in order to open the sample container. In addition, chain-of-custody seals will be affixed to sample storage containers in a similar manner in order to prevent tampering prior to shipment from the Facility to off-site analytical laboratories. Samples and storage containers which require seals must be sealed prior to leaving the possession of Facility personnel.

To establish the documentation necessary to trace sample possession from the time of collection, a chain of custody record will be filled out and will accompany every sample. A sample chain of custody record is provided in Permit Attachment F3~~Vol. II of this application~~.

If the sample is to be shipped off-site for analysis, it will be accompanied by a sample analysis request sheet. The sample analysis request sheet will include the information necessary to identify the sample and the analyses requested by the Facility. Samples shipped off-site for analysis will be packaged and shipped in accordance with DOT transportation requirements.

Laboratory samples will be maintained in a secure area and retained until holding times expire, as listed in SW-846, or three months, whichever comes earlier. After the holding time or three month holding period has expired, samples will be disposed at the Facility with compatible waste batches. Records of the date the samples are removed from storage and the date and method of disposal will be maintained at the Facility until completion of post-closure care. In cases where samples are not analyzed within their holding times, the Facility will resample.

4.6.5.3 QA Review of Procedures to Ensure Proper Use of Equipment

Standard operating procedures will be developed for the use, decontamination, and storage of sampling equipment used to characterize waste shipped to the Facility. The standard operating procedures will include the sampling equipment to be used, instructions for use, and the applications for use of the equipment for collection of samples from specific media and types of shipping containers. The procedures and QA standards for waste sample collection will be included in the standard operating procedures.

4.6.5.4 Protocols for Equipment Maintenance

The protocols for equipment maintenance will be included in the standard operating procedures. Protocols will be developed, as described in the preceding paragraph, for use, decontamination, and storage of equipment. Protocols for equipment maintenance will be included in the standard operating procedures (See Section 4.6.7 for general decontamination requirements).

4.6.5.5 Identification of Required Sampling Techniques For Specific Media

The sampling methods and equipment used for collecting samples from specific media will be selected in accordance with the guidelines included in 40 CFR, Part 261, Appendix I, and in the EPA guidance manual, *Waste Analysis at Facilities That Generate, Treat, Store, and Dispose of Hazardous Waste*, Chapter 2. Alternative sampling methods may be used with prior approval of NMED.

4.6.5.6 Field Sampling QC Procedures

Blank and duplicate samples will be obtained during waste characterization sampling to confirm that sample collection and handling procedures meet the QA/QC standards outlined in the standard operating procedures and data quality objectives included in the Facility sampling manual. Duplicate samples will be collected at a minimum frequency of 10 percent (1 for every 10 samples). Field blanks and equipment blanks will be collected at a minimum frequency of 5 percent (1 for every 20 samples). Trip blanks will be included with all sample kits where samples are sent to off-site laboratories for chemical analysis. The field QA samples are described below:

- *Field blanks:* Field blanks are prepared in the field by filling a clean container with pure de-ionized water and appropriate preservative (if required for a specific activity). Contaminants found may indicate airborne contamination, contaminated equipment, or cross-contamination during sampling. A minimum of one field blank will be collected for every 20 waste samples collected.

- *Trip blanks:* Trip blanks are sample containers that are prepared with an inert material such as de-ionized water and carried into and out of the field, but not opened at any time during the sampling event. Contaminants detected in the trip blank may indicate that the source where the sample was prepared or the container that transported the trip blank was contaminated. A trip blank will accompany all sample shipping containers sent from and to off-site laboratories.

- *Equipment blanks:* Equipment blanks are prepared in the field prior to sampling by running de-ionized water over sampling equipment and placing it into a clean sample container. Contamination in this type of sample will indicate that the sampling equipment is contaminated. A minimum of one equipment blank will be collected for every 20 waste samples collected.

- *Field duplicates:* Field duplicates are independent samples that are taken from the same location at the same time and are used to measure the effectiveness of obtaining representative samples. A minimum of one field duplicate will be collected for every 10 waste samples collected.

4.6.5.7 Documentation of Sampling Activities

Sampling activities, including observations and field procedures, will be recorded on appropriate forms and kept on file at the Facility. Copies of the completed forms will be maintained in a bound and sequentially numbered file. The record of waste stream sampling activities will include:

- the date;
- the time of arrival and departure;
- weather conditions (including estimated temperature and wind direction);
- the name of the sample collector;
- daily activities and times sampling was conducted;
- observations;
- a record of samples collected, with sample designations and locations specified;
- field monitoring data, including health and safety monitoring;
- a list of equipment used and calibration records, if appropriate;
- a list of additional data sheets completed; and
- the signature of personnel completing the field record.

Each sample collected during waste stream sampling activities will be identified by a unique sample designation. The sample designation will be included on the sample label. QA samples will be designated with a "Q" (QA/QC samples) at the end of the sample designation, followed by one of the following to indicate the type of QA sample:

- "D" will be used for a duplicate sample;
- "E" will be used for equipment rinsate blanks;
- "F" will be used for field blank samples; or
- "TB" will be used for field trip blanks.

This coding will be used to assure that duplicates and blanks are submitted "blind" to the laboratory, but can still be easily tracked by the Facility for QA purposes.

4.6.6 Sample Preservation, Volumes, and Holding

Table 4F-7 presents general preservation, container, and holding time information for samples collected. SW-846 guidelines have been used to determine these general requirements, although these may be modified or augmented to account for waste-specific requirements, waste-container compatibility considerations, or additional waste parameters for analysis. Specific sample volumes and containers appropriate for the sampling event will be determined by the Facility. Prior to any sampling event, sample container labels will be prepared and affixed to sample containers, and all sample containers will be certified clean by the supplying laboratory. Sample labels will identify, at a minimum, sample number, date, sampler, matrix, analyses to be performed, and sample preservation. Once collected, samples will be placed immediately into the shipping container (i.e., cooler), and chain-of-custody documentation will be filled out (see Section 4.6.5.2).\

4.6.7 Equipment Decontamination

Sampling equipment will be decontaminated prior to use. Decontamination of sampling equipment typically includes initial scrubbing with a biodegradeable commercial detergent, followed by a de-ionized water rinse. The decontamination process will include wiping down of sampling equipment to remove surface residue, followed by detergent wash, rinse, a second detergent wash, and second rinse. Modifications to this process may be required to account for site/contaminant conditions, and may take place so long as the decontamination procedure is well documented and appropriate supporting information is placed in the Operating Record.

Table 4F-7. General Container, Holding Time, and Preservative Requirements by Sample Matrix

Sample Matrix	Concentration	Fraction	Volume	Container Type [a]	Preservative	Holding Times
Inorganics						
~~Water~~	~~Low~~	~~Total metals~~	~~1 liter~~	~~C, H, or L~~	~~Cool to 4°C~~	~~6 months~~
		~~Dissolved metals~~	~~1 liter~~	~~C or L~~	~~Filter on-site; HNO_3 to pH<2~~	~~6 months~~
	~~Medium~~	~~Total metals~~	~~1 liter~~	~~C or L~~	~~Cool to 4°C~~	~~6 months~~
		~~Dissolved metals~~	~~1 liter~~	~~C or L~~	~~Filter on-site; HNO_3 to pH<2~~	~~6 months~~
Soil, Sediment, and Residue	Low/Medium Medium	Total metals	6 oz	F or G	Cool to 4°C	6 months
Organics						
~~Water~~	~~Low~~	~~VOCs~~	~~80 mL~~	~~B~~	~~HCl to pH <2, Cool to 4°C~~	~~14 if preserved~~
		~~SVOCs~~	~~2 liters~~	~~A,K, or H~~	~~HCl to pH <2, Cool to 4°C~~	~~7 days for extraction; 40 days after extraction to analysis~~
		~~Petroleum hydro-carbons~~	~~2 liters~~	~~A, K, or H~~	~~HCl to pH <2, Cool to 4°C~~	~~7 days for extraction, 40 days after extraction to analysis~~
Soil, Sediment, and Residue	Low/Medium	VOCs	240 mL	D	Cool to 4°C	14 days
		SVOCS	3 oz	F or G	Cool to 4°C	14 days for extraction, 40 days after extraction to analysis
		Petroleum hydro-carbons	3 oz	F or G	Cool to 4°C	15 days for extraction, 40 days after extraction to analysis

Note: The above table is general in nature and may be modified or augmented, so long as the requirements are congruent with SW-846 requirements.

[a] Container types are as follows:

~~A = 80 oz amber glass bottle with teflon-lined black phenolic cap~~

~~B = 40-mL glass vial with teflon-backed silicon septum cap~~
~~C = 1-L high-density polyethylene bottle with poly-lined, poly cap~~
D = 120-mL glass vial with teflon lined, white poly cap
~~E = 16-oz wide-mouthed glass jar with teflon-lined, black poly cap Water~~
F = 8-oz wide-mouthed glass jar with teflon-lined black poly cap Water
G = 4-oz wide-mouthed glass jar with teflon-lined, black poly cap Water
~~H = 1-L amber glass bottle with teflon-lined, black poly cap~~
~~K = 4-L amber glass bottle with teflon-lined, black phenolic cap~~
~~L = 500-mL high-density polyethylene bottle with poly-lined, black poly cap~~

4.7 Analytical Methods

Analytical methods which the Facility will use for specific tests are identified in the waste analysis tables (Tables 4F-1 through 4F-3). All analytical methods used in conjunction with this ~~waste analysis plan~~WAP must be EPA-approved methods or methods required by hazardous waste regulations. If there is no equivalent EPA-approved method, an ASTM method or other approved method may be used. If the Facility or a generator wishes to use alternate test methods, the Facility or generator will first demonstrate to the NMED Secretary that the proposed method is equal or superior to the corresponding methods prescribed in 40 CFR 261 or 264, in accordance with 40 CFR 260.21.

An example of a non-EPA method required by hazardous waste regulations are the ASTM tests specified in 40 CFR 264.314(e)(2) to determine the presence of non-biodegradable sorbents.

Section 4.7.1 identifies the duties of the laboratory manager. Section 4.7.2 identifies the contents of the laboratory QA/QC plan. Requirements for off-site laboratories used by the Facility are contained in Section 4.7.3.

4.7.1 Duties of the Laboratory Manager

The on-site laboratory manager will have the following responsibilities to ensure an effective quality assurance program:

- ensuring that laboratory personnel are adequately trained to perform sampling and analytical procedures and in safety procedures;
- ensuring that equipment and instrumentation under his or her control are calibrated and functioning properly;
- coordinating internal and external assurance audits;
- reviewing procedures and QA plans of outside laboratories used. QA/QC practices will be considered during the selection of independent analytical laboratories. QA/QC practices that will be reviewed include written procedures, certification, internal and external audits, personnel training, and chain-of-custody procedures; and
- development, updating, and implementation of the laboratory QA plan.

4.7.2 Facility Laboratory QA/QC Plan

Prior to beginning operations, the Facility will develop procedures which will comprise the laboratory QA/QC plan. The Facility will develop a QA manual for operation of the on-site laboratory. The manual will be submitted to NMED for review.

The results of chemical analysis of waste samples generated by the on-site laboratory will not be used as part of the waste acceptance evaluation process prior to NMED's review of the QA manual.

The overall QA objective for measurement data is to ensure that data of known and acceptable quality are provided. All measurements will be made to yield accurate and precise results representative of the media and conditions measured. QA objectives for precision, accuracy, and completeness will be established for each measurement variable, where possible, and will be included in the QA manuals of the on-site and off-site laboratories where waste samples will be submitted for chemical analysis. The laboratory procedures, practices, and qualifications will be included in the QA manual for each laboratory.

The laboratory QA/QC plan will be based on guidance provided in EPA's *Requirements for Quality Assurance Project Plans for Environmental Data Operations* (EPA QA/R-5). As such, the plan will address the following key elements in compliance with EPA QA/R-5: project organization; laboratory quality assurance organization; data quality objectives and criteria; employee training and certification requirements; laboratory analytical methods; quality control requirements; laboratory equipment and instrumentation calibration, testing, inspection, and maintenance; QA/QC of suppliers and vendors; data acquisition requirements; data management; data review, validation and verification; and, reconciliation with quality objectives and criteria. These elements and other procedures which will be included in this plan are discussed in the following sections:

- laboratory quality assurance;
- equipment calibration;
- laboratory QA/QC samples;
- laboratory QC;
- analytical procedures; and
- laboratory maintenance.

4.7.2.1 Laboratory Quality Assurance

The Facility laboratory and each off-site laboratory will maintain an internal quality assurance program, as documented in its laboratory quality assurance manual. The laboratories will use a combination of blanks, surrogates, duplicates, MS/MSD (matrix spike/matrix spike duplicate) and laboratory control samples, BS/BSD (blank spike/blank spike duplicate), to demonstrate analytical QA/QC. Control limits will be established for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The specific procedures to be completed and the laboratory control limits will be included in the QA manual for each laboratory.

4.7.2.2 Equipment Calibration

The laboratory equipment calibration procedures, calibration frequency, and calibration standards will be in accordance with EPA (or equivalent method) specified test methodology requirements and will be documented in the laboratory's QA manual. All instruments and equipment used by the laboratory will be operated, calibrated, and maintained according to manufacturers' guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance will be kept on file at the laboratory.

4.7.2.3 Laboratory QA/QC samples

Analytical procedures will be evaluated by analyzing reagent or method blanks, surrogates, MS/MSDs, BS/BSDs, and/or laboratory duplicates, as required or appropriate for each method. The laboratory QA/QC samples and frequency of analysis to be completed will be in accordance with EPA or equivalent method protocols and will be included in the QA manual for each laboratory.

The laboratory QA manuals and procedures will incorporate data quality objectives (DQOs) to verify that waste characterization data obtained by the methods established in this ~~waste analysis plan~~WAP meet regulatory requirements with regard to regulatory compliance and Facility waste management requirements. The following DQOs are established for the sampling and analysis of waste managed by the Facility:

- Identify and quantify the hazardous constituents in the waste to ensure compliance with 40 CFR 264 and the requirements of the Facility permit, and
- Compare the contaminant concentrations in the waste with the specified characteristics of 40 CFR 261 in order that the waste may be managed in accordance with Facility requirements.

To ensure that the laboratory data quality objectives are met, the following analyses will be completed in the laboratory to monitor the analytical process:

- *Laboratory duplicate samples:* Laboratory duplicate samples will be analyzed to monitor for intralaboratory precision of data generated. These samples will be analyzed at a rate of no less than 5 percent (1 for every 20 samples) of the total samples with at least one replicate if fewer than 20 samples are analyzed for any particular parameter.

- *Spiked samples (MS/BS):* Spiked samples will be analyzed to monitor analytical precision. Spiked samples will be tested on no less than a five percent (1 for every 20 samples) basis for any particular parameter. At least one spiked sample will be run if fewer than 20 samples are analyzed.

- *Control charts:* Control charts will be utilized to establish laboratory control limits to monitor and review the accuracy of the data generated as a result of spike analyses. Control limits reflect long-term data accuracy trends and will be modified as new data are acquired.

- *Method/reagent blanks:* Method/reagent blanks will be prepared using samples of purified water or reagents which will then subjected to the entire sample analytical procedure to monitor potential contamination of samples due to contamination in the laboratory or laboratory equipment. Method or reagent blanks will be included with each set of samples.

- *Laboratory equipment blanks:* Laboratory equipment blanks will be analyzed to monitor potential contamination of samples due to improper or ineffective cleaning of equipment. These samples will be analyzed at a rate of no less than 5 percent (1 for every 20 samples) of the total samples.

- *Quality control samples:* QC samples will be analyzed to monitor for accuracy of data generated. EPA QC samples or samples purchased from a reputable independent source will be submitted to off-site laboratories as blind samples for chemical analysis of a set of selected analytes approved by NMED at the beginning of the Facility operation and also at regular intervals during the Facility operating life.

- *Surrogates:* Surrogates will be analyzed in accordance with EPA guidelines for organics analysis. Surrogate recovery is a measure of the effectiveness of the analytical process. Surrogates will be

tested on no less than a 5 percent (1 for every 20 samples) basis for any analysis of organic compounds.

- *Calibration standards and devices:* Calibration standards and devices will be used in accordance with the manufacturers' recommended guidelines to calibrate laboratory instrumentation.

- *Internal standards:* Internal standards prepared in the laboratory will be referenced against external standards to measure accuracy.

Laboratory QC procedures will be included in the laboratory QA manuals prepared by each laboratory.

4.7.2.4 Laboratory Quality Control

QC objectives for the analytical data are a means of checking and controlling the sources of error in analytical data results. The criteria for data evaluation include assessing the data accuracy, precision, completeness, representativeness, and comparability. The criteria are described below:

- *Accuracy:* Accuracy is a measure of the error between chemical analytical results and the true sample concentrations. Accuracy is a measure of the bias in a system and will be expressed as the percent recovery of spiked samples. Accuracy will be presented as percent recovery and will be calculated as follows:

$$\%R - (S-U) \text{ X } 100\%C_{sa}$$

where %R = percent recovery
S = spike sample analytical result
U = sample analytical result
C_{sa} = known spike concentration

The data quality objectives (DQOs) for accuracy for each analytical method will be presented in the laboratory QA manual.

- *Precision:* Precision is a measure of data variability. Variability can be attributed to sampling activities and/or chemical analysis. Relative percent difference (RPD) will be used to assess the precision of the sampling and analytical method and will be calculated as follows:

$$RPD = [*C_1 - C_2*/(C_1 + C_2)/2)] \text{ x } 100$$

where RPD = relative percent difference
C1 = larger of the two concentrations
C_2 = smaller of the two concentrations

The DQOs for precision for each analytical method will be presented in the laboratory QA manual.

- *Completeness:* Completeness will be evaluated to assess whether a sufficient amount of valid data is obtained. Completeness is described as the ratio of acceptable measurements. Completeness will be calculated as follows:

C = (Number of samples having acceptable data)/(total number of samples analyzed) x 100%

where C = completeness

The DQOs for completeness will be presented in the laboratory QA manual.

- *Representativeness:* Representativeness is a qualitative parameter related to the degree to which the sample data represent the specific characteristics of concern. Procedures in sample collection will be implemented to assure representative samples, such as repeated measurements of the same parameter from the same waste stream in the same shipping container over several distinct sampling events. Any procedures or variations that may affect the collection or analysis of representative samples will be noted and the data qualified as appropriate.

- *Comparability:* Comparability is a qualitative parameter related to whether similar sample data can be prepared. To assure comparability, analytical results will be reported in appropriate units for comparison with other data (such as past studies or clean-up standards), and the standard collection and analytical procedures included in this ~~waste analysis plan~~WAP will be implemented. Any procedures or variations that may affect comparability will be noted, and the data will be qualified as appropriate.

4.7.2.5 Analytical Procedures

Specific QA/QC procedures to be used for sampling, chain-of-custody, calibration, analytical methods, reporting, internal QC, audits, and preventative maintenance will be included in the laboratory QA manual.

Laboratory procedures and methods to be used will contain all of the information presented in the EPA document, SW-846, for each method. The format for each method will be similar to that used in SW-846. If there is no appropriate SW-846 method ASTM or other approved methods will be employed. The laboratory procedures and methods also will include the following:

- *Scope:* A description of the scope of applicability of the procedure.

- *Principal:* A brief description of the steps to be taken and/or the theory involved in the laboratory analysis.

- *Interference:* A description of known interfering agents that would cause difficulty in the laboratory analysis.

- *Apparatus:* A listing or description of equipment required to perform the laboratory analysis.

- *Reagents:* A listing of the reagents required, a description of the steps involved in preparing the reagents, and instructions on storage requirements and retention times.

- *Procedures (instructions):* An enumeration of the sequence of activities to be followed. The topics include sample preparation or pretreatment, sample storage requirements, instrument set-up, standardization or calibration, sample analysis, calculations, and glassware-cleaning procedures. The procedure includes any precautions, explanation, or clarifications needed to properly perform the analysis. These include safety precautions, the frequency of standardization required, the acceptance criteria or procedures for determining the acceptability of standard curves, clarification or special techniques critical to the analysis, and the procedure the analyst uses to determine the reliability of sample results based on the standard curves.

- *Quality control requirements:* A listing of the QC checks to be performed and the acceptance criteria used to evaluate the QC data.

- *Reference:* A listing of the publications from which the information was derived in preparing the laboratory method. All references pertain to these documents. As a rule, laboratory methods are derived from the following publications:
  - Standard Methods for the Examination of Water and Wastewater, American Public Health Association;
  - Annual Book of Standards, American Society for Testing and Materials;
  - Methods for Chemical Analysis of Water and Waste, US Environmental Protection Agency;
  - Test Methods for Evaluating Solid Waste, SW-846, US Environmental Protection Agency;
  - National Functional Guidelines for Organics Data Review; and
  - Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses.

  Editions used will be those currently specified in 40 CFR, as updated.

4.7.2.6 Laboratory Maintenance

The analytical laboratory will have in place a procedure that details the steps to be taken to calibrate and standardize instruments to ensure that analytical data produced are accurate. Records of all calibrations, preventative maintenance, and service calls will be readily available from the laboratory files. Calibration procedures will follow the method procedures outlined in the EPA document, SW-846, or the *Annual Book of ASTM Standards.*

A procurement procedure that identifies methods to be used to document and control the purchase of materials, parts, and services will be implemented by the laboratory and will be presented in the laboratory QA manual. The procedure will include identifying the quality of laboratory chemicals and equipment, management approval of procedure items, inspection of shipments for compliance with requirements, and isolation of nonconforming items to be returned to vendors. The quality of all equipment will conform to the requirements specified in the most current edition of the EPA document, *Handbook of Analytical Quality Control in Water and Wastewater Laboratories*, the Federal Register, or other regulatory agency publications. This procurement procedure will serve to ensure that spare parts routinely required will be readily available.

4.7.3 Requirements for Off-Site Laboratories

The Facility will document that the following conditions are met for each off-site laboratory performing waste analyses for the Facility:

- the laboratory will not be the same laboratory that was used by the generator;
- the laboratory must be approved by the Facility;
- the laboratory must use the analytical methods identified in Section 4.5;
- if there is more than one analytical method for a specific test identified in Section 4.5, the laboratory must follow the guidance in Chapter Two of the current version of EPA document SW-846 to determine the appropriate analytical method; and
- the laboratory must follow the QA/QC requirements described in this ~~waste analysis plan~~WAP.

4.7.4 Laboratory Requirements for Foreign Generators

The Facility will ensure and document that laboratory analysis provided by foreign generators is performed by a laboratory accredited or certified for the appropriate hazardous waste field of testing (FOT) by an authority using the EPA's National Environmental Laboratory Accreditation Conference standards.

4.8 Waste Tracking

To identify and track the waste managed at the Facility, a Facility-specific number will be assigned to each waste stream and to each shipment within that waste stream. Each waste shipment will be tracked using a unique alphanumeric designation. This designation will identify the generator, a sequential number specific to the shipment, substance and source and the delivery date (or, in the case of site-generated waste, the date the waste entered the system). An example is presented below:

ABC-0001-043099

where ABC identifies the generator
0001 identifies the waste stream, source, and shipment
043099 is the date the waste was delivered

The waste numbering system will assist in the tracking of waste as it moves through the Facility. The number will be recorded on:

- all incoming paperwork from the generator;
- samples received from the generator;
- samples taken on-site; and
- site-generated records.

The date will not be recorded until the waste actually arrives on-site. This numbering system will allow the Facility to track a specific waste with regard to ~~analyses conducted, necessary treatment, and~~ the final disposition of the waste. In addition, assigning a unique designation to each generator and a unique number to each waste stream from that generator will make possible determining the amount of waste from a given waste stream that has been received by the Facility. Individual shipments from within the waste stream will receive an additional identifier to enable the Facility to tie information back to the specific shipment as well as to the waste stream. The system will allow the Facility to locate the current position of the waste at the Facility, including the location of the waste in the landfill.

Tracking waste in this manner will allow the Facility to determine the efficiency and accuracy of a generator's profiling efforts and the rejection rate for incoming waste. This information will be used to assist Facility operations in determining the rate of fingerprint analysis required for a given generator.

The Facility number will designate waste generated on-site. All other numbering and tracking will be the same for all waste managed at the Facility. The tracking system will be maintained in the Facility records as either hard copy or electronically (computer database).

4.9 Notification, Certification, and Recordkeeping

The Facility will maintain a Facility Operating Record in accordance with 40 CFR 264.73. The Operating Record will include:

- all analytical results;
- all chain-of-custody forms;
- generator notices of restricted wastes not meeting treatment standards or exceeding levels specified in RCRA Section 30049(d), including the information listed in 40 CFR 268.7(a)(1); and
- generator notices of restricted wastes meeting applicable treatment standards and prohibition levels, including the information in 40 CFR 268.7(a)(2).
- all final disposition records;
- all manifest and waste discrepancy resolution documentation; and
- all other information (e.g., notifications, certifications, waste analysis reports, waste movements) which will be maintained in the Operating Record as noted in this ~~waste analysis plan~~WAP.

As required in 40 CFR 268.7, the following records will be maintained at the Facility for wastes generated on-site, and/or documentation of treating restricted wastes:

- Where on-site generated wastes are characterized to determine compliance with LDR standards using only process knowledge, all data used to make any such determination. ~~This~~ These data will be maintained by site personnel.
- Where a representative sample of waste is analyzed to determine compliance with LDR standards, all waste analysis information. ~~This~~ These data will be retained on-site in Facility files.
- All notifications and/or certifications submitted by waste generators. These records will be maintained until Facility closure as required in 40 CFR 264.73.

In addition, relevant inspection forms and monitoring data will be maintained on file at the Facility. Files will be maintained for a minimum of three years (for inspection records and LDR notification), or until approval of Facility closure (for inventory records).

~~Permit~~ Attachment F1. Rationale for Analytical Parameter Selection

~~Modified from the Permit Application, Volume I,~~

~~Section 4.5.1~~

4.5.1 Analytical Parameters

The analytical parameter lists for pre-acceptance waste characterization, fingerprint analysis, and additional unit-specific analysis are presented in Permit Attachment F, Waste Analysis Plan, Tables 4F-1, Parameters and Methods for Pre-Acceptance Representative Sample Analysis, 4F-2, Tests and Analytical Methods for Fingerprint Samples, and 4F-3, Additional Tests and Analytical Methods. The Facility will augment these lists as necessary~~,~~ to ensure that additional considerations pertaining to waste-stream~~-~~-specific pre-acceptance characteristics, LDR standards analysis, and other Facility operational limits are met. The rationale used to determine pre-acceptance characterization is specified in Section 4.5.1.1. The rationale for selecting additional parameters to ensure compliance with the LDR standards is specified in Section 4.5.1.2. The rationale for selecting parameters to ensure compliance with other facility regulatory and operational limits is contained in Section 4.5.1.3. For each waste stream accepted~~, treated,~~ and disposed of at the facility, appropriate parameters will be selected to ensure that each of the facility acceptance criteria (see Permit Attachment F, Section 4.2, Criteria for Waste Management at the Facility~~,~~) is met.

4.5.1.1 Parameters for Waste Characterization

Permit Attachment F, Table 4F-1 specifies parameters to confirm that a waste stream agrees with the information provided by the generator. The rationale for the selection of these parameters is as follows:

- *Total volatile organic compounds (VOCs):* This test will determine the presence and concentration of individual VOCs.

- *Total semivolatile organic compounds (SVOCs):* This test will determine the presence and concentration of individual SVOCs.

- *Metals and inorganic constituents:* These tests will determine the presence and concentrations of individual metals and other inorganic constituents.

- *Physical appearance:* This test determines the general identity of the waste and establishes baseline characteristics that can then be subjectively compared with the waste shipment when it arrives at the facility. The waste is visually inspected and the physical appearance of the waste is recorded, including, at a minimum, the following properties: Color, physical state (solid or~~,~~ semi-solid~~, or liquid~~), texture, viscosity, layering (single phase, bi-layer, multi-layer), and presence of free liquids.

- *pH:* This test indicates the corrosive nature of the waste. It also determines compatibility with other wastes and with ~~containers or~~ liners~~, and treatment requirements~~. The tolerance range for pH is plus or minus 2.5 pH units.

- *Radioactivity screen:* This test screens each load using a gamma ray scintillation detector or other appropriate equipment. This test will be used to ensure that the level of radioactivity observed in NORM waste or equipment from oil, gas, and water production containing hazardous constituents,

or other naturally occurring radioactive materials not regulated under 20.3.1.14 NMAC, is not above regulated limits as defined in 20 NMAC 3.1, Subpart 14 (i.e., the maximum radiation exposure reading at any accessible point does not exceed 50 microroentgens per hour ~~([~~ΦR/hr~~)]~~; and the maximum radiation reading for sludges and scales contained in oil, gas, and water production equipment does not exceed 50 ΦR/hr, or, if the radiation readings for removable sludges and scales exceed 50 ΦR/hr, the concentration of radium 226, in a representative sample, does not exceed 30 picocuries per gram ~~(30[~~pCi/g~~)]~~). ~~(~~Material regulated under the Atomic Energy Act of 1954, as amended, is not permitted for waste management~~)~~.

4.5.1.2 Additional Analysis to Ensure Compliance with the LDR Treatment Standards

The facility will ensure that LDR treatment standards are met by identifying the appropriate treatment standard requirements as follows:

- *Total waste standards:* All hazardous constituents in the waste or in the treatment residue must be at or below the values for these constituents contained in the table in 40 CFR 268.40.
- *Waste extract standards:* The hazardous constituents in the extract of the waste or in the extract of treatment residue must be at or below the values found in the table in 40 CFR 268.40.
- *Technology standards:* The waste must be treated using the technology specified in the table in 40 CFR 268.40.

Identification of parameters to demonstrate compliance with LDR standards will be conducted as follows:

- identification of all hazardous applicable characteristic and listed EPA Hazardous Waste Numbers;
- identification of the appropriate subcategory for each applicable EPA Hazardous Waste Number (from the most current version of the Table in 40 CFR 268.40);
- ~~determination of wastewater/non-wastewater status for the waste stream;~~
- identification of all underlying hazardous constituents for each applicable EPA Hazardous Waste Number (from the most current version of the Tables in 40 CFR 268.40 and 268.48; and
- selection of the most current versions of the analytical methods associated with all identified hazardous wastes, underlying hazardous constituents, and subcategories~~, and wastewater/non-wastewater status~~ (from Table 4-2, SW-846, or equivalent).

The rationale for the selection of additional parameters to ensure compliance with the LDR standards is as follows:

- ~~*Total organic carbon (TOC):* This test determines the total organic carbon concentration of the waste and is needed to determine whether the waste is a wastewater or non-wastewater.~~
- ~~*Total suspended solids (TSS):* This test determines the total suspended solids concentration of the waste and is needed to determine whether the waste is a wastewater or non-wastewater.~~
- *Ignitability:* This is a qualitative test to determine the ignitable nature of the waste and~~,~~ indicate if the waste is prohibited~~, and determine treatment requirements~~. It also helps to determine whether the waste is compatible with ~~containers, tanks,~~ liners, piping, structures, equipment, and other waste streams.

- *Explosive meter vapor test (TLV sniff test):* This test determines the fire-producing potential of the waste and whether it is regulated as flammable or combustible by the US Department of Transportation. If liquid waste exceeds 200 ppm, the waste will also be tested for ignitability using the flash point test. The tolerance range for the TLV sniff test is plus or minus 200 ppm.

- *Flash point test:* This test determines the flash point of the waste and determines whether the waste is ignitable.

- *pH:* This test indicates the corrosive nature of the waste. It also determines compatibility with other wastes and with ~~containers or~~ liners~~, and treatment requirements~~. The tolerance range for pH is plus or minus 2.5 pH units.

- *Reactive sulfide:* This test determines the reactive nature of the waste and~~,~~ indicates if the waste is prohibited~~, and determines treatment requirements~~. It is also used to determine whether the waste is compatible with ~~containers, tanks,~~ liners, piping, structures, equipment, and other waste streams. Wastes containing total releasable sulfide with concentrations less than 500 ppm are considered non-reactive.

- *Reactive cyanide:* This test determines if cyanide could potentially be reactive under acidic conditions, indicates if the waste is prohibited~~, and determines treatment requirements~~. It also determines whether the waste is compatible with ~~containers, tanks,~~ liners, piping, structures, equipment, and other waste streams. Wastes containing total releaseable cyanide with concentrations less than 250 ppm are considered non-reactive.

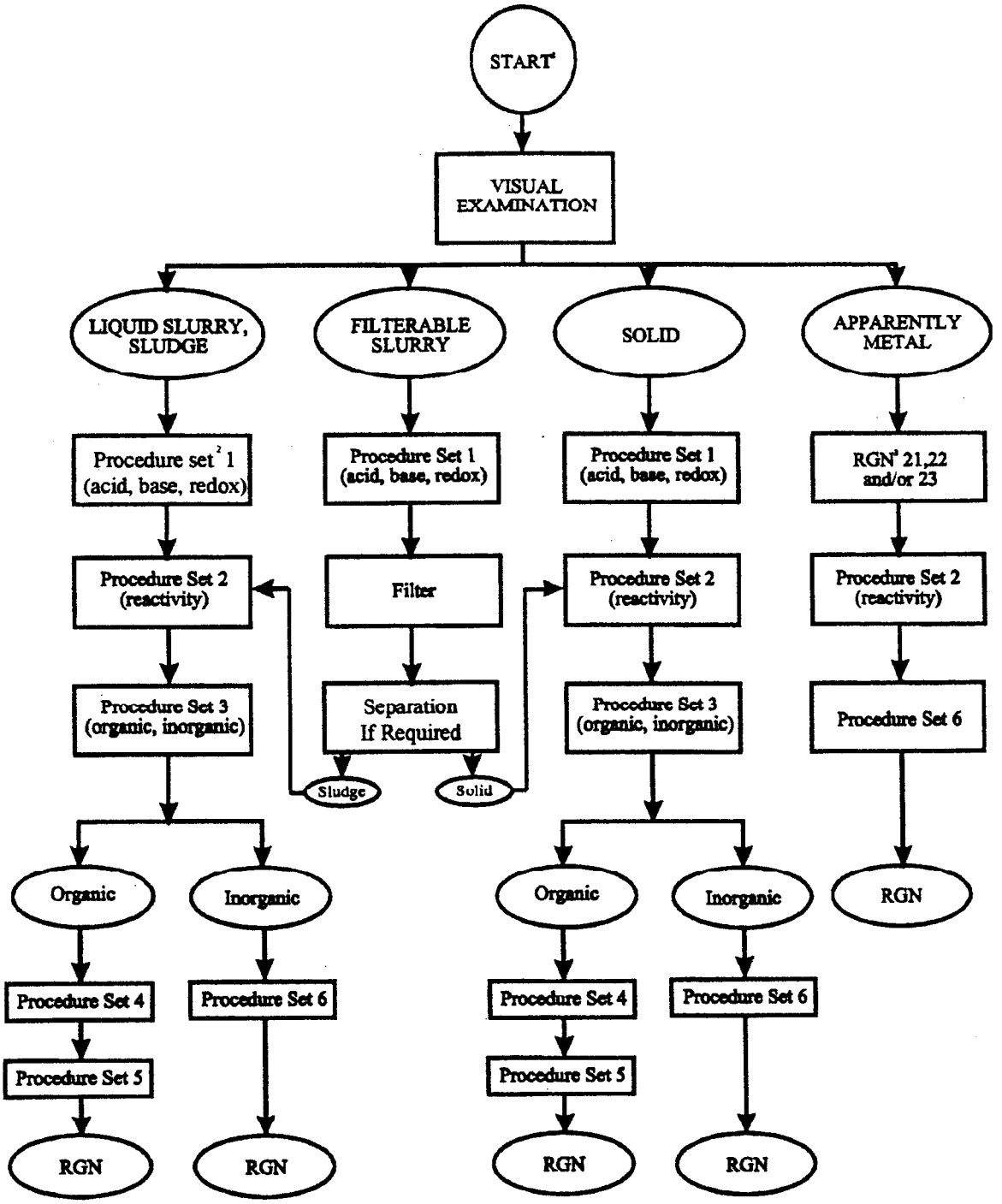
- *Reactivity (compatibility):* This test determines the compatibility between the waste and the liner~~, tank, container,~~ or equipment which the waste may contact.

  The Facility will ensure that potentially incompatible wastes will not be ~~stored, treated, or~~ disposed of in the same location. The facility will perform a compatibility determination based on the pre-acceptance waste characterization information. Acceptable knowledge or assessment information provided on the Waste Profile Form may be used to assign compatibility codes to each waste type form based on 40 CFR 264, Appendix V. ~~For wastes that will be mixed with other waste streams for the purpose of treatment, chemical analysis will be required to ensure the compatibility of the waste streams.~~

  Chemical analysis will be accomplished in three steps, as appropriate for the waste being analyzed:

  - An analysis of the waste for reactive cyanide and sulfide. This analysis will be used to determine the waste's potential to release dangerous levels of hydrogen cyanide or hydrogen sulfide gases in acidic conditions (i.e., pH less than 2).

  - An evaluation of the reactivity characteristics of the waste through process knowledge and a series of analytical procedures that will test for the presence of reactive chemical groups. The procedures in the EPA document, *Design and Development of a Hazardous Waste Reactivity Testing Protocol,* EPA-600/2-84-057, February 1984, will be followed and the results used to assign the waste a reactivity group designation. Figure 4-3[RF1], Sequence of Procedure Sets for Determining Reactivity Group, summarizes the reactivity testing protocol.



[1] Based upon its knowledge of the waste, a generator may only need to use parts of the following sequence to confirm the generator's knowledge of the material.
[2] Procedure sets are identified in EPA's "Design Development of a Hazardous Waste Reactivity Testing Protocol" (EPA 600/2-84-057, February 1984).
[3] RGN = Reactivity Group Number

Start, Stop, Continue
Procedure
Result

SEQUENCE OF PROCEDURE SETS FOR DETERMINING REACTIVITY GROUP

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 4-3

- Use of the reactivity group designation contained in Figure 4-3 to evaluate compatibility of the waste with other wastes by comparing it to the compatibility matrix shown in Figure 4-4[RF2], Reactivity Group Designation. (Refer to EPA document, A Method for Determining the Compatibility of Hazardous Wastes, EPA-600/2-80-076, April 1980, and 40 CFR Part 264, Appendix V, for additional information on waste compatibility).

- *Total ~~volatile organic compounds (~~VOCs~~)~~:* This test will determine the presence and concentration of individual VOCs.

- *Total ~~semi-volatile organic compounds (~~SVOCs~~)~~:* This test will determine the presence and concentration of individual SVOCs.

- *Metals:* These tests will determine the presence and concentrations of individual metals and other inorganic constituents.

- *Organochlorine pesticides:* This test determines the pesticide concentration of the waste.

- *Chlorinated herbicides:* This test determines the herbicide concentration of the waste.

- *PCBs:* This is a quantitative test to determine whether PCBs are contained in oil-bearing and other types of waste and to determine the concentration.

- *Leachate:* Leachate must be tested for all leachate constituents listed in the table in 40 CFR 268.40.

4.5.1.3 Additional Analysis to Ensure Compliance with Regulatory and Operational Limits

The rationale for the selection of additional parameters to ensure compliance with the facility's regulatory and operational limits is as follows:

- *Radioactivity screen:* See Section 4.5.1.1. This test will determine if the waste is prohibited from acceptance at the facility (see Section 4.1.2 for a list of prohibited wastes).

- *PCBs:* See Section 4.5.1.2. This test will determine if the waste contains a prohibited concentration of PCBs.

- *VOCs (Subpart BB):* These tests are conducted as required by 40 CFR 264.1063(d) to determine, for each piece of equipment subject to the requirements of 40 CFR~~,~~ 264, Subpart BB, whether the equipment contains or exceeds 10 percent VOCs by weight. Applicable process knowledge may be used to make this determination.

- ~~*VOCs (Subpart CC).* – These tests are conducted as required by 40 CFR 264.1084(a)(3)(iii) to determine, if wastes placed in tanks, the evaporation pond, and the stabilization bins are subject to the requirements of Subpart CC. A hazardous waste with a volatile organic concentration equal to or greater than 500 ppmw will be accepted only for storage in approved containers and direct disposal in the landfill;~~

- *Dioxins and dibenzofurans:* This test is conducted to ensure that the waste stream does not contain dioxins and/or dibenzofurans.

REACTIVITY GROUP DESIGNATION AND WASTE COMPATIBILITY MATRIX (1)

TRIASSIC PARK WASTE DISPOSAL FACILITY

Figure 4-4

Reactivity Group No.	Reactivity Group Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107
1	Acids, Mineral, Nonoxidizing	1																																								
2	Acids, Mineral, Oxidizing		2																																							
3	Acids, Organic		G H	3																																						
4	Alcohols and Glycols	H	HF	HF	4																																					
5	Aldehydes	HP	HF	HP		5																																				
6	Amides	H	H GT				6																																			
7	Amines, Aliphatic and Aromatic	H	H GT	H		H		7																																		
8	Azo Compounds, Diazo Compounds, and Hydrazines	H G	H GT	H G	H G	H			8																																	
9	Carbamates	H G	H GT						G	9																																
10	Caustics	H	H	H		H				H C	10																															
11	Cyanides	GT GF	GT GF	GT GF					G			11																														
12	Dithiocarbamates	H GF E	H GF F	H GF F		GF GT		U	H C				12																													
13	Esters	H	H F						H G		H			13																												
14	Ethers	H	H F												14																											
15	Fluorides, Inorganic	GT	GT	GT												15																										
16	Hydrocarbons, Aromatic		H F														16																									
17	Halogenated Organics	H GT	H F GT					H GT	H G		H GF	H						17																								
18	Isocyanates	H G	H F GT	H G	H F			H P	H G		H F G	H G	U						18																							
19	Ketones	H	H F						H G		H	H								19																						
20	Mercaptans and Other Organic Sulfides	GT GF	H F GT						H G									H	H	H	20																					
21	Metals, Alkali and Alkaline Earth, Elemental	GT H GF	GT H GF	GT H GF	GT H GF	GT H GF	GF H	GF H	GF H	GF H	GF H	GF H	GF GT H	GF H				H E	GF H	GF H	GF H	21																				
22	Metals, Other Elemental & Alloys as Powders, Vapors or Sponges	GF H F	GF H F	GF					H F GT	U	GF H							H E	GF H		H GF F		22																			
23	Metals, Other Elemental & Alloys as Sheets, Rods, Moldings, etc.	GF H GF	GF H GF						H F G									H F						23																		
24	Metals and Metal Compounds, Toxic	S	S	S			S	S			S														24																	
25	Nitrides	GF H F	H F	H GF	GF H E	GF H			U	H G	U	GF H	GF H	GF H				GF H	U	GF H	GF H	E				25																
26	Nitriles	H GT GF	H F GT	H							U											H F			S	GF H	26															
27	Nitro Compounds, Organic		H F GT			H					H E											H GF F				H GF F		27														
28	Hydrocarbons, Aliphatic Unsaturated	H	H F			H																	H E						28													
29	Hydrocarbons, Aliphatic Saturated		H F																											29												
30	Peroxides and Hydroperoxides, Organic	H HO	H E		H P	H G		H GT	H P E	H P GT		H S GT	H P GT					H E	H	E	H F GT	H E	H G		H G	H GF F	H P GT		H P		30											
31	Phenols and Cresols	H	H F						H G										H F			GF H				GF H					H	31										
32	Organophosphates, Phosphothioates, Phosphodithioates	H GT	H GT						U		H E											H									U		32									
33	Sulfides, Inorganic	GT GF	HF GT	GT		H			E										H												H GT			33									
34	Epoxides	H P	H P	H P	H P	U		H P	H P		H P	H P	U								H F	H F	H F		H F	H F					H F	H F	U	H F	34							
101	Combustibles and Flammable Materials, Miscellaneous	H G	H F GT	H																		H G F				H GF F					H F GT					101						
102	Explosives	H E	H E	H E				H E		H E			H E									H E	H E	H E	E	E					H E	H E		H E	H E	H E	102					
103	Polymentable Compounds	P H	P H					P H		P H	P H	U										F H	F H	F H	F H	F H					F H	F H		F H			H E	103				
104	Oxidizing Agents, Strong	H GT		H GT	H F	H F	H F GT	H P GT	H E	H F GT		H F GT	H F GT	H F	H F		H F	H GT	H F GT	H F	H F GT	H F E	H P E	H F		H F	H F GT	H E	H F	H F	H G	H F GT	H F	H F G	H E	H P GT	104				
105	Reducing Agents, Strong	H GF	H F GF	H F GF	H F GF	H F GF	G H	H GF	H G				H GT	H F				H E	GF H	GF H	GF H					H GF E					H E	GF H	GT GE H		H	GF H	H E	H P GT	H F E	105		
106	Water and Mixtures Containing Water	H	H						G										H S			GF H	GF H		S	GF H								GT GF							106	
107	Water Reactive Substances	EXTREMELY REACTIVE! DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL! EXTREMELY REACTIVE!																																								107
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	101	102	103	104	105	106	107

Reactivity Code	Consequences
H	Heat Generation
F	Fire
G	Innocuous
GT	Toxic gas generation
GF	Flammable gas generation
E	Explosive
P	Violent polymerization
S	Solubilization of toxic substances
U	May be hazardous but unknown

Example

H F GT — Heat generation, fire, and toxic gas generation

[1] Determine the reactivity group numbers of the waste being evaluated. Locate the higher number using the left column "Reactivity Group No." and locate the other number on the stair-stepped column on the right.

Locate the square at the intersection of the two group numbers, then consult the legend to match the reactivity code(s) with the consequences.

- *Non-biodegradable sorbent test:* This test is performed as required by 40 CFR 264.314 (prohibition of liquids in landfills). This test is required if the facility determines that the generator did not indicate whether a sorbent was added to the waste or indicates that a sorbent was added but did not specify the name and type of sorbent and whether it is nonbiodegradable. If any of this information is not present, the generator will be contacted for clarification. If uncertainty remains, 40 CFR 264.314(e)(1)(i-iii) will be reviewed. If the sorbent's biodegradability cannot be determined from the list or if the name of the sorbent is unknown, the material will be analyzed following one of the tests referenced in 40 CFR 264.314(e)(2). The facility will select one of the following tests:
    - ASTM Method G21-70 (1984a) - Standard Practice for Determining Resistance of Synthetic Polymer Materials to Fungi;
    - ASTM Method G22-76 (1984b) - Standard Practice for Determining Resistance of Plastics to Bacteria;
    - OECD Test 301B - CO_2 Evolution (Modified Sturm Test) ASTM Method G21-70 (1984a) - Standard Practice for Determining Resistance of Synthetic Polymer Materials to Fungi; or
    - Other approved test method.

- *Total organic halogens (TOX):* This test determines if concentrations of halogens in the waste are in compliance with the LDR treatment standards. It also determines if the waste contains constituents that could degrade a liner. Wastes containing TOX greater than 1,000 mg/l (based on TCLP extract) will not be placed in the ~~evaporation pond or the~~ landfill.

- *Free liquid content test (paint filter liquids test):* This test is a qualitative test to determine the free liquids concentration contained within the waste matrix and will be used as a control parameter for wastes that are to be landfilled.

- *Toxicity characteristic leaching procedure (TCLP):* This test must be used to obtain an extract of the waste where treatment standards are based on concentrations in the waste extract:
    - major ions and metals in non-leachate (sulfides and sulfates, radionuclides, VOCs, SVOCs, pesticides, PCBs, perchlorate, and TPH).

Permit Renewal Application
October 17, 2011

Attachment G

Air Quality

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Modified by:

The New Mexico Environment Department
March 2002

~~Permit~~ Attachment G. Air Quality

~~Modified from the Permit Application, Volume I, Section 11.0.~~

11. 40 CFR 264 Subparts AA~~,~~ and BB ~~& CC~~ Regulations

This section provides a brief summary of the air requirements, as presented in 40 CFR 264 subparts AA and BB. In addition, this section provides a brief summary of other regulations which may be applicable to the Facility.

11.1 40 CFR 264 Subpart AA - Air Emissions for Progress Units

The Facility will not be subject to the 40 CFR 264 Subpart AA regulations because the Facility will not utilize distillation, fractionation, thin-film evaporation, solvent extraction, air or steam stripping operations.

11.2 40 CFR 264 Subpart BB – Air Emission Standards for Equipment Leaks

No wastes with organic concentrations greater than 10 percent by weight shall be ~~accepted for storage in the liquid waste storage unit, treated in the evaporation pond or treated in the stabilization unit stored in containers, or~~ placed in the landfill. Units in compliance with this provision will not be subject to 40 CFR 264 Subpart BB regulations. Equipment such as pumps, compressors, pressure relief devices, sampling equipment, connecting system, and valves shall not contain or contact hazardous wastes with organic concentrations of 10 percent or greater by weight.

~~11.3 40 CFR 264 Subpart CC – Air Emissions Standards for Tanks, Suface Impoundments and Containers~~

~~Tanks and evaporation ponds shall not be used to manage hazardous wastes containing volatile organic concentrations of equal to or greater than 500 parts per million by weight (ppmw). Units in compliance with this provision will not be subject to 40 CFR 264 Subpart CC regulations.~~

~~Drums and roll-off containers may hold hazardous waste that contains greater than 500 ppmw volatile organic compounds. These wastes shall be stored in containers with appropriate covers (see Section 11.3.2).~~

~~11.3.1 Waste Determination~~

~~A waste determination will only be conducted for each waste stream to be placed in a unit that is exempt from the Subpart CC requirements for air emission controls (e.g. the evaporation pond). The waste determination shall be made at the point of waste origination. In general, the Facility will use generator-supplied information (manifests, shipping papers, certification notices etc.) prepared in accordance with 40 CFR 264.1083 to make this determination, however, the Facility may choose to test a representative sample of the waste. For waste to be placed in units that comply with Subpart CC requirements for air emission controls, no formal waste determination is required.~~

~~11.3.2 Applicability to Containers~~

~~There are two types of containers expected to be used at the Facility to store wastes: (1) drums and (2) roll-off containers. These containers may hold hazardous waste that contains greater than 500 ppmw volatile organic compounds. These drums and roll-off containers stored at the Facility will have covers and meet DOT requirements for packaging of hazardous waste for transport under 49 CFR 178. Potential air pollution, from containers that hold hazardous waste with greater then 500 ppmw volatile organic compounds, will be controlled in accordance with the standards specified in CFR 264.1086(d).~~

~~11.3.3 Applicability to the Evaporation Pond~~

~~The Facility will not accept waste to be placed in the evaporation pond that contains greater than 500 ppmw volatile organics. Therefore, the evaporation pond is exempt from air emission control requirements specified in Subpart CC.~~

~~11.3.4 Applicability to Tanks~~

~~The waste storage tanks will not be subject to the Subpart CC requirements for inspection, monitoring, and emission controls because this unit will not be used to manage wastes containing volatile organic concentrations greater than 500 parts per million by weight (ppmw)~~

~~11.3.5 Applicability to the Stabilization Process~~

~~The concentration of volatile organics in the waste to be stabilized will be limited to less than 500 ppmw. Final design documentation will be included as part of the operating record for the Facility.~~

~~11.3.6 Inspection and Monitoring~~

~~A written plan and schedule will be developed and implemented to perform all inspection and monitoring in accordance with 40 CFR 264.1088(b).~~

~~11.3.7 Recordkeeping and Reporting~~

~~Recordkeeping and reporting will be conducted in accordance with 40 CFR 264.1089 and 264.1090, respectively.~~

~~11.3.7.1 Recordkeeping~~

~~The following records will be kept:~~

- ~~waste determinations;~~
- ~~inspection and monitoring results;~~
- ~~design specifications for closed vent systems and control devices;~~
- ~~control device exceedances and corrective action; and,~~
- ~~leak repair information.~~

~~11.3.7.2 Reporting~~

~~If the Facility becomes aware that an exempt unit has received hazardous waste containing greater than 500 ppmw volatile organic compounds, the regulatory agency will be notified within 15 days. In accordance with 40 CFR 270.30, if continuous emission monitoring is used at the exempt unit holding hazardous waste with greater than 500 ppmw volatile organic compounds, a semi-annual report will be provided that indicates each time the unit is operated in non-compliance over a 24 hour (or more) period of time. This report will not be provided if the unit remains in compliance during the entire 6-month reporting period.~~

11.4 Other Applicable Regulations

There are a number of other federal regulations which will apply to the Facility. Once the Facility has received a final permit and the configuration and operational aspects are finalized (it is possible that some minor changes to the Facility configuration and operation will occur as a result of the final permit), other regulations will be evaluated. Some of the regulations that will be evaluated are:

- National Pollution Discharge ~~and~~ Elimination System;
- Clean Water Act;
- Clean Air Act; and
- Occupational Safety and Health Administration regulations.

The regulations listed above will be evaluated for their applicability to the Facility. In addition to these federal regulations, the Facility will evaluate numerous state, county, and local regulations. GMI will ensure that the Facility is designed, constructed, and operated in compliance with all applicable regulations.

Permit Renewal Application
October 17, 2011

Attachment I

Vadose Zone Monitoring System Work Plan

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The New Mexico Environment Department
March 2002

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A Synthetic Precipitation Leaching ~~Meteoric Water Mobility~~ Procedure

Attachment I. Vadose Zone Monitoring System Work Plan

1. Introduction

1.1 Background

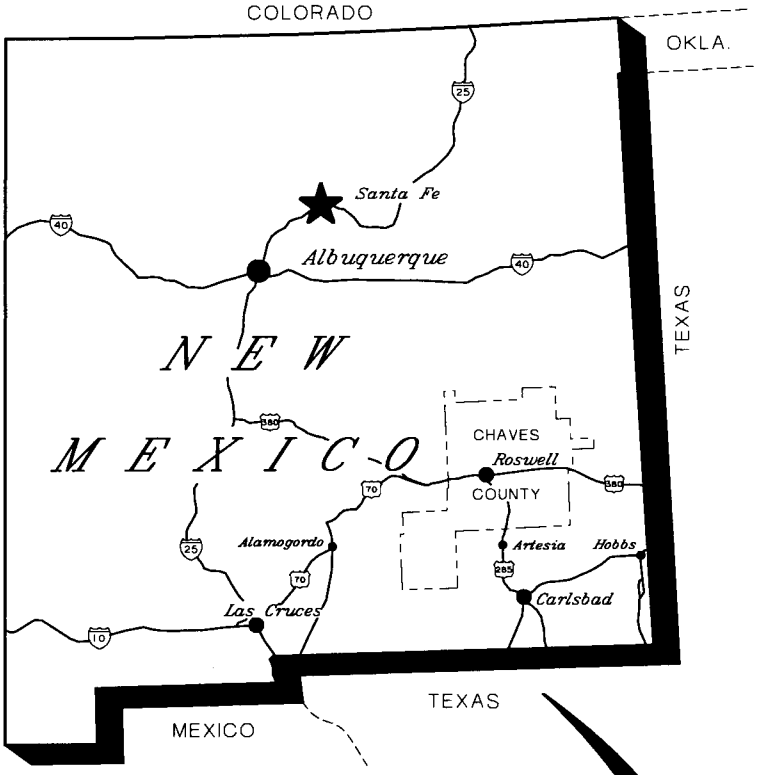
On January 12, 2000, the Hazardous Waste Bureau (HWB) of the New Mexico Environment Department (NMED) granted ~~the~~ Gandy Marley, Inc. ~~Corporation~~ (GMI) ~~was granted~~ a Groundwater Monitoring Waiver for its proposed Triassic Park Waste Disposal Facility ~~by the Hazardous and WasteRadioactive Materials Bureau (HWRMB) of the New Mexico Environmental Department (NMED) on January 12, 2000~~. The Groundwater Monitoring Waiver and a Vadose Zone Monitoring System (VZMS) Work Plan for liquid detection and water quality monitoring were part of the permit approval for the Triassic Park Waste Disposal Facility authorized by NMED in a Final Order on March 18, 2002.

The Triassic Park Waste Disposal Facility will be located in Chaves County, New Mexico, east of Roswell (Figure 1, Site Location Map[rpf1]). The facility will be a full-service Resource Conservation and Recovery Act (RCRA) Subtitle C waste ~~treatment, storage and~~ disposal operation. The facility will provide landfill disposal only. Two treatment processes authorized under the original permit are no longer planned; therefore, the VZMS work plan has been updated to reflect elimination of certain operations from the facility design. Previously planned operations that will no longer need monitoring include ~~will be used at the facility. E~~evaporation ponds ~~will be used~~ for managing ~~leachate~~ fluids that meet~~s~~ land~~fill~~ disposal restriction standards and a stabilization process ~~will be used~~ for treating fluids, sludge, and solids ~~prior to final disposal in the on-site landfill~~. Under the permit renewal, the landfill will be the only regulated unit for waste disposal.

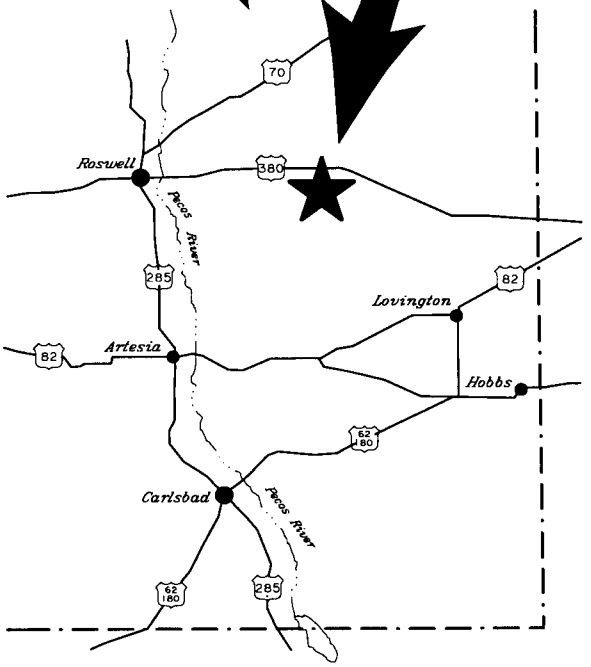
Site-specific hydrogeologic conditions and engineering safeguards for the landfill~~regulated units~~ were documented in the report titled *Groundwater Monitoring Waiver Request, Triassic Park Waste Disposal Facility* (Montgomery Watson, January 2000). The *Groundwater Monitoring Waiver Request* report indicated that hydrogeologic conditions at the site will minimize migration of potential leachate fluids from the facility to the uppermost aquifer. The conservative modeling calculations presented in the *Groundwater Monitoring Waiver Request* report estimated that the migration time for potential leaks from the disposal facility to the uppermost aquifer would be greater than 1000 years. As an alternative to conventional groundwater monitoring, the *Groundwater Monitoring Waiver Request* report recommended installation of a ~~vadose zone monitoring system (~~VZMS~~)~~ as a superior means for protecting human health and the environment because of its ability to detect potential leaks in a more timely manner.

This Work Plan presents the design of a VZMS at the site and will be an ~~appendix~~ attachment to the Permit Application. It includes a discussion of the location and design of the vadose zone monitoring wells and methodologies for characterizing fluids that may accumulate in vadose zone wells and sumps from various sources. This Work Plan also discusses how data will be collected to select chemical parameters indicative of fluids (waste or non-waste) that may occur at the site. A summary of monitoring frequency, sampling procedures, laboratory analyses, and data reporting associated with the monitoring system are also provided. Figure 2, Location of Sumps and Monitoring Wells[rpf2], presents a map of the proposed facility showing significant site features, including the locations of the waste management units, vadose zone monitoring wells, and sumps.

~~(NOTE)~~ The VZMS Work Plan in the 2002 permit approval noted that Permit Part 7, Vadose Zone Monitoring, supersede~~d~~s the ~~is~~ Work Plan in the Permit Application. ~~Any conflict or contradiction between Permit Part 7 and this Work Plan shall cause the Permittee to abide by the conditions in the Permit Part~~This



TRIASSIC PARK FACILITY



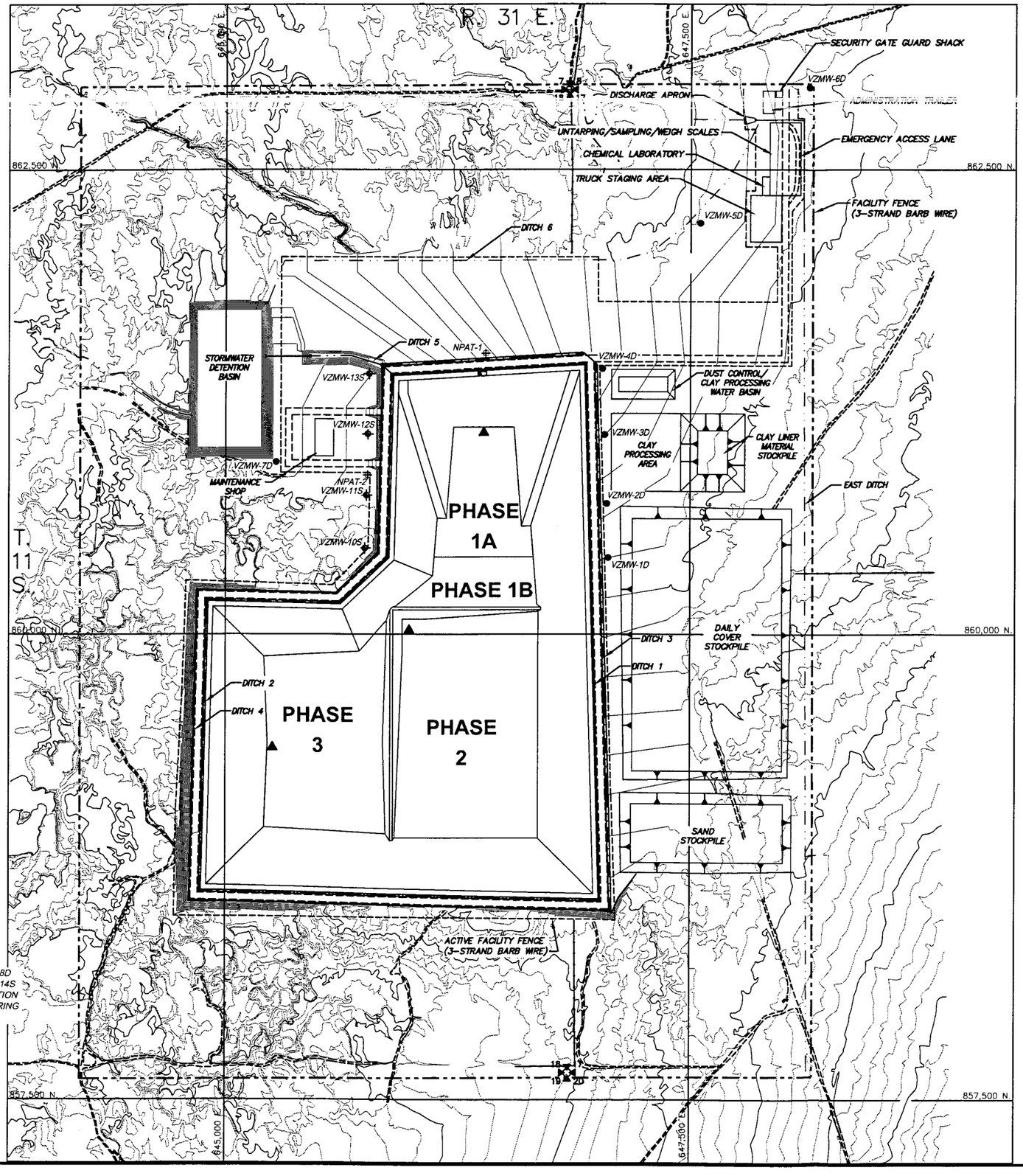
REV. No.	REVISIONS	REV. DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	Reissue	7/6/00	T.Leeson	K.Conrath	T.Leeson
	Issued for Report	2/11/00	T.Leeson	K.Conrath	T.Leeson

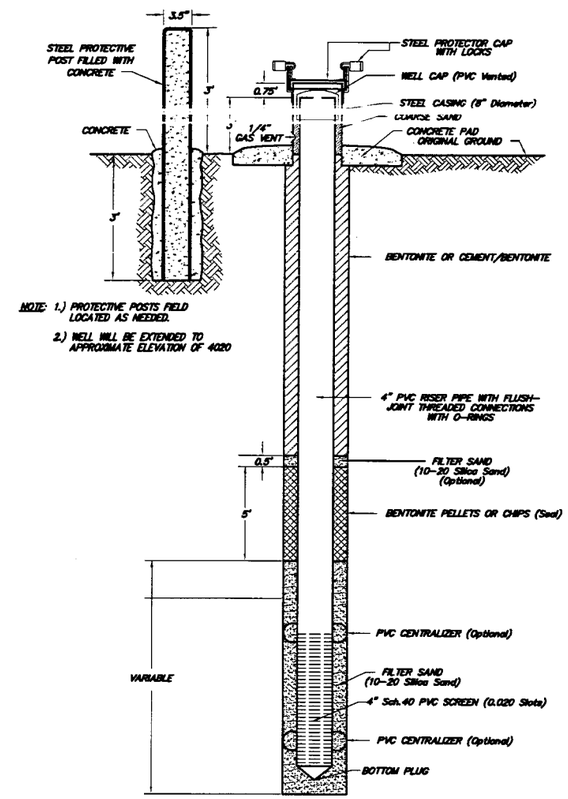
MONTGOMERY WATSON

PROJECT No.: 1342602.02190200
AutoCAD FILE: SITELOC.DWG
SCALE: N/A
FIGURE No: 1

TRIASSIC PARK WASTE DISPOSAL FACILITY

SITE LOCATION





NOTE: 1.) PROTECTIVE POSTS FIELD LOCATED AS NEEDED.
2.) WELL WILL BE EXTENDED TO APPROXIMATE ELEVATION OF 4020

TYPICAL VADOSE ZONE MONITORING WELL INSTALLATION DETAIL

SCALE
300' 0 300' 600'

LEGEND
- Existing contour
- Regraded contour
- Deep monitoring well
- Shallow monitoring well
- Vadose zone sump
- Neutron probe access tube
- Facility and active facility fences (3-strand barb wire)

NOTES:
1. VADOS ZONE MONITOR WELLS VZMW-9D AND VZMW-15S ARE LOCATED APPROXIMATELY 3,300 FEET NORTHEAST OF THE FACILITY BOUNDARY WITHIN 15 FEET OF THE LOCATION OF BORING WW-1.

PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PART B HWMU APPLICATION RENEWAL

FILE NAME: S:\Projects\ES11.0141_Triassic_Park_Permit_Renewal\VR_Drawings\TT\LEBLOCK\TL_22X24.dwg

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TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

LOCATION OF SUMPS AND MONITORING WELLS

JOB NO. ES11.0141

FIGURE 2

updated VZMS Work Plan has been modified to be consistent with Permit Part 7 along with additional updates reflecting the Facility design changes.

1.2 Project Scope and Objectives

This Work Plan presents recommendations for a VZMS at the site. The vadose zone monitoring program for the facility allows collection of fluids beneath or downgradient of the facility and identification of the potential source(s) associated with these fluids. The following items are included as part of this Work Plan. References to the Part B Permit Application or the permit are presented where additional detail is required.

- A description of the methodology for installing a VZMS capable of detecting fluids migrating from the waste management units
- A description of the methodology for developing baseline data characterizing the chemical characteristics of non-leachate fluids that may accumulate in sumps or vadose zone wells
- A methodology for selection of appropriate indicator parameters that could be used to identify leachate fluids during future monitoring at the site
- A description of the methodology to be used for collecting field and analytical data as part of the vadose zone monitoring program at the site
- A description of the contingencies to the monitoring program if fluids are detected in the monitoring system~~. References to the Part B Permit Application or actual permit are presented where additional detail is required.~~

The primary VZMS consists of a vadose zone monitoring sump~~s~~ located beneath the landfill ~~Phase IA~~Phase 1A cell~~ and beneath each of two evaporation ponds~~. A secondary system consists of a series of vadose zone monitoring wells located adjacent to the landfill ~~Phase IA~~Phase 1A cell and~~ the evaporation ponds, and~~ on the periphery of the facility. Neutron access probe tubes ~~and lysimeters~~ are also located adjacent to the landfill ~~Phase IA~~Phase 1A cell~~ and the evaporation ponds~~.

This Work Plan also describes how the chemical characteristics of non-leachate fluids from various sources (i.e., stormwater evaporation ponds, rainwater, consolidation water, and water supply) are characterized. These data are used to develop a list of indicator parameters and/or water profiles that enable distinguishing between non-leachate fluids and leachate fluids.

Additional components of the vadose zone monitoring system presented in this Work Plan include the following~~are listed belowas follow~~.:

- Monitoring frequency
- Sampling procedures
- Laboratory analyses
- Data management
- Data reporting
- Health and safety

The methods described within this Work Plan include the necessary elements for a Quality Assurance Project Plan (QAPP). The QAPP objectives are designed to assure that sampling, chain of custody, laboratory analysis, data measurements, and reporting activities provide quality data that ~~is~~are representative of conditions at the site and legally defensible.

1.3 Project Organization

~~HRMB/~~The NMED HWB is the lead regulatory agency for this portion of the hazardous waste management p~~P~~ermit renewal a~~A~~pplication. ~~Gandy Marley~~GMI is the permittee and will review project documents prior to their submittal to the HW~~RM~~B. When the work plan is implemented, GMI will use a qualified engineering and environmental~~Montgomery Watson, in conjunction with their sub-consultants, is the~~ oversight contractor ~~and~~ responsible for coordination of field activities, subcontractors, data management, review, and reporting of information concerning site characteristics and interpretation of data developed during the studies. Additional contractors or subcontractors ~~to Montgomery Watson will~~are expected to conduct monitoring well construction and laboratory analyses.

1.4 Geology and Hydrology

A detailed discussion of regional and site-specific geology and hydrology is provided in the *Groundwater Monitoring Waiver Request*~~,~~ ~~Triassic Park Waste Disposal Facility~~ (Montgomery Watson, ~~January~~ 2000) and Section 3 ~~(Volume I)~~ of the Part B Permit Application. A brief summary of the site-specific geology and hydrology is presented below.

1.4.1 Site-Specific Geology

The thickness of Quaternary alluvial deposits (fine to very fine wind-blown sands) at the site varies from less than 10 to 35 feet. Two distinct Tertiary units, the Upper and Lower Dockum, exist beneath the alluvial deposits at the site. Within the proposed facility boundary, the Upper Dockum unit never exceeds 100 feet in thickness and the Lower Dockum is approximately 700 feet thick. The Upper Dockum consists of mudstones interbedded with siltstones and sandy siltstones. The Upper Dockum mudstones have an average permeability of 2.5×10^{-7} centimeters per second (cm/s) and the siltstones have an average permeability of 1.2×10^{-5} cm/s. The Upper Dockum sediments were deposited in a fluvial environment and individual lithologies may pinch out and not correlate over long distances.

The Lower Dockum was deposited in a lacustrine environment resulting in a thick accumulation of predominantly mudstones interbedded with thin siltstones. This unit is very homogeneous compared to the Upper Dockum. The Lower Dockum has an average permeability of 5.7×10^{-8} cm/s and represents a significant geologic barrier to downward migration of potential leachate from the proposed facility.

The site is located in a geologically stable region of the United States based upon its distance from tectonic centers and historically low seismic activity. There are no identified faults in the immediate area of the site.

1.4.2 Site-Specific Hydrology

There are no perennial stream drainages on or near the site. The nearest surface drainage is the Pecos River, ~~that~~which is located approximately 30 miles to the west.

The basal sand unit (Santa Rosa Sandstone) within the Lower Dockum is considered the "uppermost aquifer" in the region. Previous exploratory drilling, consisting of approximately 50 boreholes within the site boundary, did not encounter groundwater within potential Triassic host sediments. There is no water being produced from the Triassic sediments within a ~~four~~4-mile radius of the site. Beyond the site boundary, groundwater flow in the uppermost aquifer is generally easterly in the direction of the regional dip of the unit.

Based on drilling information, the western boundary of the Quaternary Ogallala Aquifer is located topographically between ~~one-half~~0.5 and ~~two~~2 miles east and stratigraphically above the site. Because of its

stratigraphic and physical location, it is highly unlikely that the proposed disposal facility will have any impact on this aquifer.

Groundwater was encountered in several wells during subsurface characterization for the Part B Permit Application. Brackish groundwater was identified in ~~a~~ perched zone (~42 feet below ground surface [bgs]) borehole PB-14, which is located to the southwest outside of the site footprint and appeared to be due to a lithologic depression on the surface of the Lower Dockum unit. Groundwater was also encountered in wells WW-1, WW-2, PB-1, and PB-26, which are located 2,000 feet or more to the north and south of the site. Additional detail on the results of this drilling can be found in Section 3.0 of the Permit Application.

1.4.3 Site Model

In order to justify the design of the VZMS, potential contaminant pathways, should there ever be a release from one of the waste management units, are shown in Figure 3, Schematic Site Model[rpf3]. There are several types of potential conduits for fluid movement through bedrock, including ~~those listed below.~~the following:

- Primary permeability (i.e., connected interstitial voids) in either bedrock or alluvial material
- Bedding planes (i.e., between interbeds within the Upper Dockum unit or along the contact between the Upper and Lower Dockum units)
- Secondary permeability (i.e., faults and fractures), although there is no evidence of faults in the area

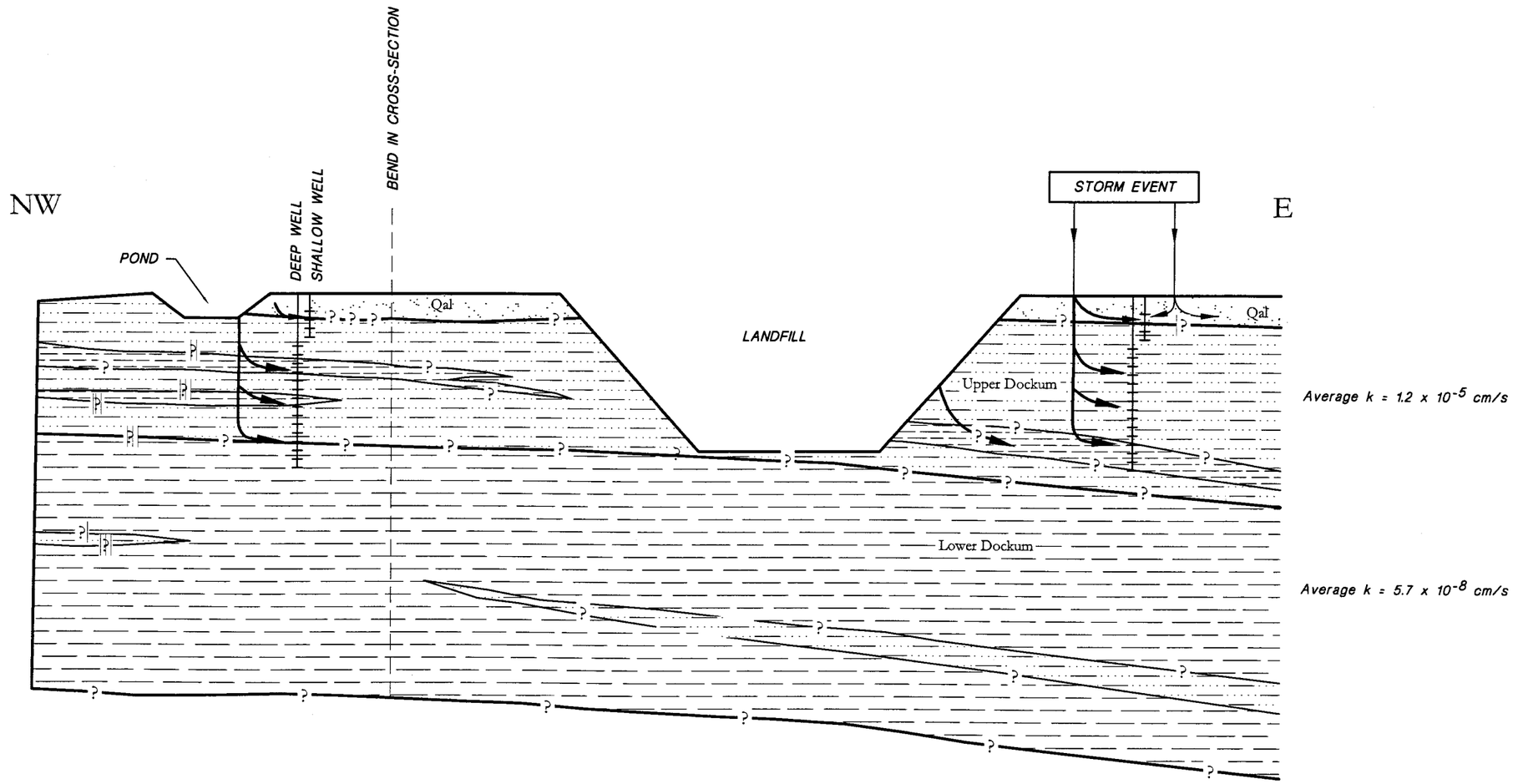
Consequently, if there were a release of fluids from ~~one of~~ the landfill~~regulated units~~, fluid could migrate vertically and/or laterally via one of the above-mentioned conduits. It is likely that lateral migration of the fluids along the dip of the units (i.e., along bedding planes) would dominate the flow regime. Therefore, a monitoring well located down dip of the facility and screened across the Upper Dockum/Lower Dockum contact and up into the Upper Dockum unit (i.e., across the silty and sandy silty interbeds) would be the most likely locations to observe these fluids if they ever were to occur.

Additionally, fluids that may have been released from the landfill~~a regulated unit, such as the evaporation ponds,~~ could migrate through alluvium and along the alluvium/Upper Dockum contact, such that a shallow well located down-dip of the unit and screened across the contact and up into the alluvium would be the most likely place to observe these fluids. Furthermore, all non-leachate fluids, except consolidation water, would be expected to appear first in the shallow wells.

2. Vadose Zone Monitoring System Installation

The landfill cells ~~and evaporation ponds~~ will be constructed in phases. The ~~Phase 1A~~Phase 1A landfill cell will be completed first and will include a single central sump system. The Phase 2~~II~~ and Phase 3~~III~~ cells will be completed at a much later date and will also include individual sump systems. ~~Evaporation Ponds 1A and 1B will be constructed first and each will have its own central monitoring sump system. Evaporation Ponds 2A and 2B will be completed at a later date.~~ The VZMS will be installed prior to the initial acceptance of waste at the facility.

This Work Plan only addresses the vadose zone monitoring sumps and vadose zone monitoring wells associated with the ~~Phase 1A~~Phase 1A landfill cell~~ and Evaporation Ponds 1A and 1B~~. Additional monitoring sumps and vadose zone monitoring wells will be addressed in a permit modification request for the remaining landfill cells~~ and evaporation ponds~~. Construction details for the vadose zone monitoring sumps are provided in the design document *Design Drawings, Triassic Park Waste Disposal Facility, Chaves County, New Mexico* (Montgomery Watson~~ *December 1997*~~ (Revised October 2000).



LEGEND

POTENTIAL CONTAMINANT TRANSPORT PATHWAY

MONITORING WELL

Screened Interval

NOTE:
THIS FIGURE IS STRICTLY SCHEMATIC, NOT TO SCALE, AND NOT MEANT TO PRESENT THE ACTUAL STRATIGRAPHY OR CONSTRUCTION OF TRUE REGULATED UNITS.

Not to Scale

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
0	Issued for Review	6/14/00	T.Leeson	K.Conrath	T.Leeson

TRIASSIC PARK WASTE DISPOSAL FACILITY

PROJECT:
VADOSE ZONE MONITORING SYSTEM WORK PLAN

DRAWING TITLE:
SCHEMATIC SITE MODEL

MONTGOMERY WATSON

Sheet 1 Of 1 Sheets

SCALE: Not to Scale

Figure No.: 3

AutoCAD FILE: schematic-site2.dwg PROJECT NUMBER: 1342602.0219.0200

2.1 Vadose Zone Sumps

Each landfill cell will have a triple leachate detection/removal sump system. Figure 4, Typical Landfill Sump Detail Cross-Section[rpf4], provides a cross-_section of the landfill sump system. The uppermost leachate collection and removal system (LCRS) consists of collection piping located above a primary liner system. The LCRS is sloped so any leachate above the primary liner drains to the sump within the landfill cell. A secondary landfill leak detection and removal system (LDRS), similar in design to the LCRS, will be located below the LCRS and primary liner. Beneath the LDRS and its secondary liner will be a vadose zone monitoring sump fitted with a transducer that will serve as a detection and removal system in the event of leakage through the primary and secondary liners. The vadose zone sump piping and gravel arrangement will be similar to the LCRS and LDRS arrangements.

~~The evaporation pond vadose zone monitoring sumps will serve as a detection system for possible leakage from the LDRS sump associated with the ponds. Figure 5, *Evaporation Pond LDRS and Vadose Plan and Details*[rpf5], provides a cross-section of the evaporation pond sump system. Leakage through the secondary liner system will flow into vadose zone monitoring sumps. This will allow the leakage to be detected, contained and properly treated and disposed. The vadose zone monitoring sump piping and gravel arrangement is similar to the LDRS arrangement.~~ The Permit Application provides additional details on the sump transducers. Operation and maintenance of the sumps and transducer is covered in the Operation and Maintenance Manual included in the Permit Application.

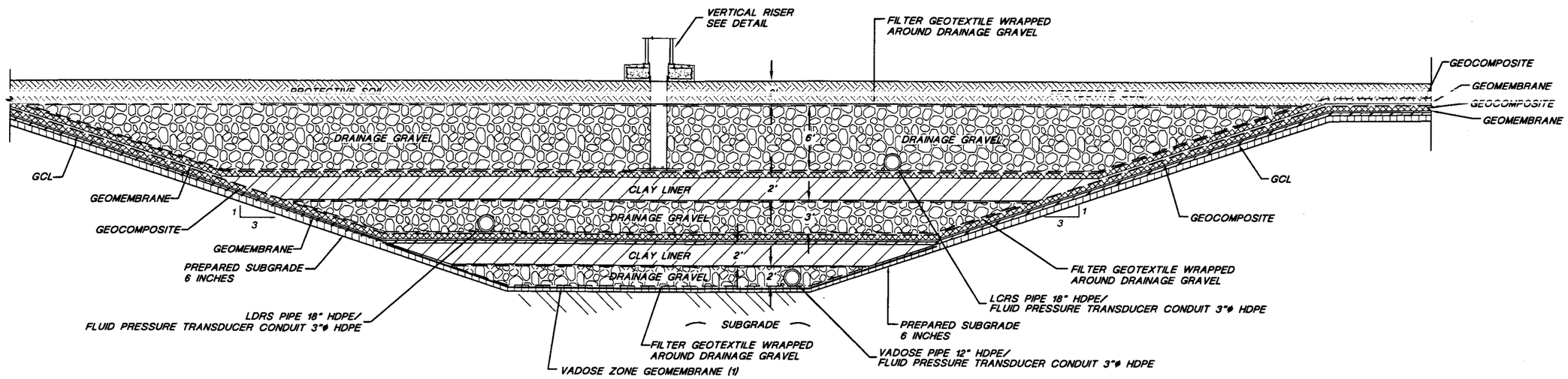
2.2 Vadose Zone Monitoring Wells

2.2.1 Well Locations

Vadose zone monitoring wells will be constructed and maintained to yield sufficient fluid samples that are representative of the various fluid sources, as required by 20.4.1.500 (incorporating 40 CFR 264.95(a) and 40 CFR 264.97(a)(2)). A total of 15~~Seventeen~~ vadose zone monitoring wells and 2 neutron probe access tubes will be installed to detect potential migration of fluids from the landfill (~~Phase 1A~~Phase 1A cell)~~ and evaporation ponds (1A and 1B)~~, as shown in Figure 2. The vadose zone monitoring wells include 6 shallow wells, 8 deep wells, and 1 very deep well. Of the 15 vadose zone monitoring wells, 11 are located within the facility boundary at locations shown in Figure 2. The other 4 vadose zone monitoring wells will be installed outside the facility at locations where previous investigation borings have encountered perched groundwater. The 2 neutron access probes are located on the north and west sides of the Phase 1A landfill, as shown in Figure 2. ~~Ten of these wells will be deep (installed across the Lower Dockum/Upper Dockum contact and up into the Upper Dockum), six will be shallow (screened across the Upper Dockum/alluvium contact), as detailed in Section 2.2.2, and one will be very deep as described in Permit Part 7. Two of the shallow wells will be nested with a deep well and will be located 8 to 15 feet from the deep well.~~

2.2.2 Vadose Zone Monitoring Well Construction

A utility clearance will be conducted at all drill locations to ~~insure~~ensure that no subsurface utilities or obstacles exist in the area. This will be conducted using methods appropriate to the conditions of each location (e.g., geophysics, utility maps, or facility personnel knowledge). The vadose zone monitoring wells will be installed using an air-rotary drill rig with no drive casing. Soil samples from cuttings will be logged and collected for use in characterizing fluids that may accumulate in the sumps and vadose zone monitoring wells, as described in ~~see~~ Section 3.0. These samples will also be collected for baseline chemical analyses. For additional well construction requirements, see Permit Part 7.



TYPICAL SUMP DETAIL

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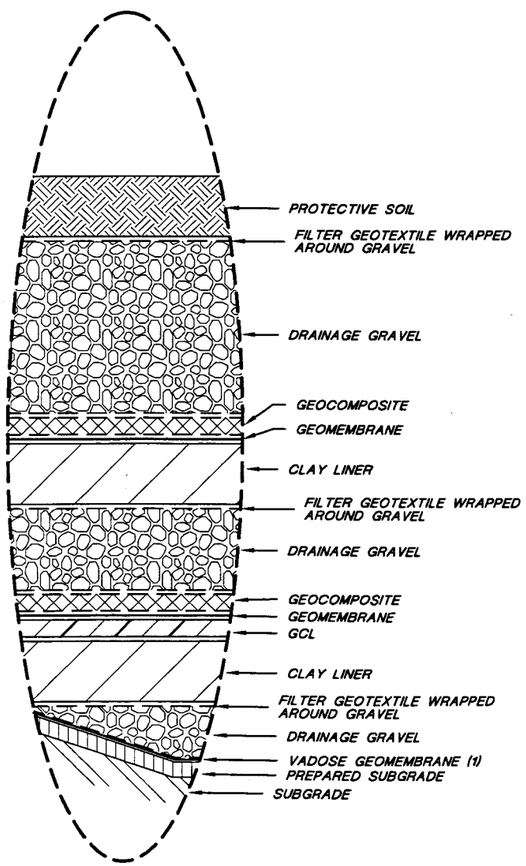
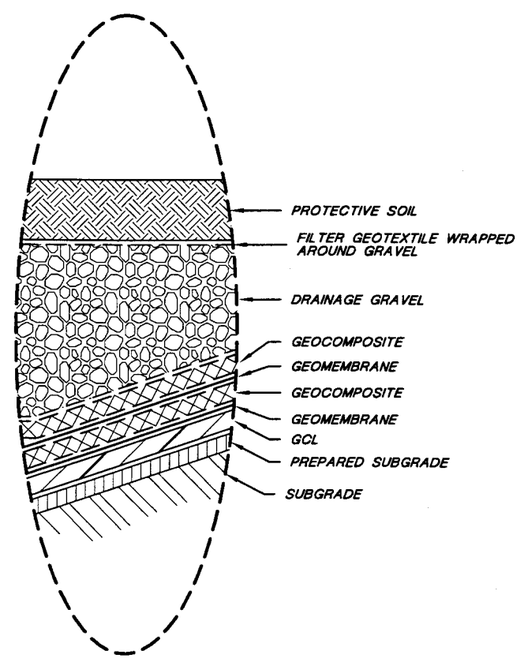
Feet



EXAGGERATED GEOSYNTHETIC COMPONENT DETAIL

Not To Scale



EXAGGERATED GEOSYNTHETIC COMPONENT DETAIL

Not To Scale

NOTE:
THE VADOSE GEOMEMBRANE EXTENDS TO LIMITS OF THE SECONDARY CLAY LINER.

Not For Construction

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0	Issued for Report	6/14/00	T.Leeson	K.Conrath	T.Leeson

TRIASSIC PARK

WASTE DISPOSAL FACILITY

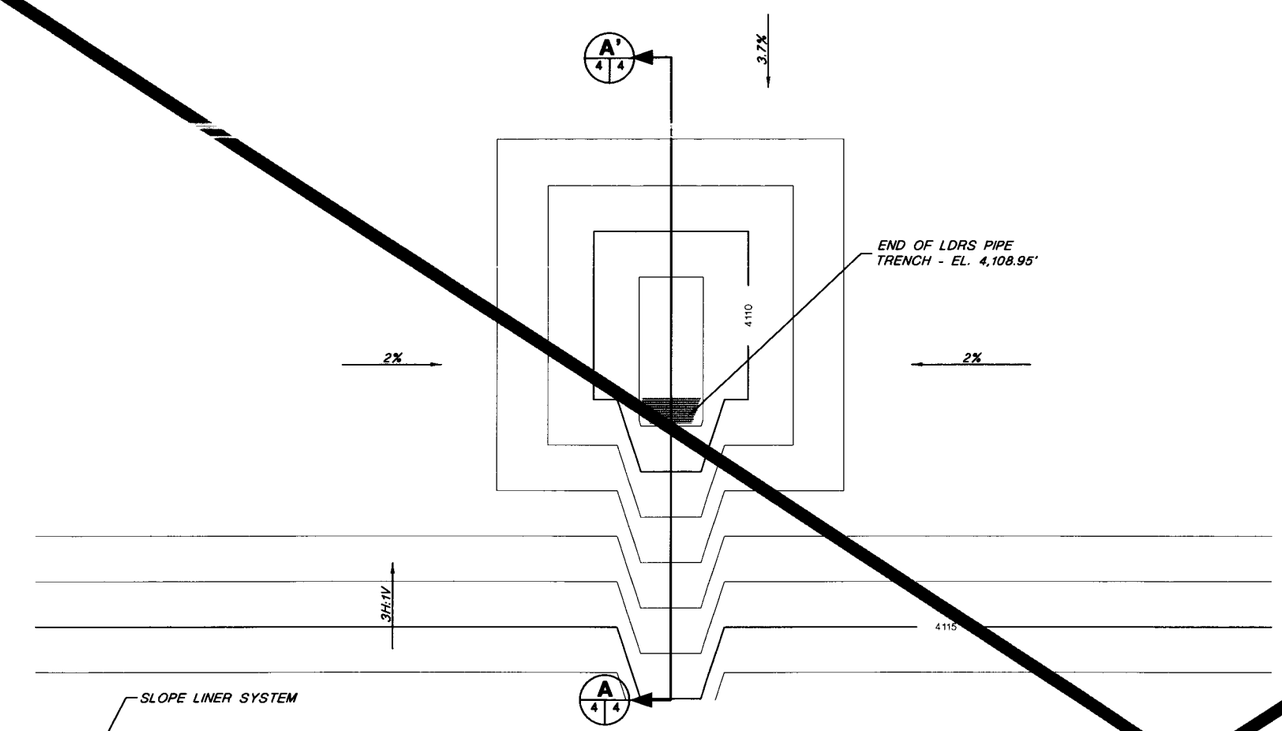
PROJECT:
VADOSE ZONE MONITORING SYSTEM WORK PLAN

DRAWING TITLE:
TYPICAL LANDFILL SUMP DETAIL CROSS-SECTION

MONTGOMERY WATSON

Sheet 1 Of 1 Sheets
SCALE: As Shown
Figure No: 4

AutoCAD FILE: WP-TYP.DWG PROJECT NUMBER: 1342602.02190200



4 / 29 32 EVAPORATION POND SUMP LAYOUT

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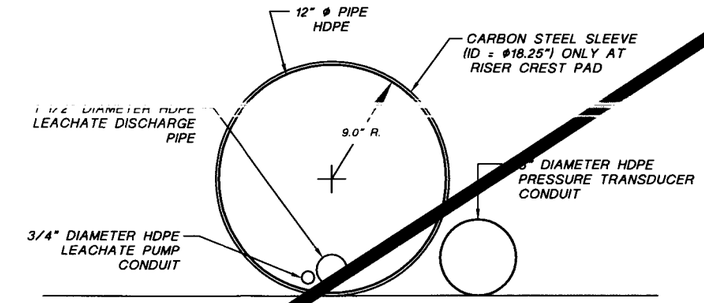

5 / 4 4 LDRS RISER PIPE DETAIL

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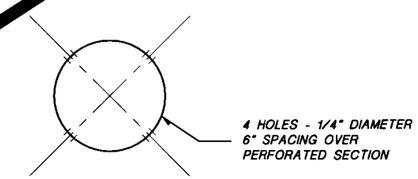
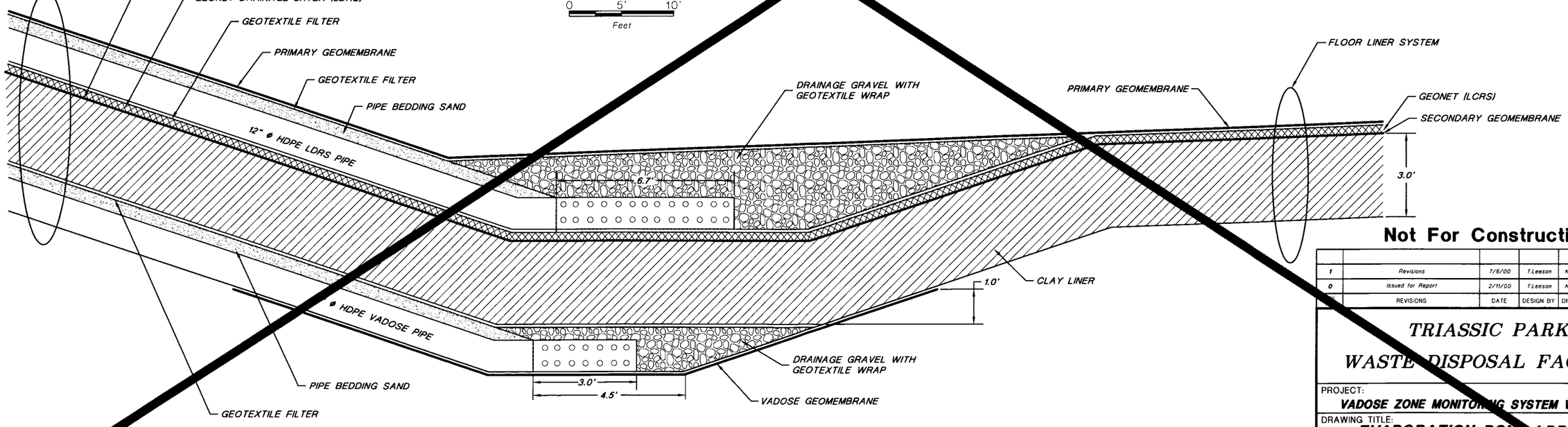


6 / 4 4 PIPE PERFORATION DETAIL

Not To Scale

Drawing eliminated for 2011 permit renewal.



A / 4 4 EVAPORATION POND SUMP CROSS-SECTION

Not To Scale

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

Not For Construction

1	Revisions	7/6/00	T.Leeson	K.Conrath	T.Leeson
0	Issued for Report	2/11/00	T.Leeson	K.Conrath	T.Leeson
No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRIASSIC PARK
WASTE DISPOSAL FACILITY

PROJECT:
VADOSE ZONE MONITORING SYSTEM WORK PLAN

DRAWING TITLE:
EVAPORATION POND LDRS AND VADOSE PLAN AND DETAILS

MONTGOMERY WATSON

Sheet 1 of 1 Sheets
SCALE: As Shown
DRAWING No. 3

PROJECT NUMBER: 1342602
AutoCAD FILE: WP-LDRSPLAN.DWG

2.2.2.1 Deep Monitoring Wells

The deep monitoring wells will be installed primarily to monitor for the possible detection of saturation above the Upper Dockum/Lower Dockum contact. Of the 8 deep monitoring wells, 7 wells will be installed with well screens across the Upper Dockum/Lower Dockum contact and up into the Upper Dockum. The one very deep vadose zone monitoring well will be installed within the Lower Dockum Unit above the lower sandstone formation (Santa Rosa Sandstone). The very deep well will be screened from 50 feet below the top of the Lower Dockum Unit~~,~~ down to 100 feet above the top of the Santa Rosa Sandstone.

The 9 deep and very deep vadose zone monitoring wells will be installed at the following locations:

- 4 deep monitoring wells will be located in a line along the eastern boundary of the Phase 1A landfill, spaced at approximately 350-foot intervals.
- 1 deep monitoring well will be located at the northeast corner of the facility.
- 1 deep monitoring well will be located at the midpoint between the northeast corner of the Phase 1A landfill and the northeast corner of the facility.
- 1 off-site deep monitoring well will be installed approximately 3,300 feet northeast of the facility, within 15 feet of the location of boring WW-1.
- 1 off-site monitoring well~~s~~ will be installed approximately 550 feet west of the facility, near the southwest facility corner, within 15 feet of the location of boring PB-14.
- The very deep monitoring well will be installed at the southeast corner of the stormwater detention basin.

The on-site geologist will log the boring and confer with the driller regarding lithology changes that identify the Upper Dockum/Lower Dockum contact. Drilling will use continuous coring to log the lithology in detail at deep borings VZMW-1 and VZMW-4 and very deep boring VZMW-9. All geologic core will be labeled as to depth, photographed, boxed, stored, and be available for inspection for the operating life of the facility. The location of the contact will be confirmed using a down-hole geophysical tool –(i.e., gamma ray and neutron logging methods). Monitoring wells that will continually undergo neutron logging shall have baseline logs created in both open and cased boreholes. It is estimated that the total depths for the deep landfill monitoring wells will range between 140 and 185 feet based on well location, ~~and~~ final grading at the site, ~~.~~ and~~T~~ the anticipated depth of~~for the deep evaporation pond monitoring wells will be approximately 70 feet, assuming the wells are drilled ten feet below~~ the Upper Dockum/Lower Dockum contact.

The deep vadose zone monitoring wells will be screened from 20 feet beneath the alluvium/Upper Dockum contact to 10 feet below the ~~contact between the~~ Upper Dockum/~~-and~~ Lower Dockum contact, with the screened interval extending ~~five~~5 feet below the contact and a ~~five~~5-foot~~-~~long sump below that. A detail of the well construction is shown on Figure 2.

Five feet of solid 4-inch-diameter Schedule 80 PVC casing will be placed at the bottom of the borehole to serve as a liquid collection sump. Above this casing, 4-inch-diameter Schedule 80 PVC flush-threaded 0.010-inch well screen will extend to 20 feet below the top of the alluvium/Upper Dockum~~/alluvium~~ contact. The top of the screened interval will extend to a depth that enables a minimum 20-foot seal below the alluvium/Upper Dockum~~/alluvium~~ contact and a minimum of 10 feet from the bottom of the adjacent shallow well's screened interval, if applicable. This will result in 80- to 100-foot screened intervals in the deep wells. Solid 4-inch-diameter Schedule 80 PVC casing will then be installed to the surface. Bottom caps will be attached with stainless steel rivets. Additionally, in order to minimize the chances of the bottom of the well being inadvertently broken out, extra care will be taken to ensure that the filterpack is filled in, while still

hanging the well casing under tension, with maximum density around the end of the well casing for added stability.

The casing will be lowered into the borehole a section at a time by hanging the casing from the drill rig. The casing will be left hanging from the drill rig after all the well casing has been attached and during the emplacement of filterpack material and grout to ensure that the casing remains straight. Centralizers will also be used to ensure that the well is straight. It will be important for the well to be plumb (i.e., vertical) to allow adequate visual monitoring of the wells. This will be accomplished by drilling the borehole straight, which will be the responsibility of the driller, as well as using the methods described above.

Following placement of the well casing, fine-grained sand (e.g., 20/40 silica sand) will be placed in the annulus to form a filter pack. Sand will be placed approximately 3 feet above the top of the well screen. Above the sand pack, ~~Three~~3 feet of transitional sand (i.e., 100-mesh sand) will be placed ~~above the sand pack~~ to prevent migration of the grout seal into the filterpack during emplacement. The main advantage of using transitional sand versus bentonite pellets is that it does not require hydration and will prevent any confusion of the source of the water if it were to enter into the well sump. The wells will be completed by pumping a grout mixture to form a seal from the top of the transitional sand to the top of the borehole using a tremie pipe. The grout mixture will consist of a high solids (~20 to 30%) bentonite grout ~~(e.g., Aquaguard or equivalent)~~ mixed to the manufacturer's specifications. The top of the well will be cemented with concrete and set with aboveground well protection. -No water will be used in the construction of the well, except in the grout mixture, which will be pre-mixed above_ground prior to emplacement in the annulus to avoid any free water entering the well or annulus during well construction.

2.2.2.2 Shallow Monitoring Wells

The shallow monitoring wells will be installed to monitor for the possible detection of saturation above the alluvium/Upper Dockum contact. The 6 shallow monitoring wells will be screened across the alluvium/Upper Dockum contact.

The shallow vadose zone monitoring wells will be installed at the following locations:

- 4 shallow monitoring wells will be located in a line along the western boundary of the Phase 1A landfill, spaced at approximately 330-foot intervals.
- 1 off-site shallow monitoring well will be installed approximately 3,300 feet northeast of the facility, within 15 feet of the deep vadose zone monitoring well near the location of borehole WW-1.
- 1 off-site monitoring wells will be installed approximately 550 feet west of the facility, near the southwest facility corner, within 15 feet of the deep vadose zone monitoring well near the location of boring PB-14.

If there is greater than 4 feet of alluvium present, the shallow vadose zone monitoring wells will be drilled to approximately 3 feet below the alluvium/Upper Dockum contact, ~~between the Upper Dockum and alluvium~~ with a 5-foot screened interval extending 2 feet below the contact and with a 1-foot-long sump below that. If less than 4 feet of alluvium is encountered, no monitoring well will be installed at that location._ A detail of the well construction is shown on Figure 2. The on-site geologist will log the boring and confer with the driller regarding lithology changes that identify the alluvium/Upper Dockum~~/alluvium~~ contact.

The thickness of the alluvium averages around 10 feet across the site. A minimum 3-foot seal or 4 feet of alluvium will be necessary to install a properly constructed monitoring well. 1 foot of solid 4-inch-diameter Schedule 80 PVC casing will be placed at the bottom of the borehole to serve as a liquid collection sump. Above this casing, 5 feet of 4-inch-diameter Schedule 80 PVC flush-threaded 0.010-inch well screen will extend to 3 feet above the alluvium/Upper Dockum~~/alluvium~~ contact.

Following placement of the well casing, fine-grained sand (e.g., 20/40 silica sand) will be placed in the annulus to form a filter pack. Sand will be placed between ~~½~~ 0.5 and 1 foot above the top of the well screen followed by ~~½~~ 0.5 to 1 foot of transitional sand. The actual thicknesses will be determined by the depth of the contact and a minimum 3-foot surface seal. The wells will be completed by emplacing a grout mixture to form the surface seal from the top of the bentonite to the top of the borehole. The grout mixture will be gravity emplaced if the wells are less than 50 feet deep and contain no formation water; if they are greater than 50 feet deep or contain formation water, the grout will be emplaced using the same procedures as the deep wells. The grout mixture will consist of a high solids (~20 to 30%) bentonite grout ~~(e.g., Aquaguard or equivalent)~~ mixed to the manufacturer's specification. The top of the well will be cemented with concrete and set with aboveground well protection. No water will be used in the construction of the well, except in the grout mixture, which will be pre-mixed above ground prior to emplacement in the annulus to avoid any free water entering the well or annulus during well construction.

2.2.2.3 Neutron Probe Access Tubes

Neutron probe access tubes will also be installed at two locations near the Phase 1A landfill liner to allow moisture content monitoring in the vadose zone and enable collection of a representative sample of any fluid that may accumulate at or above the stratigraphic boundary between the Upper and Lower Dockum stratigraphic units and below the stratigraphic boundary between the alluvium and the Upper Dockum. The locations of the two neutron probe access tubes are shown in Figure 2.

Neutron probe access tubes will be constructed with the same care as monitoring wells to ensure functionality and to prevent fluid contamination. ~~Details are provided in Permit Part 7.~~ Because the neutron probe access tubes will be located near stormwater runoff channels, the access tubes will be installed in a way to distinguish moisture changes that may occur due to infiltration of clean stormwater from moisture possibly caused by landfill leakage. The portion of the access tubes located close to the channels will be isolated from the deeper portion of the access tubes by sealing an interval of the borehole with cement grout containing 5 percent bentonite.

Neutron probe access tubes will be constructed using either PVC, low carbon steel, or stainless steel casing. Flush-threaded or welded tubing is preferred to coupled tubing, to minimize wall thickness for better transmission of neutrons. To allow use of various models of neutron probes, 2.5- to 3.0-inch tubing diameter will be used. The borehole annulus outside the casing will be backfilled with soil cuttings or silica sand to allow transmission of neutrons to the surrounding formation materials, with the exception of the sealed interval between the upper and lower intervals. If possible, cuttings from each major hydrostratigraphic interval should be segregated on plastic and kept covered so the material can be used to backfill the boring annulus. During installation, a dummy probe will be used to check the access tubes for bends or dents before and after installation is complete.

The neutron probe access tube is used to collect representative moisture content information with the neutron probe. Therefore, the access hole diameter and disturbance to the surrounding soil should be minimized. Working with the drilling contractor, a final borehole diameter will be selected that is the minimum necessary for successful completion of the access tube installation. A borehole diameter of approximately 5 to 6 inches is expected.

The top of the well will be cemented with concrete and set with aboveground well protection. No water will be used in the construction of the well, except in the grout mixture, which will be pre-mixed above ground prior to emplacement in the annulus to avoid any free water entering the well or annulus during well construction. Finally, a desiccant should be suspended beneath the well cap to keep the access tube free of moisture.

To determine the moisture content of soil surrounding the neutron probe access tubes, a calibration is needed between instrument counts and soil moisture. During installation of the neutron probe access tubes, the

neutron moisture meter will be used to profile the moisture content. Moisture profile measurements will be made before and after the cement grout is emplaced, so the moisture introduced by the grout can be distinguished from background conditions. The moisture profile will be compared with laboratory soil moisture data from samples collected during drilling, so a correlation can be made between neutron counts and moisture content for each major lithology type encountered. Thus, an accurate geologic log is needed for the calibration.

~~2.2.2.4Suction Lysimeters~~

~~Suction lysimeters will be constructed with the same care as monitoring wells to ensure functionality and to prevent fluid contamination. Details are provided in Permit Part 7.~~

2.2.2.4 VZMS Construction Information

Vadose zone monitoring wells will be drilled using air-rotary drilling methods. During drilling, VZMS construction information will be recorded on boring logs and well construction forms by the field geologist for each well and will contain the following information. The information will also be provided on final detailed well construction drawings presenting depth of well construction material emplacement and well dimensions.

- Name of geologist, site location, and date of activity
- Description and identification of drilling and sampling equipment
- Name of drilling contractor
- Soils description using the Unified Soil Classification System
- Description of soil texture, color, density, odors, and other appropriate descriptions
- Description of rock type
- Depth and thickness of groundwater (if encountered)
- Total depth of the boring and well to within 0.1 foot with respect to ground surface, and well depth to within 0.01 foot with respect to top of casing (marked)
- All applicable well construction details
  - Casing material specifications and size, and reference material certifications
  - Screen slot size and depth to both top and bottom of screen interval
  - Casing and screen joint type
  - Filterpack material source and grain size analysis
  - Filterpack placement methodology
  - Sealant material sources, types, and mix design
  - Surface seal and protective casing design
  - Well location horizontal and vertical coordinates
- Explanation of any introduced water and a reference to its source and its chemical analysis
- Reference to any non-anthropogenic fluids encountered during construction
- Well development procedures, should they be required
  - Equipment and methods used
  - Total daily amounts of fluids removed
  - Recovery rates
  - Turbidity
  - Static fluid surface elevation measurements

- Aquifer test results, including hydraulic conductivity, for any well encountering groundwater during installation

Three borings drilled for deep vadose zone monitoring wells will be continuously cored. Core will be collected during drilling of VZMW-1D and VZMW-4D located on the east side of the Phase 1A landfill and VZMW-7D located west of the Phase 1A landfill as the southeast corner of the stormwater detention basin. VZMW-7D is the very deep boring drilled into the Lower Dockum. The primary purpose of the coring is to evaluate the possible existence of paleofractures or faults beneath the facility. Should these borings yield insufficient core to accurately determine the lithology and geologic structure, additional core may be collected from other borings. All geologic core will be labeled as to depth, photographed, boxed, stored, and be stored for possible inspection for the operating life of the Facility. The core samples will be maintained as part of the Operating Record.

Following monitoring well installation, a licensed surveyor using a benchmark of known elevation as a reference point will survey each vadose zone monitoring well and neutron probe access tube. A reference mark will be made at the top of each well casing and surveyed for horizontal coordinates (±0.1 foot) and height above mean seal level (±0.01 foot). Then the depth of the well will be measured and recorded to 0.01 foot below the top of casing, as well as below the well pad and ground surface. Any deviations from this Work Plan will be documented and justified.

2.2.3 Decontamination

The drill rig and equipment used for installing the vadose zone monitoring wells for the landfill ~~Phase IA~~Phase 1A cell ~~and evaporation ponds~~ will be decontaminated prior to drilling and between boreholes. Decontamination procedures are described below.

Drilling equipment ~~which~~ that comes into direct contact with subsurface soils or groundwater will be decontaminated between each boring by removing adherent soil, steam cleaning and/or scrubbing with an anionic detergent in potable water followed by a double rinse with purified (deionized) water.

Investigation derived waste (IDW) will be handled in accordance with the waste analysis plan (WAP).

2.2.4 Well Development

Based upon previous investigations, groundwater is not anticipated in many of the vadose zone monitoring wells; therefore, well development should not be necessary. Isolated zones of perched groundwater may be encountered in the two deep vadose zone monitoring wells drilled at the locations of borings WW-1 and PB-14. ~~However, a description of~~The protocols for well development ~~is~~ provided below will be followed for all vadose zone monitoring wells where ~~in the unlikely event~~ groundwater is encountered. In the ~~unlikely~~ event that groundwater is encountered during the installation of monitoring wells, NMED will be contacted within 24 hours of the event.

If groundwater is encountered, wells will be developed to remove fine material from the formation and filterpack surrounding the well. Following well construction, the cement grout will be allowed to cure for approximately one week, after which development will consist of bailing and surging until relatively clear water (i.e., groundwater with low turbidity) is produced. Each well will be surged and bailed using a development rig equipped with a winch and a 3-inch-diameter steel bailer. Surging and bailing of fines is anticipated to take up to 4 hours per well to complete. The volume of water removed may ~~vary between~~range from ~~one~~ 1 casing volume for low-recharge wells (i.e., those that do ~~n't~~ not fully recharge within 12 hours) ~~and~~ to 6 casing volumes.

3. Baseline Liquid Characterization

Potential sources for water detected in the vadose zone monitoring wells and sumps may include ~~those shown below~~the following:~~.~~

- Non-leachate fluids
  - Rainwater
  - Stormwater detention pond fluids
  - Consolidation water from prepared subgrade or geosynthetic clay liner (GCL)
  - Pipeline leaks from facility water supply

- Leachate fluids (originating within the regulated unit)
  - Fluids that have migrated through waste from the landfill
  - Stormwater runoff collected in the landfill~~-~~ contaminated water basin

  ~~oEvaporation pond fluids~~

A baseline liquid characterization program will be conducted within three months of activating the facility water supply system to evaluate the water quality characteristics of sources of non-leachate fluids that could accumulate in sumps or vadose zone monitoring wells. Additionally, leachate fluids will be evaluated as part of the WAP and will include sampling and analysis of each of the leachate fluid~~s~~ types listed above. The potential characteristics of leachate fluids will be evaluated after a sufficient amount of waste materials have been placed in the landfill and landfill leachate has been collected~~, if it occurs~~. These data will be used to distinguish leachate fluids from non-leachate fluids that could accumulate in sumps or vadose zone monitoring wells during operation, according to the methods discussed in Section 6.4.

The baseline characterization program will be conducted on samples of non-leachate fluids to produce preliminary chemical profiles for these waters. _Samples of non-leachate fluids will be analyzed according to the program described in Table I-1. These data will be used to develop a water quality profile representative of each potential non-leachate fluid source.

Table I-1. Baseline Chemical Analyses

Analytes	Analytical Method	Sample Container(s)	Preservation Method/ Holding Time
General Water Quality			
Bicarbonate/carbonate	~~EPA 310.1~~SM 2320B	250-mL HDPE	4°C / 14 days~~48 hours~~
Chloride	EPA 300.0	250~~125~~-mL HDPE	4°C / 28 days
Dissolved major cations (Na, K, Mg, Ca, Fe)	EPA 6010B	500-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months
Total dissolved solids	~~EPA 160.1~~SM 2540C	250~~125~~-mL HDPE	4°C / 7 days
Sulfate	EPA 300	250~~500~~-mL HDPE	4°C / 28 days
Heavy Metals			
Dissolved ~~and total~~ metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb~~, Hg~~, Ni, Se, Ag, Tl, Zn)	EPA 6010B/~~7000~~6020	~~1 L~~125-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months~~; 28 days for Hg~~
Total metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, Zn)	EPA 6010B/6020	500-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months

Analytes	Analytical Method	Sample Container(s)	Preservation Method/ Holding Time
Total mercury (Hg)	EPA 7470/7471/ 245.2	500-mL HDPE	4°C; pH < 2 with HNO_3 / 28 days
Radionuclides			
Gross alpha, gross beta, gamma emitters	EPA E900.0/ 901.~~1~~0	~~250-mL CWM glass jar~~1-L HDPE	4°C; pH < 2 with HNO_3 / 6 months
Uranium, total	EPA ~~200.8~~6020	~~250-mL CWM glass jar~~500-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months
Radium 226/228	EPA 903.1/904.0/ 600~~/9320~~	~~250-mL CWM glass jar~~1-L HDPE	4°C; pH < 2 with HNO_3 / 6 months
Radon	EPA 913.0	~~250-mL CWM glass jar~~2 x 40-mL VOA vial	4°C / ~~6 months~~1 days
Organics			
Volatile organic compounds	EPA ~~624~~8260B	3 x 40-mL VOA vial	4°C; pH < 2 with HCl / 14 days
Semivolatile organics compounds	EPA ~~625~~8270C	1-L ~~HDPE~~glass amber	4°C / 7 days extraction~~, 40 days analysis~~
Pesticides	EPA ~~608~~8081/8141B	1-L ~~HDPE~~glass amber	4°C / 7 days extraction~~, 40 days~~
Polychlorinated biphenyls	EPA 8082~~608~~	1-L ~~HDPE~~glass amber	4°C / 7 days extraction~~, 40 days~~
Perchlorate	EPA 300.11/314.1	~~1-L~~125-mL wide-mouth HDPE	4°C / ~~2~~ 28 days
Cyanide	EPA 335.3	1-L HDPE	4°C / ~~2~~ 14 days
~~Sulfide, reactive~~	~~EPA 376.2~~	~~1-L HDPE~~	~~4°C / 14 days~~
TPH-gasoline	EPA ~~8015M~~418.1	~~3 x 40-mL VOA vial~~500-mL glass amber	4°C; pH <2 with HCl / 7 days extraction~~, 40 days analysis~~
TPH-diesel	EPA ~~8015M~~418.1	~~1-L glass~~500-mL glass amber	4°C; pH < 2 with HCl / ~~14 days~~7 days extraction
Oil & grease	EPA 9071/413.2	~~1-L HDPE~~500-mL glass amber	4°C; ~~H_2SO_4~~ pH < 2 with HCl / ~~28 days~~7 days extraction
Soil Analyses			
Metals	EPA 200.7/6010C	125-mL CWM glass jar	~~4~~°C / 6 months
Radiochemistry	HASL-300 / Gamma spec	500-mL CWM glass jar	4°C / 6 months

VOA = Volatile organic analysis
CWM = Clear wide-mouth jar
HDPE = High density polyethyrene bottles
HCl = Hydrochloric acid

A sample of the potential consolidation water will be analyzed as part of the baseline characterization program. The sample will be obtained by running a permeability test (ASTM D 5084~~-90~~) on a representative sample of the clay liner and/or GCL. -The extract from that test will then be analyzed according to Table I-1.

Water representative of the potential non-leachate fluid sources will be used in conjunction with drill cuttings from both the Upper and Lower Dockum Units to establish a chemical baseline using the Synthetic Precipitation Leaching Procedure (SPLP)~~,~~ (U.S. EPA SW-846 method 1312; ~~Meteoric Water Mobility Procedure (~~see Appendix A). The ~~MWMP~~SPLP will be used to test three samples representative of the lithologies (e.g., mudstone, siltstone, and sandy siltstone) of both the Upper and Lower Dockum Units using each distinct non-leachate fluid type. If the water profiling discussed in the previous paragraph reveals that the different non-leachate fluids each have distinct profiles, each water type will be used to conduct the ~~MWMP~~SPLP tests; otherwise, water representative of all the non-leachate fluids combined will be used.

Cuttings will be collected for use in these tests during installation of the vadose zone monitoring wells. The extract from these tests will be analyzed according to the program described in Table I-1. ~~If it is determined that the solids are too fine to conduct the standard extraction method (column leaching) for the MWMP test (see Appendix A), an alternative method will be used (i.e., bottle roll).~~ These data will provide an indication of the chemical profile (in terms of major ion chemistry, radiochemistry and trace metals) of water that would occur as a result of Dockum sediments being subjected to non-leachate fluid sources. Certain constituents listed in Table I-1, such as volatile organic compounds, are not expected to be detected during these tests~~,~~; however, their absence will be confirmed in case any natural organic materials (e.g., hydrocarbons) exist in the geologic materials.

Additionally, the samples of the Dockum cuttings collected ~~of the Dockum cuttings~~ during drilling will be used to analyze the material (solid) for background determination. These samples will be analyzed for heavy metals and radionuclides, as listed in Table I-1~~, Baseline Chemical Analyses~~.

After initial vadose zone fluids are sampled and tested, an assessment will be completed to determine whether the vadose zone fluids may be adversely affected by well construction materials. The compatibility assessment will consider both non-leachate and leachate fluids. The compatibility demonstration will be completed within six months of monitoring well construction, provided that sufficient vadose zone fluids are available to perform the assessment.

4. Monitoring Procedures

4.1 Monitoring Frequency

Following installation, monitoring for the presence of fluids will be performed daily for the vadose zone sump~~s~~ below the LCRS and LDRS sumps ~~will be monitored for the presence of fluids daily~~ and monthly for the vadose zone monitoring wells ~~monthly~~. The total depth of the vadose zone wells will also be measured each time the wells are monitored. Table I-2~~, *Monitoring Frequency*,~~ presents a summary of the monitoring program for the facility.

Table I-2. Monitoring Frequency

Time Period	Landfill		~~Evaporation Ponds~~	
	Sumps	Vadose Wells	~~Sumps~~	~~Vadose Wells~~
Operation	Daily	Monthly	~~Daily~~	~~Monthly~~
Closure	Daily	Monthly	~~Daily~~	~~Monthly~~
Post-Closure	Semiannually	Semiannually	~~Semiannually~~	~~Semiannually~~

During the operating life of the Facility, ~~The Permittee shall inspect~~ each vadose zone monitoring well and neutron probe access tube and the landfill vadose zone sump will be inspected according to the schedule in Table I-2. ~~, plus Vadose Zone Monitoring Wells 1, 2 and 3, every six months.~~ During the post-closure care period, monitoring wells VZMW-1D, -2D, -3D, and -4D and the landfill vadose zone sump will be inspected and sampled semiannually.

4.2 Response Actions

The following response actions~~, plus those identified in Permit Part 7,~~ will be conducted based on the outcome of each monitoring event.

- Liquid not present: no further action.
- Liquid present: the fluids will be sampled and analyzed. All remaining fluids will be removed and properly disposed of.

If the source of water in the sumps or vadose monitoring well is determined to be non-leachate fluids, no further action will be conducted other than removing the liquid and mitigating the source, if possible (e.g., a break in the water supply system). As part of the source mitigation, ~~the applicant will submit~~ a written plan for determining and mitigating the source of the fluids will be submitted to NMED for ~~their~~ approval within one week of its occurrence. If the source of the water is determined to be leachate fluids, corrective action steps will be taken, as described in the applicable permit module. Additionally, if the action leakage rate (ALR) is exceeded, corrective action or contingency steps will be taken, as described in the applicable permit modules, to include an increase in the monitoring frequency to weekly for one month or until the ALR is reduced, whichever occurs first. All response actions will be assessed by an independent New Mexico Professional Engineer. Reporting commitments are described in Section 6.4.

If fluids are detected in one of the shallow wells, the depth of the fluids will be compared to the depth of the waste. This comparison will aid in evaluating whether the source of the fluids could be from the waste disposal units.

4.3 Monitoring Method

The sumps are fitted with a dedicated transducer ~~fitted~~ with a manual readout. Consequently, the readout will be recorded and documented manually at the frequency indicated in Table I-2.

The wells will not be fitted with transducers and so will be monitored visually and manually, as listed below.

- ~~A light source, such as a flashlight or mirror, will be directed down the well and used to inspect for a reflection off fluids.~~
- A water level sounder capable of detecting and measuring the depth to water, if water is present.
- If water is detected, ~~A~~an interface probe~~,~~ capable of detecting water as well as petroleum hydrocarbons, will be lowered down the well and used to measure the depth of any water and/or the thickness of any petroleum hydrocarbons present.
- If fluids or petroleum hydrocarbons are suspected, a clean disposable bailer will be lowered into the well to collect a sample of the fluid for visual inspection and confirmation of its presence prior to collecting any for laboratory analysis.

The water level sounder and interface probe will be decontaminated prior to ~~using it~~use at each well. The results of this monitoring will be documented.

The procedures and schedule for inspection and maintenance of the VZMS sumps are described in the operations and maintenance manual included in the permit application. The wells will be visually inspected for damage or malfunction at the time of each monitoring event. Any problems will be communicated to the NMED and fixed in a timely manner.

4.4 Sample Collection

Consolidation water from prepared subgrade or GCL will be sampled for baseline characterization if and when it occurs. The most likely locations for consolidation water to collect are in the LDRS and VZMS

sumps, as shown on Figure 4~~5~~. As such, if it occurs prior to initial placement of waste in the landfill, it likely will represent consolidation water, provided there is no other significant source of fluids in the LDRS sump, like rainwater. If it is observed after initial placement of waste in the landfill, it will still be sampled, but may not represent consolidation water. The exact nature of that water will be determined at the time of occurrence.

If fluids are encountered in the sumps or vadose zone monitoring wells, samples will be collected as described below. The vadose zone monitoring sumps will each be equipped with a bladder pump. Samples will be collected from the pump using the minimal flow rate if sufficient volume exists in the sump. Laboratory analyses of samples will be completed by a chemical laboratory, as described in the WAP.

Groundwater is not anticipated in the on-site vadose zone monitoring wells based on results from previous hydrogeologic investigations at the site. Perched groundwater may be encountered at the two off-site locations where VZMS wells will be installed at the locations of borings WW-1 and PB-14. In the ~~unlikely~~ event groundwater is encountered following well installation, the wells will be initially sampled approximately one week after installation and development, or whenever water shows up.

Static water level measurements will be taken in the wells using an interface probe prior to sampling. Measurements will be taken to the nearest 0.01 foot from the surveyed reference point on the well casing. The interface probe will be cleaned between each well using a non-phosphate biodegradable detergent and fresh tap water followed by a distilled or de-ionized water rinse. New chemical-resistant disposable sample gloves will be used while collecting samples at each sump or well.

Following water-level measurement, well purging will commence and field measurements of pH, conductivity, temperature, and turbidity will be recorded every 2 to 5 minutes to demonstrate parameter stabilization prior to sampling. Purging will be discontinued once the parameters have stabilized or when three well volumes of water have been purged from the well, whichever occurs first. If there is insufficient recharge for the well to fully recover within 12 hours-, the well will only be purged once and sampled as soon as sufficient volume is recharged to the well, as per the guidelines in the Technical Enforcement Guidance Document (U.S. EPA, 1989). Groundwater samples will be collected using a disposable polyethylene bailer attached to a nylon rope. However, groundwater may also be collected from a submersible pump under a reduced flow to prevent volatilization if sufficient water exists.

Groundwater samples will be placed in appropriate containers provided by the laboratory. Table I-1 indicates the appropriate sample containers, volumes, and preservation required for each analyte. Samples will then be labeled and immediately placed in a refrigerated cooler for transport to the laboratory. Sample information will also be recorded in the field log book.

4.5 Sample Preservation and Transportation

After sealing the sample container, samples will be placed into a cooler as soon as possible and maintained at a temperature of approximately 4 degrees Celsius (°C). Samples will be transported to the analytical laboratory at the end of each sampling event. Samples in breakable containers will be packed in such a way as to prevent breakage during transportation. Table I-1 provides a summary of sample preservation and holding times required for each analyte.

4.6 Quality Assurance Samples

Duplicate samples will be collected in order to check the precision of laboratory analyses. Duplicates will be included for each parameter requested with samples sent to the laboratory and labeled so that the samples are

not identified as quality assurance samples. Approximately one duplicate sample will be collected for each ten samples sent to the laboratory or one per sample batch, whichever is less.

One trip blank sample will also be sent with each cooler containing samples for volatile organics analysis. Blank samples will be labeled so that the samples are not identified as quality assurance samples.

4.7 Chain of Custody Procedures

Chain of custody documentation will be used to ensure the integrity of samples from the time of collection to reporting of analytical results. This documentation will permit tracing of the possession and handling of samples from the time of collection through analysis and final disposition. Copies of the chain of custody forms will be kept in the facility operating record.

Sample custody will be initiated at the time of sample collection by placing a label on the sample container and filling out a chain of custody form. Each sample collected will be identified in the chain of custody form. Each person handling the sample will be identified on the form.

4.8 Field Equipment

Field equipment required for collecting samples will include: sample containers; gloves; refrigerated cooler; sample labels; physical parameter meter; log book; and miscellaneous equipment.

Calibration of field equipment (e.g., pH meter or organic vapor meter) will be conducted at the beginning and end of each work day.

4.9 Decontamination

In order to prevent cross contamination between sampling sites, sampling equipment will be decontaminated according to the following procedures.

- Remove excess soil or other adhering substances
- Wash with a solution of non-phosphate detergent in tap water
- Rinse with tap water
- Double rinse with distilled water

Decontamination of all equipment that comes into direct contact with sampled media will be carried out between samples and prior to equipment leaving the site. If a pump and hose system is used, the system will be cleaned prior to each groundwater sampling event by pumping a non-phosphate detergent dissolved in fresh tap water followed by a double rinse with de-ionized water. Should bailers be necessary, an unused, disposable bailer will be used at each well to prevent cross-contamination.

5. Laboratory Analysis

5.1 Analytical Methods

Table I-1 summarizes the analytical program for the baseline liquid characterization program, as well as for water detected in vadose zone monitoring wells and sumps. ~~Detection limits will be below drinking water~~

~~standards for applicable parameters.~~ Analytical detection limits will meet the most stringent of the following three criteria:

- Applicable state or federal drinking water standards
- Universal treatment standards (UTS) contained at 20.4.1.800 NMAC (incorporating 40 CFR 268, Subpart D)
- Lowest detection limits specified at EPA publication SW-846 (most recent edition)

This analytical program is designed to "fingerprint" fluids associated with the landfill operations so that if water is detected in the vadose zone sumps or monitoring wells, the source of that water can be determined. As such, it may become justifiable to revise the vadose zone sump and monitoring well analytical program based on the results of the baseline liquid characterization program. NMED approval will be obtained prior to making any changes to the program.

5.2 Laboratory Quality Assurance/Quality Control

Internal laboratory quality assurance/quality control procedures will include the following:

- Laboratory chain-of-custody tracking of samples
- Instrument calibration using calibration check standards and laboratory blanks
- Use of reagent and method blanks
- QC spike samples (approximately 1 every 20 samples)
- Matrix spike samples (approximately 1 every 20 samples)
- Laboratory split sample duplicates (approximately 1 every 20 samples)
- Laboratory check standards (approximately 1 every 20 samples)

5.3 Data Review, Validation, and Verification Requirements

All analytical laboratory data will be presented in accordance with~~as~~ SW-846 [i.e., EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*~~, Third Edition~~ (most recent edition, e.g., U.S. EPA, 2011a~~EPA, 1986~~)] documentation packages that provide the same level of detail as EPA Contract Laboratory Program (CLP) protocol ~~Level IV [see OLM02.1, *USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration* (EPA, 1990a) and OLM03.0, *USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration* (EPA, 1990b)].~~ (U.S. EPA, 2011b).

A tabular key will be provided with the package that relates field/laboratory sample numbers to: (1) QA and QC samples; (2) cooler receipt form(s); (3) reporting requirements for organic and inorganic analyses; (4) reporting of internal QC results (e.g., laboratory blanks, surrogate spike samples, matrix spike samples, laboratory duplicates and/or matrix spike duplicate pairs, and laboratory control standards); and (5) identification of field duplicates and all types of blanks. Actual chromatograms will be provided for all samples analyzed by gas chromatography (GC) methods.

At a minimum, data package verification will include evaluation of sampling documentation and representativeness, technical holding time, instrument calibration and tuning, field and lab blank sample analyses, method QC sample results, field duplicates, compound identification and quantification, the presence of any elevated detection limits, and a summary of qualified data. All data will be flagged with appropriate qualifiers.

The data validation and verification procedures will include: (1) an initial review or verification of the completeness of individual data packages for each sample delivery group; (2) validation of the data using guidelines tailored to the type of analyses performed (i.e., organics, inorganics, or radiochemical); (3) resolution of data discrepancies, where possible, by liaison with the responsible laboratory; (4) qualification of data by flagging with appropriate codes, with emphasis on data usability for decision-making purposes; and (5) preparation of sample delivery group specific data assessment summaries and a narrative report.

6. Data Management

6.1 Field Documentation

Records of all field activities will be kept in the facility operating record and the following items will be used to document field activities:

- Field log book
- Boring logs and well construction diagrams
- Well or sump sampling logs
- Chain of custody forms

Field log books will be maintained during the operating and post-closure period of the facility and used to record details of work including daily activities, any deviations from sampling or quality assurance plans, and equipment calibration.

Geologic boring logs will be produced by the field geologist during drilling activities. The logs will be prepared under the direct supervision of a qualified geologist or geotechnical engineer. Field logs will also be reviewed by the supervising geologist or engineer prior to finalization.

6.2 Laboratory Documentation

Once custody of a sample has been relinquished to the laboratory, complete documentation of the progress of the sample through the analytical process will be carried out by the laboratory. This will include a description of sample condition upon receipt, recording of sample receipt in the laboratory log book, documentation of steps in the analytical process, and recording of the results of analysis.

6.3 Laboratory Reporting

The laboratory reports (Level IV Data Validation Packages) will include the following information: ~~listed below.~~

- Sample number (as recorded on sample label and in field log book)
- Date sample received by laboratory
- Date of analysis
- Analysis performed
- Results of analysis
- Detection limits
- Reporting units

- Signatures of persons responsible for analysis

In addition, laboratory reports will include the raw data (e.g., chromatograms), copies of chain of custody forms, and results of laboratory QC procedures indicating accuracy and precision of analytical results.

6.4 Data Analysis

Data analysis will include tabular and graphical representation, graphical comparison between various parameters, and statistical analysis~~, if appropriate,~~ to determine whether fluids detected in the VZMS during the monitoring period are from leachate fluids sources or not. Statistical procedures will follow the methods described in Permit Attachment Q, Statistics for Release Determination. The application of data analysis methods is dependent on the data -reported during monitoring of the VZMS, if any.

Using primarily the baseline characterizations and the leachate fluid analyses (WAP), chemical profiles of the water types as well as a suite of appropriate analytical indicator parameters will be selected to be incorporated into the vadose zone monitoring program for leak detection during facility operation. The indicator parameters will be based primarily on the leachate fluid analyses, while the non-leachate fluid~~s~~ profiles will be based primarily on major ion chemistry established in the baseline, if available. Therefore, the indicator parameter list is expected to evolve as varying waste streams are accepted by the facility. In addition, all hazardous chemicals ever received at the facility will be considered as indicator parameters.

Analytical data from samples of fluids detected in the VZMS –will be compared to the non-leachate fluids baseline characterizations and leachate fluids evaluations discussed in Section 3.0. These comparisons will be based on evaluating trilinear plots of major ion chemistry characterization for non-leachate parameters: (bicarbonate, chloride, dissolved major cations [Na, K, Mg, Ca, Fe], total dissolved solids [TDS], and sulfate) ~~(e.g., calcium, magnesium, potassium, sodium, bicarbonate, sulfate and chloride)~~ and tabular and graphical summaries of metals/nonmetals, radionuclides, hydrocarbons, and other constituents. Through these evaluations, an obvious correlation between the water types and concentration ranges of the monitoring sample to either the leachate fluids or non-leachate fluids characterization may be observed. If the monitoring sample data cannot be easily characterized as leachate fluid or non-leachate fluid, or if concentrations fall outside the ranges established during baseline characterization, the monitoring sample will be characterized using statistical methods. Statistical analysis will be used to determine statistically significant changes in the following non-leachate parameters: dissolved and total metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Ti, Zn) and radionuclides (gross alpha, gross beta, gamma emitters, total uranium, radium 226/228, radon). In this case, a tolerance or prediction interval statistical procedure will be applied~~,~~ unless a more appropriate statistical method is identified.

In order to apply these statistics, it may become necessary to collect additional baseline data for non-leachate fluids to establish a more concrete background profile. The need for additional baseline sampling and analysis will be evaluated at the time of occurrence and evaluation of fluids in the VZMS.

Solid ~~and liquid~~ wastes accepted by the facility, as well as leachate fluids, will be sampled and analyzed separately and individually as per the WAP. These data will be used to develop a list of indicator parameters (i.e., waste constituents) to monitor for in the VZMS and will be used to determine if fluids detected in the VZMS are in fact leachate fluids. Additionally, if based on these data it is not clear whether the fluids detected in the VZMS are leachate fluids or not, additional samples of any fluids present in the LCRS~~s and the evaporation ponds~~ will be collected and analyzed for major ions and metals, as per Table I-1. These data will then be used to develop a chemical profile of these waters at the time of occurrence of fluids in the VZMS and used to compare to the baseline non-leachate fluid profile(s) to aid in determining the source of fluids in the VZMS.

6.5 Data Reporting

Data will be summarized and presented to NMED on a quarterly basis. All reports will be prepared under the supervision of a qualified geologist or professional engineer. The report will include an executive summary that highlights any significant findings during the reporting period.

The first quarterly report will contain the following information:

- Well completion and lithologic logs
- List of indicator parameters for non-leachate fluids and associated computations
- List of indicator parameters for initial leachate ~~based on F-039 and the first Appendix IX analysis; and~~
- VZMS analytical results collected during the first quarter
- Well inspection logs
- Monitoring field logs with sampling information

The main body of quarterly ~~the~~ reports will include discussions or summaries of the following topics~~ listed below.~~:

- Monitoring and sampling methodology
- Sample collection and preservation procedures
- Indicator parameter list, including non-leachate and leachate parameters indicating any revisions and evaluations used to derive the indicator parameters
- Current and historical analytical results
- Monthly leachate chemistry results
- Current and historical fluid levels~~, if applicable~~
- VZMS inspection and maintenance results
- Volumes of fluids removed from all monitoring points, including the LCRS~~s~~ and LDRS~~s~~
- Release assessment information in the form of a summary of the data reports
- Significant historical changes in fluid levels or fluid chemistry (e.g., leachate fluids)
- Summary of 40 CFR 264 Appendix IX results included in the previous biennial sampling event
- A cumulative list of chemicals managed in the landfill~~regulated units~~, as identified in the WAP

~~The report will also include the items listed below.~~

- Maps illustrating facility waste management units and monitoring sump and well locations
- Maps illustrating groundwater depth, gradient and flow direction (if appropriate)
- Map (plan view or cross-section) illustrating groundwater pathways (if appropriate)
- Graphs and/or tables depicting water quality
- Laboratory documentation, chain of custody and QA/QC documentation
- Copies of well and sump sampling logs and other pertinent documentation
- Operation and maintenance report
- Conclusions and recommendations

Biennial reports will also be submitted that contain the following information:

- 40 CFR 264 Appendix IX analysis
- Any modification to the indicator parameter list based on 40 CFR 264 Appendix IX analysis, including evaluations used to derive the indicator parameters

If needed, special reports will be submitted that contain the following information:

- Release information
- Monthly reports, as long as there are leachate fluids in the VZMS
- Non-leachate parameter list, including evaluations used to derive the indicator parameters

If fluids are detected in either the sumps or wells, NMED will be notified within 24 hours. Subsequently, an additional report (i.e., not a regularly scheduled quarterly report) will then be submitted to NMED within 14 days of fluid appearance. This report will include an assessment of the amount and source of the fluids; the possible size, location, and cause of the leak; and the seriousness of the any leak in terms of potential releases to the environment. It will also include a summary of any immediate short or long term response actions to be taken. The report will also include ~~those items listed below~~the following items~~.~~:

- Monitoring results from the sumps and wells (volumes/fluid levels and analytical results)
- A comparison to the baseline characterization results
- Analytical results for all fluids

Within 30 days of fluid appearance, a report will be submitted to NMED describing the effectiveness of the response actions. Monthly reports will be submitted to NMED as long as fluids are present in the VZMS.

6.6 Data Storage

All completed data analyses and reports from this project will be stored electronically. Copies of the electronic data and hard copies of the data and laboratory reports will be placed in the facility record during the operating and post-closure periods.

7. Health and Safety

If there is reasonable potential for exposure to toxic compounds, field personnel will be required to have current certification of 40-hour health and safety training per OSHA 29 CFR 1910.120(e). Personnel will adhere to proper health and safety protocols as described in a separate health and safety plan that will be submitted to NMED for review and approval prior to initiation of work plan activities. The selected contractor will also provide a health and safety plan relating to their operation (e.g., drilling equipment).

A Health and Safety Officer (HSO) will be designated that will be responsible for monitoring potentially hazardous situations during all field activities, ensuring that all personnel know the potential physical and chemical hazards and are trained in the proper use of personal protective equipment (PPE). It is anticipated that safety Level D will be the highest level of PPE necessary (i.e., work clothes, hard hats, steel-toed boots and safety glasses). The HSO will make the decision when it is necessary to upgrade to a higher level of PPE. The HSO will also conduct periodic air monitoring (documented following Rule 1166-type requirements [SCAQMD, 2001]) and determine if conditions require an immediate termination of work.

References[rpf6][rpf7]

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Drawing 2, Sheet 1 of 2

2.2.2.1 Deep Monitoring Wells

The deep monitoring wells will be installed primarily to monitor for the possible detection of saturation above the Upper Dockum/Lower Dockum contact. Of the 8 deep monitoring wells, 7 wells will be installed with well screens across the Upper Dockum/Lower Dockum contact and up into the Upper Dockum. The one very deep vadose zone monitoring well will be installed within the Lower Dockum Unit above the lower sandstone formation (Santa Rosa Sandstone). The very deep well will be screened from 50 feet below the top of the Lower Dockum Unit~~,~~ down to 100 feet above the top of the Santa Rosa Sandstone.

The 9 deep and very deep vadose zone monitoring wells will be installed at the following locations:

- 4 deep monitoring wells will be located in a line along the eastern boundary of the Phase 1A landfill, spaced at approximately 350-foot intervals.
- 1 deep monitoring well will be located at the northeast corner of the facility.
- 1 deep monitoring well will be located at the midpoint between the northeast corner of the Phase 1A landfill and the northeast corner of the facility.
- 1 off-site deep monitoring well will be installed approximately 3,300 feet northeast of the facility, within 15 feet of the location of boring WW-1.
- 1 off-site monitoring well~~s~~ will be installed approximately 550 feet west of the facility, near the southwest facility corner, within 15 feet of the location of boring PB-14.
- The very deep monitoring well will be installed at the southeast corner of the stormwater detention basin.

The on-site geologist will log the boring and confer with the driller regarding lithology changes that identify the Upper Dockum/Lower Dockum contact. Drilling will use continuous coring to log the lithology in detail at deep borings VZMW-1 and VZMW-4 and very deep boring VZMW-9. All geologic core will be labeled as to depth, photographed, boxed, stored, and be available for inspection for the operating life of the facility. The location of the contact will be confirmed using a down-hole geophysical tool –(i.e., gamma ray and neutron logging methods). Monitoring wells that will continually undergo neutron logging shall have baseline logs created in both open and cased boreholes. It is estimated that the total depths for the deep landfill monitoring wells will range between 140 and 185 feet based on well location, ~~and~~ final grading at the site, ~~.~~ and~~T~~ the anticipated depth of~~for the deep evaporation pond monitoring wells will be approximately 70 feet, assuming the wells are drilled ten feet below~~ the Upper Dockum/Lower Dockum contact.

The deep vadose zone monitoring wells will be screened from 20 feet beneath the alluvium/Upper Dockum contact to 10 feet below the ~~contact between the~~ Upper Dockum/~~-and~~ Lower Dockum contact, with the screened interval extending ~~five~~5 feet below the contact and a ~~five~~5-foot~~-~~long sump below that. A detail of the well construction is shown on Figure 2.

Five feet of solid 4-inch-diameter Schedule 80 PVC casing will be placed at the bottom of the borehole to serve as a liquid collection sump. Above this casing, 4-inch-diameter Schedule 80 PVC flush-threaded 0.010-inch well screen will extend to 20 feet below the top of the alluvium/Upper Dockum~~/alluvium~~ contact. The top of the screened interval will extend to a depth that enables a minimum 20-foot seal below the alluvium/Upper Dockum~~/alluvium~~ contact and a minimum of 10 feet from the bottom of the adjacent shallow well's screened interval, if applicable. This will result in 80- to 100-foot screened intervals in the deep wells. Solid 4-inch-diameter Schedule 80 PVC casing will then be installed to the surface. Bottom caps will be attached with stainless steel rivets. Additionally, in order to minimize the chances of the bottom of the well being inadvertently broken out, extra care will be taken to ensure that the filterpack is filled in, while still

hanging the well casing under tension, with maximum density around the end of the well casing for added stability.

The casing will be lowered into the borehole a section at a time by hanging the casing from the drill rig. The casing will be left hanging from the drill rig after all the well casing has been attached and during the emplacement of filterpack material and grout to ensure that the casing remains straight. Centralizers will also be used to ensure that the well is straight. It will be important for the well to be plumb (i.e., vertical) to allow adequate visual monitoring of the wells. This will be accomplished by drilling the borehole straight, which will be the responsibility of the driller, as well as using the methods described above.

Following placement of the well casing, fine-grained sand (e.g., 20/40 silica sand) will be placed in the annulus to form a filter pack. Sand will be placed approximately 3 feet above the top of the well screen. Above the sand pack, ~~Three~~3 feet of transitional sand (i.e., 100-mesh sand) will be placed ~~above the sand pack~~ to prevent migration of the grout seal into the filterpack during emplacement. The main advantage of using transitional sand versus bentonite pellets is that it does not require hydration and will prevent any confusion of the source of the water if it were to enter into the well sump. The wells will be completed by pumping a grout mixture to form a seal from the top of the transitional sand to the top of the borehole using a tremie pipe. The grout mixture will consist of a high solids (~20 to 30%) bentonite grout ~~(e.g., Aquaguard or equivalent)~~ mixed to the manufacturer's specifications. The top of the well will be cemented with concrete and set with aboveground well protection. -No water will be used in the construction of the well, except in the grout mixture, which will be pre-mixed above_ground prior to emplacement in the annulus to avoid any free water entering the well or annulus during well construction.

2.2.2.2 Shallow Monitoring Wells

The shallow monitoring wells will be installed to monitor for the possible detection of saturation above the alluvium/Upper Dockum contact. The 6 shallow monitoring wells will be screened across the alluvium/Upper Dockum contact.

The shallow vadose zone monitoring wells will be installed at the following locations:

- 4 shallow monitoring wells will be located in a line along the western boundary of the Phase 1A landfill, spaced at approximately 330-foot intervals.
- 1 off-site shallow monitoring well will be installed approximately 3,300 feet northeast of the facility, within 15 feet of the deep vadose zone monitoring well near the location of borehole WW-1.
- 1 off-site monitoring wells will be installed approximately 550 feet west of the facility, near the southwest facility corner, within 15 feet of the deep vadose zone monitoring well near the location of boring PB-14.

If there is greater than 4 feet of alluvium present, the shallow vadose zone monitoring wells will be drilled to approximately 3 feet below the alluvium/Upper Dockum contact, ~~between the Upper Dockum and alluvium~~ with a 5-foot screened interval extending 2 feet below the contact and with a 1-foot-long sump below that. If less than 4 feet of alluvium is encountered, no monitoring well will be installed at that location._ A detail of the well construction is shown on Figure 2. The on-site geologist will log the boring and confer with the driller regarding lithology changes that identify the alluvium/Upper Dockum~~/alluvium~~ contact.

The thickness of the alluvium averages around 10 feet across the site. A minimum 3-foot seal or 4 feet of alluvium will be necessary to install a properly constructed monitoring well. 1 foot of solid 4-inch-diameter Schedule 80 PVC casing will be placed at the bottom of the borehole to serve as a liquid collection sump. Above this casing, 5 feet of 4-inch-diameter Schedule 80 PVC flush-threaded 0.010-inch well screen will extend to 3 feet above the alluvium/Upper Dockum~~/alluvium~~ contact.

Following placement of the well casing, fine-grained sand (e.g., 20/40 silica sand) will be placed in the annulus to form a filter pack. Sand will be placed between ~~½~~ 0.5 and 1 foot above the top of the well screen followed by ~~½~~ 0.5 to 1 foot of transitional sand. The actual thicknesses will be determined by the depth of the contact and a minimum 3-foot surface seal. The wells will be completed by emplacing a grout mixture to form the surface seal from the top of the bentonite to the top of the borehole. The grout mixture will be gravity emplaced if the wells are less than 50 feet deep and contain no formation water; if they are greater than 50 feet deep or contain formation water, the grout will be emplaced using the same procedures as the deep wells. The grout mixture will consist of a high solids (~20 to 30%) bentonite grout ~~(e.g., Aquaguard or equivalent)~~ mixed to the manufacturer's specification. The top of the well will be cemented with concrete and set with aboveground well protection. No water will be used in the construction of the well, except in the grout mixture, which will be pre-mixed above ground prior to emplacement in the annulus to avoid any free water entering the well or annulus during well construction.

2.2.2.3 Neutron Probe Access Tubes

Neutron probe access tubes will also be installed at two locations near the Phase 1A landfill liner to allow moisture content monitoring in the vadose zone and enable collection of a representative sample of any fluid that may accumulate at or above the stratigraphic boundary between the Upper and Lower Dockum stratigraphic units and below the stratigraphic boundary between the alluvium and the Upper Dockum. The locations of the two neutron probe access tubes are shown in Figure 2.

Neutron probe access tubes will be constructed with the same care as monitoring wells to ensure functionality and to prevent fluid contamination. ~~Details are provided in Permit Part 7.~~ Because the neutron probe access tubes will be located near stormwater runoff channels, the access tubes will be installed in a way to distinguish moisture changes that may occur due to infiltration of clean stormwater from moisture possibly caused by landfill leakage. The portion of the access tubes located close to the channels will be isolated from the deeper portion of the access tubes by sealing an interval of the borehole with cement grout containing 5 percent bentonite.

Neutron probe access tubes will be constructed using either PVC, low carbon steel, or stainless steel casing. Flush-threaded or welded tubing is preferred to coupled tubing, to minimize wall thickness for better transmission of neutrons. To allow use of various models of neutron probes, 2.5- to 3.0-inch tubing diameter will be used. The borehole annulus outside the casing will be backfilled with soil cuttings or silica sand to allow transmission of neutrons to the surrounding formation materials, with the exception of the sealed interval between the upper and lower intervals. If possible, cuttings from each major hydrostratigraphic interval should be segregated on plastic and kept covered so the material can be used to backfill the boring annulus. During installation, a dummy probe will be used to check the access tubes for bends or dents before and after installation is complete.

The neutron probe access tube is used to collect representative moisture content information with the neutron probe. Therefore, the access hole diameter and disturbance to the surrounding soil should be minimized. Working with the drilling contractor, a final borehole diameter will be selected that is the minimum necessary for successful completion of the access tube installation. A borehole diameter of approximately 5 to 6 inches is expected.

The top of the well will be cemented with concrete and set with aboveground well protection. No water will be used in the construction of the well, except in the grout mixture, which will be pre-mixed above ground prior to emplacement in the annulus to avoid any free water entering the well or annulus during well construction. Finally, a desiccant should be suspended beneath the well cap to keep the access tube free of moisture.

To determine the moisture content of soil surrounding the neutron probe access tubes, a calibration is needed between instrument counts and soil moisture. During installation of the neutron probe access tubes, the

neutron moisture meter will be used to profile the moisture content. Moisture profile measurements will be made before and after the cement grout is emplaced, so the moisture introduced by the grout can be distinguished from background conditions. The moisture profile will be compared with laboratory soil moisture data from samples collected during drilling, so a correlation can be made between neutron counts and moisture content for each major lithology type encountered. Thus, an accurate geologic log is needed for the calibration.

~~2.2.2.4Suction Lysimeters~~

~~Suction lysimeters will be constructed with the same care as monitoring wells to ensure functionality and to prevent fluid contamination. Details are provided in Permit Part 7.~~

2.2.2.4 VZMS Construction Information

Vadose zone monitoring wells will be drilled using air-rotary drilling methods. During drilling, VZMS construction information will be recorded on boring logs and well construction forms by the field geologist for each well and will contain the following information. The information will also be provided on final detailed well construction drawings presenting depth of well construction material emplacement and well dimensions.

- Name of geologist, site location, and date of activity
- Description and identification of drilling and sampling equipment
- Name of drilling contractor
- Soils description using the Unified Soil Classification System
- Description of soil texture, color, density, odors, and other appropriate descriptions
- Description of rock type
- Depth and thickness of groundwater (if encountered)
- Total depth of the boring and well to within 0.1 foot with respect to ground surface, and well depth to within 0.01 foot with respect to top of casing (marked)
- All applicable well construction details
  - Casing material specifications and size, and reference material certifications
  - Screen slot size and depth to both top and bottom of screen interval
  - Casing and screen joint type
  - Filterpack material source and grain size analysis
  - Filterpack placement methodology
  - Sealant material sources, types, and mix design
  - Surface seal and protective casing design
  - Well location horizontal and vertical coordinates
- Explanation of any introduced water and a reference to its source and its chemical analysis
- Reference to any non-anthropogenic fluids encountered during construction
- Well development procedures, should they be required
  - Equipment and methods used
  - Total daily amounts of fluids removed
  - Recovery rates
  - Turbidity
  - Static fluid surface elevation measurements

- Aquifer test results, including hydraulic conductivity, for any well encountering groundwater during installation

Three borings drilled for deep vadose zone monitoring wells will be continuously cored. Core will be collected during drilling of VZMW-1D and VZMW-4D located on the east side of the Phase 1A landfill and VZMW-7D located west of the Phase 1A landfill as the southeast corner of the stormwater detention basin. VZMW-7D is the very deep boring drilled into the Lower Dockum. The primary purpose of the coring is to evaluate the possible existence of paleofractures or faults beneath the facility. Should these borings yield insufficient core to accurately determine the lithology and geologic structure, additional core may be collected from other borings. All geologic core will be labeled as to depth, photographed, boxed, stored, and be stored for possible inspection for the operating life of the Facility. The core samples will be maintained as part of the Operating Record.

Following monitoring well installation, a licensed surveyor using a benchmark of known elevation as a reference point will survey each vadose zone monitoring well and neutron probe access tube. A reference mark will be made at the top of each well casing and surveyed for horizontal coordinates (±0.1 foot) and height above mean seal level (±0.01 foot). Then the depth of the well will be measured and recorded to 0.01 foot below the top of casing, as well as below the well pad and ground surface. Any deviations from this Work Plan will be documented and justified.

2.2.3 Decontamination

The drill rig and equipment used for installing the vadose zone monitoring wells for the landfill ~~Phase IA~~Phase 1A cell ~~and evaporation ponds~~ will be decontaminated prior to drilling and between boreholes. Decontamination procedures are described below.

Drilling equipment ~~which~~ that comes into direct contact with subsurface soils or groundwater will be decontaminated between each boring by removing adherent soil, steam cleaning and/or scrubbing with an anionic detergent in potable water followed by a double rinse with purified (deionized) water.

Investigation derived waste (IDW) will be handled in accordance with the waste analysis plan (WAP).

2.2.4 Well Development

Based upon previous investigations, groundwater is not anticipated in many of the vadose zone monitoring wells; therefore, well development should not be necessary. Isolated zones of perched groundwater may be encountered in the two deep vadose zone monitoring wells drilled at the locations of borings WW-1 and PB-14. ~~However, a description of~~The protocols for well development ~~is~~ provided below will be followed for all vadose zone monitoring wells where ~~in the unlikely event~~ groundwater is encountered. In the ~~unlikely~~ event that groundwater is encountered during the installation of monitoring wells, NMED will be contacted within 24 hours of the event.

If groundwater is encountered, wells will be developed to remove fine material from the formation and filterpack surrounding the well. Following well construction, the cement grout will be allowed to cure for approximately one week, after which development will consist of bailing and surging until relatively clear water (i.e., groundwater with low turbidity) is produced. Each well will be surged and bailed using a development rig equipped with a winch and a 3-inch-diameter steel bailer. Surging and bailing of fines is anticipated to take up to 4 hours per well to complete. The volume of water removed may ~~vary between~~range from ~~one~~ 1 casing volume for low-recharge wells (i.e., those that do ~~n't~~ not fully recharge within 12 hours) ~~and~~ to 6 casing volumes.

3. Baseline Liquid Characterization

Potential sources for water detected in the vadose zone monitoring wells and sumps may include ~~those shown below~~the following:~~.~~

- Non-leachate fluids
  - Rainwater
  - Stormwater detention pond fluids
  - Consolidation water from prepared subgrade or geosynthetic clay liner (GCL)
  - Pipeline leaks from facility water supply

- Leachate fluids (originating within the regulated unit)
  - Fluids that have migrated through waste from the landfill
  - Stormwater runoff collected in the landfill~~-~~ contaminated water basin

  ~~oEvaporation pond fluids~~

A baseline liquid characterization program will be conducted within three months of activating the facility water supply system to evaluate the water quality characteristics of sources of non-leachate fluids that could accumulate in sumps or vadose zone monitoring wells. Additionally, leachate fluids will be evaluated as part of the WAP and will include sampling and analysis of each of the leachate fluid~~s~~ types listed above. The potential characteristics of leachate fluids will be evaluated after a sufficient amount of waste materials have been placed in the landfill and landfill leachate has been collected~~, if it occurs~~. These data will be used to distinguish leachate fluids from non-leachate fluids that could accumulate in sumps or vadose zone monitoring wells during operation, according to the methods discussed in Section 6.4.

The baseline characterization program will be conducted on samples of non-leachate fluids to produce preliminary chemical profiles for these waters. _Samples of non-leachate fluids will be analyzed according to the program described in Table I-1. These data will be used to develop a water quality profile representative of each potential non-leachate fluid source.

Table I-1. Baseline Chemical Analyses

Analytes	Analytical Method	Sample Container(s)	Preservation Method/ Holding Time
General Water Quality			
Bicarbonate/carbonate	~~EPA 310.1~~SM 2320B	250-mL HDPE	4°C / 14 days~~48 hours~~
Chloride	EPA 300.0	250~~125~~-mL HDPE	4°C / 28 days
Dissolved major cations (Na, K, Mg, Ca, Fe)	EPA 6010B	500-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months
Total dissolved solids	~~EPA 160.1~~SM 2540C	250~~125~~-mL HDPE	4°C / 7 days
Sulfate	EPA 300	250~~500~~-mL HDPE	4°C / 28 days
Heavy Metals			
Dissolved ~~and total~~ metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb~~, Hg~~, Ni, Se, Ag, Tl, Zn)	EPA 6010B/~~7000~~6020	~~1 L~~125-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months~~; 28 days for Hg~~
Total metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, Ag, Tl, Zn)	EPA 6010B/6020	500-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months

Analytes	Analytical Method	Sample Container(s)	Preservation Method/ Holding Time
Total mercury (Hg)	EPA 7470/7471/ 245.2	500-mL HDPE	4°C; pH < 2 with HNO_3 / 28 days
Radionuclides			
Gross alpha, gross beta, gamma emitters	EPA E900.0/ 901.~~1~~0	~~250-mL CWM glass jar~~1-L HDPE	4°C; pH < 2 with HNO_3 / 6 months
Uranium, total	EPA ~~200.8~~6020	~~250-mL CWM glass jar~~500-mL HDPE	4°C; pH < 2 with HNO_3 / 6 months
Radium 226/228	EPA 903.1/904.0/ 600~~/9320~~	~~250-mL CWM glass jar~~1-L HDPE	4°C; pH < 2 with HNO_3 / 6 months
Radon	EPA 913.0	~~250-mL CWM glass jar~~2 x 40-mL VOA vial	4°C / ~~6 months~~1 days
Organics			
Volatile organic compounds	EPA ~~624~~8260B	3 x 40-mL VOA vial	4°C; pH < 2 with HCl / 14 days
Semivolatile organics compounds	EPA ~~625~~8270C	1-L ~~HDPE~~glass amber	4°C / 7 days extraction~~, 40 days analysis~~
Pesticides	EPA ~~608~~8081/8141B	1-L ~~HDPE~~glass amber	4°C / 7 days extraction~~, 40 days~~
Polychlorinated biphenyls	EPA 8082~~608~~	1-L ~~HDPE~~glass amber	4°C / 7 days extraction~~, 40 days~~
Perchlorate	EPA 300.11/314.1	~~1-L~~125-mL wide-mouth HDPE	4°C / ~~2~~ 28 days
Cyanide	EPA 335.3	1-L HDPE	4°C / ~~2~~ 14 days
~~Sulfide, reactive~~	~~EPA 376.2~~	~~1-L HDPE~~	~~4°C / 14 days~~
TPH-gasoline	EPA ~~8015M~~418.1	~~3 x 40-mL VOA vial~~500-mL glass amber	4°C; pH <2 with HCl / 7 days extraction~~, 40 days analysis~~
TPH-diesel	EPA ~~8015M~~418.1	~~1-L glass~~500-mL glass amber	4°C; pH < 2 with HCl / ~~14 days~~7 days extraction
Oil & grease	EPA 9071/413.2	~~1-L HDPE~~500-mL glass amber	4°C; ~~H_2SO_4~~ pH < 2 with HCl / ~~28 days~~7 days extraction
Soil Analyses			
Metals	EPA 200.7/6010C	125-mL CWM glass jar	~~4~~°C / 6 months
Radiochemistry	HASL-300 / Gamma spec	500-mL CWM glass jar	4°C / 6 months

VOA = Volatile organic analysis
CWM = Clear wide-mouth jar
HDPE = High density polyethyrene bottles
HCl = Hydrochloric acid

A sample of the potential consolidation water will be analyzed as part of the baseline characterization program. The sample will be obtained by running a permeability test (ASTM D 5084~~-90~~) on a representative sample of the clay liner and/or GCL. -The extract from that test will then be analyzed according to Table I-1.

Water representative of the potential non-leachate fluid sources will be used in conjunction with drill cuttings from both the Upper and Lower Dockum Units to establish a chemical baseline using the Synthetic Precipitation Leaching Procedure (SPLP)~~,~~ (U.S. EPA SW-846 method 1312; ~~Meteoric Water Mobility Procedure (~~see Appendix A). The ~~MWMP~~SPLP will be used to test three samples representative of the lithologies (e.g., mudstone, siltstone, and sandy siltstone) of both the Upper and Lower Dockum Units using each distinct non-leachate fluid type. If the water profiling discussed in the previous paragraph reveals that the different non-leachate fluids each have distinct profiles, each water type will be used to conduct the ~~MWMP~~SPLP tests; otherwise, water representative of all the non-leachate fluids combined will be used.

Cuttings will be collected for use in these tests during installation of the vadose zone monitoring wells. The extract from these tests will be analyzed according to the program described in Table I-1. ~~If it is determined that the solids are too fine to conduct the standard extraction method (column leaching) for the MWMP test (see Appendix A), an alternative method will be used (i.e., bottle roll).~~ These data will provide an indication of the chemical profile (in terms of major ion chemistry, radiochemistry and trace metals) of water that would occur as a result of Dockum sediments being subjected to non-leachate fluid sources. Certain constituents listed in Table I-1, such as volatile organic compounds, are not expected to be detected during these tests~~,~~; however, their absence will be confirmed in case any natural organic materials (e.g., hydrocarbons) exist in the geologic materials.

Additionally, the samples of the Dockum cuttings collected ~~of the Dockum cuttings~~ during drilling will be used to analyze the material (solid) for background determination. These samples will be analyzed for heavy metals and radionuclides, as listed in Table I-1~~, Baseline Chemical Analyses~~.

After initial vadose zone fluids are sampled and tested, an assessment will be completed to determine whether the vadose zone fluids may be adversely affected by well construction materials. The compatibility assessment will consider both non-leachate and leachate fluids. The compatibility demonstration will be completed within six months of monitoring well construction, provided that sufficient vadose zone fluids are available to perform the assessment.

4. Monitoring Procedures

4.1 Monitoring Frequency

Following installation, monitoring for the presence of fluids will be performed daily for the vadose zone sump~~s~~ below the LCRS and LDRS sumps ~~will be monitored for the presence of fluids daily~~ and monthly for the vadose zone monitoring wells ~~monthly~~. The total depth of the vadose zone wells will also be measured each time the wells are monitored. Table I-2~~, *Monitoring Frequency*,~~ presents a summary of the monitoring program for the facility.

Table I-2. Monitoring Frequency

Time Period	Landfill		~~Evaporation Ponds~~	
	Sumps	Vadose Wells	~~Sumps~~	~~Vadose Wells~~
Operation	Daily	Monthly	~~Daily~~	~~Monthly~~
Closure	Daily	Monthly	~~Daily~~	~~Monthly~~
Post-Closure	Semiannually	Semiannually	~~Semiannually~~	~~Semiannually~~

During the operating life of the Facility, ~~The Permittee shall inspect~~ each vadose zone monitoring well and neutron probe access tube and the landfill vadose zone sump will be inspected according to the schedule in Table I-2. ~~, plus Vadose Zone Monitoring Wells 1, 2 and 3, every six months.~~ During the post-closure care period, monitoring wells VZMW-1D, -2D, -3D, and -4D and the landfill vadose zone sump will be inspected and sampled semiannually.

4.2 Response Actions

The following response actions~~, plus those identified in Permit Part 7,~~ will be conducted based on the outcome of each monitoring event.

- Liquid not present: no further action.
- Liquid present: the fluids will be sampled and analyzed. All remaining fluids will be removed and properly disposed of.

If the source of water in the sumps or vadose monitoring well is determined to be non-leachate fluids, no further action will be conducted other than removing the liquid and mitigating the source, if possible (e.g., a break in the water supply system). As part of the source mitigation, ~~the applicant will submit~~ a written plan for determining and mitigating the source of the fluids will be submitted to NMED for ~~their~~ approval within one week of its occurrence. If the source of the water is determined to be leachate fluids, corrective action steps will be taken, as described in the applicable permit module. Additionally, if the action leakage rate (ALR) is exceeded, corrective action or contingency steps will be taken, as described in the applicable permit modules, to include an increase in the monitoring frequency to weekly for one month or until the ALR is reduced, whichever occurs first. All response actions will be assessed by an independent New Mexico Professional Engineer. Reporting commitments are described in Section 6.4.

If fluids are detected in one of the shallow wells, the depth of the fluids will be compared to the depth of the waste. This comparison will aid in evaluating whether the source of the fluids could be from the waste disposal units.

4.3 Monitoring Method

The sumps are fitted with a dedicated transducer ~~fitted~~ with a manual readout. Consequently, the readout will be recorded and documented manually at the frequency indicated in Table I-2.

The wells will not be fitted with transducers and so will be monitored visually and manually, as listed below.

- ~~A light source, such as a flashlight or mirror, will be directed down the well and used to inspect for a reflection off fluids.~~
- A water level sounder capable of detecting and measuring the depth to water, if water is present.
- If water is detected, ~~A~~an interface probe~~,~~ capable of detecting water as well as petroleum hydrocarbons, will be lowered down the well and used to measure the depth of any water and/or the thickness of any petroleum hydrocarbons present.
- If fluids or petroleum hydrocarbons are suspected, a clean disposable bailer will be lowered into the well to collect a sample of the fluid for visual inspection and confirmation of its presence prior to collecting any for laboratory analysis.

The water level sounder and interface probe will be decontaminated prior to ~~using it~~use at each well. The results of this monitoring will be documented.

The procedures and schedule for inspection and maintenance of the VZMS sumps are described in the operations and maintenance manual included in the permit application. The wells will be visually inspected for damage or malfunction at the time of each monitoring event. Any problems will be communicated to the NMED and fixed in a timely manner.

4.4 Sample Collection

Consolidation water from prepared subgrade or GCL will be sampled for baseline characterization if and when it occurs. The most likely locations for consolidation water to collect are in the LDRS and VZMS

sumps, as shown on Figure 4~~5~~. As such, if it occurs prior to initial placement of waste in the landfill, it likely will represent consolidation water, provided there is no other significant source of fluids in the LDRS sump, like rainwater. If it is observed after initial placement of waste in the landfill, it will still be sampled, but may not represent consolidation water. The exact nature of that water will be determined at the time of occurrence.

If fluids are encountered in the sumps or vadose zone monitoring wells, samples will be collected as described below. The vadose zone monitoring sumps will each be equipped with a bladder pump. Samples will be collected from the pump using the minimal flow rate if sufficient volume exists in the sump. Laboratory analyses of samples will be completed by a chemical laboratory, as described in the WAP.

Groundwater is not anticipated in the on-site vadose zone monitoring wells based on results from previous hydrogeologic investigations at the site. Perched groundwater may be encountered at the two off-site locations where VZMS wells will be installed at the locations of borings WW-1 and PB-14. In the ~~unlikely~~ event groundwater is encountered following well installation, the wells will be initially sampled approximately one week after installation and development, or whenever water shows up.

Static water level measurements will be taken in the wells using an interface probe prior to sampling. Measurements will be taken to the nearest 0.01 foot from the surveyed reference point on the well casing. The interface probe will be cleaned between each well using a non-phosphate biodegradable detergent and fresh tap water followed by a distilled or de-ionized water rinse. New chemical-resistant disposable sample gloves will be used while collecting samples at each sump or well.

Following water-level measurement, well purging will commence and field measurements of pH, conductivity, temperature, and turbidity will be recorded every 2 to 5 minutes to demonstrate parameter stabilization prior to sampling. Purging will be discontinued once the parameters have stabilized or when three well volumes of water have been purged from the well, whichever occurs first. If there is insufficient recharge for the well to fully recover within 12 hours-, the well will only be purged once and sampled as soon as sufficient volume is recharged to the well, as per the guidelines in the Technical Enforcement Guidance Document (U.S. EPA, 1989). Groundwater samples will be collected using a disposable polyethylene bailer attached to a nylon rope. However, groundwater may also be collected from a submersible pump under a reduced flow to prevent volatilization if sufficient water exists.

Groundwater samples will be placed in appropriate containers provided by the laboratory. Table I-1 indicates the appropriate sample containers, volumes, and preservation required for each analyte. Samples will then be labeled and immediately placed in a refrigerated cooler for transport to the laboratory. Sample information will also be recorded in the field log book.

4.5 Sample Preservation and Transportation

After sealing the sample container, samples will be placed into a cooler as soon as possible and maintained at a temperature of approximately 4 degrees Celsius (°C). Samples will be transported to the analytical laboratory at the end of each sampling event. Samples in breakable containers will be packed in such a way as to prevent breakage during transportation. Table I-1 provides a summary of sample preservation and holding times required for each analyte.

4.6 Quality Assurance Samples

Duplicate samples will be collected in order to check the precision of laboratory analyses. Duplicates will be included for each parameter requested with samples sent to the laboratory and labeled so that the samples are

not identified as quality assurance samples. Approximately one duplicate sample will be collected for each ten samples sent to the laboratory or one per sample batch, whichever is less.

One trip blank sample will also be sent with each cooler containing samples for volatile organics analysis. Blank samples will be labeled so that the samples are not identified as quality assurance samples.

4.7 Chain of Custody Procedures

Chain of custody documentation will be used to ensure the integrity of samples from the time of collection to reporting of analytical results. This documentation will permit tracing of the possession and handling of samples from the time of collection through analysis and final disposition. Copies of the chain of custody forms will be kept in the facility operating record.

Sample custody will be initiated at the time of sample collection by placing a label on the sample container and filling out a chain of custody form. Each sample collected will be identified in the chain of custody form. Each person handling the sample will be identified on the form.

4.8 Field Equipment

Field equipment required for collecting samples will include: sample containers; gloves; refrigerated cooler; sample labels; physical parameter meter; log book; and miscellaneous equipment.

Calibration of field equipment (e.g., pH meter or organic vapor meter) will be conducted at the beginning and end of each work day.

4.9 Decontamination

In order to prevent cross contamination between sampling sites, sampling equipment will be decontaminated according to the following procedures.

- Remove excess soil or other adhering substances
- Wash with a solution of non-phosphate detergent in tap water
- Rinse with tap water
- Double rinse with distilled water

Decontamination of all equipment that comes into direct contact with sampled media will be carried out between samples and prior to equipment leaving the site. If a pump and hose system is used, the system will be cleaned prior to each groundwater sampling event by pumping a non-phosphate detergent dissolved in fresh tap water followed by a double rinse with de-ionized water. Should bailers be necessary, an unused, disposable bailer will be used at each well to prevent cross-contamination.

5. Laboratory Analysis

5.1 Analytical Methods

Table I-1 summarizes the analytical program for the baseline liquid characterization program, as well as for water detected in vadose zone monitoring wells and sumps. ~~Detection limits will be below drinking water~~

~~standards for applicable parameters.~~ Analytical detection limits will meet the most stringent of the following three criteria:

- Applicable state or federal drinking water standards
- Universal treatment standards (UTS) contained at 20.4.1.800 NMAC (incorporating 40 CFR 268, Subpart D)
- Lowest detection limits specified at EPA publication SW-846 (most recent edition)

This analytical program is designed to "fingerprint" fluids associated with the landfill operations so that if water is detected in the vadose zone sumps or monitoring wells, the source of that water can be determined. As such, it may become justifiable to revise the vadose zone sump and monitoring well analytical program based on the results of the baseline liquid characterization program. NMED approval will be obtained prior to making any changes to the program.

5.2 Laboratory Quality Assurance/Quality Control

Internal laboratory quality assurance/quality control procedures will include the following:

- Laboratory chain-of-custody tracking of samples
- Instrument calibration using calibration check standards and laboratory blanks
- Use of reagent and method blanks
- QC spike samples (approximately 1 every 20 samples)
- Matrix spike samples (approximately 1 every 20 samples)
- Laboratory split sample duplicates (approximately 1 every 20 samples)
- Laboratory check standards (approximately 1 every 20 samples)

5.3 Data Review, Validation, and Verification Requirements

All analytical laboratory data will be presented in accordance with~~as~~ SW-846 [i.e., EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*~~, Third Edition~~ (most recent edition, e.g., U.S. EPA, 2011a~~EPA, 1986~~)] documentation packages that provide the same level of detail as EPA Contract Laboratory Program (CLP) protocol ~~Level IV [see OLM02.1, *USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration* (EPA, 1990a) and OLM03.0, *USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration* (EPA, 1990b)].~~ (U.S. EPA, 2011b).

A tabular key will be provided with the package that relates field/laboratory sample numbers to: (1) QA and QC samples; (2) cooler receipt form(s); (3) reporting requirements for organic and inorganic analyses; (4) reporting of internal QC results (e.g., laboratory blanks, surrogate spike samples, matrix spike samples, laboratory duplicates and/or matrix spike duplicate pairs, and laboratory control standards); and (5) identification of field duplicates and all types of blanks. Actual chromatograms will be provided for all samples analyzed by gas chromatography (GC) methods.

At a minimum, data package verification will include evaluation of sampling documentation and representativeness, technical holding time, instrument calibration and tuning, field and lab blank sample analyses, method QC sample results, field duplicates, compound identification and quantification, the presence of any elevated detection limits, and a summary of qualified data. All data will be flagged with appropriate qualifiers.

The data validation and verification procedures will include: (1) an initial review or verification of the completeness of individual data packages for each sample delivery group; (2) validation of the data using guidelines tailored to the type of analyses performed (i.e., organics, inorganics, or radiochemical); (3) resolution of data discrepancies, where possible, by liaison with the responsible laboratory; (4) qualification of data by flagging with appropriate codes, with emphasis on data usability for decision-making purposes; and (5) preparation of sample delivery group specific data assessment summaries and a narrative report.

6. Data Management

6.1 Field Documentation

Records of all field activities will be kept in the facility operating record and the following items will be used to document field activities:

- Field log book
- Boring logs and well construction diagrams
- Well or sump sampling logs
- Chain of custody forms

Field log books will be maintained during the operating and post-closure period of the facility and used to record details of work including daily activities, any deviations from sampling or quality assurance plans, and equipment calibration.

Geologic boring logs will be produced by the field geologist during drilling activities. The logs will be prepared under the direct supervision of a qualified geologist or geotechnical engineer. Field logs will also be reviewed by the supervising geologist or engineer prior to finalization.

6.2 Laboratory Documentation

Once custody of a sample has been relinquished to the laboratory, complete documentation of the progress of the sample through the analytical process will be carried out by the laboratory. This will include a description of sample condition upon receipt, recording of sample receipt in the laboratory log book, documentation of steps in the analytical process, and recording of the results of analysis.

6.3 Laboratory Reporting

The laboratory reports (Level IV Data Validation Packages) will include the following information: ~~listed below.~~

- Sample number (as recorded on sample label and in field log book)
- Date sample received by laboratory
- Date of analysis
- Analysis performed
- Results of analysis
- Detection limits
- Reporting units

- Signatures of persons responsible for analysis

In addition, laboratory reports will include the raw data (e.g., chromatograms), copies of chain of custody forms, and results of laboratory QC procedures indicating accuracy and precision of analytical results.

6.4 Data Analysis

Data analysis will include tabular and graphical representation, graphical comparison between various parameters, and statistical analysis~~, if appropriate,~~ to determine whether fluids detected in the VZMS during the monitoring period are from leachate fluids sources or not. Statistical procedures will follow the methods described in Permit Attachment Q, Statistics for Release Determination. The application of data analysis methods is dependent on the data -reported during monitoring of the VZMS, if any.

Using primarily the baseline characterizations and the leachate fluid analyses (WAP), chemical profiles of the water types as well as a suite of appropriate analytical indicator parameters will be selected to be incorporated into the vadose zone monitoring program for leak detection during facility operation. The indicator parameters will be based primarily on the leachate fluid analyses, while the non-leachate fluid~~s~~ profiles will be based primarily on major ion chemistry established in the baseline, if available. Therefore, the indicator parameter list is expected to evolve as varying waste streams are accepted by the facility. In addition, all hazardous chemicals ever received at the facility will be considered as indicator parameters.

Analytical data from samples of fluids detected in the VZMS –will be compared to the non-leachate fluids baseline characterizations and leachate fluids evaluations discussed in Section 3.0. These comparisons will be based on evaluating trilinear plots of major ion chemistry characterization for non-leachate parameters: (bicarbonate, chloride, dissolved major cations [Na, K, Mg, Ca, Fe], total dissolved solids [TDS], and sulfate) ~~(e.g., calcium, magnesium, potassium, sodium, bicarbonate, sulfate and chloride)~~ and tabular and graphical summaries of metals/nonmetals, radionuclides, hydrocarbons, and other constituents. Through these evaluations, an obvious correlation between the water types and concentration ranges of the monitoring sample to either the leachate fluids or non-leachate fluids characterization may be observed. If the monitoring sample data cannot be easily characterized as leachate fluid or non-leachate fluid, or if concentrations fall outside the ranges established during baseline characterization, the monitoring sample will be characterized using statistical methods. Statistical analysis will be used to determine statistically significant changes in the following non-leachate parameters: dissolved and total metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Ti, Zn) and radionuclides (gross alpha, gross beta, gamma emitters, total uranium, radium 226/228, radon). In this case, a tolerance or prediction interval statistical procedure will be applied~~,~~ unless a more appropriate statistical method is identified.

In order to apply these statistics, it may become necessary to collect additional baseline data for non-leachate fluids to establish a more concrete background profile. The need for additional baseline sampling and analysis will be evaluated at the time of occurrence and evaluation of fluids in the VZMS.

Solid ~~and liquid~~ wastes accepted by the facility, as well as leachate fluids, will be sampled and analyzed separately and individually as per the WAP. These data will be used to develop a list of indicator parameters (i.e., waste constituents) to monitor for in the VZMS and will be used to determine if fluids detected in the VZMS are in fact leachate fluids. Additionally, if based on these data it is not clear whether the fluids detected in the VZMS are leachate fluids or not, additional samples of any fluids present in the LCRS~~s and the evaporation ponds~~ will be collected and analyzed for major ions and metals, as per Table I-1. These data will then be used to develop a chemical profile of these waters at the time of occurrence of fluids in the VZMS and used to compare to the baseline non-leachate fluid profile(s) to aid in determining the source of fluids in the VZMS.

6.5 Data Reporting

Data will be summarized and presented to NMED on a quarterly basis. All reports will be prepared under the supervision of a qualified geologist or professional engineer. The report will include an executive summary that highlights any significant findings during the reporting period.

The first quarterly report will contain the following information:

- Well completion and lithologic logs
- List of indicator parameters for non-leachate fluids and associated computations
- List of indicator parameters for initial leachate ~~based on F-039 and the first Appendix IX analysis; and~~
- VZMS analytical results collected during the first quarter
- Well inspection logs
- Monitoring field logs with sampling information

The main body of quarterly ~~the~~ reports will include discussions or summaries of the following topics~~ listed below.~~:

- Monitoring and sampling methodology
- Sample collection and preservation procedures
- Indicator parameter list, including non-leachate and leachate parameters indicating any revisions and evaluations used to derive the indicator parameters
- Current and historical analytical results
- Monthly leachate chemistry results
- Current and historical fluid levels~~, if applicable~~
- VZMS inspection and maintenance results
- Volumes of fluids removed from all monitoring points, including the LCRS~~s~~ and LDRS~~s~~
- Release assessment information in the form of a summary of the data reports
- Significant historical changes in fluid levels or fluid chemistry (e.g., leachate fluids)
- Summary of 40 CFR 264 Appendix IX results included in the previous biennial sampling event
- A cumulative list of chemicals managed in the landfill~~regulated units~~, as identified in the WAP

~~The report will also include the items listed below.~~

- Maps illustrating facility waste management units and monitoring sump and well locations
- Maps illustrating groundwater depth, gradient and flow direction (if appropriate)
- Map (plan view or cross-section) illustrating groundwater pathways (if appropriate)
- Graphs and/or tables depicting water quality
- Laboratory documentation, chain of custody and QA/QC documentation
- Copies of well and sump sampling logs and other pertinent documentation
- Operation and maintenance report
- Conclusions and recommendations

Biennial reports will also be submitted that contain the following information:

- 40 CFR 264 Appendix IX analysis
- Any modification to the indicator parameter list based on 40 CFR 264 Appendix IX analysis, including evaluations used to derive the indicator parameters

If needed, special reports will be submitted that contain the following information:

- Release information
- Monthly reports, as long as there are leachate fluids in the VZMS
- Non-leachate parameter list, including evaluations used to derive the indicator parameters

If fluids are detected in either the sumps or wells, NMED will be notified within 24 hours. Subsequently, an additional report (i.e., not a regularly scheduled quarterly report) will then be submitted to NMED within 14 days of fluid appearance. This report will include an assessment of the amount and source of the fluids; the possible size, location, and cause of the leak; and the seriousness of the any leak in terms of potential releases to the environment. It will also include a summary of any immediate short or long term response actions to be taken. The report will also include ~~those items listed below~~the following items~~.~~:

- Monitoring results from the sumps and wells (volumes/fluid levels and analytical results)
- A comparison to the baseline characterization results
- Analytical results for all fluids

Within 30 days of fluid appearance, a report will be submitted to NMED describing the effectiveness of the response actions. Monthly reports will be submitted to NMED as long as fluids are present in the VZMS.

6.6 Data Storage

All completed data analyses and reports from this project will be stored electronically. Copies of the electronic data and hard copies of the data and laboratory reports will be placed in the facility record during the operating and post-closure periods.

7. Health and Safety

If there is reasonable potential for exposure to toxic compounds, field personnel will be required to have current certification of 40-hour health and safety training per OSHA 29 CFR 1910.120(e). Personnel will adhere to proper health and safety protocols as described in a separate health and safety plan that will be submitted to NMED for review and approval prior to initiation of work plan activities. The selected contractor will also provide a health and safety plan relating to their operation (e.g., drilling equipment).

A Health and Safety Officer (HSO) will be designated that will be responsible for monitoring potentially hazardous situations during all field activities, ensuring that all personnel know the potential physical and chemical hazards and are trained in the proper use of personal protective equipment (PPE). It is anticipated that safety Level D will be the highest level of PPE necessary (i.e., work clothes, hard hats, steel-toed boots and safety glasses). The HSO will make the decision when it is necessary to upgrade to a higher level of PPE. The HSO will also conduct periodic air monitoring (documented following Rule 1166-type requirements [SCAQMD, 2001]) and determine if conditions require an immediate termination of work.

References[rpf6][rpf7]

~~Environmental Protection Agency (EPA). 1989. Technical Enforcement Document.~~

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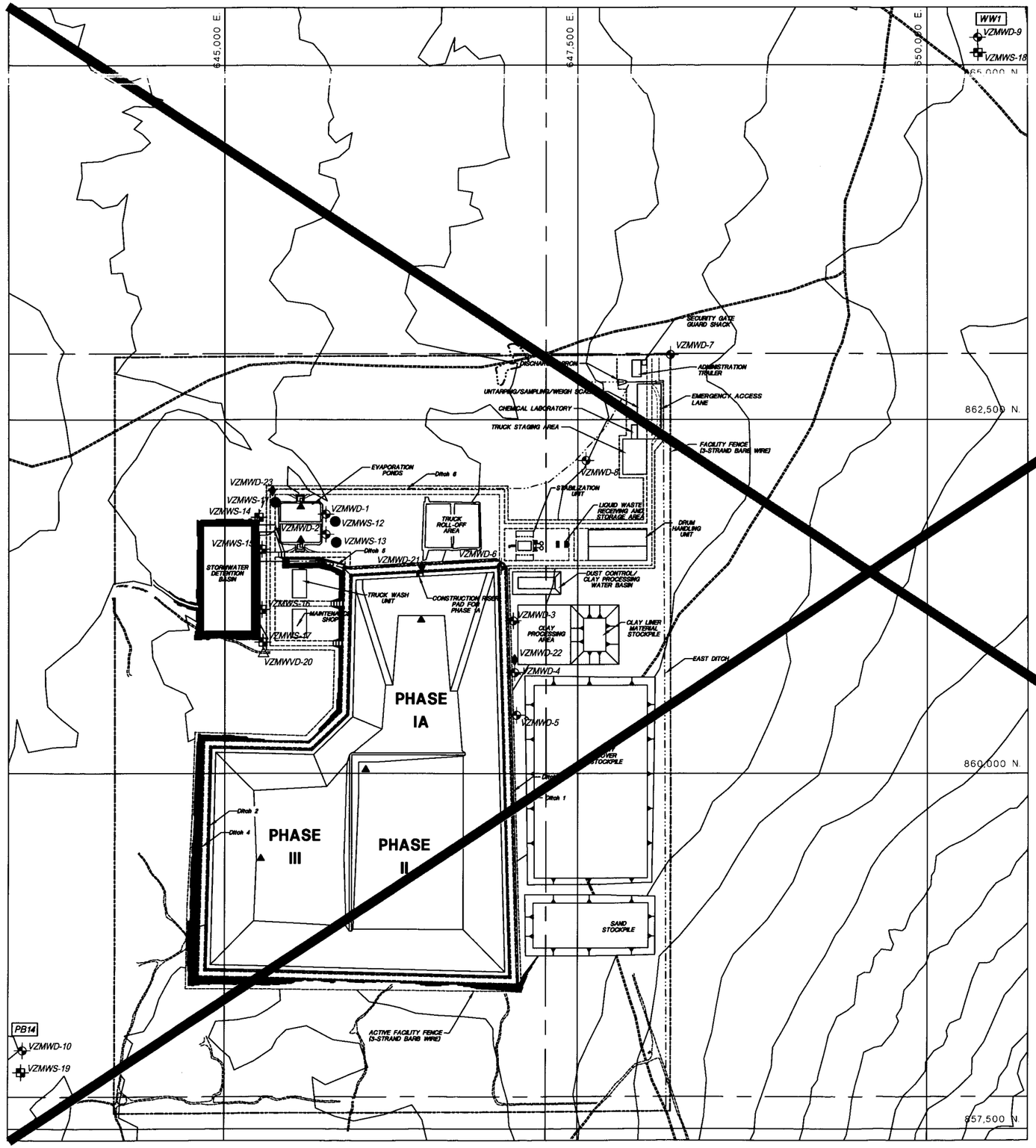
U.S. EPA. 2011b. U.S. EPA Contract Laboratory Program (CLP) statement of work for multi-media, multi-concentration organics analysis, SOM01.2. Accessed October 3, 2011 at <http://www.epa.gov/superfund/programs/clp/som1.htm#pdf>.

Drawing 2, Sheet 1 of 2



LEGEND

- EXISTING CONTOUR
- REGRADED CONTOUR
- FACILITY AND ACTIVE FACILITY FENCES
- VADOSE ZONE SUMP
- VZMWS-11 ● SHALLOW WELL AT UPPER DOCKUM WITH LYSIMETER
- VZMWD DEEP WELL AT UPPER/ LOWER DOCKUM
- VZMWVD-20 △ VERY DEEP - LOWER DOCKUM
- VZMWS-15 SHALLOW WELL AT UPPER DOCKUM ALLUVIAL
- VZMWD-22 NEUTRON PROBES

Drawing eliminated for 2011 permit renewal.

Not For Construction

SCALE

500' 0 500' 1000'

No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
3	Revisions	4/15/02	P.Corser	J.Gates	P.Corser
2	Revisions	7/6/00	T.Leeson	K.Conrath	T.Leeson
1	Revisions	5/9/00	T.Leeson	K.Conrath	T.Leeson
0	Issued for Report	2/11/00	T.Leeson	K.Conrath	T.Leeson

TRIASSIC PARK WASTE DISPOSAL FACILITY

PROJECT:
VADOSE ZONE MONITORING SYSTEM WORK PLAN

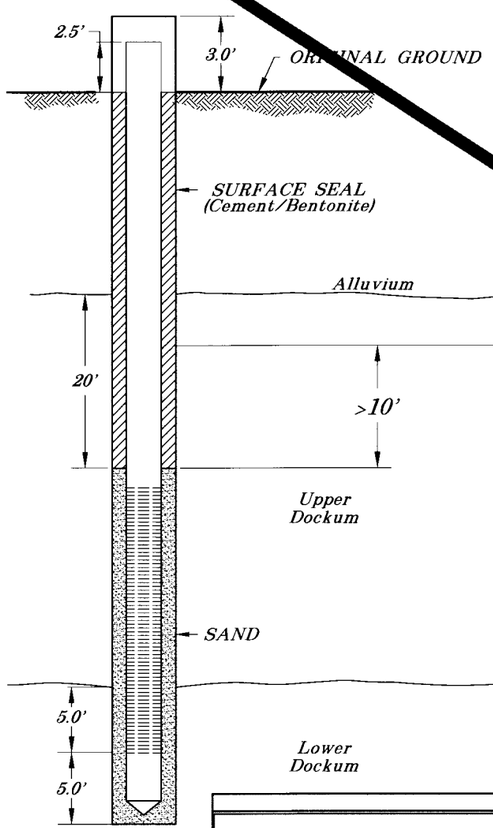
DRAWING TITLE:
MONITORING WELL LOCATIONS

MWH
MONTGOMERY WATSON HARZA

Sheet 1 of 2 Sheets
SCALE: As Shown
DRAWING No. 2

DEEP MONITORING WELL AND NEUTRON PROBES INSTALLATION DETAILS (2)

NTS



SHALLOW MONITORING WELL INSTALLATION DETAIL (2)

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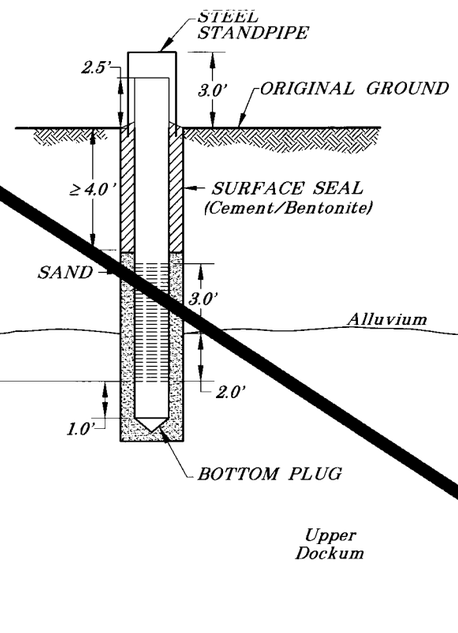
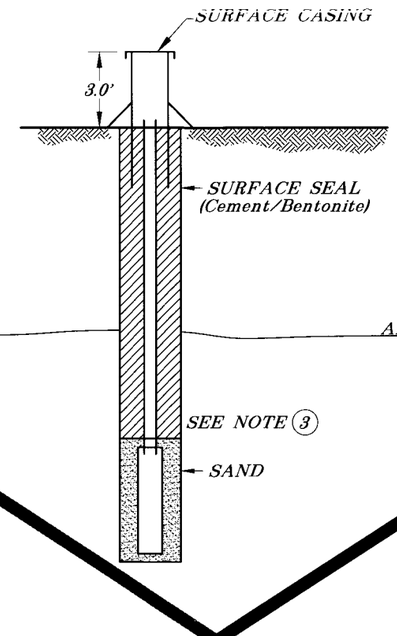


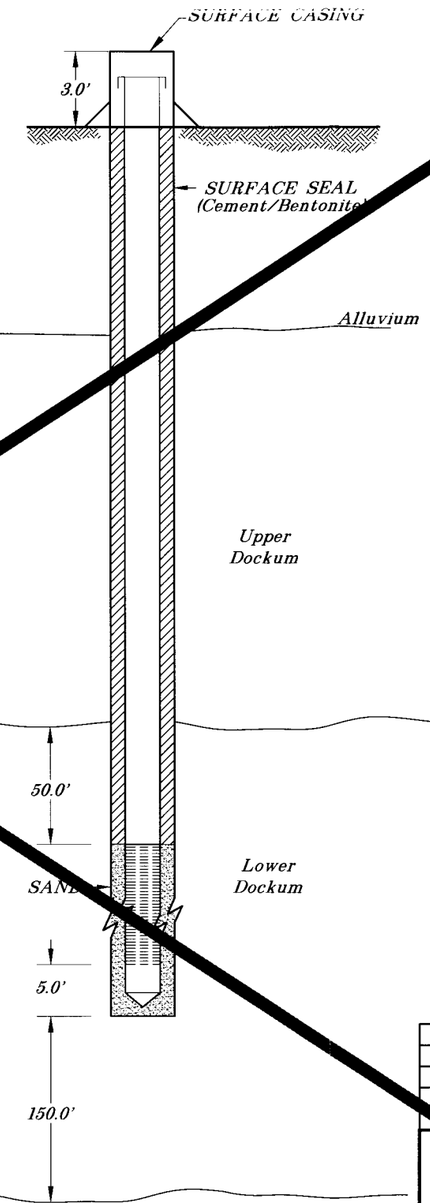
PRESSURE-VACUUM SOIL-WATER SAMPLER INSTALLATION DETAIL (2)

NTS



VERY DEEP MONITORING WELL INSTALLATION DETAIL (2)

NTS



NOTES:

(2) INSTALLATION DETAILS ARE CONCEPTUAL TO INDICATE APPROXIMATE DEPTH OF INSTALLATION AND SCREENED OR MONITORED INTERVALS. ACTUAL DETAILS TO BE DETERMINED IN THE FIELD.

(3) SAMPLER TO BE LOCATED AT DEPTH OF FIVE FEET BELOW VADOSE ZONE SUMPS FOR SURFACE IMPOUNDMENT.

Drawing eliminated for 2011 permit renewal.

Gandy Monitoring System Description

Name	Number	Depth	Contact/Zone to Be Monitored	Installation Description	General Location (1)
VZMW- D	1	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	East side of north evaporation pond
VZMW- D	2	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	East side of south evaporation pond
VZMW- D	3	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	East side of Phase IA, 400 feet south of NE corner of landfill
VZMW- D	4	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	East side of Phase IA, 750 feet south of NE corner of landfill
VZMW- D	5	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	East side of Phase IA, 1050 feet south of NE corner of landfill
VZMW- D	6	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	At NE corner of Phase IA of landfill
VZMW- D	7	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	At NE corner of Facility boundary
VZMW- D	8	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	Halfway along a straight line extended between VZMW-D6 and D7
VZMW- D	9	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	Next to WW1
VZMW- D	10	Deep	Upper/Lower Dockum	4-inch diameter Sch 80, PVC Pipe	Next to PB14
VZMW- S	11	Shallow	Upper Dockum	Vacuum-pressure Suction Cup Sampler	NW Corner of north evaporation pond (next to VSMW-D23)
VZMW- S	12	Shallow	Upper Dockum	Vacuum-pressure Suction Cup Sampler	East side of north evaporation pond (next to VZMW-D1)
VZMW- S	13	Shallow	Upper Dockum	Vacuum-pressure Suction Cup Sampler	East side of south evaporation pond (next to VZMW-D2)
VZMW- S	14	Shallow	Alluvial/Upper Dockum	4-inch diameter Sch 80, PVC Pipe	NE corner of Stormwater Detention Basin
VZMW- S	15	Shallow	Alluvial/Upper Dockum	4-inch diameter Sch 80, PVC Pipe	East side of Stormwater Detention Basin, one-third distance between 14 and 17
VZMW- S	16	Shallow	Alluvial/Upper Dockum	4-inch diameter Sch 80, PVC Pipe	East side of Stormwater Detention Basin, two-thirds distance between 14 and 17
VZMW- S	17	Shallow	Alluvial/Upper Dockum	4-inch diameter Sch 80, PVC Pipe	SE corner of Stormwater Detention Basin
VZMW- S	18	Shallow	Alluvial/Upper Dockum	4-inch diameter Sch 80, PVC Pipe	Next to WW1
VZMW- S	19	Shallow	Alluvial/Upper Dockum	4-inch diameter Sch 80, PVC Pipe	Next to PB14
VZMW- VD	20	Very Deep	Lower Dockum	4-inch diameter Sch 80, PVC Pipe	SE corner of Stormwater Detention Basin (next to VZMW-S17)
VZMW- D	21	Deep	Upper/Lower Dockum	2-inch dia. Sch 80, PVC Pipe, Neutron Probe	North side, center, Phase 1A Landfill
VZMW- D	22	Deep	Upper/Lower Dockum	2-inch dia. Sch 80, PVC Pipe, Neutron Probe	West side, center, Phase 1A Landfill
VZMW- D	23	Deep	Upper/Lower Dockum	2-inch dia. Sch 80, PVC Pipe, Neutron Probe	NW Corner of north evaporation pond (next to VSMW-S11)

Note 1 - See Sheet 1 of 2 for approximate locations on site facility map.

Not For Construction

	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
3	Revisions	4/15/02	P.Corser	J.Gates	P.Corser
2	Revisions	7/6/00	T.Leeson	K.Conrath	T.Leeson
1	Revisions	5/9/00	T.Leeson	K.Conrath	T.Leeson
0	Issued for Report	2/11/00	T.Leeson	K.Conrath	T.Leeson

TRIASSIC PARK
WASTE DISPOSAL FACILITY

PROJECT:
VADOSE ZONE MONITORING SYSTEM WORK PLAN

DRAWING TITLE:
WELL INSTALLATION DETAILS

MWH
MONTGOMERY WATSON HARZA

Sheet 2 of 2 Sheets
SCALE: As Shown
DRAWING No. 2

AutoCAD FILE: Well Install Details PROJECT NUMBER: 2450192

Appendix A

~~Meteoric Water Mobility~~Synthetic Precipitation Leaching Procedure

ABSTRACT

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) provides test procedures and guidance which are recommended for use in conducting the evaluations and measurements needed to comply with the Resource Conservation and Recovery Act (RCRA), Public Law 94-580, as amended. These methods are approved by the U.S. Environmental Protection Agency for obtaining data to satisfy the requirements of 40 CFR Parts 122 through 270 promulgated under RCRA, as amended. This manual presents the state-of-the-art in routine analytical tested adapted for the RCRA program. It contains procedures for field and laboratory quality control, sampling, determining hazardous constituents in wastes, determining the hazardous characteristics of wastes (toxicity, ignitability, reactivity, and corrosivity), and for determining physical properties of wastes. It also contains guidance on how to select appropriate methods.

Several of the hazardous waste regulations under Subtitle C of RCRA require that specific testing methods described in SW-846 be employed for certain applications. Refer to 40 *Code of Federal Regulations* (CFR), Parts 260 through 270, for those specific requirements. Any reliable analytical method may be used to meet other requirements under Subtitle C of RCRA.

CHAPTER SIX

PROPERTIES

This chapter addresses procedures for "method-defined parameters," where the analytical result is wholly dependant on the process used to make the measurement. Changes to the specific methods may change the end result and incorrectly identify a waste as nonhazardous. Therefore, when the measurement of such method-defined parameters is required by regulation, those methods are **not** subject to the flexibility afforded in other SW-846 methods (such as described in the Disclaimer and Chapter Two of this manual).

The following methods are found in Chapter Six:

Method 1030:	Ignitability of Solids
Method 1040:	Test Method for Oxidizing Solids
Method 1050:	Test Methods to Determine Substances Likely to Spontaneously Combust
Method 1120:	Dermal Corrosion
Method 1312:	Synthetic Precipitation Leaching Procedure
Method 1320:	Multiple Extraction Procedure
Method 1330A:	Extraction Procedure for Oily Wastes
Method 9041A:	pH Paper Method
Method 9045D:	Soil and Waste pH
Method 9050A:	Specific Conductance
Method 9080:	Cation-Exchange Capacity of Soils (Ammonium Acetate)
Method 9081:	Cation-Exchange Capacity of Soils (Sodium Acetate)
Method 9090A:	Compatibility Test for Wastes and Membrane Liners
Method 9095B:	Paint Filter Liquids Test
Method 9096:	Liquid Release Test (LRT) Procedure **Appendix A:** Liquid Release Test Pre-Test
Method 9100:	Saturated Hydraulic Conductivity, Saturated Leachate Conductivity, and Intrinsic Permeability
Method 9310:	Gross Alpha and Gross Beta
Method 9315:	Alpha-Emitting Radium Isotopes

METHOD 1312

SYNTHETIC PRECIPITATION LEACHING PROCEDURE

1.0 SCOPE AND APPLICATION

1.1 Method 1312 is designed to determine the mobility of both organic and inorganic analytes present in liquids, soils, and wastes.

2.0 SUMMARY OF METHOD

2.1 For liquid samples (i.e., those containing less than 0.5 % dry solid material), the sample, after filtration through a 0.6 to 0.8 µm glass fiber filter, is defined as the 1312 extract.

2.2 For samples containing greater than 0.5 % solids, the liquid phase, if any, is separated from the solid phase and stored for later analysis; the particle size of the solid phase is reduced, if necessary. The solid phase is extracted with an amount of extraction fluid equal to 20 times the weight of the solid phase. The extraction fluid employed is a function of the region of the country where the sample site is located if the sample is a soil. If the sample is a waste or wastewater, the extraction fluid employed is a pH 4.2 solution. A special extractor vessel is used when testing for volatile analytes (see Table 1 for a list of volatile compounds). Following extraction, the liquid extract is separated from the solid phase by filtration through a 0.6 to 0.8 µm glass fiber filter.

2.3 If compatible (i.e., multiple phases will not form on combination), the initial liquid phase of the waste is added to the liquid extract, and these are analyzed together. If incompatible, the liquids are analyzed separately and the results are mathematically combined to yield a volume-weighted average concentration.

3.0 INTERFERENCES

3.1 Potential interferences that may be encountered during analysis are discussed in the individual analytical methods.

4.0 APPARATUS AND MATERIALS

4.1 Agitation apparatus: The agitation apparatus must be capable of rotating the extraction vessel in an end-over-end fashion (see Figure 1) at 30 ± 2 rpm. Suitable devices known to EPA are identified in Table 2.

4.2 Extraction Vessels

4.2.1 Zero Headspace Extraction Vessel (ZHE). This device is for use only when the sample is being tested for the mobility of volatile analytes (i.e., those listed in Table 1). The ZHE (depicted in Figure 2) allows for liquid/solid separation within the device and effectively precludes headspace. This type of vessel allows for initial liquid/solid

separation, extraction, and final extract filtration without opening the vessel (see Step 4.3.1). These vessels shall have an internal volume of 500-600 mL and be equipped to accommodate a 90-110 mm filter. The devices contain VITON®[1] O-rings which should be replaced frequently. Suitable ZHE devices known to EPA are identified in Table 3.

For the ZHE to be acceptable for use, the piston within the ZHE should be able to be moved with approximately 15 psig or less. If it takes more pressure to move the piston, the O-rings in the device should be replaced. If this does not solve the problem, the ZHE is unacceptable for 1312 analyses and the manufacturer should be contacted.

The ZHE should be checked for leaks after every extraction. If the device contains a built-in pressure gauge, pressurize the device to 50 psig, allow it to stand unattended for 1 hour, and recheck the pressure. If the device does not have a built-in pressure gauge, pressurize the device to 50 psig, submerge it in water, and check for the presence of air bubbles escaping from any of the fittings. If pressure is lost, check all fittings and inspect and replace O-rings, if necessary. Retest the device. If leakage problems cannot be solved, the manufacturer should be contacted.

Some ZHEs use gas pressure to actuate the ZHE piston, while others use mechanical pressure (see Table 3). Whereas the volatiles procedure (see Step 7.3) refers to pounds-per-square-inch (psig), for the mechanically actuated piston, the pressure applied is measured in torque-inch-pounds. Refer to the manufacturer's instructions as to the proper conversion.

4.2.2 Bottle Extraction Vessel. When the sample is being evaluated using the nonvolatile extraction, a jar with sufficient capacity to hold the sample and the extraction fluid is needed. Headspace is allowed in this vessel.

The extraction bottles may be constructed from various materials, depending on the analytes to be analyzed and the nature of the waste (see Step 4.3.3). It is recommended that borosilicate glass bottles be used instead of other types of glass, especially when inorganics are of concern. Plastic bottles, other than polytetrafluoroethylene, shall not be used if organics are to be investigated. Bottles are available from a number of laboratory suppliers. When this type of extraction vessel is used, the filtration device discussed in Step 4.3.2 is used for initial liquid/solid separation and final extract filtration.

4.3 Filtration Devices: It is recommended that all filtrations be performed in a hood.

4.3.1 Zero-Headspace Extraction Vessel (ZHE): When the sample is evaluated for volatiles, the zero-headspace extraction vessel described

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[1]VITON® is a trademark of Du Pont.

in Step 4.2.1 is used for filtration. The device shall be capable of supporting and keeping in place the glass fiber filter and be able to withstand the pressure needed to accomplish separation (50 psig).

NOTE: When it is suspected that the glass fiber filter has been ruptured, an in-line glass fiber filter may be used to filter the material within the ZHE.

4.3.2 Filter Holder: When the sample is evaluated for other than volatile analytes, a filter holder capable of supporting a glass fiber filter and able to withstand the pressure needed to accomplish separation may be used. Suitable filter holders range from simple vacuum units to relatively complex systems capable of exerting pressures of up to 50 psig or more. The type of filter holder used depends on the properties of the material to be filtered (see Step 4.3.3). These devices shall have a minimum internal volume of 300 mL and be equipped to accommodate a minimum filter size of 47 mm (filter holders having an internal capacity of 1.5 L or greater, and equipped to accommodate a 142 mm diameter filter, are recommended). Vacuum filtration can only be used for wastes with low solids content (<10 %) and for highly granular, liquid-containing wastes. All other types of wastes should be filtered using positive pressure filtration. Suitable filter holders known to EPA are listed in Table 4.

4.3.3 Materials of Construction: Extraction vessels and filtration devices shall be made of inert materials which will not leach or absorb sample components of interest. Glass, polytetrafluoroethylene (PTFE), or type 316 stainless steel equipment may be used when evaluating the mobility of both organic and inorganic components. Devices made of high-density polyethylene (HDPE), polypropylene (PP), or polyvinyl chloride (PVC) may be used only when evaluating the mobility of metals. Borosilicate glass bottles are recommended for use over other types of glass bottles, especially when inorganics are analytes of concern.

4.4 Filters: Filters shall be made of borosilicate glass fiber, shall contain no binder materials, and shall have an effective pore size of 0.6 to 0.8-µm . Filters known to EPA which meet these specifications are identified in Table 5. Pre-filters must not be used. When evaluating the mobility of metals, filters shall be acid-washed prior to use by rinsing with 1N nitric acid followed by three consecutive rinses with reagent water (a minimum of 1-L per rinse is recommended). Glass fiber filters are fragile and should be handled with care.

4.5 pH Meters: The meter should be accurate to ± 0.05 units at 25°C.

4.6 ZHE Extract Collection Devices: TEDLAR®[2] bags or glass, stainless steel or PTFE gas-tight syringes are used to collect the initial liquid phase and the final extract when using the ZHE device. These devices listed are recommended for use under the following conditions:

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[2]TEDLAR® is a registered trademark of Du Pont.

4.6.1 If a waste contains an aqueous liquid phase or if a waste does not contain a significant amount of nonaqueous liquid (i.e., <1 % of total waste), the TEDLAR® bag or a 600 mL syringe should be used to collect and combine the initial liquid and solid extract.

4.6.2 If a waste contains a significant amount of nonaqueous liquid in the initial liquid phase (i.e., >1 % of total waste), the syringe or the TEDLAR® bag may be used for both the initial solid/liquid separation and the final extract filtration. However, analysts should use one or the other, not both.

4.6.3 If the waste contains no initial liquid phase (is 100 % solid) or has no significant solid phase (is <0.5% solid) , either the TEDLAR® bag or the syringe may be used. If the syringe is used, discard the first 5 mL of liquid expressed from the device. The remaining aliquots are used for analysis.

4.7 ZHE Extraction Fluid Transfer Devices: Any device capable of transferring the extraction fluid into the ZHE without changing the nature of the extraction fluid is acceptable (e.g., a positive displacement or peristaltic pump, a gas-tight syringe, pressure filtration unit (see Step 4.3.2), or other ZHE device).

4.8 Laboratory Balance: Any laboratory balance accurate to within ± 0.01 grams may be used (all weight measurements are to be within ± 0.1 grams).

4.9 Beaker or Erlenmeyer flask, glass, 500 mL.

4.10 Watchglass, appropriate diameter to cover beaker or Erlenmeyer flask.

4.11 Magnetic stirrer.

5.0 REAGENTS

5.1 Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Reagent Water. Reagent water is defined as water in which an interferant is not observed at or above the method's detection limit of the analyte(s) of interest. For nonvolatile extractions, ASTM Type II water or equivalent meets the definition of reagent water. For volatile extractions, it is recommended that reagent water be generated by any of the following methods. Reagent water should be monitored periodically for impurities.

5.2.1 Reagent water for volatile extractions may be generated by passing tap water through a carbon filter bed containing about 500 grams of activated carbon (Calgon Corp., Filtrasorb-300 or equivalent).

5.2.2 A water purification system (Millipore Super-Q or equivalent) may also be used to generate reagent water for volatile extractions.

5.2.3 Reagent water for volatile extractions may also be prepared by boiling water for 15 minutes. Subsequently, while maintaining the water temperature at 90 ± 5 degrees C, bubble a contaminant-free inert gas (e.g. nitrogen) through the water for 1 hour. While still hot, transfer the water to a narrow mouth screw-cap bottle under zero-headspace and seal with a Teflon-lined septum and cap.

5.3 Sulfuric acid/nitric acid (60/40 weight percent mixture) H_2SO_4/HNO_3. Cautiously mix 60 g of concentrated sulfuric acid with 40 g of concentrated nitric acid. If preferred, a more dilute H_2SO_4/HNO_3 acid mixture may be prepared and used in steps 5.4.1 and 5.4.2 making it easier to adjust the pH of the extraction fluids.

5.4 Extraction fluids.

5.4.1 Extraction fluid #1: This fluid is made by adding the 60/40 weight percent mixture of sulfuric and nitric acids (or a suitable dilution) to reagent water (Step 5.2) until the pH is 4.20 ± 0.05. The fluid is used to determine the leachability of soil from a site that is east of the Mississippi River, and the leachability of wastes and wastewaters.

NOTE: Solutions are unbuffered and exact pH may not be attained.

5.4.2 Extraction fluid #2: This fluid is made by adding the 60/40 weight percent mixture of sulfuric and nitric acids (or a suitable dilution) to reagent water (Step 5.2) until the pH is 5.00 ± 0.05. The fluid is used to determine the leachability of soil from a site that is west of the Mississippi River.

5.4.3 Extraction fluid #3: This fluid is reagent water (Step 5.2) and is used to determine cyanide and volatiles leachability.

NOTE: These extraction fluids should be monitored frequently for impurities. The pH should be checked prior to use to ensure that these fluids are made up accurately. If impurities are found or the pH is not within the above specifications, the fluid shall be discarded and fresh extraction fluid prepared.

5.5 Analytical standards shall be prepared according to the appropriate analytical method.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

6.1 All samples shall be collected using an appropriate sampling plan.

6.2 There may be requirements on the minimal size of the field sample depending upon the physical state or states of the waste and the analytes of concern. An aliquot is needed for the preliminary evaluations of the percent

solids and the particle size. An aliquot may be needed to conduct the nonvolatile analyte extraction procedure. If volatile organics are of concern, another aliquot may be needed. Quality control measures may require additional aliquots. Further, it is always wise to collect more sample just in case something goes wrong with the initial attempt to conduct the test.

6.3 Preservatives shall not be added to samples before extraction.

6.4 Samples may be refrigerated unless refrigeration results in irreversible physical change to the waste. If precipitation occurs, the entire sample (including precipitate) should be extracted.

6.5 When the sample is to be evaluated for volatile analytes, care shall be taken to minimize the loss of volatiles. Samples shall be collected and stored in a manner intended to prevent the loss of volatile analytes (e.g., samples should be collected in Teflon-lined septum capped vials and stored at 4°C. Samples should be opened only immediately prior to extraction).

6.6 1312 extracts should be prepared for analysis and analyzed as soon as possible following extraction. Extracts or portions of extracts for metallic analyte determinations must be acidified with nitric acid to a pH < 2, unless precipitation occurs (see Step 7.2.14 if precipitation occurs). Extracts should be preserved for other analytes according to the guidance given in the individual analysis methods. Extracts or portions of extracts for organic analyte determinations shall not be allowed to come into contact with the atmosphere (i.e., no headspace) to prevent losses. See Step 8.0 (Quality Control) for acceptable sample and extract holding times.

7.0 PROCEDURE

7.1 Preliminary Evaluations

Perform preliminary 1312 evaluations on a minimum 100 gram aliquot of sample. This aliquot may not actually undergo 1312 extraction. These preliminary evaluations include: (1) determination of the percent solids (Step 7.1.1); (2) determination of whether the waste contains insignificant solids and is, therefore, its own extract after filtration (Step 7.1.2); and (3) determination of whether the solid portion of the waste requires particle size reduction (Step 7.1.3).

7.1.1 Preliminary determination of percent solids: Percent solids is defined as that fraction of a waste sample (as a percentage of the total sample) from which no liquid may be forced out by an applied pressure, as described below.

7.1.1.1 If the sample will obviously yield no free liquid when subjected to pressure filtration (i.e., is 100% solid), weigh out a representative subsample (100 g minimum) and proceed to Step 7.1.3.

7.1.1.2 If the sample is liquid or multiphasic, liquid/solid separation to make a preliminary determination of percent solids is required. This involves the filtration device

discussed in Step 4.3.2, and is outlined in Steps 7.1.1.3 through 7.1.1.9.

7.1.1.3 Pre-weigh the filter and the container that will receive the filtrate.

7.1.1.4 Assemble filter holder and filter following the manufacturer's instructions. Place the filter on the support screen and secure.

7.1.1.5 Weigh out a subsample of the waste (100 gram minimum) and record the weight.

7.1.1.6 Allow slurries to stand to permit the solid phase to settle. Samples that settle slowly may be centrifuged prior to filtration. Centrifugation is to be used only as an aid to filtration. If used, the liquid should be decanted and filtered followed by filtration of the solid portion of the waste through the same filtration system.

7.1.1.7 Quantitatively transfer the sample to the filter holder (liquid and solid phases). Spread the sample evenly over the surface of the filter. If filtration of the waste at 4°C reduces the amount of expressed liquid over what would be expressed at room temperature, then allow the sample to warm up to room temperature in the device before filtering.

Gradually apply vacuum or gentle pressure of 1-10 psig, until air or pressurizing gas moves through the filter. If this point is not reached under 10 psig, and if no additional liquid has passed through the filter in any 2-minute interval, slowly increase the pressure in 10 psig increments to a maximum of 50 psig. After each incremental increase of 10 psig, if the pressurizing gas has not moved through the filter, and if no additional liquid has passed through the filter in any 2-minute interval, proceed to the next 10-psig increment. When the pressurizing gas begins to move through the filter, or when liquid flow has ceased at 50 psig (i.e., filtration does not result in any additional filtrate within any 2-minute period), stop the filtration.

NOTE: If sample material (>1 % of original sample weight) has obviously adhered to the container used to transfer the sample to the filtration apparatus, determine the weight of this residue and subtract it from the sample weight determined in Step 7.1.1.5 to determine the weight of the sample that will be filtered.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.1.1.8 The material in the filter holder is defined as the solid phase of the sample, and the filtrate is defined as the liquid phase.

NOTE: Some samples, such as oily wastes and some paint wastes, will obviously contain some material that appears to be a liquid, but even after applying vacuum or pressure filtration, as outlined in Step 7.1.1.7, this material may not filter. If this is the case, the material within the filtration device is defined as a solid. Do not replace the original filter with a fresh filter under any circumstances. Use only one filter.

7.1.1.9 Determine the weight of the liquid phase by subtracting the weight of the filtrate container (see Step 7.1.1.3) from the total weight of the filtrate-filled container. Determine the weight of the solid phase of the sample by subtracting the weight of the liquid phase from the weight of the total sample, as determined in Step 7.1.1.5 or 7.1.1.7.

Record the weight of the liquid and solid phases. Calculate the percent solids as follows:

$$\text{Percent solids} = \frac{\text{Weight of solid (Step 7.1.1.9)}}{\text{Total weight of waste (Step 7.1.1.5 or 7.1.1.7)}} \times 100$$

7.1.2 If the percent solids determined in Step 7.1.1.9 is equal to or greater than 0.5%, then proceed either to Step 7.1.3 to determine whether the solid material requires particle size reduction or to Step 7.1.2.1 if it is noticed that a small amount of the filtrate is entrained in wetting of the filter. If the percent solids determined in Step 7.1.1.9 is less than 0.5%, then proceed to Step 7.2.9 if the nonvolatile 1312 analysis is to be performed, and to Step 7.3 with a fresh portion of the waste if the volatile 1312 analysis is to be performed.

7.1.2.1 Remove the solid phase and filter from the filtration apparatus.

7.1.2.2 Dry the filter and solid phase at 100 ± 20°C until two successive weighings yield the same value within ± 1 %. Record the final weight.

Caution: The drying oven should be vented to a hood or other appropriate device to eliminate the possibility of fumes from the sample escaping into the laboratory. Care should be taken to ensure that the sample will not flash or violently react upon heating.

7.1.2.3 Calculate the percent dry solids as follows:

$$\text{Percent dry solids} = \frac{\text{(Weight of dry sample + filter) - tared weight of filter}}{\text{Initial weight of sample (Step 7.1.1.5 or 7.1.1.7)}} \times 100$$

7.1.2.4 If the percent dry solids is less than 0.5%, then proceed to Step 7.2.9 if the nonvolatile 1312 analysis is to be performed, and to Step 7.3 if the volatile 1312 analysis is to be performed. If the percent dry solids is greater than or equal to 0.5%, and if the nonvolatile 1312 analysis is to be performed, return to the beginning of this Step (7.1) and, with a fresh portion of sample, determine whether particle size reduction is necessary (Step 7.1.3).

7.1.3 Determination of whether the sample requires particle-size reduction (particle-size is reduced during this step): Using the solid portion of the sample, evaluate the solid for particle size. Particle-size reduction is required, unless the solid has a surface area per gram of material equal to or greater than 3.1 cm^2, or is smaller than 1 cm in its narrowest dimension (i.e., is capable of passing through a 9.5 mm (0.375 inch) standard sieve). If the surface area is smaller or the particle size larger than described above, prepare the solid portion of the sample for extraction by crushing, cutting, or grinding the waste to a surface area or particle size as described above. If the solids are prepared for organic volatiles extraction, special precautions must be taken (see Step 7.3.6).

NOTE: Surface area criteria are meant for filamentous (e.g., paper, cloth, and similar) waste materials. Actual measurement of surface area is not required, nor is it recommended. For materials that do not obviously meet the criteria, sample-specific methods would need to be developed and employed to measure the surface area. Such methodology is currently not available.

7.1.4 Determination of appropriate extraction fluid:

7.1.4.1 For soils, if the sample is from a site that is east of the Mississippi River, extraction fluid #1 should be used. If the sample is from a site that is west of the Mississippi River, extraction fluid #2 should be used.

7.1.4.2 For wastes and wastewater, extraction fluid #1 should be used.

7.1.4.3 For cyanide-containing wastes and/or soils, extraction fluid #3 (reagent water) must be used because leaching of cyanide-containing samples under acidic conditions may result in the formation of hydrogen cyanide gas.

7.1.5 If the aliquot of the sample used for the preliminary evaluation (Steps 7.1.1 - 7.1.4) was determined to be 100% solid at Step 7.1.1.1, then it can be used for the Step 7.2 extraction (assuming at least 100 grams remain), and the Step 7.3 extraction (assuming at least 25 grams remain). If the aliquot was subjected to the procedure in Step 7.1.1.7, then another aliquot shall be used for the volatile extraction procedure in Step 7.3. The aliquot of the waste subjected to the procedure in Step 7.1.1.7 might be appropriate for use for the Step 7.2 extraction if an adequate amount of solid (as determined by Step 7.1.1.9)

was obtained. The amount of solid necessary is dependent upon whether a sufficient amount of extract will be produced to support the analyses. If an adequate amount of solid remains, proceed to Step 7.2.10 of the nonvolatile 1312 extraction.

7.2 Procedure When Volatiles Are Not Involved

A minimum sample size of 100 grams (solid and liquid phases) is recommended. In some cases, a larger sample size may be appropriate, depending on the solids content of the waste sample (percent solids, See Step 7.1.1), whether the initial liquid phase of the waste will be miscible with the aqueous extract of the solid, and whether inorganics, semivolatile organics, pesticides, and herbicides are all analytes of concern. Enough solids should be generated for extraction such that the volume of 1312 extract will be sufficient to support all of the analyses required. If the amount of extract generated by a single 1312 extraction will not be sufficient to perform all of the analyses, more than one extraction may be performed and the extracts from each combined and aliquoted for analysis.

7.2.1 If the sample will obviously yield no liquid when subjected to pressure filtration (i.e., is 100 % solid, see Step 7.1.1), weigh out a subsample of the sample (100 gram minimum) and proceed to Step 7.2.9.

7.2.2 If the sample is liquid or multiphasic, liquid/solid separation is required. This involves the filtration device described in Step 4.3.2 and is outlined in Steps 7.2.3 to 7.2.8.

7.2.3 Pre-weigh the container that will receive the filtrate.

7.2.4 Assemble the filter holder and filter following the manufacturer's instructions. Place the filter on the support screen and secure. Acid wash the filter if evaluating the mobility of metals (see Step 4.4).

NOTE: Acid washed filters may be used for all nonvolatile extractions even when metals are not of concern.

7.2.5 Weigh out a subsample of the sample (100 gram minimum) and record the weight. If the waste contains <0.5 % dry solids (Step 7.1.2), the liquid portion of the waste, after filtration, is defined as the 1312 extract. Therefore, enough of the sample should be filtered so that the amount of filtered liquid will support all of the analyses required of the 1312 extract. For wastes containing >0.5 % dry solids (Steps 7.1.1 or 7.1.2), use the percent solids information obtained in Step 7.1.1 to determine the optimum sample size (100 gram minimum) for filtration. Enough solids should be generated by filtration to support the analyses to be performed on the 1312 extract.

7.2.6 Allow slurries to stand to permit the solid phase to settle. Samples that settle slowly may be centrifuged prior to filtration. Use centrifugation only as an aid to filtration. If the sample is centrifuged, the liquid should be decanted and filtered followed by

filtration of the solid portion of the waste through the same filtration system.

7.2.7 Quantitatively transfer the sample (liquid and solid phases) to the filter holder (see Step 4.3.2). Spread the waste sample evenly over the surface of the filter. If filtration of the waste at 4°C reduces the amount of expressed liquid over what would be expressed at room temperature, then allow the sample to warm up to room temperature in the device before filtering.

Gradually apply vacuum or gentle pressure of 1-10 psig, until air or pressurizing gas moves through the filter. If this point if not reached under 10 psig, and if no additional liquid has passed through the filter in any 2-minute interval, slowly increase the pressure in 10-psig increments to maximum of 50 psig. After each incremental increase of 10 psig, if the pressurizing gas has not moved through the filter, and if no additional liquid has passed through the filter in any 2-minute interval, proceed to the next 10-psig increment. When the pressurizing gas begins to move through the filter, or when the liquid flow has ceased at 50 psig (i.e., filtration does not result in any additional filtrate within a 2-minute period), stop the filtration.

NOTE: If waste material (>1 % of the original sample weight) has obviously adhered to the container used to transfer the sample to the filtration apparatus, determine the weight of this residue and subtract it from the sample weight determined in Step 7.2.5, to determine the weight of the waste sample that will be filtered.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.2.8 The material in the filter holder is defined as the solid phase of the sample, and the filtrate is defined as the liquid phase. Weigh the filtrate. The liquid phase may now be either analyzed (see Step 7.2.12) or stored at 4°C until time of analysis.

NOTE: Some wastes, such as oily wastes and some paint wastes, will obviously contain some material which appears to be a liquid. Even after applying vacuum or pressure filtration, as outlined in Step 7.2.7, this material may not filter. If this is the case, the material within the filtration device is defined as a solid, and is carried through the extraction as a solid. Do not replace the original filter with a fresh filter under any circumstances. Use only one filter.

7.2.9 If the sample contains <0.5% dry solids (see Step 7.1.2), proceed to Step 7.2.13. If the sample contains >0.5 % dry solids (see Step 7.1.1 or 7.1.2), and if particle-size reduction of the solid was needed in Step 7.1.3, proceed to Step 7.2.10. If the sample as received passes a 9.5 mm sieve, quantitatively transfer the solid material into the extractor bottle along with the filter used to separate the initial liquid from the solid phase, and proceed to Step 7.2.11.

7.2.10 Prepare the solid portion of the sample for extraction by crushing, cutting, or grinding the waste to a surface area or particle-size as described in Step 7.1.3. When the surface area or particle-size has been appropriately altered, quantitatively transfer the solid material into an extractor bottle. Include the filter used to separate the initial liquid from the solid phase.

NOTE: Sieving of the waste is not normally required. Surface area requirements are meant for filamentous (e.g., paper, cloth) and similar waste materials. Actual measurement of surface area is not recommended. If sieving is necessary, a Teflon-coated sieve should be used to avoid contamination of the sample.

7.2.11 Determine the amount of extraction fluid to add to the extractor vessel as follows:

$$\text{Weight of extraction fluid} = \frac{20 \times \%\ \text{solids (Step 7.1.1)} \times \text{weight of waste filtered (Step 7.2.5 or 7.2.7)}}{100}$$

Slowly add this amount of appropriate extraction fluid (see Step 7.1.4) to the extractor vessel. Close the extractor bottle tightly (it is recommended that Teflon tape be used to ensure a tight seal), secure in rotary extractor device, and rotate at 30 ± 2 rpm for 18 ± 2 hours. Ambient temperature (i.e., temperature of room in which extraction takes place) shall be maintained at 23 ± 2°C during the extraction period.

NOTE: As agitation continues, pressure may build up within the extractor bottle for some types of sample (e.g., limed or calcium carbonate-containing sample may evolve gases such as carbon dioxide). To relieve excess pressure, the extractor bottle may be periodically opened (e.g., after 15 minutes, 30 minutes, and 1 hour) and vented into a hood.

7.2.12 Following the 18 ± 2 hour extraction, separate the material in the extractor vessel into its component liquid and solid phases by filtering through a new glass fiber filter, as outlined in Step 7.2.7. For final filtration of the 1312 extract, the glass fiber filter may be changed, if necessary, to facilitate filtration. Filter(s) shall be acid-washed (see Step 4.4) if evaluating the mobility of metals.

7.2.13 Prepare the 1312 extract as follows:

7.2.13.1 If the sample contained no initial liquid phase, the filtered liquid material obtained from Step 7.2.12 is defined as the 1312 extract. Proceed to Step 7.2.14.

7.2.13.2 If compatible (e.g., multiple phases will not result on combination), combine the filtered liquid resulting from Step 7.2.12 with the initial liquid phase of the sample obtained

in Step 7.2.7. This combined liquid is defined as the 1312 extract. Proceed to Step 7.2.14.

7.2.13.3 If the initial liquid phase of the waste, as obtained from Step 7.2.7, is not or may not be compatible with the filtered liquid resulting from Step 7.2.12, do not combine these liquids. Analyze these liquids, collectively defined as the 1312 extract, and combine the results mathematically, as described in Step 7.2.14.

7.2.14 Following collection of the 1312 extract, the pH of the extract should be recorded. Immediately aliquot and preserve the extract for analysis. Metals aliquots must be acidified with nitric acid to pH < 2. If precipitation is observed upon addition of nitric acid to a small aliquot of the extract, then the remaining portion of the extract for metals analyses shall not be acidified and the extract shall be analyzed as soon as possible. All other aliquots must be stored under refrigeration (4°C) until analyzed. The 1312 extract shall be prepared and analyzed according to appropriate analytical methods. 1312 extracts to be analyzed for metals shall be acid digested except in those instances where digestion causes loss of metallic analytes. If an analysis of the undigested extract shows that the concentration of any regulated metallic analyte exceeds the regulatory level, then the waste is hazardous and digestion of the extract is not necessary. However, data on undigested extracts alone cannot be used to demonstrate that the waste is not hazardous. If the individual phases are to be analyzed separately, determine the volume of the individual phases (to ± 0.5 %), conduct the appropriate analyses, and combine the results mathematically by using a simple volume-weighted average:

$$\text{Final Analyte Concentration} = \frac{(V_1)\ (C_1) + (V_2)\ (C_2)}{V_1 + V_2}$$

where:

V_1 = The volume of the first phase (L).
C_1 = The concentration of the analyte of concern in the first phase (mg/L).
V_2 = The volume of the second phase (L).
C_2 = The concentration of the analyte of concern in the second phase (mg/L).

7.2.15 Compare the analyte concentrations in the 1312 extract with the levels identified in the appropriate regulations. Refer to Section 8.0 for quality assurance requirements.

7.3 Procedure When Volatiles Are Involved

Use the ZHE device to obtain 1312 extract for analysis of volatile compounds only. Extract resulting from the use of the ZHE shall not be used to evaluate the mobility of non-volatile analytes (e.g., metals, pesticides, etc.).

The ZHE device has approximately a 500 mL internal capacity. The ZHE can thus accommodate a maximum of 25 grams of solid (defined as that fraction of a sample from which no additional liquid may be forced out by an applied pressure of 50 psig), due to the need to add an amount of extraction fluid equal to 20 times the weight of the solid phase.

Charge the ZHE with sample only once and do not open the device until the final extract (of the solid) has been collected. Repeated filling of the ZHE to obtain 25 grams of solid is not permitted.

Do not allow the sample, the initial liquid phase, or the extract to be exposed to the atmosphere for any more time than is absolutely necessary. Any manipulation of these materials should be done when cold (4°C) to minimize loss of volatiles.

7.3.1 Pre-weigh the (evacuated) filtrate collection container (see Step 4.6) and set aside. If using a TEDLAR® bag, express all liquid from the ZHE device into the bag, whether for the initial or final liquid/solid separation, and take an aliquot from the liquid in the bag for analysis. The containers listed in Step 4.6 are recommended for use under the conditions stated in Steps 4.6.1-4.6.3.

7.3.2 Place the ZHE piston within the body of the ZHE (it may be helpful first to moisten the piston O-rings slightly with extraction fluid). Adjust the piston within the ZHE body to a height that will minimize the distance the piston will have to move once the ZHE is charged with sample (based upon sample size requirements determined from Step 7.3, Step 7.1.1 and/or 7.1.2). Secure the gas inlet/outlet flange (bottom flange) onto the ZHE body in accordance with the manufacturer's instructions. Secure the glass fiber filter between the support screens and set aside. Set liquid inlet/outlet flange (top flange) aside.

7.3.3 If the sample is 100% solid (see Step 7.1.1), weigh out a subsample (25 gram maximum) of the waste, record weight, and proceed to Step 7.3.5.

7.3.4 If the sample contains <0.5% dry solids (Step 7.1.2), the liquid portion of waste, after filtration, is defined as the 1312 extract. Filter enough of the sample so that the amount of filtered liquid will support all of the volatile analyses required. For samples containing ≥0.5% dry solids (Steps 7.1.1 and/or 7.1.2), use the percent solids information obtained in Step 7.1.1 to determine the optimum sample size to charge into the ZHE. The recommended sample size is as follows:

7.3.4.1 For samples containing <5% solids (see Step 7.1.1), weigh out a 500 gram subsample of waste and record the weight.

7.3.4.2 For wastes containing >5% solids (see Step 7.1.1), determine the amount of waste to charge into the ZHE as follows:

$$\text{Weight of waste to charge ZHE} = \frac{25}{\text{percent solids (Step 7.1.1)}} \times 100$$

Weigh out a subsample of the waste of the appropriate size and record the weight.

7.3.5 If particle-size reduction of the solid portion of the sample was required in Step 7.1.3, proceed to Step 7.3.6. If particle-size reduction was not required in Step 7.1.3, proceed to Step 7.3.7.

7.3.6 Prepare the sample for extraction by crushing, cutting, or grinding the solid portion of the waste to a surface area or particle size as described in Step 7.1.3.1. Wastes and appropriate reduction equipment should be refrigerated, if possible, to 4°C prior to particle-size reduction. The means used to effect particle-size reduction must not generate heat in and of itself. If reduction of the solid phase of the waste is necessary, exposure of the waste to the atmosphere should be avoided to the extent possible.

> NOTE: Sieving of the waste is not recommended due to the possibility that volatiles may be lost. The use of an appropriately graduated ruler is recommended as an acceptable alternative. Surface area requirements are meant for filamentous (e.g., paper, cloth) and similar waste materials. Actual measurement of surface area is not recommended.

When the surface area or particle-size has been appropriately altered, proceed to Step 7.3.7.

7.3.7 Waste slurries need not be allowed to stand to permit the solid phase to settle. Do not centrifuge samples prior to filtration.

7.3.8 Quantitatively transfer the entire sample (liquid and solid phases) quickly to the ZHE. Secure the filter and support screens into the top flange of the device and secure the top flange to the ZHE body in accordance with the manufacturer's instructions. Tighten all ZHE fittings and place the device in the vertical position (gas inlet/outlet flange on the bottom). Do not attach the extraction collection device to the top plate.

> Note: If sample material (>1% of original sample weight) has obviously adhered to the container used to transfer the sample to the ZHE, determine the weight of this residue and subtract it from the sample weight determined in Step 7.3.4 to determine the weight of the waste sample that will be filtered.

Attach a gas line to the gas inlet/outlet valve (bottom flange) and, with the liquid inlet/outlet valve (top flange) open, begin applying gentle pressure of 1-10 psig (or more if necessary) to force all headspace slowly out of the ZHE device into a hood. At the first appearance of liquid from the liquid inlet/outlet valve, quickly close the valve and discontinue pressure. If filtration of the waste at 4°C reduces the

amount of expressed liquid over what would be expressed at room temperature, then allow the sample to warm up to room temperature in the device before filtering. If the waste is 100 % solid (see Step 7.1.1), slowly increase the pressure to a maximum of 50 psig to force most of the headspace out of the device and proceed to Step 7.3.12.

7.3.9 Attach the evacuated pre-weighed filtrate collection container to the liquid inlet/outlet valve and open the valve. Begin applying gentle pressure of 1-10 psig to force the liquid phase of the sample into the filtrate collection container. If no additional liquid has passed through the filter in any 2-minute interval, slowly increase the pressure in 10-psig increments to a maximum of 50 psig. After each incremental increase of 10 psig, if no additional liquid has passed through the filter in any 2-minute interval, proceed to the next 10-psig increment. When liquid flow has ceased such that continued pressure filtration at 50 psig does not result in any additional filtrate within a 2-minute period, stop the filtration. Close the liquid inlet/outlet valve, discontinue pressure to the piston, and disconnect and weigh the filtrate collection container.

NOTE: Instantaneous application of high pressure can degrade the glass fiber filter and may cause premature plugging.

7.3.10 The material in the ZHE is defined as the solid phase of the sample and the filtrate is defined as the liquid phase.

NOTE: Some samples, such as oily wastes and some paint wastes, will obviously contain some material which appears to be a liquid. Even after applying pressure filtration, this material will not filter. If this is the case, the material within the filtration device is defined as a solid, and is carried through the 1312 extraction as a solid.

If the original waste contained <0.5 % dry solids (see Step 7.1.2), this filtrate is defined as the 1312 extract and is analyzed directly. Proceed to Step 7.3.15.

7.3.11 The liquid phase may now be either analyzed immediately (see Steps 7.3.13 through 7.3.15) or stored at 4°C under minimal headspace conditions until time of analysis. Determine the weight of extraction fluid #3 to add to the ZHE as follows:

$$\text{Weight of extraction fluid} = \frac{20 \times \text{\% solids (Step 7.1.1)} \times \text{weight of waste filtered (Step 7.3.4 or 7.3.8)}}{100}$$

7.3.12 The following steps detail how to add the appropriate amount of extraction fluid to the solid material within the ZHE and agitation of the ZHE vessel. Extraction fluid #3 is used in all cases (see Step 5.4.3).

7.3.12.1 With the ZHE in the vertical position, attach a line from the extraction fluid reservoir to the liquid inlet/outlet valve. The line used shall contain fresh extraction fluid and should be preflushed with fluid to eliminate any air pockets in the line. Release gas pressure on the ZHE piston (from the gas inlet/outlet valve), open the liquid inlet/outlet valve, and begin transferring extraction fluid (by pumping or similar means) into the ZHE. Continue pumping extraction fluid into the ZHE until the appropriate amount of fluid has been introduced into the device.

7.3.12.2 After the extraction fluid has been added, immediately close the liquid inlet/outlet valve and disconnect the extraction fluid line. Check the ZHE to ensure that all valves are in their closed positions. Manually rotate the device in an end-over-end fashion 2 or 3 times. Reposition the ZHE in the vertical position with the liquid inlet/outlet valve on top. Pressurize the ZHE to 5-10 psig (if necessary) and slowly open the liquid inlet/outlet valve to bleed out any headspace (into a hood) that may have been introduced due to the addition of extraction fluid. This bleeding shall be done quickly and shall be stopped at the first appearance of liquid from the valve. Re-pressurize the ZHE with 5-10 psig and check all ZHE fittings to ensure that they are closed.

7.3.12.3 Place the ZHE in the rotary extractor apparatus (if it is not already there) and rotate at 30 ± 2 rpm for 18 ± 2 hours. Ambient temperature (i.e., temperature of room in which extraction occurs) shall be maintained at 23 ± 2°C during agitation.

7.3.13 Following the 18 ± 2 hour agitation period, check the pressure behind the ZHE piston by quickly opening and closing the gas inlet/outlet valve and noting the escape of gas. If the pressure has not been maintained (i.e., no gas release observed), the ZHE is leaking. Check the ZHE for leaking as specified in Step 4.2.1, and perform the extraction again with a new sample of waste. If the pressure within the device has been maintained, the material in the extractor vessel is once again separated into its component liquid and solid phases. If the waste contained an initial liquid phase, the liquid may be filtered directly into the same filtrate collection container (i.e., TEDLAR® bag) holding the initial liquid phase of the waste. A separate filtrate collection container must be used if combining would create multiple phases, or there is not enough volume left within the filtrate collection container. Filter through the glass fiber filter, using the ZHE device as discussed in Step 7.3.9. All extracts shall be filtered and collected if the TEDLAR® bag is used, if the extract is multiphasic, or if the waste contained an initial liquid phase (see Steps 4.6 and 7.3.1).

NOTE: An in-line glass fiber filter may be used to filter the material within the ZHE if it is suspected that the glass fiber filter has been ruptured

7.3.14 If the original sample contained no initial liquid phase, the filtered liquid material obtained from Step 7.3.13 is defined as the 1312 extract. If the sample contained an initial liquid phase, the filtered liquid material obtained from Step 7.3.13 and the initial liquid phase (Step 7.3.9) are collectively defined as the 1312 extract.

7.3.15 Following collection of the 1312 extract, immediately prepare the extract for analysis and store with minimal headspace at 4°C until analyzed. Analyze the 1312 extract according to the appropriate analytical methods. If the individual phases are to be analyzed separately (i.e., are not miscible), determine the volume of the individual phases (to 0.5%), conduct the appropriate analyses, and combine the results mathematically by using a simple volume- weighted average:

$$\text{Final Analyte Concentration} = \frac{(V_1)\ (C_1) + (V_2)\ (C_2)}{V_1 + V_2}$$

where:

V_1 = The volume of the first phases (L).
C_1 = The concentration of the analyte of concern in the first phase (mg/L).
V_2 = The volume of the second phase (L).
C_2 = The concentration of the analyte of concern in the second phase (mg/L).

7.3.16 Compare the analyte concentrations in the 1312 extract with the levels identified in the appropriate regulations. Refer to Step 8.0 for quality assurance requirements.

8.0 QUALITY CONTROL

8.1 A minimum of one blank (using the same extraction fluid as used for the samples) for every 20 extractions that have been conducted in an extraction vessel. Refer to Chapter One for additional quality control protocols.

8.2 A matrix spike shall be performed for each waste type (e.g., wastewater treatment sludge, contaminated soil, etc.) unless the result exceeds the regulatory level and the data is being used solely to demonstrate that the waste property exceeds the regulatory level. A minimum of one matrix spike must be analyzed for each analytical batch. As a minimum, follow the matrix spike addition guidance provided in each analytical method.

8.2.1 Matrix spikes are to be added after filtration of the 1312 extract and before preservation. Matrix spikes should not be added prior to 1312 extraction of the sample.

8.2.2 In most cases, matrix spike levels should be added at a concentration equivalent to the corresponding regulatory level. If the analyte concentration is less than one half the regulatory level, the

spike concentration may be as low as one half of the analyte concentration, but may not be less than five times the method detection limit. In order to avoid differences in matrix effects, the matrix spikes must be added to the same nominal volume of 1312 extract as that which was analyzed for the unspiked sample.

8.2.3 The purpose of the matrix spike is to monitor the performance of the analytical methods used, and to determine whether matrix interferences exist. Use of other internal calibration methods, modification of the analytical methods, or use of alternate analytical methods may be needed to accurately measure the analyte concentration in the 1312 extract when the recovery of the matrix spike is below the expected analytical method performance.

8.2.4 Matrix spike recoveries are calculated by the following formula:

$$\%R \text{ (\% Recovery)} = 100\ (X_s - X_u)\ /\ K$$

where:

X_s = measured value for the spiked sample
X_u = measured value for the unspiked sample, and
K = known value of the spike in the sample.

8.3 All quality control measures described in the appropriate analytical methods shall be followed.

8.4 The use of internal calibration quantitation methods shall be employed for a metallic contaminant if: (1) Recovery of the contaminant from the 1312 extract is not at least 50% and the concentration does not exceed the appropriate regulatory level, and (2) The concentration of the contaminant measured in the extract is within 20% of the appropriate regulatory level.

8.4.1. The method of standard additions shall be employed as the internal calibration quantitation method for each metallic contaminant.

8.4.2 The method of standard additions requires preparing calibration standards in the sample matrix rather than reagent water or blank solution. It requires taking four identical aliquots of the solution and adding known amounts of standard to three of these aliquots. The forth aliquot is the unknown. Preferably, the first addition should be prepared so that the resulting concentration is approximately 50% of the expected concentration of the sample. The second and third additions should be prepared so that the concentrations are approximately 100% and 150% of the expected concentration of the sample. All four aliquots are maintained at the same final volume by adding reagent water or a blank solution, and may need dilution adjustment to maintain the signals in the linear range of the instrument technique. All four aliquots are analyzed.

8.4.3 Prepare a plot, or subject data to linear regression, of instrument signals or external-calibration-derived concentrations as the dependant variable (y-axis) versus concentrations of the additions of standards as the independent variable (x-axis). Solve for the intercept

of the abscissa (the independent variable, x-axis) which is the concentration in the unknown.

8.4.4 Alternately, subtract the instrumental signal or external-calibration-derived concentration of the unknown (unspiked) sample from the instrumental signals or external-calibration-derived concentrations of the standard additions. Plot or subject to linear regression of the corrected instrument signals or external-calibration-derived concentrations as the dependant variable versus the independent variable. Derive concentrations for the unknowns using the internal calibration curve as if it were an external calibration curve.

8.5 Samples must undergo 1312 extraction within the following time periods:

SAMPLE MAXIMUM HOLDING TIMES (days)

	From: Field Collection To: 1312 extraction	From: 1312 extraction To: Preparative extraction	From: Preparative extraction To: Determinative analysis	Total Elapsed Time
Volatiles	14	NA	14	28
Semi-volatiles	14	7	40	61
Mercury	28	NA	28	56
Metals, except mercury	180	NA	180	360
NA = Not Applicable				

If sample holding times are exceeded, the values obtained will be considered minimal concentrations. Exceeding the holding time is not acceptable in establishing that a waste does not exceed the regulatory level. Exceeding the holding time will not invalidate characterization if the waste exceeds the regulatory level.

9.0 METHOD PERFORMANCE

9.1 Precision results for semi-volatiles and metals: An eastern soil with high organic content and a western soil with low organic content were used for the semi-volatile and metal leaching experiments. Both types of soil were analyzed prior to contaminant spiking. The results are shown in Table 6. The concentration of contaminants leached from the soils were reproducible, as shown

by the moderate relative standard deviations (RSDs) of the recoveries (averaging 29% for the compounds and elements analyzed).

9.2 Precision results for volatiles: Four different soils were spiked and tested for the extraction of volatiles. Soils One and Two were from western and eastern Superfund sites. Soils Three and Four were mixtures of a western soil with low organic content and two different municipal sludges. The results are shown in Table 7. Extract concentrations of volatile organics from the eastern soil were lower than from the western soil. Replicate leachings of Soils Three and Four showed lower precision than the leachates from the Superfund soils.

10.0 REFERENCES

1. Environmental Monitoring Systems Laboratory, "Performance Testing of Method 1312; QA Support for RCRA Testing: Project Report". EPA/600/4-89/022. EPA Contract 68-03-3249 to Lockheed Engineering and Sciences Company, June 1989.

2. Research Triangle Institute, "Interlaboratory Comparison of Methods 1310, 1311, and 1312 for Lead in Soil". U.S. EPA Contract 68-01-7075, November 1988.

Table 1. Volatile Analytes[1]

Compound	CAS No.
Acetone	67-64-1
Benzene	71-43-2
n-Butyl alcohol	71-36-3
Carbon disulfide	75-15-0
Carbon tetrachloride	56-23-5
Chlorobenzene	108-90-7
Chloroform	67-66-3
1,2-Dichloroethane	107-06-2
1,1-Dichloroethylene	75-35-4
Ethyl acetate	141-78-6
Ethyl benzene	100-41-4
Ethyl ether	60-29-7
Isobutanol	78-83-1
Methanol	67-56-1
Methylene chloride	75-09-2
Methyl ethyl ketone	78-93-3
Methyl isobutyl ketone	108-10-1
Tetrachloroethylene	127-18-4
Toluene	108-88-3
1,1,1,-Trichloroethane	71-55-6
Trichloroethylene	79-01-6
Trichlorofluoromethane	75-69-4
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1
Vinyl chloride	75-01-4
Xylene	1330-20-7

[1] When testing for any or all of these analytes, the zero-headspace extractor vessel shall be used instead of the bottle extractor.

Table 2. Suitable Rotary Agitation Apparatus[1]

Company	Location	Model No.
Analytical Testing and Consulting Services, Inc.	Warrington, PA (215) 343-4490	4-vessel extractor (DC20S); 8-vessel extractor (DC20); 12-vessel extractor (DC20B)
Associated Design and Manufacturing Company	Alexandria, VA (703) 549-5999	2-vessel (3740-2); 4-vessel (3740-4); 6-vessel (3740-6); 8-vessel (3740-8); 12-vessel (3740-12); 24-vessel (3740-24)
Environmental Machine and Design, Inc.	Lynchburg, VA (804) 845-6424	8-vessel (08-00-00) 4-vessel (04-00-00)
IRA Machine Shop and Laboratory	Santurce, PR (809) 752-4004	8-vessel (011001)
Lars Lande Manufacturing	Whitmore Lake, MI (313) 449-4116	10-vessel (10VRE) 5-vessel (5VRE)
Millipore Corp.	Bedford, MA (800) 225-3384	4-ZHE or 4 1-liter bottle extractor (YT300RAHW)

[1] Any device that rotates the extraction vessel in an end-over-end fashion at 30 ±2 rpm is acceptable.

Table 3. Suitable Zero-Headspace Extractor Vessels[1]

Company	Location	Model No.
Analytical Testing & Consulting Services, Inc.	Warrington, PA (215) 343-4490	C102, Mechanical Pressure Device
Associated Design and Manufacturing Company	Alexandria, VA (703) 549-5999	3745-ZHE, Gas Pressure Device
Lars Lande Manufacturing[2]	Whitmore Lake, MI (313) 449-4116	ZHE-11, Gas Pressure Device
Millipore Corporation	Bedford, MA (800) 225-3384	YT30090HW, Gas Pressure Device
Environmental Machine and Design, Inc.	Lynchburg, VA (804) 845-6424	VOLA-TOX1, Gas Pressure Device

[1] Any device that meets the specifications listed in Step 4.2.1 of the method is suitable.

[2] This device uses a 110 mm filter.

Table 4. Suitable Filter Holders[1]

Company	Location	Model/ Catalogue #	Size
Nucleopore Corporation	Pleasanton, CA (800) 882-7711	425910 410400	142 mm 47 mm
Micro Filtration Systems	Dublin, CA (800) 334-7132 (415) 828-6010	302400 311400	142 mm 47 mm
Millipore Corporation	Bedford, MA (800) 225-3384	YT30142HW XX1004700	142 mm 47 mm

[1] Any device capable of separating the liquid from the solid phase of the waste is suitable, providing that it is chemically compatible with the waste and the constituents to be analyzed. Plastic devices (not listed above) may be used when only inorganic analytes are of concern. The 142 mm size filter holder is recommended.

Table 5. Suitable Filter Media[1]

Company	Location	Model	Pore Size (µm)
Millipore Corporation	Bedford, MA (800) 225-3384	AP40	0.7
Nucleopore Corporation	Pleasanton, CA (415) 463-2530	211625	0.7
Whatman Laboratory Products, Inc.	Clifton, NJ (201) 773-5800	GFF	0.7
Micro Filtration Systems	Dublin, CA (800) 334-7132 (415) 828-6010	GF75	0.7

[1] Any filter that meets the specifications in Step 4.4 of the Method is suitable.

TABLE 6 - METHOD 1312 PRECISION RESULTS FOR SEMI-VOLATILES AND METALS

		Eastern Soil (pH 4.2)		Western Soil (pH 5.0)	
	Amount Spiked (µg)	Amount Recovered* (µg)	% RSD	Amount Recovered* (µg)	% RSD
FORTIFIED ANALYTES					
bis(2-chloroethyl)-ether	1040	834	12.5	616	14.2
2-Chlorophenol	1620	1010	6.8	525	54.9
1,4-Dichlorobenzene	2000	344	12.3	272	34.6
1,2-Dichlorobenzene	8920	1010	8.0	1520	28.4
2-Methylphenol	3940	1860	7.7	1130	32.6
Nitrobenzene	1010	812	10.0	457	21.3
2,4-Dimethylphenol	1460	200	18.4	18	87.6
Hexachlorobutadiene	6300	95	12.9	280	22.8
Acenaphthene	3640	210	8.1	310**	7.7
2,4-Dinitrophenol	1300	896**	6.1	23**	15.7
2,4-Dinitrotoluene	1900	1150	5.4	585	54.4
Hexachlorobenzene	1840	3.7	12.0	10	173.2
gamma BHC (Lindane)	7440	230	16.3	1240	55.2
beta BHC	640	35	13.3	65.3	51.7
METALS					
Lead	5000	70	4.3	10	51.7
Cadmium	1000	387	2.3	91	71.3

* = Triplicate analyses.
** = Duplicate analyses; one value was rejected as an outlier at the 90% confidence level using the Dixon Q test.

TABLE 7 - METHOD 1312 PRECISION RESULTS FOR VOLATILES

Compound Name	Soil No. 1 (Western) Avg. %Rec.*	Soil No. 1 (Western) %RSD	Soil No. 2 (Eastern) Avg. %Rec.*	Soil No. 2 (Eastern) %RSD	Soil No. 3 (Western and Sludge) Avg. %Rec.**	Soil No. 3 (Western and Sludge) %RSD	Soil No. 4 (Western and Sludge) Avg. %Rec.***	Soil No. 4 (Western and Sludge) %RSD
Acetone	44.0	12.4	43.8	2.25	116.0	11.5	21.3	71.4
Acrylonitrile	52.5	68.4	50.5	70.0	49.3	44.9	51.8	4.6
Benzene	47.8	8.29	34.8	16.3	49.8	36.7	33.4	41.1
n-Butyl Alcohol (1-Butanol)	55.5	2.91	49.2	14.6	65.5	37.2	73.0	13.9
Carbon disulfide	21.4	16.4	12.9	49.5	36.5	51.5	21.3	31.5
Carbon tetrachloride	40.6	18.6	22.3	29.1	36.2	41.4	24.0	34.0
Chlorobenzene	64.4	6.76	41.5	13.1	44.2	32.0	33.0	24.9
Chloroform	61.3	8.04	54.8	16.4	61.8	29.1	45.8	38.6
1,2-Dichloroethane	73.4	4.59	68.7	11.3	58.3	33.3	41.2	37.8
1,1-Dichloroethane	31.4	14.5	22.9	39.3	32.0	54.4	16.8	26.4
Ethyl acetate	76.4	9.65	75.4	4.02	23.0	119.8	11.0	115.5
Ethylbenzene	56.2	9.22	23.2	11.5	37.5	36.1	27.2	28.6
Ethyl ether	48.0	16.4	55.1	9.72	37.3	31.2	42.0	17.6
Isobutanol (4-Methyl -1-propanol)	0.0	ND	0.0	ND	61.8	37.7	76.0	12.2
Methylene chloride	47.5	30.3	42.2	42.9	52.0	37.4	37.3	16.6
Methyl ethyl ketone (2-Butanone)	56.7	5.94	61.9	3.94	73.7	31.3	40.6	39.0
Methyl isobutyl ketone	81.1	10.3	88.9	2.99	58.3	32.6	39.8	40.3
1,1,1,2-Tetrachloroethane	69.0	6.73	41.1	11.3	50.8	31.5	36.8	23.8
1,1,2,2-Tetrachloroethane	85.3	7.04	58.9	4.15	64.0	25.7	53.6	15.8
Tetrachloroethene	45.1	12.7	15.2	17.4	26.2	44.0	18.6	24.2
Toluene	59.2	8.06	49.3	10.5	45.7	35.2	31.4	37.2
1,1,1-Trichloroethane	47.2	16.0	33.8	22.8	40.7	40.6	26.2	38.8
1,1,2-Trichloroethane	76.2	5.72	67.3	8.43	61.7	28.0	46.4	25.4
Trichloroethene	54.5	11.1	39.4	19.5	38.8	40.9	25.6	34.1
Trichlorofluoromethane	20.7	24.5	12.6	60.1	28.5	34.0	19.8	33.9
1,1,2-Trichlorotrifluoroethane	18.1	26.7	6.95	58.0	21.5	67.8	15.3	24.8
Vinyl chloride	10.2	20.3	7.17	72.8	25.0	61.0	11.8	25.4

* Triplicate analyses
** Six replicate analyses
*** Five replicate analyses

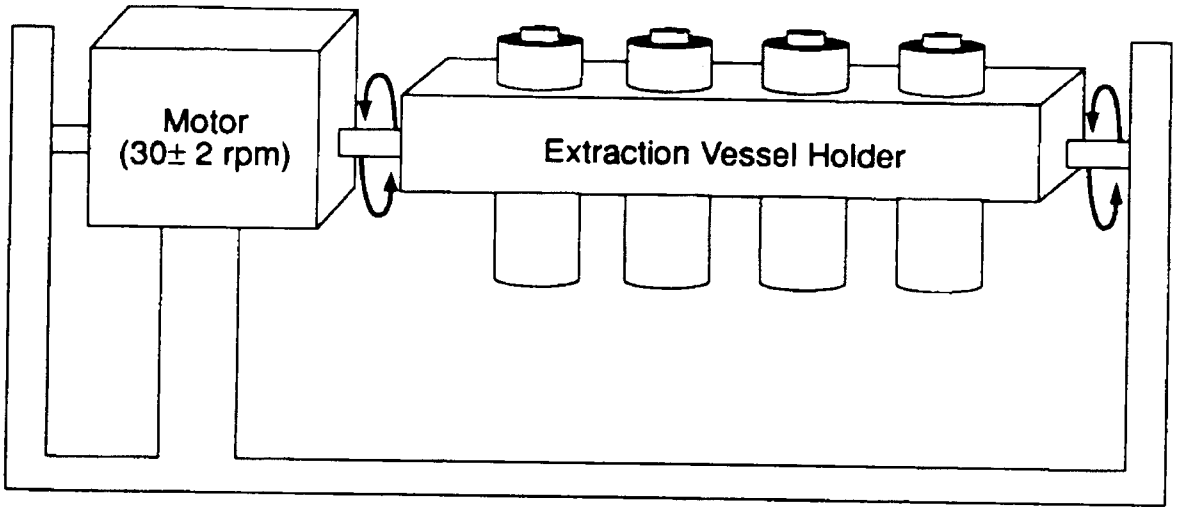


Figure 1. Rotary Agitation Apparatus

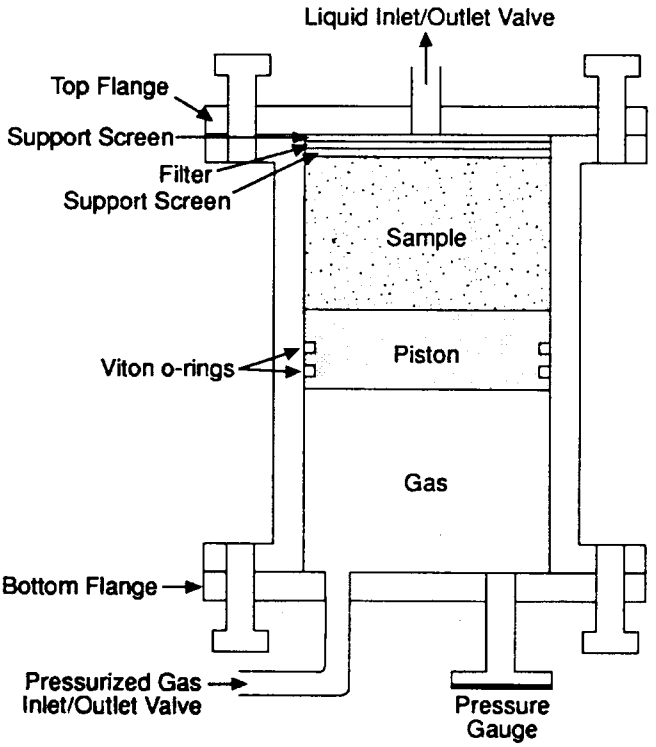
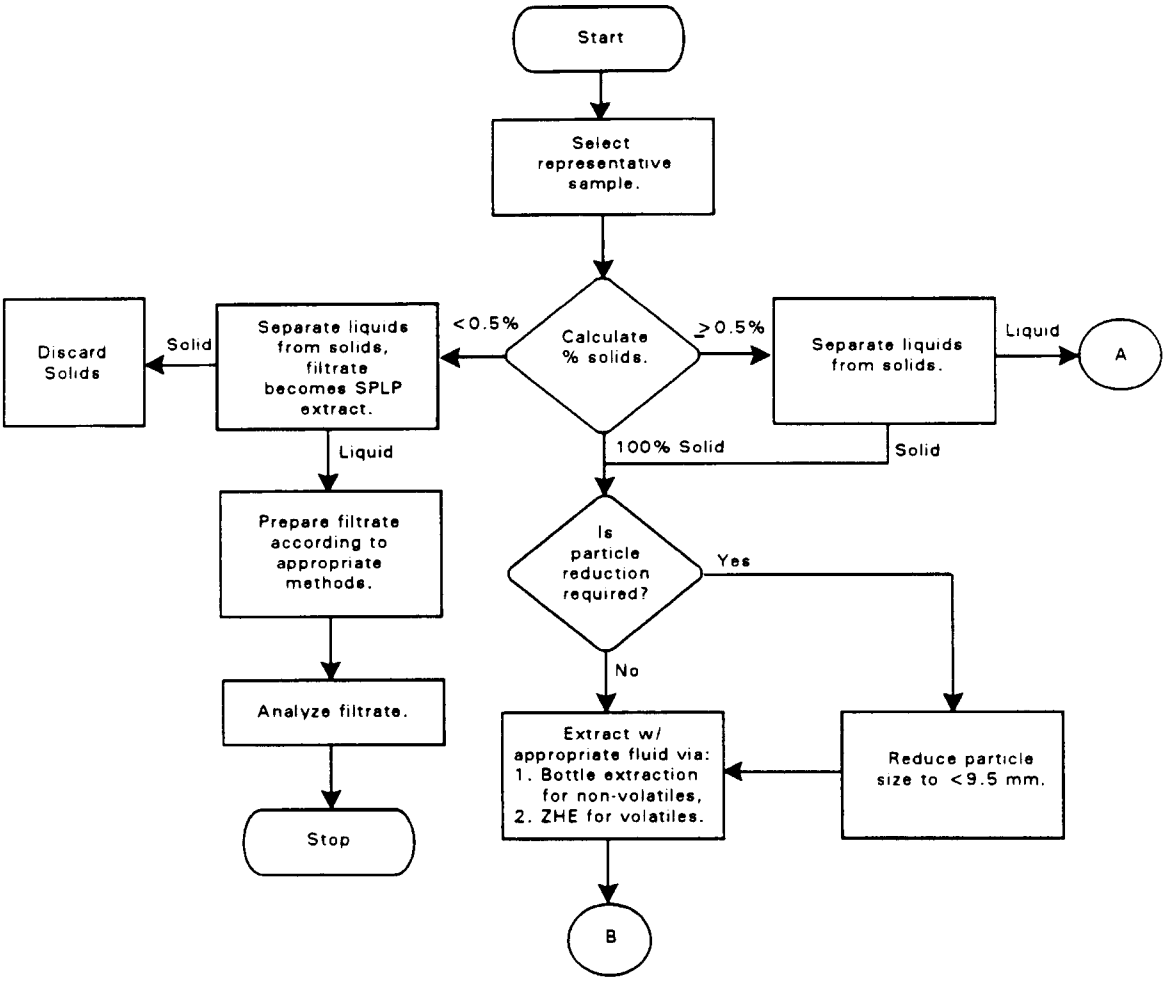


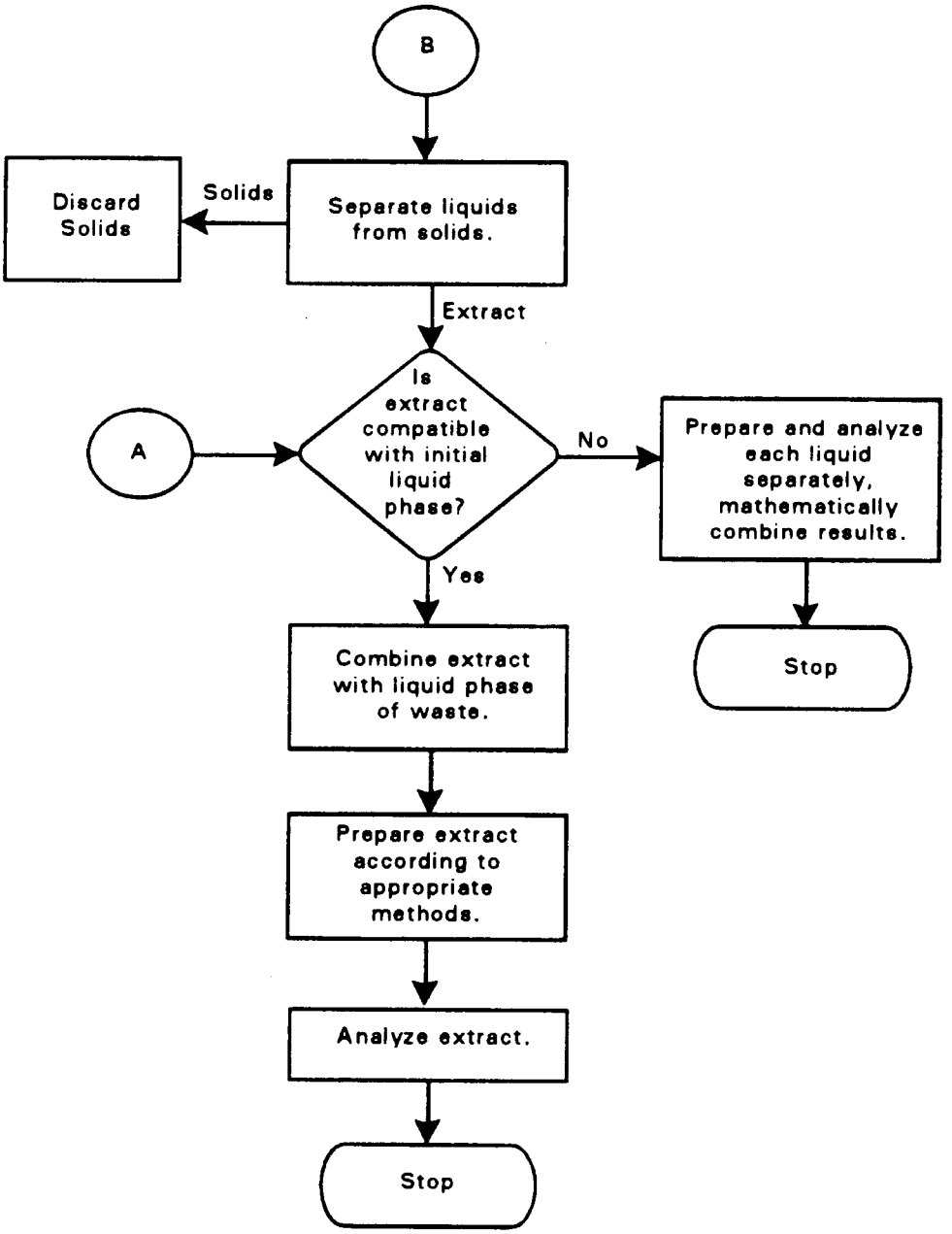
Figure 2. Zero-Headspace Extractor (ZHE)

METHOD 1312

SYNTHETIC PRECIPITATION LEACHING PROCEDURE



SYNTHETIC PRECIPITATION LEACHING PROCEDURE (continued)



Permit Renewal Application
October 17, 2011

Attachment J

Action Leakage Rate and Response Action Plan

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Attachment J. Action Leakage Rate and Response Action Plan

1. Introduction

An Action Leakage Rate (ALR) and Response Action Plan (RAP) for the proposed Triassic Park Hazardous Waste Facility landfill ~~and evaporation pond is~~are required under 40 CFR Parts 264.302 and 304. A three-phased landfill ~~and a two phased evaporation pond have~~has been proposed as part of this~~a~~ Resource Conservation and Recovery Act (RCRA) Part B Permit Renewal Application dated October 17, 2011 ~~November 1997~~. This report presents a proposed ALR~~s~~ based on the landfill ~~and evaporation pond~~ specific design~~s~~ and calculation methodologies recommended by the U.S. Environmental Protection Agency (EPA). The ALR, as defined in the final rule published in January 29, 1992 (U.S. EPA, 1992a), is the maximum design flow rate that the leak detection and removal system (LDRS) may remove without the fluid head on the bottom liner exceeding one foot. The RAP describes the steps to be taken in the event the ALR is exceeded in the landfill ~~or the evaporation pond~~. The RAP specifies the initial notifications, steps to be taken in response to the leakage rate being exceeded, and follow-up reports.

2. Proposed Landfill Design

This section briefly describes aspects of the landfill design~~s~~ relevant to the ALR and the RAP. Engineering drawings and technical specifications are included in ~~the~~ Attachment L to the ~~Revised~~ Part B Permit Renewal Application ~~dated November 1997~~.

2.1 Liner Design

The landfill liner system consists of a single and composite liner. The liner system which applies to the base and slopes of the landfill is described below (from top to bottom).

- A minimum 2-foot-thick protective soil layer.
- A leachate collection system consisting of:
  - a double sided geocomposite (geonet with a layer of geotextile bonded to both sides, transmissivity $\geq 2 \times 10^{-4}$ square meters per second [m^2/s]).
- A primary liner consisting of:
  - 60-mil high density polyethylene (HDPE) geomembrane.
- A leak detection and removal system consisting of:
  - a double-sided geocomposite (geonet with a layer of geotextile bonded to both sides, transmissivity $\geq 1.2 \times 10^{-4}$ m^2/s).
- A secondary composite liner consisting of:
  - 60-mil HDPE geomembrane
  - a geosynthetic clay liner (GCL) with $k \leq 5 \times 10^{-9}$ centimeters per second (cm/s) (bentonite sandwiched between two layers of geotextile).
- 6 inches of prepared subgrade.

The liner system in the sump area differs from the liner system in the landfill base and slope areas due to the inclusion of drainage gravel ($k \geq 1.0$ cm/s) and compacted clay ($k \leq 1 \times 10^{-7}$ cm/s) in the base area of the leachate collection and removal system (LCRS) sump and the ~~leak detection and removal~~LDRS sump. The liner system in the landfill sump area is illustrated on Drawing No. 16, Sump Cross-Sections - Phase 1A, and Drawing No. 18, Vadose, LDRS, LCRS Cross-Sections and Details~~ phase 1A~~.

2.2 Leachate Collection and Removal System, Leak Detection and Removal Systems, and Vadose Monitoring System

The geocomposite ~~leachate collection and removal system (~~LCRS~~)~~ installed above the primary geomembrane will collect liquid above the geomembrane and transmit it to the LCRS ~~collection~~ sump.

The ~~leak detection and removal system (~~LDRS~~)~~ installed above the secondary geomembrane will detect and collect liquid above the geomembrane and transmit it to the LDRS sump. The vadose monitoring sump will detect and collect fluid leakage from the LDRS sump.

2.2.1 Leachate Collection and Removal System

Liquid entering the LCRS will come from rainfall which percolates through the waste thereby generating leachate. The function of the LCRS is to transport this liquid to the sump where it can be removed so that hydraulic head on the primary liner is minimized.

Components of this system, in addition to those described above, include a lateral 8-inch-diameter drainage pipe located along the minimum grade line in the floor of the landfill, an 18-inch-diameter HDPE sump collection and slope riser pipe, and a 24-inch-diameter steel vertical riser pipe. The floor pipe and slope riser pipe will be surrounded by a gravel envelope, separated from the surrounding soil by an 8-oz. non-woven geotextile filter. The vertical riser pipe system, which will extend from the center of the LCRS sump vertically through the waste and cover system, provides a second access to the LCRS from which leachate can be removed. Accumulated liquids will be removed from the leachate collection sump by pumping either through the slope riser pipe or through the vertical riser pipe. A submersible pump will be used for leachate removal.

2.2.2 Leak Detection and Removal System

The potential sources of liquid entering the LDRS include primary liner leakage and consolidation water from the primary sump's clay liner. To meet the design requirements, the leak detection system must be able to collect and transmit liquid to the leak detection sump so that it can be removed.

The LDRS will be installed above the secondary composite liner on the landfill base and sideslopes. Should liquid enter the detection system, it will drain toward the collection sump via the LDRS drainage geocomposite and drainage pipe. Once in the sump, the liquid can be detected and removed via a riser pipe which extends up the slope of the landfill to the surface. The liquid will be pumped to the surface by a submersible pump.

2.2.3 Vadose Monitoring Sump

Sources of liquid entering the vadose sump include secondary liner leakage and consolidation water from the secondary sump's clay liner. The purpose of the vadose monitoring sump is to detect and remove leakage passing through both the primary and secondary liner systems. As with the LCRS sump and LDRS sump described above, liquid in the vadose sump will be pumped to the surface by a submersible pump.

~~3. Proposed Evaporation Pond Design~~

~~This section briefly describes aspects of the evaporation pond design relevant to the ALR and the RAP. Engineering drawings and technical specifications are included in the Revised Part B Permit dated November 1997.~~

~~3.1 Liner Design~~

~~The evaporation pond liner system consists of a single and a composite liner. The liner system which applies to the base and slopes of the evaporation pond is described below (from top to bottom).~~

- ~~A primary liner consisting of:~~
  - ~~60 mil HDPE geomembrane.~~
- ~~A leak detection system and removal system consisting of:~~
  - ~~a geonet drainage layer (transmissivity $\geq 5 \times 10^{-3}$ m²/s).~~
- ~~A secondary composite liner consisting of :~~
  - ~~a 60 mil HDPE geomembrane~~
  - ~~a 3 foot thick compacted clay liner (CCL) with $k \leq 1 \times 10^{-7}$ cm/s.~~

~~The liner system in the sump area differs from the liner system elsewhere in the pond due to the inclusion of drainage gravel and geotextile cushion layers in the LDRS layer. Drawing No. 32, Evaporation Pond LDRS Plan and Details illustrates the liner sump liner system arrangement.~~

~~3.2 Leak Detection and Removal System and Vadose Monitoring System~~

~~3.2.1 Leak Detection and Removal System~~

~~Liquid entering the LDRS will be the result of primary liner leakage. To meet design requirements, the LDRS must be able to collect and transmit liquid to the leak detection sump so that it can be removed.~~

~~The LDRS will be installed above the secondary composite liner on the evaporation pond floor and sideslopes. Should liquid enter the LDRS, it will drain toward the collection sump where it can be detected and removed via a slope riser pipe which extends up the side slope of the evaporation pond to the surface. The liquid will be pumped to the surface by a submersible pump.~~

~~3.2.2 Vadose Monitoring System~~

~~Sources of liquid entering the vadose sump include secondary liner leakage and consolidation water from the secondary clay liner. The purpose of the vadose monitoring sump is to detect and remove leakage passing through the secondary liner systems. As with the LDRS sump described above, liquid in the vadose sump will be pumped to the surface by a submersible pump.~~

4. Potential Sources of Flow from the Leak Detection and Removal System

Before an ALR~~s~~ and a RAP can be established, ~~for the~~ potential sources of flow from the landfill LDRS ~~of the landfill and evaporation pond~~ must be understood, and the magnitudes of flow from the potential sources should be estimated. This understanding of the potential sources and magnitudes of flow is also useful in planning for the potential flow quantities and in identifying unusual flow conditions.

4.1 Potential Sources of Flow from the Landfill LDRS

Potential sources of flow from the landfill LDRS are:

- Precipitation that enters the leak detection layer during construction (hereafter referred to as construction water).
- Water expelled from consolidation of the clay components of the composite primary liner during landfill operations (hereafter referred to as consolidation water).
- Leakage through the primary liner.

These potential sources of liquid have been discussed in detail in the technical papers by Gross et al. (1990) and Bonaparte and Gross (1990). An evaluation of potential sources and magnitudes of flow from each of the sources discussed above is presented below:

Substantial flow rates of construction water are possible; however, ~~since~~ because geocomposites do not exhibit significant capillarity, it is likely that the flow of construction water from the geocomposite and sump drainage gravel will be complete before waste placement begins.

The average consolidation water flow rate is dependent on the area, thickness, and degree of saturation of the primary clay component in the sump area~~;~~ and the rate of waste filling. Because the sump primary clay component is very small (limited to the sump area), consolidation water volumes are not expected to be significant.

The potential for leakage through the primary liner is the basis for the ALR and is discussed in Section 5.~~0~~.

~~4.2 Potential Sources of Flow from the Evaporation Pond LDRS~~

~~The source of flow from the evaporation pond LDRS is restricted to leakage through the primary geomembrane. Similar to the landfill, construction water will likely be removed from the LDRS prior to placement of waste liquids in the pond. Since there is no primary clay component in the pond liner system, consolidation water is not a potential source of liquids in the LDRS.~~

5. Action Leakage Rate Determination

5.1 Introduction

As presented in Code of Federal Regulations, Title 40, Part 264, Rule 264.302 (40 CFR Rule 264.302):

> The action leakage rate is the maximum design flow rate that the leak detection and removal system (LDRS) can remove without the fluid head on the bottom liner exceeding 1 foot. The action leakage rate must include

an adequate safety margin to allow for uncertainties in the design (e.g., slope, hydraulic conductivity, thickness of drainage material), construction, operation, and location of the LDRS, waste and leachate characteristics, likelihood and amount of other sources of liquids in the LDRS and proposed response actions (e.g., the action leakage rate must consider decreases in the flow capacity of the system over time resulting from siltation and clogging, rib layover and creep of synthetic components of the system, overburden pressures, etc.).

In other words, the ALR is the maximum design flow rate, including a safety factor, that the leak detection system can remove without the head on the bottom liner exceeding 1 foot.

5.2 Determination of Action Leakage Rate: Landfill

5.2.1 Equation for Geocomposite Flow Capacity

The leak detection drainage layer consists of a double sided geocomposite (geotextile/geocomposite/ geotextile). The maximum flow rate from a single hole in the primary HDPE liner that a geocomposite drainage layer can convey without the fluid head on the secondary liner exceeding a predetermined level is given by the following equation (U.S. EPA 1992b)

$$Q = k*D*(2h-D) \qquad \text{(Equation 1)}$$

where Q = the flow rate through a single hole in the primary liner;
k = the hydraulic conductivity of the leakage detection geocomposite drainage layer;
h = the head on the secondary liner; and
D = thickness of leak detection drain layer (geocomposite).

5.2.2 Design Parameters

5.2.2.1 Hydraulic Conductivity

The technical specifications require that over the base and side slopes of the landfill the geocomposite of the LDRS have a hydraulic transmissivity of at least 2.2×10^{-4} m^2/s when subjected to testing conditions which include stress, hydraulic gradient, and boundary conditions similar to those anticipated in the field. The thickness of the geocomposite of the LDRS is 0.2 inch. Using the specified hydraulic transmissivity of 2.2×10^{-4} m^2/s (and adjusting the transmissivity by a total factor of safety of 3.3 to account for creep, chemical clogging, and sediment clogging) and geocomposite thickness of 0.2 inch results in a calculated hydraulic conductivity of 1.3 cm/s for the LDRS geocomposite drainage layer over the base of the landfill. Hydraulic transmissivity test results confirming that the specified geocomposite has this calculated hydraulic conductivity are required in the specifications and CQA Plan.

5.2.2.2 Head on Secondary Liner

The current federal regulations require that the head on the liner should not exceed one foot. Therefore, 1 foot will be used for the calculated maximum head build-up on the secondary liner and the calculation of the ALR.

5.2.2.3 Geocomposite Thickness

A 1-foot head on the secondary liner does not mean that the flow thickness in the geocomposite is 1 foot (the geocomposite thickness is only 0.2 inch); it only means that the fluid pressure in the geocomposite directly beneath the hole in the primary liner could be equivalent to 1 foot of fluid head.

5.2.3 Discussion of Proposed Action Leakage Rates

The proposed ALR of 900 gallons per acre per day (gpad) is greater than the 100 gpad suggested by the ~~U.S.~~ EPA (U.S. EPA, 1992b) for landfill units that are built to meet the ~~minimum~~ design specifications presented in 40 CFR Part 264 for the LDRS. This ALR (100 gpad) was developed by ~~U.S.~~ EPA using calculations similar to those presented in this document. However, the proposed LDRS design for the Triassic Park landfill includes a geocomposite drainage layer with a hydraulic transmissivity at least two orders of magnitude greater than that required to meet the minimum design specifications (granular drainage layer) presented in 40 CFR Part 264. With this greater hydraulic transmissivity, the geocomposite drainage layer is capable of conveying much greater flow rates without the fluid head on the secondary liner exceeding 1 foot. As a result, the proposed ALR~~s~~ calculated using the equation given in ~~U.S.~~by EPA (U.S. EPA, 1992b) ~~are~~ is substantially greater than 100 gpad. However, consistent with 40 CFR Part 264, the proposed ALR~~s~~ has~~ve~~ been established to ensure that the maximum fluid head on the secondary liner is not in excess of 1 foot. This is demonstrated by the calculations presented in Appendix ~~G-1~~A. Therefore, the proposed ALR~~s~~ is~~are~~ consistent with the requirements of 40 CFR Part 264, and the designs for the landfill are appropriate.

~~5.3 Determination of Action Leakage Rate: Evaporation Pond~~

~~5.3.1 Equation for Geocomposite Flow Capacity~~

~~The leak detection drainage layer consists of a geonet. The maximum flow rate from a single hole in the primary liner that a geonet drainage layer can convey without the fluid head on the secondary liner exceeding a predetermined level is given by Equation 1 presented in Section 5.2.1.~~

~~5.3.2 Design Parameters~~

~~5.3.2.1 Hydraulic Conductivity~~

~~The technical specifications for the evaporation pond geonet require that over the base and the side slopes of the evaporation pond the geonet of the LDRS have a hydraulic transmissivity of at least 5×10^{-3} m²/s when subjected to testing conditions which include stresses, and hydraulic gradient and boundary conditions similar to those anticipated in the field. Using the specified hydraulic transmissivity of 5×10^{-3} m²/s and (and adjusting the transmissivity by a total factor of safety of 5.1 to account for intrusion, chemical slogging, biological clogging, and sediment clogging) geonet thickness of 0.2 inch, the calculated hydraulic conductivity is 20 cm/s. Hydraulic transmissivity test results confirming that the specified geonet has this calculated conductivity are required in the specifications and the CQA plan.~~

~~5.3.2.2 Head on Secondary Liner~~

~~Similar to the landfill LDRS regulations, the head on the evaporation pump liner should not exceed 1 foot. Therefore, 1 foot will be used for the calculated maximum head build-up on the secondary liner and the calculation of the ALR. Also, as with the landfill LDRS, 1 foot of head is interpreted to mean an equivalent fluid pressure of 1 foot rather than a 1-foot increase in fluid elevation.~~

~~5.3.3 Action Leakage Rate~~

~~5.3.3.1 Action Leakage Rate Calculation~~

~~Using Equation 1 and the design parameters listed above the maximum flow rate that the LDRS geocomposite drainage layer at the base of the evaporation pump can convey from a single hole in the primary layer is calculated to be approximately 13,000 gallons per acre per day (gpad). For the pond area this is approximately 9,000 gpd. The calculations are attached as Appendix G-1.~~

~~5.3.3.2 Design LDRS Sump Flow Capacity~~

~~The flow rate listed above is for the case of flow entering the drainage layer from a single hole in the primary liner. In order to determine if the LDRS sump has sufficient capacity to remove and therefore to detect the flow from a single hole in the primary liner, an analysis was carried out for the LDRS sump capacity.~~

~~The construction materials and layout for the LDRS sump are shown on Drawings 28 to 32. The calculations for the capacity of the LDRS sump presented in Appendix G-2 and indicate that the sumps can safely remove flows of approximately 75,600 gpd. This exceeds the expected flow capacity of LDRS geonet layer from a single hole in the primary liner; therefore, the sump could detect a leak of this magnitude.~~

~~5.3.4 Discussion of Proposed Action Leakage Rates~~

~~The proposed ALR of 1000 gpad is equivalent to the EPA recommended maximum and is substantially less then the calculated maximum. The ALR, as proposed by EPA, generally refers to values with units of gallons per acre per day (gpad). The calculated flow rates for the LDRS net layer for a single hole in the primary liner system are presented in units of gallons per day. However, if the value is divided by the pond area, the flows are reported in gallons per acre per day.~~

5.4 Determination if the Action Leakage Rate is Exceeded

Determination if the ALR is exceeded in ~~either~~ the landfill ~~or evaporation pond~~ will be conducted in accordance with 40 CFR 264.302(b). Each week during the active life and closure period of the landfill ~~and each week during the active life of the evaporation pond~~, the weekly flow rates into each LDRS sump (based on the results of the LDRS monitoring) will be converted to average daily flow rates per unit area (gpad). Each month during the landfill post-closure care period (i.e., after the final cover is installed), the monthly flow rates into each LDRS sump will be converted to average daily flow rates per unit area. The ALR is exceeded~~,~~ if the average daily flow rate into a LDRS sump is greater than the ALR assigned to that sump. If the ALR is exceeded, the response actions described in Section 7.0 will be implemented by the Triassic Park facility.

6. Leak Detection and Removal System Monitoring

The flow of liquid removed from the~~each~~ leak detection sump will be monitored either with a flow meter or using a container of known volume and a stop watch.

In accordance with 40 CFR 264.303 and 40 CFR 264.222, the volume of liquid removed from ~~each~~ the leak detection system sump in the landfill ~~and evaporation pond~~ will be recorded at least once each week during the active life. Liquid volumes will also be recorded once each week for the landfill LDRS sump~~s~~ during the closure period.

During the landfill post-closure care period, the volume of liquid removed from ~~each~~ the leak detection system sump will be recorded at least monthly. If the liquid level in the sump stays below the pump operating level, (i.e., 1 foot above the bottom liner)~~,~~ for two consecutive months, the level of liquid in the sump must be recorded at least quarterly. If the liquid level in the sump stays below the pump operating level for two consecutive quarters, the level of liquid in the sump will be recorded at least semiannually. However, if at any time during the post-closure care period the pump operating level is exceeded ~~for a sump~~ on quarterly or semiannual recording schedules, monthly recording of the volume of liquid removed from the sump will be reinstated. This will continue until such time that the liquid level in the sump again remains below the pump operating level for two consecutive months.

7. Response Actions

In accordance with 40 CFR 264.223 and 40 CFR 264.304, if the ALR is exceeded for the landfill LDRS sump ~~in either the landfill or evaporation pond~~, the Triassic Park Facility will:

- Notify the NMED in writing of the exceedance within 7 days of the determination;
- Submit a preliminary written assessment to NMED within 14 days of the exceedance determination, as to the amounts of liquids, likely sources of liquids, possible location, size, and cause of any leaks, and short term actions taken and planned;
- Determine, to the extent practicable, the location, size, and cause of any leak;
- Determine whether waste receipt should cease or be curtailed, whether any waste should be removed from the unit for inspection, repairs, or controls, and whether or not the unit should be closed;
- Determine any other short term and long term actions to be taken to mitigate or stop any leaks;
- Within 30 days after the notification that the action leakage rate has been exceeded, submit to NMED the results of the determinations described above, the results of the actions taken, a description of the actions planned;
- Monthly, as long as the action leakage rate continues to be exceeded, submit a report to NMED summarizing the results of any remedial actions taken -and planned; and
- In making the determinations described in this section, either conduct the following -investigation or document why such an investigation is not needed:
  - Assess the source and amount of liquid from each source collected in the sump.
  - Conduct a hazardous constituent analysis of the liquid collected in the sump, and use the results to help identify the source(s) of the liquid and possible location of any leaks as well as the potential hazard associated with the liquid and its mobility.
  - Assess the seriousness of any leaks in terms of potential for escaping into the environment.~~Closure of the pond per 40 CFR 264.223(b)(4).~~

8. References

Bonaparte, R. and B.A. Gross. Field behavior of double liner systems. Waste Containment Systems Construction, Regulation, and Performance, ASCE Geotechnical Special Publication No. 26, Nov 1990, pp. 52 83.

~~Giroud, J.P., Gross, B.A., and Darrasse, J., "Flow in Leachate Collection Layers" to be published, 1993.~~

Gross, B.A., R. Bonaparte, and J.P. Giroud. Evaluation of flow from landfill leakage detection layers. Proceedings, Fourth International Conference on Geotextiles, Vol. 2, The Hague, June 1990, pp. 481-486.

~~USEPA, "Action Leakage Rates for Leak Detection Systems", EPA/580 R 92¬004, Jan 1992, 69 p.~~

U.S. Environmental Protection Agency (EPA). 1992a. Federal Register, Volume 57, No. 19, Wednesday, January 29, 1992 Rules and Regulations, pp. 3462 - 3482.

U.S. EPA. 1992b. *Action leakage rates for leak detection systems*. EPA/580 R 92¬004, Jan 1992, 69 p.

Appendix ~~G-1~~A

~~Landfill ALR~~ Calculations

TERRAMATRIX INC.

Calculation Cover Sheet

Sheet 1 of 1

Project Title: Triassic Park

Project No. 602-0200

Calculation Title: Landfill Action Leakage Rate

	Name	Date
Prepared By:	J. Kendall	10/6/97
Checked By:	J. Pellicer	13-Nov-97
Reviewed By:	P. Gorski	14 Nov 97
QA Review:		

Revisions	Date	By	Checked By	Reviewed By	QA Review

TerraMatrix
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Project Name: TRIASSIC PARK HW FACILITY - ALR
Project Number: 602-0200 Sheet 1 of 40
Prepared By: K Date: 10/6/97
Checked By: J. Pellion Date: 10-Nov-97

TITLE: TRIASSIC PARK LANDFILL ACTION LEAKAGE RATE

OBJECTIVE: DETERMINE ACTION LEAKAGE RATE (ALR) FOR THE TRIASSIC PARK HAZARDOUS WASTE FACILITY LANDFILL

REFERENCES:

1. USEPA, FEDERAL REGISTER, VOL 57 NO 19, WEDNESDAY JANUARY 29, 1992, RULES AND REGULATIONS, pp 3462-3477
2. USEPA, "ACTION LEAKAGE RATES FOR LEAK DETECTION SYSTEMS", EPA/530-R-92004, JANUARY 1992.
3. CODE OF FEDERAL REGULATIONS, TITLE 40, PART 264.302
4. BEAR, JACOB, "HYDRAULICS OF GROUNDWATER", McGRAW-HILL, 1979. pp 74-89.
5. TERRAMATRIX/MONTGOMERY WATSON, TRIASSIC PARK HAZARDOUS WASTE FACILITY DRAWINGS AS FOLLOWS:

DRAWING NO.	DRAWING TITLE	DATE
6	ULTIMATE LANDFILL EXCAVATION PLAN	NOV 97
12	LINER DETAILS	
15	SUMP PLAN VIEW	
16	SUMP CROSS-SECTIONS	
17	TYP. SUMP DETAILS	
18	CROSS-SECTION + DETAILS	

6. TERRAMATRIX/MONTGOMERY WATSON, TRIASSIC PARK HAZARDOUS WASTE FACILITY SPECIFICATIONS AS FOLLOWS:

SPEC NO	SPEC TITLE	DATE
02224	DRAINAGE GRAVEL	NOV 97
02710	GEO COMPOSITES	NOV 97

7. MANUFACTURER'S PRODUCT SPECIFICATIONS AND TEST DATA AS FOLLOWS:

A. NSC, "TEX-NET TRANSMISSIVITY CHARTS", TEX-NET TN3002/1125 (PLATE/FRICTION SEAL/TN3002CN/1125/FRICTION SEAL/PLATE)

B. ADS, "TECHNICAL NOTE 2.109 RE: FLOW CAPACITY", 3/1/95.

8. MINIMUM EPA REQUIREMENTS FOR GEOSYNTHETIC DRAINAGE LAYERS IN LANDFILLS: 3×10^{-5} m²/SEC (REF 1. p 3468)

9. KOERNER, ROBERT M., "DESIGNING WITH GEOSYNTHETICS" 3rd ED., PRENTICE HALL, ENGLEWOOD CLIFFS, NJ, 1994.

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Project Name: TRINITY PARK HW FACILITY - LEALR
Project Number: 602-0200 Sheet: 2 Of 40
Prepared By: K Date: 10/6/97
Checked By: J Pillon Date: 13-Nov-97

METHOD:

1. ALR IS DEFINED BY FEDERAL LAW AS:

REF 3.) 40 CFR PART 264.302

§ 264.302 Action leakage rate.

(a) The Department shall approve an action leakage rate for landfill units subject to § 264.301(c) or (d). The action leakage rate is the maximum design flow rate that the leak detection system (LDS) can remove without the fluid head on the bottom liner exceeding 1 foot. The action leakage rate must include an adequate safety margin to allow for uncertainties in the design (e.g., slope, hydraulic conductivity, thickness of drainage material), construction, operation, and location of the LDS, waste and leachate characteristics, likelihood and amounts of other sources of liquids in the LDS, and proposed response actions (e.g., the action leakage rate must consider decreases in the flow capacity of the system over time resulting from siltation and clogging, rib layover and creep of synthetic components of the system, overburden pressures, etc.).

(b) To determine if the action leakage rate has been exceeded, the owner or operator must convert the weekly or monthly flow rate from the monitoring data obtained under § 264.303(c), to an average daily flow rate (gallons per acre per day) for each sump. Unless the Department approves a different calculation, the average daily flow rate for each sump must be calculated weekly during the active life and closure period, and monthly during the post-closure care period when monthly monitoring is required under § 264.303(c).

2. FLOW RATE INTO LEAK DETECTION SYSTEM CAN BE DETERMINED FROM THE FOLLOWING EQU CITED IN REF 1, p. 3474 AND DEVELOPED FOR GEONET DRAINAGE LAYERS CITED IN REF 2, p 12, (EQN 3).

$Q = K \cdot D(2h - D)$ WHERE

Q = FLOW RATE IN LEAK DETECTION SYSTEM RESULTING FROM 1 HOLE PER ACRE (GPAD)

K = HYDRAULIC CONDUCTIVITY OF DRAINAGE LAYER (FT/SEC)

FOR GEONET: $K = T/t$

WHERE T = TRANSMISSIVITY OF GEONET (FT^2/SEC)

t = THICKNESS (FT)

h = HEAD ON LINER (FT)

D = LEAK DETECTION LAYER THICKNESS (FT)

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METHOD (CONTINUED)

3. GEOCOMPOSITE TRANSMISSIVITY (OR FLOW RATE) COLLECTIONS FOR INTRUSION OF ADJACENT MATERIALS (REF 9, PP 402-423)

GEOCOMPOSITE MANUFACTURERS TYPICALLY REPORT TRANSMISSIVITY (OR FLOW RATE) DATA BASED ON ASTM 4716-87 TEST PROCEDURES CONDUCTED AT VARIOUS RANGES OF OVERBURDEN PRESSURES (NORMAL LOADS), HYDRAULIC GRADIENTS, AND MATERIAL LAYER ARRANGEMENTS. FOR THIS DATA TO BE APPLICABLE, THE TEST CONDITIONS MUST BE REPRESENTATIVE OF ACTUAL DESIGN AND OPERATING CONDITIONS. THEREFORE, APPROPRIATE FACTORS OF SAFETY MUST BE APPLIED TO MANUFACTURER'S DATA TO ACCOUNT FOR TEST PROCEDURE DIFFERENCES. FURTHER, HYDRAULIC TESTING OF THE SELECTED GEOCOMPOSITE SHOULD BE CONDUCTED UNDER ACTUAL DESIGN AND OPERATING CONDITIONS TO CONFIRM THAT THE FACTORS OF SAFETY APPLIED TO MANUFACTURER'S DATA ARE ADEQUATE.

4. CHECK LDRS PIPE FLOW CAPACITY VS LDRS INFLOW
CHECK LDRS SUMP FLOW CAPACITY VS LDRS INFLOW

REF 7A

<40

NSC

National Seal Company

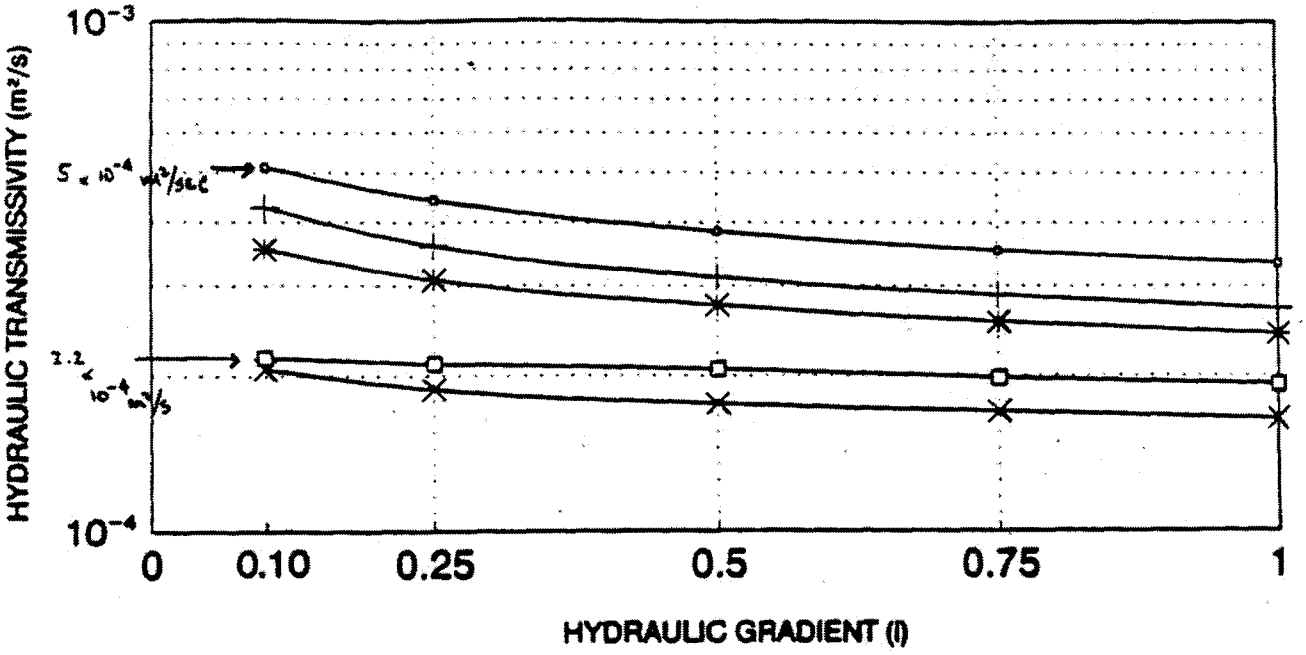
TEX-NET® TRANSMISSIVITY CHARTS

The results listed are nominal values based on limited testing. Minimum values and minimum average roll values may vary.

REF 7A
602-0200
10/6/97

TEX-NET TN3002/1125

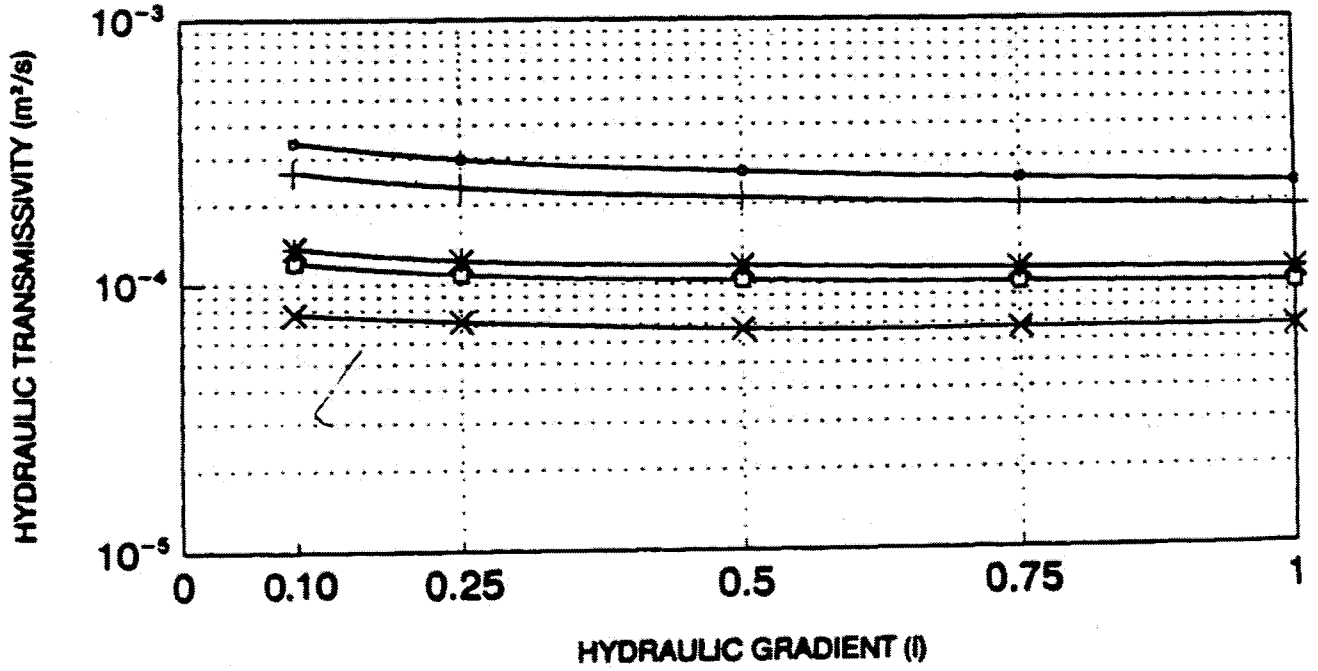
plate/FRICTION SEAL/TN3002/1125/FRICTION SEAL/plate



- 2000 psf
+ 5000 psf
✱ 10000 psf
□ 15000 psf
× 20000 psf

TEX-NET TN3002CN/1125

plate/FRICTION SEAL/TN3002CN/1125/FRICTION SEAL/plate



REF. 7A 6

SPECIFICATION – Minimum Average Roll Values

502-22W
K
10/6/97

Raw material	PN2000 polyethylene	PN3000 polyethylene	PN3000CN polyethylene
Weight (lbs/ft²) ASTM D5261	0.100	0.162	0.140
Thickness (inches) ASTM D5199	0.160	0.200	0.200
Density (g/cm³) ASTM D1505	0.940	0.940	0.940
Tensile strength (lb/in) ASTM D5035	30	45	32
Carbon black (%) ASTM D4218	2	2	2
Porosity (%), Nom.	83	80	76
Roll with (feet), Nom.	7.54 & 14.5	7.54 & 14.5	7.54 & 14.5
Standard roll length (feet), Nom.	300	300	300
Area per roll (ft²), Nom.	2262 & 4350	2262 & 4350	2262 & 4350

The transmissivity results listed on the preceding pages were determined in compliance with ASTM D4716-87 test procedure. The transmissivity was measured using water @ 20°C (68°F) with a seat time of one hour. Values may vary, based on dimensions of the transmissivity specimen and specific laboratory.

CONVERSION FACTORS FOR TRANSMISSIVITY UNITS

$1 m^2/s$ = 1 cubic meter/second/meter width/unit gradient
$1 m^2/s = 10^3$ liters/second/meter width/unit gradient
$1 m^2/s = 6 \times 10^4$ liters/minute/meter width/unit gradient
$1 m^2/s$ = 10.76 ft^2/second
$1 m^2/s$ = 646 ft^2/minute
$1 m^2/s$ = 4830 gallons/minute/foot width/unit gradient

1 ft^2/second = 1 cubic foot/second/foot width/unit gradient
1 ft^2/second = $9.3 \times 10^{-2} m^2/s$
1 ft^2/minute = 1 cubic foot/minute/foot width/unit gradient
1 ft^2/minute = $1.55 \times 10^{-3} m^2/s$
1 gpm/foot width/unit gradient = $2.07 \times 10^{-4} m^2/s$
1 liter/minute/meter width/unit gradient = $1.66 \times 10^{-5} m^2/s$
100 liters/minute/meter width/unit gradient = 1.07 ft^2/min.

The information contained herein has been compiled by National Seal Company and is, to the best of our knowledge, true and accurate. All suggestions and recommendations are offered without guarantee. Final determination of suitability for use based on any information provided, is the sole responsibility of the user. There is no implied or expressed warranty of merchantability or fitness of the product for the contemplated use.

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ASSUMPTIONS

1. GEOCOMPOSITE TRANSMISSIVITY

FROM REF 7A, CHART FOR TEX-NET TN 3002./1125. MINIMUM TRANSMISSIVITY REPORTED IS 2.2×10^{-4} / m^2/SEC @ NORMAL PRESSURE = 15,000 PSF AND HYDRAULIC GRADIENT OF 0.1. TEST SECTION WAS PLATE/FRICTION SEAL/TN 3002 CN/1125/FRICTION SEAL/PLATE.

ADJUST TRANSMISSIVITY CITED ABOVE FOR DIFFERENCES BETWEEN MANUFACTURER'S TEST CONDITIONS AND ACTUAL DESIGN CONDITIONS. APPLY FS IN A MANNER SIMILAR TO APPROACH SUGGEST BY KOERNER (REF. 9, PP 413-414)

$FS_{INTRUSION}$: SINCE TEST CONDITIONS ALLOW FOR INTRUSION OF GEOTEXTILE FROM ABOVE AND BELOW THE GEONET AND NORMAL PRESSURES ARE CONSISTENT WITH DESIGN (120 FT WASTE @ 110 lb/CFT = 13,200 PSF), USE $FS_{IN} = 1$.

FS_{CREEP}: SINCE TEST CONDITIONS MAY REPRESENT SHORT DURATIONS, USE $FS_{CR} = 1.5$

$FS_{CHEMICAL\ CLOGGING}$: SINCE LEACHATE FROM WASTES OF A WIDE CHEMICAL VARIETY MAY BE PRESENT, USE $FS_{CC} = 1.5$.

$FS_{BIOLOGICAL\ CLOGGING}$: SINCE MUNICIPAL WASTES WILL NOT BE ACCEPTED IN THE LANDFILL, THE PERCENTAGE OF BIODEGRADABLE MATERIAL PRESENT WILL BE SMALL, USE $FS_{BC} = 1$.

$FS_{SEDIMENT\ CLOGGING}$: SINCE FINE GRAINED SOILS MAY BE PRESENT IN THE PROTECTIVE COVER MATERIAL (SM CLASSIFICATION), USE $FS_{SC} = 1.5$

TOTAL FS = $FS_{IN} \times FS_{CR} \times FS_{CC} \times FS_{BC} \times FS_{SC} = 1 \times 1.5 \times 1.5 \times 1 \times 1.5$

$= 3.375$

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ASSUMPTIONS (CONTINUED)

1. GEOCOMPOSITE TRANSMISSIVITY (CONTINUED)

ALLOWABLE GEOCOMPOSITE FLOW RATE (q) = q (MANUF. TEST) x $\frac{1}{FS_{TOTAL}}$

$q_{ALLOW} = \frac{2.2 \times 10^{-4}}{3.375} = 6.52 \times 10^{-5}\ m^2/sec$ SAY $6.5 \times 10^{-5}\ m^2/sec$

CHECK q_{ALLOW} VS EPA MINIMUM (REF 1, p 3468)

$6.5 \times 10^{-5} > 3.0 \times 10^{-5}$ ∴ OK

(NOTE: ALTHOUGH THE ASSUMPTIONS LEADING TO $q_{ALLOW} = 6.5 \times 10^{-5}\ m^2/sec$ ARE CONSERVATIVE, CONFIRMATORY TESTING OF GEOCOMPOSITE TRANSMISSIVITY WILL BE REQUIRED. TESTING WILL BE CONDUCTED ON ACTUAL GEOCOMPOSITE SELECTED AT DESIGN CONDITIONS)

2. MAXIMUM HEAD ON LINER

USE 1.0 ft PER EPA 40 CFR 264.302

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Project Name: TRANSITC PARK HW FACILITY - LF ALR
Project Number: 602-0200 Sheet 9 of 40
Prepared By: K Date: 10/6/97
Checked By: J. Pillion Date: 13-Nov-97

CALCULATION

DETERMINE ALR

$ALR = Q_{allowable} = KD(2h - D)$ (GPAD)

WHERE

$K_{geocomposite} = T/t$ T = TRANSMISSIVITY = 6.5×10^{-5} m²/s
t = THICKNESS = 5 mm

$K_{geocomposite} = \frac{6.5 \times 10^{-5} m^2/sec}{.005 m} = 0.013$ m/sec
= 1.3 cm/sec
= 0.043 FT/SEC

h = 1.0 ft

D = 5 mm = 0.0164 FT

$ALR = Q_{allowable} = 0.043 \frac{FT}{SEC} \times 0.0164 FT \times (2 \times 1.0 FT - 0.0164 FT)$
= 0.00140 CFT/Ac/sec
= 120.9 CFT/Ac/DAY
= 904 GPAD

RECOMMENDED ALR IS 900 GPAD

NOTE: THE RECOMMEND ALR VALUE OF 900 GPAD IS ABOVE THE EPA RECOMMENDED VALUE OF 100 GPAD (REF 1, p 3974). THE PRIMARY REASON FOR THIS DIFFERENCE IS THE EPA VALUE IS BASED ON SAND PERMEABILITY (1×10^{-2} cm/sec) COMPARED TO THE GEOCOMPOSITE PERMEABILITY ASSUMED ABOVE (1.3 cm/sec).

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Steamboat Springs, Colorado 80477
Phone 970.879.6260 Fax 970.879.9048

Project Name: TRIAGRIC PARK HW FAC LITT - LF ALR
Project Number: 602-0280 Sheet: 10 of 40
Prepared By: K Date: 10/6/97
Checked By: J. Pellicer Date: 13-Nov-97

CALCULATION (CONTINUED)

CHECK LDRS FLOOR PIPE CAPACITY

USE FLOOR LAYOUT AND CROSS SECTIONS (REF.

USE ADS N-12 PIPE FLOW CAPACITY CHART FOR 8" DIAM. PIPE (REF. 7B)

FLOW = 2.07 CFT/SEC
= 929 GPM ✓
= 1.337 MGPD ✓

USE EPA FLOW RATE EQN TO DETERMINE FLOW INTO LDRS WITH $T = 5 \times 10^{-4}$ mm/SEC (REF. 7A) (most transmissiv value, conservativ

NOTE: TRANSMISSIVITY VALUE USED HERE IS GREATER THAN THAT USED FOR ALR CALC BECAUSE WE ARE CHECKING MAXIMUM FLOW CAPACITIES FOR THE LDRS PIPE AND SUMP GRAVEL. THE HIGH TRANSMISSIVITY VALUE HERE IS MORE REPRESENTATIVE OF A SCENARIO EARLY IN THE LIFE OF THE LANDFILL WHEN WASTE FILL HEIGHTS ARE RELATIVELY LOW.

$Q = K \cdot D(2h - D)$ (REF 2, P12, EQN 3)

$K = T/L = \frac{5 \times 10^{-4}\ mm^2/sec}{0.005\ mm} = 0.1\ mm/sec$ ✓
$= 10\ cm/sec$ ✓
$= 0.328\ FT/SEC$ ✓

$h = 1.0\ ft$
$D = 5\ mm = 0.0164\ FT$ ✓

$Q = 0.328 \times 0.0164 \times ((2 \times 1.0) - 0.0164)$
$= 0.0106\ CFT/AC/SEC$ ✓
$= 922\ CFT/AC/DAY$ ✓
$= 6898\ GAL/AC/DAY$ (GAPD) ✓

FLOW INTO PHASE 1 LDRS = 6898 GAPD x 7Ac = 48,286 GPD ✓

FLOW INTO PHASE 1 LDRS << PIPE FLOW CAPACITY
48,286 GPD << 1.34 MGPD So PIPE CAPACITY OK ✓

Technical Notes

ADS

Technical Note 2.109

Re: Flow Capacity
Date: March 1, 1995

It is the intent of this Technical Note to provide current hydraulic performance data for use by the engineering community. A bibliography is included for the engineer's use if further information or guidance is needed.

Manning's "n" values are offered for design purposes based on the best available data assembled from a variety of sources as indicated. Table 1 presents the Manning's "n" values recommended by the A.D.S. engineering staff for use in design.

REF 7B

Table 1
Manning's "n" Value For Design
(Storm & Sanitary Sewer and Culverts)

Pipe Type	"n"
A.D.S. Corrugated Polyethylene Pipe	
3" - 6" Diameter	0.015
8" Diameter	0.016
10" Diameter	0.017
12" - 15" Diameter	0.018
18" - 36" Diameter	0.020
A.D.S. N-12	0.012 ←
Concrete Pipe	0.013
Corrugated Metal Pipe (2 2/3" x 1/2" corrugation)	
Annular	
Plain	0.024
Paved Invert	0.020
Fully Paved (smooth lined)	0.013
Helical	
Plain 15" Diameter	0.013
Plain 18" Diameter	0.015
Plain 24" Diameter	0.018
Plain 36" Diameter	0.021
Spiral-Rib	0.012
Plastic Pipe (SDR, S&D, Etc.)	0.011
Vitrified Clay	0.013

3300 RIVERSIDE DRIVE COLUMBUS, OH 43221 (614) 457-3051 http://www.ADS-pipe.com

REF. 7B

PIPE SLOPE = 2.5%

TABLE 4

CIRCULAR PIPE FLOW CAPACITY
Full Flow (cubic feet per second)

Mannings "n"= 0.012

Dia. (in.)	*Conv. Factor	% Slope (feet per 100 feet) 0.02	0.05	0.10	0.20	0.35	0.50	0.75	1.00	1.25	1.50	1.75	2.0	2.5	5.0	10.0	20.0
		(c.f.s.)															
3	0.957	0.014	0.021	0.030	0.043	0.057	0.068	0.083	0.096	0.107	0.12	0.13	0.14	0.15	0.21	0.30	0.43
4	2.062	0.029	0.046	0.065	0.092	0.122	0.146	0.179	0.206	0.231	0.25	0.27	0.29	0.33	0.46	0.65	0.92
5	3.738	0.053	0.084	0.118	0.167	0.221	0.264	0.324	0.374	0.418	0.46	0.49	0.53	0.59	0.84	1.18	1.67
6	6.079	0.086	0.136	0.192	0.272	0.360	0.430	0.526	0.608	0.680	0.74	0.80	0.86	0.96	1.36	1.92	2.72
8	13.091	0.185	0.293	0.414	0.585	0.774	0.926	1.134	1.309	1.464	1.60	1.73	1.85	2.07	2.93	4.14	5.85
10	23.74	0.34	0.53	0.75	1.06	1.40	1.68	2.06	2.37	2.65	2.91	3.14	3.36	3.75	5.31	7.51	10.61
12	38.60	0.55	0.86	1.22	1.73	2.28	2.73	3.34	3.86	4.32	4.73	5.11	5.46	6.10	8.63	12.21	17.26
15	69.98	0.99	1.56	2.21	3.13	4.14	4.95	6.06	7.00	7.82	8.57	9.26	9.90	11.06	15.65	22.13	31.30
18	113.80	1.61	2.54	3.60	5.09	6.73	8.05	9.86	11.38	12.72	13.94	15.05	16.09	17.99	25.46	35.99	50.89
21	171.65	2.43	3.84	5.43	7.68	10.16	12.14	14.87	17.17	19.19	21.02	22.71	24.28	27.14	38.38	54.28	76.77
24	245.08	3.47	5.48	7.75	10.96	14.50	17.33	21.22	24.51	27.40	30.02	32.42	34.66	38.75	54.80	77.50	109.60
27	335.51	4.74	7.50	10.61	15.00	19.85	23.72	29.06	33.55	37.51	41.09	44.38	47.45	53.05	75.0	106.1	150.0
30	444.35	6.28	9.94	14.05	19.87	26.29	31.42	38.48	44.44	49.68	54.42	58.78	62.84	70.26	99.4	140.5	198.7
36	722.57	10.22	16.16	22.85	32.31	42.75	51.09	62.58	72.26	80.79	88.50	95.59	102.19	114.25	161.6	228.5	323.1
42	1089.9	15.41	24.37	34.47	48.74	64.5	77.1	94.4	109.0	121.9	133.5	144.2	154.1	172.3	243.7	344.7	487.4
48	1556.1	22.01	34.80	49.21	69.59	92.1	110.0	134.8	155.6	174.0	190.6	205.9	220.1	246.0	348.0	492.1	695.9

* Conveyance Factor = (1.486 x R2/3 x A) / n

JK 10/6/97

12/41

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CALCULATION (CONTINUED)

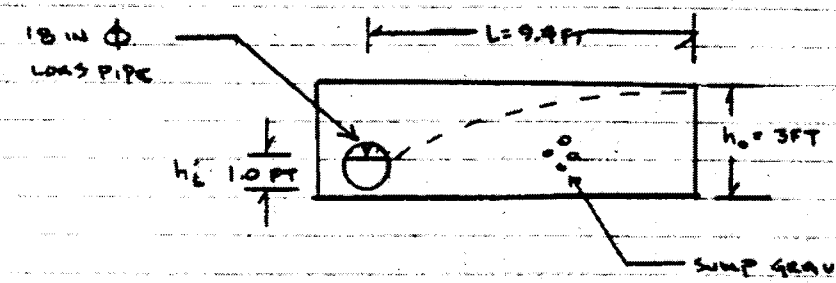
CHECK LDRS SUMP PUMPING CAPACITY

USE LDRS CROSS-SECTIONS (REF
USE METHOD DESCRIBED IN "HYDRAULICS OF GROUNDWATER" (REF 4)

USE DUPUIT-FORCHHEIMER EQN

$$Q = K/2L\,(h_o^2 - h_L^2)$$

WHERE: Q = FLOW RATE PER FT OF PIPE LENGTH
L = DISTANCE TO MAXIMUM FLUID ELEVATION
h_o = MAXIMUM FLUID ELEVATION
h_L = FLUID ELEVATION IN PIPE
K = PERMEABILITY OF LDRS SUMP GRAVEL



(REF
= 1.969 FT/MIN ✓

$$Q = \frac{1.969\ \text{FT/MIN}}{2 \times 9.4\ \text{FT}} \times \left(3^2\,\text{FT} - 1^2\,\text{FT}\right)$$

= 0.837 CFT/MIN/FT PIPE LENGTH ✓

PIPE LENGTH = 15 FT (REF.

Q_{TOTAL} = 0.837 CFT/MIN/FT PIPE LENGTH & 15 FT = 12.57 CFT/MIN
= 135,403 GPD

FLOW INTO LDRS < FLOW CAPACITY OF SUMP

48,286 GPD < 135,403 GPD ∴ SUMP CAPACITY OK

Permit Renewal Application
October 17, 2011

Attachment L

Engineering Report

Prepared for:
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Modified by:
The New Mexico Environment Department
March 2002

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Attachment L. Engineering Report

1. General

1.1 Introduction

Gandy Marley Inc. (GMI) is submitting a Resource Conservation and Recovery Act (RCRA) Part B Permit Application to construct and operate the proposed Triassic Park Waste Disposal Facility (EPA ID NO. NM0001002484) to be located in Chaves County, New Mexico. This Engineering Report was updated by Daniel B. Stephens & Associates, Inc. (DBS&A) based on the original Engineering Report prepared for the Triassic Park Permit Application by TerraMatrix/Montgomery Watson (TerraMatrix). This Engineering Report presents the detailed design of the Triassic Park Waste Disposal Facility submitted in support of the Triassic Park Waste Disposal Facility RCRA Part B Application.

1.1.1 Background

In 1994, ~~Gandy Marley Inc.~~GMI contracted the S.M. Stoller Corporation to perform site characterization work and to prepare RCRA Part A and Part B Permit Applications for location of a hazardous waste treatment, storage and disposal facility on a 480 acre parcel of privately owned land located in Chaves County, New Mexico. The proposed site is located in Section 17 and 18 of R31E, T11S which lies approximately 42 miles east of Roswell, New Mexico and 36 miles west of Tatum, New Mexico.

In August 1994, ~~Gandy Marley Inc.~~GMI contracted with TerraMatrix to prepare preliminary designs for the various site facilities and to assist S.M. Stoller in the preparation of the RCRA Part B Permit submittals. ~~Since that time,~~ S.M. Stoller and TerraMatrix ~~have been~~ worked~~ing~~ jointly to respond to comments and requests for additional information made by the New Mexico Environmental Department (NMED).

The Facility design as presented herein is a product of several design iterations which incorporated additional information and design modifications as suggested by the NMED. The Facility permit was approved by NMED in 2002.

In 2011, GMI contracted DBS&A to update the engineering design for the Triassic Park Facility, which is yet to be constructed. The design updates include elimination of some operations and waste types planned under the original design and permit. Details of the changes are described in this Engineering Report.

1.1.2 Objective and Scope

The primary objective of this report is to present the detailed design and engineering analyses required under Title 40, Code of Regulations (40 CFR), Part 264 and Title 20, New Mexico Administrative Code ~~(20 NMAC)~~ 4.1 (20 4.1 NMAC) in support of the Triassic Park Waste Disposal Facility RCRA Part B Permit Application. This engineering report presents ~~detailed design drawings, construction specifications, construction quality assurance plan, surface water control plan, and supporting engineering analyses and laboratory studies~~information applicable to the following site features and facilities:

- Site arrangement
- Landfill

Updates to the engineering design for the renewal of the Triassic Park permit include elimination of the following facilities that were part of the original permitted design.

- Evaporation Pond
- Truck Roll-Off Area
- Stabilization Facility
- Drum Handling Facility
- Liquid Waste Storage Facility
- Truck Wash Facility

~~The report also presents the landfill and evaporation pond action leakage rate and response action plan along with its supporting engineering analyses.~~

1.1.3 Report Organization

~~This report is organized into ten sections including this Section 1.0, Introduction.~~ Sections 2~~.0~~ and 3~~.0~~ of this report ~~through 9.0~~ describe the design elements and engineering analyses for the general facility arrangement and~~,~~ the landfill~~, the evaporation pond, the truck roll-off area, the stabilization facility, the drum handling facility, the liquid waste storage facility and the truck wash facility~~. Sections 4 through 9 describing facilities that have been eliminated from the 2002 Engineering Report have been removed. ~~Section 10.0 presents a~~A list of references used in the report follows the removed sections~~followed by the report appendices~~. Detailed design drawings are provided as Permit Attachment L1. The Construction Quality Assurance (CQA) Plan is provided as Permit Attachment M. The landfill action leakage rate and response action plan and its supporting engineering analyses are provided as Permit Attachment J. See Appendices ~~A~~ C through F and H, presented in Volumes III through VI of the Permit Application dated October 2000 for-present~~, respectively, the detailed design drawings, construction quality assurance plan,~~ construction specifications, laboratory test results, engineering calculations, surface water control plan, ~~and action leakage rate and response action plan,~~ and manufacturer information.

The drawings in ~~Appendix A~~Permit Attachment L1 present final designs for the RCRA-permitted facilities. Details on the non-RCRA components of the facilities may be supplemented during the bidding and construction phase. ~~Gandy Marley~~GMI will supply the additional details on the non-RCRA components of the design to NMED for review and approval prior to the start of construction.

1.2 Regulatory Criteria and Guidance

The following federal and state regulations, as well as federal guidance documents were used in the design:

- New Mexico Hazardous Waste Regulations, 20.4.1 NMAC~~20.4.1~~.
- ~~Title 40 – Code of Federal Regulations (~~Federal Hazardous Waste Regulations, 40 CFR~~)~~, Part 264.
- U.S. Environmental Protection Agency (US EPA), 1984. Permit Applicants Guide Manual for Hazardous Waste Land Treatment Storage and Disposal Facilities.
- U.S. Environmental Protection Agency, 1988. Lining of Waste Containment and Other Impoundment Facilities, Part 1 of 2 and Part 2 of 2.
- U.S. Environmental Protection Agency, 1988. Seminar Presentations - Requirements for Hazardous Waste Landfill Design, Construction and Closure.
- U.S. Environmental Protection Agency, 1996. Technical Guidance Document. Construction Quality Assurance for Hazardous Waste Land Disposal Facilities.

- United States Environmental Protection Agency, July, 1990. Seminars - Design and Construction of RCRA/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Final Covers, Washington, DC

Additional supporting reference documents are presented in ~~Section 10.0.~~the reference list.

~~1.3 Review of NMED Comment Responses~~

~~In March 1997 comments on the GMI Triassic Park Waste Disposal Facility RCRA Part B Permit Application were prepared for NMED by A.T. Kearny. In June 1997, Montgomery Watson prepared a response to each comment and indicated how the comment would be addressed with revised information or submittal of additional information. In that submittal, we indicated that it was the intention of GMI to meet all relevant requirements stipulated under 40 CFR 264, 40 CFR 268, 40 CFR 270 and corresponding NMED requirements in 20 NMAC necessary to obtain a RCRA Part B Permit for the Triassic Park Waste Disposal Facility. In addition, GMI would provide the requested supporting technical information for each waste management unit proposed for the facility. Finally, GMI would also provide detailed design drawings, engineering reports, and specifications signed and stamped by a professional engineer registered in the State of New Mexico (Patrick G. Corser, P.E., Registration Number 12236) prior to NMED issuing a Draft RCRA Permit for the Triassic Park Waste Disposal Facility.~~

1.4 Summary of Geologic and Hydrologic Conditions

Regional and site geologic and hydrologic conditions are discussed in the Triassic Park Waste Disposal Facility Part B Permit Application (52~~45~~). This site characterization work was performed by the S.M. Stoller Corporation and is based on a series of exploration drilling and test pit programs conducted at the site and review of New Mexico Oil Conservation Division well logs. One of the results of primary importance to this engineering report stemming from the site characterization report is the identification of the "most favorable area" for the location of the landfill. A brief summary of the site geologic and hydrologic conditions based on the Part B Permit Application is presented below.

1.4.1 Regional Conditions

The geologic formations present within the region where the Triassic Park ~~Treatment, Storage, and Disposal~~ Facility ~~(TSDF)~~ is situated range from Quaternary through Triassic in age. These include Quaternary alluvium, Tertiary Ogallala Formation, and the Triassic Dockum Group. Permian sediments do not outcrop in this region.

1.4.2 Site Geology

Site stratigraphy generally consists of, from top down, 2- to 20-foot thicknesses of Quaternary alluvial materials; 30- to 100-foot thicknesses of Upper Dockum mudstones, siltstones, and sandy siltstones; and up to 600-foot thicknesses of Lower Dockum mudstones. Permeability testing of mudstones core samples ~~were~~ was found to average 2.2×10^{-7} centimeters per second (cm/s) and siltstones averaged 1×10^{-4} cm/s (52~~45~~).

Based on the regional geologic features, the potential for subsurface subsidence and the occurrence of sinkholes is considered negligible. In addition, there are no identified faults within the project area. The proposed site is located in a geologically stable area with low seismic activity potential. Design ground accelerations of 0.04 g were used in engineering evaluations presented in this report (1).

1.4.3 Site Hydrogeology

The Part B Permit Application Section 3~~.0~~, Ground Water Protection, provides a detailed discussion of the site geology and supporting investigation activities, as well as site groundwater characteristics and supporting groundwater flow modeling. Based on these assessments, the "most favorable" area for the landfill construction was identified (see Figure 3-12 of Section 3~~.0~~). The footprint for the proposed landfill generally conforms to the "most favorable" area. Cross sections shown on Drawing No. 7 show the landfill base and geologic foundation intercepts.

1.5 Additional Field and Laboratory Studies

In addition to the site characterization drilling and test pitting programs described above, a test pit program to characterize near surface soil conditions and laboratory studies to identify geotechnical properties of the soils and proposed liner components was conducted. Appendix D provided in Volume V of the Permit Application dated October 2000 presents the results of the test pit program, soil index tests, and interface shear tests performed on the soil and geosynthetic liner materials.

1.6 Summary of Climatological Data

Site climatological data, including temperature and precipitation, ~~was~~ were obtained from the National Oceanic and Atmospheric Administration (NOAA) Class A recording station in Roswell, New Mexico. Climate conditions of the area are typical of semi-arid regions characterized by dry, warm winters with minimal snow cover and hot, somewhat moister summers (52). Other climatological data required for modeling were obtained from Weather Underground and the National Solar Radiation Database.

Moderate temperatures at the Triassic Park ~~Site~~ Facility are typical throughout the year, with annual average high and low temperatures ~~near~~ of 75 degrees Fahrenheit (°F) and 45°F, respectively~~60°F~~. Temperatures ~~in December~~ throughout ~~February~~ the year often exhibit ~~show~~ a large diurnal variation~~;~~ ~~averaging 36°F at~~in Roswell. ~~On approximately 75 percent of the~~While winter mornings~~,~~ temperatures ~~are~~ below freezing~~, and afternoon maximum temperatures in the high fifties. Afternoon winter temperatures of 70°F or more are common. Night time lows average near 23°F, occasionally dipping as low as 14°F.~~ are possible. ~~There are perhaps two or three winter~~ days when the temperature fails to rise above freezing are rare. ~~Avergae~~Average temperatures in the months of June, July, and August exceed 90°F and often exceed 100°F.

Precipitation is light and unevenly distributed throughout the year~~, averaging 10 to 13 inches~~. Winter is the season of least precipitation, averaging less than 0.6 inch~~es~~ of rainfall per month for the months of November through March. Snow averages about 5 inches per year, but often melts withing 24 hours of each snowfall event. ~~at the site and seldom remains on the ground for more than a day at a time because of the typically above freezing temperatures in the afternoon. Approximately~~ More than half of the annual precipitation ~~comes~~ in Roswell is the result of monsoonal moisture associated with the months of ~~from frequent thunderstorms in~~ June through September. ~~Rains~~ Storm events are usually brief but ~~occasionally~~ often intense~~ when moisture from the Gulf of Mexico spreads over the region~~.

Precipitation for the project area varies greatly from year to year. For example, Roswell's record low and high annual precipitation values ~~is~~are, respectively, ~~4.35~~2.9 inches in 2003 and 32.9 inches in 1941. The maximum 24-hour rainfall was 5.65 inches in October 1901. ~~The record annual high is 32.92 inches. Most years are either "wet" or "dry"; few are "average". An~~ The average annual precipitation rate for Roswell for a 118~~07~~-year period from 189~~478~~ to 2011~~1982~~, is ~~10.61~~11.65~~5~~ inches~~ per year~~.

The prevailing wind direction is from the south with a normal mean wind speed of 9.6 miles per hour (mph) at Roswell.

2. General Facility Design Elements

2.1 General Facility Design Elements

2.1.1 General

General facility design elements include the overall facility layout, traffic plan, and site wide storm-water control design. This permit application refers only to Phase 1A. However, potential expansions of the landfill to future phases have been included in the general layout drawings for completeness. This section describes the site layout and provides rationale for the individual facility locations and roadway network. In addition, the site wide storm-water control feature system is described.

2.1.2 Facility Layout

Drawing No. 4, Facility Layout, illustrates the proposed locations of all site facilities, including the site waste receiving, treatment, disposal, and storage facilities; the site maintenance area; soil stockpiles; surface water control features; water storage basins; and interconnecting access roadways. The locations of these facilities ~~is~~ are governed by the landfill layout and construction sequencing, existing roads leading to the facility, and existing topography and surface water drainage~~, and operational interactions between the waste storage, treatment, and disposal facilities~~. Additional rationale for the facility layout is~~individual facility locations are~~ discussed below.

Facility entrance and receiving areas, including the security gate, administration trailer, truck untarping and sampling stations, chemical laboratory, and truck staging area, are located near the facility entrance in the northeast corner of the site. This arrangement facilitates site access security; incoming waste load inspection, sampling, testing, and weighing; and provides vehicle parking, truck staging, and emergency vehicle access.

~~Waste processing and storage areas including the drum handling facility, stabilization facility, liquid waste storage area, and truck roll-off area are located north of the landfill access. This arrangement will minimize traffic interference between waste processing facility operations, landfill operations, and landfill construction activities. The drum handling facility and liquid waste storage area are located closest to the facility entrance because delivery vehicles to these units will not be required to access the landfill or other site facilities. The stabilization facility is located in close proximity to the liquid waste storage area, drum handling facility, truck roll-off area, and landfill entrance to facilitate waste transfer operations between these units.~~

~~The evaporation pond and truck wash facility are located to the northwest of the landfill. This arrangement allows trucks leaving the landfill, which need to be cleaned, to pass through the truck wash and exit the facility via the northernmost roadway. The evaporation pond location provides space for future evaporation pond development and is located near the truck wash and the landfill leachate tank locations to reduce leachate haul distances.~~

The facility maintenance shop area is located next to the Phase 1A landfill~~truck wash facility because landfill operations equipment is typically cleaned prior to being serviced by the maintenance personnel. As the last facility~~ along the western perimeter haul road~~,~~ _eEarthmoving and construction equipment will be able to access the maintenance shop from the south, thus reducing interference with site operations traffic and minimizing ~~ware~~ wear to the perimeter road surface. The stormwater detention basin is located in the

northwest corner of the site because this is a natural low point to which clean runoff from the facility will be directed.

Stockpile and clay processing areas are located along the east side of the facility. These areas provide adequate soil storage space and allow construction equipment to operate separately from other site operations. The landfill location is governed by subsurface geologic and hydrogeologic characterization discussed in Section 1.4.3.

2.1.3 Facility Traffic Plan

Drawing No. 26, Traffic Plan, illustrates the site roadway locations and grades, traffic flow directions, traffic control features, and emergency vehicle access lanes at the facility entrance. Roadway locations are governed by facility locations and operations requirements. Expected vehicle types and volumes, proposed road types and their intended uses, traffic control features, and individual facility traffic patterns are discussed below. Road design analyses are discussed in Section 2.2.1.

Table L-1 lists the types of vehicles, their gross vehicle weight, and estimated traffic volume per day which will travel on the site roadways. The traffic volumes shown in Table L-1 are estimated based on an assumed waste receipt volume. Actual traffic volumes may vary.

Table L-1. Expected Vehicle Types

Vehicle Type	Off Highway/ On Highway	Gross Vehicle Weight (lb)	Estimated Traffic Volume (units/day)
Waste Haulers			
Roll-off trucks	On highway	<100,000	30–70
End dump trucks (bulk waste)	On highway	<100,000	30–70
~~Tanker trucks (liquid waste)~~	~~On highway~~	~~<100,000~~	~~0–5~~
~~Semi trailer trucks (drums)~~	~~On highway~~	~~<100,000~~	~~0–5~~
Other miscellaneous trucks	On highway	<100,000	0–5
Site Operations Vehicles			
Vacuum trucks	On highway	<100,000	0–5
Tanker trucks	On highway	<100,000	0–5
Roll-off trucks	On highway	<100,000	10–30
Flat-bed trucks	On highway	<100,000	0–5
Maintenance vehicles	On highway	<100,000	0–5
LF waste compactors	Off highway	<100,000	0–2
Excavators	Off highway	>100,000	0–2
Backhoes	Off highway	<100,000	0–2
Landfill~~F~~ scrapers	Off highway	>100,000	0–2
Water trucks	On highway	<100,000	0–20
Front end loaders	Off highway	<100,000	0–2
Fork lifts	Off highway	<100,000	0–2
Construction Vehicles (restricted to construction roads)			
End dump trucks	Off highway	<100,000	NA
Water trucks	On highway	<100,000	NA
Compactors	Off highway	<100,000	NA
Graders	Off highway	<100,000	NA

Vehicle Type	Off Highway/ On Highway	Gross Vehicle Weight (lb)	Estimated Traffic Volume (units/day)
Dozers	Off highway	<100,000	NA
Excavators	Off highway	<100,000	NA
Other			
Employee vehicles	On highway	<100,000	30–50

Main Facility Roads

Drawing No. 26, Traffic Plan, identifies the extent of the main facility roadways. These roads include the facility entrance road, ~~north~~ landfill access road, ~~south access road,~~ and east and west landfill perimeter roads. Drawing No. 27, Perimeter Road Detail, illustrates the road dimensions, drainage slope, and road surface and subbase material types and thicknesses to be used in construction. The main facility road network will serve the majority of site traffic into and out of the landfill and the waste processing facilities. Construction equipment will typically be restricted to construction haul roads and the cut slope access ramp into the landfill.

Unimproved Access Roads and Temporary Construction Haul Roads

Unimproved access roads and temporary construction haul roads (not shown on the drawings) will be constructed as required by site operations and construction contractors. Access roads to the stormwater detention basin, soil stock pile areas, and along the site perimeter fence or along power lines are typical locations for these roads. In general, these roads will be constructed by removing loose materials and vegetation and compacting the underlying soils. No road surface gravels will be placed; however, provisions for surface water drainage, such as culverts and ditches, as well as, erosion control features will be included.

The truck staging area located at the south end of the facility entrance will provide space for waste haul trucks awaiting disposal approval. This area will be surfaced with gravel and will drain to the ~~surface~~ stormwater detention basin. Any localized spills will be cleaned up as required by the Contingency Plan presented ~~in Volume I~~ as Permit Attachment C.

Parking areas for site personnel vehicles will be designated near the administration trailer, chemical laboratory, ~~drum handling facility, stabilization facility,~~ and maintenance shop area. These areas are also likely be gravel-surfaced.

Traffic Control Features

Traffic control features incorporated in the site traffic plan include the main facility entrance gate, stop signs, posted speed limits, and warning and informational signs. Temporary road dividers such as K-rails (also known as California rails) are also often used to separate two-way traffic in high volume areas. Stop sign locations, as shown on Drawing No. 26, Traffic Plan, will serve to control traffic at main roadway intersections and at the various waste processing unit entrances. Speed limits will be posted on all roadways. The main facility road and unimproved access roads will be posted at 15 mph. Temporary construction haul roads will be posted at 35 mph. Additional signage will be posted to identify restricted areas, facility personal ~~protection~~ protective equipment (PPE) requirements, truck entrance areas, and facility names and access driveways.

Also shown on Drawing No. 26, Traffic Plan, are the emergency vehicle access lanes at the facility entrance. These lanes will remain clear at all times.

~~Individual Facility~~Landfill Traffic Patterns

~~The Drum Handling Facility entrance faces the north access road. Incoming trucks will enter the gravel lined apron and will back up to the loading dock areas. Once the truck unloading (or loading) operation is complete, the trucks will exit the facility via the same north access road. Parking areas for site personnel vehicles will be designated near the Drum Handling Facility Office. The gravel apron in front of the facility will not be used to stage waste haul trucks.~~

~~The Stabilization Facility has entrances for incoming trucks on both the north and south access roads. These accesses will be used for incoming waste trucks loaded with unstabilized waste for processing. Incoming trucks will enter the gravel lined apron on the north or south side of the facility and back into the stabilization building. Once the load has been dumped into the bin and the truck bed washed out, the truck will exit the facility via its entrance route. The east and west building entrances will be used by stabilized waste loadout trucks that will cycle between the truck roll-off area or the landfill. The gravel lined areas surrounding the stabilization facility will not be used to stage waste haul trucks. Parking areas for site personnel vehicles will be designated near the stabilization facility office.~~

~~Access to the liquid waste storage area is provided on the east, west, and north sides of concrete tank pads. Tanker trucks can use either the north access road or the road to the east of the liquid waste storage area.~~

~~The truck roll-off area can be accessed via the north or south access roads.~~

The landfill design incorporates three access ramps. The two northern ramps will be used by waste haul trucks and landfill operations equipment. These 30-foot-wide ramps will accommodate 2-way traffic when necessary; however, in general, the east ramp will be used for incoming traffic and the west ramp for exiting traffic. The third ramp located on the southern cut slope will provide access for earthmoving equipment involved with landfill expansion construction activities. Incoming waste haul trucks will be released from the truck staging area and use the south access road and northeast ramp to enter the landfill. Empty haul trucks will exit the landfill via the northwest ramp~~, pass through the truck wash facility, if necessary,~~ and exit the site via the north access road.

~~Evaporation Pond 1A and 1B truck discharge stations are accessible via the north and south access roads, respectively. Pond 1B will be used predominantly for day-to-day operations for incoming waste. However, the liquid levels in both ponds will be maintained at approximately the same level to maximize evaporation. Tanker trucks will enter Pond 1B discharge station turnout from the west, discharge their load, and can exit the site via the north or south access roads.~~

2.1.4 Facility Stormwater Control

Facility stormwater control is provided in the design by a network of surface water run-on and runoff diversion channels and collection and detention basins. These facilities ~~have~~ were~~been~~ designed to collect and contain the required 25-year, 24-hour storm event of 4.30 inches. Since the original permit was approved, the 25-year, 24-hour storm event increased from 4.30 to 4.39 inches. The rainfall-runoff analysis was recalculated with the new storm event and new peak discharges were calculated. The stormwater channels as previously designed can accommodate the increase in flow. The original ~~D~~diversion ditch calculations are presented in Appendix F (Volume VI of the Permit Application dated October 2000); the new analysis is provided in Permit Attachment L4.

Site Vicinity Drainage Pattern

The proposed site is located on the far eastern flank of the Pecos River Basin. The land surface gently slopes to the west at approximately 40 to 50 feet per mile toward the river. The sloping plain is characterized by low relief hummocky wind-blown deposits, sand ridges, and dunes. The Caprock escarpment (or Mescalero Rim)

is one of the most prominent topographic features in southeastern New Mexico. East of the proposed site, the escarpment has approximately 200 feet of relief. Upgradient sources of surface water flow are bounded by the Caprock escarpment. The U.S. Geological Survey (USGS) Topographic Maps (7.5 minute series) for Mescalero and Mescalero N.E. in Appendix F (Volume VI of the Permit Application dated October 2000) illustrate the topographic features and contributing surface water drainage areas pertinent to the site. The watershed associated with the east diversion channel encompasses an area of approximately 378 acres beginning at the Caprock escarpment and continuing down to the site's east property line.

Surface Water Run-On Diversion Channels

The east diversion channel located on the eastern edge of the landfill property line provides run-on control from the east watershed area. The remaining topography surrounding the site grades away from the site. The discharge location for this channel coincides with existing natural drainages to the north of the site as indicated on Drawing No. 25. The east diversion channel will remain in place after the landfill cover system is constructed.

Surface Water Run-Off Channels

To control the runoff from the facilities area, several collection channels and culverts were designed to divert the peak discharge from the 25-year, 24-hour storm event to a storm-water detention basin. The locations of the collection channels (Ditch 1 through 6), culverts, and detention pond are shown on Drawing 25. Channels 1 and 2 are located along the inside of the perimeter road at the toe of the final cover slope. The channels divert runoff from the final cover to channel 5 located at the northwest corner of the landfill. Channels 3 and 4 run along the outside edge of the perimeter road. Channel 3 collects the majority of runoff from the disturbed facilities areas immediately to the east and north of the landfill footprint. Channel 4 collects runoff from the west and south perimeter road. Both channels also discharge to channel 5 at the northwest corner of the landfill. Channel 5 collects the runoff from ditches 1, 2, 3, and 4 and conveys it to the detention pond. Channel 6 collects runoff from the facilities located near the entrance to the site and routes it to the detention pond.

Two ditches, Ditches 7 and 8, are located in the Phase 1A~~I~~ landfill. These channels are designed to divert runoff from unlined areas of the landfill to the clean water collection basin located in the south end of the landfill.

~~Two additional ditches (9 and 10) will be located around the evaporation ponds.~~

Surface Water Detention Basins

There will be three lined detention basins located on the site. The ~~surface~~ stormwater detention basin located in the northwest corner of the site is shown on Drawing No. 25. The clean stormwater collection basin located in the toe of the Phase 1A cut slope and ~~the~~ a ~~third~~ contaminated water basin, ~~which will be~~ located within the lined portion of Phase 1A ~~and will~~ extending from the waste fill slope to the clean stormwater collection basin berm, are shown on Drawing~~s~~ No. 10~~ and 13~~.

A berm has been included at the base of the access road to the stormwater collection~~retention~~ basin of Phase 1A to prevent access road runoff into the contaminated water basin.

Final Cover

The landfill Final Cover Grading Plan is shown on Drawings No. 21 and 22. An access road to the top of the landfill is located along the western side of the landfill. The surface water control ditch adjacent to the road will reduce erosion and control surface runoff of the cover. The ditch dimensions and details are shown on Drawings No. 25 and 27.

2.2 General Facility Design Analyses

2.2.1 Road Designs

Drawing No. 27, Main Facility Road Detail, illustrates the road dimensions, drainage slope, and road surface and subbase material types and thicknesses to be used in construction. Construction Specification Section 02225, Road Base, provides details regarding road construction materials and placement execution. Calculations presented in Appendix E (Volume V of the Permit Application dated October 2000) evaluate the main facility road design and specification relative to the expected traffic conditions identified in Table L-1. As described in the calculations, the main facility bearing capacity of 2,000 pounds per square foot (psf) is suitable for the expected traffic loading.

2.2.2 Facility Surface Water Control Design Analyses

All surface water calculations were conducted utilizing the SEDCAD+ computer model developed by Civil Software Design (~~63~~70). Channels were sized based on ~~the~~ Manning's equation for open channel flow. The methodology and assumptions used in the design of the surface water control system are presented in Appendix F (Volume VI of the Permit Application dated October 2000). Drawing No. 25 presents a layout of the surface water control plan and a schedule of channel and culvert dimensions and installation criteria.

Detention Basin Design Analyses

The ~~surface~~ stormwater detention basin is designed to contain the storm-water discharge from the entire active site area given flows from a 25-year, 24-hour storm event. In order to assess the required size of the surface water d~~r~~etention basin, a worst-case storm-water volume discharge area was identified. The worst-case scenario assumed that the final cover was in place and the runoff from the entire landfill footprint along with the runoff from the surrounding facilities area are all diverted to the basin. The total drainage area is approximately 265.5 acres. Of the 265.5 acres, 44 percent is assumed to be reclaimed and revegetated and the remaining 56 percent is considered to be disturbed. The total runoff was computed to be approximately 51.4 acre-feet (ac-ft). Total volume of the detention pond at the invert of the spillway is 66.1 ac-ft.

Erosion Control

Channels with flow velocities less than 5 feet per second (fps) from a 25-year event will not require erosion protection. Channels with peak flow velocities greater than 5 fps from a 25-year event but less than 5 fps from an average storm (2-year event) will also not utilize erosion protection. During average storm events these channels should be stable; however, during major storm events the channels may show signs of erosion in some areas. These areas will be repaired as required following all major storm events. Channels with peak flow velocities greater than 5 fps from an average storm will be lined with gravel or riprap, as required. ~~All e~~Channels are designed with 1 foot of freeboard.

To minimize sediment transport to receiving streams, the east diversion channel will be lined with gravel. ~~The channel was designed with 1 foot of freeboard.~~ A riprap apron will be constructed at the end of the ~~E~~east diversion channel to dissipate the flow before entering the natural channel ~~to help reduces~~ and mitigate erosion. The location and details of the discharge apron ~~is~~ are shown on Drawing No. 25. ~~Details of the apron are shown on Drawing No. 25.~~ Design calculations are shown in Appendix F (Volume VI of the Permit Application dated October 2000). Channels 7 and 8, which direct clean water runoff on the side slope of the landfill into the clean water collection~~detention~~ basin, will be lined with a high density polyethylene (HDPE) liner.

2.2.3 Operations and Maintenance

All of the regulated facilities will be constructed in accordance with the Design Drawings (Permit Attachment L1), Specifications (Permit Attachment L2), and Construction Quality Assurance Plan (Permit Attachment M).~~presented in Volume II, Appendix O of the Permit Application dated October 2000~~. In general, all maintenance and repairs to the facilities will be completed to meet the requirements of the original Design Drawings and Specifications and will be monitored in compliance with the ~~Construction Quality Assurance manual~~CQA Plan and Operations and Maintenance Plan (Permit Attachment N~~M~~).

3. Landfill

3.1 Landfill Design

3.1.1 General

Landfill design elements include ultimate and interim landfill layout and phasing; subgrade design; liner system design; and leachate collection system, leak detection system, and vadose monitoring sump design. ~~-~~This section describes each of these design elements. This permit application refers only to Phase 1A. However, potential expansions of the landfill to future phases have been included in the general layout drawings for completeness.

3.1.2 Landfill Layout and Phasing

The proposed landfill footprint illustrated on Drawing No. 4~~,~~ generally conforms to the most favorable area as previously described. The landfill footprint is divided into three phases (Phase 1, Phase 2, and Phase 3) with each phase having a separate leachate collection, leak detection, and vadose detection system. These phases will be further subdivided based on development sequencing and landfill waste receipt rates. The limits of Phase 1A~~-~~, the first area of the landfill to be developed, are shown on Drawings ~~Numbers~~ No. 8, 9, and 10. Details of the ultimate landfill configuration and the Phase 1A configuration are discussed below.

Ultimate Landfill Configuration

Drawings Nos~~.~~ 6, 7, and 22~~,~~ illustrate the ultimate configuration of the landfill for Phases ~~I~~1, ~~II~~ 2 and ~~III~~3. The landfill footprint defined by the crest line encompasses approximately 101 acres. The final cover area, which will extend~~s~~ 20 feet beyond the crest line, is approximately 107 acres. The final cover ~~area~~ for Phase 1A, including revegetation, is ~~approximately as~~ shown ~~i~~on Drawing No. 22.~~;~~ ~~n~~No waste will be placed outside of the crest line of the landfill, and leachate percolating vertically through the waste mass will be contained by the slope and floor liner systems.

The subsurface, or basal, portion of the landfill will be excavated to a depth of approximately 100 feet. At this depth, the floor and sumps of the landfill will be located in the Lower Dockum Unit (Drawing No. 7). All side slope angles are 3 horizontal: 1 vertical (3H:1V) and the base in each landfill phase grades approximately 3 percent with a minimum of 2 percent towards its respective sump area. The basal liner system anchor trench is located approximately 4 feet beyond the crest of the landfill (Drawing No. 12). Sumps are located at convenient locations in each phase to allow for subphase landfill development, to provide space for access ramps, and to maintain leachate collection system flow lengths capable of detecting a leak in a timely manner.

As shown on Drawings No. 7 and 22, the final cover system will reach a maximum elevation of approximately 4,205 feet. The cover system will crest at the mid-point of the landfill and will slope at 6 percent outwards. Slopes around the perimeter of the landfill will be 4H:1V.

Phase 1A Landfill Configuration

Phase 1A landfill development is illustrated on Drawings No. 8, 9, 10, and 11. The basal liner system will cover the entire north 3H:1V slope, the slopes below the access ramps, and most of the Phase 1A floor. Waste placement will occur only on lined areas as shown on Drawing No. 10.

Landfill access ramps located on the east and west sides of Phase 1A grade at 10 percent from the crest to the floor surface. The 30-foot-wide ramps can facilitate two-way traffic. Drawing No. 14~~,~~ illustrates the access ramp cross sections when waste placement takes place below the ramps and when waste placement takes place above the ramps.

Drawing No. 13~~,~~ shows slope runoff diversion ditches located along the access ramps that discharge into a collection basin positioned at the toe of the cut slope. This temporary stormwater control feature will collect runoff from unlined slope areas above the access ramp and from the cut slope area during Phase 1A waste filling. Clean water collected in the basin may be used for dust control within the landfill or may be pumped out of the basin and discharged into the site surface water control system.

3.1.3 Subgrade Excavation, Liner System, LCRS, LDRS, and Vadose Zone Monitoring System Sump Design

Subgrade Excavation

Drawing No. 6 shows the landfill excavation and structural fill contours._ The crest of the landfill generally follows the site's surface topography which grades from the southeast to the northwest. Fill areas along the south and west sides of the landfill combined with cut areas along the landfill's north side provide sufficient grade differences for perimeter drainage ditches to move stormwater runoff to the detention basin located in the northwest corner of the site. _Drawing No. 5 indicates the initial cut and fill areas that would be required for the initial site development. This would require grading around the perimeter of the landfill and in the waste processing areas.

Specification Section ~~No.~~ 02110, Site Preparation and Earthwork, describes site preparation, excavated soil classification and stockpiling, subgrade surface preparation and inspection, structural fill placement and compaction requirements, survey and quality control, and erosion control features.

Liner System

Drawing No. 12 shows the landfill basal liner components intended for the floor, slopes, and anchor trench areas. The landfill liner system is a double lined system consisting of (from bottom up) a prepared subgrade, a composite (geosynthetic clay liner and geomembrane) secondary liner, a geocomposite leak detection drainage layer, a primary geomembrane liner, a geocomposite leachate collection drainage layer, and a protective soil layer. Details of each liner component are discussed below:

- *6-inch thickness of prepared subgrade*

  The prepared subgrade component will provide a smooth stable surface suitable for placement of overlying geosynthetic materials. Specification Section 02119, Prepared Subgrade, presents subgrade material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.

- *16-foot compacted clay liner (CCL) around landfill perimeter*

  During excavation, Quaternary Sands will be exposed around the perimeter of the landfill to depths ranging from 2 to 10 feet. As shown on Drawing No. 23, 16 feet of ~~horizontal thickness of this~~ sand material, measured laterally, will be removed and replaced with a compacted CCL component. The

purpose of the CCL is to provide the liner with enhanced water barrier qualities in the Quaternary Sand areas. The CCL will be extended into the Upper Dockum Unit to a depth of at least 2 feet. The CCL (permeability, ~~k~~K ~~≤~~less than or equal to 1 x 10^{-7} cm/s) in combination with the overlying GCL described below will serve as a low permeability barrier layer to restrict infiltration of leachate into the subgrade. The CCL will consist of clay material (soils classified as CL or CH by the Unified Soil Classification System [USCS]) obtained during excavation of the landfill and surface impoundment. Specification Section 02221, Clay Liner, describes clay material requirements, including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements. Soil liner leachate compatibility tests (ASTM D5084) will be conducted prior to construction. In addition, a test fill will be constructed, as per the procedures outlined in the CQA Plan (Permit Attachment M). The results of the permeability testing performed in compacted samples are shown in the appendices.

- *Geosynthetic clay liner (GCL)*

The GCL will serve as a low permeability (~~k~~K ~~≤~~less than or equal to 5 x 10^{-9} cm/s) barrier layer to restrict infiltration of leachate into the subgrade. The GCL type used will consist of bentonite granules sandwiched between two layers of geotextile. The upper geotextile will be a non-woven 6-ounce~~z.~~ material and the lower geotextile will be a woven 4 ounce~~z.~~ material. Specification Section 02780, Geosynthetic Clay Liners, describes minimum GCL properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material construction quality assurance (CQA).

Site specific compatibility tests (ASTM D5084) will be conducted prior to operations.

Manufacturer published information on the compatibility of the GCL with typical leachate materials is provided in Appendix H-5 (Volume VI of the Permit Application dated October 2000).

- *60-mil-thick ~~high density polyethylene (~~HDPE~~)~~ geomembrane liner (textured on both sides)*

The 60-mil HDPE liner placed on top of the GCL is the second component of the composite secondary liner. Together, the GCL and HDPE liner form a highly efficient barrier layer to restrict percolation of leachate into the subgrade (see Section 3.2.7, HELP Modeling). HDPE texturing increases the friction angle between the geomembrane and the underlying and overlying geotextile liner elements. Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material construction quality assurance. Section 3.2.1~~,~~ discusses slope stability analyses for the landfill liner system.

Site-specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility. Manufacturers' Published Information on the compatibility of the HDPE with typical leachate materials is provided in Appendix H-4 (Volume VI of the Permit Application dated October 2000).

- *Geocomposite leak detection drainage layer (transmissivity ~~≥~~greater than or equal to 2.2 × 10^{-4} square meters per second [m^2/s] as tested under actual field conditions) consisting of:*
  - A 7 ounce~~z.~~ geotextile (non-woven)
  - A geonet
  - A 7 ounce~~z.~~ geotextile (non-woven)

The high-transmissivity geocomposite leak detection drainage layer provides a means to transmit and remove leachate percolating through any leaks in the primary geomembrane layer above. The upper

and lower geotextiles serve to filter sediments from the leachate and cushion the geomembranes, respectively. Flow calculations discussed in Section 3.2.8 and presented in ~~Appendix G~~ Permit Attachment J indicate that the geocomposite, in combination with the centrally located 8-inch-diameter drain pipe, are capable of removing leachate in a timely manner such that head on the underlying geomembrane will remain less than 1 foot. Specification Section 02710, Geocomposite, describes minimum geocomposite properties required, material transportation and handling procedures, deployment and seaming requirements, and material ~~construction quality assurance (~~CQA~~)~~.

The arrangement for the 8-inch-diameter drain pipes and surrounding drainage gravel and filtration geotextile, which are located in the floor of the leak detection layer and the leachate collection layer, are illustrated on Drawing No. 12. Specification Section 02714, Filter or Cushion Geotextile, describes minimum geotextile properties required, material transportation and handling procedures, deployment and seaming requirements, and material CQA.

Calculations demonstrating the leak detection system performance capabilities are presented in Section 3.2.7, HELP Modeling and Section 3.2.8, Leachate Collection and Removal, Leak Detection and Removal, and Vadose Monitoring System Hydraulic Analyses.

- *60-mil-thick HDPE geomembrane liner (textured on both sides)*

  This HDPE geomembrane serves as the primary barrier layer of the double liner system. Specification Section 02775, Geomembrane Liners, discussed above also applies to this geomembrane layer.

  Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility. Manufacturers' published information on the compatibility of the HDPE with typical leachate materials is provided in Appendix H-4 (Volume VI of the Permit Application dated October 2000).

- *Geocomposite leachate collection and removal drainage layer (transmissivity ~~≥~~greater than or equal to 2.2×10^{-4} m^2/s as tested under actual field conditions) consisting of:*

  - A 7 ounce~~z.~~ geotextile (non-woven)
  - A geonet
  - A 7 ounce~~z.~~ geotextile (non-woven)

  This geocomposite layer serves as the primary leachate collection and removal system. Leachate percolating through the overlying waste fill will drain through the geocomposite to the central drain pipe and then flow to the leachate collection sump where it will be removed via the slope riser pipes. This material is the same used in secondary leak detection layer. The floor drain pipe arrangement is also the same.

  Primary geocomposite flow calculations are presented in Appendices E and G (Volume VI of the Permit Application dated October 2000), and the performance demonstrations are provided in the HELP Modeling discussed in Section 3.2.7.

- *2-foot-thick protective soil layer*

  A 2-foot-thick protective soil layer will be placed above the primary leachate collection geocomposite. The protective soil layer will extend over all lined floor and side slope areas. The purpose of the soil layer is to protect the underlying geosynthetics from damage due to vehicle traffic or from waste debris settlement. Specification Section 02716, Protective Soil Layer, describes material requirements

including particle size, placement requirements, and survey and field quality control requirements. This soil layer will be placed during construction of the liner system.

3.1.4 ~~Leachate Collection and Removal~~LCRS, ~~Leak Detection and Removal~~LDRS, and ~~Vadose Monitoring~~VZMS Sumps ~~Systems~~

The leachate collection and removal system (LCRS), leak detection and removal system (LDRS), and vadose zone monitoring systems (VZMS) each have a separate sump from which fluids can be collected and removed. The liner systems on the landfill floor continue into the sumps, however, in order to provide adequate volume to efficiently operate removal pumps, gravel thicknesses are incorporated into the drainage systems. Also, because liquids may be present, clay soil liner components have been added below the primary geomembrane liner and below the secondary GCL liner. These clay soil liner elements are not required by the regulations but are added to enhance the barrier qualities of the liner elements in the sump. Drawings describing the sump arrangements in Phase 1A include Drawings Nos. 15, 16, 17, and, 18. As shown on the drawings, the sumps are square pyramidal shapes which lie concentrically above one another. The slope riser pipes enter their respective sumps at the sump base and are horizontally offset to provide adequate space for slope riser trenches. The slope riser trench arrangement enables the vadose and leak detection slope riser pipes to penetrate overlying geosynthetic liner elements at the crest of the landfill rather than in the sump area. The leachate collection riser pipe lies on top of the primary geomembrane and therefore no liner penetration is required. Table L-2~~, Landfill Sump Arrangement Summary, below~~ lists the dimensions, volumes, flow capacity, slope riser pipe dimensions, pump type and capacity, and fluid level instrumentation included in each of the sumps. Performing curves for the proposed pumps are shown in Appendix H-1 (Volume VI of the Permit Application dated October 2000).

Table L-2. Landfill Sump Arrangement Summary

	LCRS	LDRS	~~Vadose~~VZMS
Fluid capacity [a] (gallons)	102,900	16,840	1,965
Pipe dimensions (length/diameter)	30 ft/18 in	15 ft/18 in	10 ft/12 in
Flow capacity [b] (gallons per day)	618,480	135,400	For detection
Pump type/capacity [c] (gallons per minute [gpm])	Grundfos/50 gpm	Grundfos/50 gpm	Grundfos/25 gpm
Fluid level instrumentation	Yes	Yes	Yes

[a] 0.3 x net volume accounts for gravel space.
[b] Determined from Dupuit-Forcheimer equation for flow from the sump gravel to collection pipe.
[c] Expected pump type and flow capacity for side slope riser.

LCRS Vertical Riser

In addition to its side slope riser, the LCRS sump also has a vertical riser which will extend from the LCRS through the waste fill and final cover system to the surface. The vertical riser is a redundant design feature ~~which~~ that provides ~~an~~ additional access to the LCRS sump whereby a second pump can be added to rapidly increase leachate removal rates. As shown on Drawings No. 17 and 20, the vertical riser arrangement consists of three pipes and three vertical riser pipe pads. The innermost pipe is an 18-inch-diameter stainless steel pipe that rests on an HDPE flatstock and extends from the bottom of the LCRS sump through an opening in the concrete vertical riser pad above. Because this pipe is not attached to the concrete pad, any settlement that the concrete pad incurs will not be transferred to the pipe. The concrete vertical riser pad rests on the LCRS gravel and provides support for the second pipe which will extend through the waste fill to the surface. This pipe is wrapped with a double layer of HDPE. This arrangement isolates the pipes from the surrounding

waste~~soils~~, which reduces downdrag forces resulting from waste settlement. Calculations that evaluate the downdrag forces and structural design of the concrete vertical riser pad are included in Appendix E (Volume VI of the Permit Application dated October 2000).

Crest Riser Pad Arrangement

Drawing No. 19 illustrates the slope riser piping and valving, the double-lined 9,000-gallon polyethylene tank (poly tank) system for leachate storage, and the concrete containment pad. Also indicated are high and low level tank cutoff switches, flexible piping connections between the inner and outer poly tanks, the fluid level sight gauge, 50 gallons per minute (gpm) leachate discharge pump and control panel locations.

The double-lined poly tank consists of two tanks, one inside of the other. The inner tank will have a capacity of 9,000 gallons and the outer tank will have a minimum capacity of 15,500 gallons. ~~Liquids containing solvents such as MEK, toluene, xylene, diesel, or gasoline in concentrations greater than 15 percent will not be placed in the tanks.~~ Tank tie-down details have been provided by the manufacturer and are included in Appendix H-2 (Volume VI of the Permit Application dated October 2000). A chemical resistance chart for the tanks is provided in Appendix H-3 (Volume VI of the Permit Application dated October 2000).

The concrete containment pad will slope towards the landfill crest. The leachate storage tank and containment pad are a connected, integral component of the landfill and are considered part of the regulated unit. A concrete pad will be placed in the loading/unloading areas for ~~the~~ tanker trucks. This pad will be sloped providing drainage toward the sump areas. Calculations on the bearing capacity of the concrete pad are detailed in Appendix E-35 (Volume VI of the Permit Application dated October 2000). Should a catastrophic failure of the tank or piping system occur, leachate will flow back into the landfill leachate collection system rather than be released to unlined areas. The landfill liner system anchor trench will completely encompass the pad so that any leakage through the pad will also drain back into the landfill leachate collection system. Construction details for the concrete containment pad are called out in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete.

3.1.5 Waste Filling Sequence

As mentioned previously in Section 3.1.2, landfill development will begin in Phase 1A, proceed southward into Phase 2, and then finish in Phase 3. The extent of landfill subphases will be based on waste receipt rates.

Liner installation in Phase 1A will take place in two stages: the slope and floor area below the access ramps and the slope area above the access ramps. The initial stage of the Phase 1A liner installation will consist of liner placement below the access ramps and is the only portion relevant to this permit application. The approximate area that will be lined during the Phase 1A construction is 14.9 acres which is delineated on Drawing No. 10.

Detailed planning for Phase 1B, Phase 2, and Phase 3 liner installation, access ramp location, and waste fill sequencing will be determined and permitted in the future; however, the ultimate landfill configuration will be developed as follows. Once the waste fill approaches the Phase 1A limits defined in Drawing No. 10, the cut slope will be advanced southward into Phase 2 and the remaining floor and slope areas of Phase 1 will be lined. At this time, the stormwater collection basin in the landfill will be removed from Phase 1 and reestablished in Phase 2. Waste filling in Phase 1 will continue during this liner expansion. As the waste fill extends beyond and above the access ramps, a ramp will be established in the south waste fill slope to provide access to the newly lined floor areas of Phase 1. Waste filling will take place in 5- to 10-foot-thick horizontal lifts. Waste will be covered with daily cover soil as soon as practicable following waste placement (and minimally at the end of each operating shift). Daily cover soil thicknesses will be at least 0.5 foot.

3.1.6 Final Cover

Drawings No. 21, 22, and 23 illustrate the landfill's ultimate waste fill configuration and final cover design. The final cover system is a composite cover consisting of (from top down) a vegetative cover, a geocomposite drainage layer, a geomembrane layer, a geosynthetic clay layer, a prepared subgrade layer, and a cover soil layer. -Details of each component of this 4.5-foot-thick cover system are discussed below.

- *2.5-foot-thick vegetative cover*

  The vegetative cover will provide a substrate for plant growth on the cover surface and protect the underlying geosynthetics from frost and sun exposure damage. Establishment of plant growth will enhance evapotranspiration of precipitation that soaks into the vegetative cover and will reduce soil erosion due to rainwater runoff. Specification Section 02227, Vegetative Cover, discusses vegetative cover material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements. Specification Section 02900, Vegetation and Seeding, identifies seed mixtures, site preparation, and planting requirements for cover vegetation.

- *Geocomposite drainage layer (transmissivity $\geq 2 \times 10^{-4}$ m^2/s) consisting of:*
  - A 7 ~~oz.~~ounce geotextile (non-woven)
  - A geonet
  - A 7 ~~oz.~~ounce geotextile (non-woven)

  The high-transmissivity geocomposite drainage layer provides a means to transmit and remove precipitation percolating through the vegetative cover above. The upper and lower geotextiles serve to filter sediments from the rainwater and cushion the geomembrane below. Flow calculations discussed in Section 3.2.7 and presented in Appendix E (Volumes V and VI of the Permit Application dated October 2000) indicate that the geocomposite, in combination with the vegetative cover above, is capable of removing 99 percent of the precipitation falling on the cover. Specification Section 02710, Geocomposite, describes minimum geocomposite properties required, material transportation and handling procedures, deployment and seaming requirements, and material CQA.

- *60-mil-thick HDPE geomembrane (textured on both sides)*

  The 60-mil HDPE liner placed below the geocomposite drainage layer and on top of the GCL is the primary barrier layer of the cover system. Together with the underlying GCL, the HDPE geomembrane forms a highly efficient barrier layer to restrict percolation of rainwater into the waste fill (see Section 3.2.7, HELP Modeling). HDPE texturing serves to increase the geocomposite/geomembrane/GCL friction angles to enhance slope stability. Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material CQA.

  Site-specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility. Manufacturers' published information on the compatibility of the HDPE is presented in Appendix H (Volume VI of the Permit Application dated October 2000).

- *Geosynthetic clay liner (GCL)*

  In conjunction with the overlying HDPE geomembrane, the GCL will serve as a low permeability (~~k~~K ~~≤~~less than or equal to 5×10^{-9} cm/s) barrier layer to restrict infiltration of precipitation runoff into the waste fill. The GCL type used will consist of bentonite granules sandwiched between two

layers of geotextile. The upper geotextile will be a non-woven 6 ~~oz.~~ounce material and the lower geotextile will be a woven 4 ~~oz.~~ounce material. Specification Section 02780, Geosynthetic Clay Liners, describes the minimum GCL properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, material construction quality assurance.

Manufacturer published information on the compatibility of the GCL with typical leachate materials is provided in Appendix H-5 (Volume VI of the Permit Application dated October 2000).

- *6-inch-thick prepared subgrade layer*

  The prepared subgrade component will provide a smooth stable surface suitable for placement of overlying geosynthetic materials. Specification Section 02119, Prepared Subgrade, presents subgrade material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.

- *2-foot-thick cover soil layer*

  The cover soil layer placed on the surface of the waste fill serves to isolate the waste and any near surface debris from the overlying cover elements and also provides a base for the prepared subgrade layer. Specification Section 02226, Cover Soil, presents material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.

As shown on Drawing No. 23 the final cover system will extend ~~24~~ 20 feet outside the crest of the landfill. In addition, the waste fill terminates inboard of the crest line. Rainwater that percolates through the vegetative cover will flow in the cover system's geocomposite layer to the drainage pipe located in the cover anchor trench. The water will then be discharged to the landfill perimeter drainage ditch system. Rainwater that percolates through the cover system and comes in contact with the waste will flow vertically downward and be captured in the LCRS.

Prior to closure of the landfill, an assessment will be made of the landfill waste gas generating potential. If it is concluded that gas generation may result in gas build-ups beneath the barrier layer of the cover or releases following closure exceeding regulator air quality standards, then provisions will be made to collect and monitor gas generation and release during the post-closure period. If this occurs, the latest technology available will be implemented into the construction of the cover system.

Drawing No. 22 indicates the location of the cover access road and surface water diversion ditches. Traffic on the cover access road will be limited to light vehicles such as pick up trucks. Surface water drainage ditches on the cover are included to reduce runoff flow lengths and thereby reduce surface soil erosion. Sections 3.2.10 and 3.2.11 discuss ditch sizing and cover soil erosion, respectively.

Waste settlement impacts on the 6 percent and 4H:1V cover slopes are discussed in Section 3.2.2.

3.1.7 Landfill Clean Stormwater Control Features

Drawings No. 8 through ~~13,~~ 14, 22, 24, and 25 illustrate the landfill's clean stormwater control features designed to contain and control rainwater runoff and run-on for the required 25-year, 24-hour storm event. These features include the landfill's stormwater collection basin and slope runoff drainage ditches, cover system drainage ditches, perimeter drainage ditch, and the culverts and drainage ditches leading to the stormwater detention pond. The clean stormwater control features are designed to minimize the quantity of water that contacts or potentially contacts waste material in the landfill. Clean stormwater collected within the Phase 1A landfill excavation, but not within the lined waste disposal cell, will be discharged to the site-wide

surface water control system. The systems designed to contain and manage contaminated stormwater and leachate within the Phase 1A landfill are described in Sections 3.1.8 and 3.1.9.

During the Phase 1A waste filling, runoff from the slope areas above the access ramps and from the cut slope area will be diverted to the HDPE lined collection basin located near the toe of the cut slope on the floor of the landfill. HDPE lined diversion ditches located on the side of the access ramps will carry slope runoff to the stormwater collection basin. The landfill perimeter ditches located on either side of the perimeter road will intercept runoff from areas outside of the landfill and divert this water to the stormwater detention basin. ~~. Runoff from active waste filling area will drain to the contaminated water basin at the south end of the landfill. The contaminated water basin is not its own separate entity, but is a part of the Phase 1A landfill that will not initially receive waste. The layout of the contaminated water basin is shown on Drawing Nos.: 10, 11, 13, and 24. Since the contaminated water basin is only a portion of the landfill set aside to store stormwater, it will not be removed as the landfill is expanded to the south. Rather waste will be placed over the top of the contaminated water basin.~~

During the operational period of future Phases 2 and 3, when the final cover system is partially installed in some areas and waste filling continues to take place in other areas, runoff from the final cover will be diverted to the ~~surface~~ stormwater detention basin. Following the post-closure period, after the effectiveness of the landfill cover has been demonstrated, the ~~surface~~ stormwater detention basin will be removed from service and the area will be regraded to its approximate predisturbance state. Runoff from the landfill cover will be allowed to flow into the natural drainages which existed prior to construction.

Section 3.2.10~~4.2.8~~ summarizes surface water calculations performed to size the landfill's stormwater control features. The calculations are presented in Appendix F (Volume VI of the Permit Application dated October 2000).

3.1.8 Landfill Contaminated Stormwater Control Features

Drawings No. 8 through 14 and 24 illustrate the landfill's stormwater control features designed to contain and control ~~rainwater~~ stormwater runoff and run-on and isolate potentially contaminated runoff from clean runoff for the required 25-year, 24-hour storm event. Contaminated or potentially contaminated stormwater within the Phase 1A landfill is collected within the lined contaminated water basin. Runoff from the active waste filling area will drain to the contaminated water basin at the south end of the landfill. When the Phase 1A landfill has been filled to the maximum extent, the contaminated water basin has a minimum storage capacity of 17 acre-feet. At earlier stages of filling, the basin is larger, providing greater storage capacity.

The contaminated water basin is not its own separate entity, but is a part of the Phase 1A landfill that will not initially receive waste. The layout of the contaminated water basin is shown on Drawings No. 10, 11, 13, and 24. Because the contaminated water basin is only a portion of the landfill set aside to store stormwater, it will not be removed as the landfill is expanded to the south; rather, waste will be placed over the top of the contaminated water basin.

Section 3.2.10 summarizes surface water calculations performed to size the landfill's stormwater control features. The calculations are presented in Appendix F (Volume VI of the Permit Application dated October 2000).

3.1.9 Leachate and Contaminated Stormwater Recirculation Evaporation System

Leachate and contaminated stormwater generated from precipitation falling within the Phase 1A landfill waste disposal area will be managed by recirculation and enhanced evaporation within the regulated unit. The

stormwater will be applied to the protective soil cover through a piping and sprinkler network. Tanker trucks may also be used to apply water for dust control on the landfill roads and cover soil.

Modeling of recirculation rates was performed to determine the viability of recirculation of contaminated stormwater and possible effects on the volume of stormwater entering the leachate collection system. Model approach, assumptions, input files, and results are presented in Permit Attachment L5. The UNSAT-H model was used to evaluate potential for stormwater recirculation, specifically to estimate the increase in water percolation through the daily cover and waste. UNSAT-H uses daily climate data, including the added application of recirculation water, and soil and water hydraulic properties to compute evaporation, runoff, moisture storage, and percolation through the waste and soil profile. The model used several conservative conditions, including only one layer of waste and daily cover and use of climate data for the second wettest precipitation year on record. In the model, stormwater application rates are limited to 0.5 inch per day. The recirculation of stormwater adds approximately 50 percent additional water application to the precipitation rate in a given year.

The modeling results show that during average years, with annual precipitation around 11.7 inches, no increase in leachate is expected. For extremely wet years, the model results indicate that there is an increase in stormwater movement through the daily cover and waste to the leachate collection, but well within the design flow capacity of the LCRS. Leachate generation rates in arid climate landfills typically decrease as the thickness of waste placement increases. The modeling results show that the recirculation system can be used effectively to manage stormwater runoff and leachate within the lined landfill cell during the early portion of waste placement under conditions of either average or extremely wet precipitation conditions.

3.2 Landfill Design Analyses

3.2.1 Slope Stability

Cut Slope Stability

Prior to filling, unsupported cut slopes will exist on all sides of the landfill. These slopes were analyzed for static and dynamic stability using the Janbu Simplified Method. A computerized slope stability program (XSTABL) was used to analyze the cut slopes (51~~44~~). Strength parameters used for soil and rock materials were estimated using design overburden pressures and plasticity index data gathered from laboratory testing of site soil materials correlated to published data (53~~46~~). The material properties used in the analyses are summarized in Calculation ~~No.~~ E-1, presented in Appendix E (Volume V of the Permit Application dated October 2000).

The site grading plans (Drawings No. 5 and 6) indicate that the maximum cut slopes will be 3H:1V and maximum height will be approximately 100 feet. Results for the critical 3H:1V slope indicate a static factor of safety of 1.4 for the critical short term (undrained) condition. Stability during seismic loading was estimated by applying a pseudo-static earthquake force in the Janbu analysis. Results based on the 0.04 g design acceleration indicate a dynamic factor of safety of 1.2 for the short term (undrained) condition.

The stability of the outward slopes was also evaluated. Results indicate a static factor of safety of 1.3 and a dynamic factor of safety of 1.1. These slopes were analyzed using Bishop's Method (Appendix E-34).

The temporary cut slope along the south side of Phase 1A was analyzed using Bishop's Method giving a static factor of safety of 1.1 (Appendix E-37 [Volume VI of the Permit Application dated October 2000]).

Waste Fill Stability

Waste fill stability was considered for both the Phase 1A and ultimate landfill configurations. In both cases, a face failure through the waste and along the lining system, and a basal failure along the lining system was considered. The analysis assumed a 4H:1V waste fill slope and floor at design base grades. The Sarma analysis method was used to calculate factor of safety and acceleration coefficient (Kc). Kc is the net acceleration that would have to be applied to a slide mass to initiate movement.

Phase 1A Waste Fill Stability

Critical inputs for the Phase 1A stability analysis were as follows:

- *GCL, saturated undrained condition: friction angle = 2° and C=440 psf*

  Based on testing performed by Geosyntec Inc. using actual site soils and a needle punched GCL, the critical failure interface under saturated conditions occurs in bentonite layer between the geotextile components of the GCL. It should be noted that this value is highly conservative since the GCL is most likely to remain in an unsaturated state during the life of the landfill. Additionally, the type of GCL tested was the needle punched variety. Other types of GCLs with stitching between the geotextile components offer substantially greater interface shear strengths.

- *Design ground acceleration = 0.04 g*
- *Waste friction angle ϕ = 29° (29)*
- *Design fill configuration shown on Drawing No. 10*

Results of the Phase 1A analyses presented in Calculation No. E-3, Phase 1A Filling Plan Stability, indicated a static factor of safety of 1.5 and a dynamic factor of safety of 1.0. These factors of safety are considered acceptable for the interim fill configuration of Phase 1A.

Ultimate Landfill Configuration Waste Fill Stability

The ultimate landfill configuration analyses used same liner interface strength inputs as the Phase 1A evaluation and the final waste configuration shown on Drawing No. 22. Results of the ultimate configuration waste fill stability analyses presented in Calculation No. E-4, Ultimate Filling Plan Waste Stability, indicated a static factor of safety of 3.7 and a dynamic factor of safety of 1.5. These factors of safety are considered acceptable for the ultimate waste fill configuration.

Protective Soil Layer Stability

An infinite slope model approach was used to evaluate the stability of the protective soil layer on the 3H:1V landfill slopes which considered the loading scenario of the protective soil layer only, and a loading scenario with a D6 dozer (9.8 pounds per square inch [psi] track loading [~~16~~17]) on top of the protective soil. The analysis considered saturated and undrained soil conditions. The soil/geotextile interface shear strength was based on a friction angle of 31° and an adhesion of 15 psf obtained from interface shear tests. Results of the analyses indicated a static factor of safety of 2.0 for the soil only case and a static factor of safety of 1.8 for the case with the dozer loading. Both factors of safety are considered acceptable. Calculation ~~No.~~ E-2, Protective Soil Layer Stability, is presented in Appendix E (Volume V of the Permit Application dated October 2000).

Cover Stability

The cover system stability analysis focused on two potential failure mechanisms: a deep block failure through the waste and along the basal liner system, and an infinite slope failure within the cover system. Both stability analyses were conducted for static and dynamic conditions assuming undrained soil conditions. The block failure analysis assumed a zero head condition on the liner system while the infinite slope failure analyses

considered a zero head condition and a head condition of 2.5 feet in the cover. As with other stability analyses, a design ground acceleration of 0.04 g, waste friction angle of 29°, and liner interface strength of $\phi = 2°$ and c = 440 psf was assumed.

Results of the analyses indicated a static factor of safety of 2.8 and dynamic factor of safety of 1.5 for the deep block failure. The infinite slope analyses indicated a static factor of safety of 10.9 and dynamic factor of safety of 6.5 for the zero head condition and a static factor of safety of 5.2 and dynamic factor of safety of 3.1 for the 2.5 feet head condition. All of these factors of safety are considered acceptable. Calculation E-5, Cover Stability, is presented in Appendix E (Volume V of the Permit Application dated October 2000).

3.2.2 Settlement

Subgrade Settlement

Total settlement of the landfill base due to settlement of the subgrade and prepared subgrade layers was calculated to ensure that the base liner grades did not fall below EPA's recommended minimum of 2 percent.

Subgrade settlement was modeled assuming the subgrade behaves as an elastic medium (33~~30~~). This assumption implies that any settlement occurs during placement of a given load. Therefore, settlement in the subgrade should occur during the operating life of the landfill and post-closure settlement should be negligibly small. The most important parameter used in this analysis is the elastic modulus of the subgrade. The elastic modulus used was 72,000 kips per square foot (ksf) which was obtained from conservative estimates for unweathered mudstone (35~~32~~). The maximum calculated settlements near the center of the landfill are expected to be on the order of 5 inches. Settlement should progressively decrease towards the toe of the sideslopes. These settlements are not expected to result in any excessive stress in the liner system. Details of the subgrade settlement analysis are presented in Calculation E-9 in Appendix E (Volume V of the Permit Application dated October 2000).

Final Cover Grades Due to Waste Settlement

As previously mentioned, waste placed at the Facility will consist of hazardous waste which contains no free liquids. All drummed solid material and lab packs will be stacked horizontally in rows within the landfill and the voids between drums filled with compacted bulk wastes. Bulk waste filling will take place in 5- to 10-foot-thick horizontal lifts. Waste will be covered with daily cover soil as soon as practicable following waste placement (and minimally at the end of each operating shift). Daily cover soil thicknesses will be at least~~range from 0.2 to~~ 0.5 foot.

EPA guidelines (61 and 62~~54 and 55~~) suggest a minimum of 3 percent for final cover grades on hazardous waste landfills. The proposed 6 percent initial design cover grade was analyzed to determine the maximum settlement factor to maintain the final 3 percent grade after settlement. The calculated maximum settlement factor was 7 percent. The analysis assumed that the waste settlement is uniform. Calculation E-11, Waste Settlement, presents waste settlement computations in Appendix E (Volume V of the Permit Application dated October 2000).

EPA estimates, based on finite element modeling, indicate that settlement factors of 11.5 percent are appropriate for hazardous waste landfills (43~~38~~). This model considered that the most significant portion of the waste would be solidified material buried in steel drums, with the drums having a maximum allowable void space of ~~ten~~10 percent. This model may not be applicable to the Triassic Park Facility because there should be less void space in the waste than that assumed for the model.

In order to mitigate this potential discrepancy between the suggested 11.5 percent and calculated 7 percent, the post-closure waste settlement of Phase 1A should be monitored. The monitoring results will be

compared to the estimated settlement factor of 7 percent. If settlement is greater than 7 percent, cover grades of subsequent phases will be steepened to accommodate the settlement and maintain the minimum 3 percent final grade.

3.2.3 Geosynthetics Strength and Performance Analyses

Geomembranes

Settlement Induced Stress

The maximum settlement will occur at the base of the cell slopes where the waste load is highest. The subgrade settlement is estimated to be approximately 0.5 foot. This settlement will vary from this calculated maximum at the slope toe to zero at the slope crest. Resulting stresses of 65 psi in the geomembrane are much lower than the 2200 psi geomembrane yield stress. Differential settlement is therefore not expected to damage the liner (38~~—34~~). Details of the liner stress analysis are presented in Calculation E-12, Settlement Induced Stress (Volume V of the Permit Application dated October 2000).

Thermal Induced Stress

Due to the 2-foot-thick protective soil layer above the liner, the 60-mil HDPE geomembrane liner will not be subject to extended periods of contraction and expansion from daily temperature differentials. Temperature restrictions for installation of geomembrane are discussed in Specification Section 02775.

Tear and Puncture

All geomembranes in the landfill liner and cover system are overlain by at least one layer of geotextile. Review of the puncture resistance of the geotextiles indicates a worst case factor of safety of 3.5 (see Calculation E-17, Geomembrane Puncture Resistance in Landfill and Calculation E-21, Puncture Resistance of Geotextile/Geocomposite [~~33~~37]). Therefore, the proposed 60-mil HDPE is adequate to resist puncture stresses.

Geocomposites

The geocomposite is intended to act as a lateral drainage layer in both the LCRS and the LDRS. The geonet in the core of the geocomposite is the drainage media and the overlying and underlying geotextile act as filters. The primary design criterion~~a~~ of the geocomposite is the transmissivity. As part of the design process the typical transmissivity values reported in the literature and by manufacturers have been reduced to account for clogging of the geotextile, penetration of the geotextile in to the geonet, and creep of the geonet.

In order to confirm the actual transmissivity of the material that arrives on the site, the specifications require that the material be tested as part of the conformance testing program. The specific test methods, including backing materials, normal loads, seating times, gradients, and test durations, are detailed in the specifications and meet actual design conditions (57~~55~~).

Geotextiles

Geotextile Filtration

Geotextiles are used in a number of locations in both the liner and cover sections for filtration. Specifically, the geotextiles act as filters between the clay liners and drainage layers or between the granular leachate collection material, protective soil cover or general fill and a drainage layer. All of the soil materials expected to be used for either the liners, covers, protective soil cover or general fill are conservatively expected to be fine grained with more than 50 percent of the material passing the Number 200 sieve.

The design criteria outlined by Task Force 25 (34~~31~~) indicated that for soil material with more than 50 percent passing the #200 sieve, the apparent opening size (AOS) of the geotextile should be less than 0.297 mm. The current geotextile specifications require that the AOS is less than 0.212 mm. Therefore, the geotextile should

adequately retain any of the on-site soils. Calculation E-20, Geotextile/Geocomposite filtration, compares specified material AOS values to site soil analyses results.

Geotextile Cushion

The puncture resistance during installation of the proposed geotextile materials was analyzed. The analysis, which used standard design equations (~~33~~37), was based on the maximum ground pressure exerted by construction equipment, the largest average aggregate size that will be in contact with the geotextile, and the minimum puncture strength properties specified in the General Specifications. Based on these parameters the calculated safety factor for puncture is 3.6, which is acceptable (see Calculation No. E-21, Puncture Resistance of Geotextile/Geocomposite [Volume V of the Permit Application dated October 2000]).

Geosynthetic Clay Liner

No specific design analyses were conducted on the GCL other than determining the interface friction angle of the material in the liner and cover section. The GCL has a specified permeability of 5 x 10^{-9} cm/s which exceeds EPA's criteria of 1 x 10^{-7} cm/s. Detailed specifications for the GCL are presented in the specifications. The critical parameters for the GCL will be confirmed through a conformance testing program on the material that is delivered to the site.

Geosynthetics Leachate Compatibility

Specific leachate compatibility tests have not been conducted on the soil or geosynthetic liner components for the Triassic Park facility. These tests have not been conducted at this time, because the specific manufacture of the liner components has not been selected and there is not a representative leachate available for testing. EPA (~~55~~57) recommends that compatibility testing be done on the specific (manufacturer and resin type) liner materials selected for use in a facility and a representative leachate for the facility. Therefore, it is proposed that testing be completed prior to construction once the geosynthetic materials have been selected. Because the facility will not be in operation, a representative leachate will not be available. However, as recommended by EPA (~~55~~57), market studies can be used to characterize expected waste streams and a synthetic leachate can be developed for use in compatibility testing.

Although compatibility has not been completed, it is expected that the geosynthetic materials selected for the liner and leachate collection system for the Triassic Park Facility have a long track record of successful use at a variety of waste disposal facilities (both municipal waste and hazardous waste) across the U.S. Therefore, it is not expected that there will be any compatibility issues that would impact the current design. However, as mentioned above, site specific testing will be completed and the results submitted to NMED for approval prior to construction. Supporting information on the compatibility of the HDPE and GCL components of the lining system with various leachates is presented in Appendix H (Volume VI of the Permit Application dated October 2000).

3.2.4 Sump Compacted Clay Liner

In the sump base a compacted clay liner (CCL) will be placed in addition to a GCL layer. The ~~compacted clay liner (~~CCL~~)~~ will provide an added thickness to the liner in the area of the sump where leachate is expected to have the longest resident time and the largest head. The specifications for processing, placement, and compaction are detailed in the specifications. The placement criteria in terms of moisture content and dry density is defined by a window with limits defined by the zero air voids curve, a percent saturation line, a minimum dry density and a minimum moisture content. A graph indicating these specific limits is presented in the specifications which were based on actual laboratory testing conducted as part of this study (Appendix D [Volume V of the Permit Application dated October 2000]). This method of specifying a compaction window for a CCL is recommended by EPA and is detailed in a series of articles by Prof. Craig Benson (12).

As part of the CQA program samples of the material to be used as the compacted clay liner will be obtained and tested to confirm the permeability criteria (1 x 10^{-7} cm/s) can be met. In addition, samples will be taken from the in-place liner to confirm the permeability.

3.2.5 Anchor Trench Design

The pullout capacity of the primary and secondary geosynthetics from the landfill anchor trench was determined. It was assumed the geosynthetics will pull out of the trench with single-sided shear. Single-sided shear is believed to occur rather than double-sided shear because there is less shearing resistance for single-sided shear. Assumed interface friction angles were based on previous laboratory testing for similar materials at low normal stresses. Based on the trench geometry, critical HDPE geomembrane properties, and assumed interface friction angles, both the secondary and primary liners will pull out prior to tearing. Stability calculations for both the secondary and primary liner systems indicate that there are no net downslope forces on the anchor trench because the liner systems are held in place by friction (see Calculation E-15, Anchor Trench Pullout Capacity [Volume V of the Permit Application dated October 2000]).

3.2.6 Access Ramp Design

Calculation E-24, Wheel Loading on Access Ramp, presented in Appendix E (Volume V of the Permit Application dated October 2000), evaluated the puncture resistance of the geomembrane on the landfill access ramps. The ramps grade at 10 percent from the crest of the landfill to the floor. Drawing No. 14 shows the access ramp configuration during initial Phase 1A filling below the ramps and the final configuration after the slope areas above the ramp are lined.

The ramp section consists of the following components (from top down):

- 1-foot thickness of roadbase material
- 12-ounce cushion geotextile (enveloping -the top and sides of the underlying subbase)
- 2-foot thickness of subbase material
- Basal liner geosynthetics (geocomposite/60-mil ~~T~~HDPE/geocomposite/60-mil ~~T~~HDPE/GCL/ prepared subgrade)

The calculation considered a Caterpillar 631 scraper which weighs approximately 168,000 pounds when fully loaded (17~~16~~). A factor of safety of 4.6 against puncture of the HDPE is considered acceptable for this loading condition.

An assessment of the stability of the Ramp Liner System under breaking forces from a loaded scraper was also analyzed (~~34~~38). This analysis utilized the strength parameters from the interface shear testing program. The results presented in Appendix E-6 (Volume V of the Permit Application dated October 2000) indicate a factor of safety of 4.3 against sliding on the ramp.

3.2.7 HELP Modeling

Hydrologic Evaluation of Landfill Performance (HELP) (48~~41~~) modeling was performed to demonstrate equivalency of the proposed Triassic Park landfill liner and cover system with EPA's Minimum Technology Requirement (MTR) systems. This demonstration was submitted to NMED for review and was subsequently approved by NMED on March 11, 1996 and EPA on March 14, 1996. The report entitled, Triassic Park Hazardous Waste Landfill Alternative Liner System Analyses (Revision 1), dated March 1996 presents the HELP modeling performed and is reproduced in Appendix E.

The HELP modeling approach used to evaluate the hydrologic performance of the proposed landfill liner and cover alternative follows the NMED's Draft Guidance Document for Performance Demonstration for an Alternative Liner Design Using the HELP Modeling Program Under the New Mexico Solid Waste Management Regulations (20 NMAC 9.1). This approach was selected because it allows a direct comparison between MTR liner system and an alternative liner system. The results can be used to demonstrate performance equivalency required under 40 CFR 264.301(d).

The conclusions of the HELP modeling as stated in the report are as follows:

- There is little difference between the proposed alternative and MTR in terms of percolation rates through the bottom liner over the life of the facility. The differences that exist in Years 0 through 10 are insignificantly small. The proposed alternate liner performance can therefore be considered equivalent to the MTR liner performance.

- Hydraulic pressure on the primary and secondary liners of both the MTR and proposed alternate liner system is well below the regulatory maximum of 12 inches.

- The cover system leakage is less than or equal to the leakage of the liner system. It effectively reduces precipitation infiltration which will allow the waste to drain once the cover is in place.

3.2.8 ~~Leachate Collection and Removal~~LCRS, ~~Leak Detection and Removal~~LDRS, and ~~Vadose Monitoring System~~VZMS Hydraulic Analyses

Analyses performed to evaluate the effectiveness of the LCRS, LDRS, and ~~Vadose Monitoring Systems~~VZMS are discussed below. Also discussed are slope and vertical riser pipe strength evaluations and the concrete crest riser pad structural analyses.

Leachate Collection and Removal System Analyses

Based on HELP modeling data presented in Triassic Park Hazardous Waste Landfill Alternative Liner System Analyses (Revision 1), dated March 1996, maximum LCRS flow rates of 116.8 gallons per acre per day (gpad) for slope areas and 50.9 gpad for floor areas occur during year 11 of the simulated Facility life. For Phase 1A, which has a slope surface area of 7.9 acres and floor surface area of approximately 3.4 acres, this totals to approximately 1,100 gallons per day (gpd). Calculation E-31, LCRS Pumping Capacity (Volume VI of the Permit Application dated October 2000), estimates the flow capacity of the LCRS sump design to be approximately 618,000 gpd (based on Dupuit-Forchniemer Equation [11]).

The flow capacity of the LCRS sump far exceeds the flow rates delivered from the LCRS as determined from the HELP modeling. A Grundfos 50-gpm pump, which has the capacity to remove 72,000 gpd, is recommended for the LCRS sump. In addition, should flow rates into the LCRS increase beyond those predicted by the HELP modeling or the capacity of the 50-gpm pump, a second leachate removal pump can quickly be added via the vertical riser system, thus increasing the leachate removal rates.

Leak Detection and Removal System Analyses

Adequacy of the leak detection and removal system for Phase 1A is addressed in the landfill action leakage rate (ALR) calculation presented in the Action Leakage Rate and Response Action Plan (~~see Appendix G~~Permit Attachment J). In this calculation, leakage rates into the LDRS, as determined by EPA's recommended method (~~60~~66), were compared to flow capacities of the LDRS geocomposite drainage layer and the LDRS sump. Based on these calculations, the flow capacity of the LDRS sump exceeds the flow capacity of the LDRS geocomposite drainage layer and the flow capacity of the LDRS geocomposite drainage

layer exceeds the leakage rate into the LDRS. A Grundfos 50-gpm pump, which has the capacity to remove 72,000 gpd, is recommended for the LDRS ~~system~~ sump.

Vadose Monitoring System Analyses

The ~~vadose monitoring~~VZMS sump serves as a detection system for leakage of the secondary LDRS ~~system~~. A Grundfos 25-gpm pump is recommended for vadose monitoring sump. In the unlikely event that a leak develops in the LDRS sump, leachate will flow to the ~~vadose monitoring~~VZMS sump where it can be collected and removed.

Evaluation of Slope Riser Pipe and Vertical Riser Pipe Strengths

Calculation E-26, Pipe Crushing, presented in Appendix E (Volume V of the Permit Application dated October 2000), considers the stresses and deflections to the slope riser pipes. Based on this calculation, the 18-inch-diameter HDPE SDR 11 slope riser pipe ring deflection at maximum burial depths of 160 feet is 0.4 percent. This is less than the manufacturer's recommended ring deflection limit of 2.7 percent (45~~39~~).

The downdrag loads on the vertical riser pipe were evaluated in Calculation ~~G~~E-30 (Volume VI of the Permit Application dated October 2000) to determine if the vertical riser pipe could damage the liner. The vertical downdrag loads are developed as a result of waste settlement around the vertical pipe. In order to limit the downdrag loads acting on the liner, the lower portion of the vertical riser was de-coupled from the upper portion. The upper portion was founded on a large concrete pad that is located on top of the sump gravel. In addition, a friction break consisting of a double wrap of HDPE was included around the steel vertical riser pipe.

3.2.9 Action Leakage Rate and Response Action Plan

The~~Because of the similar~~ landfill liner components were used ~~in the landfill and the evaporation pond a single~~ to develop an Action Leakage Rate (ALR) and Response Action Plan (RAP) ~~was developed which includes both facilities~~. This plan and its supporting calculations are presented in their entirety ~~in Appendix G~~as Permit Attachment J. The results are summarized below.

An ~~Action Leakage Rate (~~ALR~~)~~ and RAP for the proposed Triassic Park Waste Disposal Facility landfill ~~is~~are required under 40 CFR Part~~s~~ 302. The ALR, as defined in the final rule published in January 29, 1992, is the maximum design flow rate that the LDRS may remove without the fluid head on the bottom liner exceeding ~~one~~ 1 foot (~~60~~54). The RAP describes the steps to be taken in the event the ALR is exceeded in landfill. The RAP specifies the initial notifications, steps to be taken in response to the leakage rate being exceeded, and follow-up reports.

The EPA~~-~~-recommended method for determining the landfill ALR presented in Federal Register Vol. 57, No. 19 (67) and in references No. 65 and 66~~59~~ were used to calculate the ALR for the landfill facility. Using the flow equation for geonets and applying field representative geocomposite transmissivities and appropriate factors of safety for geonet creep and sediment clogging, the recommended ALR for the landfill was determined to be 900 gpad.

The ALR value of 900 gpad is above the EPA~~-~~-recommended value of 100 gpad. The primary reason for this difference is that the EPA value is based on a sand drainage layer with a permeability of 1×10^{-2} cm/s compared to the geocomposite drainage layer transmissivity of 2.2×10^{-4} m^2/s proposed for the Triassic Park Facility landfill.

Additional computations to check the LDRS sump capacity and LDRS drain pipe capacity are also presented in ~~the Appendix G~~Permit Attachment J.

~~Response Action Plan s~~Steps outlined in the ~~Action Leakage Rate and Response Action Plan~~RAP closely follow the recommended actions presented in Federal Register Volume 57, No. 19 (67).

3.2.10 Surface Water Drainage Analyses

Design parameters for HDPE lined Channels 7 and 8 located above the landfill access ramps are presented on Drawing No. 25 (Sheet 2 of 2). The methodology, assumptions, and runoff calculations for these channels and the collection basins discussed below ~~and~~ are presented in ~~Appendix F~~Permit Attachment L4.

The clean stormwater collection basin located at the toe of the 2H:1V cut slope in the south end of the landfill will contain the runoff from the 15 acres of unlined area of Phase 1A (above the access ramps). The total runoff from the 25-year, 24-hour event is approximately ~~4.5~~ 4.6 ac-ft. Total volume of the detention pond assuming 1 foot of freeboard is 5.2 ac-ft.

The contaminated water basin at the toe of the Phase 1A waste fill slope is designed to contain the runoff from the entire 15.6-acre fill area of Phase 1A. The total runoff from the 25-year, 24-hour event is approximately 4.~~3~~4 ac-ft. The contaminated water basin is approximately 560 feet by 200 feet and can store approximately ~~10.4~~17.0 ac-ft assuming 1 foot of freeboard. This is the minimum capacity of the basin, which occurs when the landfill Phase IA has reached capacity. Prior to the landfill reaching capacity, the basin will have more than 17.0 ac-ft of storage space. The contaminated water basin will be constructed at the same time as the rest of the Phase 1A landfill so it can accommodate runoff from waste placed in Phase 1A.

3.2.11 Soil Erosion Analyses

Due to the temporary nature of the 2H:1V cut slope and the 3H:1V subgrade slopes above the access ramps, severe soil erosion of these slope areas is not anticipated. The 2H:1V cut slope will be excavated during future landfill construction and the 3H:1V subgrade areas above the access roads will be conditioned prior to liner placement as required in the specifications.

Erosional features such as rills and localized slumping in exposed areas of the protective soils layer on the 3H:1V slope areas will be repaired following rain events.

3.2.12 Frost Protection

The maximum frost depths in the Roswell area~~,~~ indicate~~s~~ that frost may reach 23 inches during the winter months. In addition, site-specific frost penetration modeling for the site indicated a maximum design freezing depth of 2.3 feet for this cover. ~~Recent s~~Studies by Kraus (39~~36~~) evaluating the effects of frost on geosynthetic clay liners indicate that there is little change in the permeability of the GCLs due to frost. Because the landfill utilizes GCLs in combination with HDPE as barrier elements for both the liner system and the cover system, frost damage to these layers is not expected. However, the 2.5-foot-thick vegetative layer on the cover system will also provide frost protection for underlying geosynthetics and soil components in the cover section;~~,~~ 2 feet of protective soil is specified on the side slopes of the landfill. Due to the relatively short time period that the side slopes will be exposed without waste placement, the 2-foot cover thickness is considered adequate.

3.2.13 Earthwork Volumetrics

Table L-3 lists the material quantities for subgrade excavation, structural fill, cover and liner soil components, and the net waste airspace available for Phase 1A development. Table L-3 also lists material quantities for the final landfill configuration.

Table L-3. Landfill Phase 1A Material Balance and Ultimate Landfill Material Balance

	Loose or Compacted Cubic Yards	Bank Cubic Yards
Material Balance Phase 1A		
Design Capacity		
Total Airspace		691,540 bcy
Liner Area		14.5 acres
Cover Area (Top of Waste)		11.9 acres
Volume of cover (NOT included in airspace)		0 bcy
Volume of Liner (NOT included in airspace)		0 bcy
Remaining Airspace		691,540 bcy
Volume of Daily Cover (20% of total)		138,308 bcy
Total Waste Capacity		553,232 bcy
Total Soil Requirements		
Volume of Daily Cover (20% of total)	170,119 lcy	138,308 bcy
Volume of Liner Material (0.5 foot)	92,194 ccy	83,813 bcy
Volume of Cover (4 feet)	718,385 ccy	653,077 bcy
Total Volume of Soil Required		875,198 bcy
Total Cut Volume		2,797,921 bcy
Cut/Fill Balance Difference		1,922,723 bcy
Material Balance Ultimate Landfill		
Design Capacity		
Total Airspace		13,997,654 bcy
Liner Area		103.9 acres
Cover Area (Top of Waste)		101.2 acres
Volume of cover (NOT included in airspace)		0 bcy
Volume of Liner (NOT included in airspace)		419,063 bcy
Remaining Airspace		13,578,591 bcy
Volume of Daily Cover (20% of total)		2,715,718 bcy
Total Waste Capacity		10,862,873 bcy
Total Soil Requirements		
Volume of Daily Cover (20% of total)	3,340,333 lcy	2,715,718 bcy
Volume of Liner Material (0.5 foot)	92,194 ccy	88,813 bcy
Volume of Cover (4 feet)	718,385 ccy	653,077 bcy
Total Volume of Soil Required		3,452,608 bcy
Total Cut Volume		10,281,466 bcy
Cut/Fill Balance Difference		6,828,858 bcy

lcy = 1.23 bcy
ccy = 1.1 bcy

~~4.Evaporation Pond~~

~~4.1Evaporation Pond Design~~

~~4.1.1General~~

~~The purpose of the evaporation pond is to treat liquid wastes which meet land ban restrictions. The majority of these liquid wastes will be leachates collected from the landfill LCRS or other containment sump systems on site. The pond may receive leachates from other off-site sources. This unit will not be used to manage wastes containing volatile organic concentrations greater than 500 parts per million by weight (ppmw).~~

~~The volume of liquids in the pond will be dependent on the waste market. Net evaporation (total evaporation minus rainfall) for the site is in the range of 80 inches per year.~~

~~Evaporation pond design elements include pond layouts and phasing; subgrade design; liner system design; and leak detection system, and vadose monitoring sump design. This section describes each of these design elements.~~

~~4.1.2Evaporation Pond Layout and Phasing~~

~~The proposed evaporation pond area layout and phasing is illustrated on Drawing No. 28. Pond 1 will be constructed initially and will service site operations during waste filling of landfill Phase 1A. A future Pond 2 would be located east of Pond 1 and would provide additional pond treatment capacity as the landfill expands into Phases 2 and 3. Space has been allocated in the site layout to the east of Future Pond 2 should demand for pond storage capacity increase beyond that currently provided in the design.~~

~~Ponds 1 and 2 are each divided into two separate ponds, A and B. This arrangement provides separate pond units which can be placed into service independently. For example, in the event of a major rain event or should the Pond 1A primary liner begin to leak, additional pond storage capacity available in Pond 1B could immediately be brought on line. Each pond unit is equipped with its own discharge station. An inter pond transfer pump will be located on separation berm between the A and B pond units. Provisions to curtail placement of liquid wastes into an impoundment that has exceeded its ALR are discussed in Appendix G.~~

~~Pond units 1A and 1B are each 135 feet wide by 290 feet long by 12 feet deep and each will contain approximately 2.62 million gallons. Sideslope angles are 3H:1V except for the interpond berms, which have 2H:1V sideslopes. Leak detection and vadose monitoring sumps are located centrally on the long side of the pond units. Pond floor grades are a minimum 2 percent towards the sumps.~~

~~Pond overtopping will be controlled manually through the use of liquid elevation indicators placed in the pond. These indicators will be graduated vertical rods fixed to a stable base. The rods will be placed such that graduated markings can be easily read from the discharge station. The rods will be surveyed when placed and checked by survey periodically to ensure accuracy. Correlation charts between elevation and pond volume will be maintained at the discharge station of each pond. Pond discharge pipes will also be equipped with flow meters so that liquid volumes placed in the pond can be continuously tracked and documented. Filling of the ponds above the 2-foot freeboard limit will not be permitted. Site personnel will be present during all fluid discharge and transfer operations to ensure that pond overtopping does not occur in the event of equipment malfunction or other human error.~~

~~Due to the small aerial extent of the evaporation ponds and limited fetch distance, wave action developed in the pond fluid surface will also be limited. The 2-ft freeboard distance will accommodate minimal wave action without overtopping. At closure, the pond will be backfilled to surrounding ground and revegetation.~~

~~4.1.3.1Subgrade Excavation, Liner System, LDS Sump Design and Vadose Monitoring Sump Design~~

~~Subgrade Excavation~~

~~Drawing No. 28 shows the evaporation pond excavation contours. The crest of the evaporation pond is essentially flat. Fill areas around the perimeter of the ponds along with site grading outside of the pond area provide sufficient grade differences for storm water run-off to flow to the perimeter road ditches and ultimately to the storm water detention basin located in the northwest corner of the site.~~

~~Specification Section No. 02110, Site Preparation and Earthwork, describes site preparation, excavated soil classification and stockpiling, subgrade surface preparation and inspection, structural fill placement and compaction requirements, survey and quality control, and erosion control features.~~

~~Liner System~~

~~Drawing Nos. 30, 31 and 32 show the evaporation pond liner components covering the floor and slopes, and extending into the anchor trench areas. The liner system will be continuous over the berm between the A and B units. The evaporation pond liner system is a double lined system consisting of (from bottom up) a composite (compacted clay and geomembrane) secondary liner, a geonet leak detection drainage layer, and a primary geomembrane liner. Details of each liner component are discussed below:~~

- ~~*3-foot thick compacted clay liner (CCL)*~~

  ~~The CCL ($k \leq 1 \times 10^{-7}$ cm/s) in combination with the overlying HDPE geomembrane will serve as a low permeability barrier layer to restrict infiltration of leachate into the subgrade. The CCL will consist of clay material (CL, CH) obtained during excavation of the landfill and surface impoundment. Specification Section 02221, Clay Liner, describes clay material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements. Soil under leachate compatibility tests (two stage permeability testing using ASTM D 5084) will be conducted prior to construction. In addition, a test fill will be constructed, as per the procedures outlined in the CQA plan. The results of the permeability testing performed compacted samples are shown in the appendices.~~

  ~~Soil liner compatibility is normally not a problem unless the leachate contains high concentrations of organics (Eklund, 1985; Peterson and Gee, 1985; Mitchell and Madsen, 1987; Finno and Schubert, 1986). Additional supporting information on the compatibility of the GCL with various leachate is presented in Appendix E-40.~~

- ~~*60-mil thick high density polyethylene (HDPE) geomembrane liner (smooth)*~~

  ~~The 60-mil HDPE liner placed on top of the CCL is the second component of the composite secondary liner. Together, the CCL and HDPE liner form a highly efficient barrier layer to restrict percolation of leachate into the subgrade (see Section 3.2.7, HELP Modeling). Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material CQA.~~

~~Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility.~~

- ~~*Geonet leak detection drainage layer (transmissivity ≥ 5x10⁻³ m²/s as tested under actual field conditions)*~~

  ~~The high transmissivity geonet leak detection drainage layer provides a means to transmit and remove leachate percolating through any leaks in the primary geomembrane layer above. Flow calculations discussed in Section 4.2.7 and presented in Appendix G indicate that the geonet is capable of removing leachate in a timely manner such that head on the underlying geomembrane will remain less than 1 foot. Specification Section 02712, Geonet, describes minimum geonet properties required, material transportation and handling procedures, deployment and seaming requirements, and material construction quality assurance.~~

- ~~*60-mil thick high density polyethylene (HDPE) geomembrane liner (smooth)*~~

  ~~This HDPE geomembrane serves as the liner systems primary barrier layer of the double liner system. Specification Section 02775, Geomembrane Liners, discussed above also applies to this geomembrane layer.~~

  ~~Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility.~~

~~Since portions of this liner component will be permanently exposed to sunlight and UV radiation, it may be necessary to replace it prior to the end of the facility life. The lifetime of exposed geomembrane liners varies, however, it is generally limited to the warranty period of the product which may be as long as 20 years (33). The staged approach to pond development will help alleviate this concern, as will maintain fluid levels near capacity in the primary use pond unit. Periodically alternating pond units for primary use will also reduce exposure time.~~

~~Leak Detection and Removal and Vadose Monitoring Sump Systems~~

~~The leak detection and vadose monitoring systems each have a separate sump from which fluids can be collected and removed. The liner systems on the evaporation pond floor continue into the sumps, however, in order to provide adequate volume to efficiently operate removal pumps, gravel thicknesses are incorporated into the drainage systems. Drawing No. 32 illustrates the sump layout and cross section. As shown on the drawings, the sumps are square pyramidal shapes which lie concentrically above one another. The slope riser pipe trenches enter their respective sumps at the sump base. The slope riser trench arrangement enables the vadose and leak detection slope riser pipes to penetrate overlying geosynthetic liner elements at the crest of the evaporation pond rather than in the sump area. The leak detection sump has a total fluid capacity of 1,790 gallons (after accounting for gravel). Similar to the landfill leak detection sump, the evaporation pond sump will be equipped with fluid level instrumentation and a 50 gpm fluid removal pump. The vadose monitoring sump has a total fluid capacity of 95 gallons (after accounting for gravel).~~

~~4.1.4Evaporation Pond Discharge Pad Arrangement~~

~~Drawing No. 31 illustrates the slope riser piping and valving, the discharge pipe arrangement, and the layout for the concrete containment pad. Tanker trucks will pull up next to the concrete pad and hook up to the desired piping system. Hose connections at the pipes are located within the concrete pad area to contain any leakage. A concrete pad will be placed in the loading/unloading area for the tanker trucks. This pad will be sloped providing drainage toward the sump area. The concrete containment pad slopes towards the evaporation pond crest. Should a catastrophic failure of the piping system occur, leachate will flow back into the evaporation pond rather than be released to unlined areas. The evaporation pond liner system anchor trench will completely encompass the pad so that any leakage through the pad will also drain back into the~~

~~evaporation pond. Construction details for the concrete containment pad are called out in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete.~~

~~Storm Water Control Features~~

~~Drawing No. 5 depicts the surface grades around the perimeter of the pond area. Surface water run-off from these areas will flow to the roadway ditch system and ultimately to the surface water detention pond.~~

~~4.2Evaporation Pond Design Analyses~~

~~4.2.1 Slope Stability~~

~~Cut Slope Stability~~

~~Prior to filling, unsupported cut slopes will exist on all sides of the evaporation pond. These slopes were analyzed for static and dynamic stability using the Bishop method of slices. A computerized slope stability program (XSTABL) (44) was used to analyze the cut slopes. Strength parameters used for soil and rock materials were estimated using pocket penetrometer data gathered during test pitting of the site soil materials. The material properties used in the analyses are summarized in Appendix E.~~

~~The site grading plans (Drawing Nos. 28 and 29) indicate that the maximum cut slopes will be 3H:1V and 2H:1V and maximum height will be approximately 12 feet. Results for the critical 2H:1V slope as presented in Calculation E-7, indicate a static factor of safety of 19.8 for the critical short term (undrained) condition. Stability during seismic loading was estimated by applying a pseudo-static earthquake force in the Bishop analysis. Results based on the 0.04 g design acceleration indicate a dynamic factor of safety of 15.7 for the short term (undrained) condition.~~

~~Slope stability was not considered for the filled evaporation pond configurations. Filling the pond with fluid does not place any stresses on the liner system which could cause instability.~~

~~4.2.2Settlement~~

~~The evaporation pond will experience relatively low overburden pressures due to its shallow depth and liquid fill density in comparison to pressures previously imparted to the clay during placement compaction. Clay liner consolidation will therefore be negligible.~~

~~4.2.3Geosynthetics Strength and Performance Analyses~~

~~As discussed in Sections 4.2.1 and 4.2.2 above geosynthetics components of the evaporation pond will not experience significant stresses related to slope stability or settlement. Settlement induced stresses to evaporation pond geosynthetics were, therefore, not considered.~~

~~Geomembranes~~

~~The general use of geomembranes in the evaporation pond is similar to that described for the landfill. Thermal induced stress and tear and puncture evaluations are discussed below.~~

~~Thermal Induced Stress~~

~~The 60-mil HDPE geomembrane liner will be subject to contraction and expansion from daily temperature differentials. The contraction/expansion potential of the HDPE liner was determined, and the maximum induced stress was determined. Calculation No. E-27, Thermal Induced Stress in Evaporation Pond Liner,~~

~~indicates the maximum induced thermal stress in the liner would be 560 psi. This value is far below the 2200 psi minimum yield strength of liner, which yields a design safety factor of 3.9.~~

~~Tear and Puncture~~

~~The evaluation of geomembrane tear and puncture in the landfill liner system was presented in Section 3.2.1.2 . The results of that analyses indicated that the 60 mil HDPE geomembranes were adequate for loading conditions which were much more severe than those expected for the evaporation pond. Since similar HDPE products will be used in the evaporation pond and the same subgrade surface preparation methods are required by the specifications, separate calculations for evaporation pond geomembrane tear and puncture are not necessary.~~

~~Geonets~~

~~The geonet is intended to act as a lateral drainage layer in the evaporation pond LDRS. The primary design criterion of the geonet is the transmissivity. Calculations presented in Appendix G-2 evaluate the typical transmissivity values reported in the literature and by manufactures. These values have been reduced to account for clogging of the geotextile, penetration of the geotextile in to the geonet and creep of the geonet.~~

~~In order to confirm the actual transmissivity of the material that arrives on the site, the specifications require that the geonet be tested as part of the conformance testing program. The specific test methods, including backing materials, normal loads, seating times, gradients, and test durations are detailed in the specifications.~~

~~Geotextiles~~

~~Geotextile Filtration~~

~~Geotextiles are used in a number of locations in both the liner and sump sections for filtration. Specifically, the geotextiles act as filters between the pipe bedding material or between the granular leachate collection materials. Similar to the landfill evaluation, if these soil materials are conservatively estimated to be fine grained with more than 50 percent of the material passing the Number 200 sieve, then the specified geotextile with a AOS of less than 0.212 mm should adequately retain these soils.~~

~~Geotextile Cushion~~

~~The puncture resistance during installation of the proposed geotextile materials was analyzed for more severe conditions in the landfill design. Therefore, these calculations are not repeated for the evaporation pond application.~~

~~4.2.4Compacted Clay Liner~~

~~As previously discussed for the sump CCL, the criteria for the CCL materials characteristics and the placement and compaction criteria are presented in the specifications.~~

~~4.2.5Anchor Trench Design~~

~~The pullout capacity of the primary and secondary geosynthetics from the evaporation pond anchor trench was determined. It was assumed the geosynthetics will pull out of the trench with single-sided shear. Single-sided shear is believed to occur rather than double-sided shear because there is less shearing resistance for single-sided shear. Assumed interface friction angles were based on previous laboratory testing for similar materials at low normal stresses. Based on the trench geometry, critical HDPE geomembrane properties, and assumed interface friction angles, pullout resistance calculations for both the secondary and primary liner anchor trenches indicate that the HDPE geomembranes will pull out prior to tearing (see Calculation No. E-15).~~

~~4.2.6Leak Detection and Vadose System Hydraulic Analyses~~

~~The leak detection system design and performance is very similar to the landfill system. Therefore, design analyses for the following criteria are not discussed. Rather the reader is referred to Appendix E for the detail of the calculations.~~

~~Adequacy of the leak detection and removal system for the evaporation pond is addressed in the Action Leakage Rate calculation presented in Action Leakage Rate and Response Action Plan (see Section 4.2.7 below and Appendix G). In this calculation, leakage rates into the LDRS, as determined by EPA's recommended method, were compared to flow capacities of the LDRS geonet drainage layer and the LDRS sump. Based on these calculations, the flow capacity of the LDRS sump exceeds the flow capacity of the LDRS geonet drainage layer and the estimated leakage rate into the LDRS. A Grundfos 50 gpm pump which has the capacity to remove 72,000 gpd is recommended for the LDRS system sump.~~

~~Vadose Monitoring System Analyses~~

~~The vadose monitoring sump serves as a detection system for leakage of the secondary LDRS system. A Grundfos 25 gpm pump is recommended for vadose monitoring sump. In the unlikely event that a leak develops in the LDRS sump, leachate will flow to the vadose monitoring sump where it can be detected and removed.~~

~~4.2.7Action Leak Rate and Response Action Plan~~

~~Because of the similar liner components used in the landfill and the evaporation pond a single ALR and RAP was developed which includes both facilities. This plan and its supporting calculations are presented in its entirety in Appendix G. The results are summarized below.~~

~~An ALR and RAP for the proposed Triassic Park Waste Disposal Facility evaporation pond is required under 40 CFR Parts 302. The ALR, as defined in the final rule published in January 29, 1992, is the maximum design flow rate that the LDRS may remove without the fluid head on the bottom liner exceeding one foot. The RAP describes the steps to be taken in the event the ALR is exceeded in the evaporation pond. The RAP specifies the initial notifications, steps to be taken in response to the leakage rate being exceeded, and follow-up reports.~~

~~The EPA recommended method for determining the landfill ALR was used to calculate the ALR for the evaporation pond. Using the flow equation for geonets and applying field representative geonet transmissivities and appropriate factors of safety for geonet creep and sediment clogging, the recommended ALR for the evaporation pond was determined to be 1000 gpad.~~

~~Although computations indicated a much higher ALR value could be justified, the ALR value of 1000 gpad, which is equal to the maximum EPA recommended value of 1000 gpad, was selected because this value adequately represented a "large and rapid" leak considering the small size of the evaporation ponds.~~

~~Additional computations to check the LDRS sump capacity and LDRS drain pipe capacity are also presented in the Appendix G.~~

~~Response Action Plan steps outlined in the ALR and RAP closely follow the recommended actions presented in the Federal Regulations.~~

~~4.2.8Frost Protection~~

~~Based on the landfill design, the design depth of frost at the site could be in the range of 2.3 feet (see Calculation No. E-25, Frost Penetration). Review of the evaporation pond design indicates that portions of~~

~~the clay liner above the pond fluid level may be exposed to frost action. The following paragraph discusses resulting effects this may have on leakage to the environment.~~

~~Unlike the landfill, the evaporation pond is a temporary facility to be removed from service during the facility's post-closure period. Increased permeability of the clay liner and any resulting leakage is therefore, not as critical as with a permanent landfill installation. Further, due to the insulating effects of the pond liquids, only portions of the clay liner above the fluid level in the pond will reach freezing temperatures. Finally, the evaporation pond design incorporates a vadose detection system and a leak detection system. Any leakage detected will be removed and if large enough, based on the action leakage rate, will cause remedial steps to be taken to locate and repair damage to the geomembrane, thus limiting exposure of fluids to the clay liner. Therefore, in our judgment, any increase in permeability of the clay liner due to potential damaging effects of frost will not result in significant increases of liquids released to the environment.~~

~~4.2.9Earthwork and Pond Volumetrics~~

~~Approximately 62,500 cy of soil materials will be excavated to construct evaporation Pond 1. Clay liner construction will require placement of 22,150 cy of compacted clay liner material. The resulting pond volume available for liquid evaporation (not including 2 ft of freeboard) is approximately 5.2 million gallons.~~

~~5.Truck Roll-Off Area~~

~~5.1Truck Roll-off Area Design~~

~~5.1.1General~~

~~It should be noted that the incoming trucks containing unstabilized waste will be Department of Transportation (DOT) approved roll-off vehicles (17). These trucks are required by DOT to be covered. Additionally, the roll-off bin must be free of leaks and the waste must be contained with a plastic bed liner. Together, the roll-off bin and the plastic bed liner are considered a double lined system. This containment system will remain in place the entire period the roll-off bin is staged in the truck roll-off area. The liner system incorporated in the waste roll-off area is included as a precautionary measure.~~

~~It should also be noted that some roll-off containers staged in the area will contain stabilized waste which has met the paint filter tests for free liquids. Additionally, these roll-off bins will be lined using a plastic bed liner and will be covered in a manner similar to DOT approved roll-off containers.~~

~~The purpose of the truck roll-off area is to provide a staging area for incoming roll-off bins containing unstabilized waste destined for the stabilization facility and a second staging area for roll-off bins containing post treatment stabilized waste awaiting landfill disposal approval.~~

~~The truck roll-off area is surrounded by a berm with a minimum height of 2.0 feet (see Drawing 41). This berm will divert run-on surface water around the perimeter of the truck roll-off area. Culverts are proposed under each of the access ramps to allow surface water flow to the west towards the run-off detention basin. The interior depth of the berms is also a minimum of 2.0 feet. The 25-year, 24-hour storm for the site is 4.3 inches. This is expected to result in ponding inside the roll-off area to a depth of approximately 2 feet in the sump area and in the range of 1-foot or less in the central area. Incoming waste roll-off containers are not expected to contain free liquids. The sumps will be pumped to remove any accumulated water after any rainfall event.~~

~~Truck roll-off area design elements include truck roll-off area layout, subgrade design; liner design; and drainage sump design. This section describes each of these design elements.~~

~~5.1.2Truck Roll-Off Area Layout~~

~~Drawing Nos. 41 and 42 illustrate the layout of the Truck Roll-Off Facility. Each is approximately 310 ft long by 180 ft wide roll-off cell can stage approximately 66 roll-off bins. The floor of each cell grades at 2 percent towards its respective sump and the surrounding soil berms have side slopes of 1.5H:1V and range in elevation from 4 ft to 8 ft. Cell access is provided by four ramps which grade at 10 percent.~~

~~The west cell will be used for unstabilized waste, and the east cell will be used for stabilized waste~~

~~5.1.3 Subgrade Excavation, Liner System, Drainage Sump Design, and Leak Detection System Design~~

~~Subgrade Excavation~~

~~Drawing No. 41 shows the truck roll-off area excavation and fill contours. Cut areas in the central portion of the facility are made to achieve the required floor grades. The berms and fill areas around the perimeter of the truck roll-off area and surrounding site grading provide sufficient grade differences for storm water run-off to flow to the perimeter road ditches and ultimately to the storm water detention basin.~~

~~Specification Section No. 02110, Site Preparation and Earthwork, describes site preparation, excavated soil classification and stockpiling, subgrade surface preparation and inspection, structural fill placement and compaction requirements, survey and quality control, and erosion control features.~~

~~Liner System~~

~~Drawing No. 43 shows the liner components on the floor, berm, and anchor trench areas. The truck roll-off area for roll-off bins is a single lined system consisting of (from bottom up) a prepared subgrade, a geomembrane underliner, a geonet drainage layer, a geotextile filter layer, a soil subbase layer, and a surface gravel layer. This design should accommodate the limited truck traffic that will be required to load and unload the roll-off boxes. Details of each liner component are discussed below.~~

- ~~*6-inch thickness of prepared subgrade*~~

  ~~The prepared subgrade component will provide a smooth stable surface suitable for placement of overlying geosynthetic materials. Specification Section 02119, Prepared Subgrade, presents subgrade material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

- ~~*60-mil thick high density polyethylene (HDPE) geomembrane underliner (smooth)*~~

  ~~The 60-mil HDPE liner placed on top of the prepared subgrade liner form a highly efficient barrier layer to restrict percolation of rain water into the subgrade. Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material construction quality assurance.~~

  ~~Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility.~~

- ~~*Geocomposite leak detection drainage layer (transmissivity ≥ 2.2 × 10^{-4} m^2/s) as tested under actual field conditions*~~

~~The high transmissivity geocomposite drainage layer provides a means to transmit and remove rainwater falling within the unstabilized waste roll-off bin area. Flow calculations discussed in Appendix E indicate that the geocomposite is capable of removing rainwater so that ponding can be minimized and trafficability of the upper gravel surface can be maintained. Specification Section 02710, Geocomposite, describes minimum geocomposite properties required, material transportation and handling procedures, deployment and seaming requirements, and material CQA.~~

- ~~*18-inch thickness of soil subbase layer*~~

~~The soil subbase will consist of free draining soils classified as SM, SW, GM, or GW. Specification Section 02230, Subbase, presents material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

- ~~*6-inch thick road base gravel surface*~~

~~The road base gravel surface will allow storm water to drain from the surface while providing sufficient bearing capacity for truck traffic. Any disturbance of the road base surface as a result of loading and unloading the roll-off trailers will be observed during the weekly inspections of the unit and repaired by placement of new material or re-grading of the raising material. In the case of severe rutting (greater than 6 inches) the area will be excavated and the geosynthetic materials will be inspected for damage. Repairs will be made if required. Specification Section 02225, Road Base, presents material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

~~Potential leakages from the containers would be very limited and are not expected to react with the road-base aggregate.~~

~~Drainage Sump System~~

~~The drainage sump will collect storm water run off from the floor of the truck roll-off area. The liner systems on the truck roll-off area continue into the sump, however, in order to provide adequate volume to efficiently operate the removal pump, a gravel thickness has been incorporated into the drainage systems. Drawing No. 43 illustrates the sump layout and cross section. As shown on the drawings, the sump is a triangular pyramidal shape. The slope riser pipe enters the sump at the sump base. The slope riser trench arrangement enables the leak detection slope riser pipe to penetrate the overlying geomembrane liner elements at the crest of the truck roll-off area berm rather than in the sump area. The sump has a total fluid capacity of 1,406 gallons (after accounting for gravel). The truck roll-off area drainage sump will be monitored visually to determine whether pumping is required. Fluid removal will be performed by a vacuum truck.~~

~~5.2Truck Roll-off Area Design Analyses~~

~~5.2.1 Geosynthetics Strength and Performance Analyses~~

~~Geomembranes~~

~~The evaluation of geomembrane puncture in the truck roll-off liner system is presented in Calculation No. 18, Geomembrane Puncture Resistance. The results of the calculation indicate that the 6-inch road base and 18 inch subbase materials will adequately dissipate truck wheel loads and, in conjunction with the subgrade preparation specifications, which call for a 1 inch maximum particle size, will adequately protect the geomembrane from puncture. A calculated factor of safety of 60 to 1 against puncture was computed.~~

~~Geocomposite~~

~~Low overburden pressures due to the overlying roadbase and subbase are not high enough to adversely affect transmissivity of the geocomposite. Review of the texnet transmissivity charts presented in Calculation No. G-1, Landfill Action Leakage Rate supports this.~~

~~Geotextiles~~

~~Geotextile filtration and puncture resistance are evaluated in Calculation No. E-20, Geotextile/Geocomposite Filtration, and Calculation No. E-21, Puncture Resistance of Geotextile/Geocomposites, respectively. Based on these calculations, the geotextiles specified for the truck roll-off area will adequately filter the sites fine grained materials and resist puncture.~~

~~5.2.2Anchor Trench Design~~

~~The purpose of the truck roll-off facility anchor trench is to hold the geosynthetic liner components in place during placement of the overlying subbase and roadbase materials. Pull out considerations due to settlement are not a relevant concern for this facility.~~

~~5.2.3Storm Water Collection Sump and Leak Detection Sump Containment Hydraulic Analyses~~

~~Calculation No. E-32, Truck Roll-Off LDRS Pumping Capacity, evaluates the capacity of the storm water collection sump in the lined portion of the truck roll-off facility to remove water from the geonet drainage layer. Based on this calculation, the geonet flow capacity is estimated to be 161,000 gpd and the sump capacity is estimated to be 199,000 gpd. The sump will, therefore, provide adequate water removal capabilities.~~

~~6.Stabilization Facility~~

~~6.1Stabilization Facility Design~~

~~6.1.1General~~

~~The purpose of the stabilization facility is to treat waste streams using a chemical stabilization process which will chemically alter hazardous waste constituents such that their leachability is reduced to levels allowing landfill disposal. The stabilization treatment process involves combining chemical reagents with waste materials according to a specific treatment recipe and mixing until the waste/reagent reactions are complete. The batch stabilization mixing method to be used in the Triassic Park Stabilization Facility requires a backhoe excavator to mix waste with reagents in a large double lined steel bin. The materials treated will be in the bins for a limited amount of time, therefore only concentrated acids will not be allowed in the bins.~~

~~Stabilization facility design elements presented here include stabilization facility layout; stabilization bin, bin vault, and floor design; and stabilization process design. This section describes each of these design elements. It should be noted that certain components of the stabilization building, process control and delivery systems, ventilation systems and steel bins will be completed under future design/build contracts.~~

~~6.1.2Facility Layout~~

~~Drawing No. 3 illustrates the layout of the stabilization building and the surrounding area. As previously discussed, the Stabilization Facility has entrances for incoming trucks on both the north and south access~~

~~roads. These accesses will be used for incoming waste trucks loaded with unstabilized waste for processing in the bins. Incoming trucks will enter the gravel lined apron on the north or south side of the facility and back into the stabilization building. Once the load has been dumped into the bin and the truck bed washed out, the truck will exit the facility via the entrance route. The east and west building entrances will be used by stabilized waste loadout trucks, which will cycle between the truck roll-off area or the landfill. The gravel lined areas surrounding the stabilization facility will not be used to stage waste hauler trucks. Parking areas for site personnel vehicles will be designated near the stabilization facility control room.~~

~~The control room is positioned centrally along the east wall of the stabilization building. From this vantage point operations personnel will be able to monitor all activities taking place inside the building. Reagent storage tanks and silos are also located on the eastside of the building which permits operations personnel to view reagent delivery activities.~~

~~The stabilization building's internal arrangement is centered around the four waste mixing bins. The mixing bins are orientated such that delivery, mixing and loadout operations can take place from either the north or the south sides of the building. Stabilization unit operations are depicted on Drawing No. 34. The 25 ft long by 10 ft wide by 10 ft deep bins can hold a maximum of approximately 100 cy of waste and reagent material. The double lined steel bins are located within a 38 ft wide by 79 ft long by 12 ft deep concrete vault which has a total volume of 1,330 cy. The bin and vault arrangement provides three levels of waste containment with the inner bin liner serving as primary containment, the outer bin as secondary containment, and the vault as final or tertiary containment.~~

~~The 118-foot-wide by 123-foot-long concrete floor is sized to accommodate the backhoe mixer and load out truck operations with adequate clearances. Section 6.2.3 discusses working point distance and clearance radius requirements for this operation.~~

~~The vertical dimensions for the stabilization building will be established during the building design/build phase when locations and sizing of the reagent delivery system and ventilation system are finalized.~~

~~6.1.3Bin Liner, Bin Vault, and Floor Design~~

~~The stabilization bin arrangement is a double lined system consisting of two concentric steel bins separated by a network of wire rope isolators. The bins must be able to withstand the impacts from mixing with a backhoe bucket and also be relatively compatible with the waste that will be placed in the bins. Since the bins are concentric, the outer bin (secondary containment) can hold 100% of the volume of the inner bin. The wire rope isolators act as shock absorbers to dissipate impact loading to the bins by the mixing action of the backhoe. The wire rope isolators also serve to reduce impact loading transferred to the concrete vault floor and walls. Drawing No. 35 illustrates the inner and outer bin arrangements, bin dimensions, plate thicknesses, reinforcing rib arrangements, and locations of the wire rope isolators. The inner bin is not attached to the outer bin and therefore, can be removed for repair or replacement. The space between the bins provides access for leak detection instrumentation and fluid removal piping. Should a leak in the inner bin occur such that fluids escape into the inter-bin space, the leak detection instrumentation will trigger alarms in the control room immediately notifying the operators. The bin can then be taken out of service, inter-bin fluids removed, bin walls inspected, and repairs made if necessary. The outer bin is attached to the floor of the concrete vault. Drawing No. 33 shows the location of the leak detection and fluid removal piping. Liquid in the leak detection and fluid removal pipes may be monitored using a probe and removed by pumping, if necessary. The design of the bin has been based on a rational assumption of the design mixing and has selected a design thickness based on a reasonable curve of risk for damage. It is fully realized that if a worst case loading condition arose and the bins were cracked or otherwise damaged to the point of not providing containment than the bin would be taken out of service and repaired or replaced. Outline Specification for Proposed Hazardous Waste Mixing Bins at the Triassic Park Facility, presented in Appendix E, describes the steel plate, reinforcing members, and energy absorbing devices intended for the stabilization bin system.~~

~~The 1,330 cy concrete vault which will contain the stabilization bins has the capacity to easily contain the volume of all 4 100 cy bins (400 cy total capacity). As mentioned above, the vault serves as a tertiary containment feature should a catastrophic bin failure occur. In addition, the vault also provides access to the bins for inspection purposes and for ancillary reagent delivery piping and ventilation ducts. Construction details will be prepared for the concrete containment vault similar to those provided in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete.~~

~~The concrete floor will be steel reinforced cast-in-place concrete. All joints in the concrete floor will be constructed with chemical resistant water stops and caulking sealer. Drawing No. 44 shows the rebar types and concrete details for the floor. Construction details for the floor will be prepared similar to those provided in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete. Specification Section 07970, Sealants and Caulking, describes the concrete epoxy coating requirements.~~

~~6.1.4Stabilization Process Design~~

~~Drawing No. 34 summarizes the major waste processing unit operations and illustrates typical waste and reagent stream flows. Also shown are reagent tank and silo capacities, delivery piping, and control valve and flow meter locations.~~

~~Waste processing unit operations include waste receiving, reagent addition, stabilization mixing, and stabilized waste loadout. Waste receiving involves positioning loaded waste hauler at the end of the bin, dumping the waste load, and washing out any residue left in the truck bed into the bin. Reagent addition involves placing a cover on top of the bin, connecting ventilation and dry reagent delivery ducts, and injecting reagents into the bin. Reagent delivery to the bins will be controlled by a process controller (computer) system which will automatically sequence and deliver the necessary quantities of reagent based on a predetermined waste processing recipe. The bin cover will then be removed and a backhoe type excavator will mix the reagents with the waste. Following mixing, the waste will be sampled and a paint filter test will be conducted to ensure that no free liquids are present. Also, if necessary, samples will be gathered for toxicity characteristic leachate procedure (TCLP) testing. If the paint filter test is passed, the backhoe will load the stabilized waste into a waste hauler (roll-off truck) and the truck's roll-off cover will be positioned over the waste. The truck will either proceed to the landfill for disposal or will stage the roll-off bin in the Truck Roll-Off Area. The stabilized waste will need to be stored temporarily at the roll-off unit while tests are completed to determine how and if the material can be disposed of in the landfill.~~

~~Reagent usage will vary with the waste type and the prescribed stabilization recipe. It should be noted that both waste receipt rates and stabilization recipes will vary considerably. Stabilization process flows are discussed further in Section 6.2.4.~~

~~Reagent storage and delivery systems for two types of dry reagent and three types of liquid reagent (one being water) are incorporated into the design. Dry reagents including cement and fly will be stored in 25,000 and 50,000 cft silos, respectively, and delivered to the bins by a pneumatic delivery system. Liquid reagents including calcium polysulfate and ferrous sulfide will be batch mixed in individual 10,000 gal reagent tanks and pumped into the bins. Water will also be pumped to the stabilization bins.~~

~~For design purposes, a CAT 213B LC type excavator was selected as the backhoe mixer, however, other equipment manufacturer's offer excavators with similar reach, power, and weight characteristics.~~

~~In order to ensure no visible fugitive dust emissions during stabilization processing, the bins and the stabilization building will be equipped with an exhausting ventilation system which will maintain a negative pressure inside the building. Slotted ducts located around the perimeter of each bin will provide supply and~~

~~return air in a push-pull arrangement to remove dust during the waste receiving, mixing, and loadout operations. During reagent delivery operations, the bin cover, which will also be connected to the exhaust system, will control dust. Dust will be removed from the exhaust air in the bag house located on the west side of the building. Collected dust will be processed in the stabilization facility.~~

~~Wastes containing VOCs greater than 500 parts per million per weight (ppmw) will not be accepted for stabilization processing.~~

~~6.2Stabilization Facility Design Analyses~~

~~6.2.1Stabilization Bin Structural Analyses~~

~~Basic engineering principles in conjunction with finite plate analyses were used to address the preliminary structural design of the steel stabilization bins. Principles of impulse - momentum and conservation of energy were used to establish the mass, velocity and displacement relationships. Then plated stresses were approximated through the use of Sap 90. Finally force and displacement results were scaled up/down to limiting displacements (controlled by the wire rope isolators) and stresses (controlled by the grade of steel).~~

~~The fundamental design inputs for the bin analysis are the forces generated by the backhoe mixing action. For the purposes of this design a CAT 213B LC type backhoe was assumed. Critical velocities of the backhoe movements to prevent damage to the bins were determined as a percentage of maximum velocities achievable by the backhoe. These limiting velocities will be implemented in the actual backhoe unit by adjusting the hydraulic system flows. Calculations are presented in Appendix E and summarized in the overview below.~~

~~Overview Structural Analysis~~

- ~~Calculations establish the structural capacity required to support the static loads from hazardous waste material plus the stabilizing materials. The worst case scenario for the static load case is 80 cubic yards of material weighing 110 lbs/cubic foot.~~

- ~~Dynamic analyses for vertical impact loads due to the material dropping into the bin indicate that this is not a significant problem. However, impact from the bucket dropping freely due to a total and instantaneous hydraulic failure from a height of 15 feet would cause stresses in a 1 inch thick inner liner which would far exceed the yield stress of the steel and cause a permanent "dent" in the steel. It does not appear cost effective to design the inner liner for this possibility.~~

- ~~Dynamic analyses established a side impact load from the backhoe bucket with contributions from the stick and boom based upon their relative velocity and percent of load transferred to the bucket when it impacts the sidewall of the mixing bin.~~

  - ~~Static loads were applied to the wall of the inner liner to establish the relative deflections of points surrounding the point of impact. Then the effectiveness of the inner liner which would act to reduce the momentum of the bucket was established and the conservation of momentum principle was used to determine the reduction in velocity immediately after impact.~~

  - ~~After impact the moving bucket plus the effective plate mass has a kinetic energy equal to one half of the total mass times the square of the velocity. That kinetic energy is "gradually" transferred into potential energy from force times displacement (or bending moment times angle change) in the inner liner, the energy absorbing springs and the outer plate support system. When the bucket has been stopped all of the energy has been transferred from the kinetic state to the potential state. It appears that 80 to 90 percent of the energy absorption occurs in the springs.~~

- ~~Through a trial and error process, approximate relationships between initial velocity, displacements and stresses in the structural systems were established. It appears that the controlling factor in the system is the stress in the inner liner when subjected to impact loads.~~

- ~~The impact loads from the weight of the bucket plus contributions from the stick and boom totaling approximately 3,290 pounds results in a kinetic energy in excess of 800,000 lb-inches for the condition where a swing angle of 180 degrees can occur in 3 seconds (approximately 440 inches per second at the outer end of the bin).~~

- ~~In order to limit the stresses in the high strength inner liner plate to an acceptable allowable value, it will be necessary to reduce the side-to-side velocity of the bucket to 15 percent of the present velocity with a ¾ inch thick plate, 19 percent for a 7/8 inch plate and 23 percent for a 1-inch plate.~~

- ~~Preliminary analysis of the dominantly in and out impact loads caused by movement of the boom, stick and bucket were also made. Combinations of circular velocities (Boom + Stick + Bucket) could easily result in velocities and resulting impact loads greater than the capacity of the inner plate to resist. Some of these velocities will probably need to be reduced to limit damage to the inner liner but this will require significantly more detailed calculations. Note that the effective mass at impact varies with each of these elements and the addition of these circular velocities and tributary masses in any particular direction and at any particular point is far from linear. The maximum reduction in velocity for any of these elements appears to be in the order of 50 percent.~~

~~Bin steel plate thickness is dependent on the grade of steel selected. The final bin design will determine the optimal steel plate to be used.~~

~~Corrosion protection for the bins will be provided by installing grounded cathodes to the inner and outer bins.~~

~~6.2.2Facility Stabilization Concrete Vault~~

~~The Stabilization Facility concrete vault is not a secondary containment feature; therefore, regulations pertaining to secondary containment do not apply. However, all joints in the concrete vault of the stabilization building will be constructed with chemical resistant water stops. In addition, a chemical resistant epoxy coating will be placed on the surface of the vault floor and walls to further restrict potential liquid penetration into the concrete.~~

~~The concrete vault area will be inspected monthly. If liquids are found, then will be removed with a portable pump and transported to the liquid waste storage unit.~~

~~6.2.3Stabilization Facility Concrete Floor~~

~~Waste entering the stabilization building will be contained in the DOT-approved waste trucks. Stabilized waste, having undergone treatment, will either be contained in roll-off trucks fashioned with DOT-approved truck bed liners or, if treatment standards are met, according to approved testing protocols, the stabilized waste will be transferred directly to the landfill. The floor of the stabilization building will not be exposed to untreated waste material and is not required to serve as a containment system. However, all joints in the concrete floor of the stabilization building will be constructed with chemical resistant water stops. In addition, a chemical resistant epoxy coating will be placed on the surface of the floor to further restrict potential liquid penetration into the concrete.~~

~~As shown on Drawing No. 33, stabilization bins are located on 19-ft centers in the middle of the stabilization building. The bins are situated such that adjacent bins alternate mixing and receiving ends allowing for reagent addition operations to take place simultaneously with mixing or loadout operations in two adjacent bins.~~

~~During mixing and loadout operations, the center point (rotational axis) of the backhoe unit will be located 8 to 9 feet from the mixing end of the bin. Load out trucks, which can access the building through one of four doorways, will be positioned 15 to 20 feet from the backhoe center point within the 20-foot wide load out truck lane. A 6.5-foot clearance is provided between the load out truck lane and the north and south building walls. A 27-foot clearance is provided between the outer bins and the east and west building walls. At this distance the backhoe unit will be able to make a full 180° swing angle in the direction of the wall with minimal reach adjustments.~~

~~The backhoe unit will be equipped with synthetic rubber track pads covering the steel track ribs. The track pads will allow the backhoe unit to move over the concrete floor without damaging the floor surface.~~

~~6.2.4Stabilization Process Analyses~~

~~Solid waste throughputs in the order of 400 tons per day and liquid waste throughputs in the order of 1000 gpd were assumed based on experience at similar operating facilities. Similarly, a typical waste recipe for stabilization of solid and liquid waste was developed.~~

~~The 25,000 and 50,000 cft dry reagent storage silos and 10,000 gal tank capacities are based on providing sufficient reagent quantities for one week of normal stabilization operations. Reagent delivery piping sizes shown on Drawing No. 34 are preliminary and will be finalized when selection of the pumps and dry reagent pneumatic system are determined, however, these piping sizes are capable of meeting the daily reagent delivery requirements.~~

~~Ventilation system requirements will be determined in conjunction with the final design of the stabilization building. As previously mentioned, the building will be maintained under negative pressure during processing operations to ensure no visible dust is emitted. Additionally, each bin will have its own push-pull ventilation system to control dust inside the building during waste receiving, mixing, and loadout operations.~~

~~6.2.5Compatibility~~

~~The steel bins of the stabilization unit will not be completely compatible with all possible wastes. However, steel bins are considered to be the best material to withstand the impacts of the mixing operations. In addition, the bins are accessible and can be inspected for corrosion that could impact their containment capabilities. If excessive corrosion or wear is noted during the inspections the tanks could be prepared or replaced.~~

~~7.Drum Handling Facility~~

~~7.1Drum Handling Facility Design~~

~~7.1.1General~~

~~The purpose of the drum handling facility is to provide storage capacity for drummed waste streams which will either be processed in the stabilization facility, placed in the landfill, or shipped to other waste processing centers such as incinerators or solvent recovery plants.~~

~~Drum handling facility design elements include drum facility layout, subgrade design; liner design; concrete floor design, and drainage sump design. This section describes each of these design elements.~~

~~7.1.2Facility Layout~~

~~Drawing No. 37 shows the layout of the drum handling facility floor and surrounding area. Additional details for the floor and floor drains are illustrated on Drawing No. 38.~~

~~As previously discussed, the drum handling facility entrance faces the north access road. Incoming trucks will enter the gravel lined apron and will back up to the loading dock areas. Once the truck unloading (or loading) operation is complete, the trucks will exit the facility via the same north access road. Parking areas for site personnel vehicles will be designated near the Drum Handling Facility Office. The gravel apron in front of the facility will not be used to stage waste haul trucks.~~

~~The drum handling building will be an open walled building with a roof which extends over the entire floor and truck docking areas. The roof structure will eliminate rain water from entering the drum handling area. The open walls will provide ample ventilation inside the building, however, personnel involved with drum sampling and decanting activities will still be required to use supplied air respiratory systems. As discussed in Section 1.6, during winter months the site will experience temperatures as low as 14°F, with average daily temperatures of 36°F. Under the most severe conditions, freezing of liquids in the drums may be possible. Therefore, during periods of extended low temperatures, drums will be monitored for any sign of leakage or damage due to freezing. Damaged drums will be immediately placed in over pack units to ensure containment.~~

~~The 49,265 sf total floor area is divided into 7 drum storage cells with each cell having a separate drain, collection sump, and leak detection sump. Each 63 ft long by 52 ft wide cell is capable of storing 160 drums. Two of the cells are designated as TSCA PCB cells and as such are required to be isolated from other drum storage cells. The 6 inch high by 41 inch wide berm walkway which surrounds the TSCA - PCB cell provides the necessary isolation. The remaining five cells are also separated by berm walkways. As shown on Drawing No. 38, drums will be placed in four rows, two drums deep. Two 12 ft wide aisles will provide access for the forklift to place and remove drums. Any drum spills or leakage will flow to the deep drain located along the center line of the cell. The drain bottom slopes at 2 percent to the sumps located on the south side (rear) of the building. The berms in combination with the sloping floors to the sumps for each cell will provide separation of the incompatible wastes. Any fluids in the sump will be removed though the sump riser pipes using a vacuum truck which can access the pipes from the rear of the building.~~

~~The perimeter of the drum storage unit will be graded to drain away from the facility foundation.~~

~~7.1.3 Subgrade Excavation, Liner System, Leachate Collection Sump, and Leak Detection Sump Design~~

~~Subgrade Excavation~~

~~The subgrade surface will be compacted to provide a suitable foundation for overlying drainage soils, geosynthetics, and the concrete floor and building foundation. Soft areas will be over excavated and replaced with compacted structural fill. Specification Section No. 02110, Site Preparation and Earthwork, describes site preparation, excavated soil classification and stockpiling, subgrade surface preparation and inspection, structural fill placement and compaction requirements, survey and quality control, and erosion control features.~~

~~Liner System~~

~~Drawing No. 37 indicates the area extent of the liner system and the basal liner components intended for the floor, drainage trenches and sumps, and anchor trench areas. In the floor area of the drum handling facility, the liner system is a double lined system consisting of (from bottom up), a prepared subgrade, a geomembrane secondary liner, a composite geotextile and sand leachate collection drainage layer, and the epoxy coated concrete floor which serves as the primary containment element. In the drainage trench areas, the liner system is a double lined system consisting of (from bottom up), a prepared subgrade, a secondary geomembrane liner, a geonet leak detection and removal layer, and a primary geomembrane liner. Details of each liner component of the floor and drainage trench areas (from bottom up) are discussed below.~~

~~Floor Liner System~~

- ~~*6-inch thickness of prepared subgrade*~~

  ~~The prepared subgrade component will provide a smooth stable surface suitable for placement of overlying geosynthetic materials. Specification Section 02119, Prepared Subgrade, presents subgrade material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

- ~~*60-mil thick high density polyethylene (HDPE) geomembrane liner (smooth)*~~

  ~~The 60-mil HDPE liner placed on top of the prepared subgrade is the secondary liner component. The HDPE liner is a highly efficient barrier layer to restrict percolation of leachate into the subgrade. Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material CQA.~~

  ~~Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility.~~

- ~~*12-oz non-woven cushion geotextile*~~

  ~~The 12-oz non-woven geotextile layer placed on top of the geomembrane will provide cushion, as well as filtration qualities to protect the geomembrane from puncture and allow liquids percolating through the concrete floor and select subbase to drain to the sump area. Specification Section 02714, Filter or Cushion Geotextile, describes minimum geotextile properties required, material transportation and handling procedures, deployment and seaming requirements, and material CQA.~~

- ~~*1-foot-thick select subbase*~~

  ~~The select subbase will provide a stable foundation for the overlying concrete floor while allowing liquids for the overlying concrete floor while allowing liquids percolating through the concrete to drain to the sump area. Specification Section 02229, Select Subbase, presents material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

- ~~*6-inch thick epoxy coated concrete floor*~~

  ~~The concrete drum handling facility concrete floor slopes towards one of the seven drainage trenches located within each cell. The drum handling facility secondary liner system completely encompasses the floor so that any leakage through the pad will also drain back into one of the drainage trenches. The concrete floor will be steel reinforced cast-in-place concrete. All joints in the concrete floor will be constructed with chemical resistant water stops and caulking sealer. Drawing No. 45 shows the rebar types and concrete details for the floor. Construction details for the floor are also called out in~~

~~Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete. Specification Section 07920, Sealants and Caulking, describes the concrete epoxy coating requirements.~~

~~Drainage Trench Liner System~~

- ~~*6-inch thickness of prepared subgrade*~~

  ~~The prepared subgrade component will provide a smooth stable surface suitable for placement of overlying geosynthetic materials. Specification Section 02119, Prepared Subgrade, presents subgrade material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

- ~~*60-mil thick high density polyethylene (HDPE) secondary geomembrane liner (smooth)*~~

  ~~The 60-mil HDPE liner placed on top of the prepared subgrade is the secondary liner component. The HDPE liner is a highly efficient barrier layer to restrict percolation of leachate into the subgrade. Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material and CQA.~~

  ~~Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility.~~

- ~~*Geonet leak detection drainage layer (transmissivity ≥ 5 x 10⁻³ m²/s)*~~

  ~~The high transmissivity geonet drainage layer provides a means to transmit and remove fluids percolating through the primary geomembrane layer. Flow calculations discussed in Section 7.2.1 and presented in Appendix E indicate that the geonet is capable of removing fluids such that ponding on the secondary liner can be avoided. Specification Section 02712, Geonet, describes minimum geonet properties required, material transportation and handling procedures, deployment and seaming requirements, and material and construction quality assurance.~~

- ~~*60-mil thick high density polyethylene (HDPE) primary geomembrane liner (smooth)*~~

  ~~The 60-mil HDPE liner placed on top of the geonet layer serves as the primary liner component in the drainage trench area. The HDPE liner is a highly efficient barrier layer to restrict percolation of fluids from entering the into the geosynthetic layers below. Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material and CQA.~~

  ~~Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility.~~

~~Leachate Collection Sump and Leak Detection Sump Design~~

~~The leachate collection system and leak detection system each have a separate sump from which fluids can be collected and removed. The liner components in the drainage trench system continue into the sumps, however, in order to provide adequate volume to efficiently operate removal pumps, gravel thicknesses are incorporated in the sumps. Drawing No. 39 illustrates the sump layout and cross-sections and the geosynthetic component arrangements. As shown on the drawings, the sumps are rectangular pyramidal shapes which lie concentrically above one another. The slope riser pipes enter their respective sumps at the sump base and are in the same vertical plane. The slope riser trench arrangement enables the leachate collection and leak detection slope riser pipes to penetrate overlying geosynthetic liner elements at the crest of~~

~~the sump rather than at its base. The leachate collection sump and drain has a total fluid capacity of 2,110 gallons (after accounting for gravel). Ten percent of the cell water volume is 880 gallons based on a storage capacity of 160 55-gallon drums. The leak detection sump and drain has a total fluid capacity of 41 gallons (after accounting for gravel). Because theses sumps are close to the surface and any fluids in the sump can be observed by looking down the riser pipes, fluid level instrumentation is not required.~~

~~7.2Drum Handling Facility Design Analyses~~

~~7.2.1Geosynthetics Strength and Performance Analyses~~

~~7.2.1.1Geomembranes~~

~~The 60 mil geomembrane located beneath the concrete floor area of the drum handling building is protected by a an overlying geotextile and fine grained foundation sand. Below this geomembrane is a 6-inch thickness of prepared subgrade. Specification No. 02119, Prepared Subgrade, requires this subgrade material to have a maximum particle size of 1 inch. Specification No. 02775, Geomembrane~~

~~Liners, requires that the surface of the prepared subgrade be smooth drum compacted and free of any foreign objects which might damage the overlying geomembrane. Considering that the loading conditions of the geomembrane in this arrangement due to the overlying sand, concrete floor, drums, and forklift wheeling loading do not approach the loading conditions evaluated in Calculation No. E-18, Geomembrane Puncture Resistance, the geomembrane will be adequately protected against puncture.~~

~~The geomembranes located in the drain areas and the drain sumps will not be subjected to significant overburden pressures. Gravel in the sump will not be compacted.~~

~~Geonet~~

~~The geonet layer in the drain areas and the drain sumps will not be subjected to significant overburden pressures which might reduce flow capacity. Additionally, the 2 percent slope of the drain system provides adequate relief to cause fluid flow to the sumps.~~

~~Geotextiles~~

~~Calculation No. E-20, Geotextile/Geocomposite Filtration, evaluates the AOS of several available geotextile products with respect to the silty sands and Upper Dockum materials found at the site. Based on this calculation, the 7 oz non woven geotextile called for in the specifications will adequately filter fines from the foundation sand material (SM).~~

~~Anchor Trench Design~~

~~The purpose of the anchor trench in the drum handling facility is to restrict movement of the geosynthetics during installation of the sand and concrete layers. Pullout capacity due to settlement is not a relevant concern for this facility.~~

~~7.2.2Drum Handling Facility Concrete Floor~~

~~The floor of the drum handling building may be exposed to untreated waste material and is required to serve as the primary containment system. All joints in the concrete floor of the stabilization building will be constructed with chemical resistant water stops. In addition, a chemical resistant epoxy coating will be placed on the surface of the floor to further restrict potential liquid penetration into the concrete.~~

~~Drawing No. 45 shows the rebar types and concrete details for the floor. Construction details for the floor are also called out in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete. Specification Section 07920, Sealants and Caulking, describes the concrete epoxy coating requirements.~~

~~8.Liquid Waste Storage Facility~~

~~8.1Liquid Storage Facility Design~~

~~8.1.1General~~

~~The purpose of the liquid waste storage facility is to provide storage capacity for bulk liquid wastes which will either be processed in the stabilization facility or be placed in the evaporation pond. The tanks will not be used to manage wastes containing volatile organic concentrations greater than 500 parts per million by weight (ppmw).~~

~~Liquid waste storage facility design elements include liquid storage facility layout, storage tank leak containment design; piping and pumping design; and concrete tank pad. This section describes each of these design elements.~~

~~8.1.2Facility Layout~~

~~Drawing No. 40 shows the arrangement of the liquid waste storage tanks, piping , and tank containment pad and surrounding area. The four double lined HDPE poly tanks (9,000 gallon capacity) will each have its own concrete pad area, discharge and intake pump, and piping and control system.~~

~~As previously discussed, access to the liquid waste storage area is provided on the east, west, and north sides of concrete tank pads. Tanker trucks can use either the north access road or the road to the east of the liquid waste storage area.~~

~~The concrete pad is included to prevent the spread of fluid should leaks or spills occur at discharge piping connections and pumps located within the pad.~~

~~A concrete pad will be placed in the loading/unloading areas for the tanker trucks. This pad will be sloped providing drainage toward the sump areas.~~

~~8.1.3Tank Leakage Containment Design~~

~~Drawing No. 40 illustrates the double walled poly tank system. The outer tank will be covered to prevent the precipitation infiltration. The inner tank will not be covered. The tanks will be equipped with flexible connections at pipe penetrations between the inner and outer tanks and drainage ports in the outer tank. Chemical resistant gaskets will be used at all tank flanges. Liquids containing solvents such as MEK, toluene, xylene, diesel, or gasoline in concentrations greater than 15% will not be placed in the tanks. Tank tie down details will be developed from manufacturer's shop drawings when the tank is purchased.~~

~~The 15,500 gallon outer tank will contain the total volume of the 9,000 gallon inner tank should a leak in the inner tank occur. Each tank system will be equipped with graduated sight gauges allowing visual determination of fluid volume in the inner tank. In addition, to prevent tank overfilling or unnecessary pumping, high level and low level cutoff switches are included.~~

~~The tanks will be vented to the atmosphere to prevent internal pressure buildup. Protected ladders running up the outside of the outer tank will provide access to openings in the top tank.~~

~~Specification Section 13205, Polyethylene Tank (see Volume IV, Appendix C for Construction Specifications), discusses the tank material and installation requirements. Construction details for the concrete tank pad are called out in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete.~~

~~8.2Liquid Waste Storage Facility Design Analyses~~

~~8.2.1Tank Design, Testing, and Quality Control Standards~~

~~The liquid waste storage facility poly tanks will be manufactured by Central California Container Inc. Performance tests, material property tests, and design standards provided by the manufacturer include the following:~~

- ~~Performance Requirement Tests~~
  - ~~Low Temperature Dart Impact Test (ASTM D-1998)~~
  - ~~o-xylene Insoluble Faction (Gel Test) (ASTM D-1998)~~
  - ~~Ultrasonic Gauge Wall Thickness Test (ASTM D-1998)~~
  - ~~Hydrostatic Pressure Test (ASTM D1998)~~
- ~~Material Properties Tests~~
  - ~~Environmental Stress Crack Resistance (ASTM D-1693)~~
  - ~~Elongation @ Break, Tensile Strength (ASTM D-638)~~
  - ~~UV Stabilizer Compounded into Resin (ASTM D-1998)~~
- ~~Design Standards~~
  - ~~Wall Thickness Calculations (ASTM D01998)~~
  - ~~Seismic & Wind Restrain (UBC)~~
  - ~~Finite Element Analysis (ADE-92)~~

~~The tank manufacturer has provided recommended tank tie down details. The details should be reviewed and approved by a registered professional engineer prior to tank installation.~~

~~The manufacturer information on the tank compatibility is provided in Appendix H-3. This assessment indicates that the tanks are compatible with a wide variety of waste liquids.~~

~~8.2.2Pumping and Piping~~

~~Drawing No. 40 illustrates the pumping, piping, and control feature arrangement for the liquid waste receiving and storage area. High and low level cutoffs will prevent tank overfilling and pump burnout. The flow meter will record fluid volumes pumped into and out of the tank.~~

~~The Piping system will be installed according to API publication 1625 (November 1979) or ANSI standard B31.2 and ANSI standard B31.4.~~

~~All piping installed at the liquid waste storage facility will be double walled.~~

~~8.2.3Tank Concrete Pad~~

~~The concrete pad will provide secondary containment for the ancillary facilities.~~

~~Drawing Nos. 40 and 45 show the rebar types and concrete details for the floor. Construction details for the floor are also called out in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete. Specification Section 07920, Sealants and Caulking, describes the concrete epoxy coating requirements.~~

~~9.Truck Wash Facility~~

~~9.1Truck Wash Facility Design~~

~~9.1.1General~~

~~DOT approved roll-off trucks delivering bulk solid waste for landfill disposal will have plastic bed liners which will isolate the waste from the roll-off bin interior. As waste loads are dumped, these bed liners can become damaged exposing the roll-off bin to the waste material. If this material cannot be removed from the roll-off bin at the landfill waste placement face, then the truck will be required to proceed to the truck wash facility, where the bin will be washed out. Also, during rainy periods, mud from access roads or daily cover soil can collect on the wheels and undercarriages of waste haul trucks exiting the landfill. Similarly, if this material cannot be removed from the truck while in the landfill, then the truck will be required to proceed to the truck wash facility for cleanup prior to exiting the site. Landfill operations equipment such as waste compactors, scrapers, water trucks, and other vehicles may also require similar cleanup upon exiting the landfill. Because potentially contaminated materials may be washed from the roll-off bin or from undercarriage recesses while at the truck wash facility, a double liner containment system has been designed to contain wash water and wash residues.~~

~~The truck wash facility design elements presented here include the facility layout, liner system, and sump and leak detection system.~~

~~9.1.2Facility Layout~~

~~Drawing No. 44 illustrates the truck wash facility layout. As previously discussed, access to the truck wash facility is from the west landfill perimeter road. Exiting traffic will proceed to the north access road. The facility is designed with two wash bays: a heavy equipment bay and a roll-off truck bay; and a water storage area. Both wash bays drain to a common sump area which will collect wash water and residue. Poly tanks and pumps, located in the water storage area provide storage and pumping capacity for clean and used wash water.~~

~~The truck wash sump drains to a collection point at its north end where water will be pumped from the sump into a clarifier. The sump and sediment bins will be inspected weekly for the accumulation of sediment and liquids and will be removed to the wash water storage tanks. Residues remaining in the sump can be removed using a front end loader which has access from the heavy equipment wash bay. Oils, grease, and fine sediments will be removed from the wash water in the clarifier before being pumped to a double lined poly tank. Wash water and residues will be chemically analyzed and handled in an appropriate manner.~~

~~The entire extent of the truck wash facility concrete, which acts as primary containment, is designed with a geosynthetic secondary liner and leak detection system. The concrete will be coated with epoxy similar to the drum handling facility.~~

~~The roll-off truck bay is equipped with a truck barrier, tail gate lift, moveable wash platforms, and three high pressure hose reel and nozzle assemblies. The high pressure pump and delivery system can either be a single fixed installation or be made up of several portable units. Roll-off trucks will back into the bay to the truck barrier and lift the truck bed as if to dump. The tailgate lift will be attached and the tailgate raised to expose the inside of the roll-off bin. Truck wash personnel will then wash out the inside of the bin using the high pressure wash system. Wash water and residue will then be washed from the concrete floor into the sump area. If necessary, moveable platforms can be positioned next to the truck and the truck bed can be washed from openings in its top surface.~~

~~The heavy equipment wash bay will be constructed with steel rail or I-beams incorporated into the concrete floor of this bay to resist damage by heavy equipment tracks. Wash water and residue will flow to the sump area and will be removed as discussed above.~~

~~A concrete pad will be placed in the loading/unloading areas for the tanker trucks. This pad will be sloped, providing drainage towards the sump areas.~~

~~9.1.3Subgrade Excavation, Liner System, Sump and Leak Detection System Design~~

- ~~Subgrade Excavation~~

  ~~The subgrade surface will be compacted to provide a suitable foundation for overlying drainage soils, geosynthetics, and the concrete floor and building foundation. Soft areas will be overexcavated and replaced with compacted structural fill. Specification Section No. 02110, Site Preparation and Earthwork, describes site preparation, excavated soil classification and stockpiling, subgrade surface preparation and inspection, structural fill placement and compaction requirements, survey and quality control, and erosion control features.~~

- ~~Liner System~~

  ~~Drawing No. 44 indicates the aerial extent of the liners system and the basal liner components intended for the floor, drainage trenches and sumps, and anchor trench areas. In the floor areas, the liner system consists of (from bottom up), a prepared subgrade, a geomembrane secondary liner, a geocomposite drainage layer, a foundation sand layer, and the epoxy coated concrete floor which serves as the primary containment element. Details of each liner component are discussed below.~~

~~Floor Liner System~~

- ~~6-inch thickness of prepared subgrade~~

  ~~The prepared subgrade component will provide a smooth stable surface suitable for placement of overlying geosynthetic materials. Specification Section 02119, Prepared Subgrade, presents subgrade material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

- ~~60-mil thick high density polyethylene (HDPE) geomembrane liner (textured)~~

~~The 60-mil HDPE liner placed on top of the prepared subgrade is the secondary liner component. The HDPE liner is a highly efficient barrier layer to restrict percolation of leachate into the subgrade. Specification Section 02775, Geomembrane Liners, describes minimum geomembrane properties required, subgrade preparation and inspection, material transportation and handling procedures, deployment and seaming requirements, and material construction quality assurance.~~

~~Site specific compatibility tests will be conducted on a synthetic leachate and the proposed liner prior to operation of the facility.~~

- ~~Geocomposite: A geocomposite drainage layer (transmissivity ≥ 2.2 x 10^{-4} m^2/s) consisting of:~~

  - ~~A 7 oz. geotextile (non-woven)~~
  - ~~A geonet~~
  - ~~A 7 oz. geotextile (non-woven)~~

  ~~The high transmissivity geocomposite drainage layer provides a means to transmit and remove fluids percolating through the epoxy coated concrete floor. Flow calculations discussed in Section 3.2.8 and presented in Appendix E indicate that the geocomposite is capable of removing fluids such that ponding on the geomembrane liner can be avoided. Specification Section 02712, Geocomposites, describes minimum geonet properties required, material transportation and handling procedures, deployment and seaming requirements, and material and construction quality assurance.~~

- ~~A 12-inch thick foundation sand layer~~

  ~~Specification Section 02231, Foundation Sand, presents foundation sand material requirements including particle size and moisture content, placement and compaction requirements, and survey and field quality control requirements.~~

- ~~1-foot-thick epoxy coated concrete floor~~

  ~~The truck wash facility floor slopes towards sump located between the two bay areas. The truck wash facility secondary liner system completely encompasses the floor so that any leakage through the floor will be captured in the leak detection system. The concrete floor will be steel reinforced cast-in-place concrete. All joints in the concrete floor will be constructed with chemical resistant water stops and caulking sealer. Construction details for the floor will be provided similar to those presented in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete. Specification Section 07920, Sealants and Caulking, describes the concrete epoxy coating requirements.~~

~~Leak Detection Sump (LDRS) Design~~

~~The leak detection system geocomposite drains to a separate sump from which fluids can be detected and removed. In order to provide adequate volume to efficiently operate removal pumps, a gravel thickness has been incorporated in the sump. Drawing No. 44 illustrates the sump layout and cross sections and the geosynthetic component arrangements. A vertical riser pipe is located in the center of the sump and provides space for the fluid removal pump. The leak detection sump has a total fluid capacity of 72 gallons (after accounting for gravel). Because this sump is close to the surface and any fluids in the sump can be observed by looking down the riser pipe, fluid level instrumentation is not required. Fluids in the sump will be removed by pumping into the clarified or by vacuum truck.~~

~~9.2Truck Wash Facility Design Analyses~~

~~9.2.1Geosynthetics Strength and Performance~~

~~Geomembrane, geocomposite, and geotextile material installation in the truck wash facility is similar to the installations in the drum pad facility. Rationale and computations pertaining to geomembrane puncture and tearing, geocomposite flow capability, and geotextile cushioning and filtration performed for the drum pad, which are applicable to the truck wash facility, are not repeated.~~

~~9.2.2Tank Design, Testing, and Quality Control Standards~~

~~Tanks and piping intended to store and convey potentially contaminated wash water will be double lined installations similar to the liquid waste storage area tanks. Section 8.2 presents a discussion of this equipment which also applies to the truck wash facility. Control features for this system are identified on Drawing No. 44.~~

~~Piping system will be installed according to API publication 1615 (November 1979) or ANSI B31.2 and ANSI standard B31.4. The clean water supply tank and piping will be single walled installations.~~

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Permit Renewal Application
October 17, 2011

Attachment L1

Design Drawings

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The New Mexico Environment Department
March 2002

Attachment L1, Design Drawings, is provided as Volume 3.

Permit Renewal Application
October 17, 2011

Attachment L4

New Landfill Engineering Calculations

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Calculation Cover Sheet

Daniel B. Stephens & Associates, Inc.

Project Name Triassic Park Landfill Permit Renewal Project Number ES11.0141

Calculation Number ES11.0141-001 Discipline Hydrology No. of Sheets

PROJECT: Triassic Park Waste Disposal Facility Permit Renewal

SITE: Triassic Park Waste Disposal Facility, Roswell, NM

SUBJECT: Calculate surface water runoff to assess existing channel and culvert sizing.

SOURCES OF DATA:

A. Part A and Part B Permit Application for the Triassic Park Waste Disposal Facility, Chaves County, New Mexico, Appendix F-3. October 2000.

SOURCES OF FORMULAE & REFERENCES:

1. W.R. Viessman, G.L. Lewis, J.W. Knapp, Introduction to Hydrology, 3rd Edition, 1989. P.310.
2. Part A and Part B Permit Application for the Triassic Park Waste Disposal Facility, Chaves County, New Mexico, October 2000.

[x] Preliminary Calculation [ ] Final Calculation Supersedes Calculation No.

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
0		KI	9/21/11	[illegible]	10/14/11	[illegible]	10/14/11

Calculation Sheet

Daniel B. Stephens & Associates, Inc.

Project No. ES11.0141 | Date 09/21/11
Subject Surface water runoff and channel sizing | Sheet 1 of 1
By K Isaacson | Checked By | Calculation No. ES11.0141-001

1.0 OBJECTIVE

The purpose of this calculation is to calculate a channel size for the 100 year storm event and compare this to the drainage nearest the landfill to see if there is any possibility of the runoff reaching the Triassic Park Waste Disposal Facility. The nearest drainage is approximately 3/4 of a mile southwest of the site (reference A).

2.0 GIVEN

The 100-year, 24-hour design storm for the site is 5.75 inches.[A] In the 2002 permit application, the area of 1937.6 acres and a runoff coefficient of 0.3 were used.

3.0 METHOD

This calculation utilizes the rational method:

Q = C.I.A
where:
Q = Peak runoff rate (cfs)
C = Maximum runoff coefficient
I = Rainfall rate (in./hr)
A = Drainage area (acres)

4.0 RESULTS

Storm Intensity was calculated by dividing the rainfall by its duration:
I = 5.75 in/24hr = 0.24 in/hr

Based on the topography of the area, the runoff coefficient is as follows:
C = 0.3

The drainage area:
A = 1937.6 acres

Peak runoff rate estimated by formula noted above in the method section (see reference 1):
Q = 0.3*((0.24in/hr*0.08333ft/in/3600s/hr)ft/s*(1937.6ac.*43560ft^3/ac.)ft^3)cfs
Q = 139.26 cfs

A flow of 140 cfs was used to size a channel in the Bentley FlowMaster software. The Manning equation was used to solve for normal depth of the channel. Inputs and results are in the attached FlowMaster report. For a flow of 140 cfs the normal depth is 1.2 ft and the channel width is approximately 80 feet. Given the distance to the drainage of 3/4 of a mile the facility is not in a flood plain.

Triassic - Surface Water Runoff and Channel Sizing

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.060	
Channel Slope	0.03000	ft/ft
Left Side Slope	33.00	ft/ft (H:V)
Right Side Slope	33.00	ft/ft (H:V)
Discharge	140.00	ft^3/s

Results

Normal Depth	1.18	ft
Flow Area	46.30	ft^2
Wetted Perimeter	78.21	ft
Hydraulic Radius	0.59	ft
Top Width	78.17	ft
Critical Depth	1.02	ft
Critical Slope	0.06564	ft/ft
Velocity	3.02	ft/s
Velocity Head	0.14	ft
Specific Energy	1.33	ft
Froude Number	0.69	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.18	ft
Critical Depth	1.02	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.06564	ft/ft

(2)

Permit Renewal Application
October 17, 2011

Attachment A

General Facility Description and Information

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Modified by:

The New Mexico Environment Department
March 2002

The site is located in eastern Chaves County, in an area that has historically been utilized primarily as range land for livestock grazing and for limited oil and gas activities. The residence nearest the site is owned by Marley Ranches, Ltd. and is located approximately 2.9 miles to the east-southeast. Land ownership for a 4-mile radius around the site is shown in Figure 1-2. All of the residences within a ten-mile radius of the site are listed in Figure 1-3.

The site will encompass 480 acres and will be enclosed by a 6-foot chain link fence. Gates to the same height as the perimeter fence will be constructed. The area will be secured and monitored so that only authorized personnel or personnel being accompanied and supervised by authorized personnel are allowed onsite. Employees responsible for site security will be present at all times to prevent unauthorized entry and to report unusual events and/or emergencies. Site security personnel will be responsible for conducting regular inspections and routine maintenance of the perimeter area (see Permit Attachment D, *Inspection Procedures*).

Land use plans and/or zoning maps have not been developed for Chaves County. All areas within the county, except those within municipal boundaries, are designated as Zone A (agricultural). The eastern half of the county is further designated as Area 1 and the western half as Area 2. Area 1 and Area 2 are zoning Land Use Areas, whose boundaries have been determined by a joint-powers agreement between the Board of Chaves County Commissioners and the Roswell City Council. Existing uses in Area 1 are livestock grazing, mineral exploration and production, wildlife habitat, and extensive recreation. Single-family dwellings require permits in Area 1. Area 2 covers an important part of the recharge area of the Roswell Artesian Basin. Existing uses in Area 2 are livestock grazing, mineral exploration and production, extensive recreation, wildlife habitat, and flood control structures and floodways. Any new parcels created in the area must be five acres or larger.

Approximately 2 miles northwest of the Facility location, the Mescalero Sands recreational "complex" has been established for use by off-road vehicles. The South Dunes area of Mescalero Sands has been designated as an "Outstanding Natural Area" (ONA) and is utilized by the public primarily for wildlife observation activities.

The land in the area of the Facility is used predominantly for grazing cattle and to a much lesser extent for oil and gas exploration activities. The nearest production well is 3 miles from the site. Additional information about the drilling activities in the area is contained in Section 3.0 of the permit application.

All abandoned wells in the area have been plugged in accordance with New Mexico Oil Conservation Division (OCD) regulations. These regulations require the use of mud-laden fluids, cement and plugs in the well "in a way to confine crude petroleum oil, natural gas, or water in the strata in which it is found and to prevent it from escaping into other strata." Surface reclamation of abandoned wells prevents surface water from entering and contaminating subsurface strata.

1.3.1 Flood Plain Information

Sections 17 and 18, T11S, R31E are included on Federal Insurance Rate Map ~~#350125~~35005C1775D. This map has not been printed because this is a non-participating community, a status which generally indicates that the area is an area of minimal flood hazards.~~e National Flood Insurance Program has determined that this is an area of minimal flood hazards.~~ This information was provided to GMI by the Director of Planning and Environmental Services, Chaves County, New Mexico, and was confirmed with the National Flood Insurance Program at their website, www.msc.fema.gov.

~~Additionally~~To confirm that this Facility is an area of minimal flood hazards, rainfall run-off calculations were performed to determine whether the site falls within the flood plain of a 100-year, 24-hour storm event. Based on information in the Precipitation Frequency Atlas published by the National Oceanic and

Atmospheric Association, a rainfall amount of 5.~~3~~75 inches was used in the calculations. The nearest drainage to the site was determined from the USGS 7.5-minute series topographic map of the Mescalero Point Quadrangle (see Section 3.0 of the permit application). This drainage flows westerly from Mescalero Point, which is approximately three-quarters of a mile south of the site.

Storm run-off flows were calculated for the area using the Rational Method (see Appendix F-3 in Volume VI of the permit application). A run-off coefficient of 0.3 was used in the calculations. It was determined that the maximum flow could be accommodated in a triangular section occupying a width of ~~76~~ 78 feet. It may be concluded from this comparison that a flood plain does not exist for the drainage and that there are no flood plains within 1 mile of the site. It may be further concluded that flood plain regulations are not applicable to this Facility.

1.3.2 Fire Control and Emergency Response

Fire control and emergency response will be the responsibility of the Emergency Coordinator (EC) who is on call or duty at the time of an incident. Each EC will be trained to handle emergencies and to notify appropriate authorities (see Permit Attachment C, *Contingency Plan*). Each EC will have the authority to commit resources necessary to implement the site Contingency Plan described in Permit Attachment C.

In addition to onsite emergency response capabilities, cooperative agreements will be established with local emergency response organizations in surrounding communities to respond to and assist in any emergencies that arise at the Facility (see Permit Attachment C).

1.4 Traffic Patterns

The flow of traffic within the Facility boundary will not be significant except during shift changes. The number of employee vehicles will not be substantial enough to require elaborate signage or other traffic control systems. All personnel will be given written instructions that will caution them to be alert to other vehicles and pedestrians. Each vehicle must enter and exit through the security gate at the northeast corner of the perimeter of the Facility boundary. ~~The arrival and departure of trucks transporting waste will not be scheduled during peak traffic times.~~ Drawing 26, Sheet 2 in Permit Attachment L1 illustrates traffic flow patterns for the operations and waste processing area, traffic control signage and truck staging areas.

1.4.1 Traffic Control

Access to the Facility will be gained through the security gate at the northeast corner of the perimeter fence (see Drawing 26, Sheet 2 in Permit Attachment L1). Authorization to enter the Facility will be verified for each vehicle.

Visitors will be required to sign in at the guard shack and will be escorted while onsite unless other arrangements are made with the Facility. Only authorized persons will be allowed past the security gate guard shack.

1.4.2 Onsite Transportation of Wastes

All trucks transporting wastes will be stopped at the security gate prior to entering the Facility. Security personnel will record the license number, transportation company, arrival time, and other pertinent information with regard to the vehicle and driver.

INTRODUCTION TO HYDROLOGY

THIRD EDITION

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models incorporating all fundamental hydrologic processes. The mechanics of all these processes are not completely known and some empiricism remains. In fact, small watershed modeling is still part art and part science, but as more data become available and modeling technology improves, a greater degree of sophistication and reliability will result. Perhaps the greatest underlying need is for more data characterizing the water cycle on urban areas. Information on both the quantity and quality of urban runoff is in critically short supply.

15.2 PEAK FLOW FORMULAS FOR URBAN AND SMALL WATERSHEDS

Numerous methods are available for estimating the peak rates of runoff required for design applications in small urban and rural watersheds. Some incorporate a rational analysis of the rainfall–runoff process whereas others are completely empiric or correlative in that they predict peak runoff rates by correlating the flow rates with simple drainage basin characteristics such as area or slope.

Both categories of peak flow determination are easily adapted and have had wide application; however, two relatively major difficulties are normally encountered in applying the techniques. First, the rainfall–runoff formulas, such as the *rational formula*, are difficult to apply unless the return periods for rainfall and runoff are assumed to be equal. Also, estimates of coefficients required by these formulas are subjective and have received considerable criticism. The empiric and correlative methods are limited in application because they are derived from localized data and are not valid when extrapolated to other regions.

The most fundamental peak flow formulas and empiric-correlative methods, due to their simplicity, persist in dominating the urban design scene, and several of the most popular forms are briefly described to acquaint the reader with methods and assumptions. Urban runoff simulation techniques are described in Chapter 26, and Chapter 16 gives a discussion of the effects of urbanization on the hydrologic cycle.

Rational Formula

The rational formula for estimating peak runoff rates was introduced in the United States by Emil Kuichling in 1889.[18] Since then it has become the most widely used method for designing drainage facilities for small urban and rural watersheds. Peak flow is found from

$$\boxed{Q_p = CIA} \tag{15.1}$$

where Q_p = the peak runoff rate (cfs)
C = the runoff coefficient (assumed to be dimensionless)
I = the *average* rainfall intensity (in./hr), lasting for a critical period of time t_c
t_c = the time of concentration
A = the size of the drainage area (acres)
CI = the net rain intensity (in./hr) at $t = t_c$

The runoff coefficient can be assumed to be dimensionless because 1.0 acre-in./hr is equivalent to 1.008 ft^3/sec. Typical C values for storms of 5–10-year return periods are provided in Table 15.1.

The rationale for the method lies in the concept that application of a steady, uniform rainfall intensity will cause runoff to reach its maximum rate when all parts of the watershed are contributing to the outflow at the point of design. That condition is met after the elapsed time t_c, the time of concentration, which usually is taken as the time for a wave to flow from the most remote part of the watershed. At this time, the runoff rate matches the net rain rate.

Figure 15.1 graphically illustrates the relation. The IDF curve is the rainfall intensity–duration–frequency relation for the area and the peak intensity of the runoff is $Q/A = q$, which is proportional to the value of I defined at t_c. The constant of proportionality is thus the runoff coefficient, $C = (Q/A)/I$. Note that Q/A is a point value and that the relation, as it stands, yields nothing of the nature of the rest of the hydrograph.

TABLE 15.1 TYPICAL C COEFFICIENTS FOR 5- TO 10-YEAR FREQUENCY DESIGN

Description of area	Runoff coefficients
Business	
Downtown areas	0.70–0.95
Neighborhood areas	0.50–0.70
Residential	
Single-family areas	0.30–0.50
Multiunits, detached	0.40–0.60
Multiunits, attached	0.60–0.75
Residential (suburban)	0.25–0.40
Apartment dwelling areas	0.50–0.70
Industrial	
Light areas	0.50–0.80
Heavy areas	0.60–0.90
Parks, cemeteries	0.10–0.25
Playgrounds	0.20–0.35
Railroad yard areas	0.20–0.40
Unimproved areas	0.10–0.30
Streets	
Asphaltic	0.70–0.95
Concrete	0.80–0.95
Brick	0.70–0.85
Drives and walks	0.75–0.85
Roofs	0.75–0.95
Lawns; sandy soil:	
Flat, 2%	0.05–0.10
Average, 2–7%	0.10–0.15
Steep, 7%	0.15–0.20
Lawns; heavy soil:	
Flat, 2%	0.13–0.17
Average, 2–7%	0.18–0.22
Steep, 7%	0.25–0.35

Calculation Cover Sheet

Daniel B. Stephens & Associates, Inc.

Project Name Triassic Park Landfill Permit Renewal Project Number ES11.0141

Calculation Number ES11.0141-002 Discipline Hydrology No. of Sheets

PROJECT: Triassic Park Waste Disposal Facility Permit Renewal

SITE: Triassic Park Waste Disposal Facility, Roswell, NM

SUBJECT: Calculate precipitation file for use in UNSAT-H Model.

SOURCES OF DATA:

A. Part A and Part B Permit Application for the Triassic Park Waste Disposal Facility, Chaves County, New Mexico, Appendix F- Surface Water Control System Design and Appendix E-28 - HELP Modeling Report. October 2000.

B. National Oceanic and Atmospheric Association (NOAA). www.ncdc.noaa.gov/oa/ncdc.html

C. Western Regional Climate Center. www.wrcc.dri.edu/htmlfiles/westernevap.final.html

D. Weather Underground. www.wunderground.com

SOURCES OF FORMULAE & REFERENCES:

1. USDA NRCS Urban Hydrology for Small Watersheds (TR55). June 1986.
2. Playan et. al. Day and Night Wind Drift and Evaporation Losses in Sprinkler Solid-Sets and Moving Laterals. *Agricultural Water Management*. Volume 76, Issue 3, 10 August 2005, Pages 139-159

[x] Preliminary Calculation [ ] Final Calculation Supersedes Calculation No.

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
0		KI	10/11/11	TG	10/14/11	[illegible]	10/14/11

1.0 OBJECTIVE

The purpose of this calculation is to generate a new precipitation file for use in an UNSAT-H model of the Triassic Park Waste Disposal Facility during active filling that accounts for measured precipitation as well as recirculation of potentially contaminated stormwater and leachate.

2.0 GIVEN

In the 2002 permit application[A] Appendix F, a Curve Number of 91 was used for the active filling area (with daily soil cover). The area contributing to the contaminated stormwater pond (CSWP) is 15.6 acres[A]. The CSWP in the bottom of Phase IA has an area of 2.5 acres[A]. The area of the bottom of the landfill that could be covered by the initial layer of waste is 6 acres[A] – this is the area to which recirculation water is applied.

3.0 METHOD

UNSAT-H allows use of daily records of precipitation and temperature, among other variables, to assess the evaporation from, infiltration into, and runoff from user-specified layers. This calculation describes the generation of the hourly precipitation file that will be used in UNSAT-H that accounts for measured precipitation and stormwater recirculation back onto the waste. For this analysis, the second wettest year on record in Roswell is used, 1986.

A complete hourly precipitation record for Roswell, NM is not available; however, daily precipitation data are available from the National Oceanic and Atmospheric Association (NOAA)[B]. To convert the daily precipitation record to hourly data, all precipitation events are set to begin at 6pm. Precipitation is assigned a rate of 1.0 inch/hour until all the precipitation has fallen. This precipitation rate was assigned due to the nature of most precipitation events in Roswell, NM, which are predominately short duration and intense. This hourly data is applied to the active filling area to determine runoff, using the United States Department of Agriculture's Natural Resource Conservation Service's TR55 method[1]. Specific equations utilized are summarized below.

The runoff resulting from each daily precipitation event is calculated using the curve number method:

$$Q_{depth} = \frac{(P - 0.2S)^2}{P + 0.8S} \qquad \text{Eq 1}$$

where

Q_{depth} = runoff (inches)

P = rainfall (inches)

S = potential maximum retention after runoff begins (inches)

In this equation, it is assumed that $S = I_a/0.2$, where I_a is the initial abstraction.

S is related to the soil and cover conditions of the watershed by the curve number (CN):

$$S = \frac{1000}{CN} - 10 \qquad \text{Eq 2}$$

The depth of runoff obtained with Equations 1 and 2 is converted to a volume by multiplying by the area of the watershed (A_{ws}):

$$Q_{runoff} = Q_{depth} * A_{ws} \qquad \text{Eq 3}$$

Q_{runoff} enters the contaminated stormwater pond each hour that there is precipitation that generates runoff. Evaporation losses from the pond are estimated from the surface of the CSWP by utilizing monthly pan evaporation data for Roswell, NM[C]. A standard reduction factor of 0.7 is applied to the pan evaporation data for evaporation from the pond[C]. If the evaporative losses are greater than the water in the pond, then the pond is empty. If the water in the pond has not evaporated by 8AM the following morning, stormwater recirculation begins. Up to 0.29 acre-ft of water is applied per day, from 8AM to 4PM with an assumed stationary sprinkler system. The percent evaporative losses from spraying are calculated[2] using average wind speed[D] and relative humidity[D]:

$$\%Loss = 20.7 + 0.185 * AWS - 2.14x10^{-3} * RH^2 \qquad \text{Eq 4}$$

where

AWS = average wind speed (meters/sec)

RH = relative humidity (%)

Equation 4 was selected due to its validation performance, and because recirculation only occurs during the daytime.

The volume of water in the pond is tracked on an hourly basis, and incorporates any water left in the pond from the day before and evaporation losses from the pond to determine how much water is sprayed back each hour. Water recirculation only occurs from 8AM-4PM, regardless of whether measured precipitation occurs that day.

This calculation is performed in Excel for the entirety of 1986, but the steps and equations described above are illustrated below for a few days in October from the 1986 record. Once hourly precipitation and recirculation values were determined in Excel, Microsoft Access was used to process the data for input into UNSAT-H.

4.0 SOLUTION

The measured rainfall on October 9, 1986 is 0.59 inches. The measured precipitation is applied at a rate of 1.0 inches/hour beginning at 6PM until all the precipitation is applied, resulting in the following precipitation record for these two days.

Month	Day	Hour	Precipitation (in)	Month	Day	Hour	Precipitation (in)
10	9	0	0	10	10	0	0
10	9	1	0	10	10	1	0
10	9	2	0	10	10	2	0
10	9	3	0	10	10	3	0
10	9	4	0	10	10	4	0
10	9	5	0	10	10	5	0
10	9	6	0	10	10	6	0
10	9	7	0	10	10	7	0
10	9	8	0	10	10	8	0
10	9	9	0	10	10	9	0
10	9	10	0	10	10	10	0
10	9	11	0	10	10	11	0
10	9	12	0	10	10	12	0
10	9	13	0	10	10	13	0
10	9	14	0	10	10	14	0
10	9	15	0	10	10	15	0
10	9	16	0	10	10	16	0
10	9	17	0	10	10	17	0
10	9	18	0.59	10	10	18	1
10	9	19	0	10	10	19	1
10	9	20	0	10	10	20	1
10	9	21	0	10	10	21	0.46
10	9	22	0	10	10	22	0
10	9	23	0	10	10	23	0

The potential maximum runoff from the active landfill waste is determined assuming a curve number of 91[A] and Equation 2:

$$S = \frac{1000}{91} - 10 = 0.99$$

For the first 17 hours of October 9, there is no precipitation, so no runoff is calculated. At 6pm, I_a over the precipitation is calculated to ensure that there is more precipitation than the initial abstractions:

$$\frac{I_a}{P} = \frac{0.2*S}{P} = \frac{0.2*0.99}{0.56} = 0.34$$

If the value of I_a/P is greater than one, then there is no runoff as initial abstractions exceed precipitation. If I_a/P is less than one, Equation 1 is used to calculate the runoff depth in inches from the precipitation:

$$Q_{depth} = \frac{(0.59 - 0.2*0.99)^2}{0.59 + 0.8*0.99} = 0.11 inches$$

The volume of runoff is determined with Equation 3:

$$Q_{runoff} = 0.11in*15.6\ acres*\frac{1ft}{12in} = 0.145\ acre-ft$$

This volume enters the CSWP. The pan evaporation losses for the month of October are 6.97 inches, which is multiplied by the pan evaporation coefficient of 0.7. The resultant losses are converted to an evaporation loss per hour:

$$\frac{6.97inch}{mo}*0.7*\frac{mo}{31day}*\frac{day}{24hour} = \frac{0.007inch}{hour}$$

From 7PM (it only rains from 6pm to 7pm) until 8AM (13 hours), Q_{runoff} sits in the pond and evaporates at a rate of 0.007inch/hour, over 2.5 acres:

$$\frac{0.007inch}{hour}*2.5acres*\frac{ft}{12inch} = \frac{0.0014acre-ft}{hour}$$

Therefore, at 8AM on October 10, there is

$$0.145\ acre-ft - \frac{0.0014acre-ft}{hour}*13hours = 0.126acre-ft$$

in the CSWP. Sprayback at a rate of 0.0357 acre-ft per hour (0.29 acre-ft per day if applied for 8 hours) then occurs. At 8AM, 0.0357 acre-ft of water is taken from the pond, and evaporative losses from this recirculation are estimated with Equation 4:

$$\%Loss = 20.7 + 0.185*(4.02)^2 - 2.14x10^{-3}*(89)^2 = 6.74\%$$

$$0.0357acre-ft*6.74\% = 0.0024acre-ft$$

Since 0.024 acre-ft is lost to evaporation during spraying, only

0.0357 acre-ft – 0.0024 acre-ft = 0.033 acre-ft

of water is recirculated over the waste, resulting in an application of water at 8AM of

$$\frac{0.033 acre-ft}{6 acres} * \frac{12 inches}{ft} = 0.067 inches$$

At 9AM on October 9, there is

0.124 acre-ft – 0.0357 acre-ft = 0.089 acre-ft

of water in the pond. The evaporative losses from the pond are the same, 0.0014 acre-ft of water per hour, leaving

0.089 acre-ft - 0.0014 acre-ft = 0.087 acre-ft

in the CSWP. Then, 0.0357 acre-ft per hour is taken from the pond to recirculate over the waste, and water losses from spraying the water are estimated as above. This continues until 11AM, at which time there is 0.0144 acre-ft of water in the pond. After evaporation losses of 0.007inch/hour are applied, the pond volume is less than the maximum application rate of 0.0357 acre-ft per hour; thus, the pond is emptied and the remaining water (0.013 acre-ft) is sprayed onto the waste. Evaporative losses from the pond are accounted for as above, and the evaporative losses from spraying are calculated:

$$\%Loss = 20.7 + 0.185 * (4.02)^2 - 2.14x10^{-3} * (89)^2 = 6.74\%$$
$$0.013 acre-ft * 6.74\% = 0.00088 acre-ft$$

Since 0.00088 acre-ft of water are lost to evaporation, only

0.013 acre-ft – 0.00088 acre-ft = 0.012 acre-ft

of water is recirculated over the waste, resulting in an application of water at 11AM of

$$\frac{0.012 acre-ft}{6 acres} * \frac{12 inches}{ft} = 0.024 inches$$

At this time, the pond is empty thus stormwater recirculation ceases. At 6PM, measured precipitation is applied as described above and the process detailed is repeated. The steps of this calculation are included in the attached table for all days of 1986.

The measured precipitation for 1986 is 24.8 inches. The resultant precipitation in 1986 for input into UNSAT-H is 34.6 inches, indicating that 9.8 additional inches of water are applied to the waste from stormwater recirculation.

A

The hydrologic properties of hazardous waste have not been studied to the same extent that municipal waste has been studied and therefore literature information is limited. The HELP model does not provide specific default values for hazardous waste and it is left to the program user to define these characteristics.

The waste was assigned soil texture numbers, initial moisture contents, and hydraulic conductivities which reflect expected actual conditions. The soil texture number of 7 corresponds to a silty sand material (SM) with default porosity of 0.473, field capacity of 0.222, wilting point of 0.104, and hydraulic conductivity of ~~5.4~~ 5.2 x 10^{-4}cm/sec. The initial moisture content was set at 0.2055.

The hydraulic properties of the waste fill will depend on the characteristics of the incoming waste and the nature of the daily cover soil used. The physical characteristics of landfilled hazardous waste can vary widely from sludges to solids and debris. Contaminated soils and bulk solid materials, however, will make up a major proportion of these materials. Typically, the waste material is placed and compacted and covered with daily cover soil material. Since the surface of the waste fill must be trafficable to waste hauler trucks and other heavy earthmoving equipment, it is not an uncommon practice to increase the amount of daily cover soil placed when softer or sludgy type wastes are received. At the Triassic Park site sand and siltstone will be predominantly used as daily cover materials and incoming contaminated soils are also likely to have a high sand content. Bulk solid wastes such as filter cake material, bag house wastes, and other process wastes are fine grained with particle sizes in the silt range. Based on this, the soil texture corresponding to a sandy silt was selected for the waste material.

Based on previous experience at hazardous waste sites, the initial moisture contents of the waste for Years 0 through 1 were set at 0.2055 which corresponds to a moisture content of 15 percent.

4.2.2 Protective Soil

0.105

The protective soil layer placed on top of the liner prior to waste filling will be the same material used for daily soil cover with the exception that it will be screened to remove oversize rocks and cobbles. Based on evaluation of bulk samples taken at the site from the upper sand unit, a soil texture number of 4 corresponding to a silty sand was selected to model the protective soil layer. This soil texture has the following defaults: porosity of 0.473, field capacity of ~~0.0105~~, wilting point of 0.047, and hydraulic conductivity of 1.7 x 10^{-3}cm/sec. The initial moisture content for this layer was set at 0.0863 which is consistent with the average moisture contents of 5.9 percent for the site's silty sand samples.

4.2.3 Lateral Drainage (Sand)

The lateral drainage sand material considered for use at the site will have to meet minimum hydraulic conductivities of 1 x 10^{-2}cm/sec. Although no hydraulic testing of candidate site materials has been conducted, it is believed that this performance standard can be met with available material sources either in their natural state or with a minimal amount of screening and washing. The soil texture number of 1 which corresponds to a poorly graded sand was selected for this layer. This soil texture has the following defaults: porosity of 0.417, field capacity of 0.045, wilting point of 0.018, and hydraulic conductivity of 1 x 10^{-2}cm/sec. Initial moisture content for this layer was set at 0.045 which equals the field capacity and therefore does not allow for water storage in the lateral drainage layer. It should be noted that the geotextile components of the sand drainage layer were not included in the this evaluation. Transmissities of this material exceeds those of the sand material and therefore this assumption is conservative.

4.2.4 Lateral Drainage (Geocomposite)

The geocomposite drainage material used in this analysis was a geotextile bonded to a geonet. The HELP model does not have a specific default for geocomposites so the default for the geonet was selected for this layer. The added capacity of the geotextile in this case is ignored and, as above, this assumption is conservative. The so

specifies the initial notifications, steps to be taken in response to the leakage rate being exceeded, and follow-up reports.

The EPA recommended method for determining the landfill ALR presented in Federal Register Vol. 57, No. 19 and in reference No. 59 were used to calculate the ALR for the landfill facility. Using the flow equation for geonets and applying field representative geocomposite transmissivities and appropriate factors of safety for geonet creep and sediment clogging, the recommended ALR for the landfill was determined to be 900 gpad.

The ALR value of 900 gpad is above the EPA recommended value of 100 gpad. The primary reason for this difference is that the EPA value is based on a sand drainage layer with a permeability of 1 x 10^{-2} cm/sec compared to the geocomposite drainage layer transmissivity of 2.2×10^{-4} m^2/sec proposed for the Triassic Park Landfill.

Additional computations to check the LDRS sump capacity and LDRS drain pipe capacity are also presented in the Appendix G.

Response Action Plan steps outlined in the Action Leakage Rate and Response Action Plan closely follow the recommended actions presented in Federal Register Volume 57, No. 19.

3.2.10 Surface Water Drainage Analyses

Design parameters for HDPE lined Channels 7 and 8 located above the landfill access ramps are presented on Drawing No. 25 (Sheet 2 of 2). The methodology, assumptions, and run-off calculations for these channels and the collection basins discussed below and are presented in Appendix F.

The clean stormwater collection basin located at the toe of the 2H:1V cut slope in the south end of landfill will contain the run-off from the 15 acres of unlined area of Phase 1A (above the access ramps). The total run-off from the 25-year, 24-hour event is approximately 4.5 ac-ft. Total volume of the detention pond assuming 1 foot of freeboard is 5.2 ac-ft.

The contaminated water basin at the toe of the Phase 1A waste fill slope is designed to contain the run-off from the entire 15.6 acre fill area of Phase 1A. The total run-off from the 25-year, 24-hour event is approximately 4.3 ac-ft. The contaminated water basin is approximately 560 feet by 200 feet and can store approximately 10.4 ac-ft assuming 1 foot of freeboard. The contaminated water basin will be constructed at the same time as the rest of the Phase 1A landfill so it can accommodate runoff from waste placed in Phase 1A.

$560 ft \times 200 ft = 112000 ft^2 \times \frac{1 \text{ acre}}{43560 ft^2} = 2.57$ acres

3.2.11 Soil Erosion Analyses

Due to the temporary nature of the 2H:1V cut slope and the 3H:1V subgrade slopes above the access ramps, severe soil erosion of these slope areas is not anticipated. The 2H:1V cut slope will be excavated during future landfill construction and the 3H:1V subgrade areas above the access roads will be conditioned prior to liner placement as required in the specifications.

Erosional features such as rills and localized slumping in exposed areas of the protective soils layer on the 3H:1V slope areas will be repaired following rain events.

3.2.12 Frost Protection

The maximum frost depths in the Roswell area, indicates that frost may reach 23 inches during the winter months. In addition, site-specific frost penetration modeling for the site indicated a maximum design freezing

Appendix H-2. A chemical resistance chart for the tanks is provided in Appendix H-3.

The concrete containment pad will slope towards the landfill crest. A concrete pad will be placed in the loading/unloading areas for the tanker trucks. This pad will be sloped providing drainage toward the sump areas. Calculations on the bearing capacity of the concrete pad are detailed in Appendix E-35. Should a catastrophic failure of the tank or piping system occur, leachate will flow back into the landfill leachate collection system rather than be released to unlined areas. The landfill liner system anchor trench will completely encompass the pad so that any leakage through the pad will also drain back into the landfill leachate collection system. Construction details for the concrete containment pad are called out in Specification Section 03100, Concrete Formwork, Section 03200, Reinforcement Steel, Section 03290, Joints in Concrete, and Section 03300, Cast-in-Place Concrete.

3.1.4 Waste Filling Sequence

As mentioned previously in Section 3.1.2, landfill development will begin in Phase 1A, proceed southward into Phase 2, and then finish in Phase 3. The extent of landfill subphases will be based on waste receipt rates.

Liner installation in Phase 1A will take place in two stages: the slope and floor area below the access ramps and the slope area above the access ramps. The initial stage of the Phase 1A liner installation will consist of liner placement below the access ramps and is the only portion relevant to this permit application. The approximate area that will be lined during the Phase 1A construction is 14.9 acres which is delineated on Drawing No. 10.

Detailed planning for Phase 1B, Phase 2 and Phase 3 liner installation, access ramp location, and waste fill sequencing will be determined and permitted in the future, however, the ultimate landfill configuration will be developed as follows. Once the waste fill approaches the Phase 1A limits defined in Drawing No. 10, the cut slope will be advanced southward into Phase 2 and the remaining floor and slope areas of Phase 1 will be lined. At this time, the stormwater collection basin in the landfill will be removed from Phase 1 and re-established in Phase 2. Waste filling in Phase 1 will continue during this liner expansion. As the waste fill extends beyond and above the access ramps, a ramp will be established in the south waste fill slope to provide access to the newly lined floor areas of Phase 1.

Waste filling will take place in 5 to 10 foot thick horizontal lifts. Waste will be covered with daily cover soil as soon as practicable following waste placement (and minimally at the end of each operating shift). Daily cover soil thicknesses will be at least 0.5 ft.

B

Data Downloaded from www.ncdc.noaa.gov/oa/ncdc.html

DSET	COOPID	WBNID	ELEM	UN	YEARMO	DAY01	DAY02	DAY03	DAY04	DAY05	DAY06	DAY07	DAY08	DAY09	DAY10	DAY11	DAY12	DAY13
3210	297610	23009	PRCP	HI	198601	0	0	0	0	0	20	47	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	198602	0	0	0	4	0	0	3	4	31	8	0	0	0
3210	297610	23009	PRCP	HI	198603	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	198604	0	0	0	0	0	0	0	31	0	0	0	0	0
3210	297610	23009	PRCP	HI	198605	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	198606	2	0	0	1	0	0	0	36	0	0	0	0	0
3210	297610	23009	PRCP	HI	198607	66	22	2	0	0	0	0	0	10	1	0	0	0
3210	297610	23009	PRCP	HI	198608	0	8	16	12	0	4	0	0	0	0	0	0	1
3210	297610	23009	PRCP	HI	198609	74	171	0	93	0	0	2	0	0	0	0	0	4
3210	297610	23009	PRCP	HI	198610	0	7	0	0	13	7	0	0	59	346	0	0	0
3210	297610	23009	PRCP	HI	198611	0	70	79	14	0	0	0	0	0	0	0	0	13
3210	297610	23009	PRCP	HI	198612	0	0	0	0	0	0	0	15	0	18	0	0	0
3210	297610	23009	TMAX	F	198601	65	67	57	51	49	67	41	33	38	56	59	58	60
3210	297610	23009	TMAX	F	198602	71	65	68	54	43	49	41	28	29	25	28	29	46
3210	297610	23009	TMAX	F	198603	81	77	67	69	72	78	68	81	76	72	63	63	59
3210	297610	23009	TMAX	F	198604	72	80	68	74	79	85	92	82	68	79	81	85	86
3210	297610	23009	TMAX	F	198605	85	83	85	92	90	89	87	75	82	85	92	93	88
3210	297610	23009	TMAX	F	198606	77	79	79	89	89	97	100	87	90	90	83	92	93
3210	297610	23009	TMAX	F	198607	92	78	85	92	93	89	89	90	90	91	97	98	93
3210	297610	23009	TMAX	F	198608	98	98	89	91	94	95	96	91	92	90	90	92	95
3210	297610	23009	TMAX	F	198609	84	82	80	87	82	84	79	77	87	89	81	85	83
3210	297610	23009	TMAX	F	198610	88	76	82	77	62	61	74	83	75	70	64	43	66
3210	297610	23009	TMAX	F	198611	69	41	47	50	63	72	62	65	57	61	50	43	29
3210	297610	23009	TMAX	F	198612	58	66	58	42	53	53	67	58	38	32	42	51	54
3210	297610	23009	TMIN	F	198601	33	25	28	27	22	28	18	13	13	23	25	31	27
3210	297610	23009	TMIN	F	198602	36	43	34	30	24	18	23	21	19	14	21	19	26
3210	297610	23009	TMIN	F	198603	31	44	49	36	38	34	43	35	51	39	47	44	35
3210	297610	23009	TMIN	F	198604	51	47	46	40	41	49	57	51	46	40	51	50	57
3210	297610	23009	TMIN	F	198605	54	62	59	59	51	52	56	51	43	50	49	63	52
3210	297610	23009	TMIN	F	198606	53	60	59	62	60	63	64	61	61	58	58	60	62
3210	297610	23009	TMIN	F	198607	66	66	68	68	68	66	69	66	66	68	66	66	67
3210	297610	23009	TMIN	F	198608	66	67	65	64	65	67	68	68	64	67	65	66	71

B

DSET	COOPID	WBNID	ELEM	UN	YEARMO	DAY01	DAY02	DAY03	DAY04	DAY05	DAY06	DAY07	DAY08	DAY09	DAY10	DAY11	DAY12	DAY13
3210	297610	23009	TMIN	F	198609	63	60	63	61	57	62	62	61	63	68	56	54	61
3210	297610	23009	TMIN	F	198610	47	59	56	52	54	51	50	47	53	54	43	37	38
3210	297610	23009	TMIN	F	198611	41	38	39	36	30	34	38	33	31	27	25	26	24
3210	297610	23009	TMIN	F	198612	25	23	28	27	40	44	39	36	32	25	23	20	22
3210	297610	23009	PRCP	HI	199801	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199802	0	0	0	5	4	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199803	0	0	0	0	0	0	5	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199804	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199805	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199806	0	0	0	0	0	0	0	0	0	18	0	0	0
3210	297610	23009	PRCP	HI	199807	0	17	0	62	2	0	0	20	1	0	0	0	0
3210	297610	23009	PRCP	HI	199808	0	21	0	0	10	0	0	0	0	0	1	69	4
3210	297610	23009	PRCP	HI	199809	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199810	154	0	0	0	0	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199811	0	0	0	1	2	0	0	0	0	0	0	0	0
3210	297610	23009	PRCP	HI	199812	10	55	0	0	0	0	0	0	0	5	0	0	0
3210	297610	23009	TMAX	F	199801	37	40	43	38	43	43	42	49	49	39	51	52	33
3210	297610	23009	TMAX	F	199802	55	66	63	39	47	55	62	68	64	59	56	48	62
3210	297610	23009	TMAX	F	199803	56	52	72	76	72	69	59	46	51	51	43	54	69
3210	297610	23009	TMAX	F	199804	77	64	68	77	79	72	70	68	71	79	86	82	76
3210	297610	23009	TMAX	F	199805	87	88	84	92	86	88	85	86	84	92	91	91	93
3210	297610	23009	TMAX	F	199806	108	106	103	94	85	79	95	93	96	81	88	97	100
3210	297610	23009	TMAX	F	199807	97	85	92	98	98	101	99	100	98	99	104	107	100
3210	297610	23009	TMAX	F	199808	93	93	92	79	79	86	97	99	98	97	97	90	85
3210	297610	23009	TMAX	F	199809	91	93	92	96	94	94	93	94	89	91	88	89	95
3210	297610	23009	TMAX	F	199810	79	84	90	87	71	72	77	83	86	92	88	80	90
3210	297610	23009	TMAX	F	199811	61	62	62	49	47	52	64	75	73	57	68	60	63
3210	297610	23009	TMAX	F	199812	66	56	61	70	74	54	46	48	48	41	46	56	60
3210	297610	23009	TMIN	F	199801	12	15	27	22	23	20	25	13	18	22	22	21	25
3210	297610	23009	TMIN	F	199802	32	22	32	34	34	35	28	40	36	34	25	26	21
3210	297610	23009	TMIN	F	199803	25	23	24	32	35	39	30	28	21	20	25	21	26
3210	297610	23009	TMIN	F	199804	28	44	38	35	36	39	37	41	34	37	43	44	41
3210	297610	23009	TMIN	F	199805	48	51	53	47	59	51	51	52	53	49	52	45	44

B

DSET	COOPID	WBNID	ELEM	UN	YEARMO	DAY01	DAY02	DAY03	DAY04	DAY05	DAY06	DAY07	DAY08	DAY09	DAY10	DAY11	DAY12	DAY13
3210	297610	23009	TMIN	F	199806	57	60	64	63	57	55	57	60	60	54	51	62	67
3210	297610	23009	TMIN	F	199807	72	66	65	67	70	72	76	70	65	66	71	69	70
3210	297610	23009	TMIN	F	199808	68	70	66	64	63	60	61	63	61	66	68	65	65
3210	297610	23009	TMIN	F	199809	62	65	64	64	64	64	62	61	59	65	59	62	61
3210	297610	23009	TMIN	F	199810	61	58	53	62	48	43	44	42	46	48	48	51	54
3210	297610	23009	TMIN	F	199811	43	40	43	44	42	42	41	36	44	34	27	38	35
3210	297610	23009	TMIN	F	199812	35	43	41	35	38	35	28	20	24	32	28	23	28

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YEARMO	DAY14	DAY15	DAY16	DAY17	DAY18	DAY19	DAY20	DAY21	DAY22	DAY23	DAY24	DAY25	DAY26	DAY27	DAY28	DAY29	DAY30
198601	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198602	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-99999	-99999
198603	4	0	0	0	2	5	1	0	0	0	0	0	0	0	0	0	0
198604	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198605	0	0	0	27	0	0	0	0	0	0	0	2	7	1	0	6	51
198606	0	0	0	0	94	8	0	0	0	104	144	109	4	0	0	0	0
198607	0	0	0	2	0	0	0	2	0	6	0	0	0	0	0	0	0
198608	0	0	0	0	0	0	0	0	59	17	0	0	85	40	26	3	11
198609	0	0	0	0	0	0	0	0	12	29	0	0	0	0	0	8	0
198610	0	0	0	18	0	0	11	87	0	0	0	0	0	0	0	0	0
198611	0	0	0	0	0	6	0	0	0	7	0	0	0	0	0	0	0
198612	0	0	8	26	10	0	0	26	44	0	0	0	0	0	0	0	0
198601	60	68	67	71	62	74	77	72	52	64	70	53	55	60	77	61	71
198602	68	78	72	77	82	84	79	61	69	78	77	85	85	61	65	-99999	-99999
198603	52	68	74	68	57	56	59	72	80	81	82	83	77	78	82	80	85
198604	76	79	83	82	77	62	77	81	87	87	88	84	85	76	88	86	91
198605	89	92	89	57	74	86	94	97	94	84	93	79	77	73	82	80	77
198606	96	99	102	92	93	89	90	91	90	68	74	78	82	87	94	94	96
198607	86	88	92	91	91	94	92	86	86	91	94	98	100	101	100	99	100
198608	92	94	96	98	97	98	103	94	92	82	85	86	89	80	68	78	85
198609	85	88	85	91	93	93	91	90	85	84	79	83	85	86	85	86	82
198610	72	72	70	76	80	63	61	78	70	66	69	70	72	77	82	66	75
198611	53	60	71	76	64	74	61	66	74	48	52	61	48	61	67	70	63
198612	58	63	49	45	41	52	55	43	37	47	49	48	53	52	51	55	59
198601	28	29	37	30	37	29	30	36	30	24	31	25	21	24	26	39	27
198602	37	39	46	40	42	42	47	33	34	32	42	39	45	43	34	-99999	-99999
198603	35	34	31	40	32	39	34	30	35	36	40	42	45	45	44	50	48
198604	39	47	48	54	42	41	37	44	48	50	51	59	57	49	45	58	60
198605	57	55	54	43	38	47	53	56	61	56	62	59	57	55	52	55	54
198606	65	65	67	66	63	65	65	63	66	63	63	64	65	65	66	68	69
198607	67	65	66	64	65	62	64	67	67	65	65	65	64	68	67	65	65
198608	70	71	67	69	67	67	66	73	66	66	64	61	65	66	62	63	65

B

YEARMO	DAY14	DAY15	DAY16	DAY17	DAY18	DAY19	DAY20	DAY21	DAY22	DAY23	DAY24	DAY25	DAY26	DAY27	DAY28	DAY29	DAY30
198609	62	59	63	58	59	65	63	63	65	61	53	51	51	49	56	59	48
198610	36	39	43	44	46	57	56	50	43	46	49	46	44	43	40	45	42
198611	26	35	40	43	49	42	39	32	36	30	24	22	30	24	26	28	33
198612	26	26	34	33	32	24	27	37	33	29	29	30	27	25	29	26	22
199801	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199802	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	-99999	-99999
199803	0	21	43	8	1	0	0	0	0	0	0	0	0	0	0	0	4
199804	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
199805	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199806	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199807	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70
199808	0	0	0	0	0	12	4	0	0	0	0	0	12	0	11	0	0
199809	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	5
199810	0	0	0	0	0	11	78	4	1	1	0	0	0	148	0	0	179
199811	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0
199812	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0
199801	52	53	62	66	63	60	63	52	53	55	59	66	60	69	67	60	67
199802	69	56	57	58	56	56	54	61	70	72	81	60	55	52	51	-99999	-99999
199803	70	63	53	57	67	56	53	68	82	88	87	90	84	76	80	79	59
199804	82	75	66	55	63	71	70	69	76	89	91	84	70	64	67	75	84
199805	87	82	93	94	97	99	98	92	95	93	95	85	90	97	98	101	101
199806	95	89	101	100	96	105	106	104	104	105	108	108	108	108	110	106	101
199807	100	100	92	93	97	102	101	99	97	96	98	95	91	90	97	100	102
199808	90	92	95	93	92	90	84	89	92	93	96	94	92	96	90	91	93
199809	94	88	87	89	90	95	95	97	85	90	96	96	96	96	92	91	87
199810	90	91	82	74	70	69	55	53	57	62	70	77	79	64	72	73	78
199811	74	74	74	74	76	70	48	69	76	72	76	72	74	73	77	57	65
199812	60	56	61	56	71	46	71	50	27	32	39	61	64	69	70	65	63
199801	23	19	30	27	33	26	34	33	24	25	24	26	28	25	25	24	27
199802	39	37	26	28	37	35	27	36	29	34	33	38	34	29	16	-99999	-99999
199803	38	47	42	37	35	30	31	30	33	40	44	45	51	44	39	51	38
199804	40	41	38	33	28	34	42	37	40	40	47	51	45	44	38	39	45
199805	51	48	45	54	58	62	61	63	59	54	50	59	53	52	55	58	57

B

YEARMO	DAY14	DAY15	DAY16	DAY17	DAY18	DAY19	DAY20	DAY21	DAY22	DAY23	DAY24	DAY25	DAY26	DAY27	DAY28	DAY29	DAY30
199806	62	59	56	60	61	57	62	63	63	64	65	65	69	65	65	65	66
199807	67	67	66	70	69	66	69	68	68	66	72	69	71	70	71	72	66
199808	61	63	61	60	65	68	66	65	64	63	64	67	66	68	71	67	57
199809	64	65	61	62	61	64	64	68	59	61	63	62	61	61	66	64	65
199810	56	59	51	43	40	53	49	49	50	50	47	50	58	48	42	42	56
199811	34	39	37	34	40	42	35	30	31	34	31	36	31	35	38	40	33
199812	22	28	25	27	35	30	39	17	11	14	19	15	20	31	26	34	27

B

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YEARMO	DAY31
198601	0
198602	-99999
198603	0
198604	-99999
198605	25
198606	-99999
198607	0
198608	29
198609	-99999
198610	0
198611	-99999
198612	0
198601	70
198602	-99999
198603	88
198604	-99999
198605	69
198606	-99999
198607	98
198608	89
198609	-99999
198610	80
198611	-99999
198612	52
198601	32
198602	-99999
198603	49
198604	-99999
198605	57
198606	-99999
198607	64
198608	65

B

YEARMO	DAY31
198609	-99999
198610	47
198611	-99999
198612	22
199801	0
199802	-99999
199803	0
199804	-99999
199805	0
199806	-99999
199807	0
199808	0
199809	-99999
199810	15
199811	-99999
199812	0
199801	64
199802	-99999
199803	66
199804	-99999
199805	99
199806	-99999
199807	86
199808	93
199809	-99999
199810	62
199811	-99999
199812	52
199801	31
199802	-99999
199803	32
199804	-99999
199805	55

B

YEARMO	DAY31
199806	-99999
199807	66
199808	60
199809	-99999
199810	46
199811	-99999
199812	36

C

WRCC pan evap data.txt
Evaporation Stations

Standard daily pan evaporation is measured using the four-foot diameter Class A evaporation pan.
The pan water level reading is adjusted when precipitation is measure to obtain the actual evaporation.
Most Class A pans are installed above ground, allowing effects such as radiation on the side walls and
heat exchnges with the pan material. These effects tend ~~to increase~~ the evaporation totals. The amounts
can then be adjusted by multiplying the totals b 0.70 or 0.80 to more closely estimate the evaporation
from naturally existing urfaces such as a shallow lake, wet soil or other moist natural surfaces.

0.7 CONSERVATI

Many stations do not measure pan evaportation during winter months. A "0.00" total indicates no measuement is taken.

Stations marked with an asterisk (*) have estimated totals computed from meteorological measurements using a
form of the Penman equation.

Click on a State: Arizona <#ARIZONA>, California <#CALIFORNIA>, Colorado <#COLORADO>, Hawaii & Pacific Islands <#HAWAII/PACIFIC ISLANDS>, Idaho <#IDAHO>, Montana <#MONTANA>, Nevada <#N
EVADA>,
New Mexico <#NEW MEXICO>, Oregon <#OREGON>, Utah <#UTAH>, Washington <#WASHINGTON>, Wyoming <#WYOMING>

NEW MEXICO

MONTHLY AVERAGE PAN EVAPORATION (INCHES)

	PERIOD OF RECORD	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
ABIQUIU DAM	1957-2005	0.00	0.00	6.06	7.43	9.95	11.39	10.52	8.90	7.23	5.30	3.13	2.22	72.13
AGRICULTURAL COLLEGE	1892-1959	3.01	4.00	7.89	10.20	8.65	13.99	12.33	11.16	8.31	6.28	4.35	2.89	93.06
ALAMOGORDO DAM	1939-1975	3.73	4.35	8.21	11.30	12.88	14.43	13.66	11.59	9.17	7.19	4.89	3.46	104.86
ANIMAS	1923-2005	3.87	4.91	8.29	10.78	12.36	14.25	11.60	11.07	8.54	6.71	4.69	3.61	100.68
ARTESIA 6 S	1914-2005	4.38	3.03	7.25	7.66	12.11	13.13	10.86	10.44	9.36	6.34	3.12	0.00	87.68
BITTER LAKES WL REFUGE	1950-2005	2.67	3.93	6.82	9.60	11.31	12.62	11.88	10.16	8.02	5.85	3.53	2.50	88.89
BOSQUE DEL APACHE	1914-2005	3.21	4.20	7.76	10.20	11.61	13.13	11.56	10.36	8.03	6.25	3.66	2.54	92.51
BRANTLEY DAM	1987-2005	4.65	0.00	8.62	11.77	14.61	15.46	14.19	12.22	9.88	7.97	5.77	4.34	109.48
CABALLO DAM	1938-2005	4.42	5.10	8.56	11.37	13.59	14.80	13.08	11.35	9.26	7.27	4.78	3.48	107.06
CAPULIN NATL MONUMENT	1966-1979	0.00	0.00	0.00	0.00	9.08	10.57	9.71	9.18	7.65	0.00	0.00	0.00	46.19
CLOVIS 13 N	1929-2005	3.83	4.12	6.63	8.72	10.15	11.45	11.65	9.55	7.64	5.78	3.95	3.21	86.68
COCHITI DAM	1975-2005	0.00	4.14	6.44	8.48	11.07	12.95	12.38	10.62	8.91	6.29	3.94	2.79	88.01

D

History for Roswell, NM

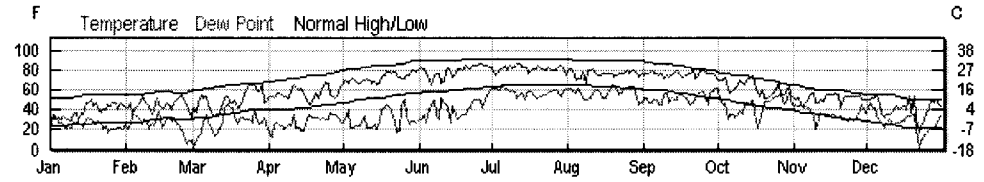
January 1, 1998 through December 31, 1998 — View Current Conditions

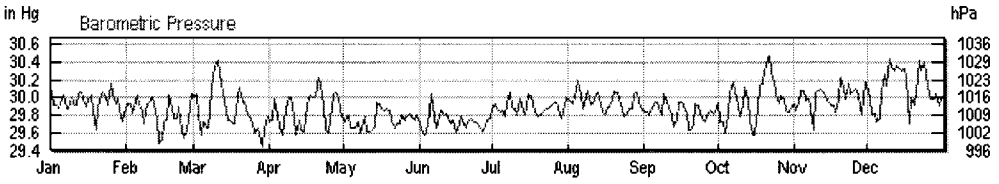
January 1, 1998 through December 31, 1998

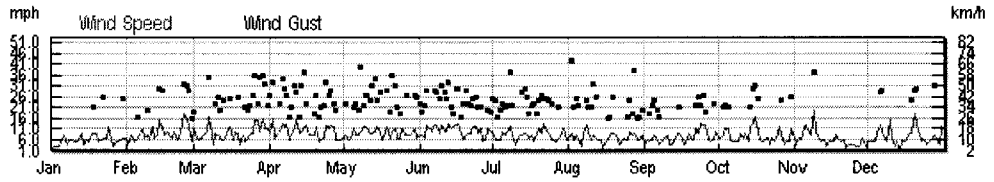
January | 1 | 1998 - TO - December | 31 | 1998 | Go

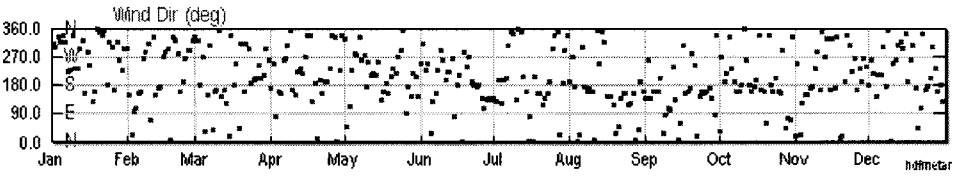
Daily | Weekly | Monthly | **Custom**

	Max	Avg	Min	Sum
Temperature				
Max Temperature	**111** °F	**76** °F	**26** °F	
Mean Temperature	**88** °F	**61** °F	**18** °F	
Min Temperature	**79** °F	**47** °F	**10** °F	
Degree Days				
Heating Degree Days (base 65)	47	9	0	3349
Cooling Degree Days (base 65)	24	6	0	2085
Growing Degree Days (base 50)	38	14	0	5136
Dew Point				
Dew Point	**72** °F	**38** °F	**-6** °F	
Precipitation				
Precipitation	**1.78** in	**0.03** in	**0.00** in	**10.93** in
Snowdepth	-	-	-	-
Wind				
Wind	**45** mph	**8** mph	**0** mph	
Gust Wind	**56** mph	**25** mph	**16** mph	
Sea Level Pressure				
Sea Level Pressure	**30.62** in	**29.89** in	**29.33** in	









Certify This Report

Observations

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Jan	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	36	24	12	30	19	10	100	91	79	30.25	30.16	30.09	10	4	0	5	2	-	0.00	Fog
2	39	29	19	33	26	18	96	88	73	30.09	30.03	29.95	10	9	5	8	2	-	0.00	Snow
3	42	36	27	36	33	25	100	92	79	29.97	29.92	29.83	10	5	0	8	3	-	0.00	Fog
4	37	30	24	36	30	21	100	97	86	30.00	29.91	29.88	10	2	0	12	3	21	0.00	Fog
5	42	32	23	35	28	21	100	95	62	29.92	29.88	29.82	10	3	0	12	3	-	0.00	Fog
6	42	30	19	31	27	17	100	88	51	30.15	29.99	29.91	10	6	0	26	6	31	0.00	Fog , Snow
7	41	34	24	31	26	19	100	75	49	30.11	30.02	29.92	10	9	2	17	8	-	0.00	Snow
8	48	30	12	29	21	9	92	72	39	29.93	29.87	29.81	10	10	10	14	4	-	0.00	Rain
9	39	30	21	30	24	19	89	72	53	29.99	29.87	29.79	10	10	10	12	6	-	0.00	
10	37	29	21	29	23	20	100	88	68	30.08	30.01	29.91	10	5	0	10	6	-	0.00	
11	50	36	23	35	27	20	89	74	52	30.01	29.93	29.87	10	8	5	12	5	-	0.00	
12	50	37	24	32	27	21	88	68	43	30.00	29.91	29.86	10	10	10	8	5	-	0.00	
13	33	29	25	32	28	24	100	95	85	30.14	30.05	29.98	10	1	0	10	6	-	0.00	Fog
14	51	38	24	32	26	22	100	75	38	30.19	30.07	30.00	10	8	0	15	9	-	0.00	Fog
15	53	36	19	31	23	15	88	63	38	30.13	29.98	29.81	10	10	10	13	4	-	0.00	
16	62	47	32	36	30	23	86	58	32	30.04	29.89	29.78	10	10	10	21	6	29	0.00	
17	66	47	28	41	32	25	89	62	36	30.11	29.98	29.85	10	10	10	17	5	-	0.00	
18	63	50	33	32	30	23	79	52	22	30.12	30.03	29.90	10	10	10	22	9	16	0.00	
19	60	44	28	33	28	21	81	55	36	30.08	29.83	29.57	10	10	10	20	9	21	0.00	
20	63	48	34	30	26	21	75	43	23	29.78	29.64	29.54	10	10	10	16	9	-	0.00	
21	50	42	33	34	29	24	79	61	46	29.96	29.87	29.76	10	10	10	8	5	-	0.00	
22	52	38	24	31	27	23	100	75	34	30.11	30.02	29.95	10	9	1	16	6	21	0.00	
23	54	40	26	26	20	12	85	55	20	30.17	30.07	29.93	10	10	10	21	7	28	0.00	
24	57	40	24	30	24	20	84	58	28	30.12	29.99	29.85	10	10	10	16	7	-	0.00	
25	66	46	27	31	18	6	85	40	10	30.13	29.92	29.84	10	10	10	32	12	39	0.00	
26	59	44	28	23	20	17	69	44	20	30.24	30.16	30.06	10	10	10	9	6	-	0.00	
27	69	48	27	25	21	14	75	44	14	30.16	30.04	29.90	10	10	10	12	3	-	0.00	
28	66	47	28	25	20	15	69	42	14	30.00	29.93	29.84	10	10	10	9	5	-	0.00	
29	57	40	24	28	22	17	75	47	24	30.12	29.98	29.86	10	10	10	8	5	-	0.00	
30	66	47	28	27	22	17	78	47	15	29.85	29.76	29.64	10	10	10	21	6	20	0.00	
31	63	46	30	29	21	12	76	41	14	29.79	29.73	29.66	10	10	10	23	7	28	0.00	
1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Feb	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	54	43	32	30	25	22	73	54	30	29.94	29.88	29.75	10	10	10	10	7	-	0.00	
2	64	42	21	25	21	16	78	46	16	30.02	29.93	29.83	10	10	10	12	4	17	0.00	
3	62	48	35	33	25	19	79	46	20	30.04	29.94	29.86	10	10	10	13	8	-	0.00	

Comma Delimited File

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
4	39	36	33	37	34	29	100	91	76	29.92	29.82	29.72	10	7	2	13	7	-	0.05	Rain
5	46	40	35	39	36	32	100	91	63	30.07	29.87	29.77	10	5	0	20	5	25	0.04	Fog , Rain
6	54	44	35	34	34	32	96	75	43	30.13	30.03	29.93	10	10	7	12	7	17	0.00	
7	62	46	30	36	31	23	100	73	28	30.02	29.92	29.75	10	6	0	17	8	-	0.00	
8	66	54	42	37	26	21	66	37	17	29.96	29.83	29.71	10	10	10	20	11	-	0.00	
9	62	50	39	37	31	19	79	53	19	29.77	29.71	29.62	10	10	10	18	7	29	0.00	
10	55	45	35	37	28	22	83	53	27	30.05	29.94	29.76	10	10	9	17	8	22	0.00	Rain
11	55	42	28	24	21	16	72	47	23	30.09	29.96	29.84	10	10	10	13	6	-	0.00	
12	46	36	27	32	27	21	89	60	43	30.12	30.01	29.84	10	10	10	30	12	38	0.00	
13	61	41	21	32	24	18	100	61	19	30.09	29.94	29.81	10	8	0	15	7	-	0.00	Fog
14	64	52	41	45	32	26	93	52	26	29.88	29.75	29.63	10	10	10	22	8	25	0.00	
15	54	46	37	45	39	31	96	77	41	29.69	29.49	29.37	10	9	5	24	15	33	0.01	Rain
16	57	42	26	32	22	16	89	47	21	29.69	29.52	29.44	10	10	10	25	11	38	0.01	
17	57	42	28	32	24	15	82	47	26	29.83	29.73	29.66	10	10	10	15	8	-	0.00	
18	55	47	39	39	33	21	82	63	38	29.92	29.74	29.63	10	10	9	20	10	25	0.03	Rain
19	55	46	35	34	32	26	87	62	34	30.14	30.03	29.93	10	10	10	13	8	-	0.00	
20	52	40	27	35	29	23	85	64	38	29.99	29.87	29.78	10	10	10	15	7	-	0.00	
21	60	48	36	37	32	26	86	58	31	29.84	29.77	29.72	10	10	10	17	10	-	0.00	
22	70	50	30	30	25	20	82	43	16	29.84	29.76	29.67	10	10	10	22	6	30	0.00	
23	71	53	35	33	25	18	73	38	15	29.99	29.90	29.83	10	10	10	14	7	-	0.00	
24	79	56	34	30	21	12	67	29	8	29.88	29.64	29.43	10	10	6	32	14	41	0.00	
25	60	50	39	23	15	7	45	27	15	29.60	29.54	29.48	10	10	10	29	18	41	0.00	
26	54	44	35	19	6	-3	50	24	10	29.71	29.63	29.58	10	10	10	29	16	41	0.00	
27	50	40	30	19	9	2	38	30	15	29.92	29.77	29.69	10	10	10	28	12	32	0.00	
28	50	33	16	23	9	-6	74	40	10	30.13	30.04	29.94	10	10	10	17	5	16	0.00	
1998	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
Mar	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	55	42	28	7	3	-1	38	23	11	30.10	30.00	29.86	10	10	10	18	11	21	0.00	
2	51	38	24	13	9	2	53	35	21	30.16	30.05	29.99	10	10	10	14	7	-	0.00	
3	71	48	25	17	14	9	58	30	12	30.01	29.79	29.59	10	10	10	14	6	18	0.00	
4	75	55	35	20	17	11	44	25	11	29.65	29.58	29.50	10	10	10	16	7	-	0.00	
5	71	53	35	33	27	20	78	42	15	29.88	29.73	29.61	10	9	5	17	8	-	0.00	
6	68	54	39	39	36	32	82	57	30	29.83	29.65	29.48	10	10	10	25	10	39	0.00	
7	57	44	30	41	29	8	100	75	16	29.96	29.66	29.42	10	7	2	32	17	47	0.05	Snow
8	46	37	28	25	21	16	82	56	39	30.16	30.08	29.95	10	10	10	14	9	-	0.00	
9	50	36	23	19	17	14	77	49	27	30.35	30.24	30.14	10	10	10	12	4	17	0.00	
10	50	34	19	16	14	9	63	46	26	30.50	30.34	30.21	10	10	10	20	9	25	0.00	
11	42	34	26	23	18	14	69	53	38	30.56	30.41	30.25	10	10	10	25	8	31	0.00	
12	54	38	21	26	22	16	80	59	34	30.46	30.27	30.10	10	10	9	17	7	21	0.00	

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1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
13	69	48	26	35	28	21	85	54	22	30.20	30.06	29.94	10	10	10	17	6	24	0.00	
14	68	52	37	49	42	35	93	74	37	30.13	29.96	29.83	10	10	4	18	7	-	0.00	
15	61	54	46	54	46	39	100	80	46	29.90	29.75	29.65	10	9	2	20	11	24	0.21	Rain
16	52	47	42	48	44	41	100	91	77	29.81	29.75	29.65	10	8	2	18	12	28	0.43	Rain
17	57	47	37	48	43	38	100	86	62	29.77	29.71	29.63	10	10	10	13	6	-	0.08	Rain
18	66	51	36	46	32	17	100	60	30	29.84	29.70	29.58	10	10	10	31	10	44	0.01	
19	55	42	30	33	26	21	79	52	31	30.09	30.02	29.89	10	10	10	22	9	26	0.00	
20	52	42	32	34	31	27	92	68	45	30.21	30.11	30.04	10	10	10	8	4	-	0.00	
21	68	49	30	35	32	29	96	59	26	30.05	29.96	29.84	10	10	10	20	8	22	0.00	
22	80	56	33	35	31	25	92	46	13	30.04	29.95	29.86	10	10	10	14	5	21	0.00	
23	86	64	42	35	31	27	76	34	13	29.90	29.81	29.72	10	10	10	16	7	22	0.00	
24	87	66	45	36	30	21	63	31	11	29.89	29.79	29.66	10	10	10	22	8	25	0.00	
25	88	66	45	41	28	23	63	27	11	29.83	29.73	29.66	10	10	10	24	9	32	0.00	Rain
26	82	67	52	54	40	21	93	50	10	29.70	29.60	29.41	10	9	2	36	15	44	0.00	Rain
27	73	59	45	32	29	26	51	32	17	29.81	29.65	29.60	10	10	10	22	15	33	0.00	Rain
28	79	59	39	34	26	19	68	32	11	29.78	29.57	29.44	10	10	10	31	10	40	0.00	
29	79	66	54	35	27	20	47	26	12	29.55	29.45	29.33	10	10	9	34	16	44	0.00	Rain
30	55	47	39	39	32	21	85	59	29	29.78	29.63	29.49	10	10	6	34	11	45	0.04	Rain
31	64	50	35	24	20	17	57	33	16	29.83	29.78	29.71	10	10	10	18	11	22	0.00	
1998	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Apr	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	77	54	32	24	18	10	66	28	10	29.87	29.72	29.55	10	10	10	25	9	32	0.00	
2	62	54	44	28	13	5	41	22	10	29.89	29.74	29.56	10	10	10	36	16	40	0.00	
3	66	52	39	30	26	19	60	36	20	30.08	29.98	29.91	10	10	10	18	7	-	0.00	
4	77	57	37	35	27	21	62	34	15	29.94	29.81	29.65	10	10	10	23	9	31	0.00	
5	78	58	37	35	25	18	73	32	12	29.79	29.67	29.56	10	10	10	23	10	28	0.00	
6	72	56	42	32	24	21	47	26	15	29.71	29.58	29.51	10	10	10	32	14	44	0.00	
7	70	54	39	27	21	16	53	30	14	29.81	29.70	29.61	10	10	10	26	12	34	0.00	
8	68	54	42	26	22	15	49	30	15	29.98	29.87	29.75	10	10	10	23	14	31	0.00	
9	71	52	34	35	26	20	79	41	16	30.07	30.00	29.93	10	10	10	12	6	17	0.00	
10	79	59	39	29	24	22	53	29	12	30.11	30.00	29.91	10	10	10	16	9	24	0.00	
11	86	65	44	42	36	27	58	37	17	29.99	29.78	29.55	10	10	10	29	11	37	0.00	
12	82	64	46	40	23	18	55	21	12	29.78	29.58	29.46	10	10	10	31	15	36	0.00	
13	75	60	46	27	22	14	44	25	12	29.84	29.75	29.66	10	10	10	15	9	17	0.00	
14	82	62	42	26	19	10	47	21	11	29.78	29.64	29.54	10	10	10	29	10	37	0.00	
15	75	58	42	28	19	12	44	23	11	29.70	29.61	29.47	10	10	10	34	12	45	0.00	
16	66	52	39	33	25	20	60	36	20	29.96	29.78	29.66	10	10	10	28	13	31	0.00	
17	55	45	35	43	36	31	100	74	45	30.08	30.01	29.96	10	10	5	22	8	-	0.05	Rain
18	63	45	28	42	34	27	100	64	28	30.11	30.02	29.93	10	10	7	26	8	17	0.00	

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
19	71	52	34	36	33	26	92	52	22	30.14	30.01	29.86	10	10	10	16	8	22	0.00	
20	70	57	45	36	32	25	66	42	27	30.21	30.02	29.86	10	10	10	23	12	31	0.00	
21	69	52	37	37	32	27	83	49	25	30.32	30.23	30.13	10	10	10	10	5	17	0.00	
22	75	57	39	33	30	26	65	36	19	30.27	30.14	30.01	10	10	5	18	6	23	0.00	
23	89	64	42	38	33	27	58	32	16	30.04	29.91	29.76	10	10	10	14	7	24	0.00	Rain
24	91	69	48	38	30	22	52	24	12	29.75	29.63	29.52	10	10	10	33	13	40	0.00	
25	84	67	52	34	30	24	37	22	15	29.80	29.60	29.48	10	10	10	24	11	39	0.00	
26	70	56	44	42	37	30	77	53	26	30.11	29.76	29.56	10	10	10	30	13	38	0.00	Rain
27	64	54	45	40	35	30	80	51	31	30.08	30.03	29.99	10	10	10	21	12	26	0.00	
28	66	52	39	43	35	27	82	55	31	30.21	30.07	29.96	10	10	10	10	6	28	0.00	
29	75	57	39	36	32	28	79	42	20	30.10	30.00	29.90	10	10	10	14	6	-	0.00	
30	84	64	45	37	29	19	68	32	11	29.96	29.86	29.76	10	10	10	15	6	-	0.00	
1998	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
May	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	86	68	50	34	28	23	43	23	11	29.82	29.74	29.66	10	10	10	12	7	21	0.00	
2	88	70	52	35	31	28	49	25	13	29.81	29.72	29.65	10	10	10	13	8	23	0.00	
3	84	68	55	54	41	27	77	44	13	30.07	29.81	29.71	10	10	10	12	6	-	0.00	
4	91	71	51	33	23	14	50	20	8	29.76	29.65	29.53	10	10	10	24	7	33	0.00	
5	86	72	61	32	23	16	24	16	10	29.76	29.65	29.55	10	10	10	20	11	24	0.00	
6	88	70	53	32	24	17	34	18	9	29.73	29.66	29.60	10	10	10	17	8	29	0.00	
7	84	68	53	31	24	18	37	19	12	29.86	29.72	29.64	10	10	5	16	8	23	0.00	
8	86	68	53	32	24	14	41	24	8	29.68	29.59	29.47	10	10	10	34	10	51	0.00	
9	84	70	55	34	30	26	42	25	13	29.92	29.73	29.64	10	10	10	20	12	24	0.00	
10	91	71	51	47	34	15	68	34	10	29.95	29.79	29.64	10	10	10	24	12	32	0.00	
11	91	72	54	30	23	16	26	15	10	29.78	29.61	29.49	10	10	10	22	11	32	0.00	
12	91	70	50	29	22	17	33	18	10	29.70	29.61	29.54	10	10	10	26	9	32	0.00	
13	93	68	45	27	22	16	34	17	10	29.70	29.63	29.56	10	10	10	24	9	34	0.00	
14	87	69	54	40	25	18	37	21	10	29.77	29.68	29.59	10	10	10	36	10	47	0.00	
15	82	65	48	29	21	10	41	20	10	30.17	29.95	29.83	10	10	10	21	12	26	0.00	
16	93	68	46	52	27	11	48	20	11	30.05	29.94	29.81	10	10	7	25	9	32	0.00	
17	93	74	55	53	40	33	77	32	12	29.95	29.88	29.81	10	9	6	16	6	-	0.00	
18	97	76	57	46	42	38	51	28	14	29.93	29.85	29.75	10	9	5	26	9	33	0.00	Rain
19	99	80	64	51	45	35	56	31	13	30.02	29.88	29.78	10	10	8	25	12	39	0.00	
20	98	79	61	54	42	34	67	31	13	29.95	29.86	29.79	10	10	6	14	7	22	0.00	
21	91	77	63	47	39	31	46	28	12	29.84	29.75	29.64	10	9	5	33	10	41	0.00	
22	95	79	63	42	29	17	39	20	7	29.88	29.65	29.54	10	10	7	29	11	40	0.00	
23	93	75	59	26	18	10	24	13	7	29.80	29.70	29.62	10	10	10	14	7	21	0.00	
24	95	74	55	27	19	12	29	13	7	29.80	29.71	29.62	10	10	10	16	7	20	0.00	
25	84	72	60	50	44	16	60	41	11	29.88	29.80	29.68	10	10	10	18	11	-	0.00	

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
26	90	72	54	60	51	43	69	50	29	29.84	29.75	29.58	10	9	6	26	8	39	0.00	
27	97	76	57	53	34	17	81	31	7	29.90	29.78	29.69	10	10	7	21	8	38	0.00	
28	98	76	55	33	25	18	23	15	8	29.93	29.82	29.74	10	10	7	14	8	-	0.00	
29	100	80	60	48	29	19	28	15	8	29.90	29.79	29.68	10	10	10	20	9	26	0.00	
30	100	80	61	43	29	21	32	17	9	29.81	29.75	29.68	10	10	10	25	11	32	0.00	
31	99	79	60	35	27	18	30	15	9	29.93	29.80	29.72	10	10	10	20	7	26	0.00	
1998	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Jun	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	108	82	59	40	30	18	27	15	10	29.80	29.71	29.60	10	10	10	16	8	26	0.00	
2	106	84	62	41	31	22	29	14	9	29.76	29.63	29.53	10	10	10	16	8	25	0.00	
3	102	83	64	40	35	27	28	17	11	29.77	29.58	29.47	10	10	10	22	7	23	0.00	
4	93	78	64	37	27	17	26	15	10	29.76	29.59	29.53	10	10	10	31	13	34	0.00	
5	84	70	57	51	41	20	72	39	15	30.09	29.84	29.67	10	10	10	20	11	-	0.00	
6	79	66	55	48	46	43	69	52	34	30.19	30.05	29.94	10	10	10	16	10	22	0.00	
7	95	75	57	66	50	27	79	49	10	30.06	29.79	29.53	10	10	8	28	13	37	0.00	
8	93	78	61	67	34	17	97	28	10	29.82	29.66	29.58	10	9	6	25	13	33	0.00	
9	96	78	61	42	30	18	29	18	13	29.88	29.78	29.70	10	10	10	21	9	28	0.00	
10	81	68	55	61	52	41	100	66	26	30.04	29.85	29.75	10	9	3	24	13	31	0.17	Rain
11	88	69	51	55	48	40	100	51	19	29.96	29.80	29.71	10	10	10	30	10	38	0.01	
12	97	79	62	51	46	39	65	35	14	29.94	29.82	29.74	10	10	10	22	10	28	0.00	
13	100	84	68	57	43	25	63	27	12	29.94	29.76	29.64	10	10	10	30	14	40	0.00	
14	95	78	63	36	28	21	22	15	12	29.84	29.70	29.60	10	10	10	18	11	24	0.00	
15	89	74	60	49	44	24	64	38	16	29.90	29.74	29.62	10	10	10	17	12	18	0.00	
16	100	78	55	42	36	22	49	21	12	29.79	29.59	29.46	10	10	10	25	13	37	0.00	
17	100	83	66	39	31	21	26	15	11	29.84	29.64	29.52	10	10	10	26	14	34	0.00	
18	96	82	66	43	34	25	26	19	14	29.90	29.79	29.71	10	10	10	15	9	17	0.00	
19	105	81	57	47	36	25	36	19	14	29.87	29.75	29.64	10	10	10	20	6	26	0.00	
20	106	85	66	48	36	27	24	17	14	29.75	29.66	29.58	10	10	10	16	8	29	0.00	
21	104	84	66	50	40	29	51	22	13	29.91	29.73	29.64	10	10	10	17	9	26	0.00	
22	104	83	64	59	42	28	44	23	15	29.86	29.77	29.69	10	10	10	18	9	28	0.00	
23	105	85	66	60	49	34	70	32	13	29.85	29.74	29.62	10	10	10	25	12	36	0.00	
24	108	86	66	59	50	38	66	30	14	29.91	29.72	29.59	10	10	10	21	12	37	0.00	
25	108	86	66	58	50	40	59	31	14	29.88	29.71	29.61	10	10	10	24	9	29	0.00	
26	108	88	70	58	50	32	61	30	15	29.74	29.65	29.55	10	10	10	18	11	22	0.00	
27	108	88	68	50	42	33	30	20	15	29.70	29.62	29.56	10	10	10	14	5	-	0.00	
28	109	86	64	59	49	36	40	27	15	29.75	29.68	29.62	10	10	10	20	6	22	0.00	
29	106	86	66	63	55	50	68	35	18	29.94	29.74	29.65	10	10	10	17	11	22	0.00	
30	100	84	69	68	60	54	69	44	21	29.83	29.77	29.72	10	10	10	16	10	22	0.00	
1998	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**

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1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Jul	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	97	84	73	66	62	57	73	49	28	30.06	29.88	29.76	10	10	10	21	10	33	0.00	
2	84	75	66	71	63	57	91	73	49	30.11	29.94	29.88	10	9	2	25	6	31	0.17	Rain
3	91	78	66	67	62	56	96	62	30	29.95	29.87	29.78	10	10	10	20	6	17	0.00	Rain
4	98	82	68	68	61	55	88	54	24	30.06	29.83	29.73	10	9	2	15	6	28	0.32	Rain
5	98	82	69	69	65	59	88	62	30	30.09	29.86	29.74	10	9	2	22	10	25	0.32	Rain
6	100	86	72	68	62	56	82	49	23	29.96	29.79	29.71	10	10	10	24	8	25	0.00	
7	81	80	75	62	62	61	62	56	50	30.08	29.96	29.77	10	10	10	25	10	30	0.00	
8	100	86	72	63	59	55	73	47	22	30.13	30.06	29.94	10	9	2	36	12	55	0.17	Rain
9	98	82	66	65	60	47	87	58	18	29.96	29.90	29.81	10	10	10	20	8	23	0.01	Rain
10	99	84	68	66	59	52	87	49	21	29.95	29.87	29.77	10	10	10	8	4	-	0.00	
11	104	88	73	61	53	42	64	34	13	29.86	29.80	29.73	10	10	10	9	6	-	0.00	
12	93	88	79	61	56	44	54	39	18	30.05	29.98	29.89	10	10	10	23	8	29	0.00	
13	100	84	70	63	57	45	76	45	17	30.11	29.91	29.74	10	10	10	25	8	36	0.00	
14	100	84	68	56	51	43	63	33	14	29.95	29.80	29.72	10	10	10	24	9	32	0.00	
15	100	84	68	66	55	47	87	45	18	30.26	29.90	29.77	10	9	3	20	8	31	0.24	Rain
16	91	78	66	67	59	50	93	56	25	30.14	30.05	29.97	10	10	10	14	7	18	0.01	
17	93	80	70	64	59	53	78	54	27	30.15	30.02	29.92	10	10	10	21	8	25	0.00	Rain
18	97	83	70	63	56	50	78	45	22	30.00	29.91	29.81	10	10	10	18	5	25	0.00	Rain
19	102	83	66	56	52	47	68	37	17	29.87	29.80	29.72	10	10	10	16	8	20	0.00	
20	100	86	71	55	53	51	51	34	19	29.85	29.79	29.73	10	10	10	23	11	30	0.00	
21	99	83	68	60	54	44	65	41	16	29.87	29.81	29.71	10	10	10	24	9	32	0.00	
22	97	82	69	60	55	50	65	39	20	29.98	29.84	29.74	10	10	9	28	14	34	0.00	
23	96	80	66	59	56	51	73	43	22	30.01	29.87	29.78	10	10	10	24	10	31	0.00	Rain
24	98	84	72	60	57	53	64	42	25	30.00	29.87	29.78	10	10	10	26	9	31	0.00	
25	95	81	69	63	59	52	68	49	26	29.97	29.91	29.87	10	10	10	21	6	26	0.00	
26	91	80	72	62	60	57	66	55	34	30.12	29.94	29.88	10	10	10	17	6	-	0.00	Rain
27	90	80	71	64	61	57	76	58	33	30.01	29.95	29.86	10	10	10	12	5	16	0.00	
28	97	84	72	65	58	50	78	47	22	29.94	29.87	29.77	10	10	10	14	7	21	0.00	
29	111	86	73	57	54	48	53	34	18	29.95	29.77	29.69	10	10	10	21	9	-	0.00	
30	102	84	66	66	59	51	90	52	20	30.03	29.84	29.67	10	8	0	45	11	56	0.68	Rain
31	86	75	66	66	62	59	90	70	44	30.08	30.00	29.92	10	10	10	12	6	-	0.00	
1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Aug	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	93	81	69	67	61	55	87	51	28	30.16	29.98	29.91	10	10	10	17	6	20	0.00	
2	93	82	71	69	63	55	84	66	28	30.12	29.96	29.88	10	10	4	37	9	43	0.21	Rain , Thunderstorm
3	91	80	68	65	59	49	90	58	24	30.01	29.94	29.87	10	10	10	18	6	23	0.00	
4	79	70	64	60	58	53	81	64	45	30.15	30.09	30.01	10	10	10	21	8	26	0.00	
5	79	72	64	64	62	58	94	79	58	30.36	30.19	30.10	10	9	3	17	6	22	0.10	Rain ,

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
																				Thunderstorm
6	86	73	60	61	57	49	100	63	29	30.14	30.03	29.90	10	10	9	9	3	-	0.00	
7	97	79	62	58	53	48	84	44	20	30.03	29.87	29.77	10	10	10	17	9	21	0.00	
8	75	68	66	53	51	50	57	52	46	30.13	30.01	29.84	10	10	10	21	13	25	0.00	
9	98	80	62	60	50	43	65	35	17	30.21	30.08	29.89	10	10	10	17	10	24	0.00	
10	97	81	66	59	53	47	66	39	19	29.99	29.92	29.82	10	10	10	14	6	22	0.00	
11	97	83	70	63	58	47	76	51	19	30.02	29.94	29.85	10	10	10	24	8	32	0.01	Rain
12	90	78	64	64	61	55	97	66	31	30.29	30.05	29.94	10	9	2	23	7	28	0.64	Rain
13	84	75	66	65	61	53	93	70	34	30.14	30.06	29.96	10	10	10	12	6	-	0.09	Rain
14	90	76	62	61	57	49	90	55	25	30.02	29.94	29.83	10	10	10	10	6	17	0.00	
15	91	77	63	59	52	37	75	45	15	29.92	29.84	29.76	10	10	10	8	2	-	0.00	
16	95	78	64	57	52	47	73	42	21	29.88	29.82	29.77	10	10	10	13	5	21	0.00	
17	93	78	64	63	55	50	75	47	23	29.95	29.89	29.82	10	10	10	12	6	16	0.00	
18	91	78	64	65	61	55	87	57	30	29.96	29.90	29.81	10	10	10	15	8	17	0.00	
19	90	78	68	72	66	61	94	70	40	30.16	29.97	29.87	10	9	2	16	9	28	0.12	Rain
20	84	74	66	67	65	61	97	78	47	30.27	30.08	29.99	10	10	7	21	9	-	0.04	Rain
21	89	76	64	66	61	55	97	63	32	30.14	30.07	29.98	10	10	10	13	6	18	0.00	
22	91	78	64	61	56	51	87	50	25	30.05	29.98	29.89	10	10	8	15	4	-	0.00	
23	93	78	64	62	57	50	84	51	24	29.94	29.87	29.78	10	10	10	13	6	-	0.00	
24	96	78	64	65	60	55	90	55	29	29.84	29.78	29.69	10	10	10	13	7	21	0.00	
25	93	80	66	67	63	57	94	62	30	30.07	29.82	29.71	10	10	10	14	6	17	0.00	
26	91	78	66	66	64	61	97	67	38	30.08	29.88	29.76	10	10	6	21	10	31	0.12	Rain
27	96	80	68	68	64	57	90	60	29	30.09	29.87	29.79	10	10	8	13	8	18	0.00	
28	90	80	71	70	64	60	88	68	39	30.31	30.05	29.87	10	9	2	34	9	38	0.11	Rain
29	91	78	66	64	53	36	87	51	15	30.16	30.06	29.96	10	10	10	10	6	16	0.00	
30	93	74	57	51	45	36	75	40	15	30.04	29.96	29.86	10	10	10	13	6	18	0.00	
31	93	78	62	55	48	41	70	38	16	29.93	29.86	29.79	10	10	10	14	8	20	0.00	
1998	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Sep	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	91	76	63	61	52	48	66	45	27	29.91	29.86	29.80	10	10	10	18	4	-	0.00	Rain
2	93	78	64	58	53	47	70	46	21	29.91	29.83	29.74	10	10	4	14	6	21	0.00	
3	91	78	64	53	48	42	63	38	18	29.86	29.81	29.76	10	10	9	16	5	18	0.00	
4	96	80	64	52	48	46	58	38	19	29.94	29.87	29.82	10	10	10	14	6	26	0.00	
5	93	78	64	57	51	48	61	40	23	30.08	29.94	29.87	10	10	10	21	8	26	0.00	
6	93	78	64	57	50	44	63	40	20	30.15	29.95	29.86	10	10	10	16	5	22	0.00	
7	93	76	62	54	46	41	58	36	20	29.97	29.89	29.80	10	10	10	13	4	17	0.00	
8	93	77	61	50	46	43	62	35	18	29.89	29.81	29.73	10	10	10	12	5	-	0.00	
9	75	72	70	62	56	49	66	56	44	30.11	30.04	29.81	10	10	10	20	7	30	0.00	
10	91	76	64	60	57	54	76	53	31	30.13	29.95	29.81	10	10	10	12	8	-	0.00	

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1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
11	88	74	61	53	48	45	60	41	25	30.08	29.88	29.81	10	10	7	10	4	-	0.00	
12	89	75	62	57	53	47	73	49	27	29.91	29.81	29.71	10	10	10	9	4	-	0.00	
13	95	78	62	57	51	48	67	42	23	29.76	29.67	29.58	10	10	10	9	5	-	0.00	
14	93	80	66	62	51	43	78	40	21	29.97	29.74	29.62	10	10	7	24	9	41	0.06	Rain
15	88	77	66	62	57	51	84	56	29	30.01	29.95	29.87	10	10	10	16	9	21	0.00	Rain
16	87	74	62	59	55	50	84	56	30	30.04	29.96	29.89	10	10	10	15	6	-	0.00	
17	89	74	62	57	54	49	80	51	27	30.03	29.92	29.84	10	10	10	14	4	-	0.00	
18	90	76	61	55	52	50	72	47	26	29.93	29.82	29.70	10	10	10	15	6	22	0.00	
19	95	78	64	56	47	40	67	38	17	29.70	29.63	29.54	10	10	10	16	9	-	0.00	
20	95	78	64	50	45	38	56	31	14	29.69	29.64	29.57	10	10	10	14	7	-	0.00	
21	97	82	68	53	48	42	56	32	19	29.75	29.69	29.62	10	10	10	16	6	23	0.00	
22	84	72	59	61	51	43	81	51	33	30.20	29.94	29.75	10	10	9	21	11	25	0.00	
23	90	76	62	59	57	55	78	58	35	30.01	29.91	29.78	10	10	10	24	9	30	0.00	
24	96	80	64	62	57	46	87	49	20	29.96	29.81	29.72	10	10	7	20	14	26	0.00	
25	96	80	64	64	59	48	87	53	19	29.99	29.74	29.62	10	10	6	23	13	31	0.00	
26	96	79	62	62	52	37	90	44	15	29.85	29.72	29.63	10	10	6	18	13	22	0.00	
27	96	78	61	58	45	36	59	33	15	29.91	29.83	29.75	10	10	10	13	6	-	0.00	
28	91	78	66	64	58	53	73	53	31	29.92	29.85	29.77	10	10	10	14	5	16	0.00	
29	91	77	64	66	59	52	87	61	29	29.96	29.82	29.72	10	9	4	22	6	34	0.13	Rain , Thunderstorm
30	87	75	66	65	62	59	90	75	48	29.89	29.83	29.77	10	10	10	18	10	-	0.05	Rain
1998	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
Oct	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	79	70	62	64	62	59	100	87	58	30.14	29.95	29.70	10	7	1	13	7	-	1.54	Rain
2	84	70	57	62	50	38	93	55	21	29.78	29.72	29.66	10	10	10	14	7	21	0.01	
3	90	71	53	52	46	38	86	48	16	29.83	29.72	29.62	10	10	10	21	8	21	0.00	
4	87	74	62	54	47	41	65	43	20	29.79	29.60	29.51	10	10	10	16	11	24	0.00	
5	71	61	51	50	31	14	58	33	12	29.98	29.80	29.54	10	10	10	21	11	26	0.00	
6	72	58	44	39	35	27	79	49	19	30.15	30.07	29.96	10	10	10	9	6	-	0.00	
7	77	60	44	40	35	27	79	47	16	30.26	30.17	30.10	10	10	10	13	5	-	0.00	
8	82	62	44	40	33	28	76	40	15	30.17	30.07	29.98	10	10	10	18	5	23	0.00	
9	86	66	46	39	36	32	68	39	17	30.01	29.92	29.81	10	10	10	12	5	-	0.00	
10	91	70	48	46	39	36	74	41	14	29.88	29.78	29.66	10	10	10	23	9	32	0.00	
11	88	68	48	48	35	20	74	37	8	30.06	29.92	29.74	10	10	10	13	7	-	0.00	
12	80	66	52	57	47	37	81	54	44	30.22	30.11	30.05	10	10	10	13	9	-	0.00	
13	90	72	54	55	48	36	90	53	15	30.08	29.97	29.84	10	10	5	16	5	20	0.00	
14	90	72	55	57	46	35	93	47	15	29.86	29.74	29.60	10	10	6	16	12	21	0.00	
15	91	75	59	59	51	38	93	54	15	29.69	29.57	29.46	10	9	5	25	14	33	0.00	
16	82	67	52	60	36	24	93	39	12	29.66	29.57	29.49	10	10	9	32	17	39	0.00	
17	73	58	43	31	23	15	53	29	11	30.04	29.89	29.74	10	10	10	18	10	25	0.00	

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
18	70	54	39	33	29	25	63	40	21	30.23	30.13	30.05	10	10	10	13	6	-	0.00	
19	69	61	53	55	41	30	93	53	35	30.24	30.15	30.09	10	10	10	14	5	-	0.09	Rain
20	55	52	48	50	49	48	100	93	80	30.42	30.31	30.15	10	8	1	12	6	-	0.78	Rain
21	53	52	50	50	49	47	100	93	83	30.54	30.44	30.33	10	5	2	12	7	-	0.18	Rain
22	57	54	50	50	49	46	100	88	67	30.57	30.47	30.36	10	6	1	9	4	-	0.01	Rain
23	62	56	50	54	50	46	100	88	75	30.42	30.28	30.14	10	8	2	13	7	-	0.01	Rain
24	70	58	46	56	52	46	100	91	57	30.28	30.17	30.03	10	6	0	10	5	-	0.01	Fog
25	77	64	50	57	54	49	97	77	45	30.06	29.97	29.86	10	8	4	20	9	-	0.01	
26	79	68	57	59	56	53	93	75	40	30.11	29.93	29.83	10	9	5	16	12	24	0.00	
27	63	56	48	61	56	48	100	93	87	30.15	30.03	29.90	10	6	1	17	8	24	1.39	Rain
28	71	56	42	52	46	42	100	88	36	30.09	29.99	29.81	10	5	0	7	4	-	0.01	Fog
29	73	58	44	54	47	41	90	70	36	29.96	29.86	29.78	10	10	10	8	5	-	0.00	
30	77	66	55	62	57	52	100	87	56	29.95	29.83	29.63	10	6	0	40	5	46	1.78	Fog , Rain
31	62	55	46	56	51	42	96	86	60	30.05	29.87	29.71	10	10	2	23	11	32	0.04	Rain
1998	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Nov	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	60	52	43	49	42	38	90	73	53	30.04	29.94	29.83	10	10	10	13	7	-	0.00	
2	61	51	41	50	45	39	96	79	62	29.93	29.85	29.75	10	10	8	9	4	-	0.00	
3	61	52	43	46	44	40	96	81	56	30.05	29.93	29.83	10	9	3	15	7	-	0.01	
4	48	46	44	46	45	43	100	94	86	30.18	30.09	29.96	10	4	2	10	6	-	0.01	Rain
5	46	44	42	43	42	41	100	94	81	30.19	30.08	29.98	10	6	2	16	11	-	0.02	Rain
6	52	47	42	48	44	41	100	93	80	30.05	29.97	29.86	10	5	0	20	13	21	0.00	Fog
7	64	53	42	45	43	38	100	85	40	30.11	29.99	29.88	10	6	0	20	9	-	0.01	Fog
8	73	55	37	44	39	36	96	61	27	30.06	29.88	29.67	10	10	9	25	8	29	0.00	
9	72	58	44	40	34	18	66	47	23	29.85	29.63	29.39	10	10	8	38	20	51	0.00	
10	57	47	34	28	21	13	79	41	18	30.14	30.06	29.88	10	10	10	17	10	-	0.00	
11	66	47	28	38	31	25	88	59	26	30.21	30.09	29.97	10	10	10	13	6	-	0.00	
12	60	50	39	41	38	36	89	70	47	30.19	30.10	30.01	10	10	10	10	5	-	0.00	
13	63	49	35	39	36	33	92	66	37	30.17	30.07	29.97	10	10	10	9	6	-	0.00	
14	73	54	35	38	34	28	93	56	19	30.07	30.00	29.94	10	10	10	12	3	-	0.00	
15	73	56	39	38	36	34	79	56	24	30.10	29.96	29.84	10	10	10	16	5	-	0.00	
16	73	55	37	39	34	28	83	53	18	30.00	29.92	29.84	10	10	10	15	5	-	0.00	
17	73	55	37	39	36	32	83	57	27	30.05	29.92	29.78	10	10	10	14	5	-	0.00	
18	75	58	42	37	34	28	73	46	18	29.92	29.83	29.78	10	10	10	12	8	-	0.00	
19	70	56	42	37	33	28	71	49	22	30.16	29.97	29.81	10	10	10	14	6	-	0.00	
20	48	42	36	36	34	30	89	72	56	30.31	30.23	30.17	10	10	10	8	5	-	0.00	
21	68	50	32	37	32	27	92	63	21	30.22	30.11	29.99	10	10	9	14	6	-	0.00	
22	75	54	34	35	31	26	82	50	18	30.06	29.99	29.88	10	10	10	9	2	-	0.00	
23	72	54	37	32	29	25	70	45	18	30.24	30.16	30.00	10	10	10	9	4	-	0.00	

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
24	75	54	33	39	32	27	78	49	24	30.17	30.04	29.89	10	10	8	13	4	-	0.00	
25	71	54	37	34	29	24	79	47	17	30.16	30.09	30.00	10	10	10	9	4	-	0.00	
26	73	54	34	33	31	28	79	50	21	30.20	30.10	30.01	10	10	10	8	3	-	0.00	
27	72	54	36	42	35	28	80	58	29	30.12	30.02	29.94	10	10	10	12	3	-	0.00	
28	75	56	37	47	40	33	83	61	29	30.00	29.88	29.75	10	10	10	16	4	-	0.00	
29	55	50	39	54	46	33	100	83	52	29.94	29.81	29.70	10	7	0	25	7	36	0.19	Fog , Rain
30	64	50	35	41	37	32	89	67	38	30.28	30.17	29.97	10	10	10	8	3	-	0.00	
1998	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
Dec	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	64	50	37	41	38	33	89	69	38	30.27	30.16	30.05	10	10	10	15	5	-	0.02	Rain
2	55	50	44	52	47	40	100	89	77	30.10	29.98	29.84	10	7	0	25	5	31	0.00	Fog , Rain
3	60	52	42	49	44	40	100	87	53	29.87	29.80	29.70	10	7	0	17	5	-	0.00	Fog , Rain
4	68	52	36	49	42	36	100	76	40	29.88	29.82	29.76	10	10	5	12	5	-	0.00	
5	73	56	39	43	35	26	89	55	18	29.83	29.72	29.59	10	10	10	22	9	30	0.00	
6	54	46	37	36	28	23	81	53	32	29.84	29.76	29.59	10	10	10	22	13	28	0.00	
7	45	36	28	31	27	24	100	71	44	30.32	30.08	29.81	10	10	7	24	10	31	0.00	
8	46	32	19	25	22	18	92	69	34	30.37	30.26	30.15	10	10	10	14	6	-	0.00	
9	46	35	24	34	27	20	85	68	50	30.27	30.14	30.05	10	10	10	14	5	-	0.00	
10	41	36	32	35	31	25	100	85	60	30.52	30.44	30.28	10	7	0	20	15	29	0.02	Fog , Rain , Snow
11	46	37	28	31	28	25	92	76	46	30.47	30.35	30.25	10	10	9	9	6	-	0.00	
12	55	40	24	30	25	20	92	67	26	30.37	30.30	30.22	10	10	10	7	3	-	0.00	Rain
13	59	44	28	30	27	22	85	62	24	30.46	30.37	30.31	10	10	10	9	5	-	0.00	
14	59	41	23	30	27	20	88	70	31	30.38	30.32	30.19	10	10	10	9	1	-	0.00	
15	55	42	28	32	29	26	92	72	37	30.39	30.31	30.25	10	10	10	10	6	-	0.00	
16	61	44	26	35	29	24	92	66	27	30.45	30.33	30.25	10	10	10	13	5	-	0.00	
17	55	41	27	38	32	25	97	75	47	30.44	30.21	29.88	10	10	10	17	6	-	0.00	
18	71	54	37	43	34	22	100	68	16	29.83	29.70	29.54	10	8	2	32	9	40	0.00	Rain
19	45	38	30	39	34	30	100	87	71	30.11	30.01	29.82	10	8	1	18	9	24	0.00	
20	69	54	39	41	35	19	100	72	15	30.02	29.92	29.76	10	6	0	29	18	38	0.00	Fog
21	48	33	17	34	20	3	82	55	33	30.60	30.07	29.74	10	10	10	25	13	34	0.00	
22	26	18	10	7	3	-1	67	52	37	30.62	30.42	30.19	10	10	10	12	8	-	0.00	
23	30	22	15	9	8	6	71	54	38	30.41	30.31	30.18	10	10	10	10	5	-	0.00	
24	39	29	19	18	15	9	82	62	39	30.49	30.39	30.31	10	10	10	15	6	-	0.00	
25	60	38	15	21	16	12	89	54	20	30.37	30.25	30.13	10	10	10	12	4	-	0.00	
26	63	41	19	27	20	14	78	46	21	30.17	30.03	29.90	10	10	10	13	5	-	0.00	
27	69	51	33	28	22	14	70	40	14	30.14	29.99	29.88	10	10	10	22	6	28	0.00	
28	69	48	28	29	23	19	79	44	16	30.12	29.99	29.83	10	10	10	24	8	39	0.00	
29	64	50	36	27	24	21	60	40	22	30.11	30.05	29.93	10	10	10	12	6	-	0.00	
30	63	46	30	34	30	24	82	59	34	30.04	29.91	29.77	10	10	10	16	4	-	0.00	

1998	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
31	51	44	37	37	34	32	93	69	54	30.20	30.00	29.78	10	10	10	18	12	-	0.00	

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History for Roswell, NM

January 1, 1986 through December 31, 1986 — View Current Conditions

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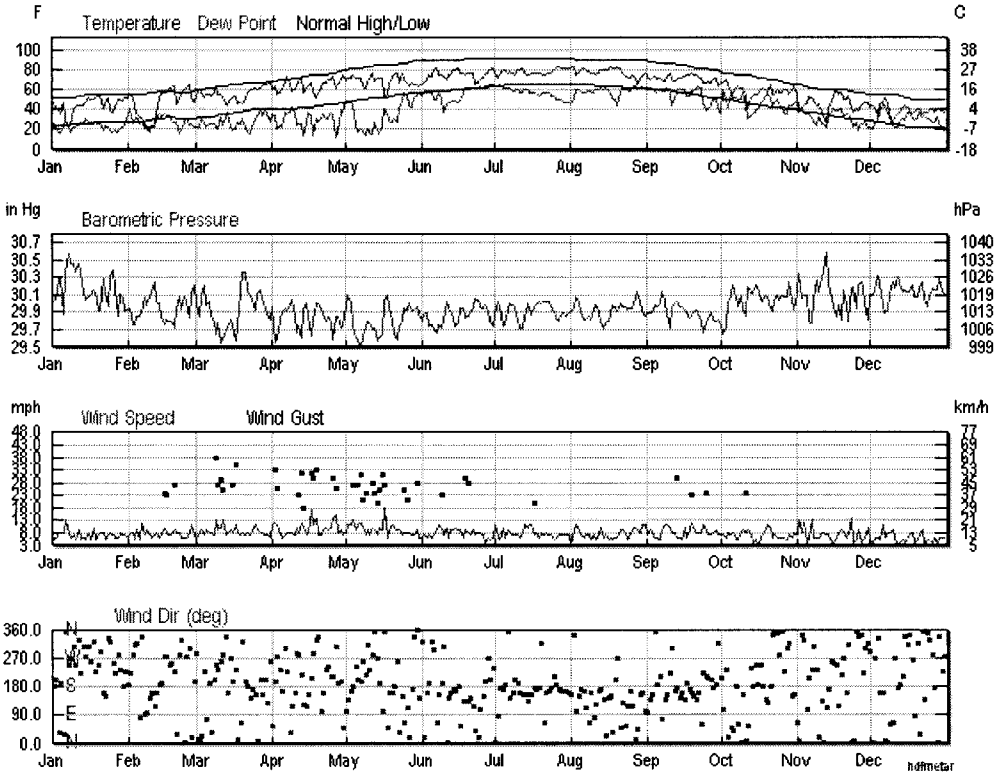
January 1, 1986 through December 31, 1986

January | 1 | 1986 - TO - December | 31 | 1986 | Go

Daily | Weekly | Monthly | **Custom**

	Max	Avg	Min	Sum
Temperature				
Max Temperature	**102** °F	**74** °F	**24** °F	
Mean Temperature	**84** °F	**61** °F	**20** °F	
Min Temperature	**73** °F	**48** °F	**12** °F	
Degree Days				
Heating Degree Days (base 65)	45	8	0	3091
Cooling Degree Days (base 65)	20	4	0	1596
Growing Degree Days (base 50)	34	13	0	4909
Dew Point				
Dew Point	**69** °F	**40** °F	**4** °F	
Precipitation				
Precipitation	**2.90** in	**0.06** in	**0.00** in	**23.68** in
Snowdepth	**5.0** in	**3.0** in	**1.0** in	-
Wind				
Wind	**53** mph	**8** mph	**0** mph	
Gust Wind	**47** mph	**26** mph	**16** mph	
Sea Level Pressure				
Sea Level Pressure	**30.72** in	**29.96** in	**29.31** in	



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Observations

1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Jan	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	64	50	36	37	32	24	73	55	34	30.08	29.98	29.87	15	10	7	12	7	-	0.00	Rain
2	66	46	27	32	21	9	100	49	11	30.14	30.02	29.90	20	9	7	10	5	-	0.00	
3	55	42	28	29	23	14	64	47	33	30.14	30.04	29.92	10	8	7	14	6	-	0.22	
4	50	39	28	25	18	15	59	42	26	30.48	30.29	29.99	10	10	7	17	8	-	0.00	
5	48	36	23	18	16	12	72	47	24	30.48	30.28	30.04	20	11	10	16	8	-	0.00	
6	66	47	28	36	24	15	79	43	23	30.02	29.87	29.71	20	9	7	18	8	26	0.00	Rain
7	41	31	19	37	28	18	100	94	79	30.62	30.37	29.87	10	5	0	17	13	-	0.30	Fog , Rain , Snow
8	33	22	12	30	20	13	100	94	69	30.63	30.58	30.51	15	10	7	9	7	-	0.10	
9	37	24	12	21	17	12	100	75	48	30.56	30.46	30.34	10	9	4	8	6	-	0.00	Fog
10	55	40	24	26	23	19	81	59	32	30.53	30.45	30.38	20	8	6	12	7	-	0.00	Fog
11	59	42	26	26	22	18	81	53	28	30.44	30.36	30.26	15	9	7	9	5	-	0.00	
12	57	44	32	36	24	20	100	53	25	30.53	30.45	30.30	20	10	7	14	9	-	0.00	
13	60	44	27	35	27	20	100	64	32	30.49	30.34	30.15	20	11	10	10	5	-	0.00	
14	60	44	28	33	26	19	89	61	21	30.19	30.12	30.06	10	9	7	9	6	-	0.00	
15	66	47	28	34	30	25	85	59	25	30.11	30.04	29.93	10	10	10	12	5	-	0.00	
16	66	52	37	32	28	19	76	48	17	30.14	30.07	30.00	20	11	7	16	8	26	0.00	
17	70	50	30	31	28	25	82	49	22	30.18	30.09	29.98	10	8	7	14	5	-	0.00	
18	61	51	37	31	28	24	73	43	24	30.29	30.16	29.98	20	9	7	16	10	18	0.00	
19	73	52	30	31	28	24	82	52	16	30.23	30.13	30.00	15	10	7	8	5	-	0.00	
20	77	54	30	30	26	21	79	44	14	30.02	29.90	29.77	20	10	7	12	7	-	0.00	
21	70	54	37	27	25	20	62	35	15	30.19	29.92	29.76	15	9	7	12	8	21	0.00	
22	51	40	30	22	19	16	59	40	25	30.39	30.29	30.21	20	12	10	14	8	-	0.00	
23	64	45	26	28	24	18	78	51	24	30.27	30.11	29.92	10	9	7	13	5	-	0.00	
24	70	52	33	29	23	18	72	42	14	30.11	29.97	29.86	15	11	7	20	7	-	0.00	
25	52	39	26	22	19	17	69	47	26	30.45	30.31	30.10	20	11	10	21	8	23	0.00	
26	54	38	21	18	17	14	72	48	24	30.50	30.39	30.26	20	14	10	16	7	-	0.00	
27	60	42	25	22	19	14	71	47	21	30.33	30.17	29.94	20	10	7	12	6	-	0.00	
28	75	51	27	23	17	9	72	37	8	29.93	29.85	29.75	15	10	10	21	6	24	0.00	
29	61	50	39	24	20	14	55	35	22	30.30	30.12	29.83	20	11	10	16	8	-	0.00	
30	71	49	27	26	23	18	69	43	17	30.20	30.08	29.92	20	11	7	9	7	-	0.00	
31	70	52	33	28	24	22	66	40	18	29.99	29.91	29.83	20	12	7	12	7	-	0.00	
1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
Feb	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	high	sum	
1	69	53	37	43	36	29	76	51	33	30.01	29.93	29.86	20	11	10	14	6	-	0.00	
2	64	56	46	46	41	36	77	60	42	30.04	29.94	29.85	20	11	10	15	7	-	0.00	
3	68	52	35	36	25	12	86	45	12	29.90	29.76	29.63	20	11	10	18	8	-	0.00	

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1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
4	53	42	30	37	27	20	87	60	31	29.84	29.75	29.67	20	10	7	7	5	-	0.04	Rain
5	43	36	25	36	32	21	96	85	73	29.98	29.86	29.77	20	11	7	21	9	-	0.00	Rain
6	48	33	18	39	25	17	100	74	40	29.98	29.85	29.73	20	7	0	7	5	-	0.00	Fog
7	39	32	25	35	27	19	96	78	61	30.14	29.89	29.70	20	10	6	25	12	33	0.03	Rain , Snow
8	28	24	21	25	21	17	96	86	75	30.15	30.07	29.96	10	6	1	10	7	-	0.10	Fog , Snow
9	28	24	19	27	23	18	100	93	81	30.07	29.99	29.92	7	2	0	14	9	-	0.10	Fog , Snow
10	24	20	16	23	17	12	100	87	74	30.13	30.08	30.02	20	6	0	10	7	-	0.10	Fog , Snow
11	27	24	21	25	24	20	100	95	88	30.22	30.14	30.08	2	1	0	14	6	-	0.00	Fog
12	28	24	19	27	23	17	96	93	85	30.33	30.25	30.16	10	2	0	13	7	-	0.00	Fog
13	46	36	27	37	31	26	96	86	66	30.17	30.02	29.84	7	3	0	12	8	-	0.00	Fog
14	66	52	37	41	35	30	86	57	29	30.10	30.00	29.94	20	9	5	12	6	-	0.00	Fog
15	75	57	39	40	33	23	89	47	14	29.95	29.84	29.71	15	9	7	17	8	25	0.00	
16	71	58	46	40	35	30	71	45	22	29.82	29.76	29.69	20	10	7	18	10	25	0.00	
17	77	58	39	38	32	27	73	41	16	29.94	29.82	29.72	20	10	7	17	8	23	0.00	
18	81	62	43	40	34	28	74	45	14	29.86	29.79	29.73	15	11	7	15	7	-	0.00	
19	82	62	43	37	29	15	74	37	8	29.90	29.80	29.70	15	10	10	16	7	25	0.00	
20	79	64	48	33	27	18	52	29	10	29.79	29.72	29.65	10	10	10	23	9	33	0.00	
21	60	46	33	33	27	19	70	48	26	30.06	29.95	29.80	20	12	7	14	8	-	0.00	
22	68	51	34	24	16	6	56	29	9	30.19	30.07	29.99	7	7	7	13	8	-	0.00	
23	78	56	33	23	19	16	59	30	10	30.03	29.93	29.83	10	10	7	21	6	24	0.00	
24	75	60	45	31	27	23	52	33	15	30.15	30.07	29.94	15	10	10	9	6	-	0.00	
25	84	62	39	33	30	25	68	35	12	30.13	30.02	29.90	20	13	7	12	6	-	0.00	
26	84	65	46	32	24	14	47	26	7	29.93	29.83	29.69	20	12	7	14	8	-	0.00	
27	61	52	44	34	25	21	47	36	24	30.24	30.11	29.80	15	10	10	21	11	31	0.00	
28	64	48	33	25	22	20	65	37	19	30.38	30.21	30.10	20	14	10	14	7	-	0.00	
1986	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
Mar	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	81	56	30	27	22	17	76	34	10	30.11	29.98	29.83	10	10	10	10	5	-	0.00	
2	77	60	44	28	23	18	42	24	11	29.92	29.86	29.81	20	11	10	14	8	-	0.00	
3	66	58	50	34	30	26	52	38	24	30.31	30.10	29.92	20	11	7	13	9	-	0.00	Rain
4	68	52	36	32	28	24	79	42	19	30.35	30.21	30.03	20	9	7	14	7	-	0.00	
5	71	55	39	27	23	18	49	33	13	30.14	29.99	29.90	20	11	7	17	9	24	0.00	
6	77	56	35	30	25	16	59	33	15	30.17	30.02	29.86	15	11	7	16	8	-	0.00	
7	66	54	43	27	25	21	49	34	22	29.93	29.86	29.80	20	11	10	17	8	-	0.00	
8	81	58	35	30	26	22	64	34	12	29.92	29.79	29.64	10	10	10	16	7	21	0.00	
9	75	64	52	30	22	12	35	21	11	29.81	29.64	29.54	10	8	5	38	13	46	0.00	
10	71	55	39	26	21	12	38	25	17	29.94	29.78	29.65	10	8	7	21	9	29	0.00	
11	62	55	48	36	32	29	56	44	29	29.65	29.55	29.45	20	11	7	23	10	34	0.00	Rain , Thunderstorm
12	62	54	45	28	24	19	48	34	19	29.67	29.59	29.52	20	12	10	22	13	30	0.00	

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1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
13	57	46	36	36	30	21	82	56	36	29.80	29.70	29.62	20	10	7	14	7	-	0.00	
14	52	44	35	45	37	21	89	78	51	29.81	29.72	29.62	20	12	7	18	8	-	0.04	Rain
15	66	50	35	34	23	13	89	41	12	29.88	29.81	29.75	20	11	10	14	9	25	0.00	
16	73	52	30	26	19	13	59	31	10	29.90	29.75	29.59	10	10	10	20	8	30	0.00	
17	66	54	42	30	20	14	55	29	14	29.61	29.57	29.49	20	13	10	29	11	40	0.00	
18	57	46	34	38	28	22	76	53	29	29.99	29.74	29.58	15	10	10	17	8	-	0.02	Rain
19	55	47	39	37	25	17	83	48	23	30.29	30.14	29.99	15	10	7	23	7	34	0.10	Rain
20	57	46	34	37	30	22	93	61	25	30.48	30.36	30.22	20	11	7	14	8	-	0.01	Rain
21	71	50	30	27	23	18	79	40	14	30.49	30.36	30.24	15	10	10	13	7	-	0.00	
22	79	58	37	25	18	12	59	25	8	30.25	30.13	30.01	20	11	10	17	8	-	0.00	
23	81	60	39	22	15	9	43	20	8	30.25	30.10	30.01	10	9	7	10	7	-	0.00	
24	81	61	41	34	23	12	57	28	8	30.17	30.05	29.93	15	11	7	21	9	23	0.00	
25	82	63	44	39	30	14	73	36	10	30.05	29.92	29.81	20	9	7	16	11	-	0.00	
26	75	60	45	41	33	20	58	38	21	30.24	30.12	29.93	20	11	10	16	9	-	0.00	
27	78	62	46	46	41	33	86	50	21	30.26	30.16	30.06	20	11	7	13	8	-	0.00	
28	82	64	46	45	34	21	76	40	13	30.15	30.06	29.97	20	11	10	13	8	-	0.44	
29	79	65	51	45	39	27	69	44	21	30.00	29.94	29.88	20	11	10	23	7	31	0.00	
30	84	66	48	41	35	25	68	36	14	29.96	29.87	29.78	15	10	10	12	7	-	0.00	
31	88	69	50	33	28	23	43	23	10	29.88	29.81	29.74	15	9	7	14	6	-	0.00	
1986	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Apr	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	71	61	51	42	36	28	57	39	23	30.16	29.97	29.80	15	10	7	18	11	30	0.00	
2	80	64	46	46	34	20	86	43	12	29.79	29.54	29.31	20	12	7	32	12	47	0.00	
3	66	56	46	33	21	12	54	29	15	29.75	29.60	29.52	20	11	10	20	11	26	0.00	
4	73	57	41	29	24	18	51	30	15	29.85	29.79	29.73	20	12	7	12	7	-	0.00	
5	79	60	41	29	22	17	48	26	10	29.97	29.90	29.84	20	11	10	12	6	-	0.00	
6	84	67	50	56	37	19	57	34	21	30.15	29.94	29.83	20	13	10	12	7	-	0.00	
7	91	74	57	45	35	28	58	28	12	29.99	29.90	29.80	10	9	7	21	8	30	0.00	
8	81	66	51	51	38	28	78	37	17	30.20	29.98	29.90	20	12	7	17	8	-	0.30	Rain , Thunderstorm
9	66	59	50	47	42	38	77	58	37	30.21	30.04	29.91	20	11	7	12	8	-	0.01	
10	78	60	41	45	37	27	89	51	15	30.03	29.86	29.70	20	11	7	10	7	-	0.00	
11	80	66	53	36	24	19	41	20	11	29.72	29.66	29.60	15	11	7	17	10	28	0.00	
12	84	67	50	30	26	21	36	23	12	29.82	29.73	29.67	20	13	10	16	8	23	0.00	
13	86	74	61	31	26	11	31	19	12	29.75	29.60	29.48	15	9	5	23	12	39	0.00	
14	75	58	42	21	14	5	27	16	12	30.03	29.92	29.76	10	9	7	15	10	18	0.00	
15	78	63	48	32	25	17	34	24	17	30.12	30.00	29.92	15	11	7	14	7	-	0.00	
16	80	64	48	53	38	28	65	37	23	29.99	29.85	29.71	20	11	5	20	8	36	0.00	Fog , Rain
17	81	68	55	56	34	9	97	40	11	29.80	29.63	29.52	20	9	0	29	17	40	0.00	Fog
18	75	58	42	18	14	10	31	17	11	29.87	29.81	29.71	15	11	7	18	11	30	0.00	

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1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
19	61	53	43	36	30	12	65	43	18	30.12	30.00	29.86	20	13	10	25	14	36	0.00	
20	77	57	37	32	28	25	73	37	16	30.09	30.00	29.89	15	10	10	13	7	-	0.00	
21	81	63	45	36	31	23	46	30	17	30.03	29.95	29.90	10	10	10	12	7	-	0.00	
22	87	68	48	43	36	30	59	34	13	29.98	29.87	29.74	15	11	7	18	9	25	0.00	
23	84	68	52	38	31	27	47	26	13	29.92	29.80	29.72	20	11	7	18	10	-	0.00	Rain , Thunderstorm
24	87	70	52	37	31	24	41	24	10	29.96	29.85	29.75	20	11	10	16	9	-	0.00	
25	82	71	60	48	38	32	64	33	16	29.89	29.77	29.67	20	11	7	20	10	29	0.00	
26	84	74	63	40	35	31	38	26	15	29.67	29.58	29.49	20	12	7	28	14	34	0.00	
27	75	62	48	30	13	7	36	17	7	29.91	29.85	29.70	15	11	7	23	15	29	0.00	
28	87	66	46	25	17	9	24	15	8	29.95	29.85	29.71	15	10	10	17	8	-	0.00	
29	84	70	57	48	39	26	49	32	21	29.88	29.72	29.64	10	10	10	17	9	-	0.00	Rain , Thunderstorm
30	90	76	61	53	38	22	72	34	9	29.83	29.73	29.65	20	13	7	14	7	23	0.00	
1986	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
May	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	84	69	54	53	49	45	72	47	26	30.04	29.96	29.85	20	12	7	17	8	-	0.00	
2	82	72	62	55	49	40	78	50	25	30.21	30.10	30.01	20	12	10	17	11	-	0.00	
3	84	72	59	54	49	45	78	49	26	30.13	30.01	29.85	20	10	7	21	11	30	0.00	
4	91	75	59	54	44	21	81	41	12	29.93	29.74	29.55	20	10	7	23	13	30	0.00	
5	90	72	53	49	24	7	67	22	7	29.70	29.61	29.56	15	10	10	18	9	29	0.00	
6	89	72	54	22	18	10	28	13	7	29.68	29.59	29.52	10	10	10	23	11	34	0.00	
7	86	72	57	32	20	12	26	14	8	29.58	29.50	29.39	20	10	7	24	12	37	0.00	
8	75	64	52	30	17	5	40	18	8	29.76	29.62	29.47	10	9	7	18	10	23	0.00	
9	81	62	43	21	14	6	30	17	8	29.83	29.74	29.63	10	10	10	18	7	28	0.00	
10	84	68	53	27	20	5	37	18	9	29.86	29.79	29.73	15	10	7	17	9	-	0.00	
11	91	70	48	25	17	11	29	14	7	29.88	29.77	29.67	15	9	7	16	7	28	0.00	
12	91	77	63	20	15	7	16	9	6	29.78	29.70	29.60	15	10	10	21	10	28	0.00	
13	86	69	52	48	27	8	47	20	10	29.85	29.71	29.62	10	10	10	18	9	25	0.00	
14	88	72	57	29	19	4	32	15	7	29.62	29.56	29.49	10	9	7	18	7	21	0.00	
15	90	72	55	21	15	7	19	10	7	29.70	29.60	29.52	20	11	10	18	10	26	0.00	
16	89	72	55	46	24	9	48	20	8	29.90	29.64	29.55	15	10	2	23	9	37	0.00	Fog
17	62	52	43	45	40	37	89	74	53	30.22	30.04	29.74	20	8	1	23	18	32	0.30	Fog , Rain
18	73	56	39	40	36	32	93	52	22	30.20	30.09	29.98	20	11	10	10	6	-	0.00	
19	86	67	48	39	29	22	54	29	11	30.03	29.95	29.84	10	10	10	17	9	25	0.00	
20	93	73	53	32	28	22	43	21	9	29.89	29.80	29.67	20	11	10	15	11	-	0.00	
21	97	76	55	37	31	24	40	20	9	29.73	29.65	29.55	20	10	7	14	10	-	0.00	
22	93	78	63	37	28	20	32	17	9	29.63	29.58	29.55	20	11	7	16	9	24	0.63	
23	82	68	55	52	40	21	59	33	17	29.84	29.74	29.59	20	11	7	18	9	-	0.00	
24	91	78	64	60	48	35	71	41	15	29.98	29.79	29.68	20	15	5	21	7	34	0.00	

1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
25	79	70	59	61	57	55	90	69	47	30.14	29.95	29.84	20	12	7	17	8	28	0.00	Rain , Thunderstorm
26	77	67	57	58	54	51	93	70	45	30.13	29.93	29.72	20	10	7	14	8	21	0.02	Rain , Thunderstorm
27	72	64	55	52	44	37	83	55	29	30.12	30.00	29.91	20	14	10	12	8	-	0.10	
28	81	67	53	47	43	40	69	42	24	29.99	29.90	29.78	20	12	10	17	7	-	0.00	
29	78	66	55	58	53	48	90	66	36	30.10	29.93	29.83	15	10	7	25	7	30	0.00	Rain , Thunderstorm
30	77	66	55	58	54	50	96	72	42	30.07	29.97	29.85	20	12	1	25	9	28	0.40	Fog , Rain , Thunderstorm
31	69	64	59	59	57	54	96	83	61	30.01	29.88	29.79	20	11	4	14	6	-	0.20	Fog , Rain , Thunderstorm
1986	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Jun	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	77	66	54	59	54	50	93	70	45	29.92	29.80	29.75	20	13	10	14	6	-	0.10	Rain , Thunderstorm
2	77	68	60	59	57	53	90	73	43	30.05	29.87	29.81	20	11	7	13	7	-	0.00	
3	79	70	60	60	58	50	96	72	36	30.06	29.88	29.76	10	5	0	10	6	-	0.00	Fog
4	89	76	63	62	57	51	90	59	30	29.83	29.73	29.64	20	12	10	14	7	-	0.01	Rain , Thunderstorm
5	87	74	61	62	57	52	90	58	31	29.82	29.75	29.67	10	9	7	12	6	-	0.00	
6	95	80	64	58	51	44	75	40	17	29.76	29.69	29.62	10	10	7	12	7	-	0.00	
7	98	82	66	57	50	42	61	37	15	29.88	29.67	29.62	20	10	7	16	9	-	0.00	
8	86	76	64	63	59	51	78	59	40	29.93	29.75	29.60	15	10	7	23	11	34	0.20	Rain , Thunderstorm
9	90	76	61	62	51	27	93	56	11	29.90	29.71	29.58	15	9	7	14	10	23	0.00	Rain , Thunderstorm
10	89	74	59	46	37	29	51	27	12	29.89	29.80	29.68	10	10	10	9	7	-	0.00	
11	82	70	57	52	46	43	62	41	25	30.09	30.03	29.95	10	10	10	17	10	-	0.00	
12	91	76	60	56	48	35	72	41	14	30.01	29.95	29.86	15	10	10	13	6	-	0.00	
13	91	76	62	59	48	39	72	39	17	29.99	29.92	29.85	20	13	10	14	9	20	0.00	
14	93	80	66	61	49	34	76	38	12	29.93	29.84	29.74	20	12	10	13	9	-	0.00	
15	98	81	64	62	49	40	68	37	17	29.82	29.74	29.66	20	11	10	14	10	-	0.00	
16	100	83	66	58	47	36	68	34	12	30.09	29.78	29.70	10	9	4	17	9	28	0.00	
17	91	78	66	53	49	42	61	38	19	30.01	29.94	29.88	20	12	7	15	9	-	0.00	
18	91	78	63	63	57	51	87	52	27	30.17	29.94	29.78	20	12	5	17	6	29	0.30	Rain , Thunderstorm
19	87	76	64	66	62	58	90	69	37	29.99	29.84	29.77	20	13	7	18	9	30	0.10	Rain , Thunderstorm
20	88	77	66	64	60	50	87	60	33	29.91	29.86	29.81	20	12	10	18	8	28	0.00	
21	90	77	64	64	60	53	87	58	28	29.98	29.89	29.81	20	14	10	14	7	-	0.00	
22	89	78	66	65	63	58	93	69	35	30.10	29.94	29.86	20	14	10	17	9	-	0.00	Rain , Thunderstorm
23	69	66	63	65	62	58	96	88	70	30.20	30.06	29.99	10	8	1	14	7	-	0.70	Fog , Rain
24	73	68	63	66	63	61	97	90	71	30.20	30.04	29.96	15	6	0	17	8	-	1.60	Fog , Rain , Thunderstorm

1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
25	78	71	64	66	64	63	97	86	62	30.11	29.97	29.88	20	8	0	16	8	-	1.80	Fog , Rain , Thunderstorm
26	81	72	64	65	63	60	96	76	54	30.09	29.94	29.88	20	11	5	15	7	-	0.04	Fog , Rain
27	87	76	64	69	64	59	93	69	39	30.04	29.98	29.94	10	9	7	12	4	-	0.00	
28	91	78	66	68	63	55	93	62	29	29.98	29.90	29.80	20	11	7	9	6	-	0.00	
29	93	80	68	69	65	62	90	63	37	30.03	29.80	29.71	15	11	10	10	5	-	0.00	
30	95	83	71	69	65	60	87	61	34	29.92	29.73	29.66	20	14	10	12	6	-	0.00	
1986	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
Jul	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	91	78	66	67	64	60	97	66	38	30.14	29.87	29.70	20	10	5	23	11	22	0.50	Fog , Rain , Thunderstorm
2	77	72	66	66	64	61	96	80	58	30.14	30.02	29.97	20	10	5	12	6	-	0.30	Fog , Rain , Thunderstorm
3	82	75	68	68	66	64	96	79	58	30.16	29.97	29.83	20	10	5	12	5	-	0.02	Fog , Rain , Thunderstorm
4	91	80	68	67	63	59	96	62	33	29.83	29.73	29.60	15	10	7	21	10	28	0.00	
5	91	80	70	66	63	58	81	57	32	29.98	29.75	29.68	20	12	7	17	6	-	0.00	
6	89	78	66	65	62	59	87	59	39	30.00	29.93	29.82	20	13	10	13	9	-	0.00	
7	89	79	69	66	62	55	84	60	32	30.06	30.00	29.94	20	14	10	14	8	-	0.00	
8	90	78	66	63	59	52	81	55	28	30.06	29.99	29.91	20	11	7	12	7	-	0.00	
9	87	76	66	61	59	53	76	57	36	30.10	29.94	29.85	20	14	7	17	7	28	0.08	Rain , Thunderstorm
10	91	80	68	64	60	55	87	56	29	29.93	29.80	29.71	20	10	7	13	7	-	0.10	Rain , Thunderstorm
11	95	80	66	63	58	49	84	50	21	29.76	29.71	29.64	10	9	7	14	6	-	0.00	
12	98	82	66	64	58	49	81	47	19	29.76	29.71	29.68	10	8	7	13	8	-	0.00	
13	91	78	66	64	60	54	87	54	27	29.95	29.84	29.77	10	9	7	17	11	-	0.00	
14	84	76	68	63	61	57	81	61	38	30.22	30.00	29.91	20	11	7	15	10	-	0.00	
15	88	76	64	60	58	54	73	53	37	30.00	29.94	29.86	20	12	7	17	11	-	0.00	
16	91	78	66	61	57	52	73	49	27	30.06	29.87	29.78	20	11	10	17	11	25	0.00	
17	90	77	64	59	57	53	78	49	29	30.16	29.94	29.87	15	12	10	18	7	21	0.00	Rain , Thunderstorm
18	91	78	64	60	57	52	81	50	27	30.21	29.99	29.94	15	10	7	14	8	-	0.00	
19	93	78	63	59	54	43	81	47	18	30.08	30.02	29.94	20	11	7	12	6	-	0.00	
20	91	78	64	58	55	51	78	46	26	30.09	30.00	29.88	20	11	10	14	8	-	0.00	
21	84	75	66	62	58	53	76	58	41	30.24	30.02	29.90	20	15	10	14	7	-	0.02	Rain
22	86	76	66	59	57	54	76	53	35	30.17	30.03	29.98	10	8	7	14	8	-	0.00	
23	90	77	64	64	58	51	93	54	28	30.21	30.02	29.92	20	10	7	16	7	-	0.10	Rain , Thunderstorm
24	93	78	64	57	54	49	68	43	22	30.03	29.96	29.89	10	10	10	12	7	-	0.00	
25	98	81	64	59	54	49	78	44	19	29.96	29.90	29.83	15	10	10	18	5	28	0.00	
26	99	82	66	59	51	42	68	38	14	29.93	29.84	29.77	15	12	7	12	6	-	0.00	
27	100	84	69	54	50	42	58	32	14	29.86	29.80	29.76	20	13	7	9	7	-	0.00	

1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
28	99	82	66	53	51	47	61	34	17	30.13	29.87	29.81	10	10	10	10	7	-	0.00	
29	99	82	66	51	47	42	56	31	15	29.95	29.88	29.82	20	11	10	12	7	-	0.00	
30	99	82	66	52	47	38	52	30	13	29.90	29.85	29.78	20	10	7	10	7	-	0.00	
31	97	82	66	54	47	36	56	32	12	29.93	29.88	29.83	15	10	10	14	7	-	0.00	
1986	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Aug	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	98	83	68	51	46	42	47	29	15	29.99	29.91	29.83	20	11	10	13	3	-	0.00	
2	97	84	71	57	51	40	49	33	21	30.25	29.94	29.85	15	12	7	25	9	32	0.00	Rain , Thunderstorm
3	88	76	64	64	60	55	90	60	32	30.30	30.07	29.94	20	10	7	17	11	-	0.10	Rain , Thunderstorm
4	90	77	64	64	61	57	93	63	33	30.27	30.01	29.85	20	11	7	26	9	34	0.10	Rain , Thunderstorm
5	93	80	66	64	59	48	87	56	21	30.20	29.89	29.78	10	10	5	9	7	-	0.00	Fog , Rain , Thunderstorm
6	95	82	69	61	57	53	73	45	26	29.85	29.81	29.75	20	11	7	13	6	-	0.04	
7	93	81	69	63	58	55	71	47	27	29.86	29.82	29.79	10	9	7	14	7	-	0.00	
8	90	79	68	61	59	56	76	55	34	30.10	29.86	29.79	20	11	7	17	7	-	0.00	
9	91	78	66	61	59	53	81	53	33	30.00	29.81	29.73	15	12	7	18	5	-	0.00	
10	89	78	66	61	58	54	81	55	31	30.00	29.93	29.83	20	13	7	10	7	-	0.00	
11	89	76	64	63	61	58	84	59	35	30.24	29.99	29.90	20	14	10	10	5	-	0.00	
12	91	78	66	64	60	57	81	54	31	29.99	29.90	29.79	20	12	10	12	7	-	0.00	
13	91	81	71	66	62	59	73	54	33	29.92	29.78	29.67	20	12	7	16	10	23	0.01	Rain , Thunderstorm
14	91	80	70	65	61	55	81	54	30	29.78	29.71	29.65	20	11	10	10	6	-	0.10	
15	91	81	71	66	62	57	84	56	32	30.01	29.78	29.67	20	12	10	17	7	-	0.00	Rain , Thunderstorm
16	96	81	66	66	61	49	90	56	21	29.85	29.79	29.73	10	9	7	13	5	-	0.00	
17	97	84	70	61	55	48	68	41	19	29.94	29.88	29.81	20	10	7	14	6	-	0.00	
18	97	82	66	57	52	49	59	37	20	30.06	29.99	29.92	20	14	7	12	5	-	0.00	
19	98	82	66	56	50	43	61	35	16	30.08	29.97	29.90	15	11	10	13	6	-	0.00	
20	102	84	66	51	44	34	49	27	10	29.97	29.90	29.82	20	12	10	8	6	-	0.00	
21	91	82	73	62	58	39	62	45	20	30.32	30.00	29.88	20	14	7	14	9	-	0.00	
22	88	77	66	67	63	60	90	66	39	30.21	29.96	29.85	20	10	7	21	9	32	0.50	Rain , Thunderstorm
23	81	74	66	66	61	55	93	69	41	30.02	29.97	29.91	10	8	3	22	8	-	0.10	Rain
24	84	74	64	64	61	55	96	71	37	30.00	29.93	29.86	10	6	2	18	5	-	0.00	Fog
25	84	72	61	63	59	54	97	68	37	30.13	29.95	29.84	20	9	3	14	7	-	0.00	Fog
26	88	76	64	66	62	57	93	70	35	30.18	29.95	29.83	20	9	1	17	9	-	0.90	Fog , Rain , Thunderstorm
27	79	72	66	66	64	61	93	79	54	30.24	30.06	29.98	20	8	2	16	10	-	0.40	Fog , Rain
28	68	66	63	64	61	59	97	89	81	30.25	30.13	30.08	10	5	2	14	9	-	0.20	Fog , Rain
29	78	71	64	65	63	61	96	82	60	30.22	30.02	29.87	15	7	3	14	8	-	0.03	Fog

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1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
30	84	74	64	66	64	62	97	75	51	30.10	29.91	29.79	20	10	2	17	11	-	0.10	Fog , Rain , Thunderstorm
31	88	77	64	66	63	53	100	70	38	30.04	29.86	29.74	20	10	1	16	11	23	0.10	Fog , Rain , Thunderstorm
1986	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Sep	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	84	74	63	65	62	58	97	71	46	30.06	29.88	29.76	20	11	7	20	7	-	0.60	Rain , Thunderstorm
2	81	70	60	65	62	57	97	78	55	30.07	29.89	29.78	20	9	3	15	9	-	1.60	Fog , Rain , Thunderstorm
3	80	72	63	65	62	59	93	75	54	29.95	29.89	29.85	20	9	7	12	8	-	0.00	
4	86	74	62	63	59	54	97	70	38	30.18	29.99	29.86	20	8	0	28	6	41	1.00	Fog , Rain , Thunderstorm
5	82	70	57	63	58	55	97	71	42	30.09	29.97	29.88	15	11	0	9	6	-	0.00	Fog
6	84	73	62	64	61	57	90	71	41	30.16	30.00	29.90	20	11	0	8	5	-	0.00	Fog , Rain , Thunderstorm
7	79	70	62	61	59	47	93	74	34	30.32	30.14	30.04	20	11	4	15	9	-	0.02	Fog , Rain
8	77	69	61	60	59	56	93	76	52	30.25	30.05	29.90	20	7	3	16	11	-	0.00	Fog
9	86	74	63	64	62	57	93	72	40	30.08	29.87	29.69	20	7	2	17	11	-	0.00	Fog , Rain , Thunderstorm
10	88	78	69	64	55	47	78	51	25	29.79	29.71	29.64	20	10	7	16	10	21	0.00	
11	81	70	59	49	44	38	60	40	22	30.06	29.96	29.80	15	10	7	12	8	-	0.00	
12	84	69	54	65	51	47	81	55	31	30.07	30.00	29.92	15	11	10	17	8	23	0.00	
13	81	71	61	64	59	53	87	73	56	30.19	30.02	29.95	20	11	10	18	6	30	0.04	Rain , Thunderstorm
14	82	72	63	64	62	60	97	75	49	30.04	29.97	29.88	15	9	7	12	6	-	0.00	
15	87	73	59	64	60	51	97	70	29	30.12	29.96	29.86	20	10	3	13	5	-	0.00	Fog
16	84	74	63	63	60	53	93	68	43	30.04	29.93	29.85	15	11	7	14	10	-	0.00	Rain , Thunderstorm
17	91	75	59	60	54	45	93	57	22	30.08	29.88	29.77	20	11	7	10	6	-	0.00	
18	91	76	61	62	54	45	84	51	20	29.95	29.83	29.74	20	12	10	21	9	25	0.00	Rain , Thunderstorm
19	93	78	64	65	59	50	97	60	23	30.07	29.86	29.78	15	7	1	16	12	23	0.00	Fog
20	90	76	63	62	59	54	90	61	30	29.95	29.88	29.82	15	10	10	17	10	-	0.00	
21	89	76	63	64	61	54	93	66	30	30.14	29.93	29.82	20	10	3	14	8	-	0.00	Fog
22	84	74	64	66	64	60	93	74	47	30.08	29.89	29.80	20	10	5	10	8	-	0.10	Fog , Rain , Thunderstorm
23	82	72	62	66	63	58	93	81	49	29.98	29.80	29.70	20	9	4	41	8	-	0.30	Fog , Rain , Thunderstorm
24	79	67	55	59	45	20	96	57	11	29.74	29.66	29.60	20	10	6	28	11	38	0.00	Fog , Rain
25	82	67	52	49	39	27	67	42	14	29.82	29.77	29.71	20	12	10	18	9	25	0.00	
26	84	69	54	48	41	35	72	43	18	29.91	29.84	29.77	20	11	7	12	7	-	0.00	
27	86	68	50	49	44	39	80	47	20	30.05	29.89	29.80	15	10	10	14	7	23	0.00	
28	84	70	57	62	53	44	93	61	25	30.02	29.81	29.68	15	11	10	23	8	-	0.00	
29	84	72	60	65	51	33	97	56	18	29.99	29.79	29.66	10	4	1	18	9	25	0.10	Fog , Rain , Thunderstorm

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1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
30	81	64	48	49	41	34	68	43	21	29.91	29.81	29.71	10	9	7	12	7	-	0.00	
1986	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Oct	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	87	68	48	40	36	25	71	37	10	29.83	29.75	29.64	20	11	7	18	7	24	0.00	
2	72	68	63	66	61	45	93	84	45	29.79	29.64	29.57	20	14	10	9	7	-	0.07	Rain
3	82	70	57	60	50	43	97	61	25	29.88	29.74	29.64	20	11	7	21	6	29	0.00	
4	75	64	53	52	42	37	75	48	28	30.08	30.00	29.89	20	12	10	12	8	-	0.00	
5	62	58	55	58	56	51	97	91	75	30.28	30.10	29.96	10	4	1	12	7	-	0.10	Fog , Rain
6	60	56	51	54	52	50	97	87	72	30.34	30.22	30.16	20	6	1	53	8	-	0.10	Fog , Rain
7	73	62	50	55	52	50	100	75	46	30.21	30.07	29.92	15	6	0	12	5	-	0.00	Fog
8	82	64	46	54	49	41	100	68	26	30.11	29.96	29.86	10	5	0	8	5	-	0.00	Fog
9	73	63	53	56	51	46	93	67	45	30.26	30.09	29.93	20	11	3	16	8	-	0.20	Fog , Rain , Thunderstorm
10	68	62	57	61	58	53	97	89	70	30.18	29.92	29.72	15	6	0	23	9	34	2.90	Fog , Rain , Thunderstorm
11	64	54	44	53	45	33	100	78	60	30.10	29.86	29.70	20	6	0	17	8	25	0.00	Fog , Rain , Thunderstorm
12	43	40	37	33	31	29	76	72	65	30.26	30.19	30.13	10	7	3	12	9	-	0.00	Fog
13	66	52	37	37	34	26	89	59	22	30.22	30.11	29.98	10	8	7	14	7	-	0.00	
14	72	54	36	40	35	29	86	56	20	30.18	30.11	30.05	15	10	10	9	4	-	0.00	
15	71	55	39	43	38	36	89	59	29	30.30	30.22	30.14	15	9	7	12	5	-	0.00	
16	68	56	45	46	41	37	83	61	32	30.28	30.19	30.11	20	10	7	9	3	-	0.00	
17	75	60	44	52	46	41	90	68	34	30.11	30.04	29.93	20	12	10	12	6	-	0.18	Rain , Thunderstorm
18	79	62	46	54	49	45	100	73	30	30.16	30.02	29.91	15	8	0	16	7	-	0.00	Fog
19	63	60	57	56	54	52	96	82	67	30.23	30.10	30.01	15	6	1	14	9	-	0.00	Fog , Rain , Thunderstorm
20	61	58	55	57	55	53	97	90	81	30.20	30.08	30.00	10	6	1	15	11	-	0.07	Fog , Rain
21	77	66	53	57	53	37	100	77	24	30.08	29.94	29.75	20	6	0	15	10	23	0.87	Fog , Rain , Thunderstorm
22	69	56	44	49	42	34	90	63	29	30.01	29.91	29.85	15	8	1	8	6	-	0.00	Fog
23	66	56	46	53	47	40	86	71	54	30.22	30.03	29.90	20	10	7	13	7	-	0.00	Rain , Thunderstorm
24	68	60	51	52	50	48	93	77	50	30.24	30.09	29.99	20	12	7	8	6	-	0.00	
25	69	58	46	50	46	43	97	71	40	30.15	30.05	29.99	20	13	6	9	6	-	0.00	Fog
26	71	58	45	45	42	37	93	65	31	30.17	30.10	30.05	15	9	7	8	6	-	0.00	
27	75	60	44	43	38	30	85	55	19	30.17	30.08	30.00	10	10	10	9	6	-	0.00	
28	82	60	39	41	35	25	86	50	12	30.18	30.08	29.99	10	10	10	14	5	-	0.00	
29	64	55	46	48	44	39	83	65	48	30.32	30.24	30.18	15	11	7	9	7	-	0.00	
30	75	59	43	47	44	40	93	65	32	30.18	30.05	29.91	15	12	7	13	6	-	0.00	
31	79	64	48	50	46	39	100	64	24	30.07	29.93	29.82	20	8	0	14	8	-	0.00	Fog
1986	**Temp. (°F)**			**Dew Point (°F)**			**Humidity (%)**			**Sea Level Press. (in)**			**Visibility (mi)**			**Wind (mph)**			**Precip. (in)**	**Events**
Nov	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	

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1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
1	68	56	42	62	49	37	97	77	55	30.33	30.12	29.96	15	8	4	17	7	23	0.00	Fog
2	41	39	37	40	38	36	100	95	89	30.44	30.35	30.25	10	3	1	17	13	-	0.51	Fog , Rain
3	46	42	39	46	42	39	100	95	89	30.25	30.06	29.93	15	5	1	14	8	-	0.98	Fog , Rain , Thunderstorm
4	50	44	36	41	37	33	93	81	61	30.15	30.10	30.06	15	8	5	21	12	-	0.14	Fog , Rain
5	62	46	30	40	35	30	96	72	41	30.19	30.09	29.97	15	8	1	7	4	-	0.00	Fog
6	72	54	35	43	36	30	93	64	21	29.96	29.79	29.65	10	10	7	14	6	-	0.10	
7	62	52	41	40	32	21	74	48	21	29.95	29.77	29.63	20	12	10	25	13	38	0.00	
8	64	49	34	31	27	22	73	50	21	30.20	30.05	29.96	20	11	10	12	6	-	0.00	
9	55	44	32	30	24	14	75	51	19	30.40	30.26	30.15	20	13	10	12	6	-	0.00	
10	60	45	28	39	32	19	89	67	46	30.40	30.13	30.01	20	11	10	14	6	-	0.00	
11	50	38	26	34	26	17	92	67	50	30.41	30.29	30.14	10	10	10	12	8	-	0.00	
12	41	34	26	33	25	18	96	77	57	30.71	30.39	30.09	10	8	0	23	8	36	0.00	Fog
13	28	26	24	24	22	19	91	84	75	30.72	30.59	30.34	10	5	1	12	7	-	0.13	Fog , Rain , Snow
14	53	40	27	37	30	24	96	82	55	30.37	30.22	30.09	20	7	0	8	7	-	0.00	Fog
15	59	48	36	44	39	34	93	77	53	30.14	30.06	29.99	20	11	3	7	4	-	0.00	Fog
16	71	55	39	45	40	35	97	66	27	30.01	29.96	29.91	20	12	7	9	4	-	0.00	
17	75	60	45	42	39	33	80	51	22	29.94	29.86	29.78	20	10	7	12	6	-	0.00	
18	63	56	50	43	39	34	74	55	34	30.11	29.99	29.84	10	10	10	14	8	-	0.00	
19	73	58	43	48	41	36	93	60	26	29.91	29.82	29.67	15	11	5	14	9	-	0.06	Fog , Rain
20	61	50	39	38	33	26	80	54	31	30.25	30.15	29.92	15	12	7	14	8	24	0.00	
21	66	50	33	42	36	30	89	67	36	30.14	29.99	29.83	20	10	7	12	6	-	0.00	
22	73	54	36	43	35	24	93	58	17	29.86	29.79	29.69	20	11	10	16	7	-	0.00	
23	48	40	30	37	31	25	93	77	57	30.33	30.17	29.83	15	9	2	20	14	23	0.10	Fog , Rain , Snow
24	52	38	25	26	23	18	89	63	28	30.33	30.20	30.04	15	9	7	8	4	-	0.00	
25	61	41	21	34	27	19	91	64	33	30.11	29.95	29.80	20	10	7	16	5	23	0.00	
26	48	39	30	27	19	14	69	48	27	30.28	30.21	30.12	20	11	7	12	9	-	0.00	
27	61	44	26	31	26	20	82	61	30	30.32	30.25	30.17	15	11	7	8	4	-	0.00	
28	66	46	27	32	26	19	85	56	18	30.27	30.18	30.09	20	11	7	8	5	-	0.00	
29	69	48	28	32	27	21	85	55	17	30.15	30.00	29.82	20	10	7	13	6	-	0.00	
30	62	48	34	28	21	11	79	39	15	29.99	29.82	29.72	20	9	7	23	10	31	0.00	
1986	**Temp.** (°F)			**Dew Point** (°F)			**Humidity** (%)			**Sea Level Press.** (in)			**Visibility** (mi)			**Wind** (mph)			**Precip.** (in)	**Events**
Dec	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**low**	**high**	**avg**	**high**	**sum**	
1	57	42	27	28	22	17	85	53	22	30.20	30.09	29.99	20	10	7	16	5	-	0.00	
2	66	44	23	25	20	16	85	48	16	30.17	30.10	30.04	10	10	10	9	4	-	0.00	
3	55	42	28	28	26	22	81	58	30	30.23	30.15	30.06	20	11	10	9	6	-	0.00	
4	42	34	27	34	29	23	85	77	70	30.40	30.32	30.15	15	10	5	12	6	-	0.00	Fog
5	52	46	39	41	37	34	100	78	59	30.37	30.23	30.10	10	6	0	13	5	-	0.00	Fog
6	52	48	44	48	45	43	100	89	74	30.11	29.99	29.87	15	4	0	20	11	-	0.00	Fog , Rain

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1986	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Press. (in)			Visibility (mi)			Wind (mph)			Precip. (in)	Events
7	64	52	39	45	42	38	100	74	41	30.04	29.89	29.80	20	7	0	16	6	-	0.00	Fog
8	57	47	36	40	36	25	96	78	28	29.99	29.91	29.78	20	7	0	13	8	-	0.10	Fog , Rain
9	37	35	33	35	33	31	96	89	79	30.20	30.09	29.99	10	4	1	13	8	-	0.00	Fog
10	32	28	25	31	24	21	96	87	72	30.34	30.24	30.18	15	4	1	14	9	-	0.10	Fog , Rain , Snow
11	41	32	24	27	23	19	96	75	53	30.30	30.18	30.10	10	8	5	9	5	-	0.00	Fog
12	50	36	21	31	23	17	96	67	33	30.38	30.30	30.24	15	8	6	12	3	-	0.00	
13	53	38	24	32	28	21	92	73	41	30.31	30.23	30.14	20	10	7	8	4	-	0.00	
14	57	42	26	35	31	23	96	76	37	30.20	30.14	30.04	20	9	0	8	5	-	0.00	Fog
15	62	44	26	33	29	22	86	66	31	30.21	30.15	30.09	20	12	7	8	4	-	0.00	
16	48	42	35	46	38	31	100	86	68	30.21	30.13	30.08	20	9	3	10	6	-	0.10	Fog , Rain
17	45	39	33	43	38	32	100	96	89	30.25	30.14	30.04	10	3	0	16	7	-	0.20	Fog , Rain , Snow
18	39	36	33	32	31	30	96	86	68	30.30	30.22	30.15	20	9	2	12	8	-	0.10	Fog , Snow
19	52	38	24	38	29	23	100	82	48	30.14	30.07	29.99	20	7	0	9	4	-	0.00	Fog
20	54	41	28	36	31	25	92	72	43	30.15	30.08	30.02	20	12	7	8	5	-	0.00	
21	43	40	37	38	37	36	97	90	76	30.23	30.18	30.13	10	6	1	14	7	-	0.20	Fog , Rain
22	37	35	33	35	33	32	96	95	92	30.31	30.25	30.21	10	3	0	12	9	-	0.40	Fog , Rain , Snow
23	46	37	28	38	34	28	100	94	73	30.20	30.05	29.93	10	2	0	8	3	-	0.00	Fog
24	48	38	28	35	31	27	100	78	43	30.02	29.97	29.93	10	4	0	16	5	-	0.00	Fog
25	48	39	30	33	31	28	92	71	50	30.15	30.07	30.01	20	11	10	8	5	-	0.00	
26	52	40	27	31	27	24	92	70	35	30.26	30.18	30.11	15	9	7	9	4	-	0.00	
27	51	38	26	31	28	22	89	73	41	30.22	30.15	30.09	20	11	7	12	6	-	0.00	
28	50	40	30	37	32	26	92	80	57	30.23	30.15	30.08	20	12	10	8	4	-	0.00	
29	55	40	26	32	25	21	96	63	27	30.37	30.29	30.22	20	11	6	12	6	-	0.00	Fog
30	57	39	21	26	23	17	84	59	22	30.29	30.13	30.00	15	11	7	12	6	-	0.00	
31	51	38	26	23	19	14	78	52	23	30.17	30.09	29.97	15	10	10	17	6	-	0.00	

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Chapter 2 Estimating Runoff

SCS runoff curve number method

The SCS Runoff Curve Number (CN) method is described in detail in NEH-4 (SCS 1985). The SCS runoff equation is

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \qquad \text{[eq. 2-1]}$$

where

Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins (in) and
I_a = initial abstraction (in)

Initial abstraction (I_a) is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. I_a is highly variable but generally is correlated with soil and cover parameters. Through studies of many small agricultural watersheds, I_a was found to be approximated by the following empirical equation:

$$I_a = 0.2S \qquad \text{[eq. 2-2]}$$

By removing I_a as an independent parameter, this approximation allows use of a combination of S and P to produce a unique runoff amount. Substituting equation 2-2 into equation 2-1 gives:

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad \text{[eq. 2-3]}$$

S is related to the soil and cover conditions of the watershed through the CN. CN has a range of 0 to 100, and S is related to CN by:

$$S = \frac{1000}{CN} - 10 \qquad \text{[eq. 2-4]}$$

Figure 2-1 and table 2-1 solve equations 2-3 and 2-4 for a range of CN's and rainfall.

Factors considered in determining runoff curve numbers

The major factors that determine CN are the hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition (ARC). Another factor considered is whether impervious areas outlet directly to the drainage system (connected) or whether the flow spreads over pervious areas before entering the drainage system (unconnected). Figure 2-2 is provided to aid in selecting the appropriate figure or table for determining curve numbers.

CN's in table 2-2 (*a* to *d*) represent average antecedent runoff condition for urban, cultivated agricultural, other agricultural, and arid and semiarid rangeland uses. Table 2-2 assumes impervious areas are directly connected. The following sections explain how to determine CN's and how to modify them for urban conditions.

Hydrologic soil groups

Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. Appendix A defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of interest may be identified from a soil survey report, which can be obtained from local SCS offices or soil and water conservation district offices.

Most urban areas are only partially covered by impervious surfaces: the soil remains an important factor in runoff estimates. Urbanization has a greater effect on runoff in watersheds with soils having high infiltration rates (sands and gravels) than in watersheds predominantly of silts and clays, which generally have low infiltration rates.

Any disturbance of a soil profile can significantly change its infiltration characteristics. With urbanization, native soil profiles may be mixed or removed or fill material from other areas may be introduced. Therefore, a method based on soil texture is given in appendix A for determining the HSG classification for disturbed soils.

Chapter 3 Time of Concentration and Travel Time

Travel time (T_t) is the time it takes water to travel from one location to another in a watershed. T_t is a component of time of concentration (T_c), which is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. T_c is computed by summing all the travel times for consecutive components of the drainage conveyance system.

T_c influences the shape and peak of the runoff hydrograph. Urbanization usually decreases T_c, thereby increasing the peak discharge. But T_c can be increased as a result of (a) ponding behind small or inadequate drainage systems, including storm drain inlets and road culverts, or (b) reduction of land slope through grading.

Factors affecting time of concentration and travel time

Surface roughness

One of the most significant effects of urban development on flow velocity is less retardance to flow. That is, undeveloped areas with very slow and shallow overland flow through vegetation become modified by urban development: the flow is then delivered to streets, gutters, and storm sewers that transport runoff downstream more rapidly. Travel time through the watershed is generally decreased.

Channel shape and flow patterns

In small non-urban watersheds, much of the travel time results from overland flow in upstream areas. Typically, urbanization reduces overland flow lengths by conveying storm runoff into a channel as soon as possible. Since channel designs have efficient hydraulic characteristics, runoff flow velocity increases and travel time decreases.

Slope

Slopes may be increased or decreased by urbanization, depending on the extent of site grading or the extent to which storm sewers and street ditches are used in the design of the water management system. Slope will tend to increase when channels are straightened and decrease when overland flow is directed through storm sewers, street gutters, and diversions.

Computation of travel time and time of concentration

Water moves through a watershed as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. The type that occurs is a function of the conveyance system and is best determined by field inspection.

Travel time (T_t) is the ratio of flow length to flow velocity:

$$T_t = \frac{L}{3600V} \qquad \text{[eq. 3-1]}$$

where:

T_t = travel time (hr)
L = flow length (ft)
V = average velocity (ft/s)
3600 = conversion factor from seconds to hours.

Time of concentration (T_c) is the sum of T_t values for the various consecutive flow segments:

$$T_c = T_{t_1} + T_{t_2} + \ldots T_{t_m} \qquad \text{[eq. 3-2]}$$

where:

T_c = time of concentration (hr)
m = number of flow segments

Day and Night Wind Drift and Evaporation Losses in Sprinkler Solid-Sets and Moving Laterals

by

Playán, E. [1], Salvador, R. [2], Faci, J. M. [2], Zapata, N. [2], Martínez-Cob, A. [1] and Sánchez, I. [2]

Abstract

Wind drift and evaporation losses (*WDEL*) represent a relevant water sink in sprinkler irrigation, particularly in areas with strong winds and high evaporative demand. The objectives of this paper include: 1) Characterize *WDEL* under day and night operation conditions for solid-set and moving lateral configurations; 2) Propose adequate predictive equations; and 3) Prospect the effect of sprinkler irrigation on the meteorological variables and on the estimates of reference evapotranspiration. A total of 89 catch can irrigation evaluations were performed in both irrigation systems and

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2

Table 5. *Selected predictive equations for WDEL. Equations are presented for solid-sets, moving laterals and both irrigation systems; and for day, night and both conditions. Quality indicators are supplied for each equation: R^2 (Determination Coefficient), AMRE (Average Magnitude of the Relative Error) and Pred[0.25] (Prediction level 25 %). Three dependent variables are used in the equations: Wind Speed at an elevation of 2 m (U, m s^{-1}), Relative Humidity (RH, %), and Air Temperature (T, °C).*

Irrigation System	Day or Night	Eq. #	WDEL =	R^2 (%)	SE (%)	AMRE (%)	Pred[0.25] (-)
Solid-Set	All	E15	$20.3 + 0.214\ U^2 - 2.29\ 10^{-3}\ RH^2$	0.80	3.1	0.31	62
		E14	$26.1 + 1.64\ U - 0.274\ RH$	0.79	3.2	0.31	59
		E5	$38.6 - 0.407\ RH$	0.67	3.9	0.37	49
		E23	$4.4 + 3.60\ U^{0.9}$	0.60	4.3	0.51	43
		E4	$5.2 + 2.90\ U$	0.60	4.3	0.51	43
	Day	E13	$20.7 + 0.185\ U^2 - 2.14\ 10^{-3}\ RH^2$	0.75	2.8	0.11	89
		E12	$24.1 + 1.41\ U - 0.216\ RH$	0.69	3.1	0.13	79
		E21	$12.3 + 0.552\ U^{1.6}$	0.59	3.5	0.17	79
		E1	$13.0 + 0.246\ U^2$	0.58	3.5	0.18	79
		E20	$10.5 + 1.89\ U$	0.57	3.5	0.17	74
	Night	E22	$3.2 + 1.84\ U^{1.7}$	0.55	3.2	0.43	56
		E2	$3.7 + 1.31\ U^2$	0.55	3.2	0.42	61
		E3	$29.9 - 0.300\ RH$	0.39	3.7	0.53	28
Moving Lateral	All	E18	$-2.1 + 1.91\ U + 0.231\ T$	0.74	1.8	0.33	58
		E7	$2.7 + 2.31\ U$	0.60	2.2	0.42	54
		E27	$2.4 + 2.70\ U^{0.9}$	0.60	2.2	0.42	56
	Day	E17	$7.0 + 1.65\ U - 1.16\ 10^{-3}\ RH^2$	0.51	1.8	0.17	81
		E16	$8.9 + 1.67\ U - 0.097\ RH$	0.50	1.8	0.17	81
		E25	$5.1 + 1.78\ U^{0.9}$	0.38	2.0	0.20	77
		E24	$5.4 + 1.48\ U$	0.38	2.0	0.20	77
	Night	E26	$3.1 + 0.00600\ U^{9.2}$	0.28	1.2	0.40	43
		E6	$239 / RH$	0.11	1.3	0.45	38
Both Irrigation Systems	All	E11	$3.1 + 2.95\ U$	0.58	3.7	0.49	51
	Day	E8	$8.6 + 0.337\ U^2$	0.51	3.8	0.28	62
		E28	$8.4 + 0.409\ U^{1.9}$	0.51	3.8	0.28	64
		E19	$5.7 + 2.29\ U$	0.51	3.8	0.29	56
	Night	E29	$3.2 + 0.761\ U^{2.6}$	0.59	2.5	0.48	46
		E9	$3.4 + 0.512\ U^3$	0.59	2.5	0.47	46
		E10	$10.3 - 8.97\ 10^{-4}\ RH^2$	0.12	3.7	0.70	36

Calculation Cover Sheet

Daniel B. Stephens & Associates, Inc.

Project Name Triassic Park Landfill Permit Renewal Project Number ES11.0141

Calculation Number ES11.0141-001 Discipline Hydrology No. of Sheets

PROJECT: Triassic Park Waste Disposal Facility Permit Renewal

SITE: Triassic Park Waste Disposal Facility, Roswell, NM

SUBJECT: Calculate surface water runoff to assess existing channel and culvert sizing.

SOURCES OF DATA:

A. National Oceanic and Atmospheric Association Precipitation Frequency Atlas 14, Volume 1, Version 5.

B. Part A and Part B Permit Application for the Triassic Park Waste Disposal Facility, Chaves County, New Mexico, Appendix F- Surface Water Control System Design and Drawing 25 (Sheet 1 of 2 and Sheet 2 of 2). October 2000.

SOURCES OF FORMULAE & REFERENCES:

1. USDA NRCS Urban Hydrology for Small Watersheds (TR55). June 1986.
2. Hydraulic Engineering, Roberson Cassidy, and Chaudhry, 1998.

[x] Preliminary Calculation [ ] Final Calculation Supersedes Calculation No.

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
0		KI	9/21/11	TA	9/27/11	JP	10/2/11

1.0 OBJECTIVE

The purpose of this calculation is to assess the stormwater conveyance system designed as part of the 2002 permit application for Triassic Park landfill. The design storm for the area has increased from the design storm used in the previous permit (4.3 inches)[B]. This calculation evaluates whether the previously designed channels and culverts can convey the increased runoff resulting from the increase in precipitation.

2.0 GIVEN

The 25-year, 24-hour design storm for the site is 4.39 inches.[A] In the 2002 permit application, the area, curve numbers, and time of concentration of the sub-watersheds associated with the site were determined[B] (Table 1).

Table 1. Characteristics of sub-watershed in Triassic Park storm water calculations

Site	Area (acres)	Curve Number	Time of Concentration (hrs)
Offsite east	377.8	71	0.709
East landfill	32.8	71	0.348
West landfill	77.8	71	0.595
East site	104.1	86	0.852
Very west side/road	4.4	86	0.563
Near evap pond	4.5	86	0.099
North site	15.6	86	0.330
Inside landfill W	2.3	94	0.026
Inside landfill E	6.1	94	0.071
West site	8.3	86	0.166
West site	8.2	71	0.561
West site	9.8	98	0.001
Pond inside landfill	6.6	94	0.046
Roadside ditch	27	71	0.258
Landfill waste	15.6	91	0.070

3.0 METHOD

This calculation utilizes the United States Department of Agriculture's Natural Resource Conservation Service's TR55 method[1]. Specific equations utilized are summarized below.

The runoff resulting from a precipitation event can be calculated using the curve number method:

$$Q_{depth} = \frac{(P - 0.2S)^2}{P + 0.8S} \qquad \text{Eq 1}$$

where

Q_{depth} = runoff (inches)
P = rainfall (inches)
S = potential maximum retention after runoff begins (inches)

In this equation, it is assumed that $S = I_a/0.2$, where I_a is the initial abstraction.

S is related to the soil and cover conditions of the watershed by the curve number (CN):

$$S = \frac{1000}{CN} - 10 \qquad \text{Eq 2}$$

The depth of runoff obtained with Equations 1 and 2 is converted to a volume by multiplying by the area of the watershed (A_{ws}):

$$Q_{runoff} = Q_{depth} * A_{ws} \qquad \text{Eq 3}$$

The 2002 permit application used proprietary software to determine peak discharge. Several industry standard methods, including the one outlined in TR55, were used by DBS&A to attempt to duplicate the peak discharge calculated in the 2002 permit application, without success. Therefore, as peak discharge is linearly related to runoff volume in most methods, the percent increase in runoff volume (Q_{runoff}) for each sub-watershed was applied to the peak discharge calculated in the 2002 permit application to generate the updated peak discharge.

The new peak discharge, along with the channel dimensions, armoring, and slopes from Drawing 25 and Appendix F in the 2002 permit application[B] were entered into Bentley's FlowMaster software. Calculations in FlowMaster for normal depth are based on Manning's equation[2]:

$$Q = \frac{C_m}{n} A R^{2/3} S_O^{1/2} \qquad \text{Eq 4}$$

where:

C_m = unit conversion coefficient, 1.486 for English units (unitless)
n = Manning's roughness coefficient (unitless)
A = cross-sectional area (ft^2)
R = hydraulic radius (ft.) = A/P
S_O = longitudinal slope (ft./ft.)
Q = channel discharge (ft^3/s)

The Manning's roughness coefficient is taken from the 2002 permit application for the material types indicated in the previous design.

4.0 SOLUTION

The runoff and peak discharge were calculated for the 25-year, 24-hour storm following the method presented above. The 25-year, 24 hour storm calculation for the area east of the site is presented in detail; results of calculations from all the sub-watersheds are summarized below.

The NOAA Precipitation Frequency Atlas for Roswell, NM gives the 25-year, 24-hour precipitation event as 4.39 inches[A]. The east ditch captures and routes offsite runoff from an area, A_{ws}, of 377.8 acres, with a curve number of 71. The potential maximum retention after runoff begins is calculated with Equation 2:

$$S = \frac{1000}{71} - 10 = 4.08$$

Equation 1 is used to calculate the runoff depth in inches from the design storm:

$$Q_{depth} = \frac{(4.39 - 0.2 * 4.08)^2}{4.39 + 0.8 * 4.08} = 1.67\,inches$$

The volume of runoff is determined with Equation 3:

$$Q_{runoff} = 1.67in * 377.8\ acres * \frac{1ft}{12in} = 52.49\ acre-ft$$

The runoff volume of 50.47 acre-ft was calculated in the 2002 permit application[B]. The percent increase in runoff is:

$$\frac{52.49 - 50.47}{50.47} = 4\%$$

The peak discharge calculated in the 2002 permit application was 272.8 cubic feet per second (cfs); therefore the peak discharge is now:

272.8 cfs * 1.04% = 283.7 cfs

The percent increase in runoff volume for each sub-watershed was applied to the previous peak discharge to generate the new peak discharge (Table 2). Only channelized runoff peak discharge results are shown.

Table 2. Peak discharge comparison between previous permit and new calculation

Basin	Conveyance Channel	Previous Peak Discharge (cfs)	New Peak Discharge (cfs)
Offsite east	East	272.8	283.7
East landfill	Ditch 1	34.2	35.6
West landfill	Ditch 2	62.2	64.7
East site	Ditch 3	126.6	130.3
Very west side/road	Ditch 4	6.8	7.0
Near evap pond	Ditch 5	217.3	223.1
North site	Ditch 6	30.1	30.9
Inside landfill W	Ditch 7	7.3	7.5
Inside landfill E	Ditch 8	19.3	19.8
Roadside ditch	Final Cover Road Side	31.5	32.7
Spillway	Spillway	358	372

The calculated peak discharge is then used to evaluate whether any modifications are required to the planned drainage network. The new peak discharge, along with the channel dimensions, armoring, and slopes from the previous permit[B] were entered into Bentley's FlowMaster software. Calculations in FlowMaster for normal depth are based on Equation 4.

The Manning's roughness coefficient, *n*, for each channel lining type was taken from the calculations in the 2002 permit application. In the original permit the flow depth was calculated with the minimum grade of the channel (which produces the largest depth of flow); the velocity was calculated with the maximum grade of the channel (giving the fastest velocities). The same technique was used to evaluate the existing channels with the new peak discharge: for the given discharge the depth was calculated with the minimum slope given on Drawing 25 Sheet 2 of 2[B] and the velocity was calculated with the maximum slope given on Drawing 25 Sheet 2 of 2[B]. The resultant depths and velocities calculated by FlowMaster are summarized in Tables 3 and 4.

Table 3. Flow depth associated with 25-yr, 24 hour storm, calculated with minimum channel slope.

Basin	Conveyance Channel	Peak Discharge (cfs)	Slope (ft/ft)	Flow Depth (ft)
Offsite east	East	283.7	0.005	2.6
East landfill	Ditch 1	35.6	0.005	2.1
West landfill	Ditch 2	64.7	0.005	2.6
East site	Ditch 3 - Part 1	130.3	0.005	2.2
	Ditch 3 - Part 2	130.3	0.011	2.1
Very west side/road	Ditch 4	7.0	0.005	1.1
Near evap pond	Ditch 5	223.1	0.005	2.3
North site	Ditch 6	30.9	0.005	2.0
Inside landfill W	Ditch 7 - Lower	7.5	0.010	0.9
	Ditch 7 - Upper	7.5	0.100	0.6
Inside landfill E	Ditch 8 - Lower	19.8	0.010	1.3
	Ditch 8 - Upper	19.8	0.100	0.9
Roadside ditch	Final Cover Road Side	32.7	0.005	1.8
Detention Basin Overflow	Spillway	372	0.005	2.7

Table 4. Velocity associated with 25-yr, 24 hour storm, calculated with maximum channel slope.

Conveyance Channel	Peak Discharge (cfs)	Slope (ft/ft)	Velocity (ft/sec)
East	283.7	0.008	5.6
Ditch 1	35.6	0.020	6.7
Ditch 2	64.7	0.010	6.1
Ditch 3 - Part 1	130.3	0.010	6.6
Ditch 3 - Part 2	130.3	0.020	6.7
Ditch 4	35.6	0.010	3.5
Ditch 5	64.7	0.010	7.3
Ditch 6	30.9	0.010	5.1
Ditch 7 - Lower	7.5	0.010	6.0
Ditch 7 - Upper	7.5	0.100	14.2
Ditch 8 - Lower	19.8	0.010	7.6
Ditch 8 - Upper	19.8	0.100	18.1
Final Cover Road Side	32.7	0.024	5.8
Spillway	372	0.005	5.0

Based on the new depths and velocities, the planned channels as designed in the 2002 permit application will convey the increase in runoff. All but one channel has freeboard of one foot; in one channel the freeboard is less than one foot but greater than 0.5 foot.

All new peak discharges are below the capacity of the culverts (Table 5) as designed in the 2002 permit application. Therefore, no modifications are required to the culverts.

Table 5. Culvert capacity and peak discharge comparison

Conveyance Channel	Culvert Capacity (cfs)	New Peak Discharge (cfs)
East	310	283.7
Ditch 1	100	35.6
Ditch 2	100	64.7
Ditch 3	150	130.3
Ditch 4	9	35.6
Ditch 5	270	64.7
Ditch 8	50	19.8

Triassic Park Triangular Channels - Shallow Slope Report

Label	Roughness Coefficient	Channel Slope (ft/ft)	Discharge (ft³/s)
Ditch 1	0.025	0.00500	34.20
Ditch 2	0.025	0.00500	64.70
Ditch 4	0.025	0.00500	7.00
Ditch 6	0.025	0.00500	30.90
Ditch 7 - Lower	0.013	0.01000	7.50
Ditch 7 - Upper	0.013	0.10000	7.50
Ditch 8 - Lower	0.013	0.01000	19.80
Ditch 8 - Upper	0.013	0.10000	19.80
Roadside	0.030	0.00500	32.70

	Normal Depth (ft)	Velocity (ft/s)	Left Side Slope (ft/ft (H:V))	Right Side Slope (ft/ft (H:V))
DITCH 1	2.07	3.99	2.00	2.00
2	2.63	4.68	2.00	2.00
4	1.14	2.68	2.00	2.00
6	1.99	3.89	2.00	2.00
7L	0.91	5.99	1.50	1.50
7U	0.59	14.22	1.50	1.50
8L	1.31	7.64	1.50	1.50
8U	0.85	18.13	1.50	1.50
ROAD	1.84	3.20	3.00	3.00

Triassic Park Triangular Channel - Steep Slope Report

Label	Roughness Coefficient	Channel Slope (ft/ft)	Discharge (ft^3/s)
Ditch 1	0.025	0.02000	34.20
Ditch 2	0.025	0.01000	64.70
Ditch 4	0.025	0.01000	7.00
Ditch 6	0.025	0.01000	30.90
Ditch 7 - Lower	0.013	0.01000	7.50
Ditch 7 - Upper	0.013	0.10000	7.50
Ditch 8 - Lower	0.013	0.01000	19.80
Ditch 8 - Upper	0.013	0.10000	19.80
Roadside	0.030	0.02400	32.70

Normal Depth (ft)		Velocity (ft/s)	Left Side Slope (ft/ft (H:V))	Right Side Slope (ft/ft (H:V))
1.60	DITCH 1	6.71	2.00	2.00
2.31	2	6.07	2.00	2.00
1.00	4	3.48	2.00	2.00
1.75	6	5.05	2.00	2.00
0.91	7L	5.99	1.50	1.50
0.59	7U	14.22	1.50	1.50
1.31	8L	7.64	1.50	1.50
0.85	8U	18.13	1.50	1.50
1.37	ROADSIDE	5.77	3.00	3.00

Triassic Park Trapezoidal Channels - Shallow Slope Report

Label	Roughness Coefficient	Channel Slope (ft/ft)	Discharge (ft^3/s)
Ditch 3 - Part 1	0.025	0.00500	130.30
Ditch 3 - Part 2	0.035	0.01100	130.30
Ditch 5	0.025	0.00500	223.10
East	0.034	0.00500	283.70
Spillway	0.034	0.00500	372.00

	Normal Depth (ft)	Velocity (ft/s)	Left Side Slope (ft/ft (H:V))	Right Side Slope (ft/ft (H:V))
DITCH 3	2.19	5.13	3.00	3.00
3	2.14	5.35	3.00	3.00
5	2.31	5.72	3.00	3.00
EAST	2.55	4.70	3.00	3.00
SPILL	2.68	4.96	3.00	3.00

Bottom Width (ft)
5.00
5.00
10.00
16.00
20.00

Triassic Park Trapezoidal Channels - Steep Slope Report

Label	Roughness Coefficient	Channel Slope (ft/ft)	Discharge (ft^3/s)
Ditch 3 - Part 1	0.025	0.01000	130.30
Ditch 3 - Part 2	0.035	0.02000	130.30
Ditch 5	0.025	0.01000	223.10
East	0.034	0.00800	283.70
Spillway	0.034	0.00500	372.00

Normal Depth (ft)	Velocity (ft/s)	Left Side Slope (ft/ft (H:V))	Right Side Slope (ft/ft (H:V))
1.86	DITCH 3 6.62	3.00	3.00
1.85	3 6.67	3.00	3.00
1.93	5 7.33	3.00	3.00
2.25	EAST 5.55	3.00	3.00
2.68	SPILL 4.96	3.00	3.00

Bottom Width (ft)
5.00
5.00
10.00
16.00
20.00

A

NOAA Atlas 14, Volume 1, Version 5
Location name: New Mexico, US*
Coordinates: 33.3531, -103.8753
Elevation: 4081 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.307 (0.265-0.357)	0.397 (0.343-0.461)	0.527 (0.454-0.612)	0.629 (0.540-0.728)	0.766 (0.654-0.884)	0.873 (0.743-1.01)	0.986 (0.834-1.14)	1.10 (0.927-1.27)	1.26 (1.05-1.45)	1.38 (1.14-1.59)
10-min	0.468 (0.403-0.544)	0.604 (0.522-0.702)	0.802 (0.691-0.932)	0.957 (0.822-1.11)	1.17 (0.996-1.34)	1.33 (1.13-1.53)	1.50 (1.27-1.73)	1.68 (1.41-1.93)	1.92 (1.60-2.21)	2.11 (1.74-2.42)
15-min	0.580 (0.500-0.674)	0.748 (0.647-0.870)	0.995 (0.857-1.16)	1.19 (1.02-1.37)	1.45 (1.23-1.67)	1.65 (1.40-1.90)	1.86 (1.57-2.14)	2.08 (1.75-2.39)	2.38 (1.98-2.73)	2.61 (2.16-3.01)
30-min	0.781 (0.673-0.908)	1.01 (0.871-1.17)	1.34 (1.15-1.56)	1.60 (1.37-1.85)	1.95 (1.66-2.25)	2.22 (1.89-2.56)	2.50 (2.12-2.89)	2.80 (2.36-3.22)	3.20 (2.67-3.68)	3.52 (2.91-4.05)
60-min	0.966 (0.833-1.12)	1.25 (1.08-1.45)	1.66 (1.43-1.93)	1.98 (1.70-2.29)	2.41 (2.06-2.78)	2.75 (2.33-3.17)	3.10 (2.62-3.57)	3.46 (2.92-3.99)	3.96 (3.30-4.56)	4.35 (3.60-5.01)
2-hr	1.10 (0.948-1.28)	1.42 (1.23-1.66)	1.91 (1.64-2.23)	2.29 (1.96-2.66)	2.83 (2.40-3.27)	3.25 (2.74-3.74)	3.70 (3.10-4.25)	4.16 (3.46-4.78)	4.80 (3.96-5.52)	5.32 (4.35-6.13)
3-hr	1.18 (1.02-1.36)	1.53 (1.32-1.76)	2.04 (1.76-2.34)	2.45 (2.11-2.80)	3.01 (2.58-3.45)	3.47 (2.95-3.96)	3.95 (3.33-4.50)	4.45 (3.73-5.07)	5.16 (4.27-5.88)	5.73 (4.70-6.53)
6-hr	1.39 (1.22-1.59)	1.78 (1.55-2.04)	2.36 (2.06-2.69)	2.82 (2.45-3.21)	3.47 (3.00-3.94)	4.00 (3.43-4.53)	4.55 (3.88-5.15)	5.14 (4.35-5.81)	5.97 (4.99-6.74)	6.64 (5.50-7.51)
12-hr	1.57 (1.36-1.80)	2.00 (1.75-2.29)	2.64 (2.29-3.02)	3.15 (2.73-3.60)	3.87 (3.33-4.40)	4.45 (3.81-5.05)	5.07 (4.31-5.74)	5.72 (4.83-6.48)	6.63 (5.54-7.52)	7.37 (6.09-8.37)
24-hr	1.78 (1.57-2.00)	2.27 (2.01-2.56)	2.99 (2.64-3.35)	3.57 (3.14-4.00)	4.39 (3.84-4.90)	5.05 (4.39-5.63)	5.75 (4.98-6.41)	6.50 (5.58-7.25)	7.55 (6.41-8.44)	8.40 (7.07-9.40)
2-day	1.96 (1.71-2.25)	2.51 (2.19-2.88)	3.33 (2.89-3.81)	4.00 (3.47-4.56)	4.97 (4.28-5.66)	5.76 (4.95-6.56)	6.63 (5.64-7.53)	7.56 (6.38-8.60)	8.90 (7.42-10.1)	10.0 (8.25-11.4)
3-day	2.12 (1.88-2.40)	2.71 (2.40-3.08)	3.62 (3.19-4.09)	4.36 (3.83-4.91)	5.43 (4.75-6.11)	6.31 (5.49-7.10)	7.26 (6.27-8.17)	8.29 (7.10-9.34)	9.77 (8.26-11.0)	11.0 (9.19-12.5)
4-day	2.28 (2.04-2.55)	2.92 (2.62-3.27)	3.90 (3.49-4.37)	4.71 (4.20-5.26)	5.89 (5.21-6.57)	6.85 (6.03-7.64)	7.90 (6.90-8.80)	9.02 (7.82-10.1)	10.6 (9.11-11.9)	12.0 (10.1-13.5)
7-day	2.57 (2.31-2.87)	3.30 (2.96-3.68)	4.39 (3.93-4.89)	5.27 (4.71-5.87)	6.52 (5.78-7.26)	7.53 (6.64-8.38)	8.62 (7.55-9.59)	9.76 (8.49-10.9)	11.4 (9.81-12.8)	12.7 (10.9-14.3)
10-day	2.87 (2.56-3.20)	3.68 (3.29-4.11)	4.88 (4.35-5.44)	5.84 (5.20-6.51)	7.20 (6.37-8.01)	8.30 (7.30-9.23)	9.46 (8.28-10.5)	10.7 (9.30-11.9)	12.4 (10.7-13.9)	13.9 (11.8-15.5)
20-day	3.65 (3.30-4.03)	4.65 (4.20-5.13)	6.03 (5.44-6.65)	7.10 (6.40-7.83)	8.56 (7.67-9.43)	9.69 (8.65-10.7)	10.8 (9.64-12.0)	12.0 (10.6-13.3)	13.7 (12.0-15.1)	14.9 (13.0-16.6)
30-day	4.25 (3.84-4.68)	5.40 (4.88-5.95)	6.93 (6.25-7.64)	8.10 (7.29-8.92)	9.64 (8.65-10.6)	10.8 (9.67-11.9)	12.0 (10.7-13.2)	13.2 (11.7-14.6)	14.8 (13.0-16.4)	16.0 (14.0-17.8)
45-day	5.04 (4.57-5.55)	6.41 (5.80-7.05)	8.20 (7.41-9.01)	9.57 (8.63-10.5)	11.4 (10.2-12.5)	12.8 (11.4-14.0)	14.2 (12.7-15.6)	15.6 (13.9-17.2)	17.5 (15.4-19.4)	19.0 (16.6-21.1)
60-day	5.81 (5.28-6.38)	7.36 (6.70-8.09)	9.32 (8.46-10.2)	10.8 (9.76-11.8)	12.7 (11.4-13.9)	14.1 (12.7-15.5)	15.5 (13.9-17.0)	16.9 (15.1-18.6)	18.6 (16.5-20.6)	20.0 (17.6-22.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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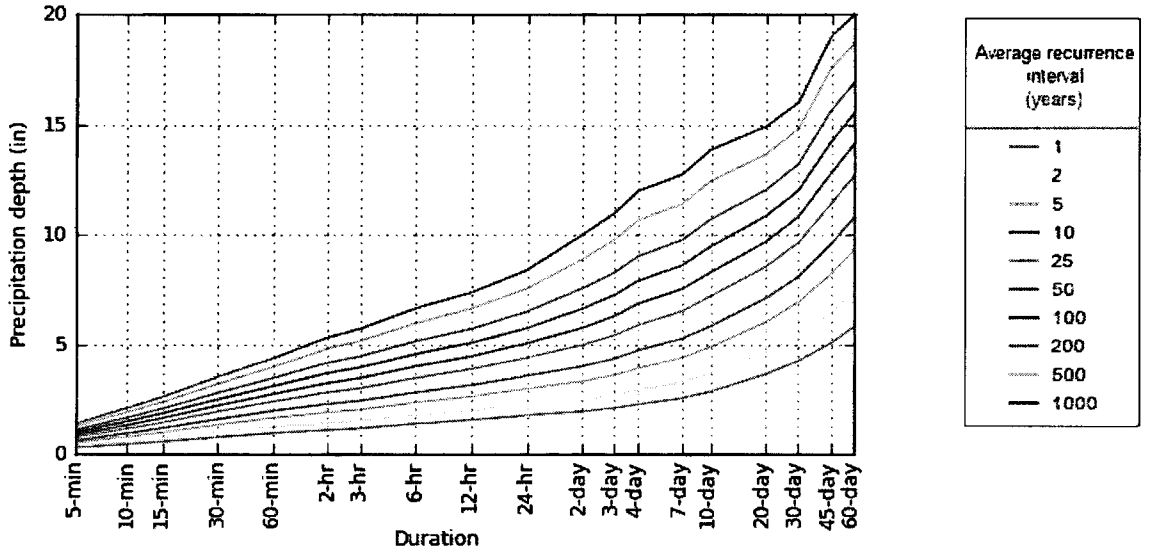
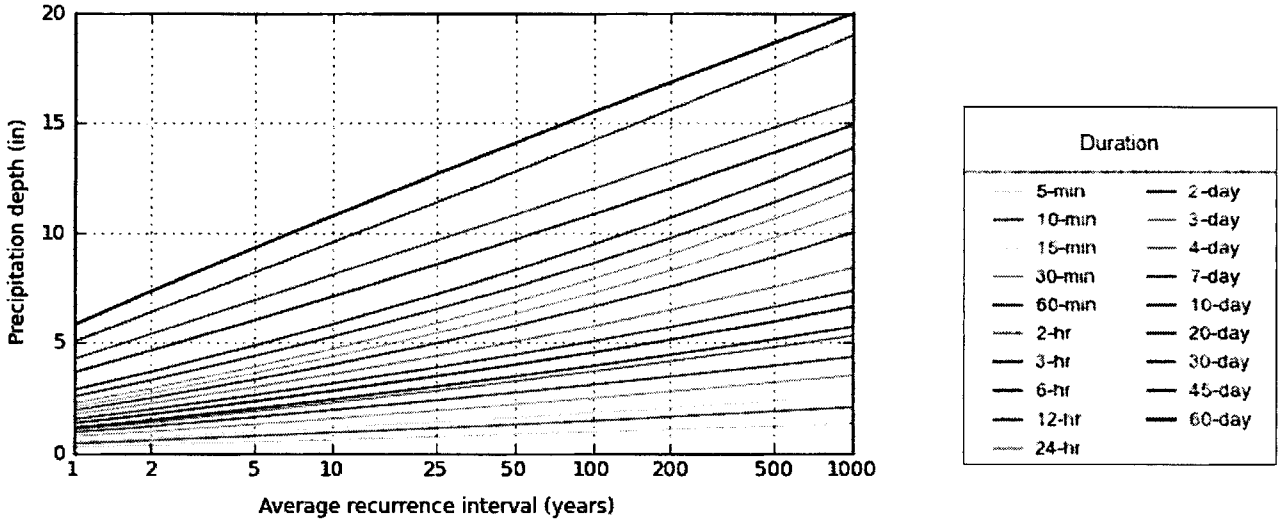
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Coordinates: 33.3531, -103.8753





NOAA/NWS/OHD/HDSC Created (GMT): Mon Sep 12 21:01:54 2011

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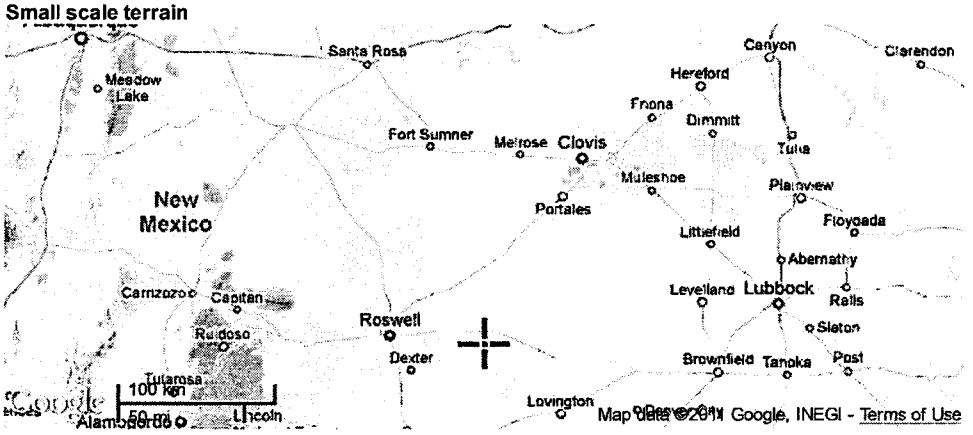
Maps & aerials

Small scale terrain



Civil Software Design -- SEDCAD+ Version 3.1
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Company Name: ACZ, INC.
Filename: J:\602\SEDCAD\LANDFILL User: TEL
Date: 11-08-1997 Time: 16:23:38
GANDY : LANDFILL PHASE 1 RUN-OFF
Storm: 4.30 inches, 25 year-24 hour, SCS Type II
Hydrograph Convolution Interval: 0.1 hr

B

SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE

-Hydrology-

JBS	SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base-Flow (cfs)	Runoff Volume (ac-ft)	Pea Disch (cf
111	1	15.60	91	M	0.070	0.000	0.000	0.0	4.30	47
		Type: Null			Label: PHASE 1 LANDFILL					
111	Structure	15.60							4.30	
111	Total IN/OUT	15.60							4.30	47

COPY

Civil Software Design -- SEDCAD+ Version 3.1
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Company Name: ACZ, INC.
Filename: J:\602\SEDCAD\ROADSIDE User: DGG
Date: 11-07-1997 Time: 15:14:00
GANDY TRIASSIC PARK LANDFILL : FINAL COVER ROADSIDE DITCH
Storm: 4.30 inches, 25 year-24 hour, SCS Type II
Hydrograph Convolution Interval: 0.1 hr

SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE

-Hydrology-

JBS	SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base-Flow (cfs)	Runoff Volume (ac-ft)	Pea Disch (cf
111	1	27.00	71	M	0.258	0.000	0.000	0.0	3.61	31
		Type: Null			Label: ROADSIDE DITCH					
111	Structure	27.00							3.61	
111	Total IN/OUT	27.00							3.61	31

COPY

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Company Name: ACZ, INC.
Filename: J:\602\SEDCAD\OFFSITE User: DGG
Date: 11-08-1997 Time: 13:07:58
GANDY TRIASSIC PARK LANDFILL : SITE PERIMETER DITCH
Storm: 4.30 inches, 25 year-24 hour, SCS Type II
Hydrograph Convolution Interval: 0.1 hr

SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE

-Hydrology-

JBS	SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base-Flow (cfs)	Runoff Volume (ac-ft)	Pe Disc (c
111	1	377.80	71	M	0.709	0.000	0.000	0.0	50.47	27
		Type: Null			Label: EAST DITCH					
111	Structure	377.80							50.47	
111	Total IN/OUT	377.80							50.47	27

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Company Name: ACZ, INC.
Filename: J:\602\SEDCAD\COLBASIN User: TEL
Date: 11-14-1997 Time: 13:22:41
TRIASSIC PARK LANDFILL: RAMP DITCHES & CLAENWATER COLLECTION POND
Storm: 4.30 inches, 25 year-24 hour, SCS Type II
Hydrograph Convolution Interval: 0.1 hr

SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE

-Hydrology-

JBS	SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base-Flow (cfs)	Runoff Volume (ac-ft)	Pe Disc (c
111	1	2.30	94	F	0.026	0.000	0.000	0.0	0.69	
		Type: Null			Label: DITCH 7					
111	Structure	2.30							0.69	
111	Total IN/OUT	2.30							0.69	
121	1	6.10	94	F	0.071	0.000	0.000	0.0	1.84	1
		Type: Null			Label: DITCH 8					
121	Structure	6.10							1.84	
1	Total IN/OUT	6.10							1.84	1
211	1	6.60	94	F	0.046	0.000	0.000	0.0	1.99	2
		Type: Null			Label: COLLECTION POND					
211	Structure	6.60							4.52	
211	Total IN/OUT	15.00							4.52	4
111 to 211 Routing						0.000	0.486			

COPY

Civil Software Design -- SEDCAD+ Version 3.1
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Company Name: ACZ, INC.
Filename: J:\602\SEDCAD\FACPOND User: TEL
Date: 11-13-1997 Time: 16:28:43
TRIASSIC PARK LANDFILL: FACILITIES DITCHES AND POND
Storm: 4.30 inches, 25 year-24 hour, SCS Type II
Hydrograph Convolution Interval: 0.1 hr

SUBWATERSHED/STRUCTURE INPUT/OUTPUT TABLE

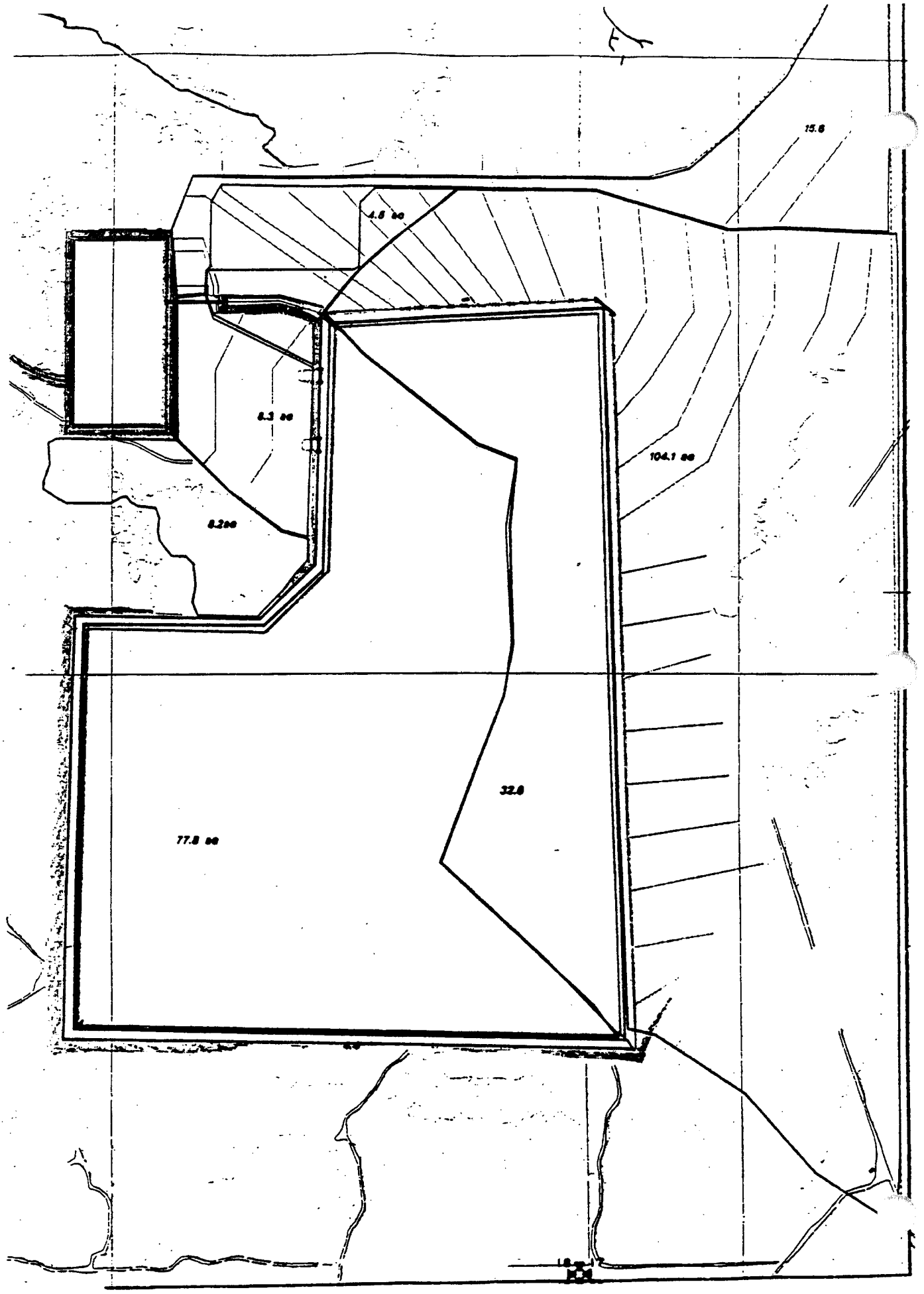
-Hydrology-

TBS	SWS	Area (ac)	CN	UHS	Tc (hrs)	K (hrs)	X	Base-Flow (cfs)	Runoff Volume (ac-ft)	Pe Disc (c
111	1	32.80	71	M	0.348	0.000	0.000	0.0	4.38	1
		Type: Null			Label: DITCH 1					
111	Structure	32.80							4.38	
111	Total IN/OUT	32.80							4.38	1
121	1	77.80	71	M	0.595	0.000	0.000	0.0	10.39	6
		Type: Null			Label: DITCH 2					
121	Structure	77.80							10.39	
21	Total IN/OUT	77.80							10.39	6
211	1	104.10	86	M	0.852	0.000	0.000	0.0	24.46	1
		Type: Null			Label: DITCH 3					
211	Structure	104.10							39.24	
211	Total IN/OUT	214.70							39.24	2
111 to 211 Routing						0.009	0.277			
221	1	4.40	86	M	0.563	0.000	0.000	0.0	1.03	
		Type: Null			Label: DITCH 4					
221	Structure	4.40							1.03	
221	Total IN/OUT	4.40							1.03	
311	1	4.50	86	M	0.099	0.000	0.000	0.0	1.06	
		Type: Null			Label: DITCH 5					
311	Structure	4.50							41.33	
311	Total IN/OUT	223.60							41.33	2
211 to 311 Routing						0.078	0.277			
321	1	15.60	86	M	0.330	0.000	0.000	0.0	3.67	
		Type: Null			Label: DITCH 6					
21	Structure	15.60							3.67	
321	Total IN/OUT	15.60							3.67	

COPY

411	1	8.30	86	M	0.166	0.000	0.000	0.0	1.95	1
411	2	8.20	71	M	0.561	0.000	0.000	0.0	1.10	
411	3	9.80	98	F	0.001	0.000	0.000	0.0	3.32	3
		Type: Null			Label: STORMWATER POND					
'11 Structure		26.30							51.36	
,11 Total IN/OUT		265.50							51.36	25
311 to 411 Routing						0.000	0.486			

COPY



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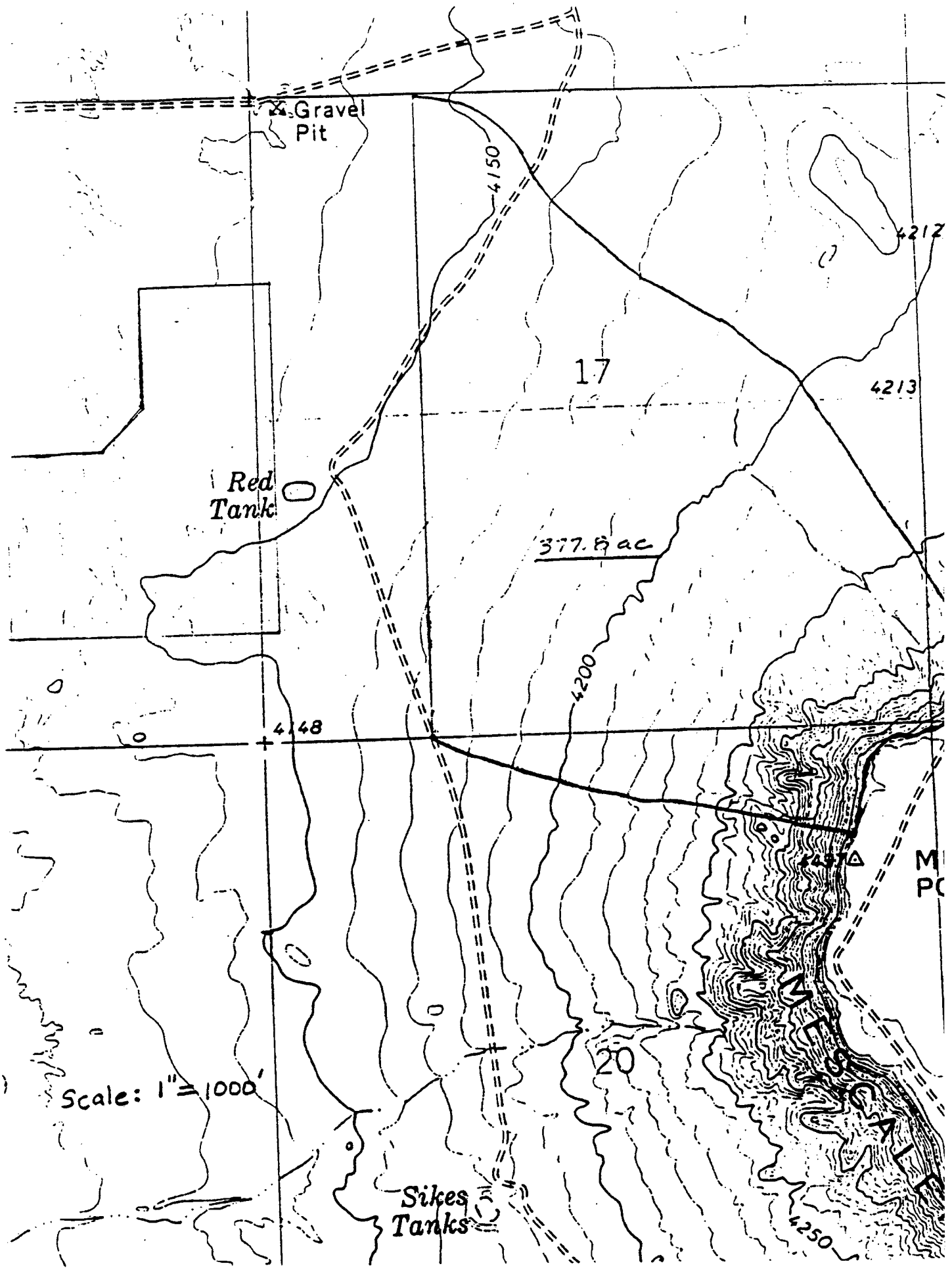

Gravel Pit
4150
4212
17
4213
Red Tank
377.8 ac
4200
4148
4437
20
Scale: 1" = 1000'
Sikes Tanks
4250

COPY

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 1

INPUT VALUES:

Shape	TRIANGULAR	
Discharge	34.20 cfs	
Slope	0.50 %	
Sideslopes	2.00:1 (L)	2.00:1 (R)
Manning's n	0.025	
Material	STIFF CLAY	
Freeboard	.3 ft	

RESULTS:

Depth	2.07 ft
with Freeboard	2.37 ft
Top Width	8.27 ft
with Freeboard	9.47 ft
Velocity	4.00 fps
Cross Sectional Area	8.55 sq ft
Hydraulic Radius	0.92 ft
Froude Number	0.69

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 2

INPUT VALUES:

Shape	TRIANGULAR	
Discharge	62.20 cfs	
Slope	0.50 %	
Sideslopes	2.00:1 (L)	2.00:1 (R)
Manning's n	0.025	
Material	STIFF CLAY	
Freeboard	.3 ft	

RESULTS:

Depth	2.59 ft
with Freeboard	2.89 ft
Top Width	10.35 ft
with Freeboard	11.55 ft
Velocity	4.65 fps
Cross Sectional Area	13.39 sq ft
Hydraulic Radius	1.16 ft
Froude Number	0.72

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 3

INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	40.00 cfs	
Slope	1.00 %	
Sideslopes	3.00:1 (L)	3.00:1 (R)
Bottom Width	5.00 ft	
Manning's n	0.025	
Material	STIFF CLAY	
Freeboard	.3 ft	

RESULTS:

Depth	1.03 ft
with Freeboard	1.33 ft
Top Width	11.18 ft
with Freeboard	12.98 ft
Velocity	4.80 fps
Cross Sectional Area	8.33 sq ft
Hydraulic Radius	0.72 ft
Froude Number	0.98

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 3

INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	126.60 cfs	
Slope	1.10 %	
Sideslopes	3.00:1 (L)	3.00:1 (R)
Bottom Width	5.00 ft	
Manning's n	0.035	
Material	6" RIPRAP	
Freeboard	.3 ft	

RESULTS:

Depth	2.10 ft
with Freeboard	2.40 ft
Top Width	17.62 ft
with Freeboard	19.42 ft
Velocity	5.32 fps
Cross Sectional Area	23.80 sq ft
Hydraulic Radius	1.30 ft
Froude Number	0.81

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 4

INPUT VALUES:

Shape	TRIANGULAR	
Discharge	6.80 cfs	
Slope	1.00 %	
Sideslopes	2.00:1 (L)	2.00:1 (R)
Manning's n	0.025	
Material	.STIFF CLAY	
Freeboard	.3 ft	

RESULTS:

Depth	0.99 ft
with Freeboard	1.29 ft
Top Width	3.96 ft
with Freeboard	5.16 ft
Velocity	3.46 fps
Cross Sectional Area	1.96 sq ft
Hydraulic Radius	0.44 ft
Froude Number	0.87

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 5

INPUT VALUES:

Shape	TRAPEZOIDAL	
Discharge	217.30 cfs	
Slope	0.50 %	
Sideslopes	3.00:1 (L)	3.00:1 (R)
Bottom Width	10.00 ft	
Manning's n	0.025	
Material	.STIFF CLAY	
Freeboard	.3 ft	

RESULTS:

Depth	2.27 ft
with Freeboard	2.57 ft
Top Width	23.63 ft
with Freeboard	25.43 ft
Velocity	5.69 fps
Cross Sectional Area	38.21 sq ft
Hydraulic Radius	1.57 ft
Froude Number	0.79

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 6

INPUT VALUES:

Shape	TRIANGULAR	
Discharge	30.10 cfs	
Slope	1.00 %	
Sideslopes	2.00:1 (L)	2.00:1 (R)
Manning's n	0.025	
Material	STIFF CLAY	
Freeboard	.3 ft	

RESULTS:

Depth	1.73 ft
with Freeboard	2.03 ft
Top Width	6.92 ft
with Freeboard	8.12 ft
Velocity	5.02 fps
Cross Sectional Area	5.99 sq ft
Hydraulic Radius	0.77 ft
Froude Number	0.95

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 7 LOWER

INPUT VALUES:

Shape	TRIANGULAR	
Discharge	7.30 cfs	
Slope	1.00 %	
Sideslopes	1.50:1 (L)	1.50:1 (R)
Manning's n	0.013	
Material	HDPE	
Freeboard	.3 ft	

RESULTS:

Depth	0.90 ft
with Freeboard	1.20 ft
Top Width	2.71 ft
with Freeboard	3.61 ft
Velocity	5.97 fps
Cross Sectional Area	1.22 sq ft
Hydraulic Radius	0.38 ft
Froude Number	1.57

SEDCAD+ NONERODIBLE CHANNEL DESIGN

DITCH 8 LOWER

INPUT VALUES:

Shape	TRIANGULAR	
Discharge	19.30 cfs	
Slope	1.00 %	
Sideslopes	1.50:1 (L)	1.50:1 (R)
Manning's n	0.013	
Material	HDPE	
Freeboard	.3 ft	

RESULTS:

Depth	1.30 ft
with Freeboard	1.60 ft
Top Width	3.90 ft
with Freeboard	4.80 ft
Velocity	7.61 fps
Cross Sectional Area	2.54 sq ft
Hydraulic Radius	0.54 ft
Froude Number	1.66

Material: Riprap

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
16.00	3.0:1	3.0:1	0.8			

PADER Method - Mild Slope Design

	w/o Freeboard	w/ Freeboard
Design Discharge:	272.80 cfs	
Depth:	2.20 ft	
Top Width:	29.18 ft	
Velocity:	5.50 fps	
X-Section Area:	49.64 sq ft	
Hydraulic Radius:	1.660	
Froude Number:	0.74	
Manning's n:	0.0340	
Dmin:	2.00 in	
D50:	3.00 in	
Dmax:	4.50 in	

EAST CHANNEL

ESS

862,500 N.

660,000 N.

857,500 N.

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. DITCHES 7 & 8 ARE SHOWN ON DRAWING 13.

N

SCALE

300' 0 300' 600'

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
4	October 2000 Revision	10/4/00	J.Pelliser	K.Dearsith	P.Carser
3	NOVEMBER 1999 UPDATES	11/15/99	J.Transcese	M.Mirmirani	P.Carser
2	SEPTEMBER 1999 REVISION	9/21/99	P.Carser	K.Dearsith	P.Carser
1	NOVEMBER 1998 REVISION	10/28/98	J.Pelliser	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	10/15/97	PBC/JPP	T.Smith	P.Carser

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:

SURFACE WATER CONTROL FEATURES

PATRICK B. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick B. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick B. Carser, NM P.E. 12236*

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 2 Sheets

SCALE: AS NOTED

DRAWING No. 25

29

CHANNEL DESIGNS

Ditch	25-yr,24-hr Flow Q (cfs)	Slope (%)	Bottom Width (BW) (ft)	Sideslope H:1V	Depth of Flow (D) (ft) 1	Velocity (fps) 2	Freeboard (ft)	Maximum Total Depth (ft)	Erosion Protection	2-yr,24-hr Flow Q (cfs)	Velocity (fps)
1	34.2	0.5-2.0	0	2	2.1	6.7	1.0	3.1	None	4.8	4.1
2	62.2	0.5-1.0	0	2	2.6	6.0	1.0	3.6	None	8.3	3.6
3	126.6	0.5-1.0	5.0	3	2.4	5.8	1.0	3.4	None	40.0	4.8
		1.1-2.0	5.0	3	2.1	6.6	1.0	3.1	Riprap D50=6"		
4	6.8	0.5-1.0	0	2	1.1	3.5	1.0	2.1	None	7	7
5	217.3	0.5-1.0	10.0	3	2.3	7.3	1.0	3.3	None	53.6	4.8
6	30.1	0.5-1.0	0	2	2.0	5.0	1.0	3.0	None	7	7
7 Lower	7.3	1.0	0	1.5	0.9	6.0	1.0	1.9	HDPE	7	7
7 Upper	7.3	10	0	1.5	0.6	14.2	1.0	1.6	HDPE	7	7
8 Lower	19.3	1.0	0	1.5	1.3	7.6	1.0	2.3	HDPE	7	7
8 Upper	19.3	10	0	1.5	0.8	18	1.0	1.8	HDPE	7	7
East	272.8	0.5-0.8	16.0	3	2.5	5.5	1.0	3.5	Gravel D50=3"	7	7
Final Cover Road Side	31.5	0.5-2.4	0	3	1.8	5.5	1.0	2.8	Gravel D50=3"	7	7
Spillway	358(6)	0.5	20.0	3	2.6	4.9	1.0	3.4	Gravel D50=3"	7	7
9,10	90.4	0.5	3.0	3	2.1	4.7	1.0	3.1	NONE	7	7

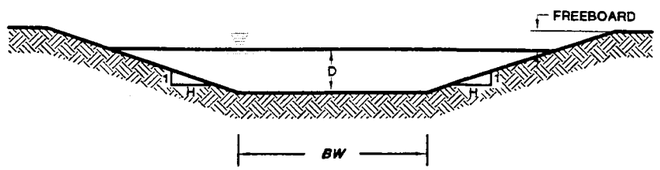
NOTES:
(1) Maximum allowable velocity for channels without erosion protection 5 fps
(2) Channels with velocities greater than 5 fps for the 25-yr event and less than the 5 fps for the 2 year storm will not be lined.
(3) Maximum allowable velocity for gravel lined channels is 6 fps.
(4) Depth of Flow determined from minimum grade of Channel.
(5) Flow Velocity determined from maximum grade of Channel.
(6) Design Flow for Spillway is 100YR - 24 HR.
(7) The velocity calculations were not required for the 2-year storm because the 25YR-24HR rain event flow velocity was less than 5 fps, so the 2YR-24HR rain event flow event flow velocity would also be less than 5 fps, or because erosion protection had already been specifed.

GENERAL NOTES:
1. STORM WATER DETENTION BASIN TO BE LINED WITH SINGLE 60 mil HDPE LINER.

CULVERT DESIGNS

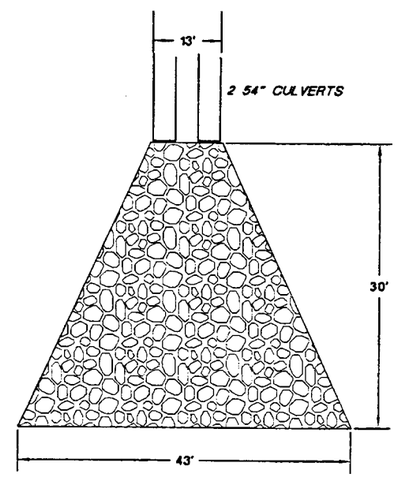
Culvert On Ditch	Flow (cfs)	Culvert Capacity (cfs)	No. Of Culverts	Culvert Diameter (in)	Total Capacity (cfs)
East	272.8	155	2	54	310
3	126.6	50	3	36	150
4	6.8	9	1	18	9
5	217.3	135	2	54	270
1 and 2	96.4	50	2	36	100
8	19.3	50	1	36	50
9 and 10	90.4	50	2	36	100

NOTES: (1) Culverts were sized assuming a Headwater/Culvert Diameter= 1.5.



TYPICAL CHANNEL

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".



NOTE:
RIP RAP D_{50} = 2', DEPTH OF ROCK 3'

25 / 26 RIP RAP OUTLET APRON DETAIL
Not To Scale

PROFESSIONAL ENGINEER'S STATEMENT
I, Patrick G. Carver, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carver, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND APPROVED BY
3	October 2000 Revision	10/1/00	J.Pelliver	K.Conrath	P.Carver
2	NOVEMBER 1999 UPDATES	11/22/99	J.Thomson	M.Mathew	P.Carver
1	NOVEMBER 1998 REVISION	11/23/98	J.Pelliver	T.Smith	P.Carver
0	PART B PERMIT APPLICATION	12/12/97	PBC/JPP	K.Conrath	P.Carver

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
SURFACE WATER CONTROL DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 Of 2 Sheets
SCALE: Not to Scale
DRAWING No. 25

AutoCAD FILE: SANDY-SPEW/TRDTLS.DWG PROJECT NUMBER: 802-0202

United States
Department of
Agriculture

**Natural
Resources
Conservation
Service**

**Conservation
Engineering
Division**

Technical
Release 55

June 1986

Urban Hydrology for Small Watersheds

TR-55

To show bookmarks which navigate through the document. Click the show/hide navigation pane button , and then click the bookmarks tab. It will navigate you to the contents, chapters, rainfall maps, and printable forms.

Chapter 2 Estimating Runoff

SCS runoff curve number method

The SCS Runoff Curve Number (CN) method is described in detail in NEH-4 (SCS 1985). The SCS runoff equation is

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \qquad \text{[eq. 2-1]}$$

where

Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins (in) and
I_a = initial abstraction (in)

Initial abstraction (I_a) is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. I_a is highly variable but generally is correlated with soil and cover parameters. Through studies of many small agricultural watersheds, I_a was found to be approximated by the following empirical equation:

$$I_a = 0.2S \qquad \text{[eq. 2-2]}$$

By removing I_a as an independent parameter, this approximation allows use of a combination of S and P to produce a unique runoff amount. Substituting equation 2-2 into equation 2-1 gives:

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad \text{[eq. 2-3]}$$

S is related to the soil and cover conditions of the watershed through the CN. CN has a range of 0 to 100, and S is related to CN by:

$$S = \frac{1000}{CN} - 10 \qquad \text{[eq. 2-4]}$$

Figure 2-1 and table 2-1 solve equations 2-3 and 2-4 for a range of CN's and rainfall.

Factors considered in determining runoff curve numbers

The major factors that determine CN are the hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition (ARC). Another factor considered is whether impervious areas outlet directly to the drainage system (connected) or whether the flow spreads over pervious areas before entering the drainage system (unconnected). Figure 2-2 is provided to aid in selecting the appropriate figure or table for determining curve numbers.

CN's in table 2-2 (*a* to *d*) represent average antecedent runoff condition for urban, cultivated agricultural, other agricultural, and arid and semiarid rangeland uses. Table 2-2 assumes impervious areas are directly connected. The following sections explain how to determine CN's and how to modify them for urban conditions.

Hydrologic soil groups

Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. Appendix A defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of interest may be identified from a soil survey report, which can be obtained from local SCS offices or soil and water conservation district offices.

Most urban areas are only partially covered by impervious surfaces: the soil remains an important factor in runoff estimates. Urbanization has a greater effect on runoff in watersheds with soils having high infiltration rates (sands and gravels) than in watersheds predominantly of silts and clays, which generally have low infiltration rates.

Any disturbance of a soil profile can significantly change its infiltration characteristics. With urbanization, native soil profiles may be mixed or removed or fill material from other areas may be introduced. Therefore, a method based on soil texture is given in appendix A for determining the HSG classification for disturbed soils.

Chapter 3 Time of Concentration and Travel Time

Travel time (T_t) is the time it takes water to travel from one location to another in a watershed. T_t is a component of time of concentration (T_c), which is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. T_c is computed by summing all the travel times for consecutive components of the drainage conveyance system.

T_c influences the shape and peak of the runoff hydrograph. Urbanization usually decreases T_c, thereby increasing the peak discharge. But T_c can be increased as a result of (a) ponding behind small or inadequate drainage systems, including storm drain inlets and road culverts, or (b) reduction of land slope through grading.

Factors affecting time of concentration and travel time

Surface roughness

One of the most significant effects of urban development on flow velocity is less retardance to flow. That is, undeveloped areas with very slow and shallow overland flow through vegetation become modified by urban development: the flow is then delivered to streets, gutters, and storm sewers that transport runoff downstream more rapidly. Travel time through the watershed is generally decreased.

Channel shape and flow patterns

In small non-urban watersheds, much of the travel time results from overland flow in upstream areas. Typically, urbanization reduces overland flow lengths by conveying storm runoff into a channel as soon as possible. Since channel designs have efficient hydraulic characteristics, runoff flow velocity increases and travel time decreases.

Slope

Slopes may be increased or decreased by urbanization, depending on the extent of site grading or the extent to which storm sewers and street ditches are used in the design of the water management system. Slope will tend to increase when channels are straightened and decrease when overland flow is directed through storm sewers, street gutters, and diversions.

Computation of travel time and time of concentration

Water moves through a watershed as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. The type that occurs is a function of the conveyance system and is best determined by field inspection.

Travel time (T_t) is the ratio of flow length to flow velocity:

$$T_t = \frac{L}{3600V} \qquad \text{[eq. 3-1]}$$

where:

T_t = travel time (hr)
L = flow length (ft)
V = average velocity (ft/s)
3600 = conversion factor from seconds to hours.

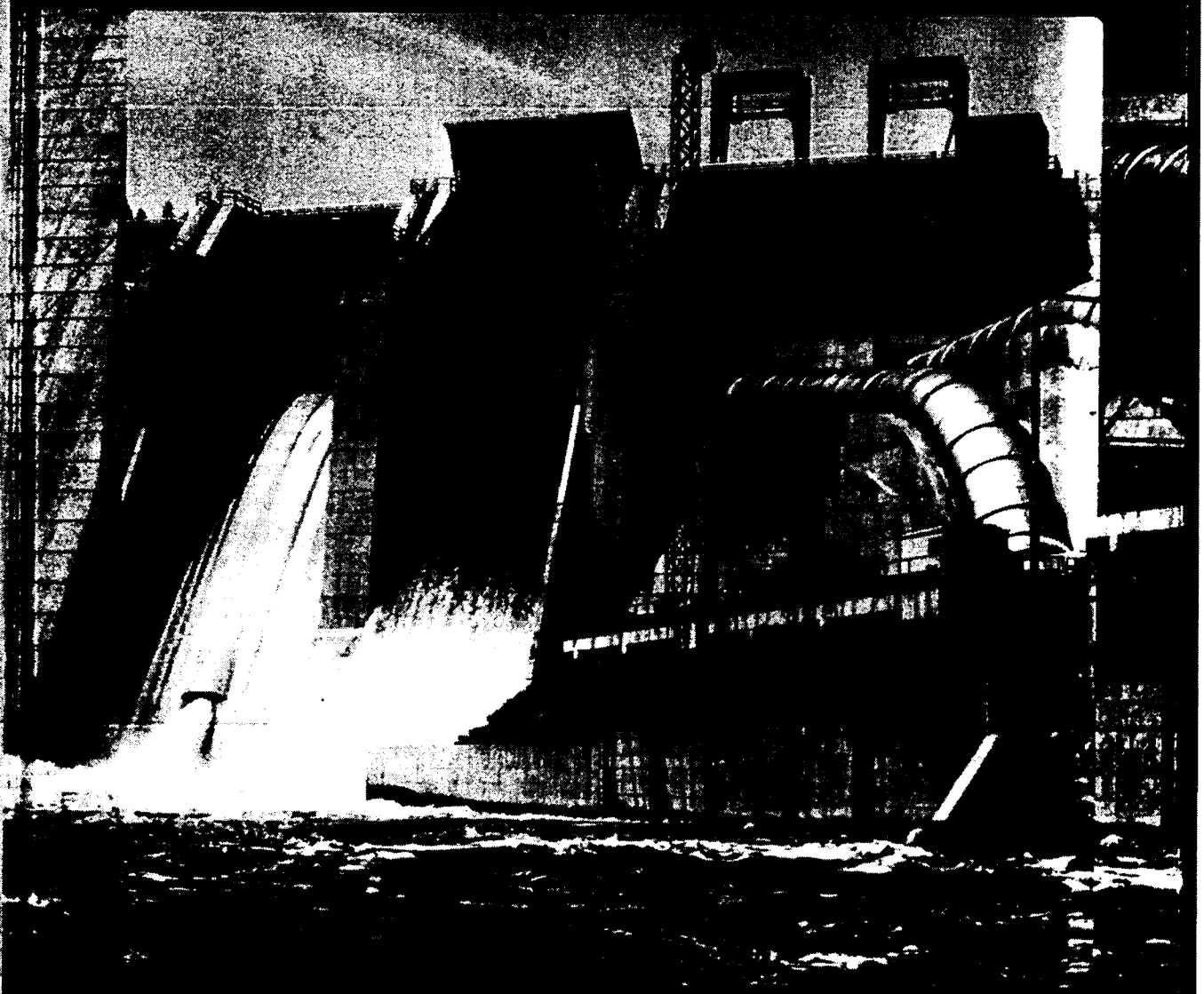
Time of concentration (T_c) is the sum of T_t values for the various consecutive flow segments:

$$T_c = T_{t_1} + T_{t_2} + \ldots T_{t_m} \qquad \text{[eq. 3-2]}$$

where:

T_c = time of concentration (hr)
m = number of flow segments

HYDRAULIC ENGINEERING



ROBERSON · CASSIDY · CHAUDHRY

SECOND EDITION

Using the Moody diagram (see Fig. 5-5), the f value is found to be about 0.020 for a Reynolds number of about 10^6. Use this f for the first computation of Q:

$$Q = \sqrt{\frac{8 \times 32.2}{0.020}} \times (2 \times 5) \times \sqrt{1.11 \times 0.002}$$

$$Q = 53.5 \text{ cfs} \qquad V = Q/A = 5.35 \text{ ft/s}$$

Assume the water temperature is 60°F, then, the kinematic viscosity will be 1.22×10^{-5} ft²/s, and the Reynolds number $V \times 4R/\nu$ will be found to be 1.95×10^6. On checking the Moody diagram with the Reynolds number of 1.95×10^6, we find that f is indeed 0.020; therefore, with the given assumptions, the discharge will be 53.5 cfs.

The Manning Equation

The discharge equation most often used by hydraulic engineers is the Manning equation, named after an Irish engineer of the nineteenth century. In the Manning equation, using the traditional system of units, the Chezy coefficient of Eq. (4-3) is given as $C = (1.49/n) \times R^{1/6}$, where n is a resistance factor. Thus, the Manning discharge equation is

$$Q = \frac{1.49}{n} A R^{2/3} S_0^{1/2} \tag{4-7a}$$

In the SI system of units,

$$Q = \frac{1}{n} A R^{2/3} S_0^{1/2} \tag{4-7b}$$

The resistance factor, n, is a function of a number of variables, the primary one being the roughness of the channel.* To assist the engineer in choosing n, Table 4-1 gives n values for various types and conditions of channels. Figures 4-2, 4-3, and 4-4 are photos of actual channels along with measured n values.

Flow in Channels of Circular Cross Section

Highway culverts and city sewers are common examples of open channel conduits of circular cross section. For a given slope and resistance coefficient (n = constant), the discharge will be proportional to $AR^{2/3}$, as can be seen by inspecting Eqs. (4-7a and 4-7b). Since $V = Q/A$, it can also be deduced that the velocity will be proportional to $R^{2/3}$. Therefore, one can easily determine $Q/Q_0 = (AR^{2/3})/(A_0R_0^{2/3})$, where Q is the discharge for a given depth of flow, and Q_0 is the discharge for the completely full conduit. Figure 4-5 is a plot of the relative discharge (Q/Q_0) versus relative depth

* For a more complete discussion of n values, see Chow (4) and Yen (24).

acteristics of Critical Flow

We have already seen that critical flow occurs when the specific energy is minimum for a given discharge. The depth for this condition may be determined if we solve for dE/dy from $E = y + Q^2/2gA^2$ and set dE/dy equal to zero:

$$\frac{dE}{dy} = 1 - \frac{Q^2}{gA^3} \cdot \frac{dA}{dy} \tag{4-15}$$

However, $dA = T\,dy$, where T is the width of the channel at the water surface as shown in Fig. 4-14. Then Eq. (4-15), with $dE/dy = 0$ (the critical flow condition), will reduce to

$$\frac{Q^2 T_c}{gA_c^3} = 1 \tag{4-16}$$

or

$$\frac{A_c}{T_c} = \frac{Q^2}{gA_c^2} \tag{4-17}$$

$$\frac{A_c}{T_c} = \frac{V_c^2}{g} \tag{4-18}$$

Determine the critical depth in a trapezoidal channel for a discharge of 500 cfs. The width of the channel bottom is 20 ft, and the sides slope upward at an angle of 45°.

LUTION

Starting with Eq. (4-16),

$$\frac{Q^2 T_c}{gA_c^3} = 1$$

or

$$\frac{A_c^3}{T_c} = \frac{Q^2}{g}$$

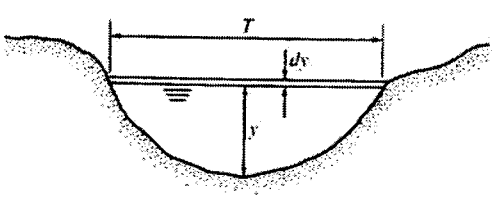


Figure 4-14 Open channel relations

Then, for $Q = 500$ cfs

$$\frac{A_c^3}{T_c} = \frac{500^2}{32.2} = 7764 \text{ ft}^2$$

For this channel, $A = y(b + y)$ and $T = b + 2y$. Then by iteration (choose y and compute A^3/T), we can find y that will yield an A^3/T equal to 7764 ft^2. Such a solution yields $y_c = 2.57$ ft.

If the channel is of rectangular cross section, then A_c/T_c is the critical depth, and $Q^2/A_c^2 = q^2/y_c^2$, so the formula for critical depth (Eq. 4-17) becomes

$$y_c = \left(\frac{q^2}{g}\right)^{1/3} \tag{4-19}$$

where q is the discharge per unit width of channel.

If we apply Eq. (4-18) to a rectangular channel, divide it by $A_c/T_c = y_c$, and then take the square root of both sides, we obtain

$$\frac{V_c}{\sqrt{gy_c}} = 1 \tag{4-20}$$

The left side of Eq. (4-20) is the Froude number; therefore, the Froude number is equal to unity when the flow is critical.

Originally, the term *critical flow* probably related to the unstable character of the flow for the condition. If we refer to Fig. 4-12, we see that only a slight change in specific energy will cause the depth to increase or decrease a significant amount; this is a very unstable condition. In fact, observations of critical flow in open channels show that the water surface consists of a series of standing waves. Because of the unstable nature of the depth in critical flow, designing canals so that normal depth is either well above or well below critical depth is usually best. The flow in canals and rivers is usually subcritical; however, the flow in steep chutes or over spillways is supercritical.

If we take the square root of Eq. 4-17 and do some rearranging, we obtain $Q/\sqrt{g} = A^{3/2}/T^{1/2}$. The right-hand side of the above equation is called the section factor. Note that for a given value of $Q/\sqrt{g}$ and a given conduit shape (circular or trapezoidal, etc.) there is only one depth (critical depth) that will satisfy the equation. Critical depth solutions have been made for both circular and trapezoidal channels for a wide range of section factors and the results have been given in graphical form as shown in Fig. 4-15.

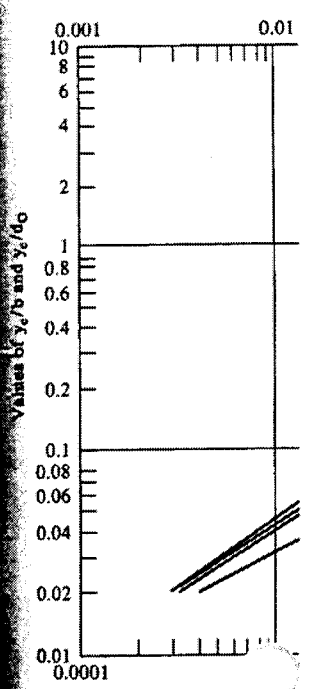


Figure 4-15 Curves for det

EXAMPLE 4-7

Solve Examp

$Q/(\sqrt{}$

Therefore, y_c

Occurrence of Critica

Critical flow
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SOLUTION

The solution is done in tabular form as shown below:

Section	Depth (ft)	Width (ft)	ΔA (ft^2)	Avg. V (ft/s)	ΔQ (ft/s)
1	5.5	12.5	68.8	6.85	471
2	7.3	15.0	109.5	7.30	799
3	8.5	15.0	127.5	7.45	950
4	8.0	17.5	140.0	7.55	1057
5	7.9	15.0	118.5	7.45	883
6	7.9	12.5	98.8	7.45	736
7	7.8	15.0	117.0	7.20	842
8	6.3	15.0	94.5	6.75	638
9	3.2	12.5	40.0	4.90	196
					Q = 6572 cfs

Weirs, Flumes, Spillways, and Gates

Sharp-Crested Weirs

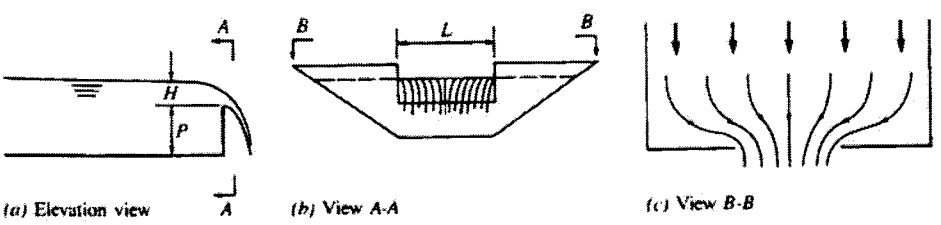
A simple device for discharge measurement in canals and flumes is the *sharp-crested weir* (Fig. 4-34). When atmospheric pressure prevails above and below the nappe, it is said to be well ventilated. The discharge equation for a *rectangular weir* (a weir that spans a rectangular flume) is given as

$$Q = K\sqrt{2g}LH^{3/2} \tag{4-38}$$

In Eq. (4-38), K is the flow coefficient of the weir and is given as

$$K = 0.40 + 0.05\frac{H}{P} \tag{4-39}$$

Based on experimental work by Kindsvater (10), this is valid up to an H/P value of about 10.



(a) Elevation view (b) View A-A (c) View B-B

Figure 4-34 Rectangular weir

Often the weir section does not span the entire width of the channel (Fig. 4-34). Therefore, there will be a contraction of the flow section just downstream of the weir so that the effective length of the weir will be somewhat less than L. Experiments show that this effective reduction in length is approximately equal to $0.20H$ when $L/H > 3$. Thus the formula for a *contracted weir* (one with flow contraction due to end walls) is given as

$$Q = K\sqrt{2g}(L - 0.20H)H^{3/2} \tag{4-40}$$

The formula for the *suppressed weir* (a weir without end walls; suppressed contractions) may also be used for the contracted weir if the sides of the weir are inclined as shown in Fig. 4-35. The degree of inclination is made so that the reduction of flow caused by the end contractions is counterbalanced by the increased flow in the "notches" (regions ABC of Fig. 4-35) at either end of the weir. The Cipolletti weir (often used in irrigation canals in the western United States) has an angle of wall inclination of 28° to effect the desired result.

With low flow rates, it is common to use a triangular weir (Fig. 4-36). The basic weir equation is given as

$$Q = \frac{8}{15} K\sqrt{2g}\tan\left(\frac{\theta}{2}\right)H^{5/2} \tag{4-41}$$

where K is the flow coefficient that is primarily a function of the head H. For weirs with θ values of 60° and 90°, Lenz (11) showed that the flow coefficient values varied from 0.60 to 0.57 as the head varied from 0.20 to 2.0 ft.

Broad-Crested Weirs

If the weir is long in the direction of flow so that the flow leaves the weir in essentially a horizontal direction, the weir is a *broad-crested weir* (see Fig. 4-16, page 178). The basic theoretical equation for the broad-crested weir is shown on page 178 (Eq. 4-23). However, to account for head loss and shape of weir, a discharge coefficient should be applied to Eq. (4-23). If the ratio of the actual discharge, Q, to the theoretical discharge, Q_{theor}, is given by C, then

$$Q = 0.385CL\sqrt{2g}H^{3/2} \tag{4-42}$$

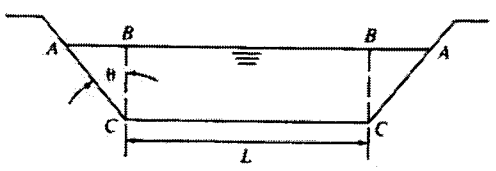


Figure 4-35 Trapezoidal weir

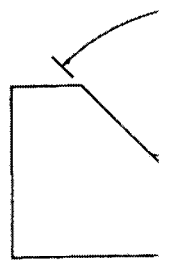


Figure 4-36 Tri

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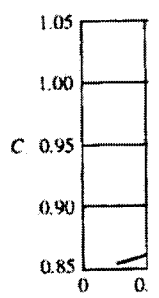

Figure 4-37 F
coefficient for
$< H/L < 0.8$

Permit Renewal Application
October 17, 2011

Attachment M

Construction Quality Assurance Plan

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March 2002

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Section I. General

I.1 Introduction

Triassic Park Waste Disposal Facility will consist of waste receiving facilities, a RCRA-compliant hazardous waste landfill, a stormwater control system including a lined stormwater detention basin, and access roadways. ~~, evaporation pond, stabilization facility drum handling facility, liquid waste storage area, truck roll-off area and truck wash.~~ This Construction Quality Assurance (CQA) plan is intended to be used in conjunction with the design drawings and construction specifications for the Triassic Park Waste Disposal Facility.

The CQA Plan addresses the construction quality assurance of the soils, geosynthetics, and related liner system components for the facilities listed above at the Triassic Park Facility. The CQA Plan is divided into the following sections:

- Section I: General;
- Section II: Soils CQA;
- Section III: Geosynthetic Clay Liner CQA;
- Section IV: Geomembrane CQA;
- Section V: Geotextile CQA;
- Section VI: Geocomposite CQA;
- Section VII: Geonet CQA;
- Section VIII: Polyethylene Pipe and Fittings CQA;
- Section IX: ADS Slotted CPT CQA;
- Section X: Corrugated Metal Pipe CQA;
- Section XI: Carbon Steel and Stainless Steel Pipe CQA;
- Section XII: Polyethylene Tank CQA;
- ~~Section XIII: Stabilization Bins CQA;~~
- Section XIV: Concrete Formwork CQA;
- Section XV: Reinforcement Steel CQA;
- Section XVI: Joints in Concrete CQA;
- Section XVII: Miscellaneous Metalwork CQA;
- Section XVIII: Cast in Place Concrete CQA
- Section XIX: Electrical System and Pump Control CQA;
- Section XX: Pumps, Piping, Meters, and Valve CQA; and
- Section XXI: CQA Documentation.

The facility will not accept waste until NMED has approved the CQA certification report.

I.2 Definitions Relating to Construction Quality Assurance

I.2.1 Construction Quality Assurance and Construction Quality Control

The CQA Plan is a site-specific document which addresses the following: (i) CQA personnel responsibilities, authorities, and qualifications; (ii) inspection, monitoring, and testing activities necessary to document that the facility is constructed to meet or exceed design criteria, plans, and specifications; and (iii) CQA documentation requirements.

Construction Quality Assurance (CQA) - A planned and systematic pattern of the means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements, and will perform satisfactorily in service.

Construction Quality Control (CQC) -Those actions which provide a means to measure and control the characteristics of an item or service to meet contractual and regulatory requirements.

I.2.2 Use of the Terms in This Plan

In the context of this document:

- Construction Quality Assurance (CQA) refers to means and actions employed by the CQA Engineer to assure conformity of liner system preparation, production, and installation with this CQA Plan, the General Specifications, and the Construction Drawings. CQA is provided by a party independent from the product Manufacturer and Contractor.

- Construction Quality Control (CQC) refers to those actions taken by Manufacturers, Suppliers, Contractors, or Owners, including their designated representatives, to ensure that the materials and the workmanship meet the requirements of the General Specifications, and the Construction Drawings. In the case of soils, and within this CQA Plan, CQC is typically made a part of the CQA requirements and is provided by the CQA Engineer. In the case of geosynthetic and other non soil components, CQC is provided by the Manufacturers and installers of the various geosynthetics.

I.3 Parties to Construction Quality Assurance

I.3.1 Organization Chart

A typical project organization chart for construction of the landfill~~s, surface impoundments~~ and associated facilities is provided in Figure I-1[AK1].

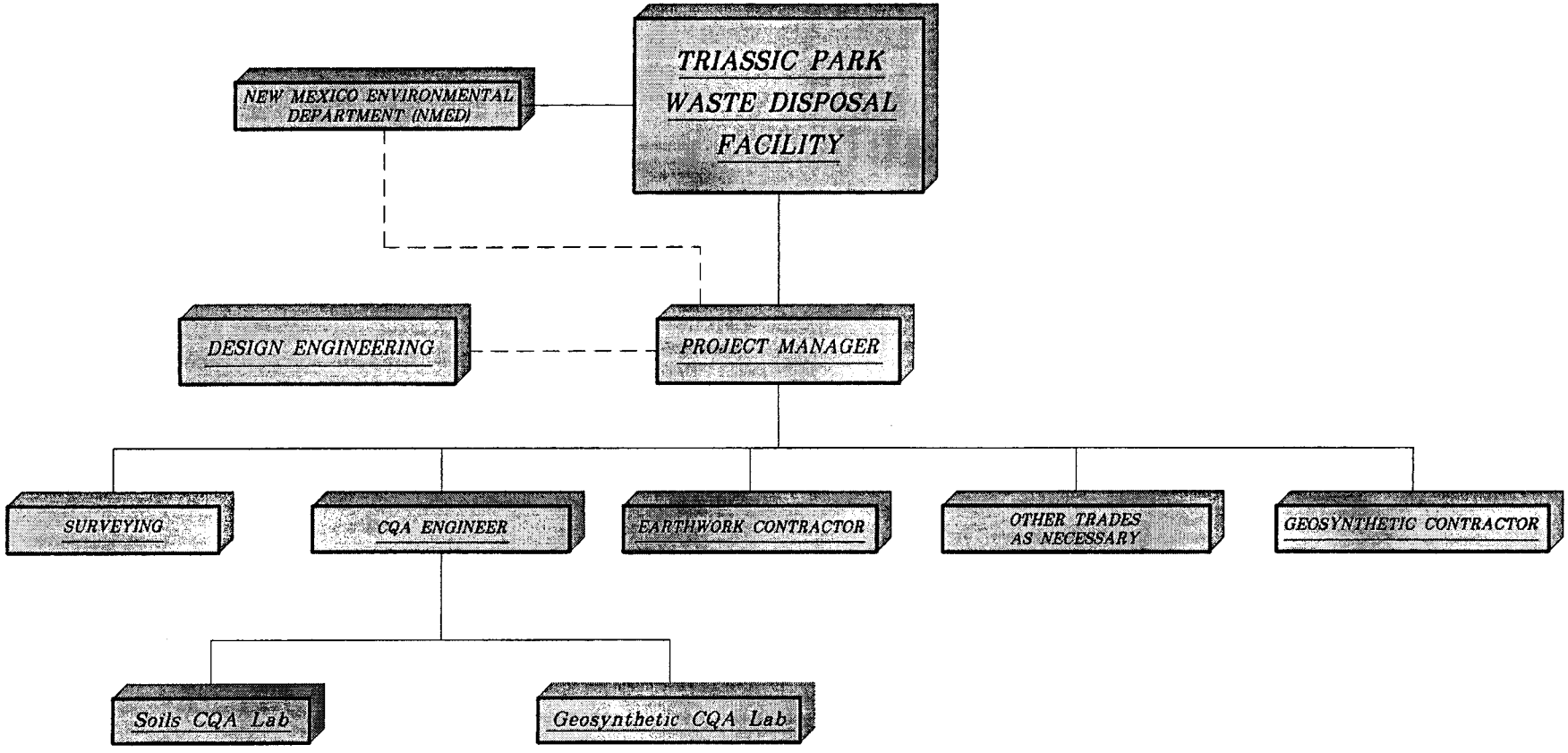
I.3.2 Description of the Parties

I.3.2.1 Design Engineer

The Design Engineer is the individual, firm or corporation having direct responsibility for the design of the landfill or surface impoundment structure. During construction, the Design Engineer must approve any significant deviation from the design requirements of the Contract Documents. The Design Engineer may be an employee of the Owner. An individual representing the Design Engineer directly responsible for the project must be registered as a Professional Engineer in the State of New Mexico.

I.3.2.2 Contractor

The individual, firm, or corporation undertaking the execution of the work under the terms of the Contract Documents. The Contractor may be responsible for constructing the entire liner system (earthwork and geosynthetics), or only selected components of the liner system. The reference to Contractor refers to the General Contractor and all subcontractors which the General Contractor may employ in meeting the requirements of the Contract Documents.



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0	TECH LAW REVIEW COPY	4/24/00	J.Pellicer	J.Bever	J.Pellicer

TerraMatrix
MONTGOMERY WATSON
Mining Group

PROJECT No 602-0200
AutoCAD FILE TPORG-TECHLAW-1
SCALE Not to Scale
FIGURE No. I-1

Triassic Park Waste Disposal Facility

TYPICAL PROJECT ORGANIZATION

I.3.2.3 Drainage Gravel Supplier

The drainage gravel supplier excavates (or manufactures) and delivers drainage gravel to the Contractor at the Triassic Park Facility.

I.3.2.4 Road Base Material Supplier

The road base supplier excavates (or manufactures) and road base material to the Contractor at the Triassic Park Facility.

I.3.2.5 Select Subbase Supplier

The select subbase supplier excavates (or manufactures) and delivers select subbase to the Contractor at the Triassic Park Facility.

I.3.2.6 Resin Supplier

The resin supplier produces and delivers resin to the manufacturer of geosynthetic materials or polymer based products such as pipe.

I.3.2.7 Manufacturer

The Manufacturer manufactures a specific component (e.g., geomembrane, geosynthetic clay liner, geotextile, geocomposite, geonet or pipe) of the proposed liner system and delivers the component to the Contractor at the site. In the General Specifications, the term Manufacturer may refer to the geomembrane Manufacturer, geotextile Manufacturer, geocomposite/geonet Manufacturer, GCL Manufacturer, or pipe Manufacturer.

I.3.2.8 Construction Quality Assurance Engineer

The CQA Engineer is an individual, firm, or corporation, independent from the Owner, Contractor, and Manufacturer, that observes, tests, and documents activities related to the CQA of the earthworks at the site, and observes, tests, and documents activities related to the CQA of the installation of the geosynthetic components of the liner system. The CQA Engineer observes, tests, and documents activities related to the CQA of pipes and other liner system components. The CQA Engineer must provide an engineer which directly manages the CQA activities who is a Professional Engineer registered in the State of New Mexico. The CQA Engineer may be the same as the Design Engineer, but must be independent from the Owner.

I.3.2.9 Soils Construction Quality Assurance Laboratory

The Soils CQA Laboratory is independent from the Owner, Gravel Supplier, Granular Material Supplier, and Contractor. The Soils CQA Laboratory conducts tests in the laboratory (which may be on-site or off-site) on samples of soil taken from the borrow pits, stockpiles, or the liner system.

I.3.2.10 Geosynthetic CQA Laboratory

The Geosynthetics CQA Laboratory is independent from the Owner, Resin Supplier, Manufacturer, and Contractor. The Geosynthetics CQA Laboratory conducts tests on samples of geosynthetics taken from the site. The Geosynthetics CQA Laboratory may also conduct tests on pipes or other liner system components. The Geosynthetics CQA Laboratory service cannot be provided by any party involved with the manufacture or installation of any of the geosynthetic components.

I.3.2.11 Owner

The Owner owns and operates the landfill or surface impoundment. In this CQA Plan, the term "Owner" refers specifically to the Triassic Park Waste Disposal Facility.

I.3.3 Qualifications of the Parties

I.3.3.1 Design Engineer

The representative of the Design Engineer, who is directly responsible for the project, will be a qualified Professional Engineer registered in the State of New Mexico. The Design Engineer will have a history which demonstrates familiarity with all liner system components, including detailed design methods and procedures.

I.3.3.2 Geomembrane Installer

The Geomembrane Installer (who may be either the Contractor or a subcontractor to the Contractor) will be trained and qualified to install geosynthetics, as well as other liner system components such as pipe, if necessary.

All personnel performing seaming operations will be qualified by experience (i.e., each seamer will have installed no less than 100,000 square feet of geomembrane using the same methods of seaming that will be used on this project). At least one seamer will have experience seaming a minimum of 1,000,000 square feet of geomembrane using the same method of seaming that will be used on this project. The most experienced seamer, the "master seamer", will provide direct supervision, as required, over less experienced seamers. Field seaming may not take place without an approved master seamer being present.

The Contractor will provide the Owner and CQA Engineer with a list of proposed seaming personnel and their professional records. Any proposed seaming personnel deemed insufficiently experienced will not be accepted by the Owner or will be required to pass a seaming test prior to working on the Project.

I.3.3.3 Construction Quality Assurance Engineer Personnel

Personnel representing the CQA Engineer shall be properly trained and qualified to test and inspect soils, including high and low permeability soils, geosynthetics, including geomembranes, geotextiles, geocomposites, GCLs, and pipe. The CQA Engineer will predominately be represented by a Resident Engineer who has direct responsibility for management of the CQA activities. The CQA Resident Engineer will be experienced in construction, CQA of soils; CQA of geosynthetics and pipe; and preparation of CQA documentation including CQA forms, reports, and plans.

As a minimum, CQA Monitors will have a high school diploma and at least two years of construction related experience and one year of experience conducting CQA monitoring for landfill construction involving both soil and geosynthetic components, or a Bachelor of Science degree from a four year college or university and one year of experience conducting CQA monitoring for landfill construction involving both soil and geosynthetic components. In addition, the lead CQAMs shall be certified in geosynthetic by the National Institute for Certification in Engineering Technologies (NICET). The number of NICET certified monitors assigned to the work shall comply with the recommendation of the U.S. Environmental Protection Agency (EPA) as indicated in Table I-1.

Qualification of CQA Personnel shall be documented by training records and professional résumés, and shall be reviewed by the Project Manager.

Table I-1. Recommended Implementation Program for Construction Quality Assurance for Geosynthetics

No. of Field Crews at Each Site [a]	End of 18 Months ~~(i.e., June 30, 1994)~~	End of 36 Months ~~(i.e., January 1, 1996)~~
1–2	1 - Level II	1 - Level III [b]
3–4	1 - Level II	1 - Level III [b]
	1 - Level I	1 - Level I
≥5	1 - Level II	1 - Level III [b]
	2 - Level I	1 - Level II
		1 - Level I

Source: ~~EPA~~U.S. EPA Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities. EPA/600/R-93/182, September 1993.
Note: Certification for natural materials is under development as of this writing.
[a] Performing a critical operation; typically 4–6 people per crew.
[b] Or PE with applicable experience

I.3.3.4 Soils Construction Quality Assurance Laboratory

The Soils CQA Laboratory will have experience with the physical testing of soils, meet all applicable regulatory requirements, and be familiar with ASTM and other required test standards. The Soils CQA Laboratory will be capable of providing test results in accordance with the specifications.

I.3.3.5 Geosynthetics Construction Quality Assurance Laboratory

The Geosynthetics CQA Laboratory will have experience in testing geosynthetics and other relevant liner system components and be familiar with ASTM and other applicable test standards.

I.3.4 Duties of Construction Quality Assurance Engineer

The overall responsibility of the CQA Engineer is to perform those activities specified in the CQA Plan (e.g., inspection, sampling, testing and documentation final certification). At a minimum, the CQA Engineer will be represented by a CQA Resident Engineer and the necessary supporting CQA inspection personnel. Specific responsibilities of the CQA Resident Engineer may include:

- Reviewing design criteria, plans, and specifications for clarity and completeness so that the CQA Plan can be implemented.
- Educating CQA personnel on CQA requirements and procedures.
- Scheduling and coordinating CQA activities.
- Directing and supporting the CQA personnel in performing observations and tests by:
  - confirming that regular calibration of testing equipment is properly conducted and recorded;
  - confirming that the testing equipment, personnel, and procedures do not change adversely over time and verifying that changes do not adversely impact the inspection process;
  - confirming that the test data are accurately recorded and maintained; and
  - verifying that the raw data are properly recorded, validated, reduced, summarized, and interpreted.

- Providing to the Owner reports on the observation results including:
  - review and interpretation of data sheets and reports;
  - identification of work that the CQA Resident Engineer believes should be accepted, rejected, or uncovered for observation, or that may require special testing, observation, or approval; and
  - rejection of defective work and verification that corrective measures are implemented.
- Verifying that the Contractor's construction quality control plan, if required, is in accordance with the site specific CQA Plan
- At the Owner's request, reporting to the Contractor results of observations and tests as the work progresses and interacting with the Contractor to provide assistance in modifying the materials and work to comply with the specified design
- Providing the final report and certifications required by the CQA Plan.

For the supporting CQA personnel, specific responsibilities may include:

- Performing independent on-site observation of the work in progress to verify conformance with the facility design criteria, plans and specifications;
- Verifying that the equipment used in testing meets the test requirements and that the tests are conducted according to the standardized procedures defined by the CQA plan; and
- Reporting to the CQA Resident Engineer results of all observation including work that is not of acceptable quality or that fails to meet the specified design.

I.4 Scope of Construction Quality Assurance

The scope of this CQA Plan includes the CQA of the subgrade, preparation and soil, pipe, concrete and geosynthetic components of the liner and cover system. This CQA Plan does not address design guidelines, installation specifications, or selection of soils, geosynthetics, pipe or other liner system components, which are all described in the General Specifications.

The CQA Plan does not provide for Construction Quality Control which the Contractor may independently undertake to facilitate the Contractor's achieving his requirements under the General Specifications.

I.5 Units

In this CQA Plan, all properties and dimensions are expressed in customary U.S. units.

I.6 References

I.6.1 Applicable Organizations

Organizations whose standards are referenced in the CQA Plan and the General Specifications are as follows:

- NMDOT~~SH~~ - New Mexico Department of Transportation~~State Highway and Transportation Department of Highways~~ (Standard Specifications for Road and Bridge Construction);
- ASTM - American Society for Testing and Materials;

- GRI - Geosynthetic Research Institute;
- OSHA - Occupational Safety and Health Administration; and
- U.S. EPA - United States Environmental Protection Agency.

I.6.2 Applicable Standards

Any reference to standards of any society, institute, association, or governmental agency will pertain to the edition in effect as of the date of this CQA Plan, unless stated otherwise.

I.6.3 Specific Standards

Specific test standards which may be cited in the CQA Plan and the General Specifications are given in Table I-2. These standards may be modified due to technological advances since compilation of Table I-2. All such modifications are to be approved by the Owner.

Table I-2. Test Methods Cited in General Specifications and CQA Plan

Method Number	Title
American Society of Testing and Materials	
1. ASTM A 307	Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
2. ASTM A 726	Standard Specification for Cold-Rolled Carbon Steel sheet, Magnetic Laminated Quality, types 1, 2, and 2S
3. ASTM C 88	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
4. ASTM C 131	Resistance to Degradation of Small-size coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
5. ASTM D 374C or D 1777	Method for Measuring Thickness of Geotextile Materials.
6. ASTM D 413	Standard Test Method for Rubber Property Adhesion to Flexible Substrate.
7. ASTM D 422	Standard Method for Particle-Size Analysis of Soils.
8. ASTM D 570	Standard Test Method for Water Absorption of Plastics.
9. ASTM D 638	Standard Test Method for Tensile Properties of Plastics.
10. ASTM D 698	Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop.
11. ASTM D 746	Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
12. ASTM D 751	Standard Methods of Testing Coated Fabrics.
13. ASTM D 792	Standard Test Methods for Specific Gravity (Relative density) and Density of Plastics by Displacement.
14. ASTM D 882	Standard Test Methods for Tensile Properties of Thin Plastic Sheeting.
15. ASTM D 1004	Standard Test Method of Initial Tear Resistance of Plastic film and Sheeting.
16. ASTM D 1204	Standard Plastics Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
17. ASTM D 1238	Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
18. ASTM D 1248	Standard Specification for Polyethylene Plastic Molding and extrusion Metals.
19. ASTM D 1505	Standard Test Methods for Density of Plastics by Density-Gradient Technique.
20. ASTM D 1556	Standard Test Method for Density of Soil In Place by the Sand-Cone Method.
21. ASTM D 1593	Standard Specification for Nonrigid Vinyl Chloride Plastic Sheeting.
22. ASTM D 1603	Standard Test Method for Carbon Black in Olefin Plastics.

Table I-2. Test Methods Cited in General Specifications and CQA Plan (Continued)

Method Number	Title
American Society of Testing and Materials (cont.)	
23. ASTM D 2167	Standard Test Method for Density and Unit Weight of Soils in Place by Rubber Balloon Method.
24. ASTM D 2216 or D 4643	Standard Method for Laboratory Determination of water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures.
25. ASTM D 2434	Standard Test Method for Permeability of Granular Soils (Constant Head).
26. ASTM D 2487	Standard Test Method for Classification of Soils for Engineering Purposes.
27. ASTM D 2657	Standard Practice for Heat-Joining for Polyolefin Pipe and Fittings.
28. ASTM D 2663	Carbon-Black Dispersion in Rubber.
29. ASTM D 2837	Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
30. ASTM D 2922	Standard Test Method for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth).
31. ASTM D 3015	Recommended Practice for Microscopic Examination of Pigment Dispersion in Plastic Compounds.
32. ASTM D 3017	Standard Test Method for Moisture Content of Soil and Rock In Place by Nuclear Methods (Shallow Depth).
33. ASTM D 3083	Standard Specification for Flexible Poly (Vinyl Chloride) Plastic Sheeting for Pond, Canal, and Reservoir Lining.
34. ASTM D 3350	Standard Specifications for Polyethylene Plastic Pipe and Fittings Materials.
35. ASTM D 3776	Mass Per Unit Area (Weight) of Woven Fabric.
36. ASTM D 4253	Standard Test Method for Maximum Index Testing of Soils Using a Vibratory Table.
37. ASTM D 4254	Standard test Method for Minimum Index Density of Soils and Calculations of Relative Density.
38. ASTM D 4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
39. ASTM D 4373	Standard Test Method for Calcium Carbonate Content of Soils.
40. ASTM D 4437	Standard Test Methods for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Geomembranes.
41. ASTM D 4491	Standard Test Method for Water Permeability of Geotextiles by the Permittivity Method.
42. ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
43. ASTM D 4632	Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Elongation Method and Peel Strength).
44. ASTM D 4643	Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.
45. ASTM D 4716	Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
46. ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile
47. ASTM D 4833	Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
48. ASTM D 5084	Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
49. ASTM D 5261	Measuring Mass Per Unit Area of Geotextile
50. ASTM D 5321	Coefficient of Soil and Geosynthetics or Geosynthetics and Geosynthetics Friction by Direct Shear.
51. ASTM D 5890	Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.
52. ASTM 5891	Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.
53. ASTM E 11	Specification for Wire-Cloth Sieves for Testing Purposes.
54. ASTM F 714	Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
55. ASTM F 904	Standard Test Method for Comparison of Bond Strength or Ply Adhesion of Similar Laminates Made from Flexible Materials.

Table I-2. Test Methods Cited in General Specifications and CQA Plan (Continued)

Method Number	Title
Geosynthetic Research Institute	
1. GRI-GMI	Standard Test Method for Ductile/Brittle Transition Time for Notched Polyethylene Specimen under Constant Stress.
United States Environmental Protection Agency	
1. U.S. EPA 9090	Compatibility Test for Wastes and Membrane Liners.

Section II. Soils Construction Quality Assurance

II.1 Introduction

This section of the CQA Plan addresses the soils components of the liner and cover systems and specifies the soils CQA program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements, and treatment of problems.

This section of the CQA Plan also addresses for construction of the foundation subgrade, clay liners, clay covers, granular drainage layers, sump and pipe bedding gravel, the protective soil layer, and cover soil.

II.2 Excavated Subgrade

II.2.1 Verification of Subgrade Continuity

When the excavation of the landfill or surface impoundment is completed, the CQA Engineer will:

- Inspect the subgrade on the side slopes and base of the landfill or surface impoundment and note areas of weak or excessively weathered subgrade materials; and
- Observe the proof rolling of the base of the landfill or surface impoundment and note areas that exhibit excessive rutting, heaving, or softening.

Backfill material in the excavation will be structural fill or clay liner material that will be placed and compacted. The CQA Engineer will observe any excavation and backfilling operations.

The CQA Engineer will report any problems or deviations from the above requirements to the Owner.

II.2.2 Structural Fill Placement and Compaction

The General Specifications will be followed for the placement and compaction of structural fill. The CQA Engineer will monitor the fill placement and compaction to verify and document the following:

- The soil being placed meets the General Specification requirements for fill as determined by the test methods and frequencies specified within this CQA Plan;
- The compacted lift thickness is in accordance with the requirements of the General Specifications;
- The previous lift is scarified as specified in the General Specifications before placing the next lift;
- Fill is moisture conditioned, as required in the General Specifications; and
- The compacted moisture content and dry unit weight of the fill meets specifications as determined by the test methods and frequencies described below.

II.2.3 Construction Quality Assurance Evaluation

The minimum frequency of soils testing for CQA purposes will conform to the minimum frequencies presented in Table II-1.

Table II-1. Minimum Frequency of Testing for CQA Evaluation of Structural Fill

Test	Frequency	Standard Test Method
Material Properties		
Modified Proctor	1 per 5,000 cy placed (minimum 1 per source)	ASTM D 1557
Sieve Analysis	1 per 5,000 cy placed (minimum 1 per source)	ASTM D 422
Atterberg Limits	1 per 5,000 cy placed (minimum 1 per source)	ASTM D 4318
IN PLACE		
Nuclear Density Meter (50 ft. Grid)		
In-Situ Moisture Content	1 per 2,500 ft^2 per lift	ASTM D 3017
In-Situ Dry Unit Weight	1 per 2,500 ft^2 per lift	ASTM D 2922
Calibration and Check		
Standard Count Calibration or Sandstone	1 per day of fill placement	ASTM D 1556/D2922
Oven Moisture Contents (In-Situ Moisture Content)	1 per day of fill placement	ASTM D 2216

Nuclear density meter test methods will be used for the field testing of the in-situ dry unit weight and moisture content of the in-place, compacted fill. Standard Count Calibration, Sand Cone tests and/or Rubber Balloon tests and oven moisture content tests will be conducted to calibrate the results of the nuclear density meter and in cases of uncertainty with the nuclear density meter test results. Any conflict over the test results will be resolved by the CQA Engineer and the Owner. All perforations in the fill will be backfilled in accordance with the General Specifications.

If an in-place density test result fails to meet specifications, a confirmatory test will be performed immediately adjacent to the failed test. If the confirmatory test meets or exceeds specifications then a second confirmatory test will be performed at a second location immediately next to the failed test. If the second confirmatory test also meets or exceeds specifications then the area will be declared as meeting project specifications and the confirmatory tests will be reported. In the event that either confirmatory test fails to meet specifications, then additional testing will be performed to identify the limits of the area that does not meet project specifications.

If a defective area is discovered in the fill, the CQA Engineer will determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the CQA Engineer will determine the extent of the defective area by additional tests, observations, a review of records, or other means that the CQA Engineer deems appropriate. If the defect is related to adverse site conditions, such as excessively wet soils or surface desiccation, the CQA Engineer will define the limits and nature of the defect by testing or observation. After the extent and nature of a defect is determined, the CQA Engineer will notify the Owner, and verify that the deficiency is corrected by the Contractor before any additional work is performed in the area of the deficiency.

II.2.4 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA survey. The CQA Surveyor will independently survey the excavation to confirm that the grades and elevations in the field agree with those shown on the Construction Drawings. CQA Surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer. The CQA Engineer and the Owner will review and approve the survey results before the next phase of the lining system is constructed.

II.3 Prepared Subgrade

II.3.1 Prepared Subgrade Placement and Compaction

The CQA Engineer will verify and document that the prepared subgrade is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the prepared subgrade, the CQA Engineer will verify and document that:

- All or an approved portion of the excavation are complete, and that a survey has been conducted to verify that the subgrade grades and elevations conform to the Construction Drawings;
- The subgrade meets specifications as determined by the test requirements of this CQA Plan;
- The surface of the subgrade is free of debris, wet and soft areas, ponded water, vegetation, mud, ice or frozen material; and
- If frozen subgrade material is encountered, it is removed and replaced in accordance with the General Specifications.

During placement and compaction of the prepared subgrade, the CQA Engineer will verify and document that:

- Close inspection of the placement and compaction of the prepared subgrade with earthmoving equipment is performed by the CQA Engineer;
- The prepared subgrade material meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 2;
- The prepared subgrade is placed in accordance with the conditions and minimum requirements of the General Specifications;
- Each lift is compacted to the required thickness and minimum dry unit weight within the range of moisture contents established by the General Specifications as determined by the CQA testing methods and frequency in Table II 2;
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications;
- Perforations in the prepared subgrade at testing and sampling locations are backfilled in accordance with the General Specifications; and
- The CQA Engineer will document the properties of the prepared subgrade as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-2. Minimum Frequency of Testing for CQA Evaluation of Prepared Subgrade

Test	Frequency	Standard Test Method
Modified Proctor	1 per 250,000 SF	ASTM D 1557
IN PLACE		
Nuclear Density Meter (50 ft. Grid)		
In-Situ Moisture Content	1 per 2,500 ft^2 per lift	ASTM D 3017
In-Situ Dry Unit Weight	1 per 2,500 ft^2 per lift	ASTM D 2922
Calibration and Check		
Sand Cone (In-Situ Density)	1 per day of fill placement	ASTM D 1556
Oven Moisture Content (In-Situ Moisture Content)	1 per day of fill placement	ASTM D 2216
Material Properties		
Sieve Analysis	1 per 125,000 ft^2	ASTM D 422
Atterberg Limits	1 per 125,000 ft^2	ASTM D 4318

II.3.2 Construction Quality Assurance Evaluation

Construction quality assurance testing is required of the prepared subgrade, and the Contractor must take quality assurance testing into account when planning his construction schedule. Nuclear density meter test methods will be used for testing the in-situ compacted dry unit weight and moisture content of the materials. Standard Count Calibration, Sand Cone and/or Rubber Balloon tests and oven moisture content tests will be used to calibrate the reading of the nuclear density meter and in cases of uncertainty with the nuclear density meter readings. Any discrepancies between test results will be resolved by the CQA Engineer and the Owner. The CQA Engineer will conduct moisture, and density tests as specified in Table II-2.

The testing frequency during prepared subgrade construction may be increased or modified at the discretion of the CQA Engineer when visual observations of construction performance indicate potential problems.

During construction, the frequency of testing may be increased by the CQA Engineer during adverse weather conditions, if equipment breaks down, at the start and finish of grading, if the material fails to meet the requirements of the General Specifications, or the extent of the work area is reduced.

If an in-place density test result fails to meet specifications, a confirmatory test will be performed immediately adjacent to the failed test. If the confirmatory test meets or exceeds specifications then a second confirmatory test will be performed at a second location immediately next to the failed test. If the second confirmatory test also meets or exceeds specifications then the area will be declared as meeting project specifications and the confirmatory tests will be reported. In the event that either confirmatory test fails to meet specifications, then additional testing will be performed to identify the limits of the area that does not meet project specifications.

If a defective area is discovered in the prepared subgrade, the CQA Engineer will determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the CQA Engineer will determine the extent of the defective area by additional tests, observations, a review of records, or other means that the CQA Engineer deems appropriate. If the defect is related to adverse site conditions, such as excessively wet soils or surface desiccation, the CQA Engineer will define the limits and nature of the defect by testing or observation. After the extent and nature of a defect is determined and has been remedied by the Contractor, the CQA Engineer will verify that the deficiency is corrected by retesting repaired areas before any additional work is performed by the Contractor in the area of the deficiency.

Based on the requirements of the General Specifications, the Contractor will be required to use all means necessary to protect all prior work, as well as all materials and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repaired.

II.3.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the clay liner surfaces, and to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The owner and the CQA Engineer will approve the survey results before the next phase of the liner system (geomembrane installation) is constructed.

II.4 Clay Liners

II.4.1 Clay Liner Placement and Compaction

The CQA Engineer will verify and document that the clay liner is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the clay liner, the CQA Engineer will verify and document that:

- A test fill has been constructed with the proposed liner material and production scale equipment to confirm processing and placement procedures. In addition, field and laboratory testing shall be completed on the test fill to confirm clay placement specifications will achieve the specified permeability. A test fill plan is presented in Appendix A.
- All or an approved portion of the excavation are complete, and that a survey has been conducted to verify that the subgrade grades and elevations conform to the Construction Drawings;
- The subgrade meets specifications as determined by the test requirements of this CQA Plan;
- The surface of the subgrade is free of debris, wet and soft areas, ponded water, vegetation, mud, ice or frozen material; and
- If frozen subgrade material is encountered, it is removed and replaced in accordance with the General Specifications.

During placement and compaction of the clay liner, the CQA Engineer will verify and document that:

- Close observation of the placement and compaction of clay liner material with earthmoving equipment is performed by the CQA Engineer;
- The clay liner material meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 3;
- The clay liner is placed in accordance with the conditions and minimum requirements of the General Specifications;

- Each lift is compacted to the required thickness and minimum dry unit weight within the range of moisture contents established by the General Specifications as determined by the CQA testing methods and frequency in Table II 3;
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications;
- Thin-walled (i.e., Shelby tube) samples of clay liner material are collected and laboratory permeability testing is performed at the frequency specified in Table II-3;
- Perforations in the clay liner at testing and sampling locations are backfilled in accordance with the General Specifications; and
- Excessive wrinkles in the geosynthetic components underlying the clay have been "worked" out.

The CQA Engineer will document the properties of the clay soil as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-3. Minimum Frequency of Testing for CQA Evaluation of Clay Liner

Test	Frequency	Standard Test Method
Material Properties		
Recompacted Permeability (moisture content and dry density inside placement window)	1 per 5,000 cy placed (minimum 1 per source)	ASTM D 5084
Sieve Analysis	1 per 1,053 cy placed (minimum 1 per source)	ASTM D 422
Atterberg Limits	1 per 1,053 cy placed (minimum 1 per source)	ASTM D 4318
Compaction	1 per 5,263 cy placed (minimum 1 per source)	ASTM D 1557
IN PLACE		
Lift Thickness Before Compaction	1 per 2,500 ft^2 per lift	Field Measurement
Nuclear Density Meter(4) (50 ft. Grid)		
In-Situ Moisture Content	5/ac/lift	ASTM D 3017
In-Situ Dry Unit Weight	5/ac/lift	ASTM D 2922
Calibration and Check		
Sand Cone or Rubber Balloon (In-Situ Density)	1 per 20 nuclear densities	ASTM D 1556/D 2167
Oven Moisture Contents (In-situ Moisture Content)	1 per 10 nuclear moisture	ASTM D 2216
Permeability		
Shelby tube Samples	1/acre/lift	ASTM D 5084

II.4.2 Construction Quality Assurance Evaluation

Extensive construction quality assurance testing is required of the clay liners, and the Contractor must take quality assurance testing into account when planning his construction schedule. Nuclear density meter test methods will be used for testing the in-situ compacted dry unit weight and moisture content of the clay materials. Standard Count Calibration, Sand Cone and/or Rubber Balloon tests and oven moisture content tests will be used to calibrate the reading of the nuclear density meter and in cases of uncertainty with the nuclear density meter readings. Any discrepancies between test results will be resolved by the CQA Engineer

and the Owner. Thin-walled (i.e., Shelby) tube samples will be collected for hydraulic conductivity testing. At the request of the CQA Engineer, on-site construction equipment operated by the Contractor will be used to slowly push the sample tube through the clay layer. The CQA Engineer will conduct moisture, density, and hydraulic conductivity tests as specified in Table II-3.

The testing frequency during clay liner construction may be increased or modified at the discretion of the CQA Engineer when visual observations of construction performance indicate potential problems or when field experience with the proposed soil liner material have been obtained.

During construction, the frequency of testing may be increased by the CQA Engineer during adverse weather conditions, if equipment breaks down, at the start and finish of grading, if the material fails to meet the requirements of the General Specifications, or the extent of the work area is reduced.

All perforations in the clay liner at nuclear density test probe locations will be backfilled by the CQA Engineer with clay liner material and compacted by hand tamping. All perforations at sand cone or rubber balloon test locations, Shelby tube sample locations, and test pit locations will be backfilled by the Contractor with clay liner material and compacted in accordance with the specifications for clay liner.

If an in-place density test results fail to meet specifications, a confirmatory test will be performed immediately adjacent to the failed test. If the confirmatory test meets or exceeds specifications then a second confirmatory test will be performed at a second location immediately next to the failed test. If the second confirmatory test also meets or exceeds specifications then the area will be declared as meeting project specifications and the confirmatory tests will be reported. In the event that either confirmatory test fails to meet specifications, then additional testing will be performed to identify the limits of the area that does not meet project specifications.

If a defective area is discovered in the clay liner, the CQA Engineer will determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the CQA Engineer will determine the extent of the defective area by additional tests, observations, a review of records, or other means that the CQA Engineer deems appropriate. If the defect is related to adverse site conditions, such as excessively wet soils or surface desiccation, the CQA Engineer will define the limits and nature of the defect by testing or observation. After the extent and nature of a defect is determined and has been remedied by the Contractor, the CQA Engineer will verify that the deficiency is corrected by retesting repaired areas before any additional work is performed by the Contractor in the area of the deficiency.

Based on the requirements of the General Specifications, the Contractor will be required to use all means necessary to protect all prior work, as well as all materials and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repaired.

II.4.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the clay liner surfaces, and to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the survey results before the next phase of the liner system (geomembrane installation) is constructed.

II.5 Drainage Gravel

II.5.1 Supplier

The Contractor will require that the drainage gravel Supplier provide the CQA Engineer with quality control test results and a written certification signed by a responsible party of the Supplier that the tests required by the General Specifications have been performed on the material to be delivered to the site.

The CQA Engineer will examine the tests results and report any deviations to the Owner. If the drainage gravel supplier cannot provide test results required by the general specifications, then the CQA Engineer may perform or arrange to perform the tests.

II.5.2 Conformance Evaluation

The test methods and frequency for CQA conformance testing of the drainage gravel are specified in Table II-4.

If the material fails to meet the requirements of the General Specifications, the CQA Engineer will perform sufficient sampling and testing to identify the extent of the nonconforming material at the expense of the Contractor. Nonconforming material will be removed from the site.

Table II-4. Minimum Frequency of Testing for CQA Evaluation of Drainage Gravel

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 500 cy placed (minimum 1 per source)	ASTM D 422
Permeability	1 per source	ASTM D 2434

II.5.3 Placement and Compaction

The CQA Engineer will verify and document that the drainage gravel is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the drainage gravel, the CQA Engineer will verify and document that:

- The underlying geosynthetic layers are free of holes, tears, excessive wrinkles, or foreign objects; and
- All work on underlying layers is complete and accepted by the Owner.

During placement and compaction of the drainage gravel, the CQA Engineer will verify and document that:

- Drainage gravel material satisfies the requirements of the General Specifications as determined by the testing prescribed within the CQA Plan;
- Drainage gravel material is spread before 12:00 noon, unless otherwise approved by the Owner;
- The equipment wheel ground pressure versus the material thickness requirements given in the General Specifications are complied with;

- The drainage gravel is placed in a manner so that the maximum material drop height is in accordance with the General Specifications;
- Close observation of the placement and compaction of drainage gravel with earth moving equipment is performed; and
- The drainage gravel is compacted utilizing the equipment and number of passes specified in the General Specifications.

II.5.4 Construction Quality Assurance Evaluation

No density tests will be conducted on the drainage gravel. If the CQA Engineer suspects damage to pipes or underlying geosynthetic, the contractor will be required to expose the potentially damaged materials and repair any observed damage.

II.5.5 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform CQA surveys. The CQA surveyor will independently survey the elevations and grades of the top of the drainage gravel, and to confirm that the grades and elevations in the field agree with those shown on the Construction Drawings. The CQA surveys will be performed in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and CQA Engineer will approve the survey results before the next phase of the lining system is constructed.

II.6 Road Base

II.6.1 Supplier

The Contractor will provide the CQA Engineer with quality control test results and a written certification signed by a responsible party of the road base Supplier that the tests required by the General Specifications have been performed on material representative of that which is to be delivered to the site.

The CQA Engineer will examine the tests results and report any deviations from the General Specifications to the Owner. If the road base Supplier cannot provide test results required by the General Specifications, then the CQA Engineer may perform or arrange to perform the tests.

II.6.2 Conformance Evaluation

The test methods and frequency for CQA testing of the road base is specified in Table II 5.

If the gravel fails to meet the requirements of the General Specifications, the CQA Engineer will perform sufficient sampling and testing to identify the extent of the nonconforming material with the cost of such tests borne by the Contractor. Nonconforming material will be removed from the site.

Table II-5. Minimum Frequency of Testing for CQA Evaluation of Road Base

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 1000 cy placed (minimum 1 per source)	ASTM D 422
Modified Proctor	1 per 1000 cy placed (minimum 1 per source)	ASTM D 1557
IN PLACE		
In-Situ Moisture Content	1 per 300 cy	ASTM D 3017
In-Situ Dry Unit Weight	1 per 300 cy	ASTM D 2922

II.6.3 Placement

The CQA Engineer will verify and document that the road base is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the road base, the CQA Engineer will verify and document that:

- The underlying geotextile is free of holes, tears, excessive wrinkles, or foreign objects; and
- All work on underlying layers is complete and accepted by the Owner.

During placement of the road base, the CQA Engineer will verify and document that:

- Close observation of the placement of road base with earth moving equipment is performed;
- The road base is suitable and meets the requirements of the General Specifications as determined by the test methods and frequency prescribed within this CQA Plan; and
- The road base is placed in accordance with the General Specifications.

II.6.4 Construction Quality Assurance Evaluation

Nuclear density tests will be used for testing the in-situ dry unit weight and moisture content of the road base. If the CQA Engineer suspects damage to underlying geosynthetics, the Contractor will be required to expose the potentially damaged materials and repair any observed damage.

II.7 Cover Soil

II.7.1 Placement and Compaction

The CQA Engineer will verify and document that the cover soil is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the cover soil, the CQA Engineer will verify and document that:

- All or an approved portion of the waste filling plan is complete, and that a survey has been conducted to verify that the waste grades and elevations conform to the Construction Drawings; and

- The surface of the subgrade is free of debris, wet and soft areas, ponded water, vegetation, mud, ice or frozen material.

During placement and compaction of the cover soil, the CQA Engineer will verify and document that:

- Close observation of the placement and compaction of cover soil with earthmoving equipment is performed by the CQA Engineer;
- The cover soil meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 6;
- The cover soil is placed in accordance with the conditions and minimum requirements of the General Specifications;
- Each lift is compacted to the required thickness and minimum dry unit weight within the range of moisture contents established by the General Specifications as determined by the CQA testing methods and frequency in Table II 6;
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications; and
- The CQA Engineer will document the properties of the cover soil as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-6. Minimum Frequency of Testing for CQA Evaluation of Soil Cover

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 3000 cy placed (minimum 1 per source)	ASTM D 422
Atterberg Limits	1 per 3000 cy placed (minimum 1 per source)	ASTM D 4318
IN PLACE		
In-Situ Moisture Content	1 per 300 ft^2 per lift	ASTM D 3017
In-Situ Dry Unit Weight	1 per 300 ft^2 per lift	ASTM D 2922

II.7.2 Construction Quality Assurance Evaluation

Nuclear density tests will be used for testing the in-situ unit weight and moisture content of the cover soil.

The Contractor will be required to use all means necessary to protect all prior work, as well as all material and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repair.

II.7.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the cover soil to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the survey results before the next phase of construction.

II.8 Vegetative Cover

II.8.1 Placement and Compaction

The CQA Engineer will verify and document that the vegetative cover is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the vegetative cover, the CQA Engineer will verify and document that:

- All work on underlying layers is complete and accepted by Owner; and
- The underlying geocomposite is free of holes, team, excessive wrinkles, or foreign objects.

During placement and compaction of the vegetative cover, the CQA Engineer will verify and document that:

- Close observation of the placement and compaction of vegetative cover with earthmoving equipment is performed;
- The vegetative cover meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 7;
- The vegetative cover is placed in accordance with the conditions and minimum requirements of the General Specifications;
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications; and
- The CQA Engineer will document the properties of the vegetative cover as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-7. Minimum Frequency of Testing for CQA Evaluation of Vegetative Cover

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 3000 cy placed (minimum 1 per source)	ASTM D 422
Atterberg Limits	1 per 3000 cy placed (minimum 1 per source)	ASTM D 4318

II.8.2 Construction Quality Assurance Evaluation

The Contractor will be required to use all means necessary to protect all prior work, as well as all material and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repaired.

II.8.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the vegetative cover to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the survey results before the next phase of construction.

II.9 Pipe Bedding Sand

II.9.1 Placement and Compaction

The CQA Engineer will verify and document that the pipe bedding is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the pipe bedding sand, the CQA Engineer will verify and document that:

- All work on underlying layers is complete and accepted by the Owner; and
- The underlying geotextile is free of holes, tears, excessive wrinkles, or foreign objects.

During placement and compaction of the pipe bedding sand, the CQA Engineer will verify and document that:

- Close observation of the placement and compaction of pipe bedding with earthmoving equipment is performed;
- The pipe bedding sand meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 8;
- The pipe bedding sand is placed in accordance with the conditions and minimum requirements of the General Specifications;
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications; and
- The CQA Engineer will document the properties of the pipe bedding sand as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-8. Minimum Frequency of Testing for CQA Evaluation of Pipe Bedding Sand

Test	Frequency	Standard Test Material
Material Properties		
Sieve Analysis	1 per 500 cy placed	ASTM D 422
Atterberg Limits	1 per 500 cy placed	ASTM D 4318

II.9.2 Construction Quality Assurance Evaluation

The Contractor will be required to use all means necessary to protect all prior work, as well as all material and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repair.

II.9.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the pipe bedding sand to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the survey results before the next phase of construction.

II.10 Select Subbase

II.10.1 Placement and Compaction

Prior to the placement of the select subbase, the CQA Engineer will verify and document that:

- All work on underlying layers is complete and accepted by the Owner; and
- The underlying geocomposite is free of holes, tears, excessive wrinkles, or foreign objects.

During placement and compaction of the select subbase, the CQA Engineer will verify and document that:

- Close observation of the placement and compaction of select subbase with earthmoving equipment is performed by the CQA Engineer;
- The select subbase meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 9;
- The select subbase is placed in accordance with the conditions and minimum requirements of the General Specifications;
- Each lift is compacted to the required thickness and minimum dry unit weight within the range of moisture contents established by the General Specifications as determined by the CQA testing methods and frequency in Table II 9;
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications; and
- The CQA Engineer will document the properties of the select subbase as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-9. Minimum Frequency of Testing for CQA Evaluation of Select Subbase

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 1,000 cy placed (minimum 1 per source)	ASTM D 422
Modified Proctor	1 per 1,000 cy placed (minimum 1 per source)	ASTM D 1557
IN PLACE		
In-Situ Moisture Content	1 per 300 cy	ASTM D 3017
In-Situ Dry Unit Weight	1 per 300 cy	ASTM D 2922

II.10.2 Construction Quality Assurance Evaluation

Nuclear density tests will be used for testing the in-situ unit weight and moisture content of the select subbase.

The Contractor will be required to use all means necessary to protect all prior work, as well as all material and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repair.

II.10.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the select subbase to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the survey results before the next phase of construction.

II.11 Subbase

II.11.1 Placement and Compaction

The CQA Engineer will verify and document that the subbase is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of subbase, the CQA Engineer will verify and document that:

- All work on underlying layers is complete and accepted by the Owner.

During placement and compaction of the subbase, the CQA Engineer will verify and document that:

- Close observation of the placement and compaction of subbase with earthmoving equipment is performed by the CQA Engineer;

- The subbase meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 10;
- The subbase is placed in accordance with the conditions and minimum requirements of the General Specifications;
- Each lift is compacted to the required thickness and minimum dry unit weight within the range of moisture contents established by the General Specifications as determined by the CQA testing methods and frequency in Table II 10; and
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications;
- The CQA Engineer will document the properties of the subbase as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-10. Minimum Frequency of Testing for CQA Evaluation of Subbase

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 1,000 cy placed (minimum 1 per source)	ASTM D 422
Modified Proctor	1 per 1,000 cy placed (minimum 1 per source)	ASTM D 1557
IN PLACE		
In-Situ Moisture Content	1 per 300 cy	ASTM D 3017
In-Situ Dry Unit Weight	1 per 300 cy	ASTM D 2922

II.11.2 Construction Quality Assurance Evaluation

Nuclear density tests will be used for testing the in-situ unit weight and moisture content of the subbase.

The Contractor will be required to use all means necessary to protect all prior work, as well as all material and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repair.

II.11.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the subbase to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the survey results before the next phase of construction.

II.12 Foundation Sand

II.12.1 Placement and Compaction

The CQA Engineer will verify and document that the foundation sand is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the foundation sand, the CQA Engineer will verify and document that:

- All work on underlying layers is complete and accepted by the Owner; and
- The underlying geomembrane is free of holes, tears, excessive wrinkles, or foreign objects.

During placement and compaction of the foundation sand, the CQA Engineer will verify and document that:

- Close observation of the placement and compaction of foundation sand with earthmoving equipment is performed;
- The foundation sand meets the requirements of the General Specifications as determined by the CQA testing methods and frequency in Table II 11;
- The foundation sand is placed in accordance with the conditions and minimum requirements of the General Specifications;
- Each lift is compacted to the required thickness and minimum dry unit weight within the range of moisture contents established by the General Specifications as determined by the CQA testing methods and frequency in Table II 11;
- The Contractor uses the compaction equipment and the number of passes specified in the General Specifications; and
- The CQA Engineer will document the properties of the foundation sand as determined by the test methods and frequency prescribed by this CQA Plan and will report any nonconformance with the General Specifications to the Owner.

Table II-11. Minimum Frequency of Testing for CQA Evaluation of Foundation Sand

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 1000 cy placed (minimum 1 per source)	ASTM D 422
Modified Proctor	1 per 1000 cy placed(minimum 1 per source)	ASTM D 1557
IN PLACE		
In-Situ Moisture Content	1 per 300 cy	ASTM D 3017
In-Situ Dry Unit Weight	1 per 300 cy	ASTM D 2922

II.12.2 Construction Quality Assurance Evaluation

Nuclear density tests will be used for testing the in-situ unit weight and moisture content of the foundation sand.

The Contractor will be required to use all means necessary to protect all prior work, as well as all material and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repair.

II.12.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA Surveyor will independently survey the elevations and grades of the foundation sand to confirm that the lines and elevations in the field agree with those shown on the Construction Drawings. CQA surveys will be conducted in accordance with the requirements described in Part 14 of Section II.

The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the survey results before the next phase of construction.

II.13 Protective Soil Layer

II.13.1 Placement and Compaction

The CQA Engineer will verify and document that the protective soil layer is constructed to the elevations, grades, and thicknesses shown on the Construction Drawings, with material meeting the requirements of the General Specifications as determined by the test methods and frequencies specified within this CQA Plan.

Prior to the placement of the protective soil layer, the CQA Engineer will verify and document that:

- The underlying geocomposite is free of holes, tears, excessive wrinkles, or foreign objects; and
- All work on underlying layers is complete and accepted by the Owner.

During placement of the protective soil layer, the CQA Engineer will verify and document that:

- The soil is suitable and satisfies the requirements of the General Specifications as determined by the test methods and frequencies prescribed in Table 11-12;
- The protective soil is placed in accordance with the General Specifications;
- The lift thicknesses and total thickness of the protective soil layer agree with the requirements of the General Specifications;
- If excessive wrinkles begin to develop in the underlying geosynthetics during material placement or spreading, the wrinkles are worked out prior to continued placement operations;
- The protective soil layer is lightly compacted as described in the General Specifications;
- The protective soil is placed on the side slopes to the limits shown on the construction drawings; and
- No protective soil layer material is placed or compacted during periods of unfavorable weather conditions.

Table II-12. Minimum Frequency of Testing for CQA Evaluation of Protective Soil

Test	Frequency	Standard Test Method
Material Properties		
Sieve Analysis	1 per 5,000 cy placed (minimum 1 per source)	ASTM D 422
Atterberg Limits	1 per 5,000 cy placed (minimum 1 per source)	ASTM D 4318

II.13.2 Conformance Evaluation

There are no CQA testing requirements for the protective soil layer, other than thickness requirements.

If damage to underlying geosynthetics is expected, the CQA Engineer will require that the overlying protective soil layer material be removed to expose the geosynthetics.

The Contractor will be required to use all means necessary to protect all prior work, as well as all materials and completed work of other Sections. In the event of damage, the Contractor will be required to immediately make all repairs and replacements necessary. The CQA Engineer will verify and document that all damages are repaired.

II.13.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will perform the CQA surveys. The CQA surveyor will independently survey the elevations and grades of the top of the protective soil layer on the base and side-slopes of the landfill, and to confirm that the grades and elevations in the field agree with those shown on the Construction Drawings. The CQA surveys will be performed in accordance with the requirements described in Part 14 of Section II. The results of the survey conducted by the CQA Surveyor will be compiled in a report signed by the CQA Surveyor and the CQA Engineer, and will be reviewed by the Owner.

II.14 Surveying

The Surveyor will be required to survey each soil layer of the liner system and cover system (except the vegetative soil cover) for the landfill or surface impoundment in accordance with the requirements of the General Specifications. If required by the Owner, a Record Drawing will be submitted by the Surveyor before the placement of the next liner system layer. The surveys will be conducted at a 100 foot grid for slopes greater than 25 percent and at 50 foot grid for slopes less than 25 percent. All pipes for leachate detection, collection and/or removal will be surveyed at start and end points and at 50 foot intervals in between. The CQA survey will include enough information to confirm that the following features of the landfill or surface impoundment are constructed in accordance with the Construction Drawings:

- Toe of slope;
- Crest of slope;
- Grade breaks;
- Anchor trench;
- Leachate collection sump;
- Leak detection sump;
- Permanent landfill sump ~~(landfills only)~~; and
- Perimeter drainage ditches.

The CQA results will be submitted to the Owner for final approval to proceed on the liner system construction.

Section III. Geosynthetic Clay Liner Construction Quality Assurance

III.1 Geosynthetic Clay Liner Manufacture and Delivery

III.1.1 Manufacture and Quality Control

Prior to the installation of the Geosynthetic Clay Liner (GCL), the Contractor will be required to provide the CQA Engineer with the following information from the GCL Manufacturer:

- The certification required by the General Specifications signed by a responsible party employed by the GCL Manufacturer based on sampling interval of 1 per 50,000 square feet; and
- The manufacturing quality control certificates for each shift's production of GCL, signed by a responsible party employed by the GCL Manufacturer (such as the production manager). The quality control certificates will include:
  - Roll numbers and identification; and
  - Sampling procedures and results of quality control tests specified by the General Specifications including descriptions of the test methods used for GCL rolls assigned to the Triassic Park project.

The CQA Engineer will verify and document that:

- The property values certified by the GCL Manufacturer meet all of the specified values listed in the General Specifications;
- The measurements of properties by the GCL Manufacturer are properly documented and the test methods used are in accordance with the General Specifications; and
- The quality control certificates have been provided at the specified frequency for GCL rolls, and each certificate identifies the rolls or batch number related to that certificate.

The CQA Engineer will report deviations from the above requirements to the Owner prior to installation of the GCL.

III.1.2 Labeling

The CQA Engineer will verify and document that the GCL Manufacturer has labeled each roll of GCL as specified in the General Specifications.

The CQA Engineer will examine GCL rolls upon delivery and deviation from the above requirements will be reported to the Owner prior to installation of the GCL.

III.1.3 Transportation and Handling

The CQA engineer will observe and document the type of GCL handling equipment used by the installer is consistent with handling equipment identified in the general specifications.

Upon delivery at the site, the CQA Engineer will conduct a visual inspection of all rolls for defects and for damage. This examination will be conducted without unrolling rolls unless visible defects or damages are found. The CQA Engineer will indicate to the Owner:

- Any rolls that should be unrolled to allow for their inspection;
- Any rolls, or portions thereof, which should be rejected and removed from the site because they have severe flaws; and
- Any rolls which include minor repairable flaws.

III.1.4 Storage

The CQA Engineer will verify and document that storage of the GCL is in accordance with the General Specifications.

III.1.5 Quality Assurance Conformance Testing

Either at the Manufacture's plant or upon delivery of the rolls of GCL, the CQA Engineer will ensure that samples are removed at the specified frequency and forwarded to the Geosynthetics CQA Laboratory for testing to verify and document conformance with the General Specifications.

Unless otherwise specified, samples will be taken at a rate of one per lot or one per 100,000 square feet, whichever is greater. These samples will be tested for:

- Bentonite Moisture Content ASTM D 4643
- GCL Grab Strength, Elongation, Per Strength ASTM D 4632
- GCL Permeability ASTM D 5084
- GCL Interface Shear Strength ASTM D 5321

Conformance samples will be taken across the entire width of the roll and will not include the first 3 feet along the length of the roll. Unless otherwise specified, samples will be 1.5 feet (minimum) long by the roll width. The CQA Engineer will mark the machine direction on the samples with an arrow.

The CQA Engineer will examine all results from laboratory conformance testing and will compare the results to the specifications presented in Table 02780-1 of the Specifications. In addition, the CQA Engineer will report any nonconformance to the Owner as soon as practical after the test results become available.

The following procedure will apply whenever a sample fails a conformance test that is conducted by the Geosynthetics CQA Laboratory:

- The Contractor will be required to replace the roll (or rolls) of GCL that is not in conformance with the specifications with a roll that meets the requirements of the General Specifications.

- The CQA Engineer will ensure that conformance samples are removed for testing by the Geosynthetics CQA Laboratory from the closest numerical roll on both sides of the roll from which the failing sample was obtained. These two samples must pass the above conformance tests. If either of these samples fails to meet the requirements, samples will be collected from the five numerically closest untested rolls on both sides of the failed samples and tested by the Geosynthetics CQA Laboratory. These ten samples must pass the above conformance tests. If any of these

samples fail, a sample from every roll of GCL on site and a sample from every roll that is subsequently delivered from the same Manufacturer must be conformance tested by the Geosynthetics CQA Laboratory. The costs of all such tests are to be borne by the Contractor.

The CQA Engineer will document actions taken in conjunction with conformance test failures and report all actions to the Owner.

III.2 Geosynthetic Clay Liner Installation

III.2.1 Earthworks

III.2.1.1 Surface Preparation

The Contractor or subcontractor responsible for GCL installation will be required to certify in writing that the surface on which the GCL will be installed is acceptable. The certificate of acceptance will be required to be given by the Contractor to the CQA Engineer, who will then verify to the Owner that the subgrade and/or clay liner installation is accepted immediately prior to commencement of GCL installation in the area under consideration.

After the surface on which the GCL is to be installed has been accepted by the Contractor responsible for GCL installation, it will be the CQA Engineer's responsibility to indicate to the Owner any change in the underlying layer that may, in accordance with the General Specifications, require repair work. If the Owner requires repair work, then it will be the responsibility of the Contractor to repair the underlying layer.

III.2.1.2 Anchor Trenches

The CQA Engineer will verify and document that the anchor trench backfill meets the requirements of the General Specifications and that the backfill is placed in accordance with the General Specifications.

III.2.2 Geosynthetic Clay Liner Deployment

III.2.2.1 Field Panel Identification

A field panel is the unit area of GCL which is to be placed in the field, i.e., a field panel is a roll or a portion of roll cut in the field.

The CQA Engineer will verify that each field panel is given an identification code (number or letter-number) consistent with the layout plan. This identification code will be agreed upon by the Owner, and the Contractor. This field panel identification code should be as simple and logical as possible. (Note: manufacturing plant roll numbers are usually cumbersome and are not related to location in the field.) It will be the responsibility of the Contractor to ensure that each field panel placed is marked with the manufacturing plant roll number. The roll number will be marked in the center of the panel in a color to allow for easy inspection.

The CQA Engineer will establish a table or chart showing correspondence between manufacturing plant roll numbers and field panel identification codes. The field panel identification code will be used for all CQA records.

III.2.2.2 Field Panel Placement

III.2.2.2.1 Installation Schedule

The CQA Engineer will evaluate significant changes in the schedule proposed by the Contractor and advise the Owner on the acceptability of that change. The CQA Engineer will verify and document that the condition of the underlying layer has not changed detrimentally during installation. Any damage to the surface of the underlying layer will be repaired by the Contractor in accordance with the General Specifications.

The CQA Engineer will record the identification code, location, and date of installation of each field panel.

III.2.2.2.2 Weather Conditions

The CQA Engineer will verify and document that GCL is not placed during inclement weather conditions as specified within the General Specifications.

Additionally, the CQA Engineer will verify and document that the underlying layer has not been damaged by weather conditions.

III.2.2.2.3 Damage

The CQA Engineer will visually observe each panel, after placement, for damage. The CQA Engineer will advise the Owner which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels which have been rejected by the Owner will be marked, and their removal from the work area will be documented by the CQA Engineer.

III.2.2.2.4 Seam Overlap and Bentonite Seal

The CQA engineer will observe and document that the seam overlaps and bentonite material placed between panels along the seams meet specification guidelines. The CQA engineer will verify overlap width and will observe bentonite seal placement.

III.2.3 Defects and Repairs

III.2.3.1 Identification

All seams and non-seam areas of the GCL will be inspected by the CQA Engineer for evidence of defects, holes, contamination of geotextiles, displaced panels, premature hydration, and any sign of contamination by foreign matter. The CQA Engineer will observe and document repair procedures described below.

III.2.3.2 Repair Procedures

Prior to cover material placement, damage to the GCL shall be identified and repaired by the installer.

III.2.3.2.1 Rip and Tear Repair (Flat Surfaces)

Rips or tears may be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch cut from unused GCL over the damage (damaged material may be left in place), with a minimum overlap of 12 inches on all edges.

Accessory bentonite should be placed between the patch edges and the repaired material at a rate of a quarter pound per lineal foot of edge spread in a continuous ~~six~~ 6-inch fillet.

III.2.3.2.2 Rip and Tear Repair (Slopes)

Damaged GCL material on slopes shall be repaired by the same procedures above, however, the overlapped edges of the patch should be wide enough to ensure the patch will keep its position during backfill or cover operations.

III.2.3.2.3 Displaced Panels

Displaced panels shall be adjusted to the correct position and orientation. The adjusted panel shall then be inspected for any geotextile damage or bentonite loss. Damage shall be repaired by the above procedure.

III.2.3.2.4 Premature Hydration

If the GCL is subjected to premature hydration, the GCL installer shall notify the CQA Engineer and Design Engineer for a site specific determination as to whether the material is acceptable or if alternative measures must be taken to ensure the quality of the design dependent upon the degree of damage.

Section IV. Geomembrane Construction Quality Assurance

IV.1 Geomembrane Manufacture and Delivery

IV.1.1 Resin

Prior to the installation of the HDPE geomembrane material, the Contractor will be required to provide the CQA Engineer with the following information from the geomembrane Manufacturer:

- A copy of the quality control certificates issued by the resin Supplier that includes the origin (resin Supplier's name and resin production plant), identification (brand name, number) the production date of the resin used in the manufacture of the geomembrane shipped to the site, and the results of tests conducted to verify that the quality of the resin used to manufacture the geomembrane rolls assigned to the project meets the General Specifications; and
- Certification from the geomembrane Manufacturer that no reclaimed polymer is added to the resin during the manufacture of the geomembrane to be used in this project; the use of polymer recycled during the manufacturing process is permitted if the recycled polymer does not exceed 2 percent by weight of the total polymer weight.

The CQA Engineer will review these documents and report any discrepancies with the above requirements to the Owner.

IV.1.2 Geomembrane Manufacturing Quality Control

Prior to the installation of the HDPE geomembrane, the Contractor will be required to provide the CQA Engineer with the following information from the geomembrane Manufacturer:

- The certification required by the General Specifications signed by a responsible party employed by the geomembrane Manufacturer based on sampling interval of 1 per 50,000 square feet; and
- The manufacturing quality control certificates for each shift's production of geomembrane, signed by a responsible party employed by the geomembrane Manufacturer (such as the production manager). The quality control certificates will include:
  - Roll numbers and identification; and
  - Sampling procedures and results of quality control tests specified by the General Specifications including descriptions of the test methods used for geomembrane rolls assigned to the Triassic Park project.

The CQA Engineer will verify and document that:

- The property values certified by the geomembrane Manufacturer meet all of the specified values listed in the General Specifications;
- The measurements of properties by the geomembrane Manufacturer are properly documented and the test methods used are in accordance with the General Specifications; and
- The quality control certificates have been provided at the specified frequency for geomembrane rolls, and each certificate identifies the rolls or batch number related to that certificate.

The CQA Engineer will report deviations from the above requirements to the Owner prior to installation of the geomembrane.

IV.1.3 Labeling

The CQA Engineer will verify and document that the geomembrane Manufacturer has labeled each roll of geomembrane as specified in the General Specifications.

The CQA Engineer will examine geomembrane rolls upon delivery and deviation from the above requirements will be reported to the Owner prior to installation of the geomembrane.

IV.1.4 Transportation and Handling

Upon delivery at the site, the CQA Engineer will conduct a visual inspection of all rolls for defects and for damage. This examination will be conducted without unrolling rolls unless visible defects or damages are found. The CQA Engineer will indicate to the Owner:

- Any rolls that should be unrolled to allow for their inspection;
- Any rolls, or portions thereof, which should be rejected and removed from the site because they have severe flaws; and
- Any rolls which include minor repairable flaws.

IV.1.5 Storage

The CQA Engineer will verify and document that storage of the geomembrane is in accordance with the General Specifications.

IV.1.6 Quality Assurance Conformance Testing

Either at the Manufacture's plant or upon delivery of the rolls of geomembrane, the CQA Engineer will ensure that samples are removed at the specified frequency and forwarded to the Geosynthetics CQA Laboratory for testing to verify and document conformance with the General Specifications.

Conformance samples will be taken by the CQA Engineer across the entire width of the roll and will not include the first 3 feet. Unless otherwise specified, samples will be 1.5 feet (minimum) long by the roll width. The CQA Engineer will mark the direction of the machine used to cut the samples with an arrow.

Unless otherwise specified, samples will be taken at a rate of one per lot or one per 100,000 square feet, whichever is greater. These samples will be tested for:

- Specific gravity
- Thickness
- Yield strength and yield elongation
- Tensile strength and tensile elongation at break
- Carbon black content
- Carbon black dispersion
- Puncture Resistance

Test shall be conducted in accordance with the test procedure presented in the specification.

The CQA Engineer will examine all results from laboratory conformance testing and will report any nonconformance to the Owner as soon practical after the test results become available.

The following procedure will apply whenever a sample fails a conformance test that is conducted by the CQA Engineer:

- The Contractor will be required to replace the roll (or rolls) of geomembrane that is in nonconformance with the General Specifications with a roll that meets the General Specifications.
- The CQA Engineer will ensure that conformance samples are removed for testing by the Geosynthetics CQA Laboratory from the closest numerical roll on both sides of the failed roll. These two samples must pass the above conformance tests. If either of these samples fails, samples will be collected from the five numerically closest untested rolls on both sides of the failed sample and tested by the Geosynthetics CQA Laboratory. These ten samples must pass the above conformance tests. If any of these samples fail, a sample from every roll of geomembrane on site and every roll subsequently delivered from the same Manufacturer must be conformance tested by the Geosynthetics CQA Laboratory; the cost of all such additional tests are to be borne by the Contractor.

The CQA Engineer will document actions taken in conjunction with conformance test failures and report all actions to the Owner.

IV.2 Geomembrane Installation

IV.2.1 Earthwork

IV.2.1.1 Surface Preparation

The Contractor or subcontractor responsible for geomembrane installation will be required to certify in writing that the surface on which the geomembrane will be installed is acceptable.

The certificate of acceptance will be required to be given by the Contractor to the CQA Engineer, who will then verify to the Owner that the subgrade is accepted immediately prior to commencement of geomembrane installation in the area under consideration.

After the surface on which the geomembrane is to be installed has been accepted by the Contractor responsible for geomembrane installation, it will be the CQA Engineer's responsibility to indicate to the Owner any change in the underlying layer that may, in accordance with the General Specifications, require repair work. If the Owner requires repair work, then it will be the responsibility of the Contractor to repair the underlying layer.

IV.2.1.2 Anchor Trenches

The CQA Engineer will verify and document that the anchor trench backfill meets the requirements of the General Specifications and that the backfill is placed in accordance with the General Specifications.

IV.2.2 Geomembrane Deployment

IV.2.2.1 Layout Drawing

The Contractor will be required to produce layout drawings which show the geomembrane panel configuration, dimensions, details, seam locations, etc. The layout drawings must be approved by the Owner prior to the installation of the geomembrane. The layout drawings, as modified and/or approved by the Owner will be part of the specifications, and a copy will be furnished to the CQA Engineer. The CQA Engineer will become familiar with the layout drawings.

IV.2.2.2 Field Panel Identification

A field panel is the unit area of geomembrane which is to be seamed in the field~~,~~ (i.e., ~~a field panel is~~ a roll or a portion of roll cut in the field).

The CQA Engineer will verify that each field panel is given an identification code (number or letter-number) consistent with the layout plan. This identification code will be agreed upon by the Owner, and the Contractor. This field panel identification code should be as simple and logical as possible. (Note: manufacturing plant roll numbers are usually cumbersome and are not related to location in the field.) It will be the responsibility of the Contractor to ensure that each field panel placed is marked with the manufacturing plant roll number. The roll number will be marked in the center of the panel in a color to allow for easy inspection.

The CQA Engineer will establish a table or chart showing correspondence between manufacturing plant roll numbers and field panel identification codes. The field panel identification code will be used for all CQA records.

IV.2.2.3 Field Panel Placement

IV.2.2.3.1 Location

The CQA Engineer will verify and document that field panels are installed at the locations and positions indicated in the Contractor's layout plan, as approved or modified by the Owner.

IV.2.2.3.2 Installation Schedule

The CQA Engineer will evaluate significant changes in the schedule proposed by the Contractor and advise the Owner on the acceptability of that change. The CQA Engineer will verify and document that the condition of the underlying layer has not changed detrimentally during installation. Any damage to the surface of the underlying layer will be repaired by the Contractor in accordance with the General Specifications.

The CQA Engineer will record the identification code, location, and date of installation of each field panel.

IV.2.2.3.3 Weather Conditions

The CQA Engineer will verify and document that geomembrane is not placed during inclement weather conditions as specified within the General Specifications.

Additionally, the CQA Engineer will verify and document that the underlying layer has not been damaged by weather conditions.

IV.2.2.3.4 Damage

The CQA Engineer will visually observe each panel, after placement and prior to seaming, for damage (e.g., holes, blisters, creases). The CQA Engineer will advise the Owner which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels which have been rejected by the Owner will be marked, and their removal from the work area will be documented by the CQA Engineer.

IV.2.3 Field Seaming

IV.2.3.1 Seam Layout

The CQA Engineer will verify and document that the seam layout shown on the Panel Layout Drawing (Part 2.2.1) is consistent with the General Specifications. No panels may be seamed in the field without the Owner's approval. In addition, seams not specifically shown on the seam layout drawing may not be made without the Owner's prior approval.

A seam numbering system compatible with the panel numbering system will be agreed upon by the Contractor, the Owner, and CQA Engineer.

IV.2.3.2 Seaming Equipment and Products

Processes approved by the General Specifications for field seaming are: (i) extrusion seaming; and (ii) fusion seaming. Proposed alternate processes will be required to be documented and submitted to the Owner for approval. Only seaming apparatus which the Owner has specifically approved by make and model will be used. The Contractor will be required to use a pyrometer to ensure that accurate temperatures of the extrudate and seamer nozzle are being achieved.

The extrusion seaming apparatus will be equipped with gauges indicating the temperatures of the extrudate and nozzle. The Contractor will be required to provide to the CQA Engineer the Manufacturer's certification that the extrudate is compatible with the General Specifications and is comprised of the same resin as the geomembrane.

The CQA Engineer will log ambient temperatures, seaming apparatus temperatures, and extrudate temperatures or fusion seaming apparatus speeds. Ambient temperatures will be measured as specified in the General Specifications.

IV.2.3.3 Seam Preparation

The CQA Engineer will verify and document that:

- Prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris, and foreign material; and
- Preparation of seams is in accordance with the General Specifications.

IV.2.3.4 Weather Conditions for Seaming

The CQA Engineer will verify and document that weather conditions for seaming are within the limits specified in the General Conditions.

IV.2.3.5 Trial Seams

The Contractor will be required to make trial seams on fragment pieces of geomembrane liner to verify that seaming conditions are adequate. The Contractor will be required to make and test trial seams at the frequency and in accordance with the methods specified in the General Specifications.

The CQA Engineer will observe all trial seam procedures. The successful trial seam sample will be assigned a number and marked accordingly by the CQA Engineer, who will log the date, hour, ambient temperature, number of seaming unit, name of seamer, and pass or fail description. The sample itself will be retained only until the construction of the liner is complete and the liner has been accepted by the Owner.

IV.2.3.6 Nondestructive Seam Continuity Testing

IV.2.3.6.1 Introduction

Except as otherwise noted in the General Specifications, the Contractor will nondestructively test all field seams over their full length in accordance with the General Specifications. The purpose of nondestructive tests is to check the continuity of seams. Continuity testing will be carried out as the seaming work progresses, not at the completion of all field seaming. Nondestructive testing will not be permitted before sunrise or after sunset unless the Contractor demonstrates to the Owner that the Contractor has the capabilities to perform continuity testing under reduced light conditions.

The CQA Engineer will:

- Observe the continuity testing;
- Record location, date, test unit number, name of tester, and outcome of all testing; and
- Document and inform the Contractor of any required repairs.

The Contractor will be required to complete any required repairs in accordance with the General Specifications.

The CQA Engineer will:

- Observe the repair and re-testing of the repair;
- Mark on the geomembrane that the repair has been made; and
- Document the results.

The CQA Engineer will verify and document the procedures specified in the General Specifications where seams cannot be nondestructively tested.

The location, date of visual observation, name of tester, and outcome of the test or observation will be recorded by the CQA Engineer and reported to the Owner.

IV.2.3.7 Destructive Seam Testing

IV.2.3.7.1 Concept

Destructive seam tests will be performed at selected locations. The purpose of these tests is to evaluate seam strength and integrity. Seam strength testing will be done as the seaming work progresses, not at the completion of all field seaming.

IV.2.3.7.2 Location and Frequency

The CQA Engineer will select locations where seam samples will be cut out for laboratory testing. The test frequency and locations will be established as follows:

- Samples will be collected at a minimum frequency of one test location per 500 feet of seam length (this minimum frequency is to be determined as an average taken throughout the entire landfill or surface impoundment project); and
- Test locations will be determined during seaming at the CQA Engineer's discretion; selection of such locations may be prompted by suspicion of excess crystallinity, contamination, offset seams, or any other potential cause of imperfect seaming.

The Contractor will not be informed in advance of the locations where the seam samples will be taken.

IV.2.3.7.3 Sampling Procedure

The Contractor will be required to cut samples as directed by the CQA Engineer as the seaming progresses in order to have laboratory test results before the geomembrane is covered by another material. The CQA Engineer will:

- Observe sample cutting;
- Assign a number to each sample and mark it accordingly;
- Record the sample number and location on the panel layout drawing; and
- Record the reason for taking the sample at this location (e.g., routine testing, suspicious feature of the geomembrane, etc.).

All holes in the geomembrane resulting from destructive seam sampling will be covered by the Contractor immediately after sampling and repaired in accordance with the repair procedures described in the General Specifications. The continuity of the new seams in the repaired area will be nondestructively tested according to the General Specifications.

IV.2.3.7.4 Size of Samples

At a given sampling location, two types of samples will be required to be taken by the Contractor.

First, two specimens for field testing will be taken. Each of these specimens will be 1 inch wide by 6 to 12 inches long, with the seam centered parallel to the width. The distance between these two specimens will be approximately 42 inches. If both specimens pass the field test described in the General Specifications, a sample for laboratory testing will be taken.

The sample for laboratory testing will be required to be taken between the two specimens for field testing. The destructive sample will be 12 inches wide by 42 inches long with the seam centered lengthwise. The sample will be cut into three parts and distributed as follows:

- One portion to the Contractor, 12 inches long;
- One portion to the CQA Engineer for archive storage, 12 inches long; and
- One portion to the CQA Engineer for CQA Laboratory testing, 18 inches long.

Final determination of the sample sizes will be made at the preconstruction meeting.

IV.2.3.7.5 Field Testing

The two 1-inch wide specimens specified above will be required to be tested in the field, by the Contractor, by tensiometer for peel and should not fail in the seam. If any field test sample fails to pass, then the procedures outlined in the General Specifications will be required to be followed.

The CQA Engineer will observe field tests and mark all samples and portions with their number, date, and time.

IV.2.3.7.6 Geosynthetic Construction Quality Assurance Laboratory Testing

Laboratory destructive test samples will be packaged and shipped to the CQA Laboratory by the CQA Engineer in a manner which will not damage the test sample. The CQA Engineer will store the archive samples until the completion of the project. Laboratory destructive test samples will be tested by the Geosynthetics CQA Laboratory.

Testing will include "Shear Strength", and "Peel Strength", (ASTM D 443) with 1-inch-wide strip, tested at 2 inches per minute). The minimum acceptable values to be obtained in these tests are those indicated in Table 02775-2 of Section 02775 of the General Specifications. At least 5 specimens will be tested for each test method. Specimens will be selected alternately by test from the samples (i.e., peel, shear, peel, shear). At least 4 out of 5 of the specimens must pass.

The Geosynthetics CQA Laboratory will provide test results verbally to the CQA Engineer in a timely manner after they receive the samples. The CQA Engineer will review laboratory test results as soon as they become available, and inform the Owner of the test results.

IV.2.3.7.7 Procedures for Destructive Test Failure

The procedures specified within the General Specifications will be required whenever a sample fails a destructive test, whether that test is conducted by the Geosynthetics CQA Laboratory, the Contractor's laboratory (if required), or by field tensiometer. The CQA Engineer will verify and document that one of the options specified within the General Specifications is followed.

The CQA Engineer will document all actions taken in conjunction with destructive test failures.

IV.2.4 Defects and Repairs

IV.2.4.1 Identification

All seams and non-seam areas of the geomembrane will be inspected by the CQA Engineer for evidence of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane will be required to be clean at the time of examination. The geomembrane surface will be required to be broomed or washed by the Contractor if the amount of dust or mud inhibits examination.

IV.2.4.2 Evaluation

Each suspect location both in seam and non-seam areas will be required to be either non-destructively tested using the methods described in the General Specifications, or repaired as appropriate as determined by the CQA Engineer. Each location which fails the non-destructive testing will be marked by the CQA Engineer and will be required to be repaired by the Contractor. Materials should not be placed over geomembrane locations that have been repaired until the CQA Engineer has approved the repair.

IV.2.4.3 Large Wrinkles

When seaming of the geomembrane is completed (or when seaming of a large area of the geomembrane is completed) and prior to placing overlying materials, the CQA Engineer will visually inspect the geomembrane for wrinkles. The CQA Engineer will indicate to the Contractor which wrinkles, if any, should be cut and reseamed. The seam thus produced will be tested like any other seam.

IV.2.4.4 Repair Procedures

Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test will be repaired by the Contractor in accordance with the applicable method specified within the General Specifications.

IV.2.4.5 Testing of Repairs

Each repair will be located and logged by the CQA Engineer. Each repair will be non-destructively tested using the methods described in the General Specifications as appropriate. Repairs which pass the non-destructive test will be considered as an adequate repair. Large caps may be of sufficient extent to require destructive testing, at the discretion of the CQA Engineer. Failed tests will require the repair to be redone and retested until passing test results are obtained. The CQA Engineer will observe the non-destructive testing of repairs and will document the date of the repair and test outcome.

IV.2.5 Appurtenances

The CQA Engineer will verify and document that:

- Installation of the geomembrane around, and connection of geomembrane to appurtenances have been made according to the General Specifications;
- Extreme care is taken while seaming around appurtenances since neither non-destructive nor destructive testing may be feasible in these areas; and
- The geomembrane has not been visibly damaged while being connected to appurtenances.

The CQA Engineer will inform the Owner if the above conditions are not fulfilled.

IV.3 Surveying

The CQA Engineer, in conjunction with the Surveyor, will be required to prepare an "as-built" Record Drawing for geomembrane installations. It will include the surveyed location of field panels, seams (factory and field), repairs, and test locations.

The CQA results (Record Drawing and certification of Contractor's work) will be submitted to the Owner for final review and approval prior to proceeding with construction of any subsequent liner system components.

Section V. Filter Or Cushion Geotextile Construction Quality Assurance

V.1 Geotextiles

V.1.1 Manufacturing

The Geosynthetics Contractor will be required to provide the CQA Engineer with the following information from the geotextile Manufacturer:

- Certification required by the General Specifications signed by a responsible party employed by the geotextile Manufacturer; and
- The manufacturing quality control certificates for each shift's production of geotextile rolls, which include geotextile roll numbers and identification, sampling procedures, and descriptions and results of the quality control tests specified in the General Specifications signed by a responsible party employed by the geotextile Manufacturer.

The CQA Engineer will examine all geotextile Manufacturer's certifications to verify and document that the property values listed on the certifications meet or exceed those specified within the General Specifications and that proper and complete documentation has been provided by the geotextile Manufacturer for all geotextile used at the site. The CQA Engineer will report any deviations from the above requirements to the Owner prior to installation of the geotextile.

V.1.2 Labeling

The CQA Engineer will verify and document that the geotextile Manufacturer has labeled all rolls of geotextile with the information specified in the General Specifications.

The CQA Engineer will examine rolls upon delivery and any deviation from the above requirements will be reported to the Owner prior to installation of the geotextile.

V.1.3 Shipment and Storage

The CQA Engineer will observe rolls of geotextile upon delivery at the site and any deviation from the requirements specified within the General Specifications will be reported to the Owner. Any damaged rolls will be rejected by the CQA Engineer and required to be repaired or replaced by the Contractor.

V.1.4 Conformance Testing

Either at the Manufacturer's factory or upon delivery of the geotextile rolls, the CQA Engineer will ensure that samples are removed and forwarded to the Geosynthetics CQA Laboratory for testing to verify and document conformance with the requirements of the General Specifications.

Conformance samples will be taken across the entire width of the roll and will not include the first 3 feet along the length of the roll. Unless otherwise specified, samples will be 1.5 feet (minimum) long by the roll width. The CQA Engineer will mark the machine direction on the samples with an arrow.

Samples will be taken at a rate of one per lot or one per 100,000 square feet, whichever is greater. These samples will be tested for:

- Mass per unit area
- Grab strength
- Tear strength
- Puncture strength
- Permittivity

(Note: All tests should be conducted in accordance with the test methods listed in the specification.)

If the geotextile is being used as a filter, cushion or separator, the samples will also be tested for apparent opening size.

The CQA Engineer will examine all results of laboratory conformance testing and report any nonconformance to the Owner as soon as results become available.

The following procedure will apply whenever a sample fails a conformance test that is conducted by the Geosynthetics CQA Laboratory:

- The Contractor will be required to replace the roll (or rolls) of geotextile that is not in conformance with the specifications with a roll that meets the requirements of the General Specifications.
- The CQA Engineer will ensure that conformance samples are removed for testing by the Geosynthetics CQA Laboratory from the closest numerical roll on both sides of the roll from which the failing sample was obtained. These two samples must pass the above conformance tests. If either of these samples fails to meet the requirements, samples will be collected from the five numerically closest untested rolls on both sides of the failed sample and tested by the Geosynthetics CQA Laboratory. These ten samples must pass the above conformance tests. If any of these samples fail, a sample from every roll of geotextile on site and a sample from every roll that is subsequently delivered from the same Manufacturer must be conformance tested by the Geosynthetics CQA Laboratory. The costs of all such tests are to be borne by the Contractor.

The CQA Engineer will document actions taken in conjunction with conformance test failures and report all actions taken to the Owner.

V.1.5 Handling and Placement

The Geosynthetics Contractor will be required to handle all geotextile in such a manner as to ensure the geotextile is not damaged in any way. The CQA Engineer will verify and document compliance with the following:

- Just prior to geotextile placement, the layer that underlies the geotextile, if it is a geosynthetic, is clean and free of excessive amounts of dust, dirt, stones, rocks, or other obstructions that could potentially damage the liner system.
- In the presence of excessive wind, the geotextile is weighted with sandbags (or equivalent weight approved by the CQA Engineer).
- Geotextile is kept under tension to minimize the presence of wrinkles in the geotextile. If necessary, the geotextile is positioned by hand after being unrolled to minimize wrinkles.

- Geotextiles are cut using a geotextile cutter approved by the geotextile Manufacturer and the CQA Engineer. If in place, special care is taken to protect other materials (such as underlying geosynthetics) from damage which could be caused by the cutting of the geotextiles.
- The Contractor takes any necessary precautions to prevent damage to the underlying layers during placement of the geotextile.
- During placement of geotextiles, care is taken not to entrap in the geotextile stones, excessive dust, or moisture that could damage the underlying layers, generate clogging of drains or filters, or hamper subsequent seaming.
- Geotextile is not left exposed for a period in excess of 30 days after placement unless a longer exposure period is approved by the CQA Engineer and Owner.

The CQA Engineer will document any noncompliance with the above requirements and report them to the Owner.

V.1.6 Seams and Overlaps

The CQA Engineer will verify and document that all geotextile seams are oriented, overlapped and sewn in accordance with the General Specifications.

The Contractor will be required to pay close attention at seams to ensure that no protective soil layer material could be inadvertently placed beneath the geotextile.

Sewing will be required to be performed as required in the General Specifications.

V.1.7 Repair

The CQA Engineer will verify and document that any holes or tears in the geotextile are repaired in accordance with the requirements of the General Specifications.

The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

Section VI. Geocomposite Construction Quality Assurance

VI.1 Geocomposites

VI.1.1 Manufacturing

The Geosynthetics Contractor will be required to provide the CQA Engineer with the following information from the geocomposite Manufacturer:

- Certification required by the General Specifications signed by a responsible party employed by the geocomposite Manufacturer;
- The certification from the geocomposite Manufacturer that no reclaimed polymer was added to the resin during the manufacture of the geonet component of the geocomposite rolls assigned this project; and
- The manufacturing quality control certificates for each shift's production of geocomposite rolls which include geocomposite roll numbers and identification, sampling procedures, and descriptions and results of quality control tests for the geonet specified in the General Specifications signed by a responsible party employed by the geocomposite Manufacturer.

The CQA Engineer will examine all of the geocomposite Manufacturer certifications to verify and document that the property values listed on the certifications meet or exceed those specified within the General Specifications and that proper and complete documentation has been provided by the geocomposite Manufacturer for all geocomposite used at the site. The CQA Engineer will report any deviations from the above requirements to the Owner prior to installation of the geocomposite.

VI.1.2 Labeling

The CQA Engineer will verify and document that the geocomposite Manufacturer has labeled all rolls of geocomposite as specified within the General Specifications.

The CQA Engineer will examine rolls upon delivery and any deviation from the above requirements will be reported to the Owner prior to installation of the geocomposite.

VI.1.3 Shipment and Storage

The CQA Engineer will observe rolls of geocomposite upon delivery at the site and any deviation from the requirements of the General Specifications will be reported to the Owner. Any damaged rolls will be rejected by the CQA Engineer and required to be repaired or replaced by the Contractor.

VI.1.4 Conformance Testing

Either at the Manufacturer's plant or upon delivery of the geocomposite rolls, the CQA Engineer will ensure that samples are removed and forwarded to the Geosynthetics CQA Laboratory for testing to verify and document conformance with the requirements of the General Specifications.

Conformance samples will be taken across the entire width of the roll and will not include the first 3 feet. Unless otherwise specified, samples will be 1.5 feet long (minimum) by the roll width. The CQA Engineer will mark the machine direction on the samples with an arrow.

Samples will be taken at a rate of one per lot or one per 100,000 square feet, whichever is greater. These samples will be tested for: peel strength (ASTM F 904); and hydraulic transmissivity, in accordance with the text methods presented in the specification.

The CQA Engineer will examine all results from laboratory conformance testing and will report any nonconformance to the Owner as soon as the results are become available.

The following procedure will apply whenever a sample fails a conformance test that is conducted by the Geosynthetics CQA Laboratory:

- The Contractor will be required to replace the roll (or rolls) of geocomposite that is not in conformance with the specifications with a roll that meets the requirements of the General Specifications.
- The CQA Engineer will ensure that conformance samples are removed for testing by the Geosynthetics CQA Laboratory from the closest numerical roll on both sides of the failed roll. These two samples must pass the above conformance tests. If either of these samples fails, samples will be collected from the 5 numerically closest untested rolls on both sides of the failed sample and tested by the Geosynthetics CQA Laboratory. These ten samples must pass the above conformance tests. If any of these samples fail, a sample from every roll of geocomposite on site and a sample from every roll that is subsequently delivered from the same Manufacturer must be conformance tested by the Geosynthetics CQA Laboratory. The cost of such tests is to be borne by the Contractor.

The CQA Engineer will document actions taken in conjunction with conformance test failures and report all actions to the Owner.

VI.1.5 Handling and Placement

The Contractor will be required to handle all geocomposite in such a manner as to ensure it is not damaged. The CQA Engineer will verify and document compliance with the following:

- Just prior to geocomposite placement, the layer that will underlie the geocomposite is clean and free of excessive amounts of dust, dirt, stones, rocks, or other obstructions that could potentially damage the underlying layers or clog the drainage system.
- In the presence of excessive wind, the geocomposite is weighted with sandbags (or equivalent weight approved by the CQA Engineer).
- Geocomposite is kept under tension to minimize the presence of wrinkles in the geocomposite. If necessary, the geocomposite is positioned by hand after being unrolled to minimize wrinkles.
- Geocomposites are cut using a geocomposite cutter approved by the geocomposite Manufacturer and the CQA Engineer. If in place, special care is taken to protect other materials from damage which could be caused by the cutting of the geocomposites.
- The Geosynthetics Contractor takes all necessary precautions to prevent damage to the underlying layers during placement of the geocomposite.
- Geocomposite is not welded to geomembranes.

- During placement of clean geocomposite, care is taken not to entrap stones, excessive dust, or moisture that could damage the underlying geomembrane, generate clogging of drains or filters, or hamper subsequent seaming.
- A visual examination of the geocomposite is carried out over the entire surface, after installation, to ensure that no potentially harmful foreign objects, such as needles, are present.
- Geocomposite is not left exposed for a period in excess of 30 days after placement unless a longer exposure period is approved by the CQA Engineer and the Owner.

The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

VI.1.6 Seams and Overlaps

The components of the geocomposite (e.g., geotextile-geonet-geotextile) are not bonded together at the ends and edges of the rolls. The CQA Engineer will document that the geocomposite is overlapped and secured or seamed in accordance with the General Specifications.

VI.1.7 Repair

The CQA Engineer will verify that any holes or tears in the geocomposite are repaired in accordance with the General Specifications.

The CQA Engineer will observe any repair, document any noncompliance with the above requirements, and report the noncompliance to the Owner.

Section VII. Geonet Construction Quality Assurance

VII.1 Geonet

VII.1.1 Manufacturing

The Geosynthetics Contractor will be required to provide the CQA Engineer with the following information from the geonet Manufacturer:

- Certifications required by the General Specifications signed by a responsible party employed by the geonet Manufacturer;
- The certification from the geonet Manufacturer that no reclaimed polymer was added to the resin during the manufacture of the geonet rolls assigned to this project; and
- The manufacturing quality control certificates for each shift's production of geonet rolls, which include geonet roll numbers and identification, sampling procedures, and descriptions and results of quality control tests for polymer specified in the General Specifications signed by a responsible party employed by the geonet Manufacturer.

The CQA Engineer will examine all geonet Manufacturer's certifications to verify and document that the property values listed on the certifications meet or exceed those specified within the General Specifications and that proper and complete documentation has been provided by the geonet Manufacturer for all geonet used at the site. The CQA Engineer will report any deviations from the above requirements to the Owner.

VII.1.2 Labeling

The CQA Engineer will verify and document that the geonet Manufacturer has labeled all rolls of geonet as specified within the General Specifications.

The CQA Engineer will examine rolls upon delivery and any deviation from the above requirements will be reported to the Owner prior to installation of the geonet.

VII.1.3 Shipment and Storage

The CQA Engineer will observe the rolls of geonet upon delivery at the site and any deviations from the requirements specified within the General Specifications will be reported to the Owner. Any damaged rolls will be rejected by the CQA Engineer and will be required to be repaired or replaced by the Contractor.

VII.1.4 Conformance Testing

Either at the Manufacturer's plant or upon delivery of the geonet rolls, the CQA Engineer will ensure that samples are removed and forwarded to the Geosynthetic CQA Laboratory for testing, to verify and document conformance with the requirements of the General Specifications.

Conformance samples will be taken across the entire width of the roll and will not include the first 3 feet. Unless otherwise specified, samples will be 1.5 feet long (minimum) by the roll width. The CQA Engineer will mark the machine direction on the samples with an arrow.

Samples will be taken at a rate of one per lot or one per 100,000 square feet, whichever is greater. These samples will be tested for:

- Polymer specific gravity
- Carbon black
- Thickness
- Transmissivity
- Polymer melt index

Tests shall be conducted in accordance with the method indicated in the specification.

The CQA Engineer will examine all results from laboratory conformance testing and will report any nonconformance to the Owner as soon as the results become available.

The following procedure will apply whenever a sample fails a conformance test that is conducted by the Geosynthetics CQA Laboratory:

- The Contractor will be required to replace the roll (or rolls) of geonet that is not in conformance with the specifications with a roll that meets the requirements of the General Specifications.
- The CQA Engineer will ensure that conformance samples are removed for testing by the Geosynthetics CQA Laboratory from the closest numerical roll on both sides of the failed roll. These two samples must pass the above conformance tests. If either of these samples fails, samples will be collected from the five numerically closest untested rolls on both sides of the failed sample and tested by the Geosynthetics CQA Laboratory. These ten samples must pass the above conformance tests. If any of these samples fail, a sample from every roll of geonet on site and a sample from every roll that is subsequently delivered from the same Manufacturer must be conformance tested by the Geosynthetics CQA Laboratory. The cost of such tests is to be borne by the Contractor.

The CQA Engineer will document actions taken in conjunction with conformance test failures and report all actions taken to the Owner.

VII.1.5 Handling and Placement

The Contractor will handle all geonet in such a manner as to ensure the geonet is not damaged. The CQA Engineer will verify and document compliance with the following:

- The geonet is free of dirt or excessive dust just before installation.
- Just prior to geonet placement, the geomembrane liner that will underlie the geonet is clean and free of excessive amounts of dust, dirt, stones, rocks, or other obstructions that could potentially damage the geomembrane or clog the drainage system.
- On side slopes, the geonet is secured at the top of the slope then rolled down the slope in such a manner as to keep the geonet sheet in tension. If necessary, the geonet is positioned by hand after being unrolled to minimize wrinkles. Geonet can be place in the horizontal direction (i.e., across the slope) in some special locations (e.g., at the toe of a slope). If an extra layer of geonet is required, this extra layer of geonet can be placed in the horizontal direction. Such locations will be identified on the Construction Drawings.
- In the presence of excessive wind, the geonet is weighted with sandbags or the equivalent.

- Unless otherwise specified, geonet is not welded to geomembrane.
- Geonet will only be cut using a cutter approved by the geonet Manufacturer and the CQA Engineer. If in place, special care is taken to protect underlying geosynthetics from damage that could be caused by cutting of the geonet.
- The Geosynthetics Contractor takes any necessary precautions to prevent damage to underlying layers during placement of the geonet.
- During placement of geonets, care is taken not to entrap in the geonet dirt or excessive dust that could cause clogging of the drainage system, and/or stones that could damage the adjacent geomembrane. If dirt or excessive dust is entrapped in the geonet, it is hosed clean prior to placement of the next material on top of it. In this regard, care should be taken with the handling or sandbags, to prevent rupture or damage of the sandbag.
- Geonet is not placed in direct contact with textured geomembrane liner unless specifically called for in the Construction Drawings.

The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

VII.1.6 Stacking and Joining

Geonet will be stacked and joined in accordance with the Construction Drawings and the General Specifications. As a minimum, the CQA Engineer will verify and document that staking, joining and overlapping is in accordance with the General Specifications.

The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

VII.1.7 Repair

The CQA Engineer will verify and document that any holes or tears in the geonet are repaired in accordance with the General Specifications.

The CQA Engineer will observe any repair, note any noncompliance with the above requirements and report them to the Owner.

Section VIII. Polyethylene Pipe and Fittings Construction Quality Assurance

VIII.1 Polyethylene Pipe Manufacture and Delivery

VIII.1.1 Manufacturing

Prior to incorporating the polyethylene pipe and fittings into the work the Contractor will be required to provide the CQA Engineer with the certifications required by the General Specifications signed by a responsible party employed by the pipe Manufacturer.

The CQA Engineer will verify and document that the property values certified by the pipe Manufacturer meet the requirements of the General Specifications based on a sampling interval of one sample per lot. The CQA Engineer will report any deviations from the above requirements to the Owner.

VIII.1.2 Labeling

The CQA Engineer will verify that the pipe is labeled with the information specified in the General Specification. Any deviations from the labeling requirements will be reported to the Owner prior to pipe installation.

VIII.1.3 Shipment and Storage

The CQA Engineer will verify and document that the pipe and fittings are stored in accordance with the General Specifications.

The CQA Engineer will visually inspect the pipe upon delivery at the site and any deviations from the requirements of the General Specifications will be reported to the Owner.

VIII.1.4 Conformance Testing

No conformance testing will be conducted on the materials delivered to the site.

VIII.2 Pipe Installation

VIII.2.1 Handling and Laying

The CQA Engineer will verify and document that the pipe is installed at the specified locations and grades and that placement of backfill around and over the pipe is conducted in accordance with the requirements of the General Specifications, and in a manner intended to prevent damage to the pipe.

The pipe and fittings will be carefully examined before installation by the CQA Engineer. The CQA Engineer will verify and document that cracks, damage or defects are not present in the pipe and fittings in excess of that allowed by the General Specifications.

The CQA Engineer will also note the condition of the interior of pipes and fittings. Foreign material shall be removed from the pipe interior before it is moved into final position. No pipe will be permitted to be placed

until the CQA Engineer has observed the condition of the pipe. The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

VIII.2.2Joints and Connections

Lengths of pipe will be required to be assembled into suitable installation lengths by the butt fusion process. Butt fusion refers to the butt joining of the pipe by softening the aligned faces of the pipe ends in a suitable apparatus and pressing them together under controlled pressure.

The CQA Engineer will spot monitor butt fusion welding operations to ensure that the Contractor follows the General Specifications.

The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

VIII.2.3Surveying

A Professional Land Surveyor registered in the State of New Mexico will provide the CQA Surveys. The CQA Surveyor will independently survey the final elevation of the invert of all polyethylene leachate collection pipe (excluding laterals).

The results of the survey will be compiled in a report signed by the CQA Surveyor and the CQA Engineer and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the results contained in the report before any subsequent construction that completely covers the pipe occurs.

Section IX. ADS Slotted CPT and N12 Construction Quality Assurance

IX.1 ADS Slotted CPT Manufacture and Delivery

IX.1.1 Manufacturing

Prior to incorporating the slotted CPT into the work the Contractor will be required to provide the CQA Engineer with the certifications required by the General Specifications signed by a responsible party employed by the pipe Manufacturer.

The CQA Engineer will verify and document that the property values certified by the pipe Manufacturer meet the requirements of the General Specifications based on a sampling interval of one sample per lot. The CQA Engineer will report any deviations from the above requirements to the Owner.

IX.1.2 Labeling

The CQA Engineer will verify that the pipe is labeled with the information specified in the General Specification. Any deviations from the labeling requirements will be reported to the Owner prior to pipe installation.

IX.1.3 Shipment and Storage

The CQA Engineer will verify and document that the pipe and fittings are stored in accordance with the General Specifications.

The CQA Engineer will visually inspect the pipe upon delivery at the site and any deviations from the requirements of the General Specifications will be reported to the Owner.

IX.1.4 Conformance Testing

No conformance testing will be conducted on the materials delivered to the site.

IX.2 Pipe Installation

IX.2.1 Handling and Laying

The CQA Engineer will verify and document that the pipe is installed at the specified locations and grades and that placement of backfill around and over the pipe is conducted in accordance with the requirements of the General Specifications, and in a manner intended to prevent damage to the pipe.

The pipe and fittings will be carefully examined before installation by the CQA Engineer. The CQA Engineer will verify and document that cracks, damage or defects are not present in the pipe and fittings in excess of that allowed by the General Specifications.

The CQA Engineer will also note the condition of the interior of pipes and fittings. Foreign material shall be removed from the pipe interior before it is moved into final position. No pipe will be permitted to be placed until the CQA Engineer has observed the condition of the pipe.

The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

IX.2.2 Joints and Connections

Lengths of pipe will be required to be assembled into suitable installation lengths by split couplers. The CQA Engineer will spot monitor installation of the split couplers to ensure that the Contractor follows the General Specifications. The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

IX.2.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will provide the CQA Surveys. The CQA Surveyor will independently survey the final elevation of the invert of all slotted CPT.

The results of the survey will be compiled in a report signed by the CQA Surveyor and the CQA Engineer and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the results contained in the report before any subsequent construction that completely covers the pipe occurs.

Section X. Corrugated Metal Pipe Construction Quality Assurance

X.1 Corrugated Metal Pipe Manufacture and Delivery

X.1.1 Manufacturing

Prior to incorporating the corrugated metal pipe (CMP) into the work the Contractor will be required to provide the CQA Engineer with the certifications required by the General Specifications signed by a responsible party employed by the pipe Manufacturer.

The CQA Engineer will verify and document that the property values certified by the pipe Manufacturer meet the requirements of the General Specifications based on a sampling interval of one sample per lot. The CQA Engineer will report any deviations from the above requirements to the Owner.

X.1.2 Labeling

No labels required in specifications.

X.1.3 Shipment and Storage

The CQA Engineer will verify and document that the pipe and fittings are stored in accordance with the General Specifications.

The CQA Engineer will visually inspect the pipe upon delivery at the site and any deviations from the requirements of the General Specifications will be reported to the Owner.

X.1.4 Conformance Testing

No conformance testing will be conducted on the materials delivered to the site.

X.2 CMP Installation

X.2.1 Handling and Laying

The CQA Engineer will verify and document that the pipe is installed at the specified locations and grades and that placement of backfill around and over the pipe is conducted in accordance with the requirements of the General Specifications, and in a manner intended to prevent damage to the pipe.

The pipe and fittings will be carefully examined before installation by the CQA Engineer. The CQA Engineer will verify and document that cracks, damage or defects are not present in the pipe and fittings in excess of that allowed by the General Specifications.

The CQA Engineer will also note the condition of the interior of pipes and fittings. Foreign material shall be removed from the pipe interior before it is moved into final position. No pipe will be permitted to be placed until the CQA Engineer has observed the condition of the pipe.

The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

X.2.2 Joints and Connections

Lengths of pipe will be required to be assembled into suitable installation lengths. The CMP will be joined using the manufacturer's recommended equipment and procedures. The CQA Engineer will spot monitor joining operations to ensure that the Contractor follows the manufacturer's specifications. The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

X.2.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will provide the CQA Surveys. The CQA Surveyor will independently survey the final elevation of the invert of all CMP.

The results of the survey will be compiled in a report signed by the CQA Surveyor and the CQA Engineer and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the results contained in the report before any subsequent construction that completely covers the pipe occurs.

Section XI. Carbon and Stainless Steel Pipe Construction Quality Assurance

XI.1 Steel Pipe Manufacture and Delivery

XI.1.1 Manufacturing

Prior to incorporating the steel pipe into the work the Contractor will be required to provide the CQA Engineer with the certifications required by the General Specifications signed by a responsible party employed by the pipe Manufacturer.

The CQA Engineer will verify and document that the property values certified by the pipe Manufacturer meet the requirements of the General Specifications based on a sampling interval of one sample per lot. The CQA Engineer will report any deviations from the above requirements to the Owner.

XI.1.2 Labeling

The CQA Engineer will verify that the pipe is labeled with the information specified in the General Specification. Any deviations from the labeling requirements will be reported to the Owner prior to pipe installation.

XI.1.3 Shipment and Storage

The CQA Engineer will verify and document that the pipe and fittings are stored in accordance with the General Specifications.

The CQA Engineer will visually inspect the pipe upon delivery at the site and any deviations from the requirements of the General Specifications will be reported to the Owner.

XI.1.4 Conformance Testing

No conformance testing will be conducted on the materials delivered to the site.

XI.2 Pipe Installation

XI.2.1 Handling and Laying

The CQA Engineer will verify and document that the pipe is installed at the specified locations and grades and that placement of backfill around the pipe is conducted in accordance with the requirements of the General Specifications, and in a manner intended to prevent damage to the pipe.

The pipe will be carefully examined before installation by the CQA Engineer. The CQA Engineer will verify and document that cracks, damage or defects are not present in the pipe fittings in excess of that allowed by the General Specifications.

The CQA Engineer will also note the condition of the interior of pipes. Foreign material shall be removed from the pipe interior before it is moved into final position. No pipe will be permitted to be placed until the CQA Engineer has observed the condition of the pipe.

The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

XI.2.2 Joints and Connections

Lengths of pipe will be required to be assembled into suitable installation lengths by butt welding.

The CQA Engineer will spot monitor welding operations to ensure that the Contractor follows the General Specifications.

The CQA Engineer will document any noncompliance with the above requirements and report it to the Owner.

XI.2.3 Surveying

A Professional Land Surveyor registered in the State of New Mexico will provide the CQA Surveys. The CQA Surveyor will independently survey the final elevation of the basal location of all steel pipe.

The results of the survey will be compiled in a report signed by the CQA Surveyor and the CQA Engineer and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the results contained in the report before any subsequent construction that completely covers the pipe occurs.

Section XII. Polyethylene Tank Construction Quality Assurance

XII.1 Polyethylene Tank Manufacture and Delivery

XII.1.1 Manufacturing

Prior to incorporating the polyethylene tank into the work the Contractor will be required to provide the CQA Engineer with the certifications required by the General Specifications signed by a responsible party employed by the polyethylene tank Manufacturer.

The CQA Engineer will verify and document that the property values certified by the polyethylene tank Manufacturer meet the requirements of the General Specifications based on a sampling interval of one sample per lot. The CQA Engineer will report any deviations from the above requirements to the Owner.

XII.1.2 Labeling

The CQA Engineer will verify that the polyethylene tank is labeled with the information specified in the General Specification. Any deviations from the labeling requirements will be reported to the Owner prior to pipe installation.

XII.1.3 Shipment and Storage

The CQA Engineer will verify and document that the polyethylene tanks are stored in accordance with the General Specifications.

The CQA Engineer will visually inspect the polyethylene tank upon delivery at the site and any deviations from the requirements of the General Specifications will be reported to the Owner.

XII.1.4 Conformance Testing

No conformance testing will be conducted on the materials delivered to the site.

XII.2 Polyethylene Tank Installation

XII.2.1 Handling and Laying

The CQA Engineer will verify and document that the polyethylene tank is installed at the specified locations, and in a manner intended to prevent damage to the polyethylene tank.

The polyethylene tank will be carefully examined before installation by the CQA Engineer. The CQA Engineer will verify and document that cracks, damage or defects are not present in the polyethylene tank in excess of that allowed by the General Specifications.

The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

The owner will obtain and keep on file at the facility written statements by the CQA engineer certifying that the design and installation of the tank system was performed in accordance with the requirements of paragraphs (B) through (F) of 40 CFR 264192.

XII.2.2 Surveying

A Professional Land Surveyor registered in the State of New Mexico will provide the CQA Surveys. The CQA Surveyor will independently survey the final locations and elevation of the base of the polyethylene tank.

The results of the survey will be compiled in a report signed by the CQA Surveyor and the CQA Engineer and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the results contained in the report before any subsequent construction hinders surveying of the polyethylene tank.

~~Section XIII.Stabilization Bins Construction Quality Assurance~~

~~XIII.1Stabilization Bins Manufacture and Delivery~~

~~XIII.1.1Manufacturing~~

~~Prior to incorporating the stabilization bins into the work the Contractor will be required to provide the CQA Engineer with the certifications required by the General Specifications signed by a responsible party employed by the stabilization bins tank Manufacturer.~~

~~The CQA Engineer will verify and document that the property values certified by the stabilization bins manufacturer meet the requirements of the General Specifications based on a sampling interval of one sample per lot. The CQA Engineer will report any deviations from the above requirements to the Owner.~~

~~XIII.1.2Labeling~~

~~The CQA Engineer will verify that the stabilization bins are labeled with the information specified in the General Specification. Any deviations from the labeling requirements will be reported to the Owner prior to pipe installation.~~

~~XIII.1.3Shipment And Storage~~

~~The CQA Engineer will verify and document that the stabilization bins are stored in accordance with the General Specifications.~~

~~The CQA Engineer will visually inspect the stabilization bins upon delivery at the site and any deviations from the requirements of the General Specifications will be reported to the Owner.~~

~~XIII.1.4Conformance Testing~~

~~No conformance testing will be conducted on the materials delivered to the site.~~

~~XIII.2Stabilization Bins Installation~~

~~XIII.2.1Handling and Laying~~

~~The CQA Engineer will verify and document that the stabilization bins are installed at the specified locations, and in a manner intended to prevent damage to the stabilization bins.~~

~~The stabilization bins will be carefully examined before installation by the CQA Engineer. The CQA Engineer will verify and document that cracks, damage or defects are not present in the stabilization bins in excess of that allowed by the General Specifications.~~

~~The CQA Engineer will document any deviation from the above requirements and report it to the Owner.~~

~~The owner will obtain and keep on file at the facility written statements by the CQA engineer certifying that the design and installation of the stabilization bins was performed in accordance with the requirements of paragraphs (B) through (F) of 40 CFR 264192.~~

~~XIII.2.2Surveying~~

~~A Professional Land Surveyor registered in the State of New Mexico will provide the CQA Surveys. The CQA Surveyor will independently survey the final locations and elevation of the base of the stabilization bins.~~

~~The results of the survey will be compiled in a report signed by the CQA Surveyor and the CQA Engineer and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the results contained in the report before any subsequent construction hinders surveying of the stabilization bins.~~

Section XIV. Concrete Formwork Construction Quality Assurance

XIV.1 Concrete Formwork Manufacture

Prior to incorporating the formwork into the work the Contractor will be required to provide the CQA Engineer with the requirements of the General Specifications.

The CQA Engineer will verify and document that the material properties meet the requirements of the General Specifications. The CQA Engineer will report any deviations from the above requirements to the Owner.

XIV.2 Formwork Installation

XIV.2.1 Handling and Laying

The CQA Engineer will verify and document that the formwork is installed at the specified locations, and in the manner intended by the General Specifications.

The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

XIV.2.2 Surveying

A Professional Land Surveyor registered in the State of New Mexico will provide the CQA Surveys. The CQA Surveyor will independently survey the final locations and elevation of the formwork.

The results of the survey will be compiled in a report signed by the CQA Surveyor and the CQA Engineer and will be reviewed by the Owner. The Owner and the CQA Engineer will approve the results contained in the report before any subsequent construction hinders surveying of the formwork.

Section XV. Reinforcement Steel Construction Quality Assurance

XV.1 Reinforcement Steel Manufacture and Delivery

XV.1.1 Manufacturing

Prior to incorporating the reinforcement steel into the work, the Contractor will be required to provide the CQA Engineer with the material certifications required by the General Specifications signed by a responsible party employed by the reinforcement steel Manufacturer.

The CQA Engineer will verify and document that the property values certified by the reinforcement steel Manufacturer meet the requirements of the General Specifications. The CQA Engineer will report any deviations from the above requirements to the Owner.

XV.1.2 Labeling

The CQA Engineer will verify that the reinforcement steel is labeled with the information specified in the General Specification. Any deviations from the labeling requirements will be reported to the Owner prior to pipe installation.

XV.1.3 Shipment and Storage

The CQA Engineer will verify and document that the reinforcement steel is stored in accordance with the General Specifications.

XV.1.4 Testing

If requested by the Engineer, testing outlined in the General Specifications will be conducted.

XV.2 Reinforcement Steel Installation

The CQA Engineer will verify and document that the reinforcement steel is installed at the specified locations, and in a manner intended to prevent damage to the work.

The reinforcement steel will be examined to ensure that the requirements of the General Specifications are followed.

The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

Section XVI. Joints in Concrete Construction Quality Assurance

XVI.1 Joint Material Manufacture

Prior to incorporating the joint materials into the work the Contractor will be required to provide the CQA Engineer with the certifications required by the General Specifications signed by a responsible party employed by the Manufacturer.

The CQA Engineer will verify and document that the property values certified by the Manufacturer meet the requirements of the General Specifications. The CQA Engineer will report any deviations from the above requirements to the Owner.

XVI.2 Joint Installation

The CQA Engineer will verify and document that the joint materials, locations and installation procedures are in accordance with the General Specifications. The CQA Engineer will document any deviation from the above requirements and report it to the Owner.

Section XVII. Miscellaneous Metalwork Construction Quality Assurance

XVII.1 Miscellaneous Metalwork Submittals

Prior to incorporating the miscellaneous metalwork into the work, the Contractor will be required to provide the CQA Engineer with the submittals required by the General Specifications.

XVII.2 Fabrication and Installation

The CQA Engineer will verify and document that the miscellaneous metalwork is fabricated and installed at the specified locations, and in a manner intended by the General Specifications.

Section XVIII. Cast in Place Concrete Construction Quality Assurance

XVIII.1 Submittals

Prior to incorporating the cast in place concrete into the work, the Contractor will be required to provide the CQA Engineer all submittals required by the General Specifications.

XVIII.2 Conference

Prior to incorporating the cast in place concrete into the work, the Contractor will be required to hold a meeting to discuss items required in the General Specifications.

XVIII.3 Testing

The CQA Engineer will verify and document that material sampling and testing required in the General Specifications is completed.

Section XIX. Electrical System and Pump Control Construction Quality Assurance

XIX.1 Submittals

Prior to incorporating the electrical system and pump controls into the work, the Contractor will be required to provide the CQA Engineer with the submittals required by the General Specifications.

XIX.2 Installation

The CQA Engineer will systematically examine wiring and conduits before covering or backfilling to confirm proper routing, wire size, and connection methods.

XIX.3 Component Check

The CQA Engineer will perform or review component checks of resistance, grounding, and load prior to complete system check.

Checking and calibration of these systems will be performed according to manufacturer recommendations and procedures.

XIX.4 Testing

The CQA Engineer will witness and document acceptance testing of the pump control system.

Section XX. Pumps, Piping, Meters, and Valve Construction Quality Assurance

XX.1 Submittals

Prior to incorporating the pumps, piping, instruments (such as flow meter), and valves into the work, the Contractor will be required to provide the CQA Engineer with the submittals required by the General Specifications.

XX.2 Installation

The CQA Engineer will observe connections and components for proper assembly, usage and construction.

XX.3 Component Check

The CQA Engineer will perform or review component checks of equipment to confirm operation in accordance with the specifications.

Checking and calibration of these systems will be performed according to manufacturer recommendations and procedures.

XX.4 Testing

The CQA Engineer will witness and document acceptance testing of the leachate removal system.

Section XXI. Construction Quality Assurance Documentation

XXI.1 Documentation

XXI.1.1 Introduction

An effective CQA plan depends largely on recognition of all construction activities that should be monitored, and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of construction quality assurance activities. The CQA Engineer will document that all quality assurance requirements have been addressed and satisfied.

The CQA Engineer will provide the Owner with signed descriptive remarks, data sheets, and logs to verify and document that all monitoring activities have been carried out. The Owner will maintain at the site a complete file of Construction Drawings, the CQA plan, the General Specifications, (test procedures, daily reports, testing logs, and other pertinent forms and documents. The forms to be used for CQA documentation should include, at a minimum, those presented in this CQA Plan. The forms presented in this CQA Plan may be revised as necessary by the CQA Engineer.

XXI.1.2 Daily Record Keeping

XXI.1.2.1 Overview

Daily records will be completed in the field documenting CQA project administration, soils CQA, geosynthetics CQA, and other required CQA activities. The forms to be completed that pertain to each of these categories of records are discussed below.

XXI.1.2.2 Project Administration Records

Most project administration records are completed daily by the CQA Engineer and submitted weekly to the Owner. Examples of these forms are included in Appendix B and are briefly described below.

XXI.1.2.2.1 Daily Field Report

The Daily Field Report will be prepared by the CQA Engineer and submitted weekly to the Owner. At a minimum, the Daily Field Report will include the following information:

- The date, project name, location, and other identification;
- A narrative of the events and activities, including meetings and observation which occurred during a given day;
- The weather conditions;
- Source and amount of water used to construct the clay liner, if any;
- The name of parties to any discussions;
- The relevant subject matter or issues;
- The activities planned and performed;
- The schedule; and
- The signature of the CQA Engineer.

XXI.1.2.2.2 Weekly Field Report

On a weekly basis, the CQA Engineer will summarize in a Weekly Field Report the activities recorded on the Daily Field Reports. This report will be submitted each week to the Owner along with the Daily Field Reports, and will include, at a minimum, the following information:

- The date, project name, location, and other information;
- A summary of work activities during reporting period;
- A summary of construction situations, deficiencies, and/or defects occurring during the reporting period;
- A summary of actions taken to remedy such situations, deficiencies and or defects; and
- The signature of the CQA Resident Engineer.

Since the weekly report is presented in a report format, a form is not presented in Appendix B.

XXI.1.2.3 Soils CQA Records

Records kept for soils related activities will be completed by the CQA Engineer. The information will be recorded as testing is done in the field or as results are received from the laboratory. The records will be available for review on site, and copies will be issued as part of the Final Report. Examples of the relevant forms are included in Appendix B and are briefly described below.

XXI.1.2.3.1 Field Laboratory Compaction Test Log (ASTM D 698 Method A, B, C, D and ASTM D 1557 Method A, B, C)

The results of field compaction tests will be recorded on the Field Laboratory Compaction Test Log. Separate forms are available for each test method used.

XXI.1.2.3.2 Standard Count, Field Sand Cone and Rubber Balloon Density Test Log

The results of the sand cone and or rubber balloon Density Test Log. The results will be used for comparison or calibration with nuclear density test results.

XXI.1.2.3.3 Summary of Sieve Analysis Test Data

This form will provide a summary of sieve analysis test results for soils.

XXI.1.2.3.4 Summary of Field Density Test

This form will provide a summary of field nuclear density test results and sand cone test results for soils.

XXI.1.2.3.5 Summary of Index Laboratory Test Data

This form will provide a summary of index test results performed as required for soils.

XXI.1.2.3.6 Summary of Permeability Laboratory Data

This form will provide a summary of laboratory permeability test data required for clay liners.

XXI.1.2.4 Geosynthetics CQA Records

Records for the installation of geosynthetics will be completed by the CQA Engineer. The information will be recorded as the work progresses. The records will be available for review on site and copies will be issued as part of the final CQA report. Examples of the CQA forms to be completed for geosynthetics are included in Appendix D and briefly described below.

XXI.1.2.4.1 Material Inventory

The identifying roll number and pertinent information of each roll of geosynthetic received at the site will be recorded on this form as the materials arrive at the site. This information will be used to track manufacturer's quality control information, conformance test samples, and other CQA documentation.

XXI.1.2.4.2 Nondestructive Test Log

This form will be used to record the time, date, equipment operator, and results of vacuum box or air pressure testing of production geomembrane seaming operations.

XXI.1.2.4.3 Panel Placement Monitoring Log

This form will be used to record geomembrane panel numbers as they are placed in the field and to cross-reference the assigned panel numbers with roll numbers. The weather conditions, time, and temperature at placement will be recorded on the log. Measured dimensions used to calculate the area of the geomembrane will be recorded on the log.

XXI.1.2.4.4 Repair Summary Log

Information on repairs to geomembrane panels and seams will be recorded on this form. The information recorded will include a code to describe the type of repair, the name of the operator making the repair, the location (i.e. seam or panel location) of the repair, nondestructive testing results of the repair, and initials of the CQA Engineer observing the repair.

XXI.1.2.4.5 Seam and Panel Location Log

The relative location of repairs to geomembrane panels and seams described in the Repair Summary Log will be recorded on this form. The results of destructive tests and nondestructive can be indicated in this log, as well as, location and results of thickness measurements taken for each panel.

XXI.1.2.4.6 Destructive Test Log

This form will be used to record the results from testing performed on geomembrane seams at the Geosynthetics CQA Laboratory (an independent testing laboratory). The results for both pep and shear will be recorded. The form will be completed as data becomes available.

XXI.1.2.4.7 Trail Seam and Seaming Log

This form will be used to record results of trial geomembrane seam testing and to track production seaming activities. The time, temperature, type of seaming equipment used, name of seamer, and length of seam will be recorded.

XXI.1.2.4.8 Certificate of Acceptance Subgrade Surface

The Certificate of Acceptance is required to be signed by the Contractor prior to the installation of the geomembrane. The area being accepted must be described on the certificate.

XXI.1.2.5 Survey Records

Record Drawings resulting from the surveying performed by the CQA Surveyor will be reviewed by the CQA Engineer and the Owner. The Record Drawings will be available for review onsite, and copies will be issued as part of the final CQA Report issued by the CQA Engineer. At a minimum, these Records Drawings will include as-built survey data for the following liner system components:

- Prepared subgrade;
- Structural fill

- Clay liner;
- Polyethylene pipe and fittings;
- Geomembrane liners;
- Drainage Gravel;
- Protective soil layer;
- Road Base;
- Cover Soil;
- Vegetative cover;
- Pipe bedding;
- Select Subbase;
- Subbase;
- Foundation sand;
- Geocomposite;
- Geonet;
- Geotextile;
- Polyvinyl Chloride Pipe;
- Geosynthetic Clay Liner
- Steel Pipe; and
- Polyethylene Tank.

XXI.1.3 Photographic Documentation

Photographic documentation will serve as a pictorial record of work progress, problems, and mitigation activities. The basic file will contain color prints; negatives will also be stored in a separate file in chronological order. These photographs will be available for review by the Owner, the CQA Engineer, and other interested parties. Selected photographs will be reproduces as part of the Final Report. The remaining photographs will be transmitted to the Owner and archived by the Owner as part of the operating records.

XXI.1.4 Design and/or Specification Changes

Design and/or specification changes may be required during construction. In such cases, the CQA Engineer will notify the Owner. The Owner will submit these changes to NMED for review and approval according to permit notifications requirements of 40 CFR 270.41 and 42.

Major design and/or specifications changes will be made only with the written agreement of the Design Engineer and the Owner and will take the form of an addendum to the General Specifications.

XXI.1.5 Signatures and Final Reports

At the completion of the work, the CQA Engineer will submit a final CQA report to the Owner.

At a minimum, this report will include: (a) summaries of all construction activities; (b) sources and amounts of water used to construct the clay liners; (c) results of chemical quality analyses of construction water from each source; (d) observation logs and testing data sheets including sample location plans; (e) a discussion of any changes from design and material specifications; (f) CQA Record Drawings; and (g) a summary statement sealed and signed by a Professional Engineer registered in the State of New Mexico that construction quality assurance was conducted as provided in the CQA Plan and, based on visual observations and data generated in accordance with the CQA Plan, the landfill or surface impoundment was constructed in accordance with

40 CFR 264.19, the Construction Drawings, the CQA Plan, and the General Specifications, except as properly authorized and documented in the CQA final report. The CQA Record Drawings will include the following: primary and secondary geomembrane panel layout drawings; all drawings (including cross-sections) depicting any deviations from the Construction Drawings; and all survey conformance data.

A separate Final Report will be issued for each phase of the landfill. The final CQA Report will present the results of CQC tests conducted by the installation constructors as well as the CQA tests.

Appendix A

Test Fill Plan

1.0 PURPOSE AND SCOPE

The purpose of the test fill is to establish a sequential and logical approach for the development of placement and compaction procedures to be used during construction of cohesive soil liners as an indicator that the soil liners are constructed in a way that meets design performance specifications. The test fill program will allow the Contractor, the Design Engineer, and the Construction Quality Assurance (CQA) engineer to identify appropriate placement and compaction procedures by establishing relationships between various compaction parameters, density, water content, Atterberg limits, particle size distribution, and permeability of the fill.

Once the construction procedures have been established by the test fill program, the Contractor and the CQA Engineer will monitor the cohesive soil liner construction procedures as an indicator that the design performance specifications are being achieved, Test fill construction procedures will include measuring lift thickness, counting the number of compactor coverages, and performing in-place density and moisture content tests to verify that the specified degree of compaction is achieved.

The test fill will be constructed in uniform horizontal lifts of uniform thicknesses.

This test fill program documents the requirements for constructing the test fill. The test fill program will include:

- subgrade preparation
- construction of a 3-foot-thick test fill
- inspection and testing of the test fill
- sampling of portions of the test fill

The test fill program described in this appendix may be modified based on site specific design and construction considerations.

Feasibility testing of clay sources will have been performed before the start of the test fill. These tests should provide the basic relationship of permeability with varying density and moisture content.

2.0 CONSTRUCTION EQUIPMENT

The equipment to be used for the test fill shall be proposed by the Contractor, and approved by the CQA Engineer and Project Manager.

3.0 TEST FILL MATERIAL

Test fill material shall be approved by the CQA Engineer. The material shall meet the requirements of the Specification Section 02221. The Material shall be an inorganic cohesive soil with a plasticity index (PI) ranging between 10 and 40; at least 50 percent of the soil shall pass the No. 200 sieve. As approved by the CQA Engineer, small quantities of fill with PI greater than 40 may be allowed if such materials are thoroughly mixed with other less plastic soils. Other materials may be considered based upon laboratory testing and upon approval of the Project Manager. The maximum particle size shall be 2 inches before processing. No frozen material shall be used, and in-place material that becomes frozen prior to completion of operations shall be removed.

4.0 TEST FILL CONSTRUCTION

4.1 SUBGRADE PREPARATION

The area within the limits of the test fill shall be cleared and grubbed of all trees, debris, brushes, stumps, roots, trash, and any other vegetation or objectionable material. Following clearing and grubbing, the area shall be stripped of topsoil. Topsoil shall be stockpiled in an area designated by the Project Manager.

The surface of the subgrade shall be proof-rolled so as to be free of soft zones, irregularities, loose earth, and abrupt changes in grade. The subgrade and test fill shall be sloped at a 2 percent grade. No standing water or excessive moisture shall be allowed on the surface of the subgrade. The surface shall be inspected by the CQA Engineer prior to beginning construction of the test fill.

If placement and compaction of soil materials on slope areas is to be accomplished by the downslope compaction method rather than by horizontal benching, the test fill shall have a sloped area of similar grade to the intended liner installation where the downslope compaction method can be evaluated.

4.2 CONFIGURATION

The test fill shall be a rectangle approximately 60 feet long by 20 feet wide. The test fill shall be constructed to a thickness of 3 feet in uniform horizontal lifts. Lines and grades shall be controlled by survey.

4.3 FILL PLACEMENT

The test fill shall be constructed in uniform horizontal lifts to a total thickness of 3 feet after compaction in accordance with the procedures specified below. The procedures, which vary with the lift considered, are intended to allow determination of a relationship between soil compaction criteria, which include density and moisture content, permeability, and compaction method parameters. Compaction method parameters include: (1) compactor characteristics; (2) thickness of compacted/uncompacted layers; (3) number of compactor coverages; and, soils moisture content.

4.3.1 First Lift

1. The first lift of test fill material shall be placed to a thickness resulting in 6 inches after compaction.

2. Soils moisture content shall be maintained when the placement window defined in the Specifications (Section 02221). The contractor shall adjust the moisture content as necessary to obtain the specified density criteria.

3. The test fill material shall be compacted with two one-way coverages using the Contractor's proposed compaction equipment.

4. The Contractor shall permit the CQA Engineer to perform in-place density tests and collect soil samples as specified in 5-3..

5. QA Engineer to perform in-place density tests and collect soil samples as specified in Section 5.3.

6. Holes left in the lift shall be repaired in accordance with methods outlined in the CQA plan. The repairs shall be compacted using procedures which have been shown to meet the required moisture and density criteria.

7. The test fill material shall be compacted a second time by applying two more one-way coverages with the selected compactor.

8. Steps 4 and 5 shall be repeated. Second tests shall be taken near the original tests.

9. The test fill material shall be compacted a third time by applying two more one-way coverages with the selected compactor.

10. Steps 4 and 5 shall be repeated. Third tests shall be taken near the first and second tests.

11. Steps 8 and 9, respectively, shall be repeated and continued until specified compaction criteria are obtained as identified by the CQA Engineer.

4.3.2 Second Lift

1. The loose thickness of the second lift shall be such that the thickness of the lift will be 6 inches after compaction.

2. A competent bond with the first lift shall be achieved by the Contractor and approved by the CQA Engineer.

3. Steps 2 through 10 of Section 4.3.1 shall be repeated.

4.3.3 Remaining Lifts

1. The loose thickness of the remaining lifts shall be such that the thickness of the lifts will be 6 inches after compaction.

2. The procedures for compacting and testing the remaining lifts shall be those that have been tested and proven effective during the compaction of the second lift.

4.3.4 Final Surface Preparation

The surface of the test fill shall be rolled with a smooth steel drum or pneumatic rolled so as to be free of irregularities, loose earth, and abrupt changes in grade. All stones larger than 1 inch shall be removed. Stones which are smaller than 1 inch and are judged to be detrimental to a geomembrane liner will be removed. One-half of the prepared soil surface shall be protected against drying with temporary plastic sheets. The sheets shall be placed immediately after the completion of surface preparation. Observations and documentation of desiccation cracking versus time shall be made on the uncovered section of the test fill.

5.0 INSPECTION AND TESTING

5.1 TEST FILL MATERIAL

The CQA Engineer shall perform testing on the cohesive soil material prior to its use in the test fill. Testing, using the most recent ASTM method, will include at least the following:

- soil density/moisture content relationship using the Modified and Standard Proctor Compaction Method (ASTM D 698 and ASTM D 1557)
- natural water content (ASTM D 2216)
- particle size distribution (ASTM D 422)
- Atterberg limits (ASTM D 4318)
- soil classification (ASTM D 2487)

5.2 SUBGRADE PREPARATION

The CQA Engineer shall observe the prepared subgrade for firmness, smoothness, and absence of abrupt changes in grade.

5.3 TEST FILL CONSTRUCTION

5.3.1 Lift Compaction

For the first and second lifts, the CQA Engineer shall perform the following activities:

- estimate the thickness of the loose lifts
- count the number of compactor coverages and observe compactor coverage of the test fill (Figure 1)
- at every two (2) coverages, perform a minimum of eight nuclear gauge in-place density and moisture reading (ASTM D 2292); compute degree of compaction (i.e., in-place dry density divided by the Standard Proctor or Modified maximum dry density; collect four additional soil samples for moisture content determination (ASTM D 2216)
- observe the repair of holes left in the lift as a result of density testing and soil sample collection
- continue in-place density testing and moisture content determination to enable development of a curve giving in-lace dry density versus number of compactor coverages for each lift thickness

For each of the remaining lifts, the CQA engineer shall perform the following activities:

- verify that the thickness of the loose lift does not exceed the loose thickness determined from testing of the second lift
- count the number of compactor coverages, determined from testing of the second lift, which are necessary to achieve the specified density and observe compactor coverage of the test fill
- perform a minimum of eight nuclear density tests per lift to verify the adequacy of the construction procedures previously established

The CQA Engineer shall collect a minimum of six (6) undisturbed samples from varying depths of the completed test fill. The samples shall be waxed or otherwise protected to retain natural moisture and tested in the laboratory for the following:

- hydraulic conductivity (permeability) using water as the permeant (ASTM D 5084)
- dry density
- particle size distribution (ASTM D 422)
- Atterberg limits (ASTM D 4318)
- soil classification (ASTM D 2487)
- soil moisture content (ASTM D 2216)

The CQA Engineer shall observe the test fill to verify the adequacy of the bonding between adjacent lifts. Such observation shall be exercised on the portion of the test fill which has been excavated to permit removal of undisturbed soil block samples.

5.3.2 Final Surface Preparation

The CQA Engineer shall observe the prepared surface for firmness, smoothness, and absence of abrupt changes in grade.

5.3.3 Permeability Testing

The permeability of the test fill shall be assessed by performance of a minimum of six (6) laboratory tests on 12-inch diameter undisturbed specimens obtained at a location selected by the CQA Engineer.

5.4 TEST RESULTS

The test results which will be used to verify that the specified construction procedures meet the design performance criteria shall be:

- compaction testing (i.e., degree of compaction, in-place dry density, and moisture content)
- results of laboratory permeability testing performed on undisturbed soils samples
- soil index testing to evaluate material suitability

5.5 LINES AND GRADES

The following surfaces shall be surveyed to verify that proper thicknesses have been constructed:

- prepared surface of the subgrade
- final surface of the test fill

6.0 DOCUMENTATION

The CQA Engineer shall document activities associated with the construction, monitoring, and testing of the test fill. Such documentation shall include daily reports of construction activities and oral communications with the contractor. In addition, the following shall be documented for each of the section listed below:

6.1 TEST FILL MATERIAL

The CQA Engineer shall provide a moisture-density relationship for the test fill liner material and other and other test results as specified in Section 5.1.

6.2 TEST FILL CONSTRUCTION

6.2.1 Subgrade preparation

The CQA Engineer shall document observations on subgrade preparation, as specified in Section 5.2.

6.2.2 Test Fill Construction

The CQA Engineer shall document activities of the test fill construction, monitoring, and testing in a test fill summary report, which shall include but not be limited to:

- record of the compactor type, configuration, and weight; for sheepsfoot compactors, record the drum diameter and length, empty and ballasted weight, length and face area of feet, and yoking arrangement, if any
- record thicknesses of lifts prior to and after compaction
- record density versus number of compactor coverages for each lift thickness, as specified in Section 5.3.1
- record the number of compactor coverage which will provide the specified degree of compaction and permeability
- record the procedure to bond lifts
- results of moisture, in-place density and degree of compaction, as specified in Section 5.3.1
- repair of holes left in the lift as a result of density testing and soil sample collection, as specified in Section 5.3.1
- results of laboratory permeability testing and other soil properties tests performed on undisturbed soil samples
- as-built drawing of the test fill and locations of all test samples for each lift
- cross-section of the test fill showing number of lifts and lift thickness
- description of actual construction procedures
- observations of test fill excavation for removal of undisturbed soils samples and observations of layer bonding, as specified in Section 5.3.1

Appendix B

Project Administration Records

TerraMatrix

Engineering & Environmental Services
1475 Pine Grove Road, P.O. Box 774018
Steamboat Springs, Colorado 80477

FIELD ENGINEER'S DAILY REPORT

PROJECT NAME: TRIASSIC PARK WASTE DISPOSAL FACILITY
PROJECT NUMBER: 602
PAGE ___ of ___
FIELD ENGINEER: _____

DATE: _____ S M T W T F S
AREA: _____
_____
WEATHER: _____

CONTRACTOR WORK PERFORMED.....

TESTING OR SURVEYING PERFORMED.....

DISCUSSIONS WITH CONTRACTOR OR CLIENT.....

COMMENTS.....

VISITORS:

Field Book Number ___ Pages ___ to ___
SIGNATURE: _____

MONTGOMERY WATSON WEEKLY FIELD SUMMARY REPORT
TRIASSIC PARK WASTE DISPOSAL FACILITY
CONSTRUCTION QUALITY ASSURANCE
WEEK #1

Introduction

In accordance with the CQA Implementation Plan for cover construction at the Triassic Park Waste Disposal project, Montgomery Watson is providing a weekly summary of construction and CQA activities for the construction related to the earthworks geosynthetics. Copies of Daily Reports and associated field book notes have been submitted previously. The following table presents a summary of construction conditions and activities for the week.

	Date Su	Date M	Date T	Date W	Date Th	Date F	Date Sa	Week Total	Cumulative Total to Date
1. Staff On-site:									
Name									
Name									
Name									
Name									
Name									
Name									
Name									
Name									
Total On-site Hours									
2. Weather Conditions									
Temperature									
Precipitation									
Site Closure									
3. Contractor Activity									
Earth Works									
Type D subgrade preparation									
Sand placement									
Type B placement over geonet									
Type E placement over geotextile									
Other									
Geosynthetics									
Geosynthetics deployment									
Geosynthetics detail work									

EXAMPLE

MONTGOMERY WATSON WEEKLY FIELD SUMMARY REPORT
TRIASSIC PARK WASTE DISPOSAL FACILITY
CONSTRUCTION QUALITY ASSURANCE
WEEK #1 (Continued)

	6/13	6/14	6/15	6/16	6/17	6/18	6/19		
	Su	M	T	W	Th	F	Sa	Week Total	
4. Geosynthetics Activity									
Material Inventory (see attached material quantities summary)									
Geomembrane									
Geonet									
Geotextile									
Material Deployment (based on total deployed lengths of panels, including overlaps and prior to trimming)									
Geomembrane (square feet)									
Geonet (square feet)									
Geotextile (square feet)									
Geomembrane Field Seaming									
Fusion welding footage									
Fusion destructive tests									
Extrusion welding footage									
Extrusion destructive tests									
5. QA Soil Testing									
Field Testing									
Laboratory Testing									

EXAMPLE

MONTGOMERY WATSON DAILY FIELD REPORT
TRIASSIC PARK WASTE DISPOSAL FACILITY

Daily Report Number
Date Work Performed

MONDAY

Staff On-site

☐ Name	☐ Name	☐ Name
☐ Name	☐ Name	☐ Name
☐ Name	☐ Name	☐ Name

Weather Conditions

Temperature (F)_____
Skies_____
Wind_____
Precipitation? ☐
Site Closure? ☐

Contractor Activity

Earthworks

☐ Type D subgrade preparation
☐ Sand placement
☐ Type B placement over geonet
☐ Type E placement over geotextile
☐ Other

Geosynthetics

☐ Geosynthetics deployment
☐ Geosynthetics detail work

Geosynthetic Activity Summary (Geosynthetic Installation Monitoring Summary attached)

Material Inventory (see Weekly Summary Report for material quantities)

☐ Geomembrane
☐ Geonet
☐ Geotextile

Material Deployment	today (sf)	total to date (sf)
Geomembrane		
Geonet		
Geotextile		

Issues List Updated ☐ (attached)
Area Approved for Sand Placement (see attached drawing)

Other:

QA Soil Testing

☐ Field Testing
☐ Laboratory Testing

Meeting Attendance (meeting notes attached)
Daily Construction Meeting

☐ Name
☐ Name
☐ Name
☐ Name
☐ Name

Miscellaneous

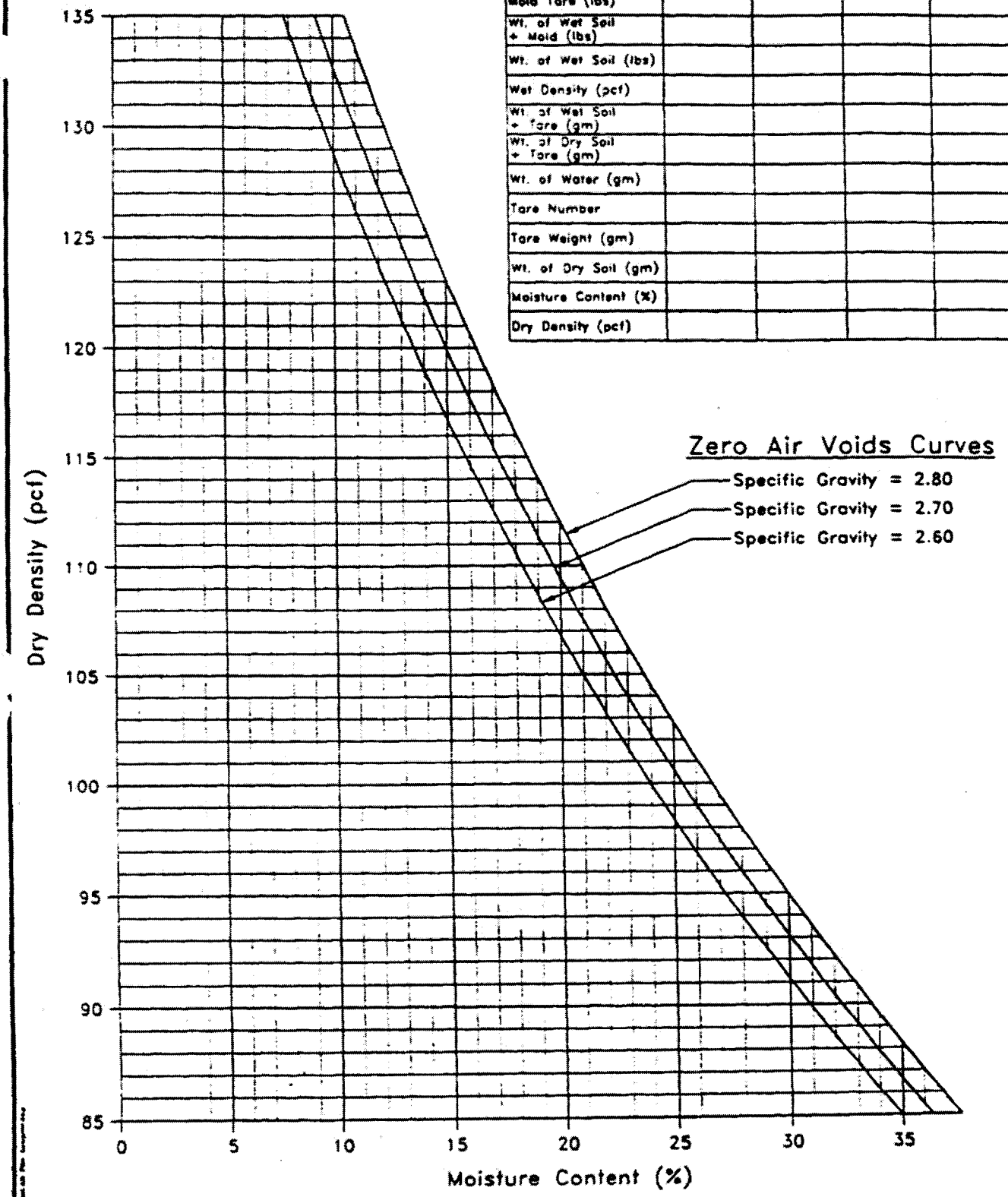
Report prepared by:

EXAMPLE

Appendix C

Soils CQA Records

Point					
Mold Number					
Mold Tare (lbs)					
Wt. of Wet Soil + Mold (lbs)					
Wt. of Wet Soil (lbs)					
Wet Density (pcf)					
Wt. of Wet Soil + Tare (gm)					
Wt. of Dry Soil + Tare (gm)					
Wt. of Water (gm)					
Tare Number					
Tare Weight (gm)					
Wt. of Dry Soil (gm)					
Moisture Content (%)					
Dry Density (pcf)					



Project Name:			TerraMatrix
Sample Location:		Sample No.:	
Sample Source:		Technician:	MOISTURE-DENSITY RELATIONSHIP OF SOIL
Sample Description:			
Max. Dry Density (pcf):	Opt. Moisture (%):	Procedure:	
Liquid Limit (%):	Plasticity Index (%):	Natural Moisture (%):	Project No.:
% - 3/4 in.:	% - No. 4:	% - No. 200:	Date:

NUCLEAR GUAGE (ASTM D2922)
STANDARD COUNT LOG (ASTM D3017)

PROJECT NAME: TRIASSIC PARK WASTE DISPOSAL FACILITY **PROJECT NO. 602**

NUCLEAR GUAGE MODEL_____ **SERIAL NO.:**_____

DATE ARRIVED ON SITE:_____ **DATE DEPART SITE:**_____

DATE (day/mo)	QA ID	MOISTURE COUNT	DENSITY COUNT	PASS/ FAIL	PECENT CHANGE		DATE (day/mo)	QA ID	MOISTURE COUNT	DENSITY COUNT	PASS/ FAIL	PECENT CHANGE

IN-SITU DENSITY TESTS - RUBBE[illegible] 'LOON METHOD (ASTM D 2167)
TRIASSIC PARK WAS[illegible] SPOSAL FACILITY

)WNER: GANDY MARLEY INC. PROJECT NUMBER: 602

)ATE:_____ MATERIAL TESTED:_____ OPTIMUM WATER CONTENT:____ MAX DRY DENSITY (pcf):___

'ESTED BY:_____ REVIEWED BY:_____ WEATHER:_____ PAGE___ OF ___

TEST NUMBER	RUBBER BALLOON	NUCLEAR DENSITY	RUBBER BALLOON	NUCLEAR DENSTIY	RUBBER BALLOON	NUCLEAR DENSITY
ELEVATION						
LOCATION						
FINAL READINGS (ft³)						
AVERAGE FINAL READING (ft³)						
INITIAL READING (ft³)						
CORRECTED VOLUME (ft³)						
SOIL WEIGHT + TARE (gm)						
TARE (gm)						
WEIGHT WET SOIL (gm)						
WET DENSITY (pcf)						
TIN NUMBER						
WEIGHT WET SOIL + TARE (gm)						
WEIGHT DRY SOIL + TARE (gm)						
WEIGHT OF WATER (gm)						
TARE (gm)						
WEIGHT DRY SOIL (gm)						
MOISTURE CONTENT						
DRY DENSITY (pcf)						
MAXIMUM DRY DENSITY (pcf)						
PERCENT COMPACTION						
CORRELATION TO TROXLER						

SAMPLE:_____

Sieve	Cumulative Weight Retained	Cumulative % Retained	Cumulative % Passing	Specification % Passing
3"				
2"				
1"				
3/4"				
3/8"				
#4				
#10				
#20				
#40				
#60				
#100				
#200				
PAN				

SAMPLE AND TARE WT: _____

TARE WT: _____ CONTAINER NO.:_____

WEIGHT BEFORE SIEVING:_____

UNIFORMITY COEFFICIENT, (D_{60}/D_{10}):_____
COEFFICIENT OF CURVATURE, (D_{30})/(D_{10} X D_{60}):_____

SIEVE ANALYSIS FORM (ASTM D 422)

PROJECT: TRIASSIC PARK WASTE DISPOSAL FACILITY CQA

PROJECT NO. 602 DATE:_____ TESTED BY:_____

TERRAMATRIX
1475 Pine Grove Road
Steamboat Springs, Colorado 80477

NUCLEAR FIEL EN /MOISTURE TEST DATA
TRIASSIC PARK WA . DISPOSAL FACILITY
(ASTM 2922, D3017)

PROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION:

CONTRACTOR:_____

SHEET NUMBER_____

TROXLER MODEL _____ SERIAL NO.:_____ STANDARD COUNT: DENSITY: _____ MOISTURE:_____ REQUIRED COMPACTION (%): __

WEATHER: _____ FIELD MONITOR: _____

TEST NUMBER													
GENERAL TEST LOCATION													
REFERENCE STAKE	I.D. NUMBER												
	NORTH COORDINATE												
	EAST COORDINATE												
	ELEVATION												
	BEARING (TO TEST)												
	DISTANCE												
MODE & DEPTH													
WET DENSITY (pcf)													
DRY DENSITY (pcf)		TROXLER	LAB	TROXLER	LAB	TROXLER	LAB	TROXLER	LAB	TROXLER	LAB	TROXLER	LAB
% MOISTURE													
% COMPACTION													
OPTIMUM MOISTURE (%)													
MAXIMUM DRY DENSITY (pcf)													
PASS/FAIL													

SOILS TEST REQUEST SHEET

PROJECT NAME: TRIASSIC PARK WASTE DISPOSAL FACILITY PROJECT NO. 602 LAB NO._____

REQUESTED BY_____ PROJECT MANAGER APPROVAL_____ PAGE____ OF ____

SAMPLE NUMBER	SAMPLE DEPTH LOCATION AND/OR STATION	VISUAL USCS SYMBOL	MOISTURE CONTENT	DRY DENSITY	ATTERBERG LIMITS	SIEVE ANALYSIS	#200 WASH	HYDROMETER ANALYSIS	COMPACTION TEST	UNDISTURBED PERMEABILITY	DIRECT SEHAR	UNCONFINED COMPRESSION	REMOLDED PERMEABILITY	DATE REQUESTED	RESULTS DUE BY	DATE COMPLETED	DATE SAMPLE STORED	DATE SAMPLE DISPOSED OF

COMMENTS:

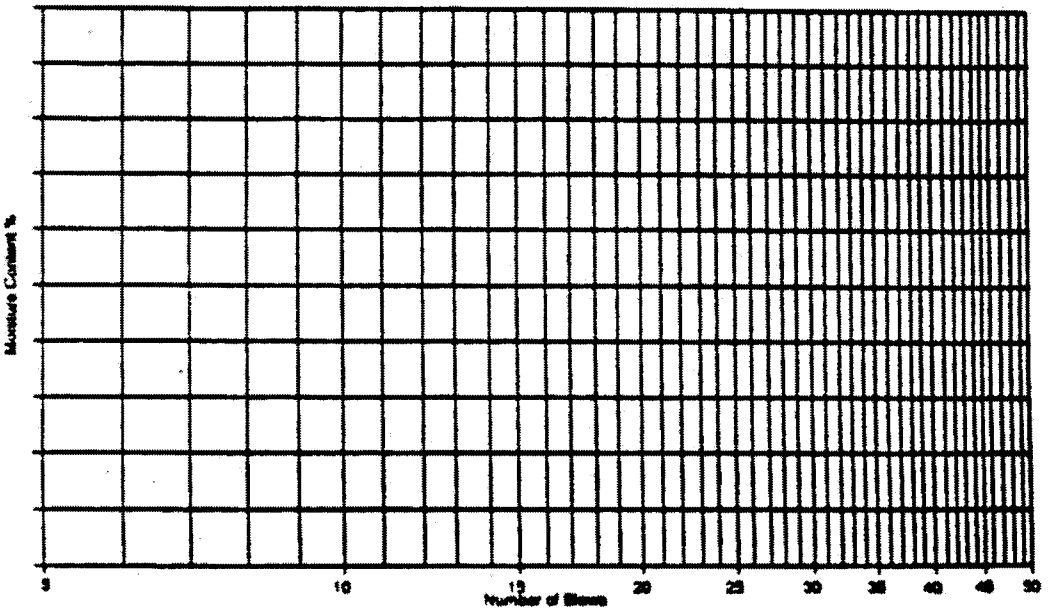
SAMPLES DELIVERED BY:_____

SAMPLES RECEIVED BY:_____

SPECIAL INSTRUCTIONS:

Type of Test	LL	LL	LL	LL	Nat. M.C.
Container #					
Tare Wt. (g)					
Number of Blows					
Wt. Sample Wet + Tare (g)					
Wt. Sample Dry + Tare (g)					
Weight of Water (g)					
Weight of Dry Soil (g)					
Moisture Content (%)					

Type of Test	PL	PL	Borehole #	
Container #			Sample #	
Tare (g)			Depth	
Wt. Sample Wet + Tare (g)			Liquid Limit	
Wt. Sample Dry + Tare (g)			Plastic Limit	
Weight of Water (g)			Plasticity Index	
Weight of Dry Soil (g)			Moisture Content	
Moisture Content (%)			Liquidity Index	



Sample Description: _____

_____

ATTERBERG LIMITS

Project: TRIASSIC PARK WASTE DISPOSAL FACILITY CQA

Project No.: DATE: TESTED BY: TERRAMATRIX

CONSTANT HEAD PERMEABILITY ON GRANULAR SOIL
GANDY MARLEY INC.
CHAVES COUNTY, NEW MEXICO

DATE:_____ SHEET____ OF ____

OWNER:_____ PROJECT NUMBER:_____

PROJECT NAME:_____ LOCATION:_____

SAMPLE NO.:_____ TECH._____

DESCRIPTION:_____

HEIGHT BEFORE (H1):

(1) _____

(2) _____

(3) _____

(4) _____

HEIGHT AFTER (H2):

(1) _____

(2) _____

(3) _____

(4) _____

AVERAGE (H1) _____ AVERAGE (H2) _____

SAMPLE DIMENSIONS

HEIGHT, L=(H1-H2), cm: _____ HEAD, h, cm: _____

DIAMETER, cm:_____

AREA, A, sq. cm:_____

	QUANTITY OF WATER, Q (cubic cm)	TIME, t (sec)
TRIAL 1:	_____	_____
TRIAL 2:	_____	_____
TRIAL 3:	_____	_____
AVERAGE:	_____	_____

K= QL/Ath= _____ cm/sec

1 inch = 2.45 cm
1 gal = 3785.41 cubic cm

Appendix D

Geosynthetics CQA Records

GEOSYNTHETICS INVENTORY, QUALITY CONTROL AND CONFORMANCE TESTING LOG

PROJECT NUMBE
PROJECT NAME:
OWNER:
INSTALLER:

DATE OF INVENTORY:_____
DATE OF DELIVERY: _____
TRUCK TYPE:_____
BILL OF LADING NUMBER:_____

QAM:_____
UNLOADING EQUIPMENT:_____
WEATHER CONDITIONS:_____
MANUFACTURER: _____

MATERIAL TYPE: GEOMEMBRANE GCL GEONET (COMPOSITE) GEOTEXTILE(CU) OTHER:_____

INVENTORY LOG							QUALITY CONTROL CERTIFICATES AND CONFORMANCE TESTING VERIFICATION				
	ROLL NUMBER	LOT #	MON ID	ROLL LXW (ft.x ft)	AREA (ft2)	DAMAGE REMARKS	QC CERT REC'D Y/N	DATE CONF. SAMPLE CUT/ SENT OUT	DATE CONF. RESULTS REC'D.	CONF. RESULTS REVIEWED BY/DATE	P/F
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											
16.											
17.											
18.											
19.											
20											

NCR#_____

TOTAL AREA THIS PAGE

REVIEWED BY:

DATE:

GEOSYNTHETICS PANEL DEPLOYMENT LOG

PROJECT NUMBER:
OWNER:
INSTALLER:

DATE: _____
SHEET NUMBER ___ of ___

GEOSYNTHETIC TYPE: PRIMARY/SECONDARY/TERTIARY/CLOSURE
GEOMEMBRANE GCL GEONET(COMPOSITE) GEOTEXTILE(CU)

OTHER/COMMENTS: _____

SUBGRADE CONDITION (Surface Compaction, Protrusions, Desiccation, Excessive Moisture): _____

PANEL NUMBER			
ROLL NUMBER			
DEPLOYED LENGTH (FT)			
*AMBIENT AIR TEMP (F)			
VISUAL OBSERVATION			
**OBSERVED OVERLAP			
MONITOR			
REMARKS			

SHEET THICKNESS (MILS)	LEAD	TRAIL	SPEC	P F		LEAD	TRAIL	SPEC	P F		LEAD	TRAIL	SPEC	P F
			ss					ss					ss	
			ss					ss					ss	
			ss					ss					ss	
			ss					ss					ss	
			ss					ss					ss	
AVERAGE			ss					ss					ss	

PANEL NUMBER			
ROLL NUMBER			
DEPLOYED LENGTH (FT)			
*AMBIENT AIR TEMP (F)			
VISUAL OBSERVATION			
**OBSERVED OVERLAP			
MONITOR			
REMARKS			

SHEET THICKNESS (MILS)	LEAD	TRAIL	SPEC	P F		LEAD	TRAIL	SPEC	P F		LEAD	TRAIL	SPEC	P F
			ss					ss					ss	
			ss					ss					ss	
			ss					ss					ss	
			ss					ss					ss	
			ss					ss					ss	
AVERAGE			ss					ss					ss	

NCR REFERENCE NUMBER (IF REQUIRED) _____

INSTRUMENT ID#
THERMOMETER _____
MICROMETER _____
WIND GAUGE _____

REVIEWED BY _____ **DATE** _____

* Ambient air temperature must be between 40° and 100° F for HDPE deployment
** Observed overlap must conform to construction specifications for relevant material type

File: Paneldep.log
Printed: December 9, 1997 (10:01am)

GEOMEMBRANE DEFECT LOG

PROJECT NUMBER:
OWNER:
LOCATION:
INSTALLER:

SHEET NUMBER: _____

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE (SEE BELOW)	LOG DATE	CQA MON	REMARKS	REPAIR DATE*	TEST DATE*
	SEAM PANEL OR REPAIR NO	DEFECT LOCATION DESCRIPTION						
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
M								
N								
P								
Q								
R								
S								
T								
W								
X								

AD ANIMAL RELATED DAMAGE
B UNDISPERSED RESIN BEAD
BO FUSION WELDER BURN
BS BOOT/SKIRT FOR FAIL PENETRATION
CO CHANGE OF OVERLAP
CR CREASE
D INSTALLATION DAMAGE
DF-# FUSION DESTRUCTIVE TEST NUMBER
DX-# EXTRUSION DESTRUCTIVE TEST NUMBER

EE EARTHWORKS DAMAGE
EXT EXTENSION
FM FISHMOUTH
FS FAILED SEAM LENGTH
FTS FIELD TEST STRIP
MT HEAT TRACK BURN
IO INSUFFICIENT OVERLAP (UNDER SPEC)
MO MANUFACTURER/DELIVERY DAMAGE

PT PRESSURE TEST CUT
SI SOIL IRREGULARITY
SL SLAG ON TEXTURED SHEET
T THREE PANEL INTERSECTION
VL VACUUM TEST LEAK
WR WRINKLE
WS WELDER RESTART
OTHER

NOTE: * COLUMNS TO BE USED BY THE DATA REVIEWER ONLY

REVIEWED BY:_____ DATE_____

NCR REFERENCE NUMBER (IF REQUIRED)_____

GEOMEMBRANE S. . PRESSURE TEST LOG

PROJECT NUMBER:
OWNER:
LOCATION:

INSTALLER:

DATE: _____

MACHINE NUMBER: _____ CQA MONITOR: _____ SHEET NUMBER: ____of____

SEAM NUMBER*	SEAM SECTION** FROM	TO	TECH ID	START TIME	FINISH TIME	INITIAL PRESSURE	FINAL PRESSURE	PRESSURE DIFFERENCE	PASS/FAIL	OSS TEST Y/N	ENTIRE SEAM COMPLETE NO	YES	REMARKS
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
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/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												

* Indicate seam number by two adjacent panel numbers, with the lowest panel number indicated first.
** Reference seam endpoints from an End of Seam (EOS), a defect repair number or a point location on the seam (reference point, distance from reference point).

REVIEWED BY_____ DATE_____

NCR REFERENCE NUMBER (IF REQUIRED)_____

GEOMEMBRANE S I VACUUM TEST LOG

PROJECT NUMBER:
OWNER:
LOCATION:
INSTALLER:

CQA MONITOR: _____
VACUUM BOX NUMBER_____

SHEET ____ **OF** __

SEAMS								REPAIRS					
SEAM NUMBER*	SEAM SECTION ** FROM TO	TEST DATE	TECH ID	DEFECTS***	SEAM COMPLETE NO YES	OBS TEST	REMARKS	DEFECT CODE	TEST DATE	TECH ID	DEFECTS***	OBS TEST	REMARKS
/	-				/								
/	-				/								
/	-				/								
/	-				/								
/	-				/								
/	-				/								
/	-				/								
/	-				/								
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/	-				/								
/	-				/								
/	-				/								
/	-												
/	-				/								
/	-				/								
/	-				/								

* Indicate seam number by two adjacent panel numbers, with the lowest panel number indicated first and proper layer (i.e., Tertiary, Secondary Primary).
** Reference seam endpoints from an End of Seam (EOS), a repair number or a point location on the seam (i.e., Reference point, distance from reference point).
*** Record quantity of leaks detected and reference new defect code in remarks column.

REVIEWED BY_____ **DATE**_____

NCR REFERENCE NUMBER (IF REQUIRED)_____

GEOMEMBRANE EX SION TRIAL SEAM LOG

PROJECT NUMBER:
OWNER:
LOCATION:
INSTALLER:

DATE: _____

SHEET NUMBER: ____of____

TRIAL SEAM NUMBER (TSX-#)	TIME WELDED	AMBIENT TEMPERATURE (F)	TECH ID	MACHINE NUMBER (MX-#)	CQA MON ID	TEMPERATURE SETTINGS		PEEL TEST RESULTS			SHEAR TEST RESULTS			PASS/FAIL	REMARKS
						PRE-HEAT SETTING	BARREL TEMP. (F)	SAMPLE	STRENGTH (lbs/in)	BREAK TYPE	SAMPLE	STRENGTH (lbs/in)	BREAK TYPE		
								A			D				
								B			E				
								C							
								A			D				
								B			E				
								C							
								A			D				
								B			E				
								C							
								A			D				
								B			E				
								C							
								A			D				
								B			E				
								C							
								A			D				
								B			E				
								C							
SPECIFICATION REQUIREMENTS : 60 mil GEOMEMBRANE								PEEL		FTB	SHEAR		FTB		

(CIRCLE MACHINE USED)

TMI TENSIOMETER CALIBRATION: SERIAL #: 124 CALIBRATION DATE: 4/1/96 RECALIBRATION DATE: 4/1/97
NSC TENSIOMETER CALIBRATION: SERIAL #'S:93021/91001 CALIBRATION DATE: 10/14/96 RECALIBRATION DATE: 10/14/97

NCR REFERENCE NUMBER (IF REQUIRED)_____

REVIEWED BY_____ DATE_____

GEOMEMBRANE FUSION DESTRUCTIVE LOG

ROJECT NUMBER:
OWNER:
LOCATION:
INSTALLER:

DESTRUCTIVE MONITOR: _____

DATE TESTED: _____

DESTRUCTIVE SAMPLE NUMBER: _____(ASSIGNED BY QAM)

DESTRUCTIVE INFORMATION:

DEFECT NO.	SEAM NO.	LOCATION	TECH ID	MACHINE NUMBER	DATE	CQA MON ID

DESTRUCTIVE TEST DATA:

PEEL TEST RESULTS					
SAMPLE (INSIDE TRACK)	STRENGTH (lbs/in)	BREAK TYPE	SAMPLE (OUT. TRACK)	STRENGTH (lbs/in)	BREAK TYPE
A1			A2		
B1			B2		
C1			C2		
D1			D2		
E1			E2		
SPECIFICATION REQUIREMENTS	90	FTB		90	FTB

SHEAR TEST RESULTS						
SAMPLE	PEAK STRENGTH (lbs/in)	BREAK TYPE	WELD TO GRIP LENGTH (a)	WELD TO GRIP FAILING SIDE AT YIELD (b)	WELD TO GRIP FAILING SIDE AT BREAK (c)	SHEAR STRAIN (%) AT YIELD((b-a)/a)/ AT BREAK ((c-a)/a)
F						
G						
H						
I						
J						
SPECIFICATION REQUIREMENTS	119	FTB				AT YIELD - 10 % MIN AT BREAK - 50 % MIN

PASS/FAIL: _____

REMARKS: _____

REVIEWED BY _____ DATE _____

(CIRCLE MACHINE USED)

TMI TENSIOMETER CALIBRATION: SERIAL #: 124 CALIBRATION DATE: 4/1/96 RECALIBRATION DATE: 4/1/97

NSC TENSIOMETER CALIBRATION: SERIAL #'S: 93021/91081 CALIBRATION DATE: 10/14/96 RECALIBRATION DATE: 10/14/97

NCR REFERENCE NUMBER (IF REQUIRED) _____

GEOMEMBRANE EXT . ION SEAM/REPAIR LOG

PROJECT NUMBER:
OWNER:
LOCATION:
INSTALLER:

MACHINE NUMBER: MX_____ CARRYOVER: _____ CQA MONITOR: _____ DATE: _____

PASSING TRIAL SEAM INFORMATION

NO	TIME	TECH ID	PRE HEAT	BARREL

EXTRUDER PURGED OF HEAT DEGRADED EXTRUDATE (1)_____ SHEET NUMBER: ____of____

SEAM NUMBER(2)	SEAM SECTION(3) FROM	TO	DEFECT CODE	START TIME	TECH ID	TEMPERATURE VERIFICATION PRE-HEAT SETTING	BARREL TEMP. (F)	REPAIR SIZE (W X H)	APPROX. LENGTH WELDED (ft)	DISTANCE FROM LAST DESTRUCTIVE (ft)	DESTRUCTIVE NUMBER	ENTIRE SEAM COMPLETE No	Yes	REMARKS	NON-DEST TEST DATE (welders only)
/															
/															
/															
/															
/															
/															
/															
/															
/															
/															
/															
/															
/															
/															

(1) Extruder must be purged when starting a seam and when welding stops for more than 1 minute.
(2) Indicate seam number by two adjacent panel numbers, with the lowest panel number indicated first.
(3) Reference seam endpoints from an End of Seam (EOS), a defect repair number or a point location on the seam (reference point, distance from reference point).

REVIEWED BY_____ DATE_____

(CIRCLE MACHINE USED)
TMI TENSIOMETER CALIBRATION: SERIAL NUMBER: 124 CALIBRATION DATE: 4/1/96 RE-CALIBRATION DATE: 4/1/97
NSC TENSIOMETER CALIBRATION: SERIAL NUMBER: 93021/91001 CALIBRATION DATE: 10/14/96 RE-CALIBRATION DATE: 10/14/97

NCR REFERENCE NUMBER (IF REQUIRED) _____

GEOMEMBRA USION SEAM LOG

PROJECT NUMBER:
OWNER:
LOCATION:
INSTALLER:

DATE: _____

MACHINE NUMBER: M#_____ CARRYOVER: _____ CQA MONITOR: _____ SHEET NUMBER: _____of_____

PASSING TRIAL SEAM INFORMATION

NO.	TIME	TECH ID	WEDGE TEMP.	SPEED

SEAM NUMBER (1)	SEAM SECTION (2) FROM	TO	START TIME	TECH ID	TEMPERATURE/SPEED VERIFICATION WEDGE TEMP (F)	SPEED	APPROX. LENGTH WELDED (ft)	DISTANCE FROM LAST DESTRUCTIVE (ft)	DESTRUCTIVE NUMBER	ENTIRE SEAM COMPLETE NO	YES	REMARKS	NON-DESTRUCT TEST DATE (vacuum only)
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												
/	-												

(1) Indicate seam number by two adjacent panel numbers, with the lowest panel number indicated first.
(2)Reference seam endpoints from an End of Seam (EOS), a defect repair number or a point location on the seam (reference point, distance from reference point).

REVIEWED BY_____ DATE_____

(CIRCLE MACHINE USED)

TMI TENSIOMETER CALIBRATION: SERIAL NUMBER: 124 CALIBRATION DATE: 4/1/96 RECALIBRATION DATE: 4/1/97
NSC TENSIOMETER CALIBRATION: SERIAL NUMBER: 93021/91001 CALIBRATION DATE: 10/14/96 RECALIBRATION DATE: 10/14/97

NCR REFERENCE NUMBER (IF REQUIRED)_____

LETTER OF ACCEPTANCE
OF SOIL SUBGRADE SURFACE

PROJECT NUMBER:
OWNER:
LOCATION:
INSTALLER:

	Check Applicable
Pond 4	_____
Repository	_____

I, the Undersigned, the duly authorized representative of TerraMatrix Inc. (TMI), have visually observed the soil subgrade surface within the area described below, and found that: 1.) all stones, rocks, debris, trash, roots, branches, and foreign matter, as well as pockets of soft or loose soil, and stones and rocks larger than ½ inch, have been removed from the surface; 2.) the surface is smooth and free of irregularities, sharp objects and abrupt changes in grade; and, 3.) the surface has been smooth-drum rolled.

This is a general acceptance for the area described below. The area of deployment for any given day will be reinspected by TerraMatrix to ensure that the subgrade surface continues to meet the above described criteria. The final inspection will be recorded in the TerraMatrix daily logs.

Area that has been observed is outlined on the attached drawing and is identified by:

_____

_____

_____

TMI REPRESENTATIVE

NAME	SIGNATURE	TITLE	DATE

LETTER RECEIVED BY

NAME	SIGNATURE	TITLE	DATE

NCR REFERENCE NUMBER (IF REQUIRED)_____

File: P:\SHELLY\FIELDFRM\SURFACCP.FRM
Printed: December 9, 1997 (10:07am)

Permit Renewal Application
October 17, 2011

Attachment N

Operations and Maintenance Plan

Prepared for:
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Modified by:
The New Mexico Environment Department
March 2002

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Attachment N. Operations and Maintenance Plan

1. Operations and Maintenance Plan

1.1 General

The Triassic Park Hazardous Waste Facility will be a full-service Resource Conservation and Recovery Act (RCRA) Subtitle C waste ~~treatment, storage, and~~ disposal operation. The Facility will offer the RCRA-regulated services for disposal of hazardous waste. ~~described in the following paragraphs: treatment, storage and disposal.~~

Support units and structures include a chemical laboratory, administration building, weigh scale area, maintenance shop, ~~truck wash unit,~~ clay processing area, clay liner material stockpiles, daily cover stockpiles, stormwater d~~r~~etention basin, stormwater diversion ditches, perimeter vadose zone monitoring wells, and access roads.

This Operations and Maintenance Plan refers to the landfill ~~treatment, storage and disposal units,~~ and the site runoff and drainage control system.

~~1.2 Treatment~~

~~Two treatment processes will be used at the Facility, including an evaporation pond for managing wastewaters that meet LDR standards and a stabilization process for treating liquids, sludges, and solids to ensure that no free liquids are present and that LDR standards are met prior to placing wastes in the landfill.~~

~~1.3 Storage~~

~~Four aboveground storage tanks will be utilized to accumulate regulated bulk liquid hazardous wastes prior to stabilization. Two container storage areas (roll-off storage area and drum handling unit) will be used to stage waste at the Facility for treatment or disposal. These container storage units will ensure that waste is stored in compliance with RCRA requirements for permitted storage. Neither of the container storage units will be used for long-term storage of waste.~~

1.4 Land Disposal

A landfill will be utilized for the disposal of waste that meets LDR standards.

2. Description of Units and Drainage System

2.1 Landfill

~~The~~ Phase 1~~I~~A of the landfill will have an area of approximately 47 acres and will have a capacity of approximately 553,200 cubic yards of waste. This unit has been designed as a double-lined landfill with a~~n~~ leachate collection and removal system (LCRS) above the primary liner and a~~n~~ leak detection and removal system (LDRS) between the primary and secondary liners. A vadose zone monitoring system (VZMS) has also been included as a detection system for leaking in the secondary LDRS system. Leachate that collects in the sumps of the LCRS, LDRS, and ~~vadose zone~~VZMS will be pumped through ~~a~~ pipes to the surface of the landfill, where it will be collected in temporary storage tanks located on a crest riser pad at the north end of

the landfill. Leachate will be managed by recirculating the liquid and applying it to the landfill soil cover for enhanced evaporation, thereby containing all leachate and potential contaminants within the lined landfill cell.

A run-on/runoff system will~~is contemplated to~~ control the water volume resulting from a 24-hour, 25-year storm. Run-on originating off-site will be directed around or away from the proposed landfill area using unlined ditches. Potentially impacted r~~R~~unoff in the active portion of the landfill will be collected in the bottom of the landfill in a contaminated stormwater collection basin that overlies the landfill liner system~~and pumped out within 24 hours of a storm event~~. Runoff water collected within the contaminated water basin will be managed by pumping the water to remove the standing water in the basin and applying it using a moveable piping and sprinkler system or tank trucks to the landfill soil cover for enhanced evaporation.~~Contaminated water will be treated either in the stabilization process or the evaporation pond.~~ Clean r~~R~~unoff from within the excavated area of the landfill unit, but not from the active portion of the landfill, will be directed to the stormwater collection basin located at the south end of the landfill (~~Dwg.~~Drawing 10). Clean stormwater will be pumped out to the stormwater control system for the site.

A daily cover consisting of soil will be spread on top of the waste placement area to limit wind dispersal. Dust generation will be reduced by restricting traffic to predetermined haul roads on the surface of the daily cover and by applying small amounts of water spray to moisten the soil surface. Water applied for dust control may include clean water supply, leachate, and runoff water collected within the landfill contaminated water basin.

Access to the landfill will be provided by two roads located on the east and west slopes. During interim filling stages, the landfill will be partially lined to the axis of the access roads (~~Dwg.~~Drawing 10). A ramp will be provided to access the stormwater collection basin.

~~2.2 Evaporation Pond~~

~~The evaporation pond will have an approximate operating capacity of 5.2 million gallons over an approximate area of 78,600 square feet. The evaporation pond has been designed as a double-lined unit with a LDRS between the primary and secondary liners. A vadose zone sump has been located beneath the liner system. Pumps will be used to transfer leachate collected in the sumps to tanker trucks. Leachate will either be returned to the evaporation pond, stabilized in the on-site treatment unit, or stored in one of the liquid waste storage tanks. The truck discharge and leachate collection stations are located on the south and east side of the pond. The pond is divided in two sections by a separator berm, providing two independent treatment areas in case repairs need to be completed in one of them.~~

~~A run-on/run-off system is contemplated to control water volume resulting from a 24-hour, 25-year storm. Run-on originating off site will be directed around the proposed evaporation pond into the site wide surface water diversion channels shown in Drawing 25.~~

~~2.3 Liquid Waste Storage Tanks~~

~~The liquid waste receiving and storage unit will house four aboveground tanks. Each tank will have a capacity of approximately 9,000 gallons. The tanks will be double-walled and constructed of high density polyethylene. The tank system will be placed on a surrounding concrete base. The concrete area will be sloped to provide drainage to a sump. This concrete area will provide secondary containment for all ancillary equipment.~~

~~Liquids in the storage tanks will be transferred to the stabilization unit with tanker trucks. Tanker trucks will be parked over a concrete pad while discharging or removing liquids from the tanks. All connections to the trucks will be with dry connect valves.~~

~~2.4 Stabilization~~

~~The stabilization unit will consist of four in-ground double lined steel stabilization bins, two dry reagent silos, two liquid reagent tanks, and a water tank. Additionally, there will be a control room from which operations will be directed and coordinated. The stabilization bins will be located inside the stabilization building.~~

~~Waste may be offloaded directly from trucks into the stabilization bins or transferred from the drum handling unit or roll-off storage area. The bins will be covered while dry reagents are being added to control particulate air emissions. The cover will be removed and a backhoe positioned adjacent to the bin will mix the waste and reagents.~~

~~The nominal dimensions of the bins will be 25 feet long by 10 feet wide by 10 feet deep. The ends of the bins will be shaped to conform to the reach profile of the backhoe selected for the mixing. The bins will be contained in a concrete vault. The bins will be double-walled tanks with the space between the walls serving as LDRS. Shock-absorbing coiled wire rope isolators will maintain separation between the bins. In order to ensure no fugitive dust emissions during stabilization processing, the bins and the stabilization building will be equipped with an exhausting ventilation system which will maintain a negative pressure inside the building. Dust will be removed from the exhaust air in the bag house located on the west side of the building. Collected dust will be processed in the stabilization facility.~~

~~2.5 Drum Handling~~

~~The Facility will contain seven separate containment areas (cells). Each of the areas will have its own floor drain and containment sump, allowing incompatible wastes to be placed in separate cells. Two of the cells will be designed to accommodate only TSCA PCB wastes. The TSCA cells will be surrounded by a 6-inch concrete berm. The drums will be stored in an open-sided and roofed building to prevent run-on from precipitation.~~

~~Each cell will have a concrete floor that slopes toward a trench covered by a steel grating. Each trench will lead to a separate secondary containment sum for that where any spilled liquids will be accumulated. The trench and sump system include a double HDPE geomembrane liner and leak detection and leachate removal system.~~

~~2.6 Truck Roll-Off~~

~~Roll-off containers will be stored on an open pad. The pad will be divided into two sections. One section will hold tarped, DOT approved, lined roll-off containers with non-stabilized waste awaiting treatment at the stabilization unit. The other section of the pad is intended as a staging area for roll-off containers containing stabilized waste awaiting TCLP test results and landfill disposal approval.~~

~~Secondary containment of the roll-off storage area will be provided by a geomembrane liner. The floor will be sloped to a sump located in the corner of the storage area. The entire roll-off storage area will be surrounded by a 4 to 8 feet high berm.~~

~~Roll-off containers will be inspected for free liquids prior to acceptance at the unit. Containers which are received for disposal, but are found to contain free liquids upon inspection, will be managed in accordance with stabilization procedures described in Section 2.4 of the application text. If the waste generator will not allow the Facility to prioritize handling of the load to eliminate free liquid, the load will not be admitted to the Facility. Otherwise, free liquids will be removed with a vacuum truck characterized, and managed in accordance with stabilization procedures described in Section 2.4. The volume of free liquids in the roll-off containers is expected to be minimal. Following the removal of free liquids, the waste (in the roll-off~~

~~container) will either be managed through the stabilization process or landfilled, whichever is appropriate. Section 2.2.12 of the application text describes the methods that will be used to separate incompatible wastes. The area will be equipped with fire extinguishers, a telephone, alarm systems, spill control, and first aid kits.~~

~~Waste in the roll-off containers that meet the requirements for free liquids (or lack thereof) will be placed in the landfill. Other wastes in roll-off containers that do not pass the appropriate acceptance testing (i.e. paint filler test) will be transferred to the stabilization area for treatment. Upon completion of the stabilization process, the waste will once again be tested to ensure that it meets the landfill criteria.~~

2.7 Runoff and Drainage Control System

Facility stormwater control is provided by a network of surface water run-on and runoff diversion channels and collection and detention basins. A diversion channel located on the east of the Facility will provide run-on control from the east watershed area. To control the runoff from the facilities area, several collection channels and culverts will be built to divert discharges from storm events to a stormwater detention basin. The location of the collection channels, culverts, and detention pond are shown on Drawing 25.

3. Operations

3.1 Waste Acceptance

Prior to initiation of a shipment of waste to the Facility, the generator of the waste will provide a full characterization of its waste and receive approval from the Facility to ship the waste. The Facility will use the waste characterization data to perform the following activities:

- ensure that the waste can be accepted in accordance with the RCRA permit;
- verify that the Facility has the capability to properly ~~treat and/or~~ dispose of the waste;
- identify any safety precautions that must be taken to properly manage the waste;
- use the physical characteristics and chemical composition of the waste to determine the most effective ~~treatment and~~ disposal methods for the waste; and
- ~~select parameters to be tested to determine the formula for stabilization of appropriate wastes; and,~~
- select parameters to be tested upon arrival at the Facility to verify that the waste accepted is the waste characterized.

The following sections provide details of the waste acceptance procedures that will be implemented at the Facility.

3.1.1 Pre-Shipment Procedures

A. Prior to entering into an agreement to manage a waste stream for a generator, the Facility will require the generator to supply enough data to determine the physical and chemical characteristics of the waste stream, as well as the U.S. Environmental Protection Agency (EPA) waste codes applicable to the waste stream.

B. The Facility will work with the waste generator to assure that all waste analyses and waste characterization information are provided to meet the applicable requirements of 20.4.1 NMAC ~~4.1~~. If the data supplied

are not adequate to provide a complete characterization of the waste stream, the Facility will either require additional data from the generator or will not accept the waste.

C. Before a waste stream may be accepted by the Facility for ~~treatment, storage, or~~ disposal, the generator must provide the following information:

C.1 A completed Waste Profile Form (EPA 530-R-94-024) or a comparable form approved by the Facility and signed by an authorized agent of the generator. The typical parameters that the generator should include in the waste stream profile are provided are discussed in Sections 4.3.3.

C.2 A representative sample of the waste.

C.3 A description of the process that generated the waste.

C.4 A Land Disposal Restriction Notification.

C.5 All supporting data required by 40 CFR 268.7.

C.6 If the waste is an LDR waste that the generator has treated to applicable BDAT standards, the generator must supply applicable LDR Certification specified in 40 CFR 268.7, a copy of the waste analysis plan required by 268.7, and the applicable LDR Certification and analytical data necessary to show compliance with 40 CFR 268.7.

C.7 If the waste is an LDR waste that the generator has determined meets the BDAT treatment standards without any type of secondary treatment, applicable LDR Certification and analytical data necessary to show compliance with 40 CFR 268.

C.8 Documentation that supports the information presented on the waste profile form.

D. The representative sample submitted during the pre-acceptance process will be analyzed by an independent laboratory. Each waste with reactive properties will also be tested for compatibility with the landfill and surface impoundment materials. The analytical results will be compared with the generator's waste profile form, and the discrepancies will be resolved with the generator prior to approval being granted to the generator to ship the waste. Information from the waste profile form and analytical results will be compared with the Facility's permit to ensure that the waste is acceptable for ~~storage, treatment and~~ disposal at the Facility.

E. The Facility will conduct required/supplemental analysis according to EPA or ASTM methods on all incoming hazardous waste to further characterize the waste. Supplemental analyses will be performed on all waste suitable for direct landfilling from the generator if slight discrepancies exist between the Waste Profile Form and the shipped waste. Sampling methods are described in Section 4.5.

F. The Facility may waive one or more of the analyses under the following conditions:

F.1 The waste is a portion of continuously shipped, well documented waste stream.

F.2 The waste has been approved for receipt by NMED on an emergency basis.

F.3 Facility personnel at the point of generation sampled, or oversaw the sampling of the waste and the required/supplemental analyses have been conducted.

F.4 A representative sample cannot be practically obtained.

F.5 Other factors are introduced which preclude the need for required/supplemental analyses.

F.6 The Facility will document the reason for the waiver of required/supplemental analyses.

G. Generators will conduct random sampling and analyses of waste streams. The procedures for selecting and sampling waste are described in Section 4.6.

3.1.2 First-Time Waste Acceptance Procedure

A. When a waste has been approved for ~~treatment and/or~~ disposal at the Facility, the waste may be scheduled for shipment. 24-hour notice will be required from each generator prior to waste shipment. This time will enable the Facility to prepare for receipt of the waste, including~~.~~ ~~Such preparation will include ensuring that adequate capacity exists in the storage areas or treatment units,~~ preparing for sample collection and fingerprint analyses~~,~~ and preparing all necessary documentation on the waste shipment. If adequate capacity to receive the waste is not available, the generator will be told not to ship the waste until notified by the Facility.

B. Upon arrival at the Facility, the waste will be analyzed to determine if it matches the Waste Profile Form and representative sample (Table 4.4). If discrepancies are noted, the waste will be further analyzed using supplemental analyses methods (Table 4.5). In addition, the Facility may specify any testing that is deemed necessary to ensure that the waste is properly characterized.

C. Any waste that does not meet the waste acceptance criteria will be returned to the generator.

3.1.3 Ongoing Waste Acceptance Procedure

A. Confirmatory analyses will be performed according to Section 4.4.

B. The Facility will conduct random sampling and analysis of incoming hazardous waste.

3.2 Waste Handling

This section refers to the general procedures and analyses that will be performed once a waste stream has been accepted in the Facility. Specific procedures for waste handling within each unit are addressed in specific sections for each unit.

3.2.1 Incoming Load Procedures

A. When a waste shipment arrives at the Facility, the truck will be routed to a parking area outside the Facility gate while documents are reviewed. Required documentation will include a waste manifest, an LDR certification, and a copy of the Waste Profile Form (or waste profile number if the form is already on file). The paperwork will be reviewed for completeness and checked against the waste shipment to verify that the numbers of containers and waste labels match the description on the manifest.

B. If the paperwork is in order, the truck will be routed to the truck sample station, a staging area inside the Facility gate.

C. If a discrepancy is found in the paperwork, the Facility will contact the generator for resolution prior to acceptance of the load and will reject the load if the discrepancy cannot be resolved (generally in less than 24 hours). During the time the discrepancy is being resolved, the waste shipment will remain in a secure area inside the Facility gate.

D. In those instances where a discrepancy with the manifest cannot be resolved within 15 days of receiving the waste, a letter will be submitted to NMED describing the discrepancy and the attempts to reconcile it. A copy of the manifest or shipping paper at issue also will be provided to NMED, as specified in 40 CFR

264.72(b). All discrepancy resolutions will be documented in writing and maintained in the Facility operating record.

3.2.2 Ongoing Complete Waste Analysis

A. If one or more waste shipments in a calendar year from any single generator do not match the fingerprint tests, full sample analyses of each waste stream from the generator will be performed annually.

B. If all waste shipments in any given calendar year from a single generator match the fingerprint analyses, full sample analyses of each waste stream from that generator will be performed annually.

C. On an annual basis, the Facility will randomly sample and analyze a minimum of 10% of the incoming waste streams that are to be directly landfilled. The ~~sampled~~ samples will be split into a minimum of two aliquots. One will be retained and the other analyzed for conformance to the LDR requirements. If the results of the analysis indicate that the waste does not conform with the applicable LDR requirements, the Facility will immediately contact the generator and suspend the placement of that waste stream into the landfill. Disposal of the waste stream will be discontinued until the discrepancy regarding compliance with the LDR requirements has been resolved and the generator has demonstrated that its ongoing program for compliance with LDR requirements is adequate.

3.2.3 Waste Tracking

A. A Facility specific number will be assigned to each waste stream. The designated number will identify the generator, a sequential number specific to the substance and source and the delivery date.

B. The number will be recorded on: (1) all incoming paperwork from the generator; (2) samples received from the generator; (3) samples taken on site; and (4) site-generated records.

3.2.4 Compliance with Regulations for ~~Storage, Treatment and~~ Disposal

A. Additional analyses may be required dependent on the ~~interim and~~ final disposition of the waste.

B. Containers will be inspected to ensure that the integrity of the container is suitable for storage.

~~C.Containerized wastes that are not compatible will be segregated within the storage area. Storage procedures within each storage unit are detailed in the following sections.~~

~~D.~~C. Solid wastes that exceed 500 parts per million by weight (ppmw) of volatile organics will only be stored in DOT containers approved for shipment of hazardous waste. ~~No wastes which exceed 500 ppmw of volatile organics will be stored in the liquid waste tanks.~~

~~E.A second representative sample of any waste that will require stabilization prior to placement in the landfill will be supplied by the generator. This sample will be used for bench-scale testing to determine regulated constituent leaching based on varying admixes and ratios. The stabilization process will result in a dry and structurally stable material that is suitable for compaction and landfilling.~~

~~F.Wastes that are treated on site in the solidification unit will be tested after treatment and before disposal to verify that LDR standards have been met.~~

~~G.~~D. No wastes will be placed in the landfill until those wastes meet applicable LDR standards. All information obtained to document LDR compliance will be maintained in the Facility operating record.

~~H.~~E. Wastes that carry more than one characteristic or listed waste code will be treated to the most stringent treatment requirements for each hazardous waste constituent of concern prior to disposal in the landfill. When wastes with differing treatment standards are combined solely for the purpose of treatment, the most stringent treatment specified will be met for each constituent of concern in the combined waste prior to land disposal.

~~I.~~F. Prior to disposal, hazardous wastes contained in lab packs will be treated to meet applicable treatment standards for each waste type.

~~J.~~G. Reactive hazardous waste will not be placed in the landfill until is has been rendered non-reactive by treatment.

~~K.~~H. F001 – F005 spent solvents will not be disposed of in the landfill unless applicable treatment standards, set forth in 40 CFR 368 Subpart D, are met.

~~L.~~I. "California List Wastes" will not be accepted at the Facility unless they can be treated to LDR standards.

~~M.~~J. Unacceptable PCB contaminated wastes are defined in Section 4.1.2 of the Waste Analysis Plan.

~~N.~~K. The Facility will accept contaminated debris only in the cases where that debris will remain hazardous after it has been treated in accordance with 40 CFR 268.45(b) or (c).

3.3 General Procedures for Hazardous Waste Generated at the Facility

A. The types of waste that might be expected to be generated at the site are discussed in Section 4.5.6.

B. During inspections of these facilities, if waste materials are identified, they will be removed from the system, characterized, and managed according to the waste analysis plan. Management of spill residues that do not require the implementation of the contingency plan will be managed in accordance with site procedures. Spills or releases that require implementation of the contingency plan will be managed in accordance with the requirements of the plan.

C. Leachate collected in the unit sumps will be pumped into temporary storage tanks that are part of the landfill operation. ~~tanker trucks. It will then be tested to assure compliance with LDR requirements defined in 40 CFR Part 268 for F039 listed wastes. Based on the test results, the frequency of sampling and required parameters for leachate analysis will be determined. Leachate that meets applicable LDR requirements will be~~ Leachate will be managed within the landfill unit by applying the leachate to the landfill soil cover for enhanced evaporation and dust suppression~~placed in the evaporation pond. Leachate that does not meet applicable LDR requirements will be stabilized before landfilling.~~

~~D. Wastes will be treated at the stabilization unit prior to disposal in the landfill and may be sampled and characterized to determine an appropriate treatment mixture prior to their acceptance.~~

~~E. After wastes have been treated at the stabilization unit, they will be retested prior to placement in the landfill to determine if they meet LDR requirements. All solidified wastes will be tested for the presence of free liquids using the paint filter test and will be analyzed for other parameters determined by the characterization of the waste before solidification. For most materials, the TCLP extraction method will be performed, followed by an analysis of the leachate for the appropriate parameters (refer to EPA test method 1311, 40 CFR Part 261, Appendix II).~~

3.4 Landfill Operation

3.4.1 Records

A. The Facility will maintain complete records of the wastes disposed of in the landfill. The documentation will contain results of waste analyses, waste compatibility analyses and waste handling compliance. Additional documentation will register the exact location of a waste within a three-dimensional grid system. Grid spacing will be a minimum of 50 feet.

B. Records of inspections of the landfill will be maintained in an operating record kept in the administration building.

C. ~~Preventative~~ Preventive maintenance information will be documented and kept in the operating record in the administration building.

D. Maintenance performed on the structures and equipment part of the landfill unit will be documented in the operating record kept in the administration building.

3.4.2 Procedures for Ignitable/Reactive Wastes

A. Reactive wastes will be treated or mixed prior to placement in the landfill so that the resulting waste mixture no longer meets the definition of reactive waste.

B. Ignitable waste will be treated or mixed prior to placement in the landfill so that the resulting waste mixture no longer meets the definition of ignitable waste.

C. Reactive wastes will be separated from sources of reaction.

3.4.3 Waste Placement

A. The landfill will be accessed by means of ramps indicated in Drawing 10.

B. The active areas of the landfill will be accessed by temporary roadways that will be established on top of the waste and daily cover.

C. Incompatible wastes will be spaced at least one grid distance to prevent commingling.

D. Lab packs may be placed in the landfill only if they meet the requirements in 40 CFR 264.316. Lab packs will not be accepted if incompatible wastes are placed within the same lab pack or if reactive wastes have not been treated to render them non-reactive.

E. Bulk and containerized wastes will not be placed in the landfill unless they meet the requirements in 40 CFR 264.314.

F. Containers less than 90% full will be crushed~~, shredded, or otherwise reduced in volume~~ to the maximum extent possible through compaction when~~prior to~~ placeed~~ment~~ in the landfill.

G. Wind dispersal will be controlled with a daily cover consisting of soil spread on top of the waste with a minimum thickness of 0.5 foot.

H. Dust generation will be reduced by applying small amounts of water spray to moisten the soil surfaces. Water applied for dust control may include clean water supply, leachate, and runoff water collected within the landfill contaminated water basin. The water will be applied using both a piping and sprinkler system and~~with a~~ water trucks equipped with a pump, piping and an array of nozzles that spray very small water droplets. The frequency of the water application will depend on the climate and traffic. Sufficient moisture will be applied to all soil surfaces on an as-needed basis to prevent wind erosion. However, the application of water will be limited so that ponding in the landfill does not occur.

I. Waste placement operations will be halted when wind speed exceeds 35 mph.

J. Landfill operational staff will visually observe trucks leaving the area for excessive accumulation of waste on the tires and/or truck body. If excessive accumulation is noted, physical cleaning of the trucks will be performed within the lined landfill on an area with soil cover daily waste disposal working face.~~the trucks will be routed to the truck wash area for cleaning.~~ Any waste resulting from cleaning will be covered with daily soil cover. The potential for waste accumulating on trucks will be minimized by limiting the waste daily waste disposal working face to the smallest practical area. All other areas will have soil cover over the waste.

3.4.4 Operation of Leachate Collection and Detection Systems

A. Pumpable liquid in the LCRS, LDRS, and ~~vadose~~ VZMS sump will be removed in a timely manner to prevent the head on the respective liners from exceeding 12 inches above the floor liner system. The depression in the sump will be used to provide sufficient head to activate the pumps.

B. The leachate collected from the sumps will be temporarily stored in tanks.

C. Overfilling of the tanks will be controlled with high-level control switches which will automatically shut down the sump pumps. An alarm will be activated that will notify personnel that the system requires maintenance. Volume of leachate pumped will be monitored by means of cumulating flow meters. Total liquids pumped will be recorded daily.

D. The leachate collection tanks will be used as 90-day storage units and managed accordingly.

E. Once the leachate levels in the riser crest pad tanks exceed 50 percent of the holding capacity the liquids will be removed by tanker truck to the main liquid waste storage tanks.

F. A fluid level pressure transducer will be installed in the LCRS, LDRS, and ~~vadose~~ VZMS sump. The pressure transducer will be wired to a digital readout box located at the crest riser pad. The readout box will show the depth of leachate in the sump. The readout box will be checked during the routine inspections which are presented in Table 5-1. When the leachate level is 12 inches or greater then the pump will be activated to remove leachate from the sump. The pump will be turned off when the leachate inflow rate becomes too small for the pump to stay activated. Volumes of leachate will be recorded as previously stated in paragraph C of this section.

G. In the event of large rain storms both the side slope riser pipe pumps and the vertical riser pipe pumps will be used to minimize head. Liner systems facility staff will be available to address large rain storm events by utilizing vacuum trucks or portable pumps to remove excess leachate and contaminated runoff, if required. Runoff water collected within the contaminated water basin will be managed by pumping the water to remove the standing water in the basin and applying it to the landfill soil cover for enhanced evaporation. A moveable piping and sprinkler system will be used to distribute the water onto the soil cover. Vacuum trucks with spray bars may also be used to apply water to the soil cover and landfill

roads.~~Vacuum trucks typically have a capacity range of 2,000 to 3,000 gallons. Portable pumps with a pumping rate in the range of 10 to 25 gallons per minute (gpm) may also be used, if needed.~~

3.4.5 Inspection and Monitoring

A. Inspections will be performed according to the schedule matrix indicated in Table 5-1.

B. The schedule matrix will be expanded, as necessary, to reflect new equipment or changes to existing equipment inspection frequencies.

C. The landfill and associated equipment will be inspected weekly and after storms.

D. The LCRS, LDRS and vadose sumps will be checked daily for the presence of liquid. Pressured transducers will be used to measure the presence of liquids in the sump. The elevation of the transducer will be determined during installation. The transducer elevation combined with the fluid pressure on the transducer will allow calculation of the fluid elevation at any time.

E. The leachate collection tank will be inspected according to the procedures indicated in Section 5.2.5.

F. Ancillary equipment will be inspected according to the manufacturer recommended programs.

G. Surveys of the active landfill surface area and the riser pipes with an organic vapor monitor (OVM) or comparable device will be performed quarterly to detect the presence of organic compounds.

H. The landfill will be inspected by properly-trained personnel for items such as spills, leaks, odors, wind-blown particulate matter, deterioration of the landfill itself, malfunction or improper operation of the run-on/runoff control systems.

I. Inspections will be documented in inspection checklists that will be kept for at least 3 years.

J. If deterioration or any other abnormalities are noted, the inspector's supervisor will be notified and will determine the appropriate course of action for correction. If the supervisor is not available, the Emergency Coordinator (EC) will be summoned to make the determination.

K. The stormwater and contaminated water basin will be inspected to ensure that liquid has not accumulated. The collection systems will be emptied as quickly as possible to ensure that the design capacity of the system is not exceeded. Stormwater collected within the landfill that has the potential to have contacted waste with be managed by enhanced evaporation through recirculation on the landfill soil cover. Vacuum trucks may~~will~~ also be used to empty the basins. Management of runoff water by recirculation for enhanced evaporation keeps all water that has a potential to contact waste within the lined landfill cell. ~~Contaminated water that meets applicable LDR requirements will be placed in the evaporation pond. Contaminated water that does not meet applicable LDR requirements will be stabilized before landfilling.~~

L. The sump pumping and instrumentation system will be checked annually to ensure that it is functioning properly. The pumping system will be turned on to check if the system works. If the system is not functioning properly the systems will be repaired in accordance with the manufacturer's recommendations or will be replaced. If there is adequate leachate in the sump, visual observation of flow into the storage tanks will be used to determine if the system is functioning properly. If there is insufficient leachate, then audible indications that the pump has engaged will be used to determine if the pump is functioning. The pressure transducers will be extracted from the sump and placed in the solution of known depth to determine if the transducer is functioning properly.

M. If either the pumping system or transducer fails to function as designed, then the failing piece of equipment will either be replaced or fixed.

N. Determination if the Action Leakage Rate (ALR) has been exceeded in the landfill will be conducted in accordance with 40 CFR 264.302(b). This is discussed in further detail in the Action Leakage Rate and Response Action Plan ~~report included in the engineering report~~(Permit Attachment J).

O. The average daily flow in the LDRS sump will be calculated as follows:

O.1 Determine volume from cumulative flows for the week

O.2 Determine landfill area based area of landfill in service (horizontal protected area)

O.3 Calculate average daily flow by calculating total gallons for the week/7/area of landfill in service.

P. The Response Action Plan will be implemented if leaks are detected.

Q. Trucks will be inspected to prevent tracking of waste out of the landfill on vehicles tires or bodies.

R. Wind speed will be monitored using a hand-held wind meter to determine if wind speed exceeds 35 mph. Waste placement operations will be halted when wind speed exceeds 35 mph.

~~3.5 Evaporation Pond Operation~~

~~3.5.1 Records~~

~~A.Results of waste analyses will be maintained in an operating record kept in the administration building.~~

~~B. The Facility will maintain complete records of the wastes disposed of in the evaporation pond.~~

~~C. Inspection records will be maintained in the inspection log for the evaporation pond. This log will be kept in the administration building.~~

~~A.Preventative maintenance information will be documented and kept in an operating record in the administration building.~~

~~B.Maintenance performed on the structures and equipment part of the evaporation pond will be documented in the operating record kept in the administration building.~~

~~C.The average daily flow rate to the sump system will be calculated and recorded weekly during the active life of the evaporation pond to ensure that ALR for the evaporation pond (1,000 gpd) is not exceeded.~~

~~3.5.2 Procedures for Ignitable/Reactive Wastes~~

~~A.Wastes that are ignitable, reactive, and/or incompatible will not be placed in the evaporation pond at the same time.~~

~~3.5.3 Waste Placement~~

~~A.Off site and on site waste will be analyzed according to the Waste Analysis Plan to ensure that the waste acceptance criteria specified in the RCRA permit are met and to identify any safety precautions that~~

~~must be taken to properly manage the waste. Hazardous waste which may be placed in the evaporation pond includes all wastes listed in Part A of the application (Volume I), provided that LDR treatment standards are met prior to placement of the wastes. Hazardous wastes that require compliance with CFR 264, Subparts BB and CC will not be placed in the evaporation pond.~~

~~B.Approved off site waste and on site leachate tanker trucks will transport the waste to the tanker discharge pad at the evaporation pond.~~

~~C.Tanker trucks will be unloaded directly into the evaporation pond through a series of hoses, valves and pipes, as shown on Drawing 31 in Volume III.~~

~~D.The pond is separated into two independent sections by a separator berm. In the event that a leak should occur in one section of the pond, liquids could be pumped into the other section until repairs are completed.~~

~~E.Two feet of freeboard will be maintained in the evaporation pond at all times.~~

~~F.Sludge will be removed by vacuum trucks and treated in the stabilization unit. Sludge will be removed on a routine basis to maintain the level of waste in the pond below the maximum operational level.~~

~~G.The vacuum trucks will park on the concrete pad during sludge removal. Sludge will be removed by means of pumps and flexible hosing.~~

~~H.Site personnel will be present during all fluid discharge and transfer operations to ensure that pond overtopping does not occur in the event of equipment malfunction or other human error.~~

~~3.5.4 Operation of Leachate Detection and Vadose Zone Monitoring Systems~~

~~A.Pumps located in the LDRS pipe and vadose zone sump will be used to remove leachate accumulating in the leachate collection systems. When leachate accumulates it will be pumped to a tanker truck and either returned to the evaporation pond, stabilized in the onsite treatment unit, or stored in one of the liquid waste storage tanks. Any time liquids are detected at a specified level, the sump pump will be activated and the liquid will be removed. The pump activation level will be related to the pump selected.~~

~~B.All pumpable liquids in the sumps will be removed in a timely manner to maintain the head on the bottom liner below 12 inches above the floor liner. The depression in the sump will be used to provide sufficient head to activate the pumps.~~

~~C.The volume of liquids removed from the sumps will be recorded in cumulating flow meters. Total liquids pumped will be recorded after each pumping event.~~

~~3.5.5 Inspection and Monitoring~~

~~A.Inspections will be performed according to the schedule matrix indicated in Table 5-1.~~

~~B.The freeboard level will be inspected daily to ensure that approved or acceptable freeboard levels are maintained and that overtopping does not occur. Liquid elevations will be checked by visual observation against the staff gauges. The staff gauges will consist of a rod made of relatively inert material which will be labeled in feet and marked every tenth of a foot. In order to prevent overtopping, the maximum liquid level allowed to maintain the minimum freeboard level will be marked on the staff gauge or noted on the inspection checklists. The bottom of the staff gauge will~~

~~be fixed to a heavy base that will sit on the pond bottom. It is not anticipated that the staff gauge will require maintenance or repair, the pond level could be lowered or a boat could be used to access the staff gauge. The data will be recorded on standard forms and filed with the operating records.~~

~~C.Elevation rods, survey monuments, staff gauges, flow meters and fluid level transducers will be used to measure and record liquid handling volumes.~~

~~D.Flow meters will be used to record volumes of liquids discharged into the pond and removed from the sumps. Transducers located in the sumps will provide a liquid level reading in the sumps. The elevation of the transducers will be determined during installation. The transducer elevation combined with the fluid pressure above the transducer will allow calculation of the fluid elevation at any time.~~

~~E.Inspections will occur on a weekly basis and after storms to detect evidence of deterioration, malfunction, improper operation of overtopping control systems (portable pump) or sudden drops in liquid levels in the pond.~~

~~E1.The overtopping control system (portable pump) will be started during the course of routine inspection. If the pump does not function as designed, the pump will be replaced or fixed. Pump operation inspection will be completed by visual inspection.~~

~~E2.Sudden drops in liquid levels will be determined using a staff gauge system discussed in paragraph B in conjunction with criteria outlined in paragraph F of this section. The liquid level will be compared to the previous liquid level reading and adjusted for estimated evaporation loss and documented liquid addition and removal to determine whether an unexplained drop in the liquid level has occurred.~~

~~F.If liquid losses exceed daily evaporation losses and no other reasonable explanation is found, then that section of the pond will be shut down and authorities at the NMED will be notified immediately.~~

~~G.Weekly visual inspections will be conducted to verify the integrity of the liners and associated systems. Visible portions of the leachate collection pipes and pump will be visually inspected for deterioration.~~

~~H.The concrete pad for tanker discharge will be visually inspected weekly for accumulation of liquids.~~

~~I.The area around the pond will be inspected weekly for any signs of deterioration, leaks or erosion. The evaporation pond berm will be inspected for any sign of abnormal deterioration, which may include excessive sloughing or the development of significant cracks.~~

~~3.6 Liquid Waste Storage Operation~~

~~3.6.1 Records~~

~~A.The results of each daily inspection will be documented in a daily operating record.~~

~~B.The quantity of waste received and the date each period of accumulation begins will be documented for each tank.~~

~~C.Inspection records will be maintained in the Facility operating record, which will be kept in the administration building.~~

~~D.Maintenance performed on the structures and equipment part of the storage tank unit will be documented in the operating record kept in the administration building.~~

~~3.6.2 Procedures for Ignitable/Reactive Wastes~~

~~A.Only the waste types approved for a tank system will be placed in the tanks. No new waste types will be placed into an existing tank system unless:~~

~~A.1 The compatibility of the new waste type with the prior contents of the tank is determined by testing or documentation.~~

~~A.2 The existing tank system is cleaned or flushed to the extent necessary to ensure compatibility with the new waste type.~~

~~B.Ignitable or reactive wastes will not be placed into any tank system unless the tank system is protected from sources of ignition be measures including but not limited to the following: signs prohibiting smoking, open flames or welding; an inert atmosphere blanket; enclosed vents isolated from sources of ignition.~~

~~3.6.3 Waste Placement and Storage~~

~~A.Each storage tank will be clearly marked with a description of the contents and records will be kept documenting the quantity of waste received, and the date each period of accumulation begins.~~

~~B. Only the waste types approved for a tank system will be placed in the tanks. No new waste types will be placed into an existing tank system unless:~~

~~B.1 The compatibility of the new waste type with the prior contents of the tank is determined by testing or documentation.~~

~~B.2 The existing tank system will be cleaned or flushed to the extent necessary to ensure compatibility with the new waste type.~~

~~C.The tanks will be operated at ambient pressure and temperature when storing liquids. One of the following feed mechanisms for tank systems or an equivalent transfer mechanism will be used.~~

~~C.1 Pump transfer: liquids will be pumped into or out of the tank through permanent or temporary transfer lines.~~

~~C.2 Gravity drain: liquids will be allowed to drain by gravity through permanent or temporary transfer lines.~~

~~D.Appropriate controls and practices will be used to prevent spills from and overfills of the tank or containment systems.~~

~~E.Spill prevention will be primarily maintained by hard plumbed piping. When transfer lines are not hard plumbed or when open-ended lines are used, one or more of the following spill prevention controls or an equivalent device will be used as described in Section 2.3.3.~~

~~F.Response to releases from tank systems will be initiated immediately upon discovery, and regulations specified in 20 NMAC 4.1 Subpart V, 40 CFR 264.196(d) or 40 CFR 264.56 will be followed as appropriate (see Section 5.0), including notification to the Hazardous and Radioactive Materials~~

~~Bureau (HRMB) of the New Mexico Environment Department (NMED) and National Response Center (NRC). The secondary containment tank will be emptied by pumping fluids from the drainage port located near the base of the tank or by use of a vacuum truck.~~

~~G.Transfer of liquids from the liquid waste storage tanks to the stabilization unit will be accomplished by tanker trucks approved for liquid waste transfer. Tanker trucks will be cleaned following a transfer operation to ensure that subsequent transfers do not result in mixing of incompatible or reactive wastes.~~

~~H.The contingency plan for leaks or spills is indicated in Section 6.3.5.2.~~

~~3.6.4 Inspection and Monitoring~~

~~A.The floor and berm of the concrete area will be inspected regularly for gaps and cracks.~~

~~B.Daily visual inspection will be used to detect releases to the secondary containment.~~

~~C.Inspections will be performed according to the schedule matrix indicated in Table 5-1. Inspections will focus on: (1) overfill control; (2) equipment condition to detect signs of corrosion or releases of waste from the tanks or ancillary equipment; and (3) data gathered from monitoring and leak detection equipment. A typical inspection checklist is provided in Appendix I in Volume II.~~

~~D.Ancillary equipment, monitoring and leak detection systems will be inspected daily.~~

~~3.7 Operation of Stabilization Unit~~

~~3.7.1 Records~~

~~A.Inspection records will be maintained in the administration building. The results of each daily inspection will be documented in a daily operating record.~~

~~B.Maintenance performed on the structures and equipment part of the stabilization unit will be documented in the operating record kept in the administration building.~~

~~3.7.2 Procedures for Ignitable/Reactive Wastes~~

~~A.Prior to treating wastes, waste characteristics will be analyzed to ensure that proper measures can be taken to safely manage ignitable, reactive, and incompatible wastes.~~

~~B.If ignitable or reactive wastes are placed in the bins, they will be immediately mixed with sufficient quantities of fly ash and/or cement to render them non-ignitable or non-reactive.~~

~~3.7.3 Waste Placement and Treatment~~

~~A.Operations in the stabilization building will be directed and coordinated from the control room.~~

~~B.As indicated in Section 4.0, wastes will be tested prior to stabilization to determine the appropriate reagent formula.~~

~~C.Wastes may be offloaded directly from trucks into the stabilization bins or transferred from the drum handling unit or roll-off storage area. Waste receiving will involve positioning the loaded waste hauler at the end of the bin, dumping the waste load, and washing out any residue left in the truck bed into the bin.~~

~~D.The bins will be covered while dry reagents are being added to control particulate air emissions. Reagent addition involves placing a cover on top of the bin, connecting ventilation and dry reagent delivery ducts, and injecting reagents into the bin. Reagent delivery to the bins will be controlled by a process controller system which will automatically sequence and deliver the necessary quantities of reagent based on a predetermined waste processing recipe.~~

~~E.A backhoe positioned adjacent to the bin will mix the waste and reagents.~~

~~F.Following mixing, the waste will be sampled and a paint filter test will be conducted to ensure that no free liquids are present. If necessary, samples will be gathered for toxicity characteristic leachate procedure (TCLP) testing. If the paint filter test is passed, the backhoe will load the stabilized waste into a waste hauler (roll-off truck) and the trucks roll-off cover will be positioned over the waste. The stabilized waste will be stored temporarily at the roll-off unit while tests are completed to determine how and if the material can be disposed of in the landfill.~~

~~G.Wastes that are treated on site in the solidification unit will be tested after treatment and before disposal to verify that LDR standards have been met.~~

~~H.The backhoe bucket and stabilization bin will be thoroughly cleaned before a load of waste which is not compatible with the waste previously stabilized in that bin is mixed. After the last bin load of a specific stabilization mixture has been loaded out, Facility personnel will use a high-pressure water hose located near the bins to rinse the backhoe bucket and the bin walls. The rinsing will cause residual clods of stabilized waste to fall to the bottom of the bin along with the rinse water. Reagents will then be added to the bin at the same mixture proportions and the remaining waste and rinse water will be stabilized, tested for free liquid, and loaded out before a different waste stabilization mixture is processed in that bin.~~

~~I.Releases into the LDRS will be detected within 24 hours by liquid sensing instruments or inspection. Accumulated liquids will be removed within 24 hours of detection. The secondary containment will be emptied by pumping accumulated liquids into a temporary storage tank or into another stabilization bin by portable pumps.~~

~~J.In case a breach should occur in a bin, such bin will be removed from service and repaired.~~

~~K.Spill and overfill prevention will be accomplished by continuous direct monitoring of transfer operations.~~

~~L.The stabilization bins will be operated at ambient temperature and pressure.~~

~~M.Reagents will either be pumped from reagent tanks or manually fed.~~

~~N.Liquid hazardous wastes will be pumped from vacuum or tanker trucks. Other wastes may be manually transferred from the incoming waste hauler truck or from the container storage areas.~~

~~O.The contingency plan for leaks or spills is indicated in Section 6.3.5.2.~~

~~P.Dust will be removed from the exhaust air in the bag house. Collected dust will be processed in the stabilization bins.~~

~~3.7.4 Inspection and Monitoring~~

~~A.Inspections will be performed according to the schedule matrix indicated in Table 5-1.~~

~~B.Each stabilization bin will be visually inspected once each operating day.~~

~~C. The concrete vault area of the stabilization unit will be inspected monthly. If liquids are found they will be removed with a portable pump and transported to the liquid waste storage unit.~~

~~D. At least once per month, the daily visual inspection will be conducted on empty bins to ensure integrity of the bins and welds.~~

~~E. An annual sonic test will be conducted to ensure the thickness of the inner tank and outer shell is maintained.~~

~~F. Ancillary equipment and monitoring systems will be inspected once each operation day.~~

~~3.8 Drum Handling Operation~~

~~3.8.1 Records~~

~~A.Records of inspections of the drum handling unit will be maintained in an operating record kept in the administration building.~~

~~B.The results of all container storage analyses, trial tests, waste compatibility analyses, and ignitable and reactive waste handling documentation pertaining to compliance will be maintained in the Facility operating record.~~

~~C.Maintenance performed on the structures and equipment part of the drum handling unit will be documented in the operating record kept in the administration building.~~

~~3.8.2 Procedures for Ignitable/Reactive Wastes~~

~~A.Ignitable or reactive wastes will be protected from any sources of ignition or reaction.~~

~~B.If ignitable wastes are handled, special precautions will be instituted, including the use of special non-sparking bung wrenches or other tools for opening drums.~~

~~3.8.3 Waste Placement and Storage~~

~~A.All containers being stored will be clearly marked with hazardous waste labels which will be clearly visible while containers are being stored.~~

~~B.All containers will remain closed during storage except when they are sampled.~~

~~C.Handling procedures will be developed to ensure that containers are not opened, handled, or stored in a manner that may cause them to rupture or leak.~~

~~D.Wastes stored will be placed in individual storage cells segregated by waste type and compatibility. Labels will be added to each section of the unit to identify the type of waste to be stored.~~

~~E.Two of the cells will be designed to accommodate only TSCA PCB wastes.~~

~~F.Containers will be managed according to the conditions indicated in Section 2.2.10.~~

~~G.Aisle spacing will be maintained to assure inspectability and accessibility for operational and emergency equipment to containers. A minimum 30 inch aisle space will be maintained between double rows of containers. Containers will be stored in single rows only if they are against a wall or other barrier that prohibits inspection from all sides.~~

~~3.8.4 Operation of Leachate Collection and Detection Systems~~

~~A.Liquids present in the LCRS and LDRS sumps will be sampled and analyzed to determine the nature and concentration of waste constituents. An appropriate treatment and disposal method will be selected in accordance with Section 4.0.~~

~~B.Pumpable quantities of liquids will be removed with a vacuum truck.~~

~~C.Leaks and spills will be removed from the sumps in a timely manner.~~

~~3.8.5 Inspection and Monitoring~~

~~A.Inspections will be performed according to the schedule matrix indicated in Table 5-1.~~

~~B.The floor will be inspected regularly to determine if any gaps or cracks have developed or if the epoxy coating has been damaged.~~

~~C.The leachate collection and removal system (LCRS) and leak detection and removal system (LDRS) sumps will be checked regularly for the presence of liquid.~~

~~D.Drum storage areas will be visually inspected at least once a week for leaking containers and deterioration of the containers and containment area. If a container is found to be in poor condition, the inspector's supervisor will be notified, who will arrange to transfer the hazardous waste to a new container, repair the existing container as specified by the manufacturer, or place the container in an overpack drum.~~

~~E.Containers with more than 500 ppmw volatile organic compounds will be inspected at least once a month for cracks, holes or gaps in the container, cover or closure devices. Defects detected will be repaired according to 40 CFR 264.1086(c)(4)(iii) and 40 CFR 264.1086(d)(4)(iii), for container Levels 1 and 2, respectively.~~

~~F.Weekly visual inspections will be performed to identify the status of warning signs, condition of containers and labels, availability and accessibility of spill control and PPE, and the adequacy of aisle space and access/egress routes.~~

~~G.Secondary containment areas will be inspected weekly. Inspections will focus on (1) the condition of the sump pits and trenches to ensure that they are free of cracks or gaps and are sufficiently impervious to contain leaks, spills, and accumulated liquids until the collected material is detected and removed; and, (2) pump operation.~~

~~H.Ancillary equipment will be inspected according to manufacturer recommended programs.~~

~~3.9 Operation of Truck Roll-Off Unit~~

~~3.9.1 Records~~

~~A.Results of container waste analyses, trial tests, waste compatibility analyses, and ignitable and reactive waste handling documentation pertaining to compliance will be maintained in the Facility operating record.~~

~~B.Records of inspections of the roll-off storage unit will be maintained in an operating record kept in the administration building.~~

~~C.Maintenance performed on the structures and equipment part of the roll-off storage unit will be documented in the operating record kept in the administration building.~~

~~3.9.2 Procedures for Ignitable/Reactive Wastes~~

~~A. Ignitable or reactive wastes will be protected from any sources of ignition or reaction.~~

~~3.9.3 Waste Placement and Storage~~

~~A.Containers being stored will be clearly marked with hazardous waste labels which identify the contents of each container as well as the date of receipt (accumulation date). All labels will be clearly visible while containers are being stored.~~

~~B.All containers will remain closed during storage, except when waste is removed or added.~~

~~C.Containers will be managed according to the conditions indicated in Section 2.2.10.~~

~~D.Container storage and handling procedures will be developed to ensure that containers are not opened, handled, or stored in a manner that cause them to rupture or leak.~~

~~E.The unit is divided in two sections. One section will hold tarped, U.S. Department of Transportation (DOT) approved, lined, roll-off containers with non-stabilized waste awaiting treatment. The other section will be a staging area for roll-off containers containing stabilized waste TCLP test results and landfill disposal approval.~~

~~F.Waste will be characterized and screened as part of the waste acceptance procedures. This will confirm that no free liquids are present in the roll-off units. If liquids are found they will be pumped and removed. In addition, this procedure will prevent incompatible wastes from being stored in the same roll-off containers that are delivered to the site.~~

~~G.Materials from a single stabilization batch will not be mixed with material from a different batch.~~

~~H.Hazardous waste will be compatible with the container or liner as defined by the following conditions:~~

~~H.1 All containers used to store hazardous waste will be made of, or lined with, material that will not react with, or otherwise be incompatible with, the waste being stored so that the ability of the container to hold waste is not impaired.~~

~~H.2 Hazardous waste will not be placed in an unwashed container that has previously held incompatible waste or material.~~

~~I.Incompatible solid wastes stored within the container storage areas will be separated by a distance of at least 10 feet unless separated by a berm.~~

~~J.Roll-off containers will be spaced 4 feet apart side to side, 2.5 ft. end to end and 4 feet from the edge of the berm. Roll-off containers will not be placed within the storage area inundated by the 25 year, 24 hour storm. The inundation limits for the 25 year, 24 hour storm will be marked in the storage area.~~

~~K.Operational staff will visually observe trucks leaving the area for excessive accumulation of waste on the tires and/or truck body. If excessive accumulation is noted, the truck will be routed to the truck wash for cleaning.~~

~~L.Roll-off containers will be covered before exiting the stabilization unit and will remain covered while they are staged in the roll-off storage area.~~

~~M.Free liquids found upon inspection of containers received for disposal will be removed with a vacuum truck, characterized and managed in accordance with stabilization procedures.~~

~~N.Liquids collected on the surface of the sump or in the sump drainage gravel will be removed by vacuum truck.~~

~~O.Samples of sump liquids will be chemically analyzed to determine the presence and concentration of any waste constituent. After this determination, an appropriate method of treatment or disposal will be selected in accordance with the criteria prescribed in the Waste Analysis Plan (Section 4.0).~~

~~P.Leaks, spills and precipitation will be removed from the sump as soon as possible.~~

~~Q.In the case of a leak, the liquids in the roll-off container will be stabilized and the stained soil will be excavated and handled as a potential hazardous waste.~~

~~3.9.4 Inspection and Monitoring~~

~~A. Inspections will be performed according to the schedule matrix indicated in Table 5-1.~~

~~D.Container storage areas will be visually inspected at least once a week for leaking containers and deterioration of the containers and containment area. All inspection information will be recorded and any problems noted during the inspection will be resolved in a timely manner.~~

~~E.Identified leaks will be resolved as described in Section 2.2.10.~~

~~F.Containers with more than 500 ppmw volatile organic compounds will be inspected at least once a month for cracks, holes or gaps in the container, cover or closure devices. Defects detected will be repaired according to 40 CFR 264.1086(c)(4)(iii) and 40 CFR 264.1086(d)(4)(iii), for container levels 1 and 2, respectively~~

~~G.Weekly visual inspections will be performed to identify the status of warning signs, condition of containers and labels, availability and accessibility of spill control and PPE, and the adequacy of aisle space and access/egress routes.~~

4. Maintenance

4.1 Landfill

A. The landfill structure will be maintained through a routine ~~preventative~~ preventive maintenance program, which will be fully defined in the final operations plan.

B. ~~Preventative~~ Preventive maintenance will involve regular visual inspections of the landfill liner where feasible and review of leachate collection and analysis results.

C. Defects detected in the liner systems will be repaired according to the procedures indicated in the Construction Specifications: Sections 02710, 02775 and 02780. Soil surfaces that need to be repaired will be removed and placed according to the Construction Specifications: Sections 02226 and 02119.

D. The LCRS and LDRS equipment, such as pumps, transducers, generators, electrical lighting, and warning systems, will be subject to manufacturer's or standard ~~preventative~~ preventive maintenance procedures.

E. Preventive maintenance information will be documented and any deviation from normal conditions will be closely tracked and corrected as necessary.

F. Landfill run-on/runoff control systems will be maintained/repaired after regular inspections (as described in Table 5-1) that determine that the design criteria are not met. Once a deficiency in the run-on/runoff control system is noted, it will be repaired in a timely manner to a state such that it meets or exceeds design criteria.

~~4.2 Evaporation Pond~~

~~A.If a section of the evaporation pond must be removed from service, flow of waste to that section will be stopped by draining the pond to below the level of the leak, surface leakage will be contained, and all necessary steps will be taken to repair the liner system and prevent future failure.~~

~~B.Preventative maintenance will involve regular visual inspections of the evaporation pond liner where feasible and review of leachate collection analysis results.~~

~~C.Defects detected in the liner systems will be repaired according to the procedures indicated in the Construction Specifications. Soil surfaces that need to be repaired will be removed and placed according to the Construction Specifications:~~

~~D.The LDRS equipment, such as pumps, generators, electrical lighting, transducers and warning systems, will be subject to manufacturer's or standard preventative procedures.~~

~~E. Evaporation pond run-on/runoff control systems will be maintained/repaired after regular inspections (as described in Table 5-1) that determine that the design criteria are not met. Once a deficiency in the run-on/runoff control system is noted, it will be repaired in a timely manner to a state such that it meets or exceeds design criteria.~~

~~4.3 Liquid Waste Storage~~

~~A.Should gaps or cracks develop in the concrete, repairs will be scheduled immediately. The nature of the repair will depend on the extent of the cracking and could range from the application of chemically resistant epoxy fillers or coatings to the replacement of portions of the concrete floor.~~

~~B.If a release occurs from the primary tank system, the tank will be removed from service immediately. Wastes in the tank will be removed within 24 hours to the extent necessary to prevent further release and allow inspection and repair of the tank system. All released materials will be removed from the secondary containment as soon as possible and within 24 hours of detection.~~

~~C.The tank system will be repaired or replaced prior to returning it to service. An independent New Mexico registered professional engineer will certify major repairs. The certification will be submitted to the NMED within seven days after the tank system is returned to service.~~

~~D.Tanks, pumps, generators, electrical lighting and warning systems will be maintained according to manufacturers recommended programs.~~

~~4.4 Stabilization Unit~~

~~A.If a release occurs from a primary tank system, the tank will be removed from service and all materials will be removed from the tank or secondary containment within 24 hours or as soon as reasonably possible. The tank system will be repaired prior to return to service. Major repairs will be certified by an independent New Mexico registered professional engineer. The certification will be submitted to the NMED within seven days after the tank system is returned to service.~~

~~B.Equipment such as pumps, generators, electrical lighting, and warning systems, will be subject to manufacturer recommended maintenance programs.~~

~~C.The stabilization unit run-on/run-off will be maintained/repaired after regular inspections (as described in Table 5-1) that determine that the design criteria are not met. Once a deficiency in the run-on/runoff control system is noted, it will be repaired in a timely manner to a state such that it meets or exceeds design criteria.~~

~~4.5 Drum Handling Unit~~

~~A.Should cracks or gaps develop in the concrete, repairs will be scheduled immediately. The nature of the repair will depend on the extent of the cracking and could range from the application of chemically resistant epoxy fillers or coatings to the replacement of portions of the concrete floor.~~

~~B.Equipment such as pumps, generators, electrical lighting, and warning systems, will be subject to manufacturer recommended maintenance programs.~~

~~C.The drum handling unit run-on/run-off will be maintained/repaired after regular inspections (as described in Table 5-1) that determine that the design criteria are not met. Once a deficiency in the run-on/runoff control system is noted, it will be repaired in a timely manner to a state such that it meets or exceeds design criteria.~~

~~4.6 Roll-Off Container Storage Unit~~

~~A.Equipment such as pumps, generators, electrical lighting, and warning systems, will be subject to manufacturer recommended maintenance programs.~~

~~1.The roll-off container storage unit run-on/run-off will be maintained/repaired after regular inspections (as described in Table 5-1) that determine that the design criteria are not met. Once a deficiency in the run-on/runoff control system is noted, it will be repaired in a timely manner to a state such that it meets or exceeds design criteria.~~

4.7 Drainage Ditch

A. Drainage ditches will be inspected weekly and immediately after a major storm event.

B. Excess debris that prevents flow in accordance with the design specifications will be removed manually or with a backhoe.

C. Drainage ditches will be maintained/repaired after regular inspections (as described in Table 5-1) that determine that the design criteria are not met. Once a deficiency in the run-on/runoff control system is noted, it will be repaired in a timely manner to a state such that it meets or exceeds design criteria.

Permit Renewal Application
October 17, 2011

Attachment O

Closure Plan

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~~Permit~~ Attachment O. Closure Plan
~~Modified from the Permit Application, Volume I, Sections 8.0, 8.1, 8.3, 8.5, and 8.6~~

8. Closure of Permitted Units

This closure plan describes specific activities required for closure of the ~~drum handling unit, roll-off storage area, stabilization unit and associated liquid waste receiving and storage unit, evaporation pond, and~~ landfill, in compliance with Resource Conservation and Recovery Act (RCRA) closure requirements. ~~It is currently planned that all of these units will be cleaned closed with the exception of the landfill.~~ The closure activities are designed to minimize the need for further maintenance and any potential impacts to human health and the environment. Closure activities are described in Section 8.1. Section 8.3 presents the closure performance standard~~;~~ and Permit Attachment O1, Compliance Schedule~~s~~ for Closure, discusses the closure schedule. Closure certification and modifications are discussed in Sections 8.5 and 8.6, respectively. Closure cost estimates and compliance with financial assurance requirements are discussed in Permit Attachments O2, Financial Assurance for Closure, and P1, Financial Assurance for Post-Closure Care.

8.1 Closure Activities

At the end of the active life of the Facility, the landfill and all ~~units and~~ structures of the Facility will be closed and dismantled in compliance with 40 CFR 264, Subpart G. Any solid hazardous waste and debris will be placed in the landfill, and non-hazardous waste will be sent off site for reuse, recycle, or disposal in compliance with 40 CFR 264, Subpart G. Liquids generated during closure (decontamination solutions~~,~~ and leachates~~, and evaporation pond liquid~~) will be treated off-site.~~onsite (stabilization unit) unless it is determined that shipment offsite for treatment is more cost effective.~~ The landfill will be capped with a final cover, and post-closure care will be initiated for the landfill. These closure activities are described in detail in the following sections. ~~The unit-specific closure descriptions are presented in the order in which the units are anticipated to be closed.~~

An off-site laboratory will be used for analysis of hazardous waste and soil samples at closure. The off-site laboratory will be a~~n~~ U.S. Environmental Protection Agency (EPA) approved laboratory with an internal quality control/quality assurance (QA/QC) program and specific procedures for each analytical method. All laboratory samples will be analyzed for the hazardous constituents specified in 40 CFR Part 261, Appendix VIII and all other constituents considered by the New Mexico Environment Department (NMED) to be a threat to human health and the environment.

Prior to the commencement of closure activities, Gandy Marley, Inc. (GMI) will notify the Secretary of the NMED in writing at least 60 days prior to the date GMI expects to begin closure~~ of the units~~. The schedule for closure is described in more detail in Permit Attachment O1, Compliance Schedule~~s~~ for Closure.
~~, Section 8.4, Closure Schedule.~~

~~8.1.1 Drum Handling Unit~~

~~The following steps will be necessary to complete closure of the drum handling unit:~~

- ~~removal of remaining waste and other material in the storage area;~~
- ~~decontamination of equipment in the area;~~
- ~~sampling of any areas or equipment suspected, based on visual observations, of being contaminated;~~
- ~~dismantling of the building structure;~~

- ~~dismantling of the concrete floor and secondary containment; and~~
- ~~sampling of soil beneath the floor to determine if contamination is present.~~

~~8.1.1.1 Removal of Inventory~~

~~Closure of the drum handling unit will commence with removal of any inventory or other materials stored in the area according to standard procedures. Remaining inventory will be removed within 90 days after receipt of the final volume of hazardous wastes at the unit. For the purposes of this plan, GMI will arrange for all waste remaining in inventory to either be disposed of directly in the landfill, treated at the onsite treatment unit prior to disposal in the landfill, or returned to the generator if either of the previous two options is not available. If required, the hazardous materials could be returned to the generator utilizing the same method of transportation that was used to deliver the material to the site (e.g., end dump trucks).~~

~~Closure cost estimates and waste volumes for disposal are based on the worst case scenario of all wastes requiring stabilization at the onsite treatment unit prior to landfilling. In the case of the drum handling unit, it is assumed that all 1,120 drums contain sludge that must be stabilized. For these calculations, the maximum inventory of the drum handling unit at the time of closure is assumed to be the maximum permitted capacity of the unit.~~

~~8.1.1.2 Decontamination of Equipment and Dismantling of Building Structure~~

~~Equipment in the area, such as drum-moving equipment, that may have contacted hazardous waste will either be decontaminated or disposed of as hazardous waste. Large equipment, such as the fork trucks, will be decontaminated. Disposal as waste will be the preferred option only for items, such as wood pallets, that are difficult to decontaminate.~~

~~The building structure is not anticipated to be contaminated with hazardous waste; however, it will be cleaned and rinsed prior to, or during, dismantling. The dismantled building structure will either be reused elsewhere or recycled as scrap metal.~~

~~A high-pressure detergent wash and water rinse will be used to clean off all visible residues. Cleaning will continue until sampling and analysis of the wash water indicates that contaminants have been removed. The use of wash water will be limited to minimize the amount of waste generated. Wash water use will be limited by using only the necessary amount to decontaminate the facility and equipment. All decontamination solutions will be collected in containers or portable tanks. The decontamination solutions will either be treated onsite or trucked to an approved off site facility for treatment. The expected volume of decontamination solutions that will be generated during closure of the drum handling unit is included in the liquid waste amounts shown in Table 8-1.~~

~~Table 8-1. Closure Generated Waste Quantities~~

~~Facility Unit~~	~~Inventory~~	~~Waste (tons)~~	~~Waste for Disposal[a] (tons)~~
~~Drum Handling Unit~~	~~1,120 drums~~	~~309~~	~~803~~
~~Evaporation Pond Unit~~	~~78,300 ft³~~	~~2,936~~	~~7,634~~
~~Liquid Waste Receiving and Storage Unit~~	~~36,000 gal~~	~~162~~	~~1,692~~
~~Stabilization Unit~~	~~3,600 ft³~~	~~180~~	~~468~~
~~Roll-Off Storage Unit~~	~~142,560 ft³~~	~~7,128~~	~~18,533~~
~~Landfill[b]~~	~~NA~~	~~NA~~	~~NA~~

~~[a] Waste for disposal includes waste and reagents quantities added together.~~

~~[b] No waste will be moved from the landfill at closure time.~~

~~Clean closure of the building will be ensured by the development and implementation of a sampling and analysis plan (SAP). The plan will be provided to the New Mexico Environment Department for approval 90 days prior to implementation. At a minimum, it will specify the following aspects of the sampling and analysis activities:~~

- ~~1.0 Sampling Program~~
  - ~~1.1 Sampling Locations~~
  - ~~1.2 Sample Matrix~~
  - ~~1.3 Sample Containers, Type and Size~~
  - ~~1.4 Sampling Tools~~
  - ~~1.5 Sample Management~~
  - ~~1.6 Field Screening Methods~~
- ~~2.0 Analytical Methods~~
  - ~~2.1 Analytes for Analysis~~
  - ~~2.2 Analysis Procedures (Specified SW-846 Methods)~~
- ~~3.0 Quality Assurance~~
  - ~~3.1 Organization~~
  - ~~3.2 Sample Management~~
  - ~~3.3 Analytical System~~
    - ~~3.3.1 Instrument Maintenance~~
    - ~~3.3.2 Instrument Calibration~~
    - ~~3.3.3 Personnel Training~~
    - ~~3.3.4 Reagents and Standards~~
    - ~~3.3.5 Corrective Actions~~
  - ~~3.4 Data Quality Objectives~~
  - ~~3.5 Performance and System Audits~~
- ~~4.0 Data Management~~
  - ~~4.1 Data Collection~~
  - ~~4.2 Data Reduction~~
  - ~~4.3 Data Reporting~~

~~The sampling and analysis plan will specify the use of equipment, methods, and techniques current at the time the plan is prepared. Applicable provisions of the then-current version of SW-846 (or other applicable standard reference then in effect) will be specified. Applicable reporting requirements will also be specified, as appropriate.~~

~~8.1.1.3 Dismantling of Concrete Floor and Secondary Containment~~

~~Secondary containment for the drum handling unit will be provided by a geomembrane lined trench and collection sump system. Drums will be stored on a coated concrete floor that drains to the trench and sump system. Because the concrete will be coated, decontamination at closure is proposed so that the concrete will be broken up and disposed of as non-hazardous debris. The liner and collection sump system will be removed at closure but will not be decontaminated. Since this material will be considered a hazardous waste, upon certification of compliance with LDR requirements, it will be disposed of in the landfill. The expected volume of solid hazardous waste that will be generated during closure is provided in Table 8-1.~~

~~8.1.1.4 Soil Sampling~~

~~After removal of the building, any contaminated soils will be removed for disposal and the area resampled until the sampling and analyses indicate that the area meets the performance standard provided in Section 8.3~~2~~. Sampling will be performed in the vicinity of the loading dock and in open areas. Individual samples~~

~~will be collected at a frequency equivalent to one per every 2,000 square feet (i.e. one sample to be taken at the center of each 2,000 square foot grid).~~

~~Contaminated soils will be disposed of in accordance with the regulations applicable to the contaminant of concern. If the landfill portion of the Facility is still operational and the contaminated soil meets the waste acceptance criteria for the landfill it will be landfilled at GMI. If the GMI landfill cannot accept the waste it will be manifested and shipped to an appropriately licensed disposal facility.~~

~~In addition, seven samples will be collected from specific locations that correspond to all of the floor drain sumps (see Permit Attachment L1, Engineering Drawings, Drawings 37, 38 and 39). Eight additional samples will be collected in the dock area and samples will be collected at 20-foot intervals beneath the drainage trenches. Sample results will be compared against the closure performance standard presented in Section 8.3~~2~~.~~

~~Any contaminated soils will be removed for disposal and the area resampled until the sampling and analyses indicate that the area meets the performance standard provided in Section 8.3~~2~~. Contaminated soils will be disposed of in accordance with the regulations applicable to the contaminant of concern. If the landfill portion of the Facility is still operational and the contaminated soil meets the waste acceptance criteria for the landfill it will be landfilled at GMI. If the GMI landfill cannot accept the waste it will be manifested and shipped to an appropriately licensed disposal facility.~~

~~8.1.2 Evaporation Pond~~

~~Clean closure of the evaporation pond will be ensured by the development of a sampling and analysis plan. The plan will be provided to the New Mexico Environment Department for approval 90 days prior to implementation. The plan will follow the outline contained in Section 8.1.1.2.~~

~~The primary steps required to complete closure of the evaporation pond are the following:~~

- ~~removal of remaining liquid waste;~~
- ~~removal and solidification of sludge;~~
- ~~removal and disposal of liner and leachate collection system;~~
- ~~sampling of soil beneath the unit to determine if contamination is present; and~~
- ~~filling and revegetating the area.~~

~~8.1.2.1 Removal of Liquid Waste~~

~~The liquid in the evaporation pond will be allowed to evaporate naturally. At the beginning of closure of the evaporation pond, no further waste will be accepted into the pond. The water balance for the site indicates that there is a net loss of approximately 80 inches of water per year (90 inches of evaporation minus 10 inches of precipitation). The liquid in the evaporation pond has an approximate depth of 9 feet, and it is assumed that at closure there will be 2 feet of sludge in the bottom of the pond, leaving 7 feet of liquid (84 inches). Therefore, approximately 1 year is projected to be adequate time to evaporate all the liquid in the pond, assuming it is full to capacity at the time closure is initiated.~~

~~8.1.2.2 Removal and Solidification of Sludge~~

~~Following evaporation of the pond liquid, the sludge will be removed from the bottom with trash pumps or hand excavation equipment. Removal operations will continue until visual examination shows that all sludge has been removed. The removed sludge will be solidified in the treatment unit. The stabilized waste will be placed in roll-off containers and cured in accordance with the provisions of Permit Attachment F, Waste Analysis Plan, prior to disposal in the landfill. The expected volume of sludge that will be removed and~~

~~disposed in the landfill is shown in Table 8-1. This information is based on an estimated sludge depth of 2 feet at the sump.~~

~~8.1.2.3 Removal and Disposal of Liner and Leachate Collection System~~

~~The pond liner and leachate collection system will be dismantled and removed as hazardous debris. Prior to removal, the liner will be washed to remove the visible contaminants. The method of treatment is consistent with debris treatment technologies as defined in 40 CFR 268.7(d). Upon certification of compliance with the LDR debris treatment requirements, as required by 20 NMAC 4.1.800 incorporating 40 CFR 268.45, the waste will be disposed in the landfill. The expected volume of solid hazardous waste and debris that will be generated during closure is provided in Table 8-1. The vadose zone monitoring wells associated with the evaporation pond will be left functional to continue monitoring the landfill, as specified in Section 3.0Permit Attachment I.~~

~~8.1.2.4 Soil Sampling~~

~~After removal of all waste, the evaporation pond liners, and the leachate collection system, soil samples will be collected and analyzed for a facility proposed subset of the constituents defined in Section 8.1 of the permit application and approved by NMED. Individual samples will be collected at a frequency equivalent to one per 2,000 square feet over the entire Surface Impoundment area (i.e. one sample to be taken at the center of each 2,000 square foot grid). In addition, a sample will be obtained from each leachate collection sump and beneath the tanker pad fill lines at the influent location and at 10 foot intervals beneath the transfer piping. Samples also will be collected adjacent to each side of the concrete containment pad. Sample results will be compared against the closure performance standard presented in Section 8.32.~~

~~Contaminated soils will be removed for disposal and the area resampled until the sampling and analyses indicate that the area meets the performance standard provided in Section 8.32. Contaminated soils will be disposed of in accordance with the regulations applicable to the contaminant of concern. If the landfill portion of the Facility is still operational and the contaminated soil meets the waste acceptance criteria for the landfill it will be landfilled at GMI. If the GMI landfill cannot accept the waste it will be manifested and shipped to an appropriately licensed disposal facility.~~

~~8.1.2.5 Filling and Revegetating~~

~~The final step in closing the Surface Impoundment will be filling the depression with clean soil to the approximate original grade and revegetating the disturbed areas. The Surface Impoundment will be graded to ensure that the direction of surface water runoff is not towards the landfill units. A seed mixture appropriate for the area will be applied and the site will be watered as necessary to promote germination.~~

~~8.1.3 Liquid Waste Receiving and Storage Unit~~

~~Clean closure of the liquid waste receiving and storage unit will be ensured by the development of a sampling and analysis plan. The plan will be provided to the New Mexico Environment Department for approval 90 days prior to implementation. The plan will follow the outline contained in Section 8.1.1.2.~~

~~The following steps will occur during closure of the liquid waste receiving and storage unit associated with the stabilization unit:~~

- ~~removal and treatment of tank contents;~~
- ~~dismantling and removal of tanks, ancillary equipment, and concrete containment area; and~~
- ~~sampling of soil beneath the unit to determine if contamination is present.~~

~~8.1.3.1 Removal of Inventory~~

~~Closure of the liquid waste receiving and storage unit will commence with removal of any inventory in the tanks according to standard procedures. The major steps of inventory removal, equipment decontamination, primary and secondary containment removal, and soil sampling will be identical to these described in Section 8.1.1.1. Remaining inventory will be removed within 90 days after receipt of the final volume of hazardous wastes in the tanks. All wastes remaining in inventory can be treated at the onsite stabilization unit prior to disposal in the landfill. Closure cost estimates and waste volumes for disposal were based on the worst-case scenario of all four tanks being full to capacity at the start of closure. The maximum possible inventory for each tank at the time closure is initiated is equal to the permitted capacity of the tanks.~~

~~8.1.3.2 Dismantling of Tanks, Equipment, and Concrete Secondary Containment Area~~

~~The tanks and ancillary equipment will be dismantled and disposed in the landfill after certification of compliance with LDR debris treatment requirements under 40 CFR 268.45, as required by 20 NMAC 4.1.800 incorporating 40 CFR 268.7 d). The piping system used to transfer waste from the tanks to tankers will be considered part of the tanks and will be drained and dismantled as part of the tank closure. After removal of the tanks, the concrete containment will be washed and broken up for disposal as hazardous debris. Upon certification of compliance with the LDR debris treatment requirements, as required by 40 CFR 268.7(d), any hazardous materials will be disposed in the landfill. The expected volume of solid hazardous waste that will be generated during closure is provided in Table 8-1.~~

~~8.1.3.3 Soil Sampling~~

~~After removal of the tanks and containment, soil samples will be collected and analyzed for a facility proposed subset of the constituents defined in Section 8.1 of the permit application and approved by NMED. Due to the limited footprint area of the liquid waste storage area, sampling will not be based on a per area basis. Rather, it is proposed that one sample be obtained beneath each sump in the concrete base for the liquid waste storage units, beneath each tank after demolition, and adjacent to each side of each tank pad. In addition, samples will be obtained at locations where visual or field screening evidence of contamination is present. Sample results will be compared against the closure performance standard presented in Section 8.3~~2~~.~~

~~8.1.4 Stabilization Unit~~

~~Clean closure of the stabilization unit will be ensured by the development of a sampling and analysis plan. The plan will be provided to the New Mexico Environment Department for approval 90 days prior to implementation. The plan will follow the outline contained in Section 8.1.1.2.~~

~~The primary steps required to complete closure of the stabilization unit are the following:~~

- ~~removal of remaining waste inventory;~~
- ~~decontamination and removal of equipment and building structure;~~
- ~~dismantling of the tanks and secondary containment area; and~~
- ~~sampling of soil beneath the floor to determine if contamination is present.~~

~~8.1.4.1 Removal of Inventory~~

~~Closure of the stabilization unit will commence with removal of any inventory remaining in the tanks according to standard procedures. The major steps of inventory removal equipment primary and secondary containment removal, and soil sampling will be identical to those described in Section 8.1.1.1. Remaining inventory will be stabilized and removed within 90 days after receipt of the final volume of hazardous wastes at the unit. The stabilized waste will be placed in roll-off containers and cured in accordance with the provisions of Permit Attachment F prior to disposal in the landfill. The maximum possible inventory for the~~

~~tanks, at the time closure is initiated, is equal to the working capacity of the unit (approximately one-third full) because adequate space must remain for addition of reagents and for mixing.~~

~~8.1.4.2 Decontamination of Equipment and Dismantling of Building Structure~~

~~Equipment in the area, such as waste mixing equipment or other ancillary equipment that may have contacted hazardous waste, will either be decontaminated and certified as clean or disposed of as hazardous debris. The building structure (roof and walls) is not expected to be contaminated with hazardous waste; however, the building will be decontaminated prior to dismantling. The building structure will be dismantled after cleaning and will either be reused or recycled as scrap metal. Building components and associated reagent silos that did not contact hazardous waste will be dismantled and removed from the site. The equipment and building will be subject to the requirements of the closure sampling and analysis plan.~~

~~A high-pressure detergent wash and water rinse will be used to clean off all visible residue. The use of wash water will be limited to minimize the amount of waste generated. All decontamination solutions will be collected in containers or portable tanks. The decontamination solutions will be trucked to an approved off site facility for treatment. The expected volume of decontamination solutions that may be generated during closure of the stabilization unit is included in the liquid waste amounts shown in Table 8-1.~~

~~8.1.4.3 Dismantling of Tanks, Ancillary Equipment, Piping and Secondary Containment Area~~

~~The tanks, ancillary equipment, piping concrete, and secondary containment system will be dismantled and removed as hazardous debris. Upon certification of compliance with the LDR requirements, the waste will be disposed in the landfill. The expected volume of solid hazardous waste that will be generated during closure is provided in Table 8-1.~~

~~8.1.4.4 Soil Sampling~~

~~After removal of the stabilization unit structure, tanks, piping, the bag house, and the containment system, soil samples will be collected and analyzed for RCRA characteristic properties and the constituents defined in Section 8.1 paragraph 2 of this permit application. Individual samples will be collected at locations specified by NMED at closure and at a frequency of one sample per 2,000 square feet in the entire stabilization unit area (i.e. one sample to be taken at the center of each 2,000 square foot grid). Sample results will be compared against the closure performance standard presented in Section 8.3~~2~~.~~

~~8.1.5 Roll-off Storage Area~~

~~Clean closure of the roll-off storage area will be ensured by the development of a sampling and analysis plan. The plan will be provided to the New Mexico Environment Department for approval 90 days prior to implementation. The plan will follow the outline contained in Section 8.1.1.2.~~

~~Closure of the roll-off storage area will be identical to closure of the drum handling unit, except that the roll-off storage area does not have a structure associated with it. The major steps of inventory removal, equipment decontamination, primary and secondary containment removal, and soil sampling will be identical to those described for the drum handling unit in Section 8.1. Details of the sampling and analysis program will be specified in a sampling and analysis plan providing information similar to that to be developed for the drum handling unit (see Sections 8.1.1.2 and 8.1.1.4). Sample results will be compared against the closure performance standard presented in Section 8.3~~2~~.~~

~~Estimated waste volumes for closure of the roll-off storage area are included in Table 8-1.~~

8.1.6 Landfill

Appropriate closure of the landfill will be ensured by the development of a sampling and analysis plan (SAP). The plan will be provided to the ~~New Mexico Environment Department~~NMED for approval 90 days prior to implementation. ~~The plan will follow the outline contained in Section 8.1.1.2.~~ At a minimum, it will specify the following aspects of the sampling and analysis activities:

- 1.0 Sampling Program
  - 1.1 Sampling Locations
  - 1.2 Sample Matrix
  - 1.3 Sample Containers, Type and Size
  - 1.4 Sampling Tools
  - 1.5 Sample Management
  - 1.6 Field Screening Methods
- 2.0 Analytical Methods
  - 2.1 Analytes for Analysis
  - 2.2 Analysis Procedures (Specified SW-846 Methods)
- 3.0 Quality Assurance
  - 3.1 Organization
  - 3.2 Sample Management
  - 3.3 Analytical System
    - 3.3.1 Instrument Maintenance
    - 3.3.2 Instrument Calibration
    - 3.3.3 Personnel Training
    - 3.3.4 Reagents and Standards
    - 3.3.5 Corrective Actions
  - 3.4 Data Quality Objectives
  - 3.5 Performance and System Audits
- 4.0 Data Management
  - 4.1 Data Collection
  - 4.2 Data Reduction
  - 4.3 Data Reporting

The SAP will specify the use of equipment, methods, and techniques current at the time the plan is prepared. Applicable provisions of the then-current version of SW-846 (or other applicable standard reference then in effect) will be specified. Applicable reporting requirements will also be specified, as appropriate.

This Part B Permit Application only includes the Phase ~~IA~~1A portion of the landfill. Therefore, this Closure Plan only addresses Phase ~~IA~~1A. If future expansions are required, they will be addressed in future permit modifications and will include revised closure plans.

At closure of the landfill, a final cover will be constructed with a permeability that is less than or equal to the permeability of the bottom liner. The final cover will consist of a three-layer cap design consisting of a vegetative cover, a geocomposite drainage layer, and a geomembrane and geosynthetic clay liner (GCL) barrier layer over a prepared subgrade, as described in Permit Attachment L, Engineering Report, Section 3.1.6~~5~~, Final Cover. The final cover will meet the following requirements:

- The vegetative cover will have a minimum thickness of 2.5 feet and final upper slopes of between 3 and 5 percent after settlement and subsidence of the waste. Native grasses will be planted.

- The drainage layer will have a transmissivity of greater than or equal to 2.2×10^{-4} square meters per second (m^2/s)and consist of a high-density polyethylene (HDPE) geonet sandwiched between two

geotextile layers (generally referred to as a geocomposite) and will be designed to allow lateral flow and discharge of liquids.

- The bottom layer will consist of a 60-mil HDPE geomembrane layer and GCL with permeability of less than or equal to 5 x 10^{-9} centimeters per second (cm/s) underlain by 6 inches of prepared subgrade and 1.5 feet of protective soil.

- The cover will be designed to function with minimum maintenance, including minimal erosion. The vegetative cover will be designed with a surface drainage system capable of conducting runoff across the cap without forming rills and gullies.

In addition, remaining water ~~and sediments~~ in the contaminated water basin (as shown in Drawing 10, Filling Plan - Phase 1A) that cannot be eliminated through evaporation will be removed, tested, and disposed of appropriately. Then, the contaminated water basin will be filled with soil and the cover will be constructed across this area. This will ensure that all lined areas of the landfill will be covered.

Prior to closure of the landfill, an assessment will be made of the landfill waste gas generating potential. This will be made from the quarterly landfill gas monitoring data that will be collected over the life of the landfill. Following closure, if it is concluded that gas generation may result in gas build-ups beneath the barrier layer of the cover or releases that exceed regulatory air quality standards, then provisions will be made to collect and monitor gas generation and release during the post-closure period. If this occurs, the best available technology ~~available~~ will be implemented into the construction of the cover system. In this case, the NMED Secretary will be informed and shall approve a monitoring plan and any changes in the construction of the cover system.

Any leachate from the landfill will be pumped from the primary and secondary collection systems and, if detected, from the vadose zone monitoring sump~~s~~ throughout the closure period and will continue throughout post-closure care. The leachate will be collected, sampled, and managed as hazardous waste, as appropriate. The leachate will be collected at a frequency appropriate to the rate at which it collects in the sump. As indicated in Permit Attachment P, Post-Closure Care~~, Table 8-2, Post-Closure Inspection Schedule~~, the collection sump will be inspected monthly until the sump remains dry for six months. Thereafter, the sump will be inspected semi-annually. Details of the leachate sampling and analysis program will be specified in a SAP.

~~After~~Before the landfill cap is completed, soil samples will be collected from outside the perimeter of the landfill cap to determine if any soil contamination is present. The sampling locations will primarily correspond to the transportation corridor used by waste hauling trucks during the active life of the landfill. In addition, samples will be collected at the landfill stormwater retention basin and within ditches directing flow to the basin.

It is proposed that individual samples be obtained along the haul roads at 100-foot intervals and at locations where visible staining is observed. Because the stormwater detention basin (Drawing 25, Surface Water Control Features) is lined with a geomembrane, individual samples will be collected from there and its associated drainage ditches at a frequency equivalent to one per 40,000 square feet over the entire area (i.e., one sample to be taken at the center of each 40,000-square-foot grid). However, if the liner in the stormwater runoff basin is observed to be damaged, additional sampling may be required. Sample results will be compared against the closure performance standards presented in Section 8.3. If any contaminated materials are identified they will be excavated and removed to the landfill prior to placement of the final cover.

No later than the submission of the certification of closure of the landfill in compliance with 40 CFR §264.115, the Facility will submit to the local zoning authority and to the NMED a survey plat indicating the

location and dimensions of the landfill with respect to permanently surveyed benchmarks in compliance with 40 CFR §264.116. This plat will be prepared and certified by a professional land surveyor. The survey plat will contain a prominent note that asserts the Facility's obligation to restrict disturbance of the hazardous waste disposal unit. The Facility will also record a notation on the deed to the Facility property in compliance with 40 CFR §264.119(b)(1) to notify any potential purchasers of the property that (1) the land has been used to manage hazardous wastes; (2) use of the land is restricted to activities that will not disturb integrity of the final cover system or monitoring system during the post-closure care period; and (3) the survey plat and record of waste disposal have been submitted to the local zoning authority and to the NMED.

A record of the type, location, and quantity of hazardous wastes disposed of within the disposal unit will be submitted to the local zoning authority and to the NMED no later than 60 days after certification of closure of the landfill in compliance with 40 CFR §264.119(a).

The vadose zone monitoring wells will be sampled and analyzed in accordance with the procedures that are presented in Permit Attachment I, Vadose Zone Monitoring System Work Plan. The frequency of sampling and parameters to be tested are outlined in Permit Attachment I.

8.1.7 Closure of Non-Waste Management Units

Other areas within the facility boundary which have the potential to become Solid Waste Management Units during the operational life of the facility will be closed in accordance with the requirements of the closure ~~sampling and analysis plan~~SAP. Those non-waste management units~~ having structures or liners~~, such as the ~~truck wash~~ maintenance shop and the storm-water detention basin,~~collection basin (Permit Attachment L1, Drawing 10)~~ will be sampled to verify the absence of contamination prior to closure and removal. If the non-waste management unit structures or liners show contamination, they will be managed in accordance with the requirements of this closure plan. If contamination is not present they will be disposed of as solid waste.

After removal of the structures, other appurtenances, and liner, the areas will be contoured and revegetated as necessary.

8.3 Closure Performance Standard

The RCRA closure performance standard (40 CFR 264.111) specifies that hazardous waste facilities are to be closed in such a way as to minimize the need for further maintenance at the Facility and protect human health and the environment by controlling, minimizing, or eliminating potential releases of hazardous waste to the environment. The Facility will meet a clean-closure performance standard for all non-waste management units except the landfill and will not impact any environmental media in excess of agency-approved background levels or pose a threat to human health or the environment.

~~The Facility-specific clean-closure performance standard for the drum handling unit, roll-off storage area, tank storage area, stabilization unit, and evaporation pond is based on sampling soil from beneath the units.~~ The landfill will not be clean-closed; therefore, the Facility-specific, clean-closure performance standard is not applicable.

Indicator parameters will be selected and approved by NMED~~ for each unit~~ at closure. These parameters will be representative of the wastes disposed~~stored and/or treated in that unit~~ of during the Facility~~its~~ operating life. The waste information used to make these selections will be based upon the Facility operating record. For soil, analytical results that show that these concentrations of contaminants of concern are within a statistically significant range relative to clean background soil as determined by NMED will constitute demonstration of clean closure. Clean background samples will be obtained from the alluvium unit and from the Upper and Lower Dockum units from each of the vadose zone monitoring well borings, for a total of six

background samples per stratigraphic unit. If the alluvium is not present at a specific vadose zone monitoring well boring location, a surface sample from the southern portion of the site shall be substituted for the sample. Each sample will be submitted to an analytical laboratory for chemical analysis of metals listed in 40 CFR 264, Appendix VIII, using EPA SW-846 analytical methods or equivalent methods approved by NMED.

8.5 Certification of Closure

Within 60 days of completion of closure~~ of each unit, and within 60 days of completion of final Facility closure~~, the Facility will submit to NMED~~,~~ a certification that the~~each~~ hazardous waste management unit has been closed in accordance with the approved closure plan in compliance with 40 CFR 264.115. The closure certification ~~for each unit~~ will be signed by the owner/operator and by an independent New Mexico registered professional engineer.

8.6 Modifications to the Closure Plan

After this closure plan is approved, it will be amended whenever it is affected by changes in operating plans or Facility design. While conducting partial or final closure activities, unexpected events may be identified that also require amendment of the approved closure plan. Requests for modification will be made within 30 days of identifying an event that justifies plan modification.

~~Permit~~ Attachment O1. Compliance Schedules for Closure ~~Modified from the Permit Application, Volume I, Section 8.4~~

8.4 Closure Schedule

Closure of ~~all units at~~ the Facility will be initiated when the landfill nears its final capacity. ~~b~~Because the other non-waste management units exist only to support landfill disposal activities~~. In other words~~, non-waste management units~~the drum handling unit, roll-off storage area, liquid waste receiving and storage unit, stabilization unit, and evaporation pond~~ will not continue to operate after the landfill has reached capacity and is no longer in use. Closure is expected to begin when the landfill is nearing final capacity, allowing enough capacity in the landfill to dispose of all solid wastes generated on site during closure activities. ~~Expected w~~Waste volumes generated by non-waste management units are expected to be negligible, and therefore incidental to final closure of the Facility.~~that will be generated during closure are shown in Permit Attachment O, Closure Plan, Table 8-1, Closure Generated Waste Quantities.~~

~~The schedule for closure is shown in Figure 8-1, Closure Schedule (Days).~~ At the time of final Facility closure, ~~the drum handling unit (container storage area) will be closed first, as wastes from this area may need to be processed through the stabilization unit prior to disposal onsite. Concurrent with the closure of the drum handling unit, the evaporation pond closure will begin because sludge from the pond must also be treated in the stabilization unit. After closure of the evaporation pond begins,~~ the leachate from the landfill will be collected in tanks and shipped off-site for proper disposal at a permitted facility. ~~Following closure of the drum handling unit and during evaporation of the liquid in the ponds, the liquid waste receiving and storage unit (storage tanks) will be closed. After the pond sludge has been removed and treated, the stabilization unit (storage tanks) will be closed, and last the roll-off storage area will be closed.~~ The landfill cover will be constructed when all closure wastes have been placed in the landfill, and non-waste management units will cease operations.

Notification will be provided to the New Mexico Environment Department (NMED) in writing at least 60 days prior to beginning closure of a hazardous waste management unit or of the entire Facility. ~~Closure of the drum handling unit, liquid waste receiving and storage unit, stabilization unit, and roll-off storage area will proceed sequentially, and each closure will be completed within 180 days. Closure of the evaporation pond will require more than 180 days to complete, since it is projected that approximately one year will be required for evaporation of all the liquid in the pond.~~ Closure of ~~T~~the landfill ~~also~~ is expected to require more than 180 days ~~for closure,~~ due to the length of time necessary to construct the cover.

The closure regulations allow a period of 180 days from receipt of the final volume of waste ~~at each unit~~ for closure activities to begin [per 40 CFR Section 264.113(b)(1)]. The closure period can be extended with approval from NMED and if the owner or operator complies with 40 CFR 264.113(d).

~~Permit~~ Attachment O2. Financial Assurance for Closure

~~Modified from the Permit Application, Volume I, Sections 8.7.1 and 8.8.1~~

8.7.1 Closure Costs

Table O2-1 summarizes the landfill closure cost estimate. ~~s for the drum handling unit, roll-off storage area, liquid waste receiving and storage unit, truck wash unit, stabilization unit, evaporation pond, and landfill closure.~~ The original landfill closure cost estimate included in the March 2002 Triassic Park Waste Disposal Facility permit was ~~These estimates are~~ based on 2000 dollars. The landfill closure cost estimate presented in this permit modification has been updated to account for inflation using the change in the Consumer Price Index (CPI) between 2000 and 2011 (U.S. Department of Labor CPI, 2011). ~~and~~ Using the CPI, the 2011 costs are 32 percent higher than those from 2000. All 2000 costs were increased by 32 percent for purposes of this analysis. After the Facility is constructed and operations begin, the landfill closure cost estimate will be updated annually as required in 40 CFR Part 264.142(b).

~~These estimates are~~The landfill closure cost estimate is based on costs for closure when ~~each unit~~ the Facility is at maximum capacity, which is the point in the Facility's active life when the extent and manner of its operation would make closure the most expensive. As required in 40 CFR Part 264.142(a)(2), ~~cost estimates are~~the landfill closure cost estimate is based on the costs of hiring a third party to close the Facility. ~~Costs for onsite disposal are used in this cost estimate because Facility closure will be scheduled when sufficient landfill capacity remains to handle closure wastes. The maximum volume of waste that the Facility is projected to generate through closure activities is shown in Permit Attachment O, *Closure Plan*, Table 8-1, *Closure Generated Waste Quantities.*~~

Water

The Gandy-Marley, Inc. (GMI) landfill closure cost estimate ~~has been revised (increased) to~~ matches the total amount recommended by the Hearing Officer when considering approval of the original permit in 2002. ~~This~~ The estimate includes detailed unit rates for all closure activities. In addition, it includes~~d~~ costs for water usage during construction and revegetation and for maintenance of the cover during the post-closure care period. ~~($30,000 per year for 30 years total of $900,000).~~ Financial assurance for closure includes costs to acquire water rights for the water that will be needed for closure and post-closure care. The water requirements for closure were based on estimates from local revegetation specialists that estimated approximately $2,000/acre for water rights ($2,640/acre escalated to 2011). ~~We~~The landfill closure cost estimate utilizes~~d~~ almost twice that number ~~in the estimate~~. Water costs are included for~~in~~ the earthwork~~s~~ for backfilling, which is expected to be the major demand for water.

Cost Estimating Handbook

~~A check using~~ Cost-estimating handbooks (CRG and Caterpillar production program) were used for the major earthwork~~s~~ items in the closure costs. This includes the backfilling for the landfill during closure and clean soil backfilling for other facilities. Also include~~ds~~ are major components of the cover placement. The handbook estimated backfill direct costs at $1.12 to 1.28/cubic yard (cy) ($1.48 to 1.69/cy escalated to 2011). This compares to the GMI estimate of $1.46/cy ($1.93/cy escalated to 2011). These numbers do not include the additional costs included in the landfill closure cost estimate of 25% for indirect costs and 10% for New Mexico Environment Department (NMED) supervision.

Conclusion

The unit rates used in the cost estimate are conservative for the major earthwork~~s~~ components.

Erosion Control and Revegetation

The type and density of vegetation was assumed in the erosion calculations (60% cover). The drainage structures are also specified in the design drawings and specifications. The top surface slopes are sufficiently flat (6%) that contour ditches are not required. The access road ditches are sufficient to handle any runoff. The calculation of erosion of topsoil was based on the vegetation density ~~of~~ (60% cover). The topsoil removed from the footprint of the ~~facilities~~ landfill will be used for the final cover. Water needs and costs are discussed above. Maintenance of the cover is included in the post-closure cost estimate. This includes approximately $30,000 per year ($39,600 per year escalated to 2011) for maintenance (reseeding and erosion repair). Over the 30-year period, this totals approximately $900,000 ($1,188,000 escalated to 2011).

Seed Mix

Upon closure, ~~Gandy~~ GMI will work with the local soil conservation service to develop a seed mixture ~~which~~ that will consist of both locale types of vegetation along with good cover types of vegetation.

Vegetation Density

According to the sediment demonstration for the final cover, a 60% herbaceous cover (which includes litter) is required to keep erosion down to 2 tons/acre/year.

Final Drainage Channels

Channels 1, 2, 3, 4, and 5 will remain as permanent channels. The locations and designs for the channels are shown on Drawings 25 and 26.

Topsoil

Upon closure, ~~Gandy~~ GMI will use the topsoil that was stripped and stockpiled prior to construction of the site. At that time, the topsoil will be tested and, according to the test results, appropriate soil amendments will be determined and added.

8.8.1 Financial Assurance for Closure

40 CFR 264.143 defines the standards for financial assurance for closure. The financial instrument selected to provide coverage for this requirement must be implemented and submitted to the NMED at least 60 days prior to the initial receipt of waste.

Upon receipt of the final permit for the Facility, GMI will evaluate and select one of the financial instruments defined in 40 CFR 264.143 to provide financial assurance for the closure of the Facility. Selection of one of the following six financial instruments will consider the effectiveness and economics of the particular options. The instruments defined in the regulations are:

- Financial test and corporate guarantee for closure
- Closure trust fund
- Surety bond guaranteeing payment into a closure trust fund
- Surety bond guaranteeing performance of closure
- Closure letter of credit
- Closure insurance

The appropriate instrument will be selected, implemented, and submitted a minimum of 60 days prior to the initial receipt of waste as required by 40 CFR 264, Subpart H.

~~Landfill Item~~	~~Cost ($)~~	
~~DRUM HANDLING UNIT~~	~~COST ($)~~	
~~Stabilization and Disposal of Remaining Drum Waste Inventory~~	~~36,071~~	
~~Decontamination of Equipment and Buildings~~	~~7,200~~	
~~Stabilization and Disposal of Decontamination Water~~	~~14,630~~	
~~Chemical Testing of Decontamination Water~~	~~2,040~~	
~~Dismantling and Moving Structure and Equipment~~	~~23,775~~	
~~Dismantling and Disposal of Concrete Floor and Secondary Containment~~	~~122,570~~	
~~Soil Sampling and Chemical Analysis~~	~~138,720~~	
~~Excavation of Contaminated Soils~~	~~7,307~~	
~~Disposal of Contaminated Soils~~	~~15,930~~	
~~Earth Backfill for Excavated Contaminated Soils~~	~~1,827~~	
~~Revegetation~~	~~1,840~~	
~~Certification of Closure Inspection~~	~~3,000~~	
~~Certification of Closure Report~~	~~20,000~~	
~~*Subtotal*~~	~~$394,910~~	
~~***EVAPORATION POND***~~	~~COST ($)~~	
~~*Stabilization and Disposal of Remaining Liquid Waste Inventory*~~	~~342,954~~	
~~*Decontamination of Equipment*~~	~~240~~	
~~*Stabilization and Disposal of Decontamination Water*~~	~~7,315~~	
~~*Chemical Testing of Decontamination Water*~~	~~2,040~~	
~~*Removal and Disposal of Liner and Leachate Collection System*~~	~~99,880~~	
~~*Soil Sampling and Chemical Analysis*~~	~~128,520~~	
~~*Excavation of Contaminated Soils*~~	~~18,019~~	
~~*Disposal of Contaminated Soil*~~	~~37,790~~	
~~*Earth Backfill for Excavated Contaminated Soils*~~	~~6,832~~	
~~*Revegetation*~~	~~1,873~~	
~~*Certification of Closure Inspection*~~	~~3,000~~	
~~*Certification of Closure Report*~~	~~20,000~~	
~~*Subtotal*~~	~~$668,463~~	
~~***LIQUID WASTE RECEIVING AND STORAGE UNIT***~~	~~COST ($)~~	
~~*Stabilization and Disposal of Remaining Waste Inventory*~~	~~*105,336*~~	
~~*Decontamination of Equipment and Buildings*~~	~~2,400~~	
~~*Chemical Testing of Decontamination Water*~~	~~2,040~~	
~~*Stabilization and Disposal of Decontamination Water*~~	~~14,630~~	
~~*Removal and Disposal of Tanks and Concrete Pad*~~	~~14,605~~	
~~*Soil Sampling and Chemical Analysis*~~	~~61,200~~	

~~Landfill Item~~	~~Cost ($)~~	
~~*Excavation of Contaminated Soils*~~	~~436~~	
~~*Disposal of Contaminated Soil*~~	~~967~~	
~~*Earth Backfill for Excavated Contaminated Soils*~~	~~218~~	
~~*Revegetation*~~	~~731~~	
~~*Certification of Closure Inspection*~~	~~3,000~~	
~~*Certification of Closure Report*~~	~~15,000~~	
~~*Subtotal*~~	~~$220,563~~	
~~*1.1.1.1.1* STABILIZATION UNIT~~	~~Cost ($)~~	
~~*Stabilization and Disposal of Remaining Waste Inventory*~~	~~21,024~~	
~~*Decontamination of Equipment and Buildings*~~	~~4,560~~	
~~*Chemical Testing of Decontamination Water*~~	~~2,040~~	
~~*Stabilization and Disposal of Decontamination Water*~~	~~14,630~~	
~~*Dismantling and Salvaging Tanks, Ancillary Equipment, and Building*~~	~~24,905~~	
~~*Removal and Disposal of Tanks and Concrete Pad*~~	~~57,980~~	
~~*Soil Sampling and Chemical Analysis*~~	~~40,800~~	
~~*Excavation of Contaminated Soils*~~	~~2,150~~	
~~*Disposal of Contaminated Soil*~~	~~4,766~~	
~~*Earth Backfill for Excavated Contaminated Soils*~~	~~1,076~~	
~~*Revegetation*~~	~~1,464~~	
~~*Certification of Closure Inspection*~~	~~3,000~~	
~~*Certification of Closure Report*~~	~~15,000~~	
~~*Subtotal*~~	~~$193,395~~	
~~***ROLL-OFF STORAGE AREA UNIT***~~	~~Cost ($)~~	
~~*Stabilization and Disposal of Remaining Waste Inventory*~~	~~832,550~~	
~~*Decontamination of Equipment*~~	~~0~~	
~~*Chemical Testing of Decontamination Water*~~	~~0~~	
~~*Stabilization and Disposal of Decontamination Water*~~	~~0~~	
~~*Demolition and Disposal of Liner System*~~	~~105,248~~	
~~*Soil Sampling and Chemical Analysis*~~	~~141,840~~	
~~*Excavation of Contaminated Soils*~~	~~21,353~~	
~~*Disposal of Contaminated Soil*~~	~~44,781~~	
~~*Earth Backfill for Excavated Contaminated Soils*~~	~~10,120~~	
~~*Revegetation*~~	~~2,733~~	
~~*Certification of Closure Inspection*~~	~~3,000~~	
~~*Certification of Closure Report*~~	~~15,000~~	
~~*Subtotal*~~	~~$1,179,625~~	
~~***TRUCK WASH UNIT***~~	~~Cost~~	

~~Landfill Item~~	~~Cost ($)~~	
	~~($)~~	
~~*Stabilization and Disposal of Remaining Waste Inventory*~~	~~5,270~~	
~~*Chemical Testing of Decontamination Water*~~	~~2,040~~	
~~*Decontamination of Equipment*~~	~~0~~	
~~*Stabilization and Disposal of Decontamination Water*~~	~~0~~	
~~*Demolition and Disposal of Tanks, Structures, Concrete and Liner System*~~	~~16,769~~	
~~*Soil Sampling and Chemical Analysis*~~	~~20,400~~	
~~*Excavation of Contaminated Soils*~~	~~285~~	
~~*Disposal of Contaminated Soil*~~	~~598~~	
~~*Earth Backfill for Excavated Contaminated Soils*~~	~~178~~	
~~*Revegetation*~~	~~99~~	
~~*Certification of Closure Inspection*~~	~~3,000~~	
~~*Certification of Closure Report*~~	~~5,000~~	
~~*Subtotal*~~	~~$53,639~~	

Table O2-1. Landfill~~Site~~ Closure Cost Estimates

Landfill Item	Cost	
	Approved Permit ($ in 2000)	Permit Renewal ($ in 2011)
Landfill Excavation Backfill	4,120,000	5,438,400
Cover Engineering Design	30,000	39,600
Landfill Cover	3,374,432	4,454,250
Demolition of Tanks, Concrete and Liner System	2,426	3,202
Leachate Treatment Facility Construction	0	0
Leachate Treatment Facility Operations	0	0
Leachate Pumping and Disposal (volume = 133,000 Gallons [551 tons])	98,021	129,388
Sump Vadose Zone Sampling and Analysis	8,000	10,560
Well Vadose Zone Monitoring System Sampling and Analysis	48,000	63,360
Soil Sampling and Analysis	104,040	137,333
Final Plat Survey	2,400	3,168
Certification of Closure Inspection	3,000	3,960
Certification of Closure Report	15,000	19,800
Subtotal	7,805,319	10,303,021
~~**Total from unit closures**~~	~~$2,710,595~~	
Water Rights and Application	114,000	150,480
Total Closure Cost	10,599,914	10,453,501

Permit Renewal Application
October 17, 2011

Attachment P

Post-Closure Care

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The New Mexico Environment Department
March 2002

~~Permit~~ Attachment P. Post-Closure Care
~~Modified from the Permit Application, Volume I, Section 8.2~~

8.2 Post-Closure Activities

Post-closure care involves long-term maintenance, monitoring, and reporting of activities that are carried out after closure is completed. Post-closure care is anticipated to be needed only for the landfill after closure. However, if clean closure cannot be certified for any non-waste management unit components~~ or secondary containment areas associated with the drum handling unit, liquid waste storage area, stabilization unit, evaporation pond, or roll-off storage area~~, then those closure activities that have been completed will be certified and a permit modification request will be submitted to the New Mexico Environment Department (NMED) to include post-closure activities for those portions of the units that do not meet the closure performance standard.

The post-closure care period for the landfill will begin after completion of closure activities and continue for an anticipated 30 years. Inspection, maintenance, and repair activities to be conducted during post-closure are described in the following sections. The schedule for performing inspections is shown in Table ~~8-2~~P-1.~~, Post-Closure Inspection Schedule~~

Table ~~8-2~~P-1. Post-Closure Inspection Schedule

Inspection Item – Problem or Problem Area	Inspection Time
Facility	
Fence	Monthly
Locks and gates	Monthly
Warning signs	Monthly
Landfill Cover	
Cracking, subsidence, ponding water, erosion, burrowing animals, deep-rooted vegetation	Quarterly
Perimeter Diversion Ditch	
Sediment and debris accumulation,	Quarterly
Leachate Collection System	
Sump	Quarterly until the sump remains dry for 6 months, then semiannually
Pumps	Quarterly
Riser pipes, grout seals, other visible portions of the system	Quarterly
Leak detection system	Quarterly until the sump remains dry for 6 months, then semiannually
Vadose Zone Monitoring System	
System	Semiannually

8.2.1 Security Systems

As shown in Permit Attachment L1, Engineering Drawings, Facility Drawing Number 4, the Facility perimeter fence encloses the entire 480 acres of the Facility. The fence and warning signs mounted on the fence will be inspected and maintained throughout the post-closure period. Monthly inspections will include

checking the condition of fencing, locks, gates, and warning signs. Any signs of unauthorized entry will be reported to the local sheriff's office and NMED. Routine maintenance will be performed based on inspection findings to repair or replace damaged or deteriorating items.

8.2.2 Landfill Final Cover

The integrity and effectiveness of the landfill final cover will be maintained, including making necessary repairs to correct the effects of settling, erosion, water damage, animal damage, or other events. The landfill cover will be inspected quarterly. Inspections will include checking for signs of cracking, subsidence, ponding water, erosion, burrowing animals, or deep-rooted vegetation. Repairs will be scheduled in a timely manner upon noting deficiencies in order to ensure that the final cover maintains its effectiveness.

General maintenance will include the following activities:

- fertilizing the vegetation periodically;
- re-establishing damaged or sparse vegetative cover, including seeding and fertilizing;
- conducting erosion damage repair, including soil excavation, transport and placement, seeding and fertilizing;
- regrading as needed to overcome the effects of subsidence or to repair areas where ponding is occurring; and
- providing rodent control as needed, including trapping and relocating animals and repairing damage caused by burrowing.

Soil for erosion repair and regrading will be excavated from unused on-site areas ~~on-site~~ and transported to the cap area for use in maintenance activities.

8.2.3 Perimeter Diversion Ditch

The perimeter diversion ditch (as shown in Permit Attachment L1 on Drawings 22 and 25) will be inspected and maintained throughout the post-closure period to ensure its designed functions to divert precipitation and run-on from the landfill area are met. Inspections will be conducted quarterly and will include checking for accumulated sediments and debris, and signs of erosion. Repairs will be scheduled in a timely manner, upon deficiencies being noted, to ensure that the diversion ditch maintains its effectiveness.

General maintenance activities will include diversion ditch cleaning to remove accumulated sediments and debris, and regrading, as needed, to repair the effects of erosion.

8.2.4 Leachate Management System

8.2.4.1 Leachate Collection System

The leachate collection system will be operated when necessary to ensure leachate depth over the liner does not exceed 30 centimeters (cm) (1 foot) until the completion of post-closure care. Leachate pumps will be operated at least quarterly. The site log will be kept on-site or at a location approved by the NMED Secretary. The volume of leachate pumped will be recorded in a site log. After records indicate that the sump has remained dry for six months, the frequency of inspection and operation of the sump pumps will be changed to semiannually. Any leachate collected will be pumped to an aboveground storage tank.

The leachate collection system will be inspected quarterly or semiannually as described in the preceding paragraph. Pumps will be inspected for proper operation. The riser pipes, grout seals, and other visible aboveground portions of the system will be inspected for integrity. The level of liquid in the sumps will be measured prior to pumping out accumulated leachate.

Routine maintenance will be conducted to ensure that the leachate collection system remains operable. Locking caps and standpipe grouting will be repaired or replaced as necessary. Accumulated sediments or sand in the standpipes will be removed as necessary to enable the system to function properly. Based on the amount of leachate collected over time, a determination will be made about the integrity of the collection system. If a system is suspected of being clogged, an assessment by a New Mexico registered professional engineer will be made. All repairs will be made according to the New Mexico registered professional engineer's assessment and upon approval by NMED.

8.2.4.2 Management of Leachate

During the post-closure care period, leachate pumped from the collection system will be temporarily stored in an aboveground tank. The leachate will be sampled and managed at an off-site facility as hazardous waste, as appropriate. Details of the leachate sampling and analysis program will be specified in a sampling and analysis plan.

8.2.4.3 Leak Detection System

During the post-closure care period, the leak detection system beneath the landfill primary liner will initially be monitored and inspected quarterly to ensure that it is operating correctly and that any leachate that has migrated through the primary liner is collected and removed. As with the primary leachate system, the volume of leachate pumped from the secondary leak detection system will be recorded in a site log. After records indicate that the sump has remained dry for six months, the frequency of inspection and operation of the leak detection system will be changed to semi-annually.

Inspections and maintenance will be equivalent to those described for the leachate collection system (see Section 8.2.4.1).

8.2.5 Vadose Zone Monitoring System

The vadose zone monitoring system will be maintained and monitored throughout the post-closure care period. The following sections outline the post-closure monitoring plan for this system. The vadose zone monitoring system is described in Permit Attachment I, Vadose Zone Monitoring System Work Plan, and consists of a vadose zone sump in the landfill and vadose zone monitoring well network.

8.2.5.1 Sampling and Analysis

Vadose zone monitoring will be conducted semiannually to test for the presence of contaminants in the unsaturated sediments hosting the landfill. Sampling procedures and analytical parameters will be defined according to the Vadose Zone Monitoring System Work Plan (Permit Attachment I) ~~(Volume II, Appendix N)~~ and will follow the same guidelines used during the active life of the Facility.

8.2.5.2 Inspection and Maintenance

The visible aboveground portions of the vadose zone monitoring system will be inspected semiannually for integrity. Routine maintenance will be conducted to ensure that the vadose zone monitoring system remains in operable condition. System equipment will be repaired or replaced as necessary.

8.2.6 Recordkeeping

A post-closure Facility record will be maintained. This record will include the dates and times of inspections, inspection findings, name of inspector, volumes of leachate pumped, disposition of leachate, sampling results of leachate and vadose zone samples, and dates and nature of any corrective actions taken.

8.2.7 Certification of Post-Closure

Within 60 days after completion of the established post-closure care period for the Facility, the permittee will submit to NMED a certification that the post-closure operations were performed in accordance with the approved post-closure plan in compliance with 40 CFR 264.120. The certification will be signed by the permittee and an independent New Mexico registered professional engineer.

8.2.8 Amendment of Plan

The permittee will submit a permit modification request for changes to the post-closure plan if changes in operating plans or Facility design, or events that occur during the active life of the Facility, affect the approved post-closure plan. The owner or operator may also request a modification to the post-closure plan at any time during the active life of the Facility or during the post-closure care period. Permit modification requests will be submitted at least 60 days prior to a proposed change in Facility design, or no later than 60 days after an unexpected event which affects the post-closure plan.

If clean closure cannot be certified for any non-waste management unit components~~ or secondary containment areas associated with the drum handling unit, tank storage area, stabilization unit, evaporation pond, or roll-off storage area~~, then the post-closure care permit will be amended to include those portions of the units that do not meet the closure performance standard. The post-closure care plan amendments will be submitted to NMED no later than 90 days after the owner or operator determines that the ~~hazardous~~non-waste management unit must be closed as a regulated unit~~landfill~~.

8.2.9 Facility Post-Closure Contact

During the post-closure care period, the Facility contact organization will be the following:

Gandy Marley, Inc.
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(575) 347-0434
~~1109 East Broadway~~
~~Tatum, New Mexico 88267~~
~~(505) 398-4960~~

~~Permit~~ Attachment P1. Financial Assurance for Post-Closure Care

~~Modified from the Permit Application, Volume I, Sections 8.7.2 and 8.8.2~~

8.7.2 Post-Closure Costs

Table P1-1~~, *Landfill Post-Closure Cost Estimate*~~, summarizes the post-closure cost estimate for the landfill. The costs include 30 years of monitoring and maintenance activities, as described in Permit Attachment P, Post-Closure Care~~, Section 8.2, *Post-Closure Activities*~~. These original post-closure cost estimate included in the March 2002 Triassic Park Waste Disposal Facility permit ~~estimates are~~ was based on 2000 dollars. The post-closure cost estimate presented in this permit renewal application has been updated to account for inflation using the change in the Consumer Price Index (CPI) between 2000 and 2011 (U.S. Department of Labor CPI, 2011). Using the CPI, the 2011 costs are 32 percent higher than those from 2000. All 2000 costs were increased by 32 percent for purposes of this analysis. After the Facility is constructed and operations begin, the post-closure cost estimate will~~and must~~ be updated annually as required in 40 CFR Part 264.144(b).

Table P1-1. Landfill Post-Closure Cost Estimate

Item	Cost	
	Approved Permit ($ in 2000)	Permit Renewal ($ in 2011)
Facility Inspection	201,600	266,112
Routine Landfill Cover Maintenance and Repair	600,000	792,000
Severe Landfill Cover Erosion Damage Repair	300,000	396,000
Perimeter Diversion Ditch Maintenance and Repair	300,000	396,000
Leachate Pumping and Treatment	239,476	316,108
Leachate Collection System Maintenance	67,200	88,704
Well and Sump Vadose Zone Maintenance	67,200	88,704
Sump Vadose Zone Sampling and Analysis	240,000	316,800
Vadose Zone Monitoring Wells Sampling and Analysis	1,440,000	1,900,800
Notation of Property Deed	2,500	3,300
Certification of Post-Closure Inspection	3,000	3,960
Certification of Post-Closure Report	150,000	198,000
~~Subtotal~~**Total Post-Closure Costs**	3,610,976	4,766,488
Total Closure Cost + Post-Closure Costs	12,899,323	15,219,989

8.8.2 Financial Assurance for Post-Closure Care

Similar to the financial assurance requirements for closure activities, the Facility is required to provide assurances for the post-closure care of the Facility. Upon receipt of the final permit, and 60 days prior to the initial receipt of waste, the owner/operators will provide the appropriate financial instrument to fulfill this requirement. Selection of the instrument to be used will be based upon economic and performance

considerations. The financial instruments allowed by this subpart of the regulations are listed in Permit Attachment O2, ~~*Cost Estimates for Closure*, Section 8.8.1,~~ Financial Assurance for Closure.

Permit Renewal Application
October 17, 2011

Attachment Q

Statistics for Release Determination

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Attachment Q. Statistics for Release Determination

1. Overview

Statistical analysis procedures approved in the original 2002 permit for the Triassic Park Waste Disposal Facility will be used to determine whether monitoring results show that a release has occurred from the facility. In accordance with Permit Condition 7.5.1.a., these procedures will~~shall~~ be used to perform release determinations for metals and radionuclides in water (i.e., fluid) samples obtained in the vadose zone monitoring system (VZMS) wells. These procedures shall be applicable to the following analytes obtained under Permit Conditions 7.3.1 and 7.3.3: dissolved and total metals (Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Ti, Zn) and radionuclides (gross alpha, gross beta, gamma emitters, total uranium, radium 226/228, radon).

As indicated~~identified~~ in Permit Condition 7.5.1.a, ~~note that the following~~ statistical release determination procedures do not apply to general water chemistry parameters (bicarbonate, chloride, dissolved major cations) or to organic parameters. ~~As identified in Permit Condition 7.5.1.a, r~~Release determinations for general water chemistry parameters will~~shall~~ be made through a trilinear diagram comparison between ~~vadose zone monitoring system (~~VZMS~~)~~ well fluid samples and baseline non-leachate fluid samples (i.e., fluid obtained by extracting non-leachate source water through representative soil samples obtained from the installation of the VZMS wells). The release determinations for organics shall be made by the detection of any anthropogenic organic in a VZMS well sample.

The overall statistical procedure for making release determinations for metals and radionuclides in VZMS well samples is as follows:

- An upper tolerance limit shall be constructed for non-leachate analytes in water samples extracted under the Synthetic Precipitation Leaching Procedure (SPLP; U.S. EPA method 1312) ~~Meteoric Water Mobility Procedure (MWMP)~~ (see Permit Attachment I, Vadose Zone Monitoring System Work Plan, Appendix A, Synthetic Precipitation Leaching Procedure~~Meteoric Water Mobility Procedure~~) for baseline soil boring samples (or baseline soil cutting samples) obtained under Permit Condition 7.3.1. This non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte tolerance limit will~~shall~~ be constructed for each individual metal analyte and for each individual radionuclide analyte in the non-leachate ~~MWMP~~SPLP-extracted samples. These non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte tolerance limits will~~shall~~ be reported as required by~~at~~ Permit Condition 7.3.1.b.

- Analyte concentrations of dissolved/total metals and radionuclides from VZMS well samples, as obtained under Permit Condition 7.3.3, will~~shall~~ be compared to~~against~~ each individual non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte tolerance limit. The results of this comparison will~~shall~~ be reported according to VZMS well sample reporting requirements established under Permit Conditions 7.4.2 and 7.5.2.

The construction of the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte tolerance limits shall adhere to the following guidelines:

- A minimum of 20 non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte concentrations (e.g., total lead) from baseline ~~MWMP~~SPLP-extract~~ant~~ samples are required to construct an adequate upper tolerance limit for each non-leachate analyte in the ~~MWMP~~SPLP-extract~~ant~~ data sets.

- Each set of non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte concentrations will~~shall~~ be evaluated for the occurrence of values reported below the achievable detection limits (i.e., non-detects). The

procedure for performing this evaluation, and the methods to manage non-detects, is provided below.

- Each set of non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte concentrations will~~shall~~ be evaluated for normality using the procedure described below. If a~~each~~ data set of non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte concentrations ~~from the MWMP-extractant samples~~ exhibits a normal distribution, the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte tolerance limits will~~shall~~ be constructed on the original (i.e., raw) data set using the parametric tolerance limit procedure described below. If a~~each~~ data set of non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte concentrations ~~from the MWMP-extractant samples~~ exhibits a log-normal distribution instead, the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte tolerance limit will~~shall~~ be constructed on the log-transformed baseline data set using the parametric tolerance limit procedure, with the respective log-transformed~~normal~~ VZMS well sample concentration for that analyte being used in the comparison of the VZMS well sample to the log-transformed~~normal~~ non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte tolerance limit.

These procedures are based upon the following guidance developed by the U.S. Environmental Protection Agency (EPA): *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance*, (U.S. EPA~~ Interim Final Guidance~~, ~~April~~ 1989); ~~and~~ *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Draft Addendum to Interim Final Guidance*, (U.S. EPA, ~~July~~ 1992); and *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (U.S. EPA, ~~March~~ 2009). Requirements set forth in *Use of Tolerance Intervals for Determining Inorganic Background Concentrations* (~~New Mexico Environment Department [~~(NMED~~]), Hazardous Materials Bureau, March 2~~, 2000) shall also be adhered to, including the following:

- Each parametric and non-parametric analyte tolerance limit will~~shall~~ be constructed with a minimum of 20 ~~MWMP~~SPLP-extract~~ant~~ samples.

- Each parametric analyte tolerance limit shall be constructed with a minimum coverage of 95% and a minimum tolerance coefficient of 95%.

2. Managing Non-Detects in Non-Leachate ~~MWMP~~SPLP-Extract~~ant~~ Data Sets

If concentrations of any non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte are reported below the achievable detection limits in ~~each non-leachate MWMP-extractant analyte~~ a data set (i.e., minimum of 20 samples), the following procedure must be followed before the tolerance limit is calculated for the data set.

If the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set has no more than 15% non-detects, use one-half of the detection limit for that particular measurement. Subsequently, proceed to the normality test procedures described in Section 3~~below~~.

If the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set has more than 15% non-detects, but less than or equal to 50% non-detects, use Cohen's approximation to approximate the mean and standard deviation of the ~~analyte non-leachate MWMP-extractant analyte~~ data set. However, before calculating Cohen's approximation, it must be decided whether the analyte data are~~is~~ more closely approximate to a normal or a log-normal distribution. To make this determination, censored probability plots, as described in EPA's ~~Draft Addendum to Interim Final G~~guidance (U.S. EPA, 1992), should be constructed on both the raw measurements and the log-transformed measurements.

~~Compare the two~~The censored probability plots will be compared to determine whether~~. If~~ the plot based on the raw measurements is more linear than the plot based on the log-transformed values.~~, compute~~ Cohen's approximation will be computed using the raw measurements and then proceed with the normality test

procedures described below. If the plot based on the log-transformed measurements is more linear, ~~compute~~ Cohen's approximation will be computed using the log-transformed measurements and then proceed with the normality test procedures described in Section 3~~below~~.

If the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set contains more than 50% non-detects, then ~~use~~ the procedure to calculate the non-parametric tolerance limit for the data set will be used, as described in Section 5~~below~~.

3. Normality Test of Non-Leachate ~~MWMP~~SPLP-Extract~~ant~~ Data Sets

Following the management of non-detects for each non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set, the normality or log-normality of each ~~non-leachate MWMP-extractant analyte~~ data set must be confirmed before constructing the analyte tolerance limit ~~for each data set~~. If the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set contains more than 50% non-detects, the data set is~~do~~ not tested for normality, and ~~and proceed directly to~~ the method for calculating the non-parametric tolerance limit for the data set is used, as described in Section 5~~below~~.

The normality or log-normality of each non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set will~~shall~~ be tested by first constructing a probability plot on the compliance data, as described in EPA's ~~Addendum to Interim Final G~~guidance (U.S. EPA, 1992). In addition, ~~since~~ because the probability plot is not a formal test of distribution, each compliance data set will~~shall~~ be assessed using the Shapiro-Wilk test of normality at the 0.01 level of significance. Note that to test normality of each non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set, the raw measurements should be used in the construction of the probability plot and the calculation of the Shapiro-Wilk test. If normality of the data is confirmed, the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set tolerance limit can be calculated on the raw measurements, as described in Section 4~~below~~ in the discussion of parametric tolerance limit procedures.

If the probability plot and the results of the Shapiro-Wilk test indicate~~s~~ the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set is not normally distributed, the data set should be log-transformed. Subsequently, the normality tests (i.e., probability plot and Shapiro-Wilk test) should be applied to the log-transformed data set to determine if the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set is log-normally distributed. If log-normality of the data is confirmed, the parametric tolerance limit can be calculated on the log-transformed data set, as described ~~below~~in Section 4 in the discussion of parametric tolerance limit procedures.

If both normality and log-normality of the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set are rejected using the probability test and the Shapiro-Wilk test at the 0.01 level of significance, then ~~construct~~ the non-parametric tolerance limit will be constructed as described in Section 5~~below~~.

4. Parametric Tolerance Limit for Non-Leachate ~~MWMP~~SPLP-Extract~~ant~~ Analyte Data Set

For log-normally distributed or log-transformed data sets of SPLP-extract analyte data, the following procedure will be followed to establish the parametric tolerance limit.

1. ~~Calculate t~~The mean ~~,~~ (X)~~,~~ and standard deviation ~~,~~ (S)~~,~~ for the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set will be calculated.

2. ~~Construct t~~The one-sided, upper tolerance limit for the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set will be constructed as:

$$\text{Tolerance Limit} = X + K\,S$$

where K = the one-sided normal tolerance factor found in U.S. EPA (2009, Appendix D Table 17-3)~~Interim Final Guidance (Appendix B, Table 5)~~

3. ~~Compare e~~Each dissolved/total metal analyte and radionuclide analyte obtained for each VZMS well sample, as obtained under Permit Condition 7.3.3, will be compared to each respective non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set parametric tolerance limit constructed for the analyte under Step 2. If the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set tolerance limit was constructed on the logarithm of the original data, the logarithm of the VZMS well sample analyte should be compared to the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set tolerance limit for each analyte under Step 2.

4. If the VZMS well sample analyte concentration exceeds the respective parametric non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set tolerance limit for that analyte, then there is statistically significant evidence that the VZMS well sample is composed of leachate from the landfill. ~~or the Surface Impoundment~~.

5. Non-Parametric Tolerance Limit for Non-Leachate ~~MWMP~~SPLP-Extract~~ant~~ Analyte Data Set

For data sets of SPLP-extract analyte data found to not be normally or log-normally distributed, the following procedure will be followed to establish the non-parametric tolerance limit.

1. ~~Examine t~~The non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set should be examined to observe and obtain the maximum value for the data set.

2. ~~Set t~~The non-parametric upper tolerance limit for the non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set will be established as ~~to~~ the~~is~~ maximum value obtained in Step 1.

3. ~~Compare e~~Each dissolved/total metal analyte and radionuclide analyte obtained for each VZMS well sample, as obtained under Permit Condition 7.3.3, will be compared to the non-parametric non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set tolerance limit constructed for each analyte under Step 2.

   If the VZMS well sample analyte concentration exceeds the respective non-parametric non-leachate ~~MWMP~~SPLP-extract~~ant~~ analyte data set tolerance limit for that analyte, then there is statistically significant evidence that the VZMS well sample is composed of leachate from the l~~L~~andfill ~~or the Surface Impoundment~~.

References

U.S. Environmental Protection Agency (EPA). 1989. *Statistical analysis of groundwater monitoring data at RCRA facilities. Interim final guidance.* U.S. EPA Office of Solid Waste. April 1989.

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Permit Renewal Application
October 17, 2011

Attachment W

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Facility Corrective Action Work Plan

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Appendix

A Permit Attachment R

B Permit Parts 9 and 10

C Standard Operating Procedures

D Work Schedule

E Potential Release Locations

List of Acronyms

ACA	Accelerated Corrective Action
AHA	Activity Hazard Analysis
ALARA	As Low as Reasonably Achievable
ANSI	American National Standards Institute
AOC	Area of Concern
APR	Air Purifying Respirator
AR	Administrative Record
CLP	Contract Laboratory Program
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
CMSWP	Corrective Measures Study Work Plan
CoC	Chain-of-Custody
COPC	Chemicals of Potential Concern
CPR	Cardiopulmonary Resuscitation
CRP	Community Relations Plan
CRZ	Contamination Reduction Zone
CS	Confirmatory Sampling
CSWP	Confirmatory Sampling Work Plan
DCO	Document Control Officer
DCQCR	Daily Chemical Quality Control Reports
DMP	Data Management Plan
DOT	U.S. Department of Transportation
DQA	Data Quality Assessment
DQO	Data Quality Objective
EC	Environmental Coordinator
EPA	Environmental Protection Agency
EZ	Exclusion Zone
Facility	Proposed Triassic Park Waste Disposal Facility
FCAWP	Facility Corrective Action Work Plan
FCR	Field Change Request
FTL	Field Team Leader
GANDY-MARLEY	Gandy-Marley Inc.
GIS	Geographical Information Systems
GM	General Manager
GMWP	Groundwater Monitoring Work Plan
GSA	Geological Society of America
H&S	Health and Safety
HASP	Health and Safety Plan
HAZMAT	Hazardous Materials Response Team

HAZWOPER	Hazardous Waste Operations Emergency Response
HEPA	High Efficiency Particulate Air
HSWA	Hazardous and Solid Waste Amendments
IAR	Independent Assessment Report
IDLH	Immediately Dangerous to Life or Health
IM	Interim Measures
IMC	Information Management Capability
IMWP	Interim Measures Work Plan
IRAR	Immediate Response Action Report
ISM	Integrated Safety Management
LDR	Land Disposal Restrictions
LS	Laboratory Specialist
NFA	No Further Action
NMED	New Mexico Environmental Department
NMHWA	New Mexico Hazardous Waste Act (1977)
NPL	National Priorities List
NRC	National Response Center
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OVM	Organic Vapor Meter
%R	Percentage Recovery
PCB	Polychlorinated Biphenyl
PE	Performance Evaluation
PEL	Permissible Exposure Limits
PM	Project Manager
PMP	Project Management Plan
PPE	Personal Protective Equipment
PQL	Practical Quantitation Limits
PRS	Potential Release Site
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAP	Quality Assurance Plan
QC	Quality Control
QCSR	Quality Control Summary Report
QP	Quality Procedures
RAWP	Remedial Action Work Plan
RAER	Response Action Effectiveness Report
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RFIWP	RCRA Facility Investigation Work Plan
RIWP	Remedial Investigation Work Plan

RRO	Records Retention Office
RUIWP	Regulated Unit Investigation Work Plan
SAP	Sampling and Analysis Plan
SCBA	Self-contained Breathing Apparatus
SDG	Sample Delivery Group
SOP	Standard Operating Procedure
SSHASP	Site-Specific Health and Safety Plan
SSO	Site Safety Officer
SWDA	Solid Waste Disposal Act of 1965
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
TSD	Waste Treatment, Storage, and Disposal Operation
VOC	Volatile Organic Compound
VSR	Verification Sampling Report
WH	Waste Handler

Attachment W. Facility Corrective Action Work Plan

1. Introduction

The purpose of the Facility Corrective Action Work Plan (FCAWP) herein is to have in place standard procedures for conducting an investigation of the nature, rate, and extent of a contaminant release at the Triassic Park Waste Disposal Facility.

The information below comprises the FCAWP for the Triassic Park Facility (Figures 1.1 and 1.2). Section 2.0 presents the corrective action Quality Assurance Plan as required by Attachment R of the Facility's RCRA permit. The Quality Assurance Plan (QAP) will act as the quality assurance program that will be followed during a corrective action. The QAP lays out the technical approach that will be followed including a description of the corrective action process, reporting requirements, and assessment strategy that will be followed.

Section 3.0 presents the Data Management Plan (DMP) and describes management objectives related to data control. A records retention program is presented that describes the type of data that will be developed during a corrective action and basic infrastructure that will be required to support documentation and archiving of the corrective action process.

Section 4.0 contains the site-specific health and safety plan (SSHASP) that will be followed under the corrective action process. The section describes the types of health and safety procedures that will be implemented, Facility personnel who will be involved in health and safety, and the roles of contractors and subcontractors. The health and safety plan is also intended to lay out personnel training and medical surveillance requirements that will be required. Important guidelines related to hazard recognition and analysis is presented in this section. A description of the personal protective equipment, levels of protection, ands decontamination are also contained in Section 4.0. The general aspects of emergency and contingency planning are included in this section.

Section 5.0 presents the Community Relations Plan (CRP). Specific details are provided, including community relations objectives and community-related actions that will be taken under the corrective action process, and the mechanism for ensuring public input into the process.

Section 6.0 describes the corrective action Project Management Plan (PMP) and technical approach that will be followed. It includes a discussion of schedule, budget, key corrective action personnel, and reporting. Also included is a description of key personnel qualifications for performing or directing the corrective action process and field investigations, including contractor personnel. This PMP also describes the overall management approach to the investigation.

When a corrective action process is determined to be required, the Facility will develop a site-specific work plan and implement corrective action based on the work plans that address the released material source, geographic location, potential impacts on the public, potential cumulative risk, and the Action Levels that must be met to complete the corrective action process.

The corrective action process will require that specific investigations be designed and implemented. It will also require certain remedial activities be conducted as well as environmental monitoring. While the specific activities cannot be predicted, this FCAWP will ensure that these activities are seamlessly designed and implemented. The reporting requirements contained in the FCAWP will ensure that NMED and the public are properly informed regarding the technical and administrative aspects of the corrective action process.

Under U. S. Environmental Protection Agency (EPA) requirements, the work scope of the corrective action process under the Resource Conservation Recovery Act (RCRA) involves completing Confirmatory Sampling (CS), Interim Measures (IM), RCRA Facility Investigations (RFI) and Corrective Measures Studies (CMS), and CMS implementation, if appropriate. The CS involves confirming that a material release has occurred. The IM involves implementing temporary measures for limiting the migration of the released materials. The RFI involves comprehensive evaluations and investigations to characterize the nature, extent, and migration rate of the released materials. The RFI also provides important information needed to address cleanup strategy. The purpose of the CMS is to characterize cost-effective and technically viable alternatives for remediating the released materials in a satisfactory manner. Subsequently, a Corrective Measures Implementation (CMI) program will be instituted.

The FCAWP in itself does not constitute the corrective action process. This FCAWP will act as a base document for designing a site-specific investigative and remedial work plans that will be effectively implemented, allow for effective agency consultations, and result in an informed public. The exact steps and schedule for implementing corrective action will be determined at the time a material release occurs.

Several phrases and descriptors should be defined at this time to simplify the terminology that is used throughout this FCAWP. The term "Facility" refers to the Triassic Park Hazardous Waste ~~Treatment, Storage, and~~ Disposal Facility. The term "corrective action site" or "site" will refer to the site within the Facility where the release of a hazardous material has occurred and has affected environmental media such as soils, stream sediments, surface water, groundwater, or ambient air on site or offsite. The term "Action Level" is used extensively throughout this FCAWP. The term is synonymous with "background concentrations" of metals and radionuclides in vadose zone fluids, soils, and groundwater and is further defined in Permit Part 10.0 under Permit Conditions 10.3.1 and 10.3.2 (a), (b), and (c). The Action Levels are presented in Permit Attachment U.

Appendices A and B contain Permit Attachment R and Permit Parts 9.0 and 10.0 for reference. Appendix C contains Standard Operating Procedures that will be used during a corrective action. Appendix D presents the corrective action work schedule as outlined in Permit Parts 9.0 and 10.0 of the permit. Appendix E includes the potential areas at the Facility where a material release could occur.

{{Figure 1.1}}

{{FIGURE 1.2}}

2. Data Collection Quality Assurance Plan

Section 2.0 presents the Facility's Data Collection Quality Assurance Plan. Background information is presented in Section 2.1 that is related to potential future corrective actions at the Facility. Section 2.2 presents the Data Collection Quality Assurance Strategy. Section 2.3 presents the Sampling and Field Measurements Plan, and Section 2.4 presents the Sample Analytical Plan.

2.1 Statement of Purpose and Technical Approach

The approach that will be taken by senior management at the Facility for ensuring data collection quality during a corrective action will be based on the EPA guidance document: Data Quality Objectives (DQO) for Hazardous Waste Site Investigations (QA/G-4HW), (EPA, 2000). The document is specific to hazardous waste site investigation and is based on the guidance and processes presented in other EPA data quality documents including:

- Guidance for the Data Quality Objectives Process (EPA, 1994b)
- Data Quality Objectives Decision Error Feasibility Trials (EPA, 1994c)
- Guidance for Quality Assurance Project Plans (EPA, 1998c)
- Data Quality Evaluation Statistical Toolbox (EPA, 1997)
- SW-846 Sampling Methods (EPA 1998)
- RCRA Waste Sampling Draft Technical Guidance - Planning, Implementation, and Assessment" (EPA 2002)
- Guidance on Choosing a Sampling Design for Environmental Data Collection (EPA, 2002b)

For the corrective action process, the documents above are collectively referred to as the DQO process.

The purpose of the data collection quality assurance plan is to document all monitoring procedures that will be used during the corrective action process given the DQO processes above. Key monitoring procedure elements include sampling, field measurements, and sample analysis that will be conducted at the corrective action site. The purpose of these elements will be to ensure that field decisions are based on good science and statistically valid, defensible, and well documented data.

The design, structure, and implementation of this Quality Assurance Plan (QAP) are required by the Facility's RCRA permit, Attachment R, Facility Corrective Action Work Plan Outline. The objective of the plan is to have in place quality assurance procedures that will be followed by the Facility if the corrective action process is triggered at the Facility. According to Attachment R of the permit, the requirement of preparing a QAP is expressly stated. The QAP must include at a minimum:

- Strategy Section
- Sampling and Field Measurements Section
- Sample Analysis Section

Adequate documentation of work performed under a corrective action process is of high importance. Strict protocols for managing documents and records will add credibility and reliability to reports and documents that will be submitted to NMED and EPA. The Facility's documents will also contain public documents, reports, and correspondence that comprises the Facility's administrative record (AR).

2.2 Quality Assurance Strategy

The information below provides:

- Description of the intended uses of data, level of precision, and accuracy for the uses
- Summary of methods and procedures that will be used to assess precision, accuracy, and data completeness
- Schedule and information to be included in Quality Assurance (QA) reports

2.2.1 Intended Data Uses and Levels of Precision and Accuracy

The information below presents information regarding data uses and levels of precision and accuracy. These aspects will be required to support all phases of the corrective action process.

2.2.1.1 Intended Data Uses

Collecting correct and useable environmental data during a corrective action will allow the Project Manager (PM) to

- Arrive at and support defensible corrective action decisions
- Avoid decision errors
- Determine extent of migration
- Evaluate and implement the appropriate corrective measures
- Verify that remedial Action Levels have been met

These objectives will be accomplished from when a material release is first observed to when CMS implementation has been completed. Such an approach will allow NMED to conclude that the corrective action site has been accurately characterized and that Permit Conditions 9.2 and 10.3 and Permit Attachment U, Action Levels, have been met.

The PM will accomplish this objective by collecting an appropriate suite of data from the potentially affected environmental media. Thus, it will be essential to collect data that is adequate in terms of both quality and quantity. Data collection of this type (DQO Process) will not be instituted during normal operations at the Facility. Separate data collection procedures under normal operations are clearly specified in the Facility's RCRA permit including Part 7.0 of the permit as well as data collection required by the other Facility permits. Statistical analysis of the collected data will be accomplished under the requirements of Permit Attachment Q.

During a corrective action, environmental data will be collected during the following field-related phases of the corrective action:

- Confirmatory sampling
- RCRA facility investigation work plan implementation
- Interim measures work plan implementation
- Corrective measures study work plan implementation

2.2.1.2 Data Collection and Evaluation Approach

Throughout the corrective action process, data collection will be required to support remedial action decisions. Data collection will be undertaken to provide data for a number of reasons. The data will be used to further define the extent of migration of the released materials. Data collection will also be required to characterize the chemical and physical aspects of the environmental fate and transport of the released materials and potential risks. At the end of the corrective action process, data collection will be needed for verifying that remedial objectives (Permit Attachment U, Action Levels) have been achieved.

The data will be evaluated for usability in context of the corrective action decisions to be made. Then, the DQO process will be used to identify significant data gaps, if any. If such gaps are identified, the gaps will be filled with additional sampling and analysis.

Acceptable decision errors will be quantitatively developed and will consider the consequences of making an incorrect field decision based on the data. Based on the analysis of data, the probability limits on decision errors will be determined. The probability limits will specify the level of confidence the PM requires in conclusions he will draw from the corrective action data. The actual determination of the probability limits will be based on the methodology contained in EPA's Data Quality Objectives

Process for Hazardous Waste Site Investigations, EPA QA/G-4HW, EPA/600/R-00/007, January 2000, Chapter 6.0. If unacceptable decision errors are identified, then the possible sources of the error (sampling design and/or measurement error) will be evaluated to determine how the total study error can be reduced. After the possible sources of error have been resolved, then the determination of the probability limits will be recalculated to confirm that the probability limits have been met.

Site-specific sampling and analytical plans (SAPs) (Sections 2.3 and 2.4 below) will be developed as part of the RFIWP and available site characterization information will be reviewed to identify Constituents of Potential Concern (COPCs) and transport pathways at the site. Data requirements will be identified and a plan for collecting the needed data developed. Data will be collected through the implementation of integrated SAPs contributing to multiple analyses, including site investigations and long-term monitoring plans. The PM will follow the DQO process defined by EPA (EPA 1994) to ensure that the data collected for each decision is appropriate and provides adequate information for decision making.

The manner in which collected environmental data will be summarized and used in decision-making will also be detailed in the RFIWP. When possible, quantitative limits of acceptable decision errors will be specified. The consequences of making an incorrect decision will be considered. Based on this analysis of consequences, a statement of the quality objectives in quantitative terms (e.g., limits on decision errors) will be provided. If there is no basis for establishing quantitative criteria, sample analysis planning will specify investigation objectives qualitatively.

Filtered water samples may be collected during site characterization (in addition to unfiltered samples) to assess released material fate and transport. Filtered groundwater samples will be obtained for inorganic analysis to address one or more of the following categories that may apply:

- Metals or suspected COPCs (New Mexico Water Quality Control Commission standards based on filtered samples for these chemicals are lower than EPA maximum concentration levels).
- Aquatic life-based criteria (which are based on filtered-water samples) will be needed to perform a risk assessment.

Sample Location and Frequency

Specific sample planning will be included in the RFIWP is developed and will incorporate the following sample location and frequency information:

- Number, or frequency of collection, for each type of sample (e.g., grab, integrated) to be collected
- Sampling network design (e.g., rectangular or triangular grid, stratification) and the assumptions underlying the design
- Approximate locations of sampling points
- Techniques and/or guidelines to be followed in selecting sampling points using field measurement methods (as applicable), a description of or reference to the measurement technique/method to be used, and a description of how field screening results are to be used
- All administrative procedures and SOPs that will be used to carry out the work

Sample Designation

All corrective action samples will receive unique sample identification numbers, and all sample locations will receive unique sample location descriptions. Sample splits receiving different treatment (e.g., filtered and unfiltered splits of water samples) will receive separate sample identifications. This numbering system will ensure that all information required for identifying and tracking samples is readily accessible and unique to each sample. It will also provide a tracking capability that facilitates data retrieval.

2.2.1.3 Field Measurements

Field measurements will be utilized to bias the locations of samples, for determining the number of samples needed for proper site characterization, or to provide a preliminary assessment of nature and extent of contamination. If it is decided to use field measurements for guiding fixed laboratory sampling locations and to support site decisions, correlation to laboratory measurements will be verified statistically.

2.2.1.4 Data Quality Assessment

After data collection is completed, corrective action data will be compared against DQO specifications to determine if the data meets the requirements expressed in the DQO specifications. This process, called Data Quality Assessment (DQA), will include determining if newly collected data are appropriate and adequate for making decisions and if the structure of the conceptual model (Figure 6.3) is valid and appropriate. If the quantity of newly collected data is not sufficient to make the decision, more data collection will be conducted.

2.2.2 Precision, Accuracy, and Completeness Procedures

Analytical methods for a corrective action investigation (CS, RFI, and CMS) will be comparable to Permit Attachment F Tables 4-1 and 4-3. Analytical **precision** and **accuracy** values will be specific to the laboratories that will be used, but will be based on the governing analytical methods as noted in the table.

Accuracy will be presented as percentage recovery (%R) and precision will be expressed as Relative Percent Difference (RPD). Accuracy will be a measure of the bias in the analytical program and will be determined as the Percent Recovery of spiked samples. Precision will be considered a measure of data variability that is attributable to both sampling and/or chemical analysis. The actual determination of accuracy and precision under the corrective action process will be based on the calculations presented in Permit Attachment F, Section 4.7.2.4 and will be performed by the laboratory.

Practical Quantitation Limits (PQLs) for each method will be as established by the laboratories. The lab PQL values will be developed by the laboratory to reflect laboratory conditions as represented in future approved subcontract documentation. The PQL values will be included in the RFIWP. Actual accuracy and precision values will be specifically developed and included in the RFI final report.

Representativeness will be ensured through the use of consistent methods in the acquisition, identification, handling, packaging, shipment, receipt, and analysis of samples.

Comparability refers to the relative confidence with which one data set can be compared to another. The number of different matrices that are sampled and the range of field conditions encountered are considered in determining comparability. Comparability is achieved by using standard methods for sampling and analysis, by reporting data in standard units, by normalizing results to standard conditions, and by using standardized, comprehensive reporting formats. Field documentation that is completed using standardized data collection forms, bound logbooks, or other appropriate means supports the assessment of comparability. Analysis of performance evaluation (PE) samples and reports from systems audits may also be used to provide additional information for assessing the comparability of analytical data. Historical comparability will be achieved through the use of consistent field sampling procedures, analytical methods, data verification and validation procedures, and data and records management practices throughout the corrective action process.

2.2.3 Quality Assurance Reports

The information below presents how measurement data will be evaluated for quality and the performance and system auditing process that will be involved. The objective will be to report the results of the periodic QA/QC analysis described in Section 2.2.2 to NMED. Reporting the results of performance and system audits are also discussed below.

2.2.3.1 Periodic Assessment of Measurement Data

During a corrective action program, each laboratory data package will be validated, as described in Section 2.4.6. The results of the data validation will be documented in a Quality Control Summary Report (QCSR). One QCSR will be generated for each distinct sampling event. The QCSRs will briefly summarize the Quality Assurance/Quality Control (QA/QC) program, data quality, any deviations from site-specific plans, and data usability.

2.2.3.2 Performance and System Audits

Laboratory system and performance audits will be performed at the discretion of the PM or upon request by NMED. System audits will be conducted at a minimum of once per year or any time a new laboratory is contracted to a corrective action process. The audit report will be submitted to NMED within 30 days of the audit completion date and will be presented in standard EPA system audit reporting format.

Other conditions that may prompt consideration of a system audit include:

- Delays in resolution of (or inadequate responses to) project-related corrective actions
- Analytical data quality concerns arising from the data validation process
- Notification of laboratory staffing changes or other business issues that could impact the quality of the analyses performed and resulting data

In addition to laboratory audits, performance audits will also be conducted. Performance audits will be conducted at least once per corrective action program at the discretion of the PM or upon request by NMED. The bullet items listed above could also prompt consideration of a performance audit. Performance

audits will include the purchase of certified matrix-specific Performance Evaluation (PE) samples. The PE samples would be spiked with representative site contaminants at appropriate site-specific action levels and submitted blind to the laboratory at the beginning of a distinct field analytical program. The PE sample analytical results would then be compared immediately against the PE sample vendor's documented acceptable control limits. If non-conformances are observed, field analysis will be halted immediately. Then a corrective action report would be issued and the problem investigated and satisfactorily resolved with the active participation of the analytical laboratory and the project chemist. As part of the resolution, the laboratory must complete its own corrective action investigation in compliance with its approved laboratory quality assurance plan. Corrective action effectiveness would be verified by the analysis of a second PE sample.

PE audit report results will be provided to NMED within 30 days of the PM's receipt of the PE analytical results. The audit report will be presented in standard EPA PE reporting format.

Conditions prompting consideration of such audits may include: 1) delays in resolution of (or inadequate responses to) project-related issues; 2) analytical data quality concerns arising from the data validation process described in Section 2.4.6 of this QAP; 3) notification of data quality issues from NMED; or 4) notification of staffing changes or other business issues that could impact the quality of the analyses performed and resulting data.

2.2.3.3 Field Laboratory PE Audits

If the Facility's field laboratory is involved in the corrective action investigation, the PM will arrange for five certified soil and 5 water PE samples will be purchased and submitted blind to the field laboratory at the beginning of the field analytical program. These samples will be spiked with representative site contaminants, above the Action Levels contained in Permit Attachment U. At least 4 of the PE samples will be submitted during the first week of onsite corrective action (with at least one submitted on the first day) in order to permit assessment of whether or note the field laboratory is functioning within acceptable control limits. PE sample results will be compared immediately against the PE sample vendor's documented acceptable control limits. If non-conformances are observed, field analysis will be halted immediately; a corrective action request will be issued to the laboratory by the PM and the issue investigated and resolved. Results of PE analysis will be reported promptly using the DCQCR process. Confirmatory analysis of a second set of PE samples will be conducted to verify the problem has been resolved.

2.2.3.4 Fixed Laboratories - PE Audits

Eight blind PE samples will be acquired by the PM and he will submit them for analysis during the corrective action process. PE samples will be obtained and analyzed annually. Eight samples will be obtained and will contain varying levels of randomly selected inorganics and radionuclides based on Permit Attachment K. Two of the eight samples will also contain organics including benzene, toluene, ethylbenzene, and xylene (BTEX) based on Permit Attachment K. Spiked concentrations for both inorganics and organics will vary but will be greater than the Action Levels contained in Permit Attachment U.

The xylene spike may represent total xylenes or may be a single isomer, at the discretion of the PE sample vendor. Spike concentrations will be independently verified by the PE sample vendor prior to submittal. All PE samples will be provided in vials by the analytical laboratory and will be designated for analysis by EPA method 8260. One of the BTEX/released material samples will be submitted with the samples from the first round of samples. The others will be held and submitted with the first round of monitoring well samples. If groundwater monitoring well sampling and analysis is not scheduled, then both of the BTEX PE samples will be analyzed along with the surface water.

If review of analytical data indicates the failure of a PE sample, a corrective action request will be issued by the PM and the issue investigated and satisfactorily resolved with the active participation of the analytical

laboratory and NMED. As part of the resolution, the laboratory must complete its own corrective action investigation in compliance with its approved Laboratory Quality Assurance Plan. Corrective action effectiveness will be verified by the analysis of a second PE sample.

2.2.3.5 Resolution of Significant Quality Assurance Problems

If significant quality assurance problems occur during the corrective action process, they will likely be related to the reported chemical and physical characteristics of the waste materials generated under a corrective action. Both major and minor discrepancies could arise. Permit Attachment F, Section 4.3.3, Representative Sample Assessment, discusses how major discrepancies will be resolved under normal operations. This same approach would be utilized under a corrective action. The types of major discrepancies listed in Permit Attachment F include:

- Analytical results indicating that incorrect waste codes were applied to the waste stream.
- Analytical results indicating incorrect information was included on the LDR notification form for the generated waste.
- Chemical constituents and hazardous characteristics of a generated waste are not understood given a detailed description of corrective action processes.
- Information from field logs suggesting that the waste stream was not correctly characterized.

If a major quality assurance problem occurs and it is not clear which discrepancy criteria above applies, the PM will arrange for the waste materials to be re-analyzed. An internal meeting involving the PM, lab specialist, fixed laboratory manager, and NMED will be conducted to identify possible deficiencies in the analytical regime. The re-analysis will be consistent with the SW-846, Chapter 9.0. Updated waste characterization information as required in Permit Attachment F, Section 4.3.1 (normal operations), will be resubmitted to the PM. Reporting the results of significant QA problems and the method for resolving the problems will be included in the monthly corrective action progress reports that will be provided to NMED (Section 6.6.1).

2.3 Sampling and Field Measurements PLAN

2.3.1 Objectives

As part of the corrective action process, the PM will undertake a sampling and field measurements program to characterize the material release. Efforts will also be made to conduct verification sampling for demonstrating that a corrective action was effective as an interim or a final remedial action. All sampling will be conducted based on the SOP for sample collection contained in Appendix C.

Sampling and analysis options will be considered and incorporated into the RFIWP, Interim Measures Work Plan (IMWP), and Corrective Measures Study Work Plan (CMSWP). Sampling and analytical options that meet the requirements of Permits Attachments F and R and are the most cost effective and expected to meet work plan specifications will be selected. Selecting a particular sampling design will define the type and number of samples required (EPA 2002b). Specific sampling locations and/or frequency of sample collection will be selected along with sample acquisition methods, measurement methods, and other procedures used to collect and analyze samples.

Possible data quality concerns will be identified for each type of measurement to be made based on the intended uses of the data (Section 2.2.1.1) and foreseeable consequences of errors resulting from incorrectly interpreted measurements. Data quality concerns may include, but may not be limited to, the following:

- Collecting an adequate number of samples to support the decision
- Selecting sample locations that adequately define the nature and extent of contamination
- Selecting measurement techniques and methods that are selective, sensitive, and precise enough to distinguish target analyte concentrations from pre-specified Action Levels
- Collecting samples representative of the environmental media of interest
- Maintaining the desired degree of data comparability to allow statistically valid evaluation or pooling of the data

2.3.2 Selection of Sampling and Field Measurement Locations

For each corrective action program, a sampling strategy will be developed that is both regulatorily and scientifically defensible. The objective will be to evaluate the shallow soil and vadose zone (0-30 feet) below the site with test pits, trenches, boreholes, and monitoring wells. Based on this objective, a sampling strategy based on sound statistical concepts extracted from EPA's "Guidance on Choosing a Sampling Design for Environmental Data Collection" (EPA, 2002b), and the nature and scope of the corrective action will be developed and implemented.

Therefore, the following approach will be utilized for determining sample quantity and type with regard to the sampling strategies above:

- If little or no information is available concerning the distribution of a released material, simple random sampling is the most appropriate sampling strategy for the sample location.
- As more information is accumulated for the contaminants of concern, judgmental, stratified random sampling, systematic random sampling, and authoritative sampling may be implemented.
- If a considerable quantity of information is accumulated or there are only certain locations that can be sampled, then biased sampling may be implemented.

The conditions under which samples will be collected will be made depend on the nature and severity of the release. If a release occurs and it is believed that the impacted media is extensive and/or that the concentrations of COPCs exceed regulatory criteria, then sampling and/or field measurement will be conducted.

The specific field or laboratory parameters to be measured will depend on the nature of the material released. The parameters to be measured will be representative of the material released.

The number of samples collected during a corrective action will be based on sound statistical concepts, as well as the nature and scope of the corrective action. Collected samples of water and soils will be representative of the contaminants and matrix within the impacted area (laterally and vertically). An adequate number of samples (in no case less than four) will be collected to represent the variability of the contaminants within the impacted media. Additionally, samples will be collected at a frequency adequate to characterize the long-term or seasonal variability to the extent that it is appropriate for the particular corrective action program. Samples will also be collected at every major phase of the corrective action process. For example, if the media of concern is soils, samples will be collected initially to establish baseline conditions and then collected after a removal action to demonstrate the effectiveness of a remedial action. In all cases (especially surface water and groundwater), samples will be collected at a certain frequency until it can be demonstrated that COPC concentrations are stable and below the Action Levels (Permit Attachment U). In the case of

groundwater, the desired number of samples may be limited to available monitoring wells; a minimum of one sample per applicable well will be sampled.

In addition to the type, frequency, and number of field samples and/or measurements that will be made, the SAP is intended to document the type and number of QA/QC samples to be collected in the field. QA/QC samples will be used for providing information about variance (regardless of source) and/or bias during data assessment. Examples of field QA/QC samples include field blanks, field duplicates or composited duplicate samples, and equipment rinsates. Section 2.3.5 presents additional QA/QC details.

The statistical approach that will be used for sampling design (sample size and number of sample will be based on EPA 2002b, Chapters 3 - 9. Specific guidance is provided in Chapter 3 that outlines the steps in the sampling design process which are:

- Review the systematic planning outputs
- Develop general sampling design alternatives
- Formulate mathematical expressions for the performance and cost of each design alternative
- Determine the sample size that satisfies the performance criteria and constraints
- **Choosing the most resource-effective design**
- Documenting the design in the QA project plan

The bolded item above will act as the basis for determining the number of samples that will be collected during a corrective action. Depending on the phase of the corrective action process (initial notification, CS, RFI, and CMS implementation), the guidance document recommends specific sampling designs:

- Judgmental sampling
- Systematic sampling
- Grid sampling
- Composite sampling
- Ranked set sampling
- Stratified sampling
- Adaptive cluster sampling
- Random sampling

Given the corrective action sampling phases and sample designs above, the following sampling designs will be implemented at the site under each corrective action phase:

- Performing initial screening (initial notification) – **judgmental sampling**
- Developing an understanding of when and where contamination is present (CS and IM) – **Systematic sampling and grid sampling**
- Delineating the boundaries of an area of contamination (RFI) – **Adaptive cluster sampling**
- Identifying areas having the highest contaminant levels (RFI) – **Adaptive cluster sampling**

- Developing an understanding of when and where contamination is present (CMS implementation) – **Systematic sampling and grid sampling**

The statistical approach for determining how many samples will collected under each sample design is contained in the guidance. The methodology for determining number of initial screening samples (judgmental sampling) is described in Chapter 4 of the guidance. Systematic and grid sampling methodology is described in Chapter 7 of the guidance. Adaptive cluster sampling methodology is described in Chapter 9 of the guidance.

The types of samples collected will depend on the nature of the release and the media of concern. Samples will be collected either as composite or grab samples. The decision to collect composite or grab samples at individual stations will be based on the matrix and situation where large numbers of samples may need to be collected and the subsequent compositing of the samples adequately characterizes a small sample area. Permit Attachment F, Section 4.6.4, discusses Samples Types under normal Facility operations. These criteria will also be used for sampling under a corrective action process. Composite sampling is considered an acceptable method for collecting individual samples where the sample area consists of a homogeneous material. As referenced in Attachment F, composite samples will be used to collect wastewater and soil. Grab samples will be collected for non-wastewater (surface and groundwater) and heterogeneous wastes or soils.

2.3.3 Sample Collection

Sample collection methods will be selected and presented in the RFIWP and will be designed to preserve sample integrity and to ensure that the samples adequately represent the environmental media. Considerations for selecting sampling methods will include:

- Environmental media to be sampled
- Portion of the environmental medium to be represented by the samples (e.g., 0 to 12-inch depth of entire site)
- Descriptions of how the materials collected at each sampling point will be partitioned for analysis
- Types of samples needed in the sample collection design
- Types of analyses to be performed on the samples and any special sampling tools or method required by the analytical methods
- Volume of each sample necessary to satisfy all analysis requirements
- Size and type of sampling equipment appropriate for collecting the desired samples; decontamination activities that must be performed on non-disposable sampling equipment prior to and between uses
- Classification of all measurements as critical
- Constraints on the sampling events that could affect the projected time or costs

Special consideration will be given to the collection of samples for Volatile Organic Compound (VOC) analysis for maintaining sample integrity and minimizing analyte loss through sampling, containerization, extraction, and analytical procedures. For site sampling, the corrective action process will follow the sampling and preservation methods recommended in EPA SW-S46 Method 5035 (EPA 1998) as modified in "Technical Guidance on EPA SW-846 Method 5035 Sampling" (Environmental Restoration Project 2000).

The appropriate method of obtaining soil samples for site characterization will be to collect discrete composite samples by depth intervals. Composite sampling will be conducted following the guidance in Section III.B.I.a of NMED 1998.

2.3.4 Standard Operating Procedures for Sampling

The SAP specific to the site and contained in the RFIWP will spell out the specific details of the conceptual sampling and analysis requirements contained in Sections 2.3 and 2.4 this FCAWP. Standard Operating Procedures (SOPs) will be included in the RFIWP and used for conducting the actual sampling. The SOPs will be utilized for collecting samples from various environmental media at the Facility. SOPs that are provided with this FCAWP include:

- Surface water sampling
- Groundwater sampling
- Soil gas sampling
- Field equipment and calibration
- Surface water flow measurements
- Trenching and test pit excavation
- Soils sampling
- Drilling methods
- Monitoring well design and installation
- Monitoring well development

Most of the SOPs are straightforward, but the trenching and test pit excavation SOP requires some explanation. Such excavation accomplishes the following: 1) Permit the in situ condition of the ground to be examined in detail both laterally and vertically; 2) Provide access for taking samples and for performing in situ tests; and 3) Provide a means of determining the orientation of discontinuities in the ground. Appendix C presents the SOPs described herein. The SOP for operation and calibration of field equipment contained in Appendix C will be updated once the equipment has been purchased.

2.3.5 Field Sampling Quality Assurance/Quality Control

Based on Permit Attachment F, Section 4.6.5.3, Field Sampling QC procedures (for normal Facility operations), the PM will utilize these procedures under the corrective action process as well. The objective is to collect blank and duplicate samples during all phases of the corrective action process to confirm that sample collection and handling procedures meet QA/QC requirements.

The QA/QC sampling and testing frequency described in Permit Attachment F, Section 4.7.2.3, will be used under the corrective action process as well. As such, laboratory duplicates, spiked samples, method/reagent blanks, laboratory equipment blanks, quality control sample will be obtained or collected, then analyzed.

2.3.6 Contamination Prevention

The information below presents sampling equipment, sampling procedures, and contamination prevention procedures.

2.3.6.1 Sampling Equipment and Procedures

Only equipment that is maintained and calibrated in accordance with the manufacturer's recommendations or in accordance with equal or more stringent standards will be used for sampling.

2.3.6.2 Contamination Prevention Procedures

Non-disposable sampling equipment will be decontaminated following appropriate EPA guidance in SW-846 (EPA 1998). Disposable sampling equipment will be disposed as a solid waste in accordance with local solid waste disposal guidelines and regulations.

2.3.7 Documenting Field Sampling Operations and Procedures

The primary methods for documenting field sampling activities will be the same as the format contained in Permit Attachment F, Section 4.6.5.7, Documentation of Sampling Activities under normal operations. Sampling activities that will be documented include observations and field procedures and will be recorded on pre-printed forms and filed at the Facility. The specific record of information that will be recorded is also presented in Permit Attachment F Section 4.6.5.7.

These methods will include the use of bound field logbooks, daily chemical quality control reports (DCQCRs), borehole/well installation logs, and the creation of photographic (35mm and/or digital) records. In addition, Section 2.3.7.4 below describes methods for documenting, processing, approving, and distributing Field Change Requests (FCRs) in response to unanticipated field conditions or other unforeseen sampling circumstances.

2.3.7.1 Field Logbooks

Permanently bound, sequentially paginated field logbooks shall be used to document all phases of the field investigation, with the exceptions noted below.

All logbook entries will be written legibly with indelible black or blue ink. The cover or first page of the logbook will be permanently labeled with all information necessary to trace the logbook to the corrective action, including the project name, equipment numbers, camera serial number (if used to document 35mm or digital photography), and the individual specifically assigned custody and responsibilities for logbook completion. All entries will be signed and dated at the completion of each workday. If field logbook custody is transferred to another field team member, the first and last entry by the new custodian will be signed and dated. Logbook entries that are out of chronological sequence due to an oversight shall be noted as such.

Logbook entries will be factual, detailed, and objective. Recordable information will include the following items:

- General observations of field work
- Equipment identification, calibration details, or readings
- Field calculations
- Weather conditions
- Names and organizational affiliations of site visitors
- Notes from field meetings
- Details of telephone/radio conversations

- Maps or sketches, which should include north arrows, location data (GPS coordinates), or dimensions as appropriate

Information provided or documented by other means may be incorporated by references to control numbers, designators, or document titles; at a minimum such references include the following:

- Borehole/well installation logs as described below in Section 2.3.7.2.
- Activity-specific DCQCR
- FCR as shown in Section 2.3.7.4

Pages will not be removed from the logbooks. Corrections to field logbook entries will be made by single lines drawn through the revised text sections and initialed and dated; use of whiteout or correction tape will not be done. Every effort will be made to protect the integrity of the information contained in field logbooks from inclement weather and other field conditions by the use of protective covers, aluminum engineering notebooks, vehicles or trailers, portable files or other appropriate means. Logbook entries will be copied on at least a weekly basis and kept on file for retention by the Document Control Officer (DCO).

2.3.7.2 Borehole/Well Installation Logs

As will be noted in the RFIWP, preliminary borehole logs and well construction diagrams shall be drafted in the field and reviewed by the PM. Revisions to the logs will be completed by the PM or his designee and finalized logs will be computerized and filed by the DCO.

2.3.7.3 Photographic Records

Photographic records of collected water and soil samples acquired will be made as described in the RFIWP. Photographic records may also be requested by the PM to support the description of physical features recorded in the field log. Photographic records will be acquired using 35mm and/or digital cameras. A separate bound photo logbook shall be assigned by the PM to each camera for recording the photographer's name, subject matter, sample identification number, interval, and other pertinent information for each image. An engineer's scale or tape and standard Munsell/Geological Society of America (GSA) soil or rock color reference charts shall be included in any photographs taken of rock core or soil. Any wasted frames or images in a roll of film or sequence of digital images shall be so noted in the field logbook. The photo logbooks will be copied on at least a weekly basis and kept on file for retention by the Document Control Officer (DCO).

Photographic records using film will use 35mm slides for ease of conversion to electronic .jpeg files. The original slides will be retained in the project records, along with the backup copies of the associated field and photo logbook entries. The 35mm slides will be converted to the digital format (.jpeg). One printed copy plus backup diskette or recordable compact disk will be retained as project records along with the backup copies of the associated field and photo logbook entries.

2.3.7.4 Field Change Requests

Due to conditions encountered in field operations, unanticipated or unexpected situations may arise that shall require deviations from or modifications to the requirements of the planning documents such as the SAP that will be included in the RFIWP. Modifications or deviations will be planned using the FCR process as described in this section. All FCRs will require approval by the PM or his designee. In some circumstances, approval or concurrence by NMED may also be required.

- The FCR shall be assigned a unique control number by the PM, who shall maintain a log of all FCRs generated for the project. The requestor of the FCR shall be identified and the FCR completed as described below.
    - Task or Activity Description: The task or activity affected by the proposed FCR will be identified.
    - Affected Plan or Procedures: The affected work plan component(s) (e.g., RFIWP, IMWP, and CMSWP) shall be identified by name, revision level, page, and paragraph.
    - Requested Variation: The requested change or modification will be described in all necessary detail.
    - Justification: A succinct technical justification for the proposed change will be provided, along with estimates of potential schedule or cost impacts that may be associated with it.
    - Comments: Additional comments related to the FCR may be made by the requestor.
- The completed FCR shall be transmitted to the PM for review and approval. All comments shall be resolved and documented in an update to the FCR as required. If the FCR is accepted by the PM, it shall be transmitted via e-mail to NMED for approval.
- Upon receipt of all necessary approvals, an electronic copy shall be disseminated by the PM to the field team for implementation. A copy shall also be filed in the corrective action records.

2.3.7.5 RFIWP Change Control

Project scope and schedule changes may be initiated by NMED or the PM that may prompt changes in the governing corrective action contracts or the RFIWP. All changes involving the wording of the contracts or the RFIWP shall be approved or accepted by both PM and NMED. Subsequent changes to any documents shall be approved by the PM and NMED. Any changes that delay or revise the corrective action schedule, create potential stakeholder issues, or revise the technical content of the RFIWP will be presented to NMED for review or concurrence.

2.3.7.6 Sample Identification and Labeling

Each sample collected will be assigned a unique alphanumeric identifier code by the field team to track samples through all phases of the project. The numbering system will allow project personnel to easily catalog all samples collected and will provide an accurate and efficient means for database manipulation after the field investigation is completed. Sample identifiers will be unique as identified in Permit Attachment F and will be based on the environmental media being sampled and the site location.

Samples will be tracked using a sample label that includes the information below.

- Project name and number
- Sample designation (number)
- Date and time of sample collection
- Initials of the sampler
- Analyses to be performed on the sample

- Preservative used, if any

Labels will be firmly affixed to the sample containers to prevent accidental removal.

As referenced in Permit Attachment F, Section 4.6.5.7, quality assurance samples will also be identified with a "Q" followed by a letter indicating if the samples is a duplicate (D), equipment rinsate blank (E), field blank (FB), or spiked sample (S).

Another objective of the sample identification scheme is to ensure that samples are not identifiable to the laboratory and that it is not possible to distinguish between samples, for example, a sample blank or a field sample should not be distinguishable.

2.3.7.7 Field Log Sheets

When corrective action is in progress, the corrective action team will utilize pre-developed field log sheets for data gathering. For example, the Monitoring Well Field Log – Evacuation and Recovery form contained in Permit Attachment R, Appendix 1, will be used for recording monitoring well data. Field log sheets will be developed for other types of environmental sampling, including surface water sampling and flow measurements, soil gas monitoring, trenching and test pitting, field equipment operations and calibration, soil sampling, and monitoring well development.

2.3.8 Selecting Appropriate Sample Containers

Permit Attachment F, Waste Analysis Plan, Table 4-7, contains a description of sample container guidelines for samples that will be taken to identify wastes that will be received at the Facility under normal operations. The container selection procedures contained in Permit Attachment F will also apply to water and solid samples collected under a corrective action. Depending on the sample matrix (water or solids) and the constituents of concern (inorganics and organics), amber glass, glass vials, polyethylene, and wide-mouthed glass jars will be utilized. If modifications regarding container type are required, then alternative container utilization will be employed after consultation with SW-846 requirements.

2.3.9 Sample Preservation

Permit Attachment F also contains a description of sample preservation, volumes, and holding guidelines for samples that will be taken to identify wastes that will be received at the Facility under normal operations. The sample preservation procedures contained in Permit Attachment F will also apply to water and solid samples collected under a corrective action. Depending on the sample matrix (water or solids) and the constituents of concern (inorganics and organics), a specific preservative (nitric acid, sulfuric acid, or sodium hydroxide) will be added to each sample or refrigerated to 4 degrees Centrigrade. Samples requiring dissolved metals analysis will be field-filtered prior to sample preservation.

2.3.10 Chain-of-Custody Control

In order to provide defensibility of corrective action sample data, CoC forms control requirements will be implemented. The purpose of the CoC forms is to provide an official record that verifies the disposition of the samples from the point when the samples are collected to when the samples are received at the analytical laboratory. CoC forms will be initialed at the time of sample collection by the field technician and will remain active until final disposition of the sample. All corrective action samples will be shipped in accordance with U.S. Department of Transportation (DOT) regulations (49 CFR Parts 171-173) to the analytical laboratory referenced in the RFIWP. Each CoC form will be prepared at the Facility with colored copies retained at the Facility and managed by the Document Control Officer at the Records Retention Office.

The CoC procedures presented below in Section 2.4.1 assume that either an outside (fixed) or the Facility's field laboratory will be used for analyzing all samples collected during the corrective action. Depending on the nature of the corrective action, NMED and the PM may conclude that the analysis can be performed at the Facility's field laboratory. An example would be if the scope of the corrective action is small and an initial laboratory performance and systems audit conducted by the PM or his designee concludes that proper QA/QC procedures will be met. If NMED and the PM determine that onsite analysis is acceptable, the CoC procedures will still apply.

2.3.11 Contaminant Material Disposal

The corrective action process may generate several different waste streams. The following list contains contaminated materials expected to be generated over all phases of the corrective action:

- Recovered soils
- Groundwater from monitoring well development and sampling
- Surface water samples
- Wastewater (cons) from treatment
- Wash and rinse water from personnel and equipment decontamination
- Expired laboratory water and soil samples

Each material will be fully characterized consistent with the requirements contained in Permit Attachment F, Tables 4-1 and 4-3. The purpose of the characterization will be to determine how the materials will be managed. Based on the analytical results and in accordance with Facility permits, the materials will be landfilled or stabilized in the Facility process onsite, if feasible, or managed offsite. In all cases, treatment, storage, disposal, or discharge of the materials will be conducted in accordance with federal, state, and local regulations.

2.4 Sample Analytical Plan

The sample analytical plan herein builds on the SAP information presented earlier in Section 2.3.4 and presents the specific analytical procedures that will be followed under the corrective action process. Included are procedures for completing CoC forms, as well as sample storage, preparation, and analysis. Also described are procedures regarding sampling equipment calibration procedures, and calibration frequency. Information is included for data reduction, validation, and reporting.

Repeated references are made below to Permit Attachment F, Waste Analysis Plan. Since the water and solids samples collected under both normal operations and a corrective action are expected to be chemically and physically similar, the PM will utilize the analytical methodologies contained in Permit Attachment F under both scenarios. During a corrective action, modifications to the procedures below could be required, from time to time, based on sample matrix or unforeseen physical or chemical attributes. The SW-846 manual will be consulted, as required, to ensure that any such modifications are based on previously established protocols. NMED will be consulted to seek approval of any such modifications.

2.4.1 Chain-of-Custody Procedures

Sample custody will be maintained by a CoC record. The custody record will be completed by the individual collecting the sample. CoC records will be completed for all samples. The following CoC procedures will be used:

- A sample will be considered under proper custody if any of the following conditions are met.
  - It is in actual possession of the responsible person.
  - It is in view, following physical possession.
  - It is in the possession of a responsible person and is locked or sealed to prevent tampering.
  - It is in a secure area.

- The CoC is a continuously maintained custody record that travels with the samples at all times.
- The CoC must always include the following items.
  - Corporate name
  - Sampler name and signature
  - The site designation
  - Sample designations
  - Sampling date
  - Sample collection times
  - Analyses to be performed on the samples
  - Number of containers submitted for each sample set

- The person(s) collecting the samples must sign the CoC in the appropriate block at the end of the sampling day.
- Labels on sample containers should be checked against the CoC to make sure there are no discrepancies. If an error is found on a label or the CoC, it should be lined through once, in ink, so the initial entry can still be read. The correction should then be made in ink and initialed by the person making it.
- The person responsible for shipping the samples must perform the following tasks.
  - Sign the topmost "relinquished by" block
  - Fill in the shipping date and time
  - Tally the number of sample containers
  - Note the shipping bill number
  - Record the storage time and temperature (if applicable)

The remainder of the CoC form must be placed inside the shipping container prior to being sealed for shipment. When samples are held at the project site overnight or longer, the comparison check described above should be made again by the person responsible for shipping the samples.

A copy of the CoC must be retained for return to the project office together with a copy of the shipping bill.

2.4.1.1 Sample Shipping and C-o-C Information Verification

At the conclusion of sampling, samples will be prepared for shipment to the analytical laboratory the following day. Sample shipping schedules should not include delays at an intermediate airport over a weekend. Each ice chest should contain one clearly labeled temperature blank consisting of tap water in a small plastic bottle.

A sample shipping notebook will be kept at the site by the PM. This notebook is a permanent record of the samples stored or shipped from the site. All notebook entries will be initialed. When preparing samples for shipment, record in the sample shipping notebook the following items:

- Time
- Date
- Sample numbers
- Laboratory to which they are being shipped

When preparing stored samples for shipping, the cooler will be repacked with fresh gel ice and the temperature will be checked and recorded on the CoC and in the sample shipping notebook. The temperature inside the cooler shall be checked by opening one of the temperature blanks and inserting the thermometer in the water after the temperature blank has been in the cooler long enough to be at the same temperature as the cooler.

Samples will be packaged and shipped using procedures described below. To the extent practical, samples will be shipped to the project laboratories the day after they are collected.

Shipping Supplies

The items listed below are needed for packing and shipping samples.

- Ice chest(s)
- Gel ice or equivalent (8 to 10 pounds per ice chest)
- Bubble wrap bags
- Packing material
- Address labels
- Strapping tape
- Temperature blank
- Shipping bill
- Custody seals
- Large zippered freezer bags

Sample Packing

- Check all container labels against the CoC to make sure there are no discrepancies and both the labels and the CoC are complete and legible.
- Count the containers to make sure the number is recorded correctly on the CoC.
- Make sure all bottle caps are tightly secured.
- If any samples were handled or treated in an unusual manner, make sure this is noted on both the sample and the CoC.
- Sample Placement:

  - One-liter bottles shall be placed upright in the ice chest, not stacked.
  - Plastic and glass bottles shall be alternated.
  - Place a temperature blank in each ice chest being shipped.
  - Place 8 to 10 pounds of completely frozen blocks of gel ice in each ice chest, distributing them evenly among the samples to insure an even temperature distribution. Dry ice should not be used because it can freeze samples. Water ice should not be used if samples are shipped by plane because it will melt during shipment and possibly contaminate samples.
  - Discard any gel ice that shows signs of leakage.
  - Fill all void spaces in the ice chests with clean packing material (styrofoam peanuts, bubble wrap or other approved wrapping material). Paper or cardboard should never be used as packing material.

- Complete the shipping bill with shippers' and receivers' addresses, if these are not already printed on the bill.
- Mark the airbill for overnight delivery.
- Note the airbill number in the appropriate box on the CoC.
- Next to each sample line on the CoC, note the number of the ice chest in which the sample was placed.
- If multiple ice chests are being used, note which contains the trip blanks and samples for VOC analysis
- Retain a copy of the CoC.
- Put the CoC in a zippered freezer bag and tape to the inside lid of the corresponding ice chest.
- Remove old labels, tape, etc., from the ice chests.
- Attach the shipping bill to the top of the corresponding container.

Shipping Containers

- Attach address labels to all shipping containers.
- Make sure each container will close properly and that the drain is plugged.
- Seal each container with strapping tape in at least two places, and wrap the tape twice around the container at the hinge points.
- Attach custody seals across the ends of the tape.
- Place "up" arrow stickers on the sides of containers holding water samples.
- Transport the samples to the carrier's shipping location.
- Obtain a copy of the airbill from the carrier's representative.
- Staple the airbill copy to the retained copy of the CoC.
- Give both papers to the PM, or designee, who will circulate or file them as needed.

The field sampling technician who collected the samples will sign and date the CoC then place the CoC inside of the shipping container with the preserved samples and the container will be sealed. The PM will fax the

CoC and airbill copy to the Project Chemist at the analytical laboratory to inform the laboratory of the anticipated arrival time of the samples at the local airport. If the samples are transported to the laboratory by a commercial carrier, signed airbills or other applicable bills of lading will serve as evidence of custody transfer between the field sampler and carrier as well as carrier and laboratory. The field sampler will retain copies of the CoC record and airbills, or bills of lading and will provided these documents to the PM who will transfer them to the DCO for filing. If the CoC records are sequentially numbered, the record number and airbill number will be cross-referenced in the field logbook or appropriate field form.

After the Project Chemist receives the samples, he will sign and date the "Received By" portion of the CoC form and return a CoC colored copy to the Facility. This will occur when the analytical results are provided to the Facility. The Document Control Officer (DCO) will collect the final CoCs and the analytical reports when they are received from the laboratory and coordinate with the PM regarding adding the results to the data record and filing of the CoC forms and analytical reports.

2.4.2 Sample Storage Procedures

Sample storage procedures will be followed according to the requirements presented in Permit Attachment F, Section 4.6.4, Table 4-7. While these requirements apply to samples collected under normal Facility operations, the requirements will also apply to samples collected under a corrective action. Specific sample holding times are listed in the table as well.

2.4.3 Sample Preparation Methods

The goal of effective sample preparations is to produce analytical samples that are homogeneous and will maximize quality assurance through consistently prepared samples (less analytical interference and bias is introduced). Environmental samples collected during the corrective action process will be collected to characterize the extent of the released material and to verify that the remedial Action Levels have been met. The samples will be expected to contain any of the compounds that are referenced in the Facility's RCRA permit (Permit Attachment K). The sample matrices will consist of soils and/or water. Analytical procedures for the samples are described below. Prior to analysis, however, specific sample preparation procedures will be followed. As described below in Section 2.4.4, characterization of corrective action samples will be performed using the methods listed in Permit Attachment F, Tables 4-1 and 4-3. Similarly, sample preparation procedures that correspond to the analytical methods as contained in the tables will also be used.

2.4.4 Analytical Procedures

It is assumed that all waste materials generated during a corrective action will be considered RCRA-regulated until sampling and analysis is conducted to verify the material's chemical and physical nature. Therefore, sampling and analysis will be conducted in accordance with the requirements of the Waste Analysis Plan contained in Permit Attachment F. The sources of the wastes will include corrective action operations (spent personal protective equipment), expired analytical samples, waste generated during remedial operations, and decontamination wash and rinse water.

All analytical services will be coordinated through the Facility's field laboratory as per Permit Attachment F, Waste Analysis Plan. All samples submitted to the lab will be either be analyzed at an external (fixed) laboratory or the Facility's field laboratory as approved by the PM and NMED. Analytical method selection will be based on the requirements of the decision to be made. These requirements may include required analytical information, sensitivity, selectivity, precision and bias, and data comparability.

Analytical methods will be selected based on the released materials to ensure that background concentrations (Action Levels) are detected. Permit Attachment F analytical methods will be used for laboratory analysis of

organic and inorganic chemicals in soil samples unless other methods are proposed by the PM and accepted by NMED. Surface water and groundwater samples will be analyzed using Permit Attachment F.

If a site investigation requires the measurement of analyte concentrations to be less than the detection limit measured by routine analytical methods, the PM will select an alternative analytical methods that will provide a lower detection limit to the extent practicable.

The Toxicity Characteristic Leaching Procedure (TCLP) will not be used as a quantitative analytical tool except to characterize waste materials generated during the corrective action process. The statutory purpose of the TCLP procedure is to determine whether a material exhibits the characteristics of a hazardous waste under 40 CFR Part 261. Similarly, it will not be used for determining the nature, rate, and extent of contamination, or for confirmation sampling.

As described earlier, Permit Attachment F contains specific analytical methods that will be used for wastes received under normal operations. Given the similarities that are expected between waste received under normal operations and wastes generated under a corrective action, the analytical methods contained in Attachment F (Tables 4-1 and 4-3) will be used to characterize corrective action samples. The PM will ensure that Attachment F, Tables 4-1 and 4-3, requirements are followed as if the waste generated under the corrective action will be stabilized or directly landfilled onsite as a received waste stream. Therefore, pre-acceptance analysis will first be conducted (Table 4-1) and additional analysis under Table 4-3 will be performed to ensure that wastes generated under a corrective action are within acceptance limits as specified in the Facility's permit.

2.4.5 Calibration Procedures and Frequency

Field and fixed laboratory equipment calibration and frequency of calibration procedures as presented in Permit Attachment F, Section 4.7.2.2, will be utilized. The procedures will be in accordance with EPA or equivalent methodology requirements. The operation, calibration, and maintenance of all laboratory instrumentation will be conducted in accordance with manufacturer specifications and will be performed by laboratory personnel who have been trained in implementing these procedures.

2.4.6 Data Reduction, Validation, and Reporting

Procedures will be used for determining whether data packages received from an analytical laboratory were generated according to contract specifications and contain the information necessary to determine if the data are sufficient for decision making. This procedure will be included in the RFIWP and CMS and will be developed by the Environmental Coordinator (EC) and approved by the PM.

All analytical laboratory data will be presented as SW-846 [i.e., EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition (EPA, 1986)] documentation packages that provide the same level of detail as EPA Contract Laboratory Program (CLP) Level IV [see OLM02.1, USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration (EPA, 1990a) and OLM03.0, USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration (EPA, 1990b)]. A tabular key will be provided with the package that relates field/laboratory sample numbers to: 1) QA and QC samples; 2) cooler receipt form(s); 3) reporting requirements for organic and inorganic analyses; 4) reporting of internal QC results (e.g., laboratory blanks, surrogate spike samples, matrix spike samples, laboratory duplicates and/or matrix spike duplicate pairs, and laboratory control standards); and 5) identification of field duplicates and all types of blanks. Actual chromatograms will be provided for all samples analyzed by gas chromatography (GC) methods.

Analytical data packages will be verified and validated in compliance with the requirements of Appendix C

(Data Validation SOP). At a minimum, data package verification will include evaluation of sampling documentation/representativeness, technical holding time, instrument calibration and tuning, field and lab blank sample analyses, method QC sample results, field duplicates, compound identification and quantification, the presence of any elevated detection limits, and a summary of qualified data. All data will be flagged with appropriate qualifiers prior to use in preparing any final RFI and CMS reports for correction action.

2.4.6.1 Reduction Methods

The data will be electronically compiled into tabular formats so that statistical analysis can be performed on the data. This compilation will be performed at the laboratory. The compiled data for each sample location will be presented chronologically on a per constituent basis. Both electronic and hardcopies of the reduced data will be provided to the PM.

2.4.6.2 Validation and Verification Methods

The data validation and verification methods presented in Appendix C address the minimum requirements and are modified from EPA Contract Laboratory Procedure validation protocols (EPA, 1994a; 1994b) for use with SW846 analytical methods. The procedures contained in Appendix C require: 1) an initial review or verification of the completeness of individual data packages for each SDG; 2) validation of the data using guidelines tailored to the type of analyses performed (i.e., organics or inorganics); 3) resolution of data discrepancies, where possible, by liaison with the responsible laboratory; 4) qualification of data by flagging with appropriate codes, with emphasis on data usability for decision-making purposes; and 5) preparation of SDG-specific data assessment summaries and a narrative report. All validated data packages, including the data assessment summaries and narrative report, will be subject to independent technical review, prior to any direct submittals to NMED, and prior to incorporation of results in the required corrective action reports.

2.4.6.3 Reconciliation with User Requirements

The validated analytical data from the corrective action and all other reviewed and approved data will be evaluated against the intended uses of the data, as stated earlier in this document and the SAP. The results of the evaluation, any noted data gaps, and other questionable results will be identified and discussed in a comprehensive site characterization technical memorandum. Specific recommendations will be made with regard to refining the project scope for the corrective action. The draft and final versions of the technical memorandum will be subject to independent technical review, prior to submittal to NMED.

All data will be flagged with appropriate qualifiers, with emphasis on data usability for decision-making purposes, prior to use in preparing corrective action reports. Data qualifiers (letter codes attached to data results) will be used in the data validation process to designate potential problems associated with individual sample results. Each data qualifier will be accompanied by a justification code that provides information about the deficiency leading to final qualification of the data. The EC will conduct this activity. The validation procedure that will be used for routine analytical services will provide information about the reason the qualifier was applied and its potential impact on the affected data so that the data may be used appropriately.

Hard copies of the validated data packages and associated data summary reports will be made available. Validated electronic copies of the data files and associated field data (i.e., basic site information, sample locations, soil boring and lithologic information, well installation and monitoring data, field sampling and field test data, and CoC information) will be transmitted to a project database that will serve as the primary database archive for the project.

As discussed in Section 2.2.3.1, the results of the data validation for each distinct sampling event will be documented in a QCSR. The QCSR will briefly summarize the QA/QC results for the samples collected,

with specific emphasis on data quality usability and acceptability. Any deviations from site-specific plans will be discussed and justified. At a minimum, the QCSR will include the following:

- Introduction – a short introduction of the sample types, analyses conducted, laboratories involved and applicable plans, specifications and references
- Summary – an assessment of the quality control parameters reviewed during the activities and a summary of the data package completeness
- Deficiencies – summary of all qualified results, including rejected data, reasons for their qualification and their effect on data usability
- Glossary of data qualifiers – a table listing all data qualifiers applied as a result of the validation process and their explanation
- Attachments – all supporting documentation related to the validation results

2.5 References for Section 2

The following list includes all references cited in this section.

EPA (US Environmental Protection Agency), December 1989. "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)," Interim Fina!. EPA 540/1-89/002, Office of Emergency and Remedial Response, Washington, DC. (EPA 1989)

EPA (US Environmental Protection Agency), May 1993. "The Plug-In Approach: A Generic Strategy to Expediting Cleanup," DOE/EH-413-9903, Office of Environmental Management, Office of Environment, Safety and Health, Washington, DC. (EPA 1993)

EPA (US Environmental Protection Agency), August 1993. "Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA," EPA/540-R-93-057, Washington, DC: (EPA 1993)

EPA (US Environmental Protection Agency), September 1993. "Presumptive Remedies: Policy and Procedures," OSWER Directive 9355.0-47FS, EPA 540-F-93-047, PB93-963345, Office of Solid Waste and Emergency Response. Hazardous Site Control Division, Washington, DC. (EPA 1993)

EPA (US Environmental Protection Agency), February 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," EPA-540/R-94-013, US Environmental Protection Agency, Washington, DC. (EPA 1994)

EPA (US Environmental Protection Agency), September 1994. "Guidance for the Data Quality Objectives Process," EPA QA/G-4, Final, US Environmental Protection Agency, Washington, DC. (EPA 1994)

EPA (US Environmental Protection Agency). 1994. "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities." OSWER Directive 9355.4-12, Office of Solid Waste and Emergency Response, Washington, DC. (EPA 1994)

EPA (US Environmental Protection Agency), December 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review: Multi-Media, Multi-Concentration (ILMO 1.0) and Low Concentration Water (OLCO 1.0)," EPA/540/R/94/090, Office of Solid Waste and Emergency Response, Washington, DC. (EPA 1934)

EPA (US Environmental Protection Agency), June 1997. "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments," EPA Interim Final Report, Washington, DC. (EPA 1997)

EPA (US Environmental Protection Agency), August 1997. "Establishment of Cleanup Levels for

CERCLA Sites with Radioactive Contamination," OSWER Directive 9200.4-18, Office of Solid Waste and Emergency Response, Washington, DC. (EPA 1997)

EPA (US Environmental Protection Agency), November 1997. "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites," Interim Final, OSWER Directive 9100.4-17, Office of Solid Waste and Emergency Response, Washington, DC. (EPA 1997)

EPA (US Environmental Protection Agency), 1996. "Clean Water Action Plan," EPA-840-R-98-001, Washington, DC. (EPA 1998)

EPA (US Environmental Protection Agency), 1998. Table of Contents, Volume One, for EPA SW-846 Methods, 1998. Washington, DC. (EPA 1998)

EPA (US Environmental Protection Agency), April 1998. "Guidelines for Ecological Risk Assessment," EPA Final Report EPA/630/R-95/002F, Washington, DC. (EPA 1998)

EPA (US Environmental Protection Agency), December 1998. "Draft Risk Management Strategy," Multimedia Planning and Permitting Division, US EPA Region 6, Dallas, Texas. (EPA 1998)

EPA (US Environmental Protection Agency), June 1999. "EPA Region 6 Human Health Medium-Specific Screening Levels," Dallas, Texas. (EPA 1999)

NMED (New Mexico Environment Department), March 3, 1998. "Risk-Based Decision Tree Description," Santa Fe, New Mexico. (NMED 1998)

EPA (US Environmental Protection Agency), August 2002. " RCRA Waste Sampling Draft Technical Guidance - Planning, Implementation, and Assessment", EPA530-D-02-002, Office of Solid Waste, Washington, D.C. (EPA 2002)

EPA (US Environmental Protection Agency), December 2002. "Guidance on Choosing a Sampling Design for Environmental Data Collection", EPA QA/G-5S, Office of Environmental Information, (EPA, 2002b)

3. Data Management Plan

3.1 Section Organization

The purpose of the data management plan is to support data control during and following corrective action activities at the Facility. The plan sets forth implementation guidelines for management of technical reports, communications, and technical data associated with the corrective action. The plan will be implemented according to internal procedures such as quality procedures (QPs), SOPs, management guidance, and administrative controls that will be developed when the Facility becomes operational.

The plan is intended to coincide with other chapters of this FCAWP. Section 3.1 presents the organization, regulatory mandate, purpose, objectives, and terminology of the plan. Section 3.2 describes the data record

and presents how sample labeling and analytical records will be kept. Section 3.3 describes the facilities and information management capabilities that will be used for managing all reports and documents associated with a corrective action.

3.1.1 Records and Documents Management Objectives

The data management plan below provides the basic elements and regulatory requirements that will enable effective data management under the Facility's RCRA permit. From a technical and compliance perspective, the plan below addresses the following aspects:

- Document and track corrective action investigation data and results
- Identify and setup data documentation materials and procedures
- Identify and setup project files requirements
- Identify and setup procedures for project-related progress reporting and documentation
- Develop a format for presenting data and conclusions related to the corrective action investigation

Another important objective is to maintain data so that it will be readily available to Facility, public, and NMED users at all times. This goal applies to both hardcopy and electronic data.

The plan presented below addresses project needs for all types of records including

- Analytical data
- Photographs
- Investigation-related reports
- Community relations-related documents

All records will be collected, organized, electronically indexed, stored in at least two locations, and protected. The DCO will manage these records. The locations for storing analytical data will consist of the Facility administrative office and the laboratory where the analyses were performed. The locations for storing photographs and investigation-related reports will include the Facility administrative office and the Gandy-Marley office in Tatum, New Mexico. Community relations-related documents will be stored at the Facility's administrative office and the repository locations specified in Section 5.4.7. All of these records will be provided to NMED.

A high level of diligence and effort will be put into the plan's implementation. The data records will be subject to regulatory audits and scrutiny as part of the permit compliance process. Therefore, data records will be kept in an organized format so that the data is technically and regulatorily defensible and can be readily audited. This will be accomplished by:

- Keeping the Facility data records up to date
- Maintaining a secure and effective data transfer system between the fixed and field laboratory, and the Facility
- Utilization of computer hardware and software that allows for instantaneous review of data in both tabular and graphical format, and data manipulation and statistical analysis can be readily performed
- Providing easy access to laboratory and Facility performance and system audit results

Certainly, records management under a corrective action must integrate with records management for the Facility under normal operations. In the event that simultaneous auditing of data associated with both corrective action and normal operations are required, this will be achieved given the four actions listed above. By implementing these actions, the auditing process will be effectively conducted given efficient access to all records as required during the auditing process. Secondly, the potential number of audit exceptions will be significantly minimized if not eliminated.

3.1.2 Regulatory Requirements

The design, structure, and implementation of this plan are required by Permit Attachment R, Facility Corrective Action Work Plan Outline, Task II. An objective of the FCAWP is to have in place SOPs for conducting an investigation of a released hazardous material.

Adequate data documentation of work performed under a corrective action process is of high importance. The Facility's corrective action data record will also contain analytical reports and correspondence that becomes part of the Facility's overall AR.

3.1.3 Definition of "Records"

The Facility recognizes the importance of effective terminology and its usage. Since there will be multiple users of the corrective action data generated by the Facility, such terminology as contained in this plan will be specifically defined. To ensure that terms are used consistently, the following definition for "records" (as contained in 44 United States Code 3301) will relate to data records described in this plan.

> "Records" are defined as "books, papers, maps, photographs, machine-readable materials, or other documentary materials, regardless of physical form or characteristics, ...appropriate for preservation... because of the informational value of the data in them."

For the purposes of corrective action at the Facility, "records" will refer to all data records (hardcopy and electronic) and will be used throughout this plan to encompass all data records related to the corrective action.

3.2 Description of the Analytical Data Record

The information below presents details related to how the sample and field measurement data will be managed.

3.2.1 Sample and Field Measurement Database

A project database will be maintained that archives all pertinent field and analytical data. The database will include a data record with the following minimum fields:

- Location ID - a unique identification number that designates the location of the sample collected
- Sample ID - a unique identification number that designates the specific sample collected
- Sample date - date of sample collection
- Matrix - the matrix of the sample collected
- Measurement type - field or laboratory
- Parameter - the property or component analyzed or measured

- Value - numerical analytical result
- Units - units of measurement
- Qualifier code
- Method detection limit
- Practical quantitation limit
- Analytical method
- Analysis date

3.2.2 Corrective Action Data Record Control

The information below lays out a program for managing corrective action data records given the objectives described earlier in Section 3.1.2.

The data management plan herein is based on a tiered approach that considers data control and Facility commitment to quality program guidelines. This approach will be achieved by the quality management concept that will involve the commitment of the PM who will assign varying levels of data control to Facility personnel. This means that one individual (EC) may be responsible for distribution of data and another person (DCO) will be responsible for filing of original copies and database upkeep. The purpose of this approach is to ensure the proper distribution of data and consistency in terms of filing and database maintenance.

The PM will receive data from the field or fixed laboratory and provide the data to the DCO.

Corrective action data records will be used for making remedial or administrative decisions or to document the completion of the corrective action process by demonstrating that the Action Levels specified in the Facility's permit have been achieved. Data related to remedial decisions will be provided to NMED in the form of corrective action progress reports or similar records documenting project decisions. These reports will be provided on a monthly basis.

The PM will review all corrective action related documents to confirm whether such documents (field notes and written materials) should be incorporated into the data management system. This determination will be completed under the following program approach:

After receiving the records from the PM, the Facility's DCO will take the following steps:

- Verify the records for clarity, legibility, and completeness.
- Update the analytical database (electronic indexing system) to account for the data records.
- Make compact disc copies of the database (any records in hardcopy only that are not suitable for transfer to CD will be kept at the locations described in Section 3.1.1.
- Enter the CD identification number in the indexing system.
- Store the original data record documents and a CD in the locations specified in Section 3.1.1.
- Provide the electronic index of available data records to NMED and local city governments (Tatum and Roswell) on a quarterly basis.

3.2.1.1 Data Control Task Training

Personnel may be designated by the DCO to be involved in the processing of data records and will have received task training in the processing of the data. Task training certificates will be retained by the DCO and will be kept in the RRO.

3.2.1.2 Internal and External Data Records

All data records transferred to the DCO will provide a base of information to which the corrective action team participants can refer. The data records will include those internal records developed on site such as field data log sheets and other data records developed offsite that have been transmitted to the Facility.

3.2.1.3 Access Rights to the Administrative Record

The AR at the Facility will include the data records both related and unrelated to the corrective action process. Access to electronic data not related to the corrective action will be enabled by separate user identifications and passwords.

3.3 Description of Records Management Facilities

3.3.1 Records Retention Office

An RRO managed by the DCO will be located at the administrative office of the Facility. The office will receive, store, and retrieve data records. The office will retain originals of all data records related to the corrective action process as described in Section 3.1.1. RRO will be the central location of the AR so that corrective action participants can access site historical information that may influence cleanup decisions. As part of this role, a centralized data records location will provide the ability to retrieve data records based on varying parameters such as subject, author, technical areas, and publication date. Corrective action participants may request data records at any time from the DCO. A checkout procedure will be maintained so that the whereabouts of released data records can be tracked. This will involve checking out read-only CDs or hardcopy records.

The DCO will work in concert with the corrective action team and NMED to ensure timely public awareness and access to data records. This will be accomplished by providing records for public inspection on a local level, upon public request, as instructed by the GM. This will also be achieved by providing an electronic index of available records at the local city government buildings in Tatum and Roswell.

3.3.2 Information Management Capability

The PM will establish an information management capability (IMC) within the RRO to provide the hardware, IT systems, and expertise required for supporting the spatial and tabular data collected during the corrective action process. The IMC may incorporate the expertise of Geographical Information Systems (GIS) and database specialists for providing corrective action personnel with an interactive database management capability, database query results, three-dimensional analyses, and data visualization.

The IMC will consist of:

- GIS capability that will focus on three-dimensional data (location of buildings, extent of released material migration, changes in COPC concentration relative to sources of release, time, depth, surface water features, roads, rivers, sample sites, monitoring wells, etc.)
- A database management person responsible for managing the database and will focus on designing, specifying, constructing, and updating the database

- Expertise to visualize and understand the analytical needs of the corrective action process and to fulfill the needs by utilizing appropriate commercial software or by developing customized in-house applications
- Availability of effective computer hardware resources to access, maintain, and conduct data analysis
- Maintenance of an automated backup
- Incorporating portable document format (pdf) capability into the actions above so that corrective action data records can be made available to outside parties. This will be accomplished by maintaining pdf versions of all record files that will be provided to outside parties.

Compact Disk Storage

Read-only CD storage systems efficiently store large volumes of information. CD storage will be used at the RRO to store and disseminate information to the Facility, NMED, or the public.

File Standards and Compatibility

The corrective action process may utilize one or more operating systems such as:

- Microsoft Windows and NT
- UNIX
- Virtual Memory Systems

While these systems are not directly compatible, the problem of file incompatibility will not be unique to the Facility or the corrective action process. Therefore, this data management plan specifies using up-to-date system versions that adhere to future standards and protocols for exchanging information.

3.4 References for Section 3

Title 44 United States Code Part 3301, Washington, D.C., USA

4. Health and Safety Plan

4.1 Introduction and Background

The Facility is located in eastern Chaves County, New Mexico in an area that has historically been utilized primarily as range land for livestock grazing and for limited oil and gas activities (Figures 1.1 and 1.2). The residence nearest the site is owned by Marley Ranches, Ltd. and is located approximately 2.9 miles to the east-southeast.

The Facility will be a full-service RCRA Subtitle C waste ~~treatment, storage, and~~ disposal operation. The Facility will be located in Southeastern New Mexico on approximately 480 acres of privately owned land in Chaves County. By road, the Facility is approximately 43 miles east of Roswell and 36 miles west of Tatum, New Mexico.

All waste placed in the Facility will meet Land Disposal Restrictions (LDR) prior to disposal. The Facility will accept polychlorinated biphenyl (PCB) wastes that are not regulated by Toxic Substances Control Act (TSCA), that is only PCB wastes at concentrations of less than ~~50 parts per million (ppm) in liquids and~~ 500 ppm for bulk PCB remediation waste. The Facility will offer the following RCRA regulated services, which are described in this permit application.

~~Two treatment processes will be used at the Facility, including an evaporation pond for managing wastewaters the discharge from which meets LDR standards and a stabilization process for treating liquids, sludges, and solids to ensure that no free liquids are present and that LDR standards are met prior to placing wastes in the landfill.~~

~~Two container storage areas (roll-off storage area and drum handling unit) will be used to stage received wastes at the Facility for treatment or disposal. These units will ensure that wastes are stored in compliance with RCRA requirements for permitted storage. Neither of the units will be used for long-term storage of wastes.~~

~~Aboveground storage tanks will be utilized to accumulate regulated bulk liquid hazardous wastes prior to stabilization. Handling of reactive materials, tank corrosion, tank assessments, tank inspection and tightness testing, and repair and certification of tank systems also will be conducted~~

A landfill will be utilized for the disposal of wastes that meets LDR standards. Support units and structures will include a chemical laboratory, administration building, weigh scale area, maintenance shop, truck wash unit, clay processing area, clay liner material stockpiles, daily cover stockpiles, and a stormwater retention basin.

~~The future debris encapsulation area and the future waste processing area identified in the Facility layout are possible future RCRA treatment units envisioned for the Facility that are not being designed at this time. Prior to construction of these units, an RCRA permit modification request will be submitted.~~

Permit Attachment L, Section 2.1.2, contains additional Facility layout details.

4.1.1 Traffic Patterns

The flow of traffic within the Facility boundary will not be significant except during shift changes. The number of employee vehicles will not be substantial enough to require elaborate signage or other traffic control systems. All personnel will be given written instructions that will caution them to be alert to other vehicles and pedestrians. Each vehicle will enter and exit through the security gate at the northeast corner of the perimeter of the Facility boundary. The arrival and departure of trucks transporting wastes will not be scheduled during peak traffic times.

Access to the Facility will be gained through the security gate at the northeast corner of the perimeter fence. Authorization to enter the Facility will be verified for each vehicle. Visitors will be required to sign in at the guard shack and will be escorted while onsite unless other arrangements are made with the Facility. Only authorized persons will be allowed past the security gate guard shack.

All trucks transporting wastes will be stopped at the security gate prior to entering the Facility. Security personnel will record the license number, transport company, arrival time, and other pertinent information with regard to the vehicle and driver.

After being granted access to the Facility through the security gate entrance, waste transport vehicles will be directed to the untarping/sampling area. Here, a sample of the waste will be collected for fingerprint testing, along with the shipment manifest and other pertinent documentation. While the sample is being analyzed at the chemical laboratory, the truck will be directed to the weigh scales and finally to the truck staging area. The truck will remain at the staging area until laboratory analysis verifies that the waste meets acceptance criteria and the waste characteristics are consistent with profile information from the shipment manifest.

Following determination that waste acceptance criteria have been met, the truck will be directed ~~either~~ to the landfill~~, in cases where wastes can be directly landfilled (for instance, when all LDR treatment standards are met), or to another station for staging/storage or further processing~~.

Transporters will use U.S. Highway 380 to reach the Facility. U.S. Highway 380 runs east and west between Roswell and Tatum, New Mexico, as shown in Figure 1.2. Permit Attachment L, Section 2.1.3, contains additional traffic details, including the anticipated vehicle types that will be used at the Facility. Permit Attachment L also describes main facility roads, unimproved access roads, temporary construction haul roads, traffic control features, and individual facility traffic patterns

4.1.2 Water Supply, Electricity, and Telephone Service

A water supply will be developed to support the Facility under:

- Normal operations
- Emergencies
- Corrective actions

Water supply wells will be drilled and developed within the Facility's boundary. Electrical and telephone service will also be provided at the Facility to accommodate the three scenarios above. In addition to this telephone service, the point of contact information contained in Permit Attachment A, Section, 1.1.6, Facility Contact, will also be available.

4.2 Health and Safety Plan - Purpose and Applicability

The Facility will develop a Health and Safety Plan (HASP) that meets all federal and state occupational safety and health requirements once the operations management staff, including the Health and Safety Supervisor, has been hired. At this preliminary stage, it is assumed that the HASP will establish generic Health and Safety (H&S) information and requirements applicable to normal Facility operations.

Section 4.0 of the FCAWP herein references the HASP that will be developed as part of corrective actions, if any, at the Facility. The differences between this section and the Facility-wide HASP are that (1) some of the detail in the body of the Facility-wide HASP does not appear in this Section 4.0, and (2) the Facility-wide HASP will contain several appendices.

To supplement the information presented in this section and the finalized Facility-wide HASP, a (SSHASP) will be prepared for each field project related to a corrective action. As used in this chapter, "field projects" refer to investigation or cleanup of a corrective action site or group of corrective action sites. Each SSHASP supplements the HASP by providing additional H&S information and requirements indicated by the operations and conditions of a corrective action.

The Facility acknowledges that potential hazards are inherent in the performance of corrective action field operations. Accordingly, the Facility expects that work conducted under the corrective action process will be performed in a safe and healthful manner that minimizes the threat and occurrence of hazards to health, property, and the environment to levels As Low As Reasonably Achievable (ALARA). It will be a priority to protect the Facility's personnel and property, the local public and their interests, and the personnel and equipment involved in conducting corrective action activities). Programs, plans, and procedures associated with the performance of corrective action field projects will be subject to approval by designated Facility management before implementation. However, such approval in no way relieves corrective action participants from complying with specific regulatory requirements pertaining to H&S programs, plans,

procedures, and work practices, nor does such approval relieve corrective action participants from their personal responsibility for maintaining a safe and healthful work environment. The term "corrective action participants" refers to anyone performing work, including Facility personnel, federal and state oversight personnel, subcontractor personnel and their lower-tier contractors, consultants, and agents (see Section 4.9.1.2 on Site Visitor Policy).

Furthermore, corrective action participants are responsible for conducting work in accordance with applicable federal, state, and local regulations. In some cases in this section and as indicated in the applicable SSHASPs, the Facility may choose to invoke Occupational Safety and Health Administration (OSHA) and Facility requirements that ordinarily might not apply to corrective action field operations (e.g., OSHA's general Industry standards in Title 29 of the Code of Federal Regulations [CFR] Part 1910 [29 CFR 1910]). These choices will be made on a case-by-case basis to maintain consistency with the Facility's ALARA policy and to clarify the Facility's expectations concerning interpretable requirements of the multiple agencies governing corrective action work.

When there is concern that implementation of work orders or H&S requirements will conflict with contract terms or could unreasonably compromise the safety or health of an individual or the environment, such concerns will be brought to the attention of the contract administrator and the Site Safety Officer (SSO) (Section 4.9.3.3) immediately. Failure to comply with the terms of H&S plans may constitute cause to stop activity or to issue a stop-work order as specified in Section 4.9.3.3 of this document without cost or penalty to the Facility.

The Facility will provide the finalized Facility-wide HASP to corrective action participants with all related materials. The materials will include this section and the HASP appendices containing forms and procedures. It will also provide a model SSHASP. The HASP and the completed SSHASP for each corrective action will be kept readily available for reference by individuals performing field operations to govern the conduct of work at the applicable site(s).

4.3 Review and Approval

Before any work is initiated, the project team will review the existing Facility-wide HASP and submit a completed SSHASP, in draft form, to the Facility SSO, who will circulate it to appropriate Facility management personnel for review and approval. Each SSHASP submitted will be signed by an authorized representative of each corrective action participant-employer whose employees are subject to the terms of the SSHASP. The employer's signature on the signature page serves as a certification that the employer has reviewed, concurs with, and will comply with the terms of the HASP and SSHASP. After signing the signature page, the SSO returns the SSHASP to each employer.

Additionally, each individual who needs to enter a controlled area of a site where access has been limited in accordance with the HASP and the completed SSHASP signs an acknowledgment form (see the finalized HASP). The intent of the acknowledgement form will be to ensure that he/she has read or has been briefed on and understands the contents of the HASP and applicable SSHASP and agrees to abide by the terms of these documents.

4.4 Integrated Safety Management

All corrective action activities and documents will be designed to be consistent with an Integrated Safety Management (ISM) system. The ISM is an over-arching environment, safety, and health policy. The corrective action participants will accept the responsibility for understanding and implementing the appropriate Facility ISM requirements. ISM implementation is accomplished through worker involvement,

communication, and feedback at all levels and is documented here, in the corrective action HASP, and in every SSHASP.

The five ISM core functions are summarized below along with how these functions are implemented during corrective actions.

1. **Define the Scope of Work**

   All corrective action work is part of a well-defined work breakdown structure. Individual scopes of work will be further defined into tasks, subtasks and activities. This structure will be in place from the Project's inception and will be ingrained into the culture.

2. **Analyze the Hazards and Environmental Aspects**

   Based on the defined scope of work and before any fieldwork is conducted, SSHASPs will be prepared that address well-defined health and safety requirements. Field supervisors and SSOs will identify and analyze the potential hazards and document them in activity hazard analyses (AHAs). Each SSHASP prepared for corrective action will contain as many AHAs as necessary to address all potential safety and environmental hazards associated with the activity.

3. **Develop and Implement the Controls**

   After hazards are identified and analyzed, various engineering, administrative, and Personal Protective Equipment (PPE) control measures will be instituted. The most suitable controls will be incorporated into the AHAs. The hazard controls will then be integrated into the overall work plan.

4. **Perform the Work**

   The scope of work is then executed. Each day the field team reviews the hazards and controls for the work they are about to perform. Every member of the field crew will have the opportunity to question and provide feedback on the effectiveness of the controls during daily safety meetings. The field supervisor and SSO will ensure that all work is conducted within the defined controls.

5. **Ensure Performance**

   Changes to AHAs will be incorporated on a real-time basis based on feedback from the field team and as conditions change. Opportunities for performance improvement are often recognized based on the experience and ingenuity of the field teams. Such improvements are carried over to other fieldwork through the sharing of SSHASPs and AHAs and through the lessons learned.

It is through these activities that the corrective action teams will seek to continuously improve safety performance and contribute to the Facility's commitment to ISM.

4.5 Hazard Recognition and Risk Analysis

Hazard assessment is the process of identifying and evaluating the hazards associated with operational activities and will be a fundamental component of the Facility's ISM System. Evaluation and identification of hazards will occur:

- During pre-operational planning of corrective action fieldwork
- Immediately after initiation of and during performance of tasks with potential hazards

- Before changes in tasks and/or operations
- As required by changing site conditions
- Continually, as appropriate

The Facility will provide a method for evaluating and rating hazards in the HASP. The hazard assessment method and rationale(s) for the resulting assessments will be clearly indicated in each SSHASP created. Attachment B of the Facility's RCRA permit discusses procedures for preventing hazards under normal operations at the Facility. These hazard prevention procedures will also apply to Facility personnel taking part in a corrective action at the Facility.

4.5.1 Activity Hazard Analysis

OSHA (29 CFR 1926.65[b][4][ii][A]) requires that a hazard analysis be prepared for each activity to be performed during a corrective action field project. The activity hazard analysis will identify the likely safety, chemical, physical, and biological hazards and the affected personnel so that determination can be made of the corresponding exposure-monitoring and response plans, administrative and engineering controls, site control measures, PPE, medical surveillance, training, and emergency/incident response requirements to be implemented to minimize or mitigate the anticipated site hazards.

Each SSHASP will include an activity hazard analysis for each of the investigative and remedial tasks described in the RFIWP. The AHAs will also be generated by the SSO prior to the commencement of operations at the Facility. These AHAs will be designated as Facility AHAs and will become part of the Facility H&S program.

Field team participants and key H&S support personnel will be identified by the role (job title) and task(s) they are expected to perform prior to the beginning of any corrective action. Each anticipated activity-specific hazard is assessed, as described in greater detail in this section, to determine the associated qualitative probability of occurrence of the hazard and the severity of injury/illness expected to result.

Not all contaminants at a particular site or chemical products used during field operations pose an occupational health threat. The determination of substances expected to pose a threat will be made by the process of hazard assessment. The following criteria should be used to identify the hazardous substances to be assessed:

- Type, nature, form, quantity, and concentration of the hazardous substance(s)
- Location of the substance(s)
- Conditions under which exposure to the substance(s) may occur
- Specific hazards associated with the substance(s)

4.5.2 Chemical

Details of the site-specific hazard assessment of each known site contaminant and chemical product to be used will be included in the SSHASP, unless there are none. Of the wide variety of chemicals of potential concern at the site, the SSHASP will include only the substances expected to pose an occupational health threat, together with the resulting hazard assessment rating. The signs and symptoms of chemical exposure, if any, will be provided in an appendix of the SSHASP. Corresponding detection methods, protective measures, and response actions will be provided in the SSHASP.

4.5.3 Physical

General physical hazards of concern include lightning strikes, slips, trips, falls from less than 4-foot elevations, heat and cold stress, altitude sickness, animal attacks, and equipment hazards. These hazards will be assessed for the Facility, assuming variable exposure conditions on a project-wide basis. Results of this assessment, together with the symptoms of exposure, detection methods, protective measures, and response actions, will be provided in the SSHASP.

4.5.4 Biological

General biological hazards of concern include tick bites, rodent flea bites, poison ivy contact, poisonous snake bites, insect bites or stings, and transmission of blood-borne pathogens when first-aid or cardiopulmonary resuscitation (CPR) is rendered. Results of this assessment, together with the symptoms of exposure, detection methods, protective measures, and response actions will also be provided in the SSHASP.

4.5.5 Job Hazard Analyses

The Facility uses the terms "task hazard analyses", "activity hazard analyses," and "job hazard analyses" interchangeably. Job (activity) hazard analyses are discussed in Section 4.5.1.

4.6 Key Personnel and Alternates

The purpose of this section is to clarify the roles, responsibilities, and authority of individuals as they relate to H&S at the Triassic Park site and to describe the organizational structure and lines of communications that are necessary to achieve the corrective action safety objectives. This section complies with the Facility's ISM System and OSHA Hazardous Waste Operations Emergency Response (HAZWOPER) requirements.

Defining H&S responsibilities, authority, and lines of communication for the corrective action is complicated by the fact that the Facility design and management structure are in the permitting stage of development. Over time, effective H&S structure and communications methods will evolve as described in this section and be formalized in future documents and revisions. The following fundamental concepts help one understand the basis for the H&S structure and communications.

Line Organization and Management - A basic premise of ISM is that line management is responsible for safety. In the case of corrective actions a memorandum of understanding or similar agreements will be issued so that individuals from all line organizations always know and understand their safety chain of command.

Programmatic Organization and Management - Many H&S issues are inherent with environmental restoration and will be addressed at the program level. Decisions are made that protect all workers involved in an Action, regardless of employer. These decisions and policies are described in program H&S requirement documents such as the Facility-wide HASP. It is the responsibility of the line organizations to implement H&S and meet the programmatic requirements.

Subcontractor Organization and Management - Several subcontractors may perform work as part of a corrective action. As private employees, they are obliged (legally and contractually) to maintain their own H&S programs and line management structure. Subcontractors will integrate the corrective action programmatic H&S requirements into their H&S programs, as necessary, while still maintaining a degree of H&S autonomy. Subcontractors will prepare their own SSHASPs for a corrective action. In the SSHASPs, lines of communication will be defined that link subcontractors to Facility's corrective action management team. SSHASPs will be reviewed and approved by Facility personnel. This mechanism, along with Facility field oversight, will help ensure that appropriate programmatic and line safety is integrated into work

performed by subcontractors.

Most importantly, H&S roles, responsibilities, authority, and communications will be established during the planning stages of every field project. The SSHASPs will provide detailed information, ensuring that the corrective action team integrates safety in the field, where potential hazards are the greatest. Specific individuals fulfilling these roles are identified in each SSHASP.

4.6.1 Project Team

The information below presents corrective team responsibilities. A description of subcontractor responsibilities is also included.

4.6.1.1 Facility General Manager

The Facility GM is the Facility employee who is ultimately responsible for the safety of people working on any corrective action. His/her responsibilities include:

- Making H&S policy decisions
- Ensuring that adequate H&S resources are available to meet H&S objectives
- Resolving conflicts between H&S and production that cannot be resolved at a lower level
- Ensuring that the corrective action team and subcontractor supervisors/subcontractor project managers comply with H&S programmatic requirements
- Performing safety walk-around surveys
- Supporting and promoting the Facility's ALARA and ISM policies and principles
- Ensuring that ALARA program requirements are met
- Exercising programmatic and line safety management authority as required

4.6.1.2 Corrective Action Project Manager

The PM is a Facility employee who reports to the GM. The PM may direct one or more corrective action team members. His/her H&S responsibilities include:

- Exercising programmatic and line safety management authority as required
- Ensuring that the required SSHASPs for his/her corrective action are developed and that the comments of appropriate reviewers have been incorporated
- Ensuring that the Facility-wide HASP and SSHASPs are implemented for field operations under his/her control
- Delegating H&S responsibility as necessary to maintain a clear chain of command for H&S issues
- Ensuring there is always a designated on-site supervisor
- Ensuring that personnel performing work under his/her management meet H&S qualifications
- Resolving H&S issues concerning his/her project
- Prohibiting personnel who do not comply with H&S requirements from working on field projects under his/her control

- Conducting required inspections (see final Facility-wide HASP for specifics)
- Ensuring the submittal of appropriate field project H&S records to the Facility's Records Processing Facility (see final Facility-wide HASP for specifics).

4.6.1.3 Subcontractor Supervisors/Subcontractor Project Managers

A subcontractor supervisor/subcontractor project manager will be responsible for ensuring that employees under his/her supervision comply with the HASP and SSHASP. They are responsible for ensuring the full cooperation of their organization with other subcontractors to achieve H&S objectives. In addition, the subcontractor supervisor/subcontractor project manager will exercise line management safety authority for personnel working for that company. When multiple subcontractors are on a site, each subcontractor will designate an on-site supervisor who has line management safety authority for their respective personnel.

Through delegation, subcontractor supervisors/subcontractor project managers may assume some H&S responsibilities and authority afforded the SSO. When this occurs, it will be authorized by the PM and clearly described in the SSHASP. The purpose of such delegation is to maintain a clear H&S chain of command in the field.

Subcontractors to the Facility who engage their own subcontractors (second-tier subcontractors) are responsible for ensuring that their subcontractors comply with all programmatic and site-specific H&S requirements. For projects where multiple second-tier subcontractors are working in the field together, ultimate on-site authority resides with the SSO or designee.

4.6.2 Health & Safety Personnel

4.6.2.1 Site Safety Officer

OSHA requires that a site safety and health officer (also known as SSO) be designated and that this person will have the responsibility and authority to develop and implement the site safety and health plan and verify compliance. The SSO may perform other duties on the project team, provided these duties do not compromise performance of his/her SSO duties. On a project-specific basis, the SSO will be qualified to recognize and evaluate hazards and to minimize and mitigate occupational H&S hazards.

The PM determines if a dedicated SSO is necessary for non-HAZWOPER projects. If a full-time SSO is not required, applicable duties of an SSO are to be assigned to other qualified personnel.

On projects with multiple subcontractors, there will be more than one person with site safety responsibilities. It is the SSO's responsibility to see that the safety chain of command is clearly defined and documented and that safety coverage is comprehensive.

The specific responsibilities of the SSO are to:

- Assist with and/or develop the SSHASP.
- Verify that on-site personnel have current certification of the applicable training and medical surveillance requirements.
- Help the field team implement the HASP and SSHASP in compliance with applicable federal, state, and local H&S regulatory requirements.
- Perform and document H&S inspections of site operations (see the finalized HASP).

- Notify the PM of any on-site personnel who are not abiding by applicable H&S requirements and of potential or actual hazardous situations needing to be rectified.
- Notify the PM and the SSO when elements of the HASP and SSHASP are not being met and when H&S hazards are not being minimized or mitigated sufficiently.
- Watch for changes in site operations and conditions that warrant hazard mitigation and/or modifications to project H&S plans, procedures, permits, etc.
- Ensure that copies of the HASP, SSHASP, supplements, and any modifications are current and that these documents are readily accessible on site and as needed for corrective action work occurring elsewhere.
- Assess the necessity and arrange for monitoring of employee exposures to H&S hazards and convey results and known implications to the PM.
- Inform the PM, and affected subcontractor supervisors/subcontractor project managers of results of employee exposure monitoring (see the finalized HASP).
- Monitor levels and effectiveness of PPE and verify proper use, storage and maintenance of equipment.
- Maintain H&S-related field project records, including a daily log of H&S-related matters concerning site operations, and provide these records to the PM as necessary before closeout of the project.

Confined-Space-Entry

Confined-space entry will be managed by the SSO and he/she will determine whether acceptable entry conditions exist at a confined space where entry is planned, will authorize and oversee entry operations, and will terminate entry in accordance with regulatory and permit requirements (29 CFR 1910.146 [b])

Industrial Hygiene

Industrial hygiene activities will be handled by the SSO for monitoring employee exposures to hazardous substances, and, to the extent necessary for the site-specific work, is capable of evaluating exposure-monitoring results to determine actions necessary to protect individuals on site. This person may be someone who is training to become an SSO and someone to whom the SSO may delegate his/her responsibilities as this person is trained and qualified to perform such duties.

Trenching/Excavation

The SSO, in accordance with 29 CFR 1910.146, "Permit-Required Confined Spaces," will be capable of identifying existing and predictable hazards in the surroundings, or unsanitary, hazardous, or dangerous working conditions for trenching or excavation. The SSO will have authorization to take prompt corrective measures to eliminate those hazards and will have had specific training in and be knowledgeable about soils analysis, the use of protective systems, and the requirements of 29 CFR 1926 Subpart P - Excavations (29 CFR 1926.650 et seq.).

4.6.2.2 Other Competent or Qualified H&S Personnel

Throughout 29 CFR 1926, "Safety and Health Regulations for Construction," and applicable standards of 29 CFR 1910, "Occupational Safety and Health Standards," invoked by the Facility, OSHA uses the terms "competent" and "qualified" to denote specialty trained and knowledgeable individuals who are required to perform certain job functions. These specific standards are cited as applicable throughout the HASP and SSHASP. Wherever requirements exist in these standards for participation of a competent or qualified person, the person will be trained and knowledgeable of the particular regulated subject matter in accordance with 29 CFR 1926.32(f) or (m), the applicable regulatory standard, and the final HASP.

4.6.3 Subcontractor Personnel

A subcontractor representative is a management or H&S professional representing an employer affected by terms of the SSHASP. This individual will have the authority to approve the terms of the SSHASP and any modifications and to ensure that employees of his/her employer abide by these terms. Additional responsibilities include:

- Interfacing with project line managers, other employers' supervisory personnel, and support professionals, as necessary, to coordinate implementation of HASP, SSHASP, and other applicable H&S requirements
- Assisting with resolving H&S issues involving his/her employees performing corrective action work, particularly those involving discrepancies between policies of multiple employers represented on- site and site-specific H&S requirements

4.7 Work Area Delineation

The corrective action work area will be delineated by the corrective action team after the RFIWP has been approved by NMED. The primary zones within the work area will include:

- Exclusion zone (EZ)
- Contamination reduction zone (CRZ)
- Support zone
- Support facilities
- Equipment decontamination pad
- Temporary drum storage area
- Mobile laboratory
- Wash facility

These zones are described in more detail in Section 4.9 below.

4.8 Description of Levels of Protection for Personnel

The purpose of PPE is to shield, isolate, or secure individuals from hazards that may be encountered when administrative or engineering controls are not feasible or cannot provide adequate protection. Accordingly, before requiring field team personnel to use PPE, appropriate administrative and engineering controls will be implemented as the first means of defense for mitigating hazards and protecting site personnel.

In accordance with applicable OSHA regulations (Subpart E of 29 CFR 19S6), personnel are not allowed to use PPE unless the hazards for which the PPE are intended to protect against have been assessed and the appropriate PPE has been specified by a qualified H&S professional.

PPE requirements will be based on a hazard assessment (see Section 4.4.1) that includes a comparative evaluation of site conditions, task-specific operations, potential hazards relative to the performance characteristics of the PPE items, and anticipated duration of use. Disposable protective clothing (e.g., Tyvek's) may be used at sites contaminated by mixed wastes. Task-specific personal PPE requirements that meet applicable OSHA requirements of Subpart E of 29 CFR 1926 will be identified in the SSHASP. The

U.S. EPA terminology of Levels D, C, B and A (see Figure 4.1) for PPE is used to describe the general PPE ensembles that may be used throughout this project.

Furthermore, personnel who use PPE to perform a job will be trained to recognize the limitations of the equipment and to properly select, fit, use, inspect, maintain, and store the equipment. Such training will occur and be documented before the user enters an area requiring the use of the PPE. When OSHA has mandated methods in the chemical-specific regulatory standards included in Subparts D and Z of 29 CFR 1926, such methods will be specified, as applicable, in the SSHASP.

{{Insert Figure 4.1}}

The level of protective clothing and accessories selected may be upgraded or downgraded based on new findings or change(s) in site conditions or operations. Whenever a significant change occurs, the PPE equipment requirements will be reassessed by the SSO, and a SSHASP modification form will be issued, as necessary.

It is the responsibility of the user of PPE to inspect the equipment before and as necessary during each use. Furthermore, the user will not use PPE that shows signs of compromised integrity. The SSO will monitor individuals in areas where PPE is required to ensure that they are properly attired.

4.8.1 Level D Personal Protective Equipment

Level D Protection Use: Level D protection will be used under the following conditions:

- The atmosphere contains no known hazard above individual or combined permissible exposure limits (PELs), essentially nuisance contamination only.
- The atmosphere will contain 19.5 percent oxygen.
- Concentrations of airborne toxic organic compounds do not exceed normal background concentrations or specified action levels requiring use of respiratory protective equipment.
- Work functions preclude splashes, immersion in, unexpected inhalation of, or direct contact with hazardous concentrations of harmful chemicals.

Level D Protective Equipment: Level D protective equipment will consist of the following, unless otherwise stated in an addendum:

- Dedicated work uniforms with long pants and long-sleeved shirt. These may include the following:
  - Chemical-resistant coveralls
  - Standard Tyvek coveralls
  - Standard cotton (or cotton blend) work uniforms

  Personnel conducting tasks that do not entail entering an exclusion or contamination reduction zone (e.g., oversight) do not need to don dedicated work uniforms to perform such activities. For oversight workers it may be advisable to keep a separate set of clothes at the office, or don disposable chemical-resistant coveralls, on an activity/need-specific basis.

- Steel-toed safety shoes or boots (leather, PVC, or rubber) meeting the specifications of American National Standards Institute (ANSI) Z41.
- Gloves that may include:
  - Heavy work gloves (e.g., cotton or leather).
  - Impervious gloves; chemical-specific gloves.
  - In general, it is recommended that an impervious glove be worn during all site activities that could result in direct contact with potentially contaminated soil, water or other items.
- Safety glasses, goggles, face shield or other approved eye protection. All approved eye protection will meet the specifications of ANSI Z87.1. The use of contact lenses is discouraged during Level D operations, however, not prohibited. Rather, safety glasses or goggles which fit over prescription lenses or prescription safety glasses or goggles are recommended.

- Hard hat, unless specifically stated otherwise. All approved hard hats will meet the specifications of ANSI Z89.1.
- Escape breathing apparatus when potential site conditions warrant.
- Hearing protection (muff or plugs) as necessary depending on measured decibel readings in the field. The protective device will have a noise reduction rating capable of providing the wearer with enough protection so as to reduce the received noise level to below 85 dBA.

Modified Level D: Because of recent concerns over the newly identified Hantavirus, which has resulted in several deaths in the southwestern part of the United States, respirators may be worn by site personnel in Level D ensembles. For this reason, personnel will be supplied with an air purifying respirator (APR), half-face or full-face, with either a dust filter or high efficiency particulate air (HEPA) filter to be used as a control device. The dust filter will suffice, as the Hantavirus is typically transported via dust particles. These filter devices can be any of the N, R, or P, 95, 99 or 100 classified series.

4.8.2 Level C Personal Protective Equipment

Level C Protection Use: Level C protection will be used under the following conditions:

- Concentration of known airborne organics or dust in the breathing zone is above the action levels given for individual work tasks.
- The types of air contaminants have been identified, concentrations measured, and an APR and chemically protective clothing are available that can protect against the identified contaminants.
- The substance(s) has adequate warning properties, and the criteria for the use of an APR have been met.
- The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin.
- The atmosphere contains at least 19.5 percent oxygen.

Level C Protective Equipment: Level C protective equipment will consist of the following:

- Chemical-resistant coveralls. This may include polyethylene-coated Tyvek, Saranex, or other approved fabric.
- Steel-toed safety shoes with disposable boot covers or chemical-resistant steel-toed boots meeting the specifications of ANSI Z41.
- Chemical-resistant gloves. This includes disposable inner gloves such as nitrile or latex; and disposable outer gloves such as nitrile, viton, silver shield, 4H, or butyl for individual work tasks.
- Work gloves as necessary to prevent cuts, scrapes and pinches.
- Half-face or full-face APR with cartridges for individual work tasks.
- Safety glasses, goggles or face shield when wearing a half-face APR, meeting the specifications of ANSI Z87.1.
- Hard hat, unless specifically stated otherwise, meeting the specifications of ANSI Z89.1.
- Cuffs sealed to boots or gloves with duct tape, or equivalent.

- Hearing protection as necessary depending on measured decibel readings in the field. The protective device will have a noise reduction rating capable of providing the wearer with enough protection so as to reduce the received noise level to below 85 dBA.

4.8.3 Level B Personal Protective Equipment

Level B Protection Use: Level B protection will be used under several conditions. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection. This involves atmospheric conditions that are immediately dangerous to life or health (IDLH) concentrations of specific substances that do not represent a severe skin hazard that do not meet the criteria for use of APRs. The presence of incompletely identified vapors or gases will be indicated by a direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin. Level B will also be used where the atmosphere contains less than 19.5 percent oxygen and action levels for contaminants of concern are exceeded.

Level B Protective Equipment: Level B protective equipment will consist of the following:

- Chemical-resistant coverall, polylaminated, Barricade or Saranex.
- Steel-toed safety shoes with disposable boot covers or chemical-resistant steel-toed boots meeting the specifications of ANSI Z41.
- Disposable, inner, surgical or nitrile gloves.
- Disposable, outer, chemical-resistant gloves, such as viton.
- Pressure-demand self-contained breathing apparatus (SCBA) or airline system with 5-minute egress bottle.
- Hard hat, unless specifically stated otherwise, meeting the specifications of ANSI Z89.1.
- Duct tape (or equivalent) to secure ankles/wrists to boots or gloves.
- Hearing protection, as necessary, depending on measured decibel readings in the field. The protective device must have a noise reduction rating capable of providing the wearer with enough protection so as to reduce the received noise level to below 85 dBA.
- Two-way radio communications, or equivalent.

Use of Level B PPE requires that at least one person be available as a backup, ready to provide emergency assistance and to assist with the air supply.

4.8.4 Level A Personal Protective Equipment

Level A provides the highest protection available for respiratory, skin, and eye protection.

Level A PPE is **not** anticipated to be required for use during the field work associated with corrective actions. However, in the event that site conditions change and the use of Level A becomes warranted, a specialty contractor will be subcontracted to provide assistance with the Level A equipment and work tasks.

Level A Protection Use: Level A protection will be used under the following conditions:

- The chemical substance has been identified and requires the highest level of protection for skin, eye, and the respiratory system based on either:
  - Measured (or potential for) high concentration of atmospheric vapors, gases, or particulates
  - Site operations and work functions involving a high potential for splash, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin
- Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible.
- Operations must be conducted in confined, poorly ventilated areas until the absence of conditions requiring Level A protection is determined.

Level A Protective Equipment: Level A protective equipment will consist of the following.

- Fully encapsulating chemical-resistant suit, as specified in an amendment to this APP.
- Steel-toed safety shoes with disposable boot covers or chemical-resistant steel-toed boots meeting the specifications of ANSI Z41.
- Disposable, inner gloves. Disposable outer gloves may also be necessary.
- Pressure-demand, full facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA.
- Hard hat, unless specifically stated otherwise, meeting the specifications of ANSI Z89.1.
- Hearing protection, as necessary, depending on measured decibel readings in the field. The protective device must have a noise reduction rating capable of providing the wearer with enough protection to reduce the received noise level to below 85 dBA.
- When heat stress is a concern, a cooling unit that can be worn inside of the fully encapsulating suit may be specified.
- Two-way radio communications or equivalent.

4.8.5 Respiratory Protective Equipment

Use of respiratory protection occurs only in accordance with the requirements of S9 CFR 1910.134, the HASP, and SSHASP. When respiratory protective equipment requirements are mandated by OSHA in the chemical-specific standards included in Subparts D and Z of 29 CPR 1926, such requirements will be specified, as applicable, in the SSHASP. Laboratory personnel required to use respirators will have a valid respirator user authorization card. Contractors whose employees use respiratory protective equipment to perform corrective action work must be enrolled in a respiratory protection program that complies with OSHA requirements.

A contractor's respiratory protection program will be submitted to the SSO for review and approval by appropriate Facility personnel at least 30 days before the scheduled start date of field operations involving use of the respiratory protective equipment. Whenever air-supplying (Level B) respiratory protection will be used, project-specific SOPs addressing the requirements and procedures for using the Level B equipment will be submitted similarly for review and approval by appropriate Facility personnel.

4.9 Site Access Control Procedures

The primary site control measures include controlled zones (e.g., EZ, CRZ, and support zone) and support facilities (e.g., equipment-staging area, support trailer(s), equipment decontamination pad, temporary drum storage area, mobile laboratory, and wash facility). The primary objectives of site control measures during field operations are:

- To prevent and limit employee exposures during corrective action field operations
- To ensure that only trained and fully informed persons are able to enter controlled areas of the work site where operational hazards are of potential concern
- To reduce the likelihood of spread of contamination by workers or equipment into uncontrolled areas of the site
- To confine work activities to appropriate areas, thereby minimizing the likelihood of accidental exposures
- To facilitate the location and evacuation of personnel in case of an emergency

The necessary site-specific control measures, some of which are required by applicable OSHA requirements, must be provided in the SSHASP. Site maps required by OSHA must be included in an appendix of the SSHASP to show the intended locations of the specified controlled zones and support facilities. Among other items, site maps should include:

- Site perimeter
- Direction of prevailing wind
- Site drainage points
- Natural and manmade features such as buildings, containers, impoundments, pits, ponds, and tanks
- Locations of work zones

Because some zone or facility locations may change as site-work progresses, the SSO must explain current locations of zones and decontamination stations to field team members during daily H&S tailgate meetings and must document these locations in his/her daily logbook. The EPA "Standard Operating Safety Guidelines" (EPA, 1992) discuss dividing hazardous waste sites into three working zones - EZ, CRZ, and support zone. Designation of three working zones is an appropriate conceptual approach. However, in practice, most Level D and Level C work entails designation of two zones only: an EZ (i.e., achieved by physical delineation using barricade tape, cones, etc.) and a support zone. Any decontamination is performed as a "step-off" decontamination at the boundary of the exclusion/support zones. Site-work zones are discussed below and presented in Figure 4.2.

{{Insert Figure 4.2}}

Exclusion Zone

The EZ, or "hot" zone, is where contamination or potential contamination exists. Since this zone has the potential for workers to be exposed to contaminants, all field staff entering this zone will wear the appropriate PPE and adhere to the training and medical surveillance requirements presented in this document. Areas with higher concentrations of contaminants within this zone will be identified (i.e., with field stakes, colored flags, etc). Field personnel entering the EZ or the higher concentration part of the EZ will enter and exit through a controlled center monitored by the SSO. Gross decontamination will take place near the "hotline," before proceeding to the CRZ. Prior to fieldwork occurring in this zone, the SSO will develop an emergency exit area. The exclusion zone will be demarcated by using lines, placards, hazard tape and/or signs, or enclosed by physical barriers, such as chains, fences or ropes.

Contamination Reduction Zone

The CRZ is the zone where field staff and equipment will undergo gross decontamination. This zone is located between the exclusion and support zones. The CRZ will serve as a buffer to further reduce the probability of the clean zone becoming contaminated or being affected by other existing hazards. It will provide additional assurance that the physical transfer of contaminants via personnel or equipment is limited through a combination of decontamination procedures and a minimum required distance between EZ and support zones. Ideally, two lines of decontamination stations should be set up within the contamination reduction corridor (the designated area within the CRZ where decontamination takes place), one for personnel and one for equipment.

Initially, the CRZ will be considered to be an uncontaminated area. At the boundary between the EZ and the CRZ, decontamination stations will be established, one for personnel and one for heavy equipment. Exit from the EZ will be through a designated decontamination corridor. Personnel assisting with decontamination will wear a level of PPE at or one below that used by personnel in the EZ.

As operations proceed, the area around the decontamination station may become contaminated, but to a much lesser degree than the EZ. On a relative basis, the amount of contaminants will decrease from the hotline to the support zone due to the distance involved and the decontamination procedures used. The "contamination control line" separating the CRZ and the support zone will be designated with yellow or orange surveyor tape, or other suitable materials.

Support Zone

The support zone, the outermost part of the regulated area, is free from recognized site hazards. Support equipment such as the command post and safety vehicles will be located in this area. Since normal work attire is appropriate within this zone, potentially contaminated personal protective clothing, equipment, and samples will not be permitted.

The location of the command post and other support facilities in the support zone at each site will depend on a number of factors, including the following:.

- Accessibility - topography, open space available, locations of roads, or other limitations.
- Visibility - line of sight to all activities in the exclusion zone is preferable.
- Wind direction - the support facilities preferably should be located upwind of the exclusion zone. Shifts in wind direction and other conditions may be such that an ideal location based on wind direction alone does not exist.
- Resource - water, electricity, places of refuge.

Access to the CRZ from the support zone will be through a controlled access point. Personnel entering the CRZ to assist in decontamination will wear the prescribed PPE. Re-entrance into the support zone will require removal of any PPE worn in the CRZ.

Only authorized personnel will enter regulated areas associated with the field activities. The SSO will establish the bounds of the regulated areas. The following measures will be taken to assure site security.

- All workers entering the regulated areas will be subject to the provisions of this health and safety plan. The SSO will have the responsibility and authority to enforce this requirement.
- All workers entering the CRZ or the EZ will have the appropriate training, PPE and respiratory protection and will be enrolled in an established medical surveillance program.
- The SSO will maintain a Site Visitor's Logbook, located in the support zone.

The SSHASP also must indicate whether each zone or facility is restricted as a regulated area and whether postings giving this information are required. Furthermore, whether the location of a facility is centralized on site or localized at multiple work areas on site, the means for demarcating each zone and other posting requirements (per 29 CFR 1926.200, "Accident Prevention Signs and Tags," and 29 CFR 1910.145, "Specifications for Accident Prevention Signs and Tags") must be specified.

4.9.1 Administrative Controls

The general work practices and administrative controls in the finalized HASP are to be implemented as applicable during corrective action field operations. Requirements addressed in the finalized HASP will be:

- Drug and alcohol policy
- Housekeeping and sanitation
- Site control measures
- Packaging, labeling, handling, transport, and disposal of hazardous substances

4.9.1.1 Required Written Programs and Permit Systems

In addition to general administrative controls and the site-specific administrative controls indicated in the SSHASP, OSHA (29 CFR 1926) has requirements that employers develop, implement, and maintain certain written programs and permit systems as a means for preventing or mitigating exposure to H&S hazards in the work place. The programs and permits required by these regulations are listed below and will be described in an appendix of the finalized HASP. When the program or permit system has been addressed sufficiently in the employer's HAZWOPER program, it need not be repeated elsewhere. Action contractors are expected to maintain and implement these programs as they apply to the project work being performed:

- Assured Equipment-Grounding Conductor Program
- Blood-borne Pathogens Exposure Control Program
- Chemical Hazard Communication Program
- Chemical-Specific Compliance Programs (OSHA-regulated substances in Subparts D and Z of 29 CFR 1926)
- Confined-Space-Entry Program (permit required)
- Hazardous Waste Operations Program

- Hearing Conservation Program
- Lockout/Tagout for Control of Hazardous Energy Sources for Personnel Safety (Red Lock Procedure) Program
- Medical Surveillance Program
- Personal Protective Equipment Program
- Respiratory Protection Program
- Spark- and Flame-Producing Operations (Hot Work/Burn Permit) Program
- Training Program

Contractors are expected to submit their programs and permits to designated Facility representatives for review and approval before implementation. At least 30 days before the scheduled start date of an operation for which a written program is required, the program must be submitted to the SSO so that it can be reviewed and approved by appropriate Facility personnel. Similarly, unless indicated otherwise below, at least 30 days before the anticipated date of permit implementation, contractors must initiate action to obtain the Facility's approval of their permits, which may include a requirement that the contractor submit project-specific SOPs.

As the host organization, the Facility will provide contractors with the hazard assessment information necessary for preparing permits. In addition, the Facility, as host organization, must be provided with a copy of the contractor's terminated permit. This copy should be given to the SSO for distribution to the appropriate Facility personnel.

4.9.1.2 Site Visitor Policy

A visitor (e.g., regulatory personnel, private property owners, field auditors, or the public) is anyone who arrives at the work site who is not identified in the project-specific documents as a project team member or associated support personnel. When a visitor arrives, the SSO or designee must meet with the visitor to determine the purpose of the visit and to provide a safety briefing. This briefing must include, at a minimum, a description of known and anticipated hazards and the applicable controls, site emergency response procedures, and site escort requirements.

Visitors are not permitted to enter limited-access, controlled work zones unless absolutely necessary. In such cases, the visitor must be briefed per the finalized HASP, must meet all applicable requirements of the HASP and SSHASP, and may need to be accompanied by an escort, at the discretion of the SSO. If a visitor does not comply with these requirements, the SSO, or designee, must request the visitor to leave the controlled zone immediately or must limit site operations to minimize threat of harm to the visitor (e.g., have the project team take a break, reset the zone boundaries if appropriate, or temporarily discontinue any threatening task). Alternatively, if a visitor needs to observe work being performed in a controlled zone which is not readily visible from outside the zone(s), the SSO should consider videotaping or photographing the work, if allowed by security.

4.9.2 Engineered Controls

As a first line of defense, OSHA requires that employers implement administrative and/or engineering controls to prevent and/or mitigate hazards and protect site personnel. Secondarily, employers may require employees to use PPE (Section 4.5 of this document). Site-specific administrative and engineering requirements must be included in the SSHASP.

4.9.3 Communications

H&S issues must be communicated quickly and effectively to protect affected corrective action team members and nearby personnel. To meet this requirement, several communications processes are implemented. These processes may be adjusted as necessary to best meet the needs of each field project and must be accurately described in each SSHASP.

4.9.3.1 Pre-Field Communications

H&S communications start before a person joins the corrective action. Managers and supervisors communicate the importance of H&S during the interview process. It is a requirement that all candidates comprehend the issues, understand the importance, and accept the responsibility to work according to the HASP and SSHASPs. H&S communications continue during the training of personnel for the corrective action. This includes general and Facility-specific H&S requirements and a pre-job-start H&S briefing. (See the finalized HASP for more details.)

4.9.3.2 Field Communications

Routine communications processes are employed as long as field activities are progressing as planned and conditions are consistent with those anticipated and addressed in the SSHASP. Each morning, a tailgate safety meeting is held (see the finalized HASP). Attendance is mandatory for all project team members on site. The SSO or his designee will conduct the meetings. During these meetings, the work plan for the day will be discussed and specific task hazard analyses reviewed. Feedback from team members will be actively solicited and incorporated into hazard control measures. Periodically, special emphasis topics will be included in the meeting. These are 5- to 10-minute refresher sessions covering H&S topics that are relevant to the work being conducted. Additional tailgate safety meetings may be held at the discretion of the SSO.

When field conditions change, added communication will be required. The SSO or designee will be responsible for communicating the changes to all field team members, the responsible PM, subcontractor management, corrective action support personnel and other personnel, as appropriate. Changing conditions often require a temporary "stop activity" until all H&S hazards can be adequately identified and controlled (Sections 4.5 and 4.9.3.3).

4.9.3.3 Stop-Activity and Stop-Work Orders

It is necessary to discontinue an activity on site or an entire field project when the conditions of operation are unsafe and must be reassessed to determine the appropriate means and/or methods for continuing work safely. The PM will be notified by the SSO of any stop-activity or stop-work and the actions already taken or proposed to rectify the hazardous situation.

Implementing stop activity and stop work may require an ad hoc safety planning meeting and immediate telephone calls or radio communications. If unanticipated tasks must be performed, an activity hazard assessment must be performed and the resulting information communicated to all affected personnel.

Any individual observing an operation that presents a clear and imminent danger to the environment or to the H&S of site personnel, visitors, or the public is obligated and has the authority to immediately notify the individuals involved and the SSO. In turn, the SSO must verbally notify supervisors and individuals on the site of the danger. Once it has been concluded that conditions or practices exist that pose a threat to personnel or environmental safety or health, the SSO must take action to diminish the immediate threat of harm. Operations must be altered or discontinued to eliminate the immediate threat of harm, and individuals must be directed to immediately leave an area of imminent danger.

A stop-activity may involve a situation such as removing defective equipment that could result in an injury or

illness or removing site personnel from a section of scaffolding that is defective. In these cases, the activity may be stopped without stopping the entire field operation. Authorization to begin an activity again is given by the PM only when it has been determined that the hazard(s) has/have been sufficiently abated, there is no further threat of harm, the PM and SSO have concurred, and affected personnel have been notified of the intent to restart.

In situations where the activity or work stoppage has contractual implications, the contract administrator must be involved in the assessment and decision to issue a stop-work order. A formal ("contractual") stop-work order may be issued only by a Facility contract administrator. The Facility SSO may provide recommendations regarding the need to issue a stop-work order by notifying the PM. The PM or the SSO will contact the contract administrator to arrange for review of the matter and will proceed in accordance with applicable Facility procedures. Only a Facility contract administrator may authorize the restarting of work after a stop-work order.

4.9.3.4 Post-Field Communications

At the conclusion of field activities, the SSO will analyze the effectiveness of the H&S program. If appropriate, feedback should be provided to project management. Suggested changes will be incorporated for continuous improvement. This is particularly relevant when there have been H&S problems or when things have gone exceptionally well.

4.10 Decontamination Procedures

Decontamination involves physically removing contaminants from personnel and equipment. This section has been developed to meet applicable OSHA requirements (i.e., those included in 29 CFR 1926.65[k], Subparts D and Z of 29 CFR 1926). The contamination reduction zone should include separate designated areas for a personnel contamination reduction corridor and an equipment contamination reduction corridor. The contamination reduction corridor boundaries must be conspicuously marked and must have restricted entry and exit points. Personnel must decontaminate themselves and any equipment that is contaminated or suspected of being contaminated according to the procedures specified in the SSHASP.

The SSO must monitor decontamination activities to determine their effectiveness. If procedures are found to be ineffective, steps must be taken to correct any deficiencies and document any deviations from the SSHASP using a modification form that will appear in an appendix of the finalized HASP. The following general requirements apply to personnel and equipment decontamination processes for Action work:

- Personnel, equipment, and vehicles must be decontaminated before exiting the contamination reduction zone. Clothing and equipment that cannot be decontaminated sufficiently must be properly contained and labeled before being transferred beyond the controlled work zones of the site.
- If any significant contamination is encountered, PPE should be disposed rather than decontaminated for reuse (see the finalized HASP).
- Loose contaminants (dusts and vapors) that cling to clothing or equipment must be removed according to the applicable decontamination procedures (e.g., using a water or water-based detergent rinse and scrub brush), except when radiation action levels are exceeded (see the finalized HASP).
- Care is taken to avoid generating mixed wastes during decontamination operations.

Rinse water and wastes generated on site must be contained and disposed according to the finalized Facility-wide HASP.

4.11 Emergency AND Medical Care Procedures

The information below presents procedures for medical emergency, site contingency, medical surveillance, and training and medical records.

4.11.1 Emergency and Contingency Plan

This section describes the generic aspects of the emergency and incident action plan, which applies to all field operations of the corrective action. Site-specific details of this plan and the necessary equipment and supplies to execute this plan must be included in the SSHASP. Any deviations or exceptions to this section must be described in the SSHASP.

This section has been developed to meet the requirements of 29 CFR 1926.24 and 29 CFR 1926.65(1), and, as applicable, 29 CFR 1926.65(q) or 29 CFR 1926.35(b). It addresses contingency planning, response actions, and associated personnel and equipment requirements in the event of occurrence of an incident or emergency as defined in this section. OSHA requires that this plan be rehearsed regularly as part of the overall training program for site operations [29 CFR 1926.65(l)(3)(iv)].

Explanations and definitions for determining the category of an unplanned or uncontrolled event will be provided in the Facility or corrective action H&S manual. For purposes of this section, the term "emergency" is used to refer to unplanned or uncontrolled events, such as:

- Situations necessitating rescue and/or administration of first-aid and/or CPR by qualified on-site responders per this section
- Situations necessitating fire fighting by qualified on-site responders per this section
- Releases of hazardous substances that cannot be responded to and adequately dealt with by qualified on-site personnel and resources per this section
- Incidents involving local or adjacent facility operations that may influence field operations

For purposes of corrective action fieldwork, the term "incidental release" is used to refer to unplanned or uncontrolled releases of hazardous substances that can be responded to and adequately dealt with by qualified on-site personnel and resources per this section. By this definition, incidental releases are defined as a release of insufficient quantity to pose a significant H&S hazard to field personnel in the immediate vicinity, to field personnel responding defensively, or to the surrounding environment. The SSO or designee, directs and coordinates responses to incidental releases. These responsibilities include appropriately responding to the situations listed above, safely evacuating on-site personnel, gathering on-site personnel at the designated muster area, notifying emergency contacts, documenting that on-site personnel are accounted for at the muster area, conducting a follow-up investigation, and reporting the incident.

Releases of hazardous substances in sufficient quantity to necessitate a response either by personnel from outside the immediate release area or by other designated responders, such as the fire department or the Facility's Hazardous Materials Response Team (HAZMAT), are considered emergencies. In such circumstances, on-site personnel are allowed only to take defensive actions for which they have been trained and are equipped in accordance with this section.

The SSO must direct and coordinate responses to emergencies in accordance with this section until off-site emergency responders arrive and implement the incident Command System. On-site spills or releases of hazardous substances must be handled in accordance with applicable requirements of this section and according to an approved site-specific spill prevention control and countermeasures plan prepared in

accordance with the Facility's Spill Prevention Control and Countermeasures Plan which will be generated once the final design or the Facility is completed.

Posting Requirements

At the start of field operations, emergency contacts and phone numbers, reporting information, emergency equipment, and maps of the route(s) to the nearest medical facility must be posted at a location on site where personnel may readily access the information. This site-specific information must be included in the SSHASP.

Emergency Alerting and Site Evacuation Procedures

The PM and SSO will determine site-specific emergency alerting procedures, evacuation procedures and routes, and locations of muster areas. This information must be included in the SSHASP and be communicated by the SSO, or designee, to on-site personnel during the pre-job-start H&S briefing and/or the daily tailgate H&S meetings. The DOT's "2000 Emergency Response Guidebook" (DOT 2000, 65088) provides information for determining the extent of and safe distances for evacuation, which must be referenced in the SSHASP for each chemical substance identified in the SSHASP. Evacuation routes and muster areas should be predominantly upwind, uphill, and upstream of work areas where fire or release of chemical contaminants might occur.

An employee alarm system must be specified in the SSHASP and must be established at the work site in accordance with 29 CFR 1926.65(l)(3)(vi) and 1926.159. The SSHASP also must include means and methods for alerting contact personnel at adjacent facilities of on-site events that could pose a threat to off-site facilities. It also must include means and methods for designated personnel at adjacent off-site facilities to alert on-site personnel of events that could pose a threat to on-site personnel or operations. The phone numbers or radio stations of contact personnel at adjacent facilities must be given in the list of emergency contacts included as an appendix to the SSHASP.

General procedures for site evacuation will be included in the finalized HASP, and procedures for on-site responders who are trained and equipped to respond to incidents in accordance with this section will also be provided in the finalized HASP prior to construction and operation of the Facility. Information will include procedures for the following:

- Emergency medical treatment and first aid/CPR
- Life-threatening cases
- Other cases
- Exposure to another's blood or body fluids
- Emergency decontamination of personnel

Reporting Emergencies and Incidents

The Facility procedure for making notifications in follow-up to an emergency or incident will be provided in the Facility's finalized HASP prior to the commencement of operations. Accidents, emergencies, incidents, injuries, and illnesses must be reported to the PM and/or the SSO. In the event of an occurrence necessitating medical care, the SSO must arrange for notification of the key personnel which must be listed in an appendix of the SSHASP (i.e., other line managers, the SSO, and the employee's manager) as soon as possible.

Response Critique and Followup

Before normal site activities are resumed, the PM, or his/her delegate, must evaluate the incident or emergency to determine:

- The cause
- Effectiveness of emergency/incident planning, preparedness, and response
- How the emergency or incident could have been prevented
- Considerations for improvements of the emergency/incident response plans

Points to be considered include whether procedures are adequate and were implemented correctly and in a timely manner. Before resuming normal site activities, personnel must be fully trained and equipped to handle another emergency or incident, which requires restocking emergency equipment and supplies and inspecting, testing, and resetting emergency equipment and systems.

4.11.2 Contingency Information

As background, Attachment C of the Facility's RCRA permit presents details for contingency measures that would be implemented in the event of an emergency at the Facility. Attachment C contains:

- Description of the Facility layout
- Location of possible hazards
- Location of emergency and decontamination equipment
- Evacuation plans and routes
- Response agreements with local emergency personnel
- List of names, addresses, and telephone numbers of Facility personnel qualified as Emergency Coordinator

4.11.3 Emergency Medical Services

IN AN EMERGENCY, ALWAYS PROVIDE YOUR EXACT LOCATION TO THE 911 OPERATOR

The SSO will be responsible for taking necessary action and contacting the appropriate emergency contacts in case of an emergency.

24-Hour Emergency Hospital

Eastern New Mexico Medical Center (505) 622-8170
405 W. Country Club Road
Roswell, New Mexico 88201

Routes to the Eastern New Mexico Medical Center are shown in Figure 1.1. From the Facility, access U.S. Highway 380 and proceed westbound to the City of Roswell. Turn right at North Main Street (North) which is identified as U.S. Highway 285 and U.S. Highway 70. Proceed on North Main Street for about 1.8 miles. Turn left (west) onto Country Club Road. Proceed about ¼ mile and the ENMMC emergency entrance will be on the right.

Other Emergency Contact Numbers

Ambulance	9-1-1
Fire Department	9-1-1
Police Department	9-1-1
Poison Control	(800) 282-3171
National Response Center	(800) 424-8802
Utilities Underground Location Center	(800) 424-5555
Client: Gandy Marley, Inc. – Larry Gandy	(505) 398-4960

4.11.4 Medical Surveillance

Before the SSO authorizes access to areas of the site where site controls have been established (e.g., exclusion and contamination reduction zones and other regulated areas), it is the responsibility of the SSO to verify that personnel entering such areas have a current certification of medical fitness for duty (see the finalized HASP). The site-specific medical surveillance requirements that meet applicable OSHA regulations must be specified in the SSHASP if they differ from those included in the HASP for the overall Facility.

A written medical surveillance program that complies with the requirements of this section must be implemented by employers of personnel working for the corrective action. These requirements include:

- Identification of active participants in the employer's medical surveillance program
- Cost and frequency of examinations
- Content of examinations
- Information to be provided to the examining physician
- Information to be obtained from the physician, including a form that will be provided in the finalized HASP

4.11.5 RecordKeeping

Site Records

The SSO must keep a daily record of H&S-related events in a bound field logbook and must verify employee training and medical surveillance records in accordance with the finalized HASP. Records of all training will be maintained and available for oversight review. Sections 7.3.2 and 7.3.3 of Permit Attachment E describe training records retention policies for both current and former Facility employees.

Employee Exposure and Medical Records

Employers must retain exposure-monitoring and medical records for their employees who work on a corrective action in accordance with OSHA's standard (29 CFR 1926.33, "Access to Employee Exposure and Medical Records." Medical records do not include medical examination or test results but include the employee's name and social security number, the physician's written opinion and recommended limitations, any medical complaints related to exposure of hazardous substances, and a copy of the information provided to the examining physician by the employer (not including a copy of the OSHA standard).

Records must be retained in accordance with the following requirements, as well as any other applicable requirements:

- To the extent permitted by law, the employer must maintain and keep in confidence records for each employee.
- The employer must maintain medical records for each employee for the duration of employment plus 30 years (except health insurance claims records maintained separately from the employer's medical surveillance program records, first-aid records of one-time treatments, and medical records of employees who have worked for the employer for less than 1 year and who have seen the records before termination).
- The employer must maintain exposure records for each employee monitored for 30 years.
- The employer must ensure that each employee, upon his/her request, has access to his/her records.
- Upon an employee's written request, the employer must ensure that the employee's designee has access to the employee's record(s). A sample consent form is provided in Appendix A of 29 CFR 1926.33.
- Whenever an employee or his/her designated representative requests access to an employee record, the employer must ensure that access is provided in a reasonable time and manner. If the employer cannot provide access to the record(s) within 15 working days, before the 15th working day following the request for access, the employer must apprise the requester of the reason for the delay and the earliest date the record(s) can be made available.
- Whenever an employee, or his/her designated representative, requests a copy of a record, the employer must ensure that either a copy of the record is provided without cost to the requester, the necessary copying equipment is made available without cost to the requester for the purpose of copying the record, or the record is lent to the requester for a reasonable time to enable a copy to be made.
- Once a record has been provided without cost to the requester, the employer may charge a reasonable, nondiscriminatory administrative cost for subsequent copies of the record. However, an employer must not charge for an initial request for a copy of new information that has been added to a record which was previously provided.

For purposes of follow-up investigation of an accident or incident, the employee's consent for the investigator(s) to access his/her records must be obtained in accordance with 29 CFR 1926.33.

Emergency/Incident Records

Records of emergency or incident reports and follow-up investigations must be processed as specified in the finalized HASP.

4.12 Environmental Field Monitoring Program

Guidance for monitoring and assessing occupational exposure to chemical, biological, and physical hazards will be provided by the Facility SSO. The exposure-monitoring strategy will be developed cooperatively by the following professionals:

- An Industrial hygienist who is certified by the American Board of Industrial Hygiene or who is otherwise Board-eligible or who has a minimum of three years' experience developing such strategies

Site-specific exposure-monitoring strategies, including action levels that meet applicable OSHA requirements, must be specified in the SSHASP for each project task having different requirements. Exposure-monitoring strategies, including establishment of action levels, are determined based on the hazards that can be

monitored using analytical instrumentation and published exposure limits and physical, chemical, and toxicological properties of the chemical and/or radiological substances of concern. This information is included in an appendix to the SSHASP for the chemical substances of occupational concern included in the SSHASP. Guidance for setting action levels for exposure to chemical substances is provided by the American Industrial Hygiene Association Hazardous Waste Committee.

Exposure monitoring must include use of direct-reading instruments, personal breathing zone sampling, and area sampling, as necessary, to evaluate the hazardous conditions posed by chemical substances on site. OSHA (29 CFR 1926.65[b][4][ii][E]) requires that the following information be specified in the SSHASP for each type of monitoring instrument to be used for exposure monitoring:

- Procedure for calibration, maintenance, and use
- Locations and frequencies of monitoring
- Corresponding action-level (s), response actions, and rationales

When OSHA has mandated methods in the chemical-specific regulatory standards included in Subparts D and Z of 29 CFR 1926, such methods must be specified in the SSHASP. Programmatic managers who choose to use alternative methods must provide a copy of the methods with the SSHASP for review and approval.

The results of exposure monitoring must be documented, and affected personnel must be informed of these results in accordance with the requirements of Section 6.8 below. Forms for recording the results of monitoring chemical exposure will be included with the respective monitoring instrument method in the Facility H&S manual.

Analytical laboratories analyzing samples are accredited by the EPA and/or the American Industrial Hygiene Association. (Accreditation by the latter organization is necessary for samples collected using OSHA or National Institute for Occupational Safety and Health methods.) Samples are analyzed as indicated in the contractor's radiological safety program, which has been approved by the Facility prior to sample shipment.

4.13 Training Program

Described in this section are the OSHA and Facility worker H&S training requirements applicable to corrective action field operations. In accordance with OSHA's training requirement in 29 CFR 1926.65(e)(1)(ii), "Hazardous Waste Operations and Emergency Response," field team personnel must have the necessary training to perform their assigned task(s) and associated responsibilities. Before the SSO tasks a project field team member with performing a corrective action field duty, the RCRA Training Officer (RTO) and SSO will verify that the field team member has current certifications of required training.

Permit Attachment E describes the training program that will be required for Facility personnel for normal operations and emergencies. These training requirements will also apply to Facility personnel taking part in a corrective action at the Facility. As described below, corrective action personnel will be required to have completed the following types of training:

- OSHA 40-hour training (HAZWOPER)
- Initial RCRA training consisting of 8-hour classroom training
- Job-specific training

Annual refresher training will be provided for each of these programs. Permit Attachment E also contains training provisions for site visitors and off-site emergency response organizations.

4.13.1 HAZWOPER Requirements

General Requirements

All employees working on site who are exposed to safety hazards, health hazards, or hazardous substances and their supervisors and managers responsible for the site must receive training that meets the requirements of the finalized HASP before they are permitted to engage in HAZWOPER work. Employees are not permitted to participate in or supervise corrective action field activities until they have been trained at the level required by their job function and responsibility.

Employees and supervisors who have successfully completed the training and field experience requirements of the finalized HASP are certified by their instructor, or the head instructor and trained supervisor, as having successfully completed the necessary training. OSHA requires that a written certificate be given to each person so certified.

Trainers must be qualified to instruct employees about the subject matter that they are presenting. Trainers must have the academic credentials and instructional experience necessary for teaching the subject(s) or must have completed a training program for teaching the subject(s). Instructors must demonstrate competent instructional skills and knowledge of the subject matter.

Employers who can show by documentation or certification that an employee's work experience and/or training has resulted in training equivalent to the training requirements of the finalized HASP are not required to provide the initial training. The employer must certify this equivalency and provide a copy of this certificate to the employee.

Anyone who has not been certified in accordance with the finalized HASP is prohibited from engaging in corrective action field activities. General HAZWOPER training requirements are described in the Facility HASP and include:

- Worker training and supervised fieldwork for periods determined by expected exposure
- Initial 40 hours of training and 24 hours of supervised fieldwork (for areas in which contaminant concentrations may exceed exposure limits)
- Initial 24 hours of training and 6 hours of supervised fieldwork (for areas in which contaminant concentrations are not expected to exceed exposure limits)
- Management and supervisor training
- Annual refresher training
- SSO requirements
- Industrial hygiene technician requirements

Emergency Response Training

If a PM, SSO, or subcontractor supervisor/subcontractor project manager chooses to have on-site personnel take any action other than immediate evacuation of the site in the event of a release or substantial threat of release of a hazardous substance, on-site personnel must receive the training described in the finalized HASP as applicable for the tasks to be performed. The training categories include first-responder awareness level training and first-responder operations level training. OSHA requires that personnel who have been trained

in accordance with this section receive annual refresher training of sufficient content and duration to maintain their competencies or demonstrate their competency at least yearly.

Pre-Job-Start H&S Briefing

In accordance with 29 CFR 1926.65(b)(4)(iii), the SSO must conduct training on the contents of the SSHASP before fieldwork begins so that each field team member is informed of the site-specific information and requirements applicable to the scope of work. This H&S briefing covers the contents of the SSHASP and applicable portions of the HASP.

Daily Tailgate H&S Meetings

Before beginning fieldwork each day and before each new shift, the SSO, task leader, or subcontractor supervisor/subcontractor project manager must conduct a tailgate H&S meeting. Field team members should be encouraged to discuss any health- or safety-related concerns during this meeting without fear of reprisal. Topics covered and attendance must be documented. During these tailgate meetings, field team members are informed of at least the following:

- Any newly identified hazards and associated monitoring and exposure control measures and results not discussed previously
- Problems or concerns (especially H&S) that have arisen since the previous tailgate meeting

4.13.2 8-Hour RCRA Classroom Training

The 8-hour RCRA classroom training (and annual 4-hour refresher training) will also be conducted for new personnel who will participate in a corrective action. As described in Permit Attachment E, Section 7.2.1.1, the training will be designed to achieve several important goals regarding personnel knowledge of key areas of hazardous waste management including:

- Developing a basic understanding of the regulatory requirements for RCRA Waste Treatment, Storage, and Disposal Operation (TSD) facilities
- Promoting an understanding of policies and procedures for protecting human health and the environment
- Ensuring adequate hazardous waste management
- Emergency response procedures

4.13.3 Job-Specific Training

Job-specific training will also be provided to new personnel who will participate in a corrective action. Attachment E, Section 7.2.1.2 of the Facility's RCRA permit, contains checklists and training elements that will be included in the training.

4.13.4 First-Aid Requirements

In accordance with 29 CFR 1926.50, "Medical Services and First Aid," in the absence of a hospital or clinic that is reasonably accessible in terms of time and distance to the work site (i.e., capable of rendering treatment within four minutes of occurrence of the injury or illness), a person who has a valid certificate in first-aid training from the American Red Cross, or equivalent, will be available at the work site to render first aid. The finalized HASP will contain more detailed information concerning first aid.

4.13.5 Other OSHA Requirements

OSHA has numerous other standards and associated training requirements applicable to corrective action work. Some of these requirements apply at a programmatic level and are addressed in Sections 3.6 and 3.12 above. Other training requirements apply to specific individuals who are either a competent person or a qualified person in the subject matter pertaining to their job function, as defined by OSHA [29 CFR 1926.32(f) and (m)] respectively, and/or as defined by applicable operation- or substance-specific standards (29 CFR 1926 and/or 29 CFR 1910, which are cited throughout this section and will be sited throughout the HASP and the SSHASPs. Examples of these types of training are those for confined-space entry, lockout/tagout of energized equipment, electrical safety, trenching and excavation, respiratory protection, bloodborne pathogen exposure control, etc.

Site-specific training requirements that meet the requirements of this section are dictated by the operations and conditions occurring on site and must be specified in the SSHASP or in a modification form to the SSHASP, as the requirement arises.

4.14 Worker Protection from Weather Conditions

The information below presents procedures that will be followed by site workers for ensuring that weather-related conditions do not become an occupational health issue that could affect the corrective action process.

4.14.1 Hot and Cold Weather

Heat Stress: The stress of working in a hot environment can cause a variety of illnesses, including heat exhaustion or heat stroke; the latter can be fatal. PPE (i.e., EPA Level C protection) can significantly increase heat stress. To reduce or prevent heat stress, frequent rest periods and controlled beverage consumption to replace body fluids and salts may be required. It should be noted that heat stress can occur in people wearing regular, permeable, work clothing.

Personnel will be trained to recognize the symptoms of heat stress and the appropriate action to take upon recognition. Even though physiological monitoring is not always necessary, it is essential that personnel understand the significance of heat stress and its recognition.

Some of the symptoms which indicate heat exhaustion are:

- Clammy skin
- Weakness, fatigue
- Lightheadedness
- Confusion
- Slurred speech
- Fainting
- Rapid pulse
- Nausea (vomiting)

If these conditions are noted, the following steps should be performed:

- Remove the victim to a cool and uncontaminated area.
- Remove protective clothing.
- Give water to drink, if conscious.

Symptoms that indicate heat stroke include:

- Staggering gait
- Mental confusion
- Hot skin, temperature rise (yet may feel chilled)
- Convulsions
- Incoherent, delirious

If heat stroke conditions are noted, immediately perform the following steps.

- Remove victim to a cool, uncontaminated area.
- Cool the victim, whole body, with water, compresses and/or rapid fanning.
- Give water to drink, if conscious.
- Transport the victim to the designated medical facility for further cooling and monitoring of body functions. **HEAT STROKE IS A MEDICAL EMERGENCY!**

Physiological monitoring for heat stress may be conducted as deemed necessary. Physiological monitoring for heat stress includes heart rate as a primary indicator and oral temperature as a secondary indicator. The frequency of monitoring depends on the ambient temperature and the level of protection used on site. To determine the initial monitoring frequency, after a work period of moderate exertion, use the following information:

Adjusted Temperature[1]	Level D	Level C
90°F or above	after 45 minutes	after 15 minutes
87.5 to 90°F	after 60 minutes	after 30 minutes
82.5 to 87.5°F	after 90 minutes	after 60 minutes
77.5 to 82.5°F	after 120 minutes	after 90 minutes
72.5 to 77.5°F	after 150 minutes	after 120 minutes

[1]Adjusted air temperature (°F) = observed temp + (13 x percent sunshine)

Air temperature is measured with a bulb shielded from radiant heat; percent sunshine is the time sun is not covered by clouds thick enough to produce a shadow (100 percent = no cloud cover and a sharp, distinct shadow; 0 percent = no shadows) (The Industrial Environment, its Evaluation and Control; U.S. Department of Health and Human Services, 1973).

The following procedures and action levels are to be used for the physiological monitoring of heat stress.

Heart rate: Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle one-

third and keep the rest period the same. If the heart rate exceeds the 110 beats per minute at the next rest period, shorten the following work cycle by another one-third and also monitor oral temperature.

Oral temperature: Use a clinical thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period (before drinking). If oral temperature exceeds 99.6°F, shorten the next work cycle by one-third without changing the rest period. If oral temperature exceeds 99.6°F at the beginning of the next rest period, shorten the following work cycle by one-third. **DO NOT** allow a field team member to wear EPA Level C protection (or higher) when oral temperature exceeds 100.6°F.

Cold Stress: On days with low temperatures, high winds, and humidity, anyone can suffer from the extreme cold. Severe cold exposure can be life threatening. Several factors increase the harmful effects of cold: being very young or very old, wet clothing, having wounds or fractures, smoking, drinking alcoholic beverages, fatigue, emotional stress, and certain diseases and medications.

Cold weather injuries may either be local or systemic. Local cold weather injuries include chilblains (chronic injury of the skin and peripheral capillary circulation) and frostbite. Frostbite occurs in three progressive stages: frostnip, superficial frostbite, and deep frostbite. Systemic cold injuries, due to hypothermia, are those that affect the entire body system. Hypothermia is caused by exposure to cold and is aggravated by moisture, cold winds, fatigue, hunger, and inadequate clothing or shelter. Precautionary measures that will be taken include the following.

- Provide field shelters or wind screens.
- Monitor temperature and wind speed to determine appropriate cold-stress personal safety measures.
- Adjust work schedule based on weather conditions and temperature.
- Provide insulated clothing for field workers.
- Adhere strictly to the buddy system so that workers can assess cold-stress symptoms in their coworkers.

Frostbite Monitoring: Frostbite is a potentially crippling condition which can occur when inadequately protected skin or body parts are subjected to freezing weather. All team members should continually be alert for signs of frostbite in coworkers and bring it to the attention of the SSO. A cold feeling, pain, and numbness precede the onset of frostbite. Frostbitten skin usually appears as gray or white waxy spots on skin. Areas most susceptible are nose, ears, and cheeks. The following steps should be taken to avoid frostbite.

- Dress warmly.
- Wear layers of clothes.
- Keep boots and gloves loose fitting.
- Stay dry; carry extra clothing.
- Avoid touching cold metal with bare hands.
- Avoid spilling cold fuel, alcohol, or other liquids that freeze below 32°F on your body or clothing.

If a person suffers frostbite, get them to a hospital as soon as possible. If transport to a hospital is not immediately available, get the person to a warm shelter and immediately perform the following:

- Cover exposed areas with additional clothing while still exposed to the elements.

- Wrap the person in blankets or a sleeping bag.
- Give the person warm drinks (no liquor).
- Undress the frozen part and submerge the frozen part in a tub of warm water (102° F to 105°F), or put the frostbitten person in a large tub of warm water, if available, and stir the water.
- Warm with skin to skin contact such as: placing warm hands on frozen nose or ears, but do not rub.
- Get the person to a hospital as soon as possible

Do ***not*** allow the following to occur:

- Do not rub the frozen part.
- Do not give the person liquor.
- Do not allow the person to walk on thawed feet; carry the person or seek additional help.
- Do not let the person smoke.
- Do not break any blisters that may form.
- Do not let the thawed part freeze again.
- Do not warm the frozen part in front of a source of dry heat (open fire, oven, etc.).

Hypothermia Monitoring: Hypothermia is a lowering of the body's temperature due to exposure to cold or cool temperatures. All team members should continually be alert for signs of hypothermia in coworkers and bring it to the attention of the SSO. Most cases of hypothermia occur at temperatures between 30° F and 50° F. If not properly treated, hypothermia can cause death in a victim. Safety equipment for hypothermia should include a synthetic sleeping bag and a hypothermia thermometer. Hypothermia is a medical emergency. Transport to a hospital as soon as possible, even if victim appears to be recovering.

To prevent hypothermia, do the following:

- Eat well prior to exposure
- Dress warmly
- Avoid becoming wet due to sweating, rain or snow, or falling in water

Early signs of hypothermia may include the following.

- Violent shivering
- Slurred speech
- Decrease in coordination
- Confusion, inability to answer simple questions
- Unusually irritable behavior
- Strange behavior
- Tendency to drop or lose clothing or equipment

As hypothermia progresses into more serious stages victims typically experience the following.

- Develop trouble seeing clearly
- Become sleepy and numb
- Move with difficulty
- Eventually become unconscious, if not properly cared for

The following actions should be taken to treat a hypothermia victim.

- Get the victim to a warm, dry shelter as soon as possible.
- Move any wet or cold garments and dry the person thoroughly.
- Wrap the victim in blankets, sleeping bags or dry clothing to prevent more heat loss.
- If a warm area is not available:
  - Build a shelter and put the victim in the warmest, driest area available.
  - Remove any wet or cold garments.
  - Have one or more persons remove their clothing and lay next to the victim, providing skin to skin contact.
  - Wrap the victim and rescuers in dry warm blankets, sleeping bags or clothing.
- When the victim becomes conscious, place warm objects along the victim's sides to warm vital areas.
- When the victim is able to swallow easily, provide warm, sweetened drinks and food (preferably candy or sweetened food).
- Do not give the victim alcohol or allow them to smoke.
- Do not rub the victim's skin.
- Keep checking the victim and give additional assistance as needed.

4.14.2 Storm Conditions

Severe Weather: This section provides general information and controls on several types of severe weather that could potentially occur at the project site.

Lightning: If a lightning storm is suspected or observed, all site activities must be stopped and evaluated in terms of providing a potential lightning rod. Drill rig mast provides a conduit for lightning to strike and injure workers. Personnel should wait indoors for the storm or lightning event to end. If the strike of lightning occurs and personnel are out in the field, the response should be to disband from one another and lay low to the ground by dropping to your knees and bending forward with your hands wrapped around your knees, away from any poles or trees.

Persons struck by lightning receive a severe electrical shock and may be burned, but they carry no electrical charge and can be handled safely. Someone who appears to have been killed by lightning often can be revived by prompt action. Those unconscious but breathing will probably recover spontaneously. First aid and CPR should be administered as appropriate until medical assistance arrives. Realize that victims who appear to be only stunned or otherwise unhurt also need attention. Check for burns, especially at fingers and toes and next to metal buckles, jewelry, or personal items that the victim is wearing. Remember to treat for shock.

Winter Storms: When snow or ice storms are predicted for the project area, site personnel should monitor weather conditions on a radio. A winter storm watch is issued when a storm has formed and is approaching the area. A winter storm warning is issued when a storm is imminent and immediate action is to be taken.

When a storm watch is issued, monitor weather conditions and prepare to halt site activities. Notify the PM of the situation. Seek shelter at site buildings or leave the site and seek warm shelter.

If you are caught in a severe winter storm while traveling, seek warm shelter if road conditions prevent safe travel. If you are stranded in a vehicle during a winter storm, do the following:

- Stay in the vehicle. Disorientation comes quickly in blowing and drifting snow.
- Wait for help.
- Keep a window open an inch or so to avoid carbon monoxide poisoning.
- Run the engine and heater sparingly.
- Keep watch - do not let everyone sleep at the same time.
- Exercise occasionally.

4.15 References for Section 4

National Institute for Occupational Safety and Health (NIOSH) Guidance Manual for Hazardous Waste Sites Activities, (1985)

U.S. Environmental Protection Agency (EPA) Order 1440.1, Respiratory Protection

U.S. Environmental Protection Agency (EPA) Order 1440.3, Health and Safety Requirements for Employees Engaged in Field Activities

U.S. Environmental Protection Agency (EPA), Operating Safety Guide, 1984

Occupational Safety and Health Administration Regulations, 29 CFR Parts 1910 and 1926

5. Community Relations Plan

5.1 Introduction

The RCRA requires public participation activities pertaining to the corrective action process. As required under Permit Attachment R of the Facility RCRA Permit, Gandy-Marley has prepared this CRP. The intent of this plan is to provide the public with timely information regarding investigation of the nature, rate, and extent of a contaminant release at the Facility. In the unlikely event of such a release, Gandy-Marley is committed to the timely dissemination of such information.

This CRP describes the community information program to be implemented at the Facility. It serves as the framework to ensure a successful information exchange with the public during corrective action investigation activities. It describes planned community relations activities and communications strategy for the Facility. This plan has been prepared consistent with U.S. EPA guidelines on public participation and all work conducted under this plan will be done in accordance with internal administrative controls.

This CRP consists of the following sections.

- Section 5.1 Introduction
- Section 5.2 Community Profile
- Section 5.3 Community Relations Objectives

- Section 5.4 Community Relations Activities
- Section 5.5 Community Input into Plan

5.2 Community Profile

The Facility is located in Southeastern New Mexico on approximately 480 acres of privately owned land in Chaves County. By road, the Facility is approximately 43 miles east of Roswell and 36 miles west of Tatum. Additional nearby towns include Lovington, Hobbs, Artesia, and Carlsbad (Figure 1.1). As illustrated in Table 5.1 below, there are 12 residences within a 10-mile radius of the Facility with the nearest one being owned by Marley Ranches, Ltd., located approximately 2.9 miles to the east-southeast.

Table 5.1. Residences Within a 10-Mile Radius of the Facility

Owner	Distance	Direction
Marley Ranch	Approximately 2.9 miles	East-Southeast
Bill Kolb – KOBR TV Towers	Approximately 4.5 miles	East
KOBR TV – two dwellings	Approximately 4.5 miles	East
Pearce Ranch	Approximately 4.5 miles	Southeast
Sand Ranch	Approximately 6.3 miles	Northeast
Jack Luce Ranch	Approximately 6.5 miles	Northeast
Pearce Ranch	Approximately 7 miles	West
Buddy Fort Ranch	Approximately 7 miles	East-Southeast
Sand Ranch	Approximately 7.2 miles	Northwest
Bill Rushing	Approximately 8 miles	Northeast
Tivis Ranch	Approximately 8.2 miles	Southeast
Johnson Ranch	Approximately 9.7 miles	North

The area near the Facility has historically been utilized primarily as rangeland for livestock grazing and for limited oil and gas activities. Nearby public access areas include the Mescalero Sands recreational area and Carlsbad Caverns National Park. The Mescalero Sands recreational "complex" has been established for off-road vehicle use while the south dunes area in Mescalero Sands is utilized by the public primarily for wildlife observation activities.

5.3 Community Relations Objectives

The overriding goal of this CRP is to provide the community surrounding the Facility with timely and pertinent information in the unlikely event of a release and assurance that the Facility is taking the proper actions to guarantee the health and safety of the community. The specific objectives of this CRP are as follows:

- In the event of a contaminant release, make corrective action investigation information immediately available to the public to help them understand the implications of such a release.
- Inform the public in a timely fashion through press releases to local newspapers, radio, and television stations, public information postings around the community, public meetings, and information repositories.

- Maintain open communication between the local community leaders, local residents, other interested individuals and groups, as well as local, state, and federal government agencies.

- Establish a community relations program with the flexibility to continually identify community concerns and to respond appropriately. As needed, the program will be periodically updated to ensure effective communication with the community.

- Encourage dialogue with the public by promoting an easily accessible point-of-contact at the Facility for questions and comments.

- Monitor community concerns to ensure that communications meet the needs of the public.

5.4 Community Relations Activities

This section describes community relations activities planned to meet the objectives described in Section 5.3. Activities include ongoing communication with local residents, community leaders, elected officials, and government agencies.

5.4.1 Contact Information

The Facility has designated a point-of-contact responsible for the oversight of all public participation. This person will be available to answer questions, will collect requests to be placed on the mailing list, and will distribute materials as requested. This contact is currently:

Larry Gandy, Vice President
Gandy Marley, Inc.
575-347-0434~~505-398-4960~~

Facility Address:

~~1109 East Broadway~~
P.O. Box 1658~~827~~
~~Tatum,~~Roswell, NM 88202 ~~88267~~

Mr. Gandy may be supported in the implementation of community relation activities by local independent consultants.

5.4.2 Newsletters

An initial newsletter will be prepared and distributed to interested parties within 90 days of the start of Facility operations. Interested parties will mostly comprise local land owners. This newsletter will provide an overview of the corrective action plan, including details on the health and safety plan and an overview of planned community relations activities. Included in this initial newsletter will be the community relations point of contact (as identified above in Section 5.4.1) for anyone desiring additional details. Also included will be detail on the information repositories (See Section 5.4.7) so that persons are able to access additional information and background about the Facility if desired.

Upon the event of a contaminant release, a newsletter will be distributed within 30 days of such release. The content of such a newsletter will include:

- Description of the incident
- Description of investigation activities
- Precautionary information
- Status of any immediate response
- Responses to issues previously raised by the community

The audience for these newsletters is the general public, so technical terminology will be explained in readily understandable terms. These newsletters will be distributed primarily through a mailing list described further in Section 5.4.6. They will also be made available at the public meetings (Section 5.4.5). All newsletters will receive Facility legal review prior to distribution.

5.4.3 Press Releases and Media Interviews

Within 7 days of a contaminant release, the Facility will distribute a press release to local radio stations, television stations, and newspapers explaining what happened, the corrective measures taken to contain the hazard, and points of contact to call with questions and to be placed on the mailing list for further information. In addition, the date and location of the upcoming public meeting to discuss the implications of the release (Section 5.4.5) will be announced. All press releases will require internal Facility review prior to distribution. The media outlets for distribution are summarized in Table 5.2. For any resulting media interview requests, the Facility will make a point of contact available.

Table 5.2. Media Outlets in Surrounding Communities

Name of Community	Newspaper	Radio Stations	Local Television Stations
Artesia City	Artesia Daily Press	KSVP	None
Carlsbad City	Carlsbad Current Argus	KAMQ, KATK, KCCC, KCDY, KDOV, KOAT	KTEL
Hobbs City	Hobbs New Sun (daily)	KZOR, KPER, KPVA, KLMA, KYKK, KHOB	None
Lovington City	Lovington Daily Reader	KLEA, KWMW	LEACO
Roswell City	Roswell Daily Record	KBCQ, KEND, KRSY	KBIM
Tatum	Covered by Lovington Daily Leader and Hobbs New Sun	Covered by Lovington KLEA	None

5.4.4 Community Postings

Within 7 days of a contaminant release, the Facility will fax fliers to community locations that can be posted for easy community review. These postings will summarize what happened and the corrective measures taken to contain the hazard, the point of contact to call with questions or to be placed on the mailing list, and an announcement of the upcoming public meeting. Locations for these postings will include the town hall, libraries, museums, and schools.

5.4.5 Public Meetings

The Facility will host public meetings within 60 days after a contaminant release to make available current information about investigation activities, to answer questions, and to respond to specific community concerns, issues, or events. Public meetings will be announced in the newsletters, press releases, and community postings. Given adequate advance notice, the Facility is also willing to meet with governing bodies or groups of interested citizens to discuss any other issues related to the Facility.

The Facility point of contact will be responsible for obtaining answers to questions and following through on commitments made to the community during the meetings. At the meetings, fact sheets and copies of newsletters will be available for distribution. A sign-up list will be included to identify attendees (and particularly attendees who want to be added to the mailing list).

To answer specific questions and to support the sharing of information in the public meetings, fact sheets will be prepared to inform and update the public on investigation activities. These brief, one-page publications are intended to explain technical information to the general public and will be written in readily understandable terms to facilitate understanding by non-technical readers. All fact sheets will receive Facility legal review prior to distribution.

5.4.6 Mailing List

A mailing list database will be developed and maintained by the DCO with contact information for interested local residents, government officials, state and federal regulatory agencies, and news media. The list will be updated, as needed, to ensure that interested parties are receiving the newsletter and any other pertinent notices.

5.4.7 Information Repositories

A physical and electronic information repository (RRO) will be established to provide public access to analytical data, technical reports, permits, published community materials (including fact sheets, newsletters, press releases, etc.), and other information about the Facility during the corrective action process. As is described in Section 3.3.1 data and documents will be located at the Facility and the city government buildings of Tatum and Roswell.

5.5 Community Input Into Plan

This CRP incorporates input that was received from local residents, community leaders, local government, media outlets, and NMED during a number of public meetings that were held as part of the Facility permit application process.

5.6 References for Section 5.0

There are no references for this section.

6. Corrective Action Project Management Plan

6.1 Purpose and Scope

The project management plan herein provides management procedures for conducting an investigation of a hazardous material that has been released at the Facility.

This FCAWP follows EPA's corrective action approach. The initial site assessment and characterization will achieve the objectives of the RCRA Facility Investigation, and the interim remedies, evaluations, and remedial implementation achieve the CMS/CMI objectives. Benefiting this approach will be the Subpart S initiative developed by EPA.

The specific steps to be taken during the corrective action process will be a function of the released materials conditions at the Facility. These steps will be defined when the site-specific corrective action work plan is designed.

Depending on the circumstances, the extent of contamination at the Facility may be characterized as low risk or an acceptable risk, thus requiring no further action (NFA). In other situations, the extent of gradually occurring contamination may pose an unacceptable risk and these areas of contamination will be referred to as SMWUs. However, most incidental material spills at the Facility will not become SWMUs. For example, in situations where small material spills that are easily contained and managed under normal housekeeping and are benign in nature will not result in an SWMU designation pending NMED's concurrence. According to RCRA, an SMWU is defined as:

> "...any discernible unit at which solid wastes have been placed at any time, irrespective of whether it was intended for the management of solid or hazardous waste. Such units include any area at or around a Facility at which solid wastes have been routinely and systematically released."

In this case, the released materials within the SMWU will be treated, removed, chemically or physically stabilized, or contained in situ to the extent necessary to meet the Action Levels (background concentrations) contained in Permit Attachment U. Once they are identified, SWMUs will be listed in the Facility's RCRA permit. SWMUs will be removed from the permit only after the objectives of this FCAWP are met.

6.1.1 Statutory Framework

The regulatory structure of the corrective action process follows the same requirements that apply to normal facility operation. Waste materials will be managed just as they are managed under normal operations. Under more significant corrective actions, environmental liability issues may develop and the overall environmental impacts of the corrective action process itself may require analysis. The information below describes the inter-relationship of the permits and environmental regulations that will be triggered under a corrective action.

The Facility is required to comply with several regulatory drivers including:

- RCRA regulations including 40 CFR Parts 261-280
- Hazardous material transportation requirements under 49 CFR Parts 171 - 180
- RCRA permit for the Triassic Park Facility (Permit No. NM-0001002484 including accompanying attachments)
- New Mexico Administrative Code including Chapter 20.4.1
- Other applicable federal and state laws and regulations (cited below in Section 6.1.1.2)

6.1.1.1 Resource Conservation and Recovery Act

The RCRA was enacted by Congress in 1976 to modify the Solid Waste Disposal Act of 1965 (SWDA). The SWDA was designed to provide the initial federal statutory provisions for improving the nation's solid waste disposal practices. The RCRA included additional provisions for maintaining adequate hazardous waste management programs on a Facility level. The hazardous waste provisions of the SWDA serve as the driving

force that governs day-to-day operation of hazardous waste management programs of TSDs. The RCRA sets forth a permitting system and standards that cover all waste-generating processes at TSD facilities.

For the purposes of this FCAWP, the term RCRA collectively refers to the federal SWDA, the 1976 Amendment to the SWDA, as well as any other amendments to the Act including the Hazardous and Solid Waste Amendment (HSWA).

The HSWAs that were promulgated by Congress in 1984 expand the scope of the RCRA and requires that TSD facilities assess, investigate, and remediate releases of hazardous wastes and hazardous constituents from the SWMUs.

The HSWA requires that the Facility institute corrective actions for hazardous material releases within or outside of the Facility boundary. As such, Section 3004(u) of the HSWA stipulates that corrective action for all releases of hazardous wastes or substances from the SMWUs within the Facility boundary be implemented. However, Section 3004(v) requires corrective action for material releases that have migrated outside of the Facility boundary. Implementation of other HSWA sections such as Section 3004(u) and (v) is required by the New Mexico Hazardous Waste Act (NMHWA) and subsequent amendments to the Act. The Facility will implement HSAW Sections 3004(u) and (v) and NMHWA via its RCRA permit.

6.1.1.2 Other Statutes and Regulations

The list below contains pertinent federal and state statutes and other laws that have a role in the plan of operation for the Facility. Also listed are specific requirements contained within 40 CFR Parts 264 and 270 which govern "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities and EPA Administered Permit Programs: The Hazardous Waste Permit Program", respectively.

Federal Statutes

- **Clean Air Act of 1970, as amended,** will regulate emissions from the unit processes at the Facility that may affect ambient air quality. The Facility's emissions will be required to meet emission performance standards that are contained in the Act.

- **Clean Water Act of 1972, as amended,** regulates the chemical, biological, and physical integrity of waters of the U.S. The Act regulates wastewater and other discharges to all navigable waters.

- **Department of Transportation Act of 1966** lays out DOT"s regulatory authority for transportation safety for the transportation of hazardous materials. The Act will regulate the shipments of manifested hazardous wastes to and from the Facility.

- **Emergency Planning and Community Right-to-Know Act of 1986** requires that the Facility develop an emergency management task force to develop and distribute to emergency response personnel and the public a detailed plan for evaluating and managing hazardous material spills. This plan, which serves as the regulatory driver behind the FCAWP herein, stipulates the requirements for reporting spills and performing remedial activities.

- **Endangered Species Act of 1973, as amended,** requires federal agencies in consultation with other federal agencies to ensure that their actions should not affect the continued existence of any endangered animal or plant species or will affect the habitat of such species.

- **Fish and Wildlife Coordination Act of 1934** requires that fish and wildlife resources receive consideration equal to what is given to other issues during the project development and planning that could affect water resources.

- **National Historic Preservation Act of 1966** requires that agencies account for the effect of their decisions on properties or sites listed on, or eligible for, the National Register of Historic Places.

- **Occupational Safety and Health Act of 1970** regulates the general welfare of workers by requiring facilities to provide safe and non-hazardous working conditions.

- **Safe Drinking Water Act of 1974, as amended,** lays out safety and water quality standards for public water supplies. Maximum contaminant levels developed under the Act must be met by the water supply that is used at the Facility.

- **Toxic Substances Control Act of 1976, as amended,** ensures that the development and utilization of chemical substances and mixtures do not represent an unreasonable risk to human health and the environment. TSCA also calls for the identification of toxic hazards that may be posed by chemical substances.

<u>State Statutes</u>

- **Air Quality Control Act of 1967** brings the legislative requirement for air pollution control to the State of New Mexico.

- **Groundwater Protection Act of 1990** requires the regulation of hazards in connection with leaks and spills from underground storage tanks, containment provisions, and remediation of pollution incidents.

- **Hazardous Chemicals Information Act of 1990** establishes systems on the state level regarding emergency planning and notification to address hazardous substance releases and to provide for informing the public about the use of hazardous substances in their community and any releases of such substances in their community.

- **Solid Waste Act of 1990** establishes a statewide solid waste management program to regulate the management and disposal of solid waste and to encourage source reduction, recycling, reuse, and treatment.

6.2 Technical Approach

The purpose of the corrective action process is to complete remedial actions at the site within a prescribed process work scope, specifically, the RFIWP (or RUIWP for regulated units) and subsequent CMS and CMS implementation. It is important to note that this technical approach will apply to both regulated units and SMWUs. The effort will be implemented by Facility personnel who will dedicate significant time to the corrective action process. Post-remedial management of the site will also be conducted by Facility personnel. These personnel will be responsible for post-remedial management, including conducting long-term environmental monitoring such as groundwater monitoring wells, if any, surface water sampling and analysis, and soils sampling and analysis, etc. Long-term, the corrective action will be considered completed after key performance standards (Permit Attachment U Action Levels) are reached and maintained. For example, the corrective action project manager will have adequately documented and demonstrated that the Action Levels (Attachment U) have been met. Another key milestone will be that NMED and affected stakeholders must concur with the results. Subsequent to corrective action completion, the Clean Closure Performance Standards must also be demonstrated upon implementation of the Facility's closure plan (Permit Attachment O) as required by Permit Condition 8.1.1.b. The Clean Closure Performance Standards also consist of restoring the site to the Action Levels under Permit Attachment U. Statistical significance of the Action Levels will be determined by conducting the statistical analysis contained in Permit Attachment Q.

The EPA provided guidelines in 1994 (RCRA Correction Plan Guidelines, May 1994) that lays out the three-step program for completing corrective actions for material releases:

- The RCRA Facility Investigation (RFI)
- Corrective Measures Study (CMS)
- Corrective Measures Implementation (CMI)

The RFI will be used to characterize the nature and extent of any potential risk associated with the material release. The CMS will optimize the approach for reducing the risks identified in the RFI. The CMI will enable implementation of the optimized corrective action approach (remedy) that is identified in the CMS.

The EPA re-evaluated the 3-step approach above through the 40 CFR 270 Subpart S initiative, and identified and implemented improvements to the overall corrective action process. These improvements included:

- Increased process efficiency
- Enhanced environmental protection
- Improved process responsiveness
- Re-focused the process to become more results oriented

The most recent version of the Subpart S initiative (Proposed Rule, 40 CFR 264,265,270, and 271, Corrective action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities", Federal Register, Vol. 55, pp. 30798-30884) to RCRA, updates the RFI/CMS/CMI approach. Subpart S prescribes a series of evaluations that will be required for ensuring correct remedial decisions are made:

- Initial site assessment
- Site characterization
- Interim remediation
- Remedial evaluations
- Permanent remediation

Under EPA's new approach, the initial site assessment and site characterization achieve the objectives of the RFI under the old approach, and the interim remedies, remedy evaluations, and remedy implementation achieve the objectives of the CMS/CMI process. While it appears that the new Subpart S initiative is firm in its approach, it actually allows for flexibility in achieving these objectives. This flexibility will be incorporated into the corrective action process (RFIWP and CMSWP) in consultation with NMED.

Initial site assessment and characterization could be completed with existing information that is contained in the Facility's RCRA permit application. Thus, initial permit information may be adequate. However, if additional investigations, including a formal environmental monitoring program, is determined to be required, then a separate data collecting effort will be designed and implemented. All of these investigations will be performed commensurate with specifications and SOPs contained in Appendix C of this FCAWP.

Upon review of the site assessment and characterization results, Interim Remediation and/or Final Remediation will be implemented. Interim and/or Final Remediation may include one or more of the following program goals:

- Removing released materials at a site so that the Action Levels contained in Permit Attachment U are met
- Stabilizing the released materials at a site so that the Action Levels are achieved
- Conducting active treatment of the released materials at a site so that the Action Levels are achieved
- Limiting human and/or environmental exposure to the released materials, if migration is documented to have ceased until the Action Levels have been met

Any combination of these methods for achieving completion of the corrective action process will likely require both short- and long-term environmental monitoring of the affected media at the site to verify that environmental protection targets are being met.

6.3 Schedule and Budget

Schedule

The PM will develop a corrective action implementation schedule in consultation with NMED that will include a technical approach for designing and implementing the remedy, including required investigations.

If the corrective action process extends over more than one construction season and the Facility incorporates the process into its annual budgetary cycles, the Facility will develop the draft work schedules and timelines together with a prioritization of corrective action costs. Draft work schedules will be developed for each phase of the correction action process including CS, IM, RFI, CMS, and CMS implementation, financial assurance, and permit modifications.

The overall schedule for all phases of the corrective action will be presented to NMED for its concurrence. If the duration of the corrective action process is less than a year, the Facility will develop the draft work schedules, timelines, and estimation of costs based on the operating budget in place at the time. Upon NMED's concurrence, the Facility will submit the final work schedule and timeline. Appendix D of this FCAWP presents a conceptual work schedule that contains key milestones. These submittals will be contained in the RFIWP and CMSWP.

Budget

The PM will oversee the development of the cost estimates above that will be associated with each corrective action alternative identified in the CMS. Budget development will be conducted consistent with Permit Attachment T, Task II.d.2, Cost Estimate. The budget will include both capital and operating & maintenance costs. Capital cost estimates will include both direct and indirect costs. The direct costs will include construction, equipment, land and site development, and building and services costs. Indirect costs such as engineering, legal fees, licenses, and permit, startup and shakedown, and contingency allowances will be included. Several operation and maintenance cost estimates will be developed including labor (wages, salaries, training, overhead and benefits), maintenance materials and labor, materials and energy costs (electricity and equipment fuel), purchased services (analytical and consulting services), waste disposal and treatment, administrative costs, insurance, taxes, and licensing costs, maintenance reserve fund and contingency fund, and miscellaneous costs.

6.4 Key Project Personnel

Gandy-Marley will oversee the construction and operation of the Facility. This section describes the management organization of the Facility.

The Facility will be managed by a relatively modest management organization. For the purposes of corrective action processes, there will be a number of management positions that will play a key role in the FCAWP implementation. It is anticipated that all site personnel may participate as corrective action team members and may assist in management and action response roles and decisions.

The key management positions under normal operations will include (corrective action role in parenthesis):

- General Manager (GM)
- Operations Manager (corrective action Project Manager, PM)
- Environmental Coordinator (RCRA Training Officer, RTO)
- Emergency Coordinator (EC)
- Site Safety Officer, also coordinates site security (SSO)

Other support positions will include:

- Document Control Officer (DCO)
- Waste Handler (WH)
- Laboratory Specialist (LS)

It is from these positions under normal facility operations from which the corrective action organization will be drawn. The Facility's GM will have overall management responsibility for decisions related to corrective actions. All of the positions identified above under the corrective action process will report to the GM.

Specifically, the individuals on the corrective action team will each be responsible for implementing certain actions as described below:

- **GM:** Provides administrative oversight and will be signatory for all corrective action documentation.

- **PM:** Directly supervises corrective action implementation.

  The PM will also direct site security issues. As such, he will direct the SSO to control entry to the Facility and to provide required signage that may be related to the corrective action. The Site Security role is referenced in Permit Attachment E, Section 7.1.4.

  The PM will also be responsible for managing maintenance activities for equipment that is used in the corrective action process. Maintenance personnel who are required for supporting the corrective action are referenced in Permit Attachment E, Section 7.1.6. These personnel, who will be performing maintenance activities under normal facility operations, will also be designated to support the corrective action process as well.

- **RTO:** Responsible for regulatory compliance, analysis and assessment, information management including agency notifications and coordination, groundwater investigations, environmental monitoring, analysis, record keeping, and communications to the public.

  The RTO's responsibilities will include providing RCRA training that is in compliance with 40 CFR Part 264.16, Personnel Training. Under the corrective action process, the RTO will be responsible for implementing additional HAZWOPER and refresher training for new employees who will participate in the correction action. He/she will maintain a list of new employees who either have received the training or are scheduled to receive the training. He/she will also maintain histories of

each new employee, job title, training schedule for each new employee, and verification of training completion. Under the corrective action process, the RTO will also make the determination on a case-by-case basis whether job-specific training will be required for the new employees.

The RTO will designate the PM to provide job-specific training to each new employee on a case-by-case basis. The PM will schedule the new employee to complete the training and will instruct the employee regarding each specific item related to the job function. These items will include:

- Nature and scope of the corrective action
- Facility orientation and operations
- Hazard recognition
- Heavy equipment usage and decontamination procedures
- Site work rules
- Subcontractors

- **EC:** Responsible for released material containment, cleanup, and stabilization. As described in Permit Attachment E, the EC will be responsible for several important functions, including communications that will be conducted under the corrective action. He/she will also be responsible for conducting hazard recognition and initially identifying the nature and extent of the released material. The EC will implement required measures for minimizing the possibility of fire and explosion at the site. He/she will ensure that the site is kept stable and no material non-compatibility issues are allowed to exist. Under normal Facility operations, the EC may be a senior equipment operator.

- **SSO:** Responsible for worker safety, workplace monitoring, and training for the use of PPE and hazard recognition. The SSO will also be responsible for site security.

- **DCO:** Responsible for maintaining a readily accessible and auditable records and document management system. The DCO will supervise the filing of files, reports, and documents. The DCO will also be responsible for controlling the flow of these materials onto and off the Facility and will maintain a check out system for any materials that may be signed out for review. The DCO will ensure that all documents are managed as laid out in Sections 3.1.1 and 3.2.2 of this FCAWP.

- **WH:** As described in Permit Attachment E, the WH will manage any hazardous wastes that are generated during the corrective action. He/she will implement the same procedures that are listed in Section 7.1.3 of Permit Attachment E. The WH will coordinate with the EC and PM regarding such issues.

- **LS:** The responsibilities of the LS under normal operations are contained in Permit Attachment E, Section 7.1.5. These same responsibilities will apply to the LS under the context of a corrective action. Accordingly, he/she will be responsible for characterizing waste materials that may be generated during the corrective action process. The results of his analysis will be provided to the PM and will determine how the waste materials will be managed by the WH.

Figure 6.1 shows the primary corrective action team organization.

6.4.1 Personnel Qualifications

The information below presents the basic qualifications that key members of the Facility management must have for effectively operating the Facility. Facility management who will be hired to operate the Facility under normal operations will also possess adequate qualifications to act as corrective action participants as well. This will be accomplished by preparing job descriptions for the Facility management that include the language outlined below. The job descriptions will serve as the basis of hiring procedures beginning with initial hires during Facility construction, startup, and initial operations.

6.4.1.1 General Manager

The GM must have had previous experience in operating and maintaining a TSD facility. He will be required to have familiarity with the environmental, regulatory, and business aspects of an operating TSD facility. In particular, the GM will be required to have extensive experience in managing the commercial aspects related to operating a TSD facility. This will include finance, marketing, communications, external affairs, human resources, and technical services.

{{INSERT FIGURE 6.1}}

6.4.1.2 Corrective Action Project Manager

The PM must be familiar with all phases of daily operations of a TSD facility. He/she will also be required to have an understanding of the environmental requirements that apply to the facility and best management practices that will be followed. In addition, he/she must be qualified and have experience in designing and implementing a corrective action process.

6.4.1.3 RCRA Training Officer

The RTO will be required to have previous experience in managing environmental and training programs at an operating facility. As described in the Facility's permit Attachment E, the RTO will possess several essential qualifications including, college-level education, working knowledge of state and federal hazardous waste regulations, hazardous waste procedures, working knowledge of contingency plans and emergency procedures, 40-hour HAZWOPER, and annual refresher training. The RTO will also be required to have previous experience in managing RCRA-regulated issues and be able to interface effectively with the regulatory agencies and the public.

6.4.1.4 Emergency Coordinator

Specific qualifications for the EC are contained in Permit Attachment E, Section 7.1.2. In the context of corrective action, these same qualifications will apply to the EC.

The EC will be required to have experience in emergency situations and to manage heavy equipment operators and operate heavy equipment that will be required for initial response. He/she must be familiar in the day-to-day operation of a TSD facility and must be competent in hazard recognition. He will also be required to communicate effectively with the GM, PM, and RTO.

6.4.1.5 Site Safety Officer

The SSO must be familiar with occupational health aspects associated with an operating TSD facility. His professional qualifications will include college-level education, working knowledge of state and federal OSHA regulations, health and safety programs including hazard recognition and personal protective equipment, workplace monitoring, worker safety procedures, occupational health program development, and Material Safety Data Sheet interpretation. He will be required to provide hazard recognition and other training to operations personnel, manage the use of personal protective equipment, conduct medical surveillance, provide workplace monitoring, and ensure that Facility H&S procedures are being followed. He must also be familiar and experienced in implementing security programs at an operating industrial facility, including experience in emergency coordination with local police and security organizations.

6.4.1.6 Document Control Officer

The DCO must have experience in managing analytical data, documents, and reports. In addition, the DCO must possess competency in maintaining hazardous waste manifests, agency correspondence, and hazardous waste management records.

6.4.1.7 Waste Handler

The WH will be required to have a minimum of a high school education and two year's previous experience in hazardous waste facility operations.

6.4.1.8 Laboratory Specialist

The LS will be required to possess a 4-year science degree or equivalent experience in performing hazardous waste acceptance analysis. The LS will also be required to have working knowledge of the New Mexico Hazardous Waste Act and Hazardous Waste Regulations. He will also be required to develop a working knowledge of the Waste Analysis Plan contained Permit Attachment F.

The above management positions will have specific corrective action responsibilities regarding agency notifications and coordination, communications to the public, environmental monitoring and analysis, record keeping, released material containment, cleanup and stabilization, and occupational health and safety issues connected with the corrective action. Figure 6.2 shows the organization of the Facility's proposed management organization and those positions within the organization that will have a lead role as part of the corrective action process team.

6.4.2 Subcontractor Qualifications

Subcontractors may be utilized for supporting the corrective action process in several ways. It is assumed that such support may be provided both onsite and offsite. Therefore, the qualifications referenced below apply to onsite work activities only. Subcontractors may be retained under the following scenarios:

- Hydrogeologic and engineering evaluations, and remedial work plans (RFIWPs, CMSs)
- Environmental sampling
- Initial material release containment
- Permanent remediation
- Waste treatment

All subcontractors will be required to exhibit previous experience at hazardous waste operations specifically under the context of corrective action or emergency cleanup. They must demonstrate the ability to submit and win bids for performing hazardous waste remediation, follow RFIWPs, report remedial progress, interface with site personnel, maintain a schedule, and operate within budget.

Subcontractors will be required to demonstrate that all employees who will participate on site will have completed the 40-hour HAZWOPER training and subsequent refresher training, and are included in the subcontractor's medical surveillance program. The subcontractor will also be required to demonstrate experience in equipment and personnel decontamination procedures.

6.5 Assessment Strategy

The information presented below discusses the strategy that will be developed if a corrective action is warranted. The corrective action assessment strategy will be based on EPA's DQO process (EPA 1994) and corrective action requirements contained in the Facility's RCRA permit (Parts 9.0 and 10.0, and Attachment R. Within part 9.0, Permit Condition 9.2, vadose zone fluid Action Levels will act as the basis for determining when a corrective action is required. Part 10.0, Permit Condition 10.3 vadose zone fluid, soils, and groundwater action levels will act as the basis for determining when corrective action should be initiated and terminated. Therefore, the aim of the assessment strategy is to meet the Action Levels contained in Permit Attachment U.

The information below also presents the PM's approach to identifying, collecting, and evaluating the data required for making critical decisions in the corrective action process depicted in Figure 6.3. The assessment strategy will include guiding principles identified by the EPA for each element of the corrective action process noted in 40 CFR Part 270 Subpart S. The strategy will also include other required elements contained in the Facility's RCRA permit (Attachment R, Corrective Action Data Collection Quality Assurance Plan).

Insert Figure 6.2

Insert Figure 6.3

The corrective action approach contained in Figure 6.3 will be initiated immediately when a material release has been suspected at the Facility. Initial data collection will dictate whether the conceptual model contained in Figure 6.3 will be implemented for verifying material release and if subsequent corrective action will required as referenced in the figure.

Corrective action activities will be result oriented. In the end, all completed activities in the corrective action process must support a demonstration of NFA, signifying that the Action Levels in Permit Attachment U have been met. Corrective action activities will be conducted in a phased approach. A demonstration that NFA has been achieved will be attempted at various stages within the corrective action process. If a demonstration is accepted by NMED, then a decision will be made by NMED as to the next course of action, including NFA. At a site where a material release is documented, the site will be characterized and remediated according to applicable state or federal regulations and achieved in the context of planned current and projected future land uses.

To better understand the existence and migration of released materials within the Facility's regional watershed, the PM will evaluate existing hydrogeologic information. Surface and ground water data will provide information on the level of specific released materials within the watershed. This information will be used to focus investigation efforts at the site and to characterize the level of contamination associated with the site.

6.5.1 Corrective Action Process Decisions

Administrative and technical decisions will be required throughout the corrective action process as referenced in Figure 6.3. These decisions will be technically supported to ensure environmental protection of both the remedial site and the regional watershed.

6.5.1.1 Determination of Suspected Material Release

During normal operations of the Facility, information may be identified by operations personnel that suggests a material release may have occurred or is suspected to have occurred. This information may consist of visual observations, analysis of environmental data, or analysis of process data. Appendix E contains a diagram depicting potential material release locations at the Facility.

6.5.1.2 Determination of Existing Site

The PM will consider whether the site is an existing site that is already undergoing corrective action. If this is the case, then NFA will be taken beyond what is currently being implemented. If the site is not an existing site, then the conceptual model described below will be further implemented.

Depending on the site and degree of migration of the released materials, NFA (Section 6.5.1.9) may be proposed without conducting any field investigations or remedial efforts. Existing data must be of high quality to document that one of the following criteria for NFA designation exists at the site:

- Material release at the site was not verified.
- Material release at the site was verified but the quantity and extent of migration did not impact any environmental receptors. A site where a release has occurred will be proposed for NFA only if it can be documented that the release was di minimus and was investigated and/or remediated in accordance with the applicable state and/or federal requirements.

If the site does not meet the criteria above, the site conceptual remedial model and subsequent corrective action program will be implemented.

6.5.1.3 Site Conceptual Model Implementation

Corrective actions will be based on the site conceptual model contained in Figure 6.3. The conceptual model is a detailed representation of site conditions and will lead to indications of what is known about released material sources, release quantities, release mechanisms, released material fate and transport, environmental exposure pathways, and potential receptors. The conceptual model will incorporate technical data available at the time and future information as it becomes available. The conceptual model will be used to test ideas, to act as a resource for decision-making, and to aid in the identification and design of potential remedial alternatives. Thus, the conceptual model will be followed, as required, as new information is identified and the model supports a conclusion that the Action Levels (Permit Attachment U) have been met.

For the conceptual model herein, the corrective action process will incorporate several informational sources including:

- Initial response data
- Physical and release profiles
- Groundwater and surface water data
- Geologic data
- Environmental data
- Other non-corrective action related data that may apply

Physical Profiles

The land-use profiles represent the various physical features present on a site that could affect evaluation of the site and an associated risk assessment. Such features may include buildings, other ancillary structures, property boundary, and land-use plans.

The physical profile is used for representing the features of the site that will affect the release, fate and transport, and biological receptors of released materials. A typical physical profile will include topographic characteristics and any natural conditions, industrial conditions, and disturbances that affect the site, including other known or potential sources of environmental contamination. Physical profile features include topography, meteorology, amount of vegetation cover, hydrology, geology, and environmental chemistry.

Release Profile

A release profile will be used for representing the processes and the nature and extent of materials released at a site. The release profile will be combined with the physical profile so that comprehensive information about the type, extent, fate, and transport of chemical released materials within the conceptual model are made known. More than one release profile may be required to provide adequate information about residual contamination at a site, contingent on the persistence, mobility, and relative toxicity of released materials present, and the physical profiles of the system.

Existing information and field data will serve as the primary sources used to develop the release profile. Fate/transport models will be used, where appropriate, in combination with existing information and field data to develop the release profile for a complex site, watershed aggregates, and entire watersheds. This data, characterizing all residual contamination, will be combined to complete a composite release profile for the surface and ground water system.

6.5.1.4 Verification of a Release

Samples of environmental media will be collected from the area in and around a site and will be analyzed for specific chemicals to determine whether a material release has, in fact, occurred. Evidence of a material release is based primarily on whether COPC are present at the site. The identification of chemicals of potential concern will be conducted using separate analytical regimes for inorganic and organic chemicals.

Inorganic Materials

The decision-making process for determining if a release of an inorganic chemical has occurred at a site will comprise a one-step process. Initially, site concentrations of the chemical will be compared with the background concentrations (Action Levels) for the constituents of concern. This will be accomplished by comparing inorganic chemicals with site-specific background data collected prior to construction and startup of the Facility and the Action Levels.

Organic Materials

The determination of an organic chemical release at a site will be based on whether the organic chemical is detectable in a particular sample matrix using analytical methods specified in Permit Attachment F (Tables 4-1 and 4-3). The analytical laboratory performing analysis of the samples will report the organic chemicals that were detected in each sample, and the PM's data validation process will verify each reported value.

Inorganic and/or organic chemicals that are detected in one or more samples will be identified as COPCs. If analytical results indicate that a release has not occurred (no COPCs identified), the site will be proposed for NFA. If COPCs are identified, the PM will initiate efforts to characterize the extent of contamination at the site as will be identified in the RFIWP and will determine if the COPCs are naturally occurring or if its possible presence is attributable to a laboratory quality control issue.

6.5.1.5 Characterizing the Extent of Released Materials

For a corrective action site containing one or more discrete sources of released materials, a more traditional means of determining the extent of migration will be used. This may include delineation of background concentrations or demonstration of a decreasing trend in released material concentrations. Where natural processes (biological or physical) such as released material degradation act to control the extent of contamination, mathematical models, field data, and laboratory data will be used combinatively to establish the effectiveness of natural attenuation mechanisms.

For complex sites, the PM will consider whether natural attenuation mechanisms have been effective or will demonstrate whether contaminant concentrations are within the Action Levels (Permit Attachment U). Environmental sampling will be limited to the samples required for establishing a released material boundary. Samples farthest from the site that exhibit background conditions (less than the Action Levels) will serve as the limit of sampling.

6.5.1.6 Determination if Corrective Action is Required

Once a chemical release has been identified and quantified and the extent of material release has been well defined, the requirement for further action at a corrective action site will be determined by comparing the data to the Action Levels. If the Action Levels have been exceeded, then selection of a preferred remedy will be made and implemented as described below.

6.5.1.7 Selection of Preferred Corrective Action

When the assessment of a corrective action site results in the determination that further action will be needed to attain the Action Levels, the need for both interim and final remedies will be considered. Interim actions will be implemented to stabilize the site during the period that long-term final remedies are being evaluated.

The preferred remedy will be selected by considering overall feasibility, effectiveness, cost benefit, and regulatory and public input. The remedy will be considered either as an interim/permanent remedy or Accelerated Corrective Action (ACA).

Interim/Permanent Remediation

Interim actions will address near-term activities to stabilize the site and to prevent or minimize the further spread of released materials. The site may be considered for interim remediation if all of the following conditions apply:

- Options will exist over the near-term for prevention of further contamination and/or long-term cost savings.
- The proposed action will not adversely affect the expected final remedial approach.
- The interim action selected does not adversely impact the ecosystem, natural resources, work place safety, or public health.
- Should waste materials be generated as part of the remedy, adequate waste-treatment, storage, or disposal capacity is available.

Permanent remedies will address long-term activities to control risks. The site will be considered for permanent remediation if the following conditions apply:

- Feasible options will exist over the long-term for incremental risk reduction, prevention of additional contamination, and/or long-term cost savings.
- The permanent remedy does not impact the ecosystem, natural resources, work place safety, or public health.
- Adequate waste-treatment, storage, or disposal capacity is available if waste materials will be generated as part of the permanent remedy.

Accelerated Corrective Action

ACAs are a type of remedy (interim and permanent) that could be identified and implemented without full-scale remedial investigations. ACAs could include voluntary cleanup programs to meet the Action Levels (Permit Attachment U), treatment of released materials or contaminated media, or natural attenuation. An ACA will be proposed and implemented if the uncertainty analysis above concludes a low level of uncertainty.

Remedial Approaches

Released Material Treatment

The Facility may use contaminant treatment as a component of corrective action when treatment results in reducing the toxicity, mobility, and/or volume of a contaminated material. Treatment may be conducted in situ without removing released materials or contaminated environmental media, or it may involve the removal of the contaminated media. Treatment will be considered for a corrective action site when, in addition to the EPA threshold and balancing criteria (evaluation criteria), several guidelines are met, including 1) appropriate and applicable treatment technology is available, 2) treatment technology is cost effective, 3) environmental impacts of the treatment are within limits, and 4) the Action Levels (Permit Attachment U) at the site will be met.

Presumptive Remedies

Presumptive remedies are remedial approaches that use proven corrective actions for streamlining corrective actions for common categories of sites. Presumptive remedies ensure uniformity in remedial implementation and reduce the cost and time required to investigate and remediate similar types of sites. Of course, this assumes that the implementation of presumptive remedies at other RCRA-regulated TSD facilities could be similarly applied at the Facility. The concept of using similarities between other TSD facilities to streamline corrective actions at the Facility is described in EPA's presumptive remedy policy (EPA 1993) and acts as the basis for implementing generic approaches to site remediation.

In consultation with NMED, the Facility will propose to follow the EPA presumptive/plug-in remedy approach in its RFIWP (or RUIWP), if appropriate for completing the corrective actions as described in the RFIWP (or RUIWP).

Monitored Natural Attenuation

EPA's RCRA Corrective Action Program does acknowledge, under specific circumstances, that natural attenuation can be an acceptable component of remedial actions, and states that natural attenuation remedies will not to be considered "no action" remedies. The EPA's Office of Solid Waste and Emergency Response (OSWER) defines natural attenuation as "naturally occurring attenuation processes in soil and groundwater environments that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants" (EPA 1997). The naturally occurring processes that are known to be geochemically and biologically active in the geologic unit underlying future corrective action site at the Facility include biodegradation, dispersion, dilution, adsorption, volatilization, and chemical or biological stabilization of released materials. The Facility will consider monitoring of natural attenuation as a component of corrective action when there is clear evidence that the attenuation process exists, environmental receptors are not affected, alternative remedies could affect those receptors, and the behavior of the released material plume is well understood.

Prior to using natural attenuation as a component of corrective action, the corrective action process will use field and analytical data to demonstrate that natural attenuation processes, in fact, exist at the site. This demonstration will include clear evidence of concentration reductions along the released material's migration pathway. The demonstration must also verify the decrease of released material mass by chemical and geochemical data and biological decomposition data.

The responsibility for ensuring that effective natural attenuation is occurring will be undertaken by the PM.

6.5.1.8 Verification of Remedial Goals

Environmental media cleanup levels (Action Levels) must protect human health and the environment as well as meet state and federal regulations. The Action Levels are based on Facility-specific background concentrations and conditions and state and permit requirements (Permit Attachment U). The procedure for verifying whether the Action Levels have been met will incorporate points of compliance, monitoring and sampling locations, analytical parameters and methods, statistical analysis, and the period of time required for monitoring restored sites. The procedure will be included in the RFIWP (or RUIWP) and CMSWP.

6.5.1.9 Site Proposed for No Further Action

Following implementation of the CMSWP (interim, permanent or where either is implemented as an ACA), if the PM can demonstrate that the Action Levels referenced in Permit Attachment U have been met, NFA will be proposed for the site. A site will be proposed for NFA with no remediation required if the concentrations

of released materials are within the Action Level limits and there is a clear expectation that the levels will not fluctuate.

6.5.1.10 Operation and Support

On an operational scale, there will be several activities required for supporting the corrective action process. The PM will be responsible for managing all these areas including:

- Health and Safety
- Finance and Procurement
- Quality Assurance and Quality Management
- Data Management
- Laboratory Support
- Project Infrastructure
- Corrective Action Planning and Control
- Long-term Monitoring
- Corrective Action Site Decontamination and Decommissioning

6.6 Overall Management Approach

The information below presents the management approach to conducting corrective action at the Facility. In particular, the approach below was developed in accordance with the provisions contained in Permit Parts 9.0, 10.0, and Permit Attachment R.

6.6.1 Corrective Action Reporting Under Permit Part 9.0

The corrective action process for SWMUs under Permit Part 9.0 will entail a prescribed reporting and decision-making process. It is important to note that corrective action reporting and financial assurance requirements revert to Permit Part 10.0 if a CMS is required. The reporting scheme involves several documents including:

- Oral report of determination of release at a regulated unit (9.3.1)
- Written report of newly discovered release at a regulated unit (9.3.1)
- Verification sampling report (9.3.2)
- Immediate response action report (9.3.3.a)
- Response action effectiveness report (9.3.3.b)
- Independent assessment report (9.3.4)
- Monthly progress reports (9.3.6)
- Regulated unit investigation work plan (9.3.7)
- Groundwater monitoring work plan (9.3.8)
- CMS work plan (9.4 and 10.9.1.a)

- CMS work plan implementation (10.9.2)
- CMS report (10.9.3.a)
- Financial assurance demonstration (10.10.2)

Regardless of the site-specific approach undertaken at a corrective action site, all aspects of the corrective action process will be recorded by the PM as the remedial effort progresses. These reports will be prepared consistent with record keeping requirements contained in the Facility's RCRA permit Parts 3, 4, 5, 9 and 10.

Proposed corrective actions will be documented in the regulated unit investigation work plan (RUIWP) that will be approved by NMED prior to work commencing. Interim and final remedial actions will be documented in technical reports prepared by the Facility that will require approval by NMED. Each type of work plan or report is described below.

6.6.1.1 Release Notification

The Facility will notify NMED within 24 hours (verbal) and 7 calendar days (written) of any material release from a regulated unit (landfill and surface impoundment) as required by the Facility's RCRA Permit, Condition 9.3.1. This notification will include the location of the release and other pertinent information including environmental media affected hazardous constituents released, and extent of release.

6.6.1.2 Verification Sampling Report

A verification sampling report (VSR) will be developed for the regulated unit as required by Permit Condition 9.3.2. The VSR will present:

- Results of the laboratory analysis
- Program for conducting 40 CFR Part 264, Appendix IX sampling

6.6.1.3 Immediate Response Action Report

An immediate response report (IRAR) will be developed for the regulated unit as required by Permit Condition 9.3.3.a. The IRAR will contain at a minimum:

- Extent and nature of the contamination
- Details including size, location, and cause of the release
- Immediate and short-term site action that will be taken

6.6.1.4 Response Action Effectiveness Report

A response action effectiveness report (RAER) will be developed for the regulated unit as required by Permit Condition 9.3.3.b. The RER will contain at a minimum:

- Response action effectiveness in stopping the migration of released materials from the regulated unit
- Description of the verification sampling and analytical results required under Permit Condition 9.3.2

6.6.1.5 Independent Assessment

An independent assessment report (IAR) will be developed for the regulated unit as required by Permit Condition 9.3.4. The IAR will contain:

- Description of the verification sampling and analytical results required under Permit Condition 9.3.2

- Determination of whether Facility waste receipt should be temporarily discontinued
- Whether waste should be removed for liner inspection, repair, or controls

6.6.1.6 Monthly Progress Report

After the material release has been verified (Section 6.6.1.2), monthly corrective action progress reports will be developed and submitted to NMED under Permit Condition 9.3.6.

6.6.1.7 Regulated Unit Investigation Work Plan

As required under Permit Conditions 9.3.8 and 10.7, a Regulated Unit Investigation Work Plan (RUIWP) will be developed and submitted to NMED. The RUIWP will conform to the structure of the RFIWP presented in Section 6.7.1.3.

6.6.1.8 Groundwater Monitoring Work Plan

Under Permit Condition 9.3.8, an application (Groundwater Monitoring Work Plan, GMWP) for a permit modification will be submitted to NMED to initiate a groundwater monitoring program that meets the requirements of NMAC 20.4.1.500 (incorporating 40 CFR 264.97 and 40 CFR 264.98). The GMWP contained in the application will layout the plan to establish the groundwater Action Levels required under Permit Condition 10.3.3.

6.6.1.9 Corrective Measures Study

Based on the outputs above, NMED will conclude whether a CMS is required. If NMED concludes that a CMS is required under Permit Condition 9.4, then the CMS reporting requirements presented below in Section 6.7.1.5 will be followed.

6.6.1.10 Financial Assurance

The Facility will provide evidence of a financial assurance instrument that will specifically apply to the selected remedial action as identified in the CMS report as approved by NMED. The financial assurance is required under Permit Condition 9.4.1 as required by 20.4.1.500 NMAC and incorporating 40 CFR 264.90(a)(2).

A Financial Assurance Report containing the evidence of the financial assurance instrument will be provided upon completion of the RCRA permit modification that incorporates the approved remedial action. The report will include the cost considerations contained in Attachment T, Cost Estimate, of the permit.

6.7.1 Corrective Action Reporting Under Permit Part 10.0

The corrective action process for SWMUs under Permit Part 10.0 will entail a prescribed reporting and decision-making process. The reporting scheme involves several documents including:

- Release notification report (10.4.1)
- SWMU Assessment Report (10.4.3)
- Notification for newly discovered releases at existing SMWUs (10.4.2)
- Confirmatory sampling work plan and sampling report (10.6.1 and 10.6.4)
- RCRA Facility Investigation Work Plan (RFIWP, 10.7.1)
- RFI report (10.7.3)

- RFI Progress reports (10.7.5)
- Interim measures work plan, progress reports, and final IM report (10.8.1.a, 10.6.3.a, and 10.8.3.a)
- CMS work plan (10.9.1.a)
- CMS work plan implementation (10.9.2)
- CMS report (10.9.3.a)
- Financial assurance demonstration (10.10.2)

Regardless of the site-specific approach undertaken at a corrective action site, all aspects of the corrective action process will be recorded by the PM as the remedial effort progresses. These reports will be prepared consistent with record keeping requirements contained in the Facility's RCRA permit Parts 3, 4, 5, 9 and 10.

Proposed corrective actions will be documented in remedial work plans that will be approved by NMED prior to work commencing. Interim and final remedial actions will be documented in technical reports prepared by the Facility that will require approval by NMED. Each type of work plan or report is described below.

6.7.1.1 Release Notification

The Facility will notify NMED within 15 days of any material releases (new SMWUs or Areas of Concern [AOCs]) as required by the Facility's RCRA Permit, Condition 10.4.1. This notification will include the location of the new SMWU or AOC and other pertinent information including environmental media affected hazardous constituents released, and extent of release.

The Facility will notify NMED within 15 days of any material releases (existing SMWUs or AOCs) as required by Permit Condition 10.4.2. This notification will include the location of the SMWU or AOC and other pertinent information, including environmental media affected, hazardous constituents released, and extent of release.

An SWMU assessment report will be issued within 90 calendar days of notification of material release to NMED.

6.7.1.2 Confirmatory Sampling Work Plan and Report

A Confirmatory Sampling Work Plan (CSWP) will be developed for SWMUS or AOCs as required by Permit Condition 10.6.1. A Confirmatory Sampling (CS) Report will be developed and submitted to NMED as required by Permit Condition 10.6.4. The purpose of the CS Work plan is to lay out schedules of implementation and completion of actions necessary for determining whether a release has occurred. The format of the work plan will be as follows:

- Schedule of implementation
- Description of actions to be taken to confirm a material release has occurred.
- Description of the permit and regulatory requirements
- Description of the environmental media affected by the release
- Summary of historical monitoring data to assist in evaluating whether a release has occurred

After the CS work plan has been implemented, a CS Report will be prepared that describes the results of CS implementation. The CS report will describe environmental data results and data interpretation. The PM

may elect to combine the CS report with the RFI Report described below. As referenced in Permit Condition 10.6.4, the report will include:

- Raw and compiled analytical data
- Statistical analysis of the data for supporting whether a release has occurred

6.7.1.3 RCRA Facility Investigation Work Plan and Report

Work Plan

To properly document the various technical approaches that will be instituted at the site, the PM will prepare an RFIWP which addresses the applicable focus areas. The RFIWP will meet the requirements of Permit Attachment S, RCRA Facility Investigation – Scope of Work, Task I, RFI Work Plan, and will reference Permit Attachment R Facility Corrective Action Work Plan Outline, as required. The affected focus areas may include the Regulatory Compliance, Analysis and Assessment, Information Management, RCRA Corrective Action, Groundwater Investigation, Material Disposal, and Operation and Support Areas. The objective of the RFIWP is to further define the technical approach for completing all investigations and evaluations for the corrective action site (i.e., soils, vegetation, surface water, and groundwater). The RFIWP will be approved by NMED for the specific corrective action.

To attain sufficient understanding of the presence and movement of released materials within each watershed, the PM will complete appropriate investigations at the site. The investigations will be implemented in accordance with the approved RFIWP. The RFIWP will describe technical approaches used to characterize air quality, stream sediments, surface-water, groundwater, and an assessment of human-health and ecological risks, if any. Data collected in an investigation of each of the media are evaluated in the context of a conceptual model used to identify potentially important uncertainties – specifically, to focus subsequent data collection methodology to reduce those uncertainties and to further support corrective action decisions. The intent of the approach is to effectively identify the nature and extent of COPCs and their subsequent fate and transport. The data will be used to support qualitative assessments of human health and ecological risk and anticipated potential impacts of released materials migration.

If, during implementation of the RFIWP, deviations from the RFIWP are necessary for characterizing remedial objectives, a revised RFIWP will be prepared and submitted to NMED. The revised RFIWP will be approved by NMED prior to implementing remedial action. However, the PM may elect to proceed with implementation of a revised RFIWP prior to NMED approval under an accelerated approach or if the scope of work remains unchanged (reference the section below).

RFIWPs that will be submitted to NMED will be provided under a standard format as referenced in Task I of Permit Attachment S as required by Permit Condition 10.7.1.a. The RFIWP format will comprise the following:

- Executive Summary
- Table of Contents
- Introduction
- Environmental Setting
- Source Characterization
- Contamination Characterization
- Attachments including technical reports

Remedial Investigation

The PM will document the results of RFIWP implementation (site assessment and characterization) in subsequent RFI progress reports, interim measures progress reports, final interim measures report, and CMS reports. The reports will either propose remedial action recommendations or recommendations for No Further Action, additional site characterization, and remedies. The reports also may provide adequate data that identifies the nature of the released materials, extent of migration, fate, and transport from the source to support recommendations or decisions that will be described in the report. The RFI report will be the initial investigation report and a subsequent CMS report will follow.

The PM will oversee characterization of soils and shallow groundwater system (0- to 30-foot. depth) through the development and implementation of a hydrogeologic evaluation that will be part of the RFIWP. The purpose of the hydrogeologic evaluation will be to characterize the soils and shallow groundwater system that underlie the site. The evaluation will include the results of field monitoring efforts. A summary of the collected data, modeling results, technical analysis, and interpretation will be reported to NMED as required in the progress reports. This information will also be integrated into the site's corrective action process.

If shallow soils and groundwater impacts are detected, the point of origination, extent, and potential effects of the released materials will be investigated by the PM. If the level of contamination is determined to exceed background levels, subsequent corrective actions will be developed in consultation with NMED.

RFI Reports

The RFI report will be developed as required under Permit Condition 10.7.3.a. RFI progress reports will be developed and submitted to NMED as required under Permit Condition 10.7.5. These reports will be submitted quarterly beginning 90 calendar days from the start date specified by NMED.

The RFI report will contain the results of the investigation that will be conducted under Task II of Permit Attachment S. The results of the investigation will be presented in the RFI Final Report and Summary described under Task III of Permit Attachment S.

The RFI report will be submitted to NMED will be provided under the format below. The report format will comprise the following:

- Executive Summary
- Table of Contents
- Statement of Purpose
- Background
- Description of Investigation and Methodology
- Field Investigation Results
- Drilling and Excavation Program Results
- Field Conditions (surface, subsurface, and soil gas)
- Geotechnical and Hydrogeological Results
- Description of Extent of Contamination and a comparative analysis to the Action Levels indicated at Permit Conditions 9.2 and 10.3 (referencing Permit Attachment Q (Statistics for Release Determination) and Attachment U, Action Levels for Corrective Action and descriptions including:
    - Migration pathways

  - Hazardous constituents
  - Environmental receptors
- Description of Sampling Program and Analytical Results
- Conclusions and Recommendation including adequate details for supporting further corrective action decisions
- Attachments including tables, figures, maps, borelogs, well installation reports, laboratory reports, and technical reports

The data for the RFI report will be presented in both tabular and graphical format. The tabular formats will include the raw data (i.e., lab reports), and various kinds of summary tables. These summary tables may include all or a subset of the data sorted by location, date matrix and/or parameter. Statistical summaries will also be developed showing such data as minimum, maximum, mean, number of detections, standard deviation, etc. Graphical summaries of the data will include bar graphs, lines graphs, plan maps, isopleth maps, cross-sections and/or three-dimensional views (e.g., block diagrams). The graphical summaries will be designed to show the spatial and temporal variation or distribution of the data as wells as relationships to key site features (e.g., geology, hydrogeology, site facilities, source area(s), human and ecological receptors, and surface water).

Tabular Presentation

Several tables will be developed for the RFI report and will present:

- Sample identification and location information, and locations and depths of exploratory trenches and test pits
- Surface and groundwater analytical results including analytical methods, and detection limits
- Soil analytical results including analytical methods and detection limits
- Statistical analysis of analytical results including standard deviation, means, maximums/minimums, averages, outliers (water and soil)
- Field data collected for each sample (field and paste pH, temperature, soil gas readings, and physical characteristics)
- Monitoring well installation/development details such as screening interval, depth to groundwater, groundwater elevations, and well log data
- Results of geotechnical analysis (moisture content, plasticity, and grain size analysis)
- Geological information for each sample location.

The constituent Action Levels contained in Permit Attachment U will be included with the tables containing the analytical results to enable a direct comparison of the analytical results to the Action Levels. Background (pre-Facility) water quality and soil chemistry data will also be included with the analytical result tables. These tables will be provided as part of the RFI report.

Graphical Presentation

Figures and graphs will developed for the report containing the following information:

- Site map depicting the location of the corrective action site and its proximity to surface and subsurface features, compass direction will be included

- Maps containing corrective action sample identifiers, locations, depths, and analytical results
- Maps that graphically display the analytical results in different ways such as depicting variations in released material concentrations as a function of time, depth, release location, and location of remedial treatments
- Maps depicting analytical data including soil gas data based on concentration intervals, source of release, identification of the released material, and extent of contamination including migration boundary
- Maps showing groundwater monitoring well installation locations and cross-section information including borehole data such as water table elevations, geological features, well installation details and screening intervals, direction of groundwater flow, and rate of flow.
- 3-Dimensional bar and line graphs portraying the analytical results of the released materials as a function of time from the release date, location, depth, proximity to source of release, extent of contamination, and location of remedial treatments

RFI reporting requirements are also contained in Permit Attachment S. Hardcopies and electronic copies will be submitted as described in the Facility's Permit Conditions 10.1.5.a, 10.1.5.c, and 10.1.5.d.

6.7.1.4 Interim Measures Work Plan and Reports

Work Plan

After the RFI Report has been accepted by NMED, NMED may require that an Interim Measures Work Plan be developed and implemented as referenced in Permit Condition 10.8.1 (a), (b), and (c). The purpose of the IM work plan will be to enable a program for minimizing or preventing further migration of released materials and environmental exposure to the materials. The work plan will include:

- IM Objectives
- Implementation procedures
- Designs, plans, and specifications, and schedule

Interim Measures (IM) will consist of near-term actions to abate potential threats to human health and to prevent or minimize further migration of the released materials. This will achieved by instituting interim stabilization measures such as erecting a fence to close off the site from Facility operations, hydraulic containment of a groundwater plume, and excavating and removing heavily contaminated soil. Stabilization may be achieved by instituting source controls, contaminated media removal, and limiting personnel exposure to the released materials.

Progress Reports

IM progress reports will be submitted to NMED under Permit Condition 10.8.3. Permit Condition 10.8.3.a describes the required elements for the progress reports. The progress reports will contain sections including:

- Reporting period
- Description of the IM portion completed
- Summary of findings
- Summary of deviations from the IM work plan during the reporting period

- Summary of problems and potential problems during the reporting period
- Planned work for the next reporting period

Final Report

As referenced in Permit Condition 10.8.3.b, a final IM report will be developed and submitted to NMED. The report will contain several key elements including:

- Description of the IM implemented
- Summary of results
- Summary of problems encountered and resolution of the problems
- Discussion of accomplishments and IM effectiveness
- Analytical and monitoring data

6.7.1.5 Corrective Measures

Work Plan

The CMS Work Plan will be prepared as required by Permit Condition 10.9.1.b and will describe how the PM proposes to evaluate alternative remedial actions and implement corrective measures. The CMS Work Plan will meet the requirements of Permit Attachment T, Corrective Measures Study Outline, Task I, Corrective Measures Study work Plan. The alternative remedial approaches will be evaluated according to the Action Levels that must be met (Permit Attachment U), and a preferred remedial approach will be recommended based on the evaluation results. The work plan will consist of four primary sections including:

- Description of Current Conditions
- Establishment of Corrective Action Objectives
- Description of CMS Approach
- CMS Schedule

The CMS Work Plan will be implemented within 15 days after NMED's approval of the CMS Work Plan as required under Permit Condition 10.9.2.

Investigation

The CMS will evaluate the remedial alternatives and recommend the preferred alternative to be taken. The format of the CMS will include the following elements as described in Task II of Permit Attachment T to meet the requirements of Permit Condition 10.9.3.a:

- Identification of Corrective Measure Alternatives
- Screening of Corrective Measures Alternatives
- Development of Corrective Measure Alternatives
- Evaluation of Corrective Measure Alternatives
- Selection of Corrective Measure Alternatives

Report

Results of the CMS implementation will be described in the CMS Report required under Permit Condition 10.9.3.a. The report will satisfy Task III of Permit Attachment T and will be structured as follows:

- Executive Summary
- Table of Contents
- Statement of Purpose
- Background
- Description of current conditions
- Environmental media cleanup standards (background conditions)
- Identification, screening, and development of corrective action alternatives, if any
- Evaluation of final corrective measures alternatives
- Proposed corrective action program
- Design and implementation precautions
- Results of a trade-off analysis associated with implementing the corrective action
- Cost estimates and proposed work schedule
- Remedial implementation schedule
- Community relations plan (based on implementation of the Community Relations Plan contained herein)
- Attachments including design criteria and rationale, results of bench- pilot-scale testing, operating and maintenance requirements, long-term monitoring, and tables and graphs of the testing results

The data and information for the CMS report will be presented in both tabular and graphical format as described below.

6.7.1.5.1 Tabular Presentation

Tables will be developed and included with the CMS report. The tables to be developed will present:

- Summarization of the applicable Action Levels, analytical results from the RFI report, and a comparison of the Action Levels and analytical results to background levels
- Summary of historical Facility surface sampling data and sample locations including analytical methods, detection limits and explanations for data outliers
- Historical groundwater depths including monitoring well data
- Summary of historical groundwater analytical data, analytical methods, detection limits, and data outliers
- Summaries of bench- and pilot-scale testing data, and units of measurement, and analytical methods and detection limits
- A listing of corrective measures alternatives and evaluation criteria

- A schedule for installing and monitoring the corrective measures

6.7.1.5.2 Graphical Presentation

Figures and graphs will be developed and maintained that clearly note the following information:

- Site map delineating the corrective action site in relation to the Facility and surrounding area
- Detailed site map showing structures and equipment, monitoring locations, and proposed remedy location
- Borehole, test pits, and test trenches locations and the results obtained from each location
- Site map containing existing surface and monitoring well sampling locations
- Site map presenting analytical data by sample location
- Site map containing bench- and pilot-scale testing locations
- Designs for the remedial system and construction details

The CMS report will be submitted to NMED in hardcopy and electronic format as described in Permit Conditions 10.9.1.a and 10.9.3.a.

6.7.1.6 Accelerated Correction Action

The PM may propose an ACA in the RFIWP for a site where the released materials are well defined, a highly focused remedial approach can been developed, and implementation of the remedial method can be expedited. If this is the case, the RFIWP containing the proposed ACA will be submitted to NMED for approval. Completed ACAs will be documented in a final CMS report. NMED will review any documentation prepared by the PM that describes the proposed ACAs and may request additional information during a visit to the Facility or public meeting to determine if the site qualifies for ACA and whether the site requires more comprehensive regulatory oversight. An ACA will be considered a final remedial action when the ACA qualifies for No Further Action (Section 6.5.1.9 above).

6.7.1.7 Financial Assurance

The Facility will provide evidence of a financial assurance instrument that will specifically apply to the selected remedial action as identified in the CMS report as approved by NMED. The financial assurance is required under Permit Condition 10.10.2 as required by 20.4.1.500 NMAC and incorporating 40 CFR 264.101 (b) and (c). Evidence of financial assurance will be provided as stipulated in Permit Part 10.0, Table 10-3.

A Financial Assurance Report containing the evidence of the financial assurance instrument will be provided upon completion of the RCRA permit modification that incorporates the approved remedial action. The report will include the cost considerations contained in Attachment T, Cost Estimate, of the permit.

6.8 Permit Modifications

Re-prioritization or elimination of corrective action sites for which remedial actions have been completed, as well as the identification of new sites, will be memorialized in the Facility's RCRA Permit. The permit will be modified according to the reopening provisions contained in the permit (NMAC 20.4.1.900 (incorporating 40 CFR 270.30 (1) and (3))). The modification process will require a formal public comment and permit finalization period before the permit modification issued by NMED becomes effective.

A determination of NFA will not preclude NMED from requiring long-term or periodic monitoring of

environmental media and/or further investigations, evaluations, or remedial action at a later date. This will be managed as part of the Permit Attachment P requirements.

6.9 Administrative Reporting Requirements

In order to comply with applicable environmental regulations and to inform all parties of progress being achieved during the corrective action process, the PM will oversee the preparation of the work plans and reports described above. The plans and reports will contain technical information that will support corrective action decision-making. All plans and reports produced by the corrective action team will be made available to the public through the information sources discussed in Section 5.0, Community Relations Plan, of this FCAWP.

All corrective action reports will comply with the reporting requirements indicated in the Facility's RCRA permit. The reports also comply with applicable guidances from EPA and NMED.

In line with 40 CFR 270.11, "Signatories to Permit Applications and Reports," the appropriate Facility managers sign off on the following certification for each report and document that is delivered to NMED:

> I certify under penalty of law that this document and accompanying attachments were prepared under my direction or supervision in accordance with a system designed to ensure that competent personnel properly gather and assess the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the data and information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including possible fines and imprisonment for willful and knowing violations.

6.10 Site Management

The information below summarizes various measures that will be required for implementing corrective action field activities. Site access and security, temporary facilities, waste management, spill-and-discharge control measures, and contingency plans are some of the items that will be considered when developing the remedial investigation work plan. This section contains a general discussion of these considerations and broadly describes the basic elements associated with each of the site management components referenced below. Each remedial work plan will address these components providing greater detail as required by the activities conducted at the site.

6.10.1 Site Access and Security

The Facility will maintain responsibility for all access and security measures required to gain access to a corrective action site. Security at sites that are undergoing remedial activities will be performed in accordance with overall Facility security requirements presented in the Facility's RCRA permit. The SSO will coordinate these functions.

6.10.2 Temporary Facilities

Temporary waste holding facilities that will be dedicated to the corrective action process include satellite accumulation areas and 90-day storage areas. These will be identified in the RFIWP. Detailed descriptions of these temporary facilities will be included in the RFI and CMS reports.

6.10.3 Waste Disposal

Waste disposal for corrective action activities that could be implemented at the Facility under a corrective action will be conducted under the requirements of the Facility's RCRA permit (Parts 1.0 through 6.0) and Attachment F (Waste Analysis Plan) of the permit.

6.10.4 Contingency Planning

A contingency plan is an alternative action that will be taken by the PM if a problem occurs during remedial activities. Before alternative actions are implemented, appropriate corrective action personnel will be notified to approve implementation of alternate strategies. Reasonably anticipated alternative actions will be addressed in the remedial investigation work plan. In case of major deviations from planned activities, NMED will be notified to discuss the alternative action. As a result of a major deviation that may be allowed by NMED, the PM will realign remedial activities to be consistent with the new scope. Permit Attachment C will be used for this purpose.

6.11 References for Section 6

The following list includes all references that are cited in this section.

MWH, Inc., December 1997 (Revised October 2000). Part A and Part B Permit Application for Triassic Park Waste Disposal Facility, Volumes I – VI, Steamboat Springs, Colorado.

New Mexico Environment Department, Hazardous and Radioactive Materials Bureau, March 2002. Triassic Park Waste Disposal Facility RCRA Permit, (RCRA Permit No. NM00010024484), Santa Fe, New Mexico.

APPENDIX A

PERMIT ATTACHMENT R

APPENDIX B

PERMIT PARTS 9.0 AND 10.0

APPENDIX C

STANDARD OPERATING PROCEDURES

APPENDIX D

WORK SCHEDULE

APPENDIX E

POTENTIAL RELEASE LOCATIONS

Part A and Part B Permit Renewal Application for the

TRIASSIC PARK
WASTE DISPOSAL FACILITY

RCRA Permit No. NM0001002484

Chaves County, New Mexico

Volume 3
Permit Attachment L1 - Engineering Drawings

October 17, 2011

Prepared for:

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Prepared by:

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Table of Contents

VOLUME 1

Introduction
- Introduction
- List of Acronyms
- RCRA Regulatory Crosswalk

Part A Permit Application
- Certification of Permit Application
- EPA Hazardous Waste Permit Application
- Facility Property Plat

Part B Permit Application
1. General Facility Standards
2. Treatment, Storage, and Disposal
3. Groundwater Protection
4. Waste Analysis Plan
5. Procedures to Prevent Hazards
6. Contingency Plan
7. Personnel Training
8. Closure and Post-Closure of Permitted Units
9. Waste Management
10. Corrective Action
11. 40 CFR 264 Subpart AA, BB & CC Regulations
12. References

Permit
- Part 1 General Permit Conditions
- Part 2 General Facility Conditions
- Part 3 Hazardous Waste Storage In Containers
- Part 4 Hazardous Waste Storage and Treatment in Tanks
- Part 5 Treatment in the Surface Impoundment
- Part 6 Hazardous Waste Disposal In The Landfill
- Part 7 Vadose Zone Monitoring
- Part 8 Closure and Post-Closure Care
- Part 9 Corrective Action for Regulated Units
- Part 10 Corrective Action for Solid Waste Management Units

Table of Contents (Continued)

VOLUME 2

All attachments indicated as included are in Volume 2 except Attachment L1, which comprises Volume 3. Attachments indicated as not included are unchanged from the 2002 permit.

Attachment			Included? Yes	Included? No
A		General Facility Description and Information	X	
B		Procedures to Prevent Hazards	X	
C		Contingency Plan	X	
	C1	Emergency Equipment		X
	C2	Emergency Coordinators		X
	C3	Cooperating Local Authorities		X
	C4	Evacuation Plans		X
D		Inspection Procedures	X	
	D1	Inspection Schedules and Checklists	X	
E		Personnel Training	X	
F		Waste Analysis Plan	X	
	F1	Rationale for Analytical Parameter Selection	X	
	F2	Example Waste Profile Form		X
	F3	Example Chain-of-Custody Form		X
	F4	Waste Characterization Using Acceptable Knowledge		X
G		Air Quality	X	
H		Ground Water Monitoring Waiver Request and Approval		X
I		Vadose Zone Monitoring System Work Plan	X	
J		Action Leakage Rate and Response Action Plan	X	
K		Part A Permit Application (included at beginning of application rather than as attachment)	X	
L		Engineering Report	X	
	L1	Engineering Drawings **(Volume 3)**	X	
	L2	Specifications for Landfill, Surface Impoundment and Associated Facilities Liner and Cover System Construction		X
	L3	Tank Integrity Assessment Certification		X
	L4	New Landfill Engineering Calculations	X	
	L5	Landfill Stormwater and Leachate Recirculation Modeling	X	
M		Construction Quality Assurance Plan	X	
N		Operations and Maintenance Plan	X	
O		Closure Plan	X	
	O1	Compliance Schedules for Closure	X	
	O2	Financial Assurance for Closure	X	
P		Post-Closure Care Plan	X	
	P1	Financial Assurance for Post-Closure Care	X	
Q		Statistics for Release Determination	X	
R		Facility Corrective Action Work Plan Outline		X

Table of Contents (Continued)

Attachment			Included? Yes	Included? No
S		RCRA Facility Investigation - Scope of Work		X
T		Corrective Measures Study - Scope of Work		X
U		Action Levels for Corrective Action (completed after permit approval)		X
	U1	Background Concentrations for Soil (completed after permit approval)		X
	U2	Vadose Zone Baseline Concentrations for Non-Leachates (completed after permit approval)		X
	U3	Background Concentrations for Ground Water (completed after permit approval)		X
V		Vadose Zone Monitoring Indicator Parameters (completed after permit approval)		X
W		Facility Corrective Action Work Plan (DRAFT)	X	

VOLUME 3

Attachment			Included? Yes	Included? No
	L1	Engineering Drawings	X	

Table of Contents (Continued)

OCTOBER 2000 PERMIT APPLICATION APPENDICES

Itemized list of appendices that have been updated for the October 2011 Permit Application

Appendix (from Permit Application dated October 2000)		Included? Yes	Included? No
Volume II			
A	RCRA Permit Application Checklist *(included as Regulatory Crosswalk in the Application Introduction)*	X	
B	Oil Well Log		X
C	Lithology Logs and Plugging Logs		X
D	Geophysical Logs		X
E	Geotechnical Laboratory Results		X
F	Grain Size Analyses		X
G	Cross-Sections *(included as figures in the Part B Application)*	X	
H	Example Waste Profile Sheet		X
I	Tank Certification Statement and Example		X
J	Inspection Sheet *(included in Attachment D1)*	X	
K	Coordinating Agreement		X
L	List of Emergency Coordinators		X
M	Evacuation Plans		X
N	Location, Description, and Capabilities of Emergency Equipment		X
O	Vadose Zone Monitoring System Work Plan *(included as Attachment I)*	X	
Volume III			
A	Design Drawings *(included as Attachment L1)*	X	
Volume IV			
B	Construction Quality Assurance Plan *(included as Attachment M)*	X	
C	Construction Specifications		X
D	Laboratory Test Results		X
E	Engineering Calculations *(new landfill engineering calculations in Attachment L4)*	X	
Volume V			
E	Engineering Calculations		X
Volume VI			
E	Engineering Calculations		X
F	Surface Water Control Plan		X
G	Action Leakage Rate and Response Action Plan *(included as Attachment J)*	X	
H	Manufacturer Information		X

Permit Renewal Application
October 17, 2011

Attachment L1

Design Drawings

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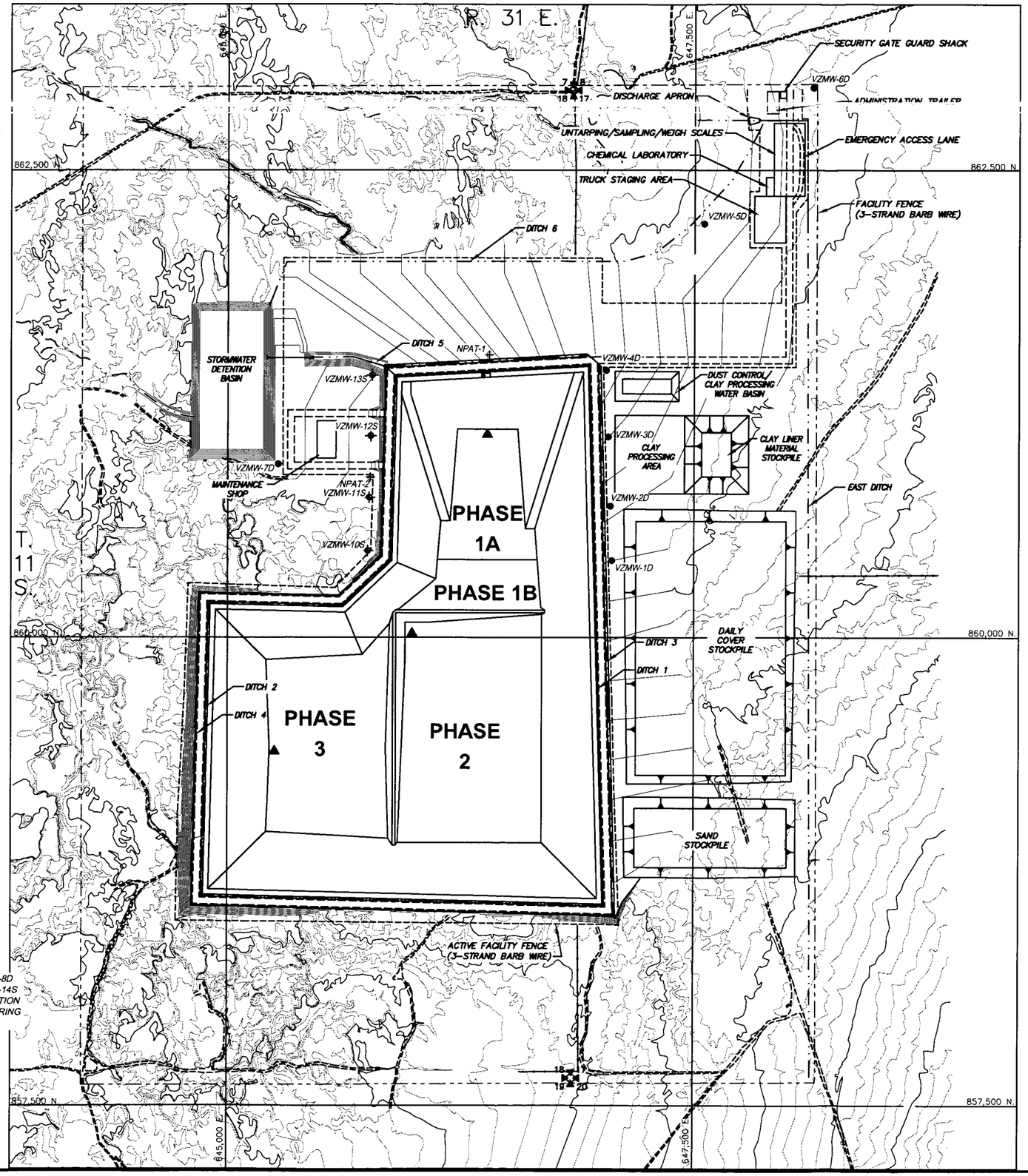
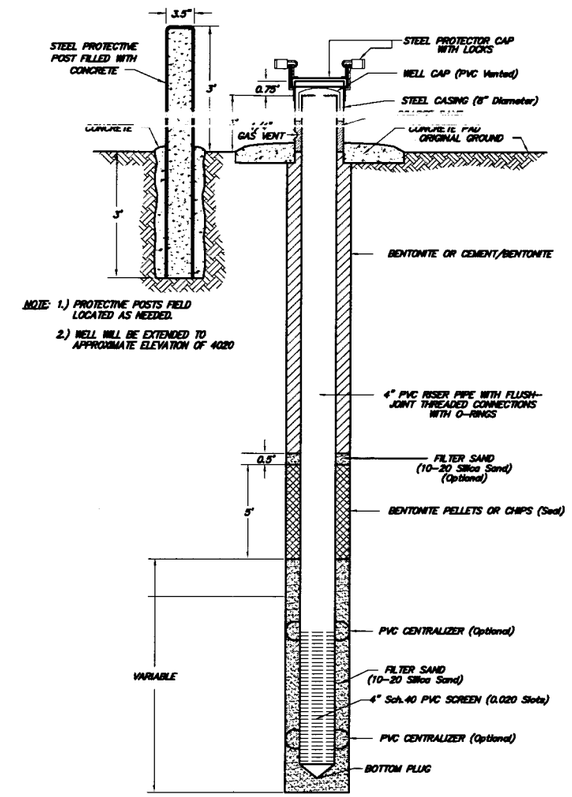
Modified by:

The New Mexico Environment Department
March 2002





TYPICAL VADOSE ZONE MONITORING WELL INSTALLATION DETAIL

SCALE

300' 0 300' 600'

LEGEND

- Existing contour
- Regraded contour
- Deep monitoring well
- Shallow monitoring well
- Vadose zone sump
- Neutron probe access tube
- Facility and active facility fences (3-strand barb wire)

NOTES:

1. VADOS ZONE MONITOR WELLS VZMW-9D AND VZMW-15S ARE LOCATED APPROXIMATELY 3,300 FEET NORTHWEST OF THE FACILITY BOUNDARY WITHIN 15 FEET OF THE LOCATION OF BORING WW-1.

PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PART B PERMIT APPLICATION RENEWAL

FILE NAME: ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VB_DRAWINGS\TITLEBLOCK\TB_22X34

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DRAWN BY: KDB
CHECKED BY: GDP
DATE: 10/4/2011

TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

FACILITY LAYOUT

JOB NO. ES11.0141

SHEET 1 of 1
DWG NO. 4

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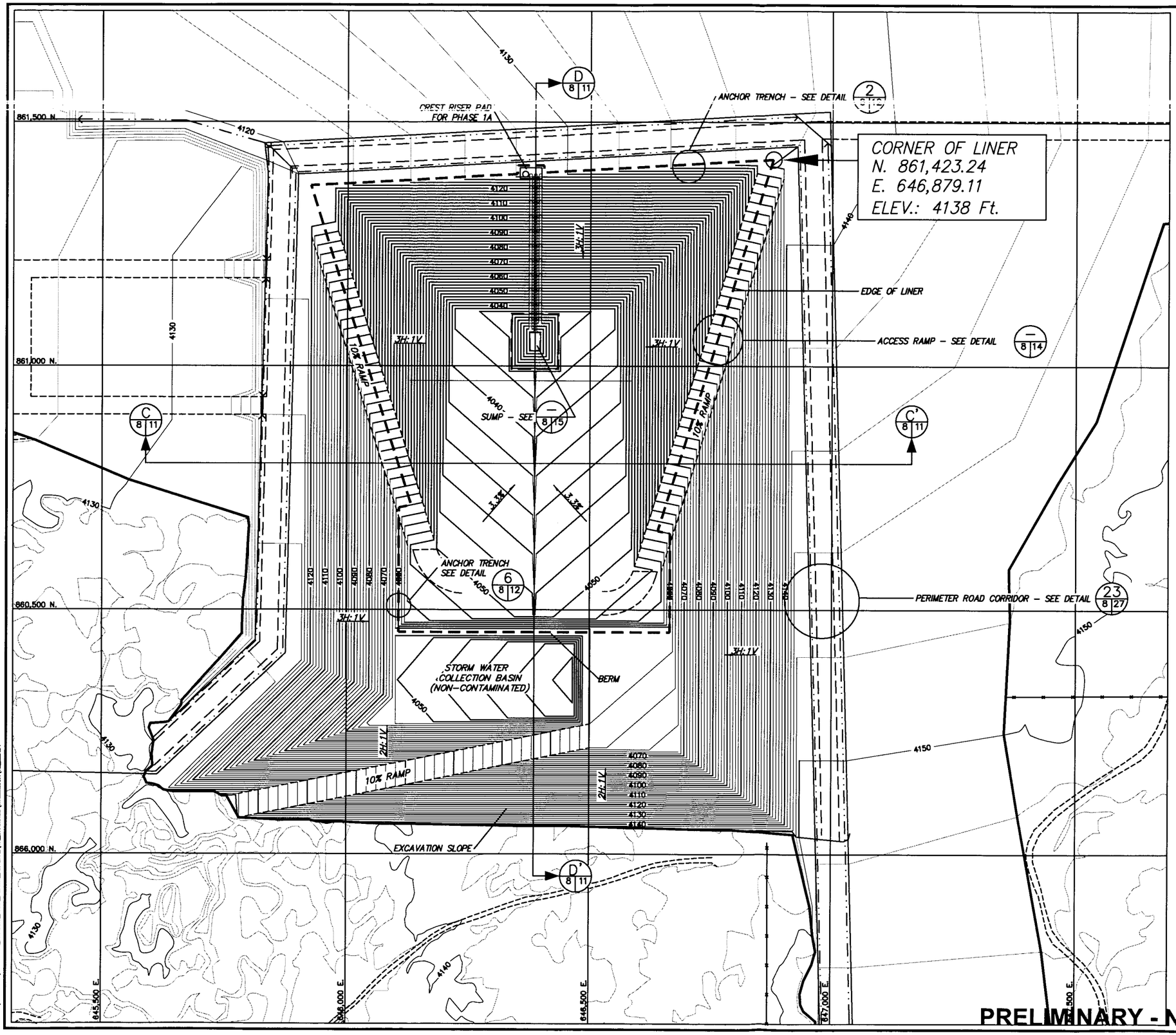

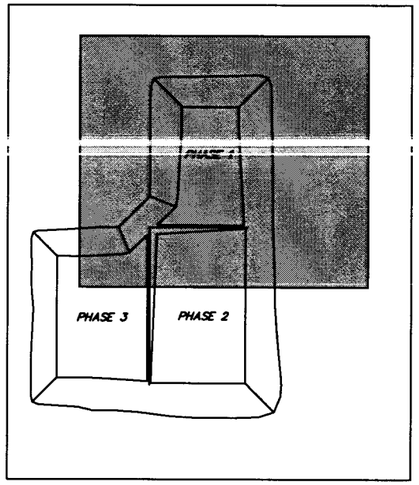

MAP KEY

NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PART B P

PART APPLICATION RENEWAL

FILE NAME: B:\TRIASSIC_PARK\PERMIT_RENEWAL\VL_Drawings\

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CHECKED BY: GDP
DATE: 10/4/2011

TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

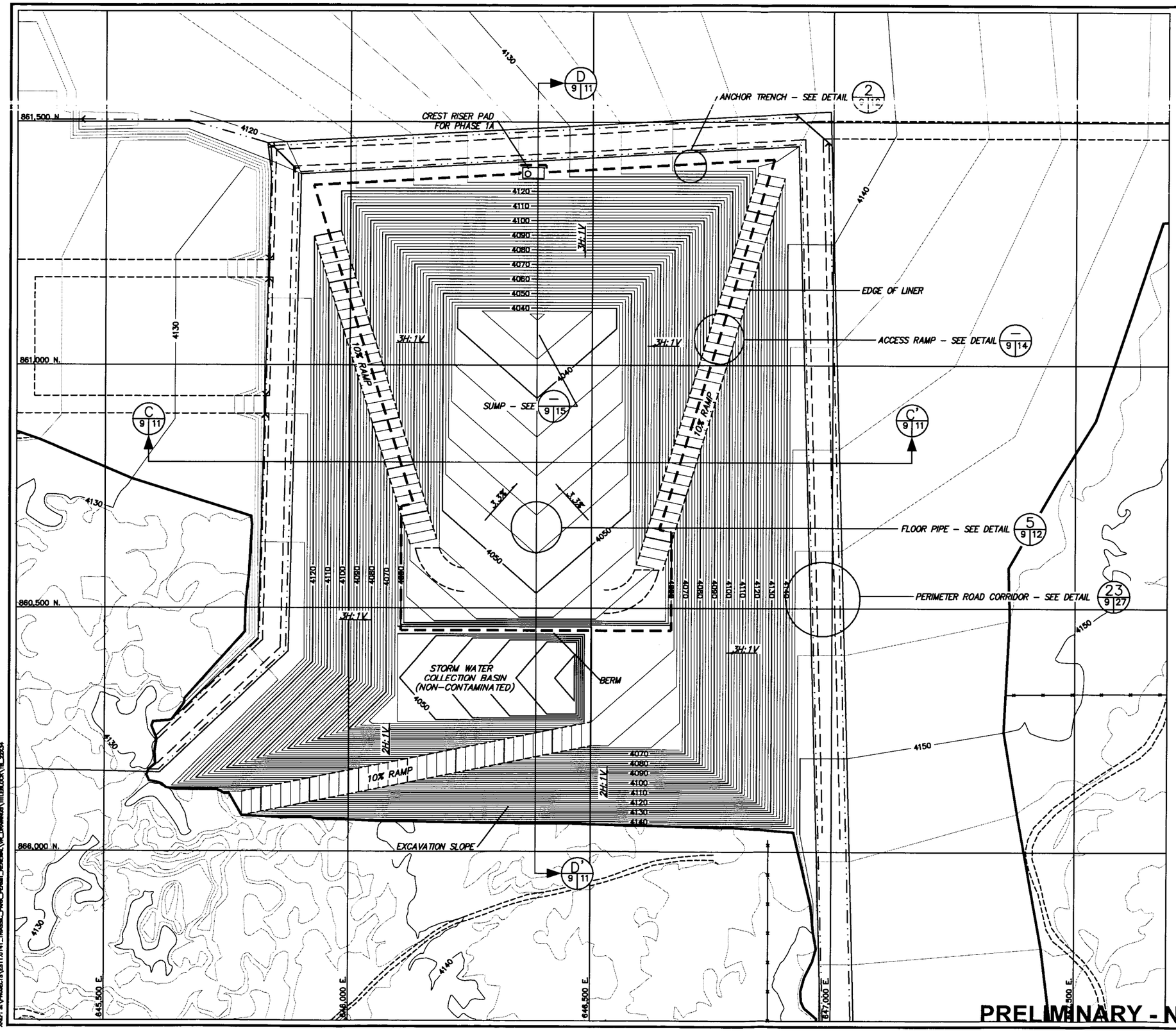
DETAILED EXCAVATION PLAN - PHASE 1A

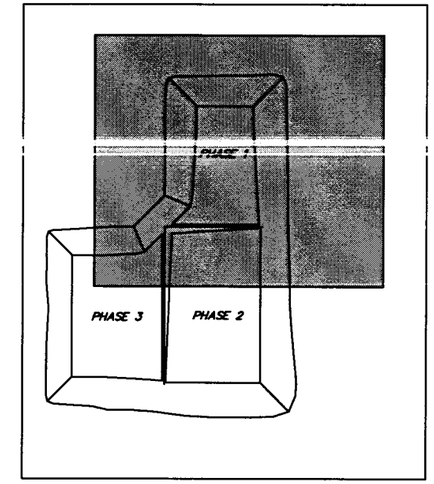
JOB NO. ES11.0141

SHEET 1 of 1
DWG NO. 8

PRELIMINARY - NOT FOR CONSTRUCTION

XREF: B:\PROJECTS\ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VL_DRAWINGS\TITLEBLOCK\TB_22X34





MAP KEY

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.

SCALE
100' 0 100' 200'

PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PART B P PART APPLICATION RENEWAL

FILE NAME: ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VR_DRAWINGS\TRIASSIC_PARK_PERMIT_RENEWAL.dwg

Daniel B. Stephens & Associates, Inc.
ENVIRONMENTAL SCIENTISTS & ENGINEERS
6020 ACADEMY NE, SUITE 100
ALBUQUERQUE, NM 87109
(505) 822-9400

DESIGNED BY: TG
DRAWN BY: KDB
CHECKED BY: GDP
DATE: 10/4/2011

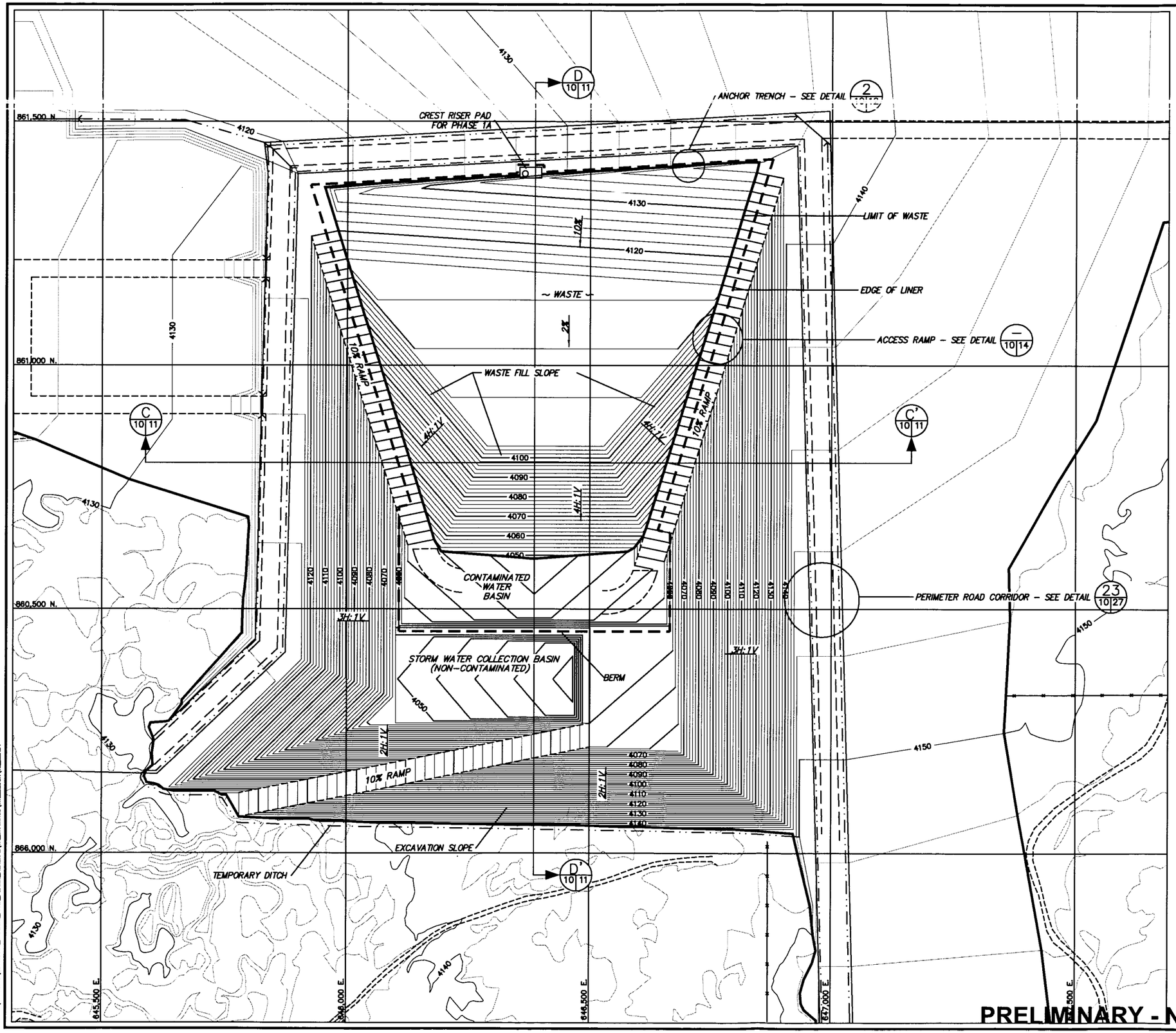
TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

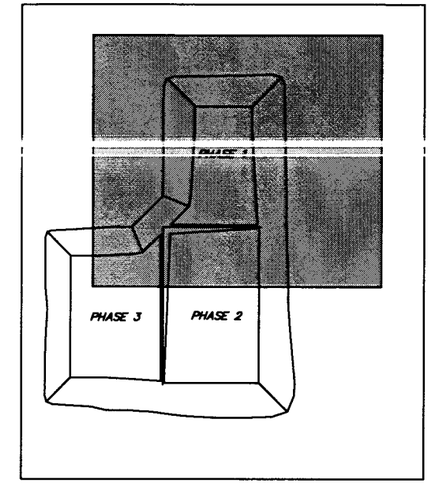
TOP OF PROTECTIVE SOIL LAYER - PHASE 1A

JOB NO. ES11.0141

SHEET 1 of 1
DWG NO. 9

XREF: S:\PROJECTS\ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VR_DRAWINGS\TITLEBLOCK\TB_22X34





MAP KEY

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.
3. WASTE FILL VOLUME FOR PHASE 1A: 553,200 CY

SCALE
100' 0 100' 200'

PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PART B PERMIT APPLICATION RENEWAL

FILE NAME: ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VR_Drawings\

Daniel B. Stephens & Associates, Inc.
ENVIRONMENTAL SCIENTISTS & ENGINEERS
6020 ACADEMY NE, SUITE 100
ALBUQUERQUE, NM 87109
(505) 822-9400

DESIGNED BY: TG
DRAWN BY: KDB
CHECKED BY: GDP
DATE: 10/4/2011

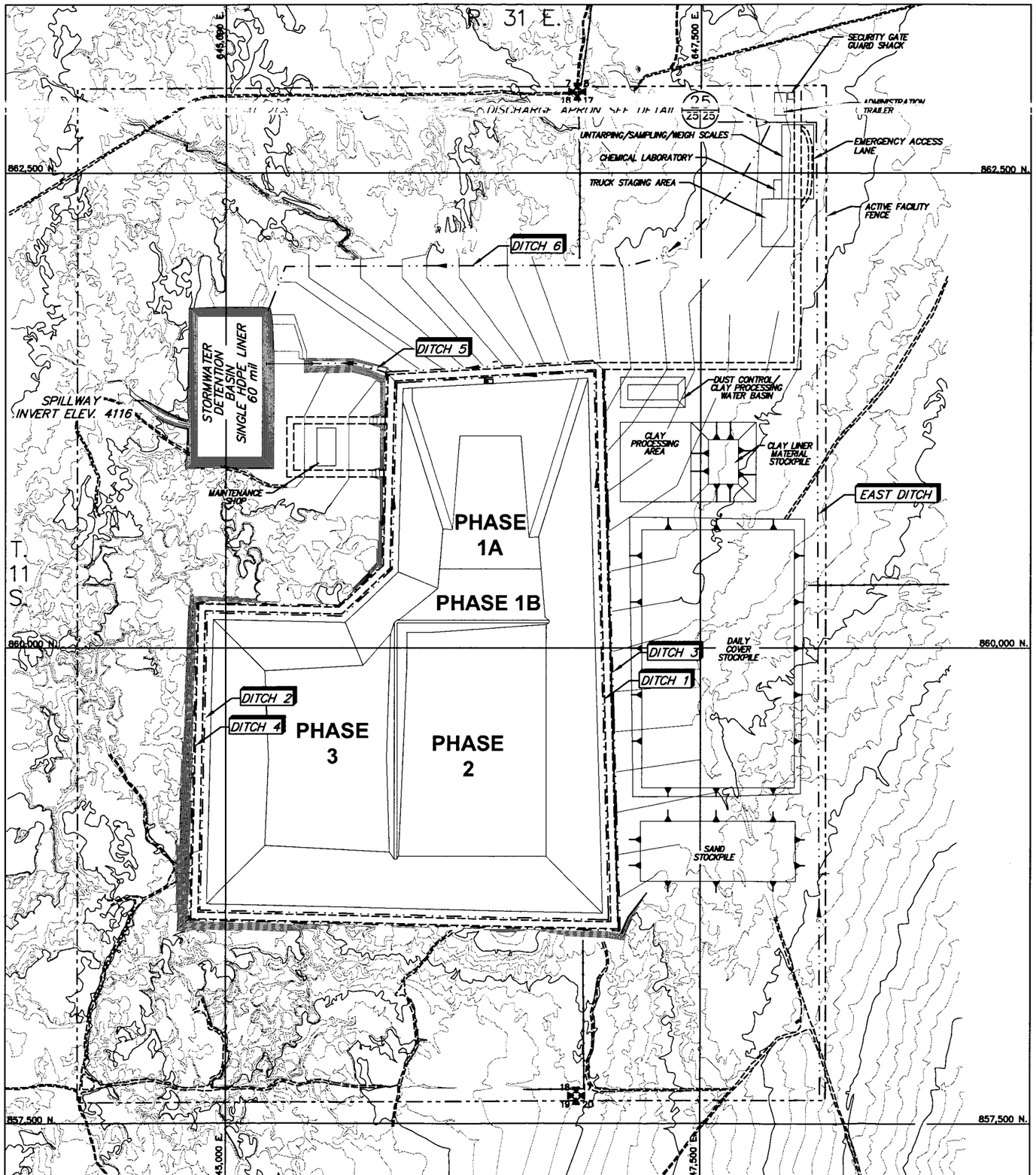
TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

FILLING PLAN - PHASE 1A

JOB NO. ES11.0141

SHEET 1 of 1
DWG NO. 10

XREF: S:\PROJECTS\ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VR_DRAWINGS\TITLEBLOCK\TB_22X34



PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PART B PERMIT APPLICATION RENEWAL

FILE NAME: ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VR_DRAWINGS\TITLE25.DGN

Daniel B. Stephens & Associates, Inc.
ENVIRONMENTAL SCIENTISTS & ENGINEERS
8220 ACADEMY NE, SUITE 100
ALBUQUERQUE, NM 87108
(505) 822-9400

DESIGNED BY: TG
DRAWN BY: KDB
CHECKED BY: GDP
DATE: 10/4/2011

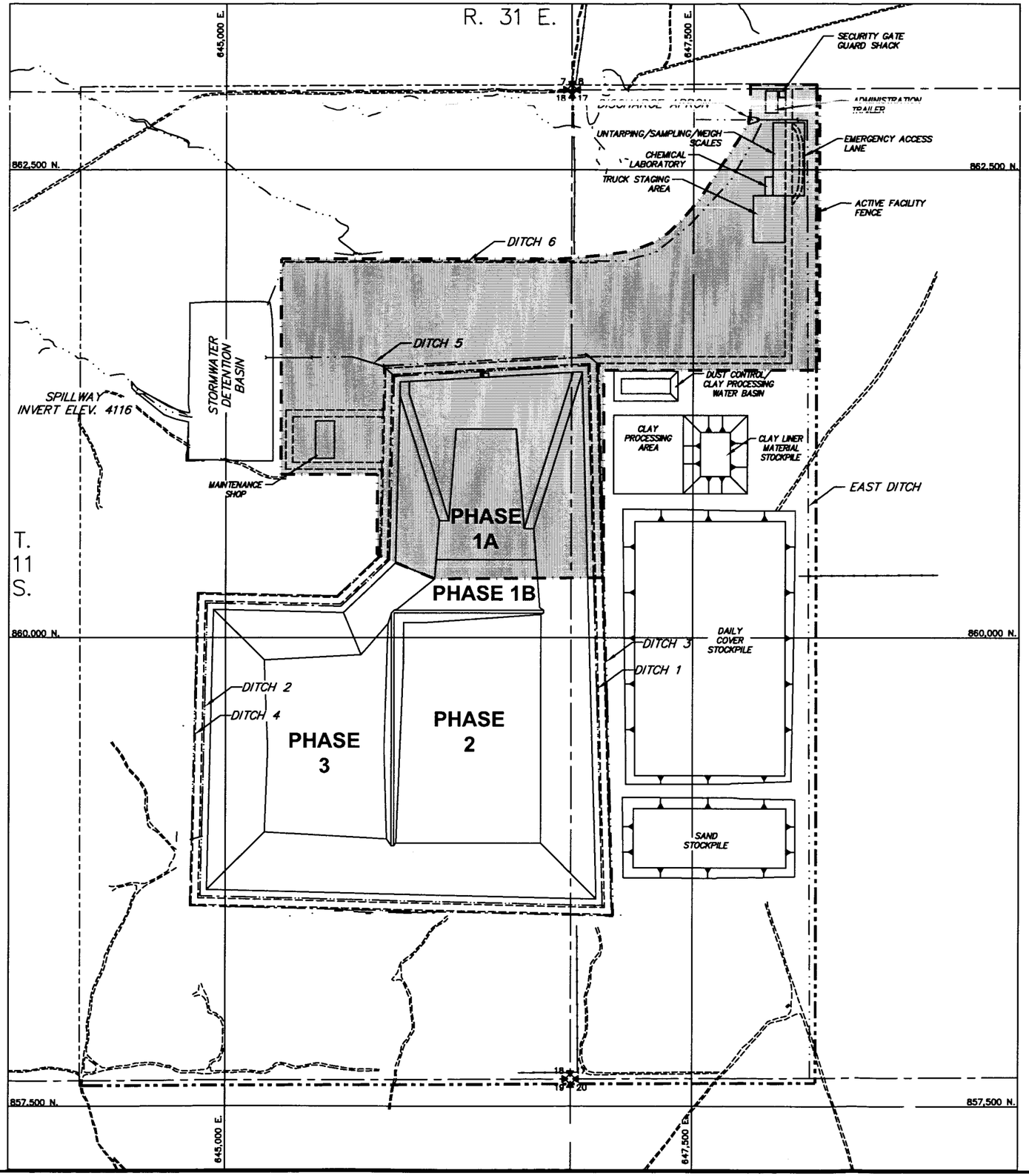
TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

SURFACE WATER CONTROL FEATURES

JOB NO. ES11.0141

SHEET 1 of 2
DWG NO. 25

XREF: S:\PROJECTS\ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\VR_DRAWINGS\TITLE25.DGN\TB_22X34



LEGEND

Limits of landfill operations and and waste receiving area

NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PRELIMINARY - NOT FOR CONSTRUCTION

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PART B PERMIT APPLICATION RENEWAL

FILE NAME: S:\PROJECTS\ES11.0141_TRIASSIC_PARK_PERMIT_RENEWAL\WL_DRAWINGS\TITLEBLOCK\TB_22X34

Daniel B. Stephens & Associates, Inc.
ENVIRONMENTAL SCIENTISTS & ENGINEERS
6020 ACADEMY NE, SUITE 100
ALBUQUERQUE, NM 87109
(505) 822-9400

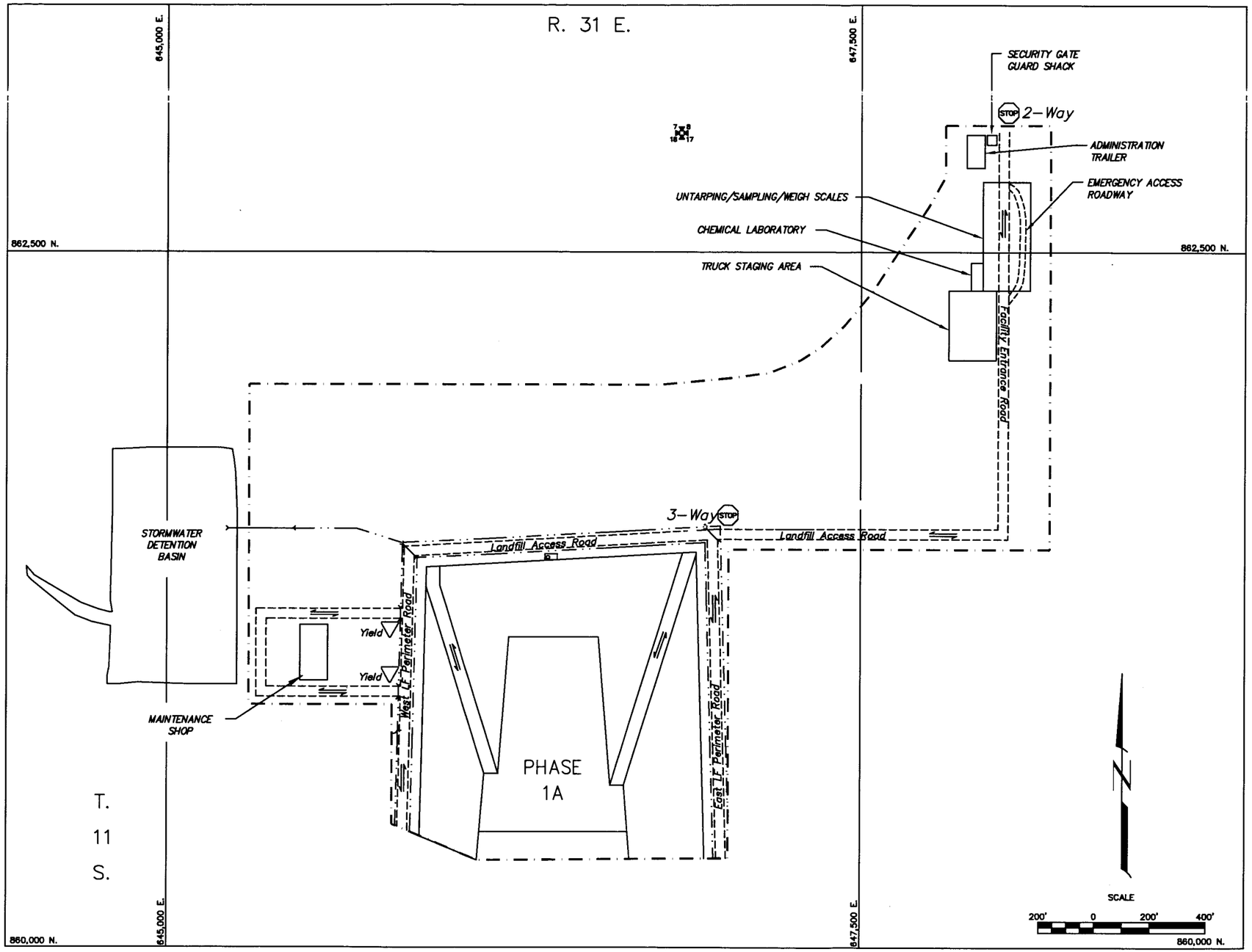
DESIGNED BY: TG
DRAWN BY: KDB
CHECKED BY: GDP
DATE: 10/4/2011

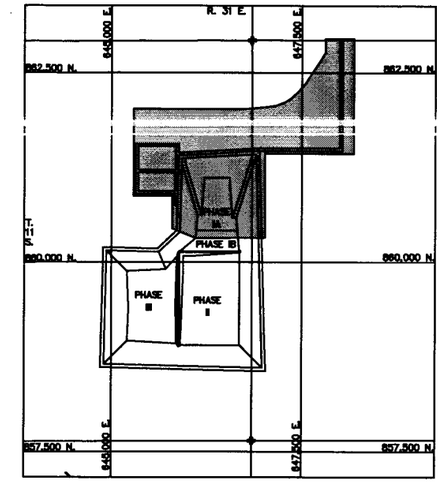
TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

TRAFFIC PLAN

JOB NO. ES11.0141

SHEET 1 of 2
DWG NO. 26





MAP KEY

NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. UNIMPROVED ROADS AND CONSTRUCTION HAUL ROADS NOT SHOWN. GRAVEL LINED ACCESS ROADS ARE 2 WAY TRAFFIC. ALL SITE ACCESS ROADS SPEED LIMIT IS 15 MPH, CONSTRUCTION HAUL ROAD SPEED LIMIT IS 35 MPH.

NO	DATE	BY	REVISION MADE
0	10/18/11	GDP	PMIT APPLICATION RENEWAL

Daniel B. Stephens & Associates, Inc.
ENVIRONMENTAL SCIENTISTS & ENGINEERS
6020 ACADEMY NE, SUITE 100
ALBUQUERQUE, NM 87109
(505) 822-9400

DESIGNED BY: TG
DRAWN BY: KDB
CHECKED BY: GDP
DATE: 10/4/2011

TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVEZ COUNTY, NEW MEXICO

TRAFFIC PLAN

JOB NO. ES11.0141

SHEET 2 of 2
DWG NO. 26

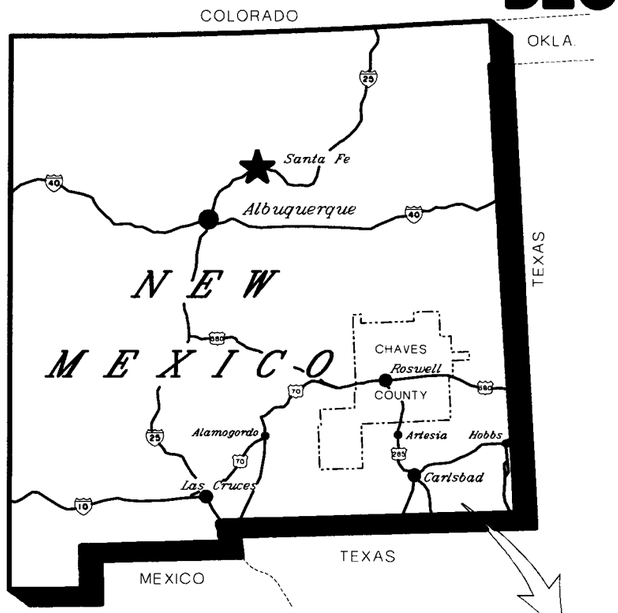
PRELIMINARY - NOT FOR CONSTRUCTION

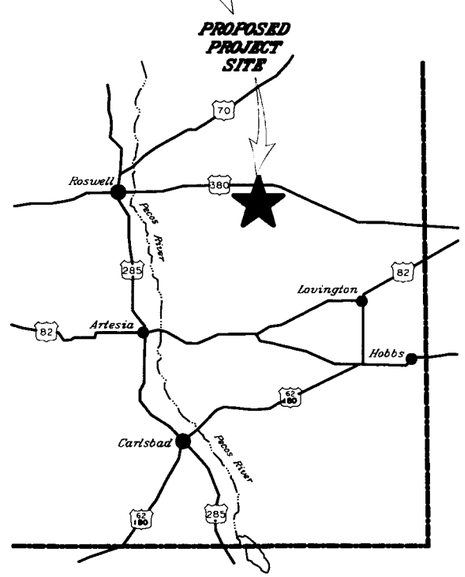
DESIGN DRAWINGS
TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVES COUNTY, NEW MEXICO

DECEMBER 1997 (Revised October 2000)

RCRA PART B APPLICATION

Not For Construction (See Notes Drawing 2)





LIST OF DRAWINGS

DRAWING NO.	DRAWING SERIES
1 - 2	GENERAL
3 - 5	FACILITY
6 - 27	LANDFILL
28 - 32	EVAPORATION PONDS
33 - 36	STABILIZATION UNIT
37 - 39	DRUM HANDLING UNIT
40	LIQUID WASTE STORAGE AREA
41 - 43	TRUCK ROLL-OFF AREA
44	TRUCK WASH LAYOUT AND DETAILS
45	CONCRETE AND GRATING DETAILS

PATRICK G. CORSER
NEW MEXICO
12236
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ Patrick G. Corser, NM P.E. 12236

PREPARED BY:

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 2 Sheets
DWG.: GANDY-COVER

DRAWING No.:	REV.
1	1

DESIGN DRAWINGS
TRIASSIC PARK WASTE DISPOSAL FACILITY
CHAVES COUNTY, NEW MEXICO

DECEMBER 1997 (Revised October 2000)

RCRA PART B APPLICATION

Not For Construction (See Notes Drawing 2)

Drawings included for reference but eliminated as annotated for 2011 permit renewal.

LIST OF DRAWINGS

	DRAWING NO.	DRAWING TITLE
GENERAL	1	COVER SHEET *(2 Sheets)*
	2	INDEX, LEGEND AND GENERAL NOTES
FACILITY	3	EXISTING TOPOGRAPHY
	4	FACILITY LAYOUT
	5	INITIAL SITE GRADING PLAN
LANDFILL	6	ULTIMATE LANDFILL EXCAVATION PLAN
	7	LANDFILL CROSS-SECTIONS
	8	DETAILED EXCAVATION PLAN - PHASE 1A
	9	TOP OF PROTECTIVE SOIL LAYER - PHASE 1A
	10	FILLING PLAN - PHASE 1A
	11	PHASE 1A CROSS-SECTIONS
	12	LINER DETAILS
	13	COLLECTION BASIN PLAN AND DETAILS
	14	LANDFILL ACCESS RAMP DETAILS
	15	SUMP PLAN VIEW - PHASE 1A
	16	SUMP CROSS-SECTIONS - PHASE 1A
LANDFILL	17	TYPICAL SUMP DETAIL CROSS-SECTION
	18	VADOSE, LDRS, LCRS CROSS-SECTIONS AND DETAILS
	19	CREST RISER PAD AND LEACHATE STORAGE TANK PLAN VIEW AND CROSS-SECTIONS *(3 Sheets)*
	20	VERTICAL RISER DETAILS *(2 Sheets)*
	21	FINAL GRADING PLAN - TOP OF WASTE CONTOURS
	22	FINAL GRADING PLAN - TOP OF VEGETATIVE COVER CONTOURS
	23	FINAL COVER DETAILS
	24	INTERPHASE BERM SECTION
	25	SURFACE WATER CONTROL FEATURES *(2 Sheets)*
	26	TRAFFIC PLAN *(2 Sheets)*
	27	PERIMETER ROAD DETAILS
EVAPORATION POND	~~28~~	~~EVAPORATION POND SUBGRADE CONTOURS - PHASE 1~~
	~~29~~	~~EVAPORATION POND CLAY LINER CONTOURS - PHASE 1~~
	~~30~~	~~EVAPORATION POND CROSS-SECTIONS~~
	~~31~~	~~EVAPORATION POND TRUCK DISCHARGE STATION *(2 Sheets)*~~
	~~32~~	~~EVAPORATION POND LDRS AND VADOSE PLAN AND DETAILS~~
STABILIZATION UNIT	~~33~~	~~STABILIZATION UNIT GENERAL ARRANGEMENT~~
	~~34~~	~~STABILIZATION UNIT WASTE FLOW DIAGRAM~~
	~~35~~	~~STABILIZATION UNIT BIN DESIGN~~
	~~36~~	~~STABILIZATION BIN DESIGN DETAILS *(2 Sheets)*~~
DRUM HANDLING UNIT	~~37~~	~~DRUM HANDLING UNIT GENERAL ARRANGEMENT~~
	~~38~~	~~DRUM HANDLING UNIT DETAILS~~
	~~39~~	~~DRUM HANDLING UNIT SUMP DETAILS *(2 Sheets)*~~
	~~40~~	~~LIQUID WASTE RECEIVING AND STORAGE UNIT LAYOUT *(2 Sheets)*~~
TRUCK ROLL-OFF AREA	~~41~~	~~TRUCK ROLL-OFF AREA DRAINAGE SURFACE CONTOURS~~
	~~42~~	~~TRUCK ROLL-OFF AREA SUBGRADE CONTOURS~~
	~~43~~	~~TRUCK ROLL-OFF AREA LINER DETAILS *(2 Sheets)*~~
	~~44~~	~~TRUCK WASH LAYOUT AND DETAILS *(2 Sheets)*~~
	45	CONCRETE AND GRATING DETAILS *(5 Sheets)*

PATRICK G. CORSER
NEW MEXICO
12236
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Corser, NM P.E. 12236*

PREPARED BY:

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 Of 2 Sheets
DWG.: GANDY-COVER2

DRAWING No.:	REV.
1	1

LEGEND

GENERAL LINES

- FACILITY BOUNDARY AND ACTIVE FACILITY FENCE
- 4150 — EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- SUBGRADE EXCAVATION CONTOURS
- TOP OF CLAY LINER
- TOP OF SUBGRADE LAYER
- TOP OF PROTECTIVE SOIL
- TOP OF WASTE
- TOP OF EXISTING SURFACE
- EXISTING GRAVEL ROAD
- EXISTING DRAINAGE
- SECTION LINE
- EDGE OF REGRADE
- GRADE BREAK LINE
- NEW SURFACE WATER DRAINAGE DITCHES
- EDGE OF LINER

GEOSYNTHETIC TYPES

- GEOMEMBRANE
- GEOTEXTILE
- GEONET
- GEOCOMPOSITE
- GCL

MISCELLANEOUS

- FENCE
- SLOPE
- SECTION CORNER
- SURVEY CONTROL POINT
- CULVERT
- NOMINAL DIAMETER
- DIRECTION OF FLOW

FILL PATTERNS

- CLAY LINER
- DRAINAGE GRAVEL
- FOUNDATION/PIPE BEDDING SAND
- SUBGRADE
- PREPARED SUBGRADE
- SUBBASE
- PROTECTIVE SOIL
- VEGETATIVE COVER
- CONCRETE
- ROAD-BASE
- STRUCTURAL FILL
- ALLUVIAL DEPOSITS
- UPPER DOCKUM
- LOWER DOCKUM
- WASTE
- SELECT SUBBASE

KEY

CROSS-SECTION LOCATION

DETAIL/SECTION NUMBER

DRAWING No. WHERE DETAIL/SECTION IS REFERENCED

DRAWING No. WHERE DETAIL/SECTION IS SHOWN

GENERAL NOTES

1. DRAWINGS PRESENT FINAL DESIGNS FOR THE RCRA PERMITTED FACILITIES. DETAILS ON THE RCRA COMPONENTS OF THE FACILITIES MAY BE SUPPLEMENTED DURING THE BIDDING AND CONSTRUCTION PHASE. GANDY MARLEY WILL SUPPLY THE ADDITIONAL DETAILS ON THE NON-RCRA COMPONENTS OF THE DESIGN TO NMED FOR REVIEW AND APPROVAL PRIOR TO THE START OF CONSTRUCTION.
2. ~~DESIGN DRAWINGS WERE PREPARED FOR PART "B" PERMIT SUBMITTAL.~~
3. DESIGN DRAWINGS TO BE USED IN CONJUNCTION WITH CONSTRUCTION SPECIFICATIONS AND CONSTRUCTION QUALITY ASSURANCE PLAN.
4. THIS SET OF DRAWINGS TO BE USED FOR PART B PERMIT APPLICATION. DRAWINGS ARE NOT TO BE USED FOR CONSTRUCTION. ADDITIONAL WORK TO BE COMPLETED TO ISSUE DRAWINGS FOR CONSTRUCTION INCLUDE THE FOLLOWING:
   - RECEIPT OF PART B PERMIT
   - SURVEY GRID POINT LISTING FOR CONSTRUCTION STAKING
   - REVIEW AND APPROVAL OF CONTRACTOR EQUIPMENT, MATERIALS, PROCEDURES, SUBMITTALS AND SHOP DRAWINGS.
5. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST, 1997, KOOGLE & POULS ENGINEERING.
6. PROTECTIVE SOIL CONSISTS OF SELECT ONSITE SOILS.
7. GEOCOMPOSITE CONSISTS OF GEOTEXTILE BONDED TO GEONET.
8. GEOMEMBRANE IS A MINIMUM 60 mil HDPE.
9. 48-in. WIDE USED CONVEYOR BELT SHALL NOT HAVE STEEL WIRE REINFORCEMENTS OR OTHER PROTRUSIONS WHICH MAY DAMAGE UNDERLYING GEOMEMBRANE.
10. EVAPORATION POND TOPOGRAPHY ON DRAWING 29 IS TOP OF CLAY LINER.
11. ACTUAL SIZE, LOCATION, AND ORIENTATION OF STABILIZATION FACILITY AND ANCILLARY STRUCTURES AND EQUIPMENT TO BE DETERMINED DURING FINAL DESIGN.
12. TOTAL CAPACITY OF COLLECTION BASIN POND NEEDED: 6.0 AC-FT.
13. ELECTRICAL AND PIPING TO BE DESIGNED BY CONTRACTOR. SHOP DRAWINGS TO BE SUBMITTED FOR REVIEW AND APPROVED BY ENGINEER.
14. ALL ANCILLARY EQUIPMENT WILL BE SUPORTED AND PROTECTED AGAINST PHYSICAL DAMAGE AND EXCESSIVE STRESS DUE TO SETTLEMENT, VIBRATION, EXPANSION, OR CONSTRUCTION, AND WILL BE INSTALLED ACCORDING TO API PUBLICATION 1615 (NOVEMBER 1979) OR ANSI STANDARD B31.2 AND ANSI STANDARD B31.4.
15. ALL GEOSYNTHETIC MATERIALS HAVE BEEN EXAGGERATED FOR CLARITY.
16. ALL CONCRETE SURFACES WHICH ARE EXPOSED TO POTENTIALLY HAZARDOUS MATERIALS AND ARE INTENDED AS CONTAINMENT FEATURES OR DIP PADS SHALL BE EPOXY COATED.
17. ALL PIPING WITHIN LINED FACILITIES WILL BE SINGLE WALL PIPE. DOUBLE WALL PIPE WILL BE USED FOR ALL PIPING OUTSIDE OF LINED FACILITIES.
18. LCRS - LEACHATE COLLECTION REMOVAL SYSTEM
19. LDRS - LEAKAGE DETECTION REMOVAL SYSTEM
20. USCS - UNIFIED SOIL CLASSIFICATION SYSTEM IS A SYSTEM WHICH CLASSIFIES SOIL TYPES ACCORDING TO SOIL TEXTURE AND GRAIN SIZE.
21. CONCRETE STRUCTURAL DETAILS ARE SHOWN ON DRAWING 45. THESE APPLY TO ANY CONCRETE SHOWN THROUGHOUT THE DRAWING SET.
22. DAILY COVER WILL CONSIST OF SOIL SPREAD ON TOP OF THE LANDFILL WASTE PLACEMENT AREA TO A DEPTH OF APPROXIMATELY 0.5 FEET.
23. PERMIT APPLICATION APPLIES TO PHASE 1A.

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
4	October 2000 Revision	10/4/00	J.Pellicer	K.Conrath	P.Carser
3	November 1999 Updates	11/03/99	J.Trancoso	M.Melchiken	P.Carser
2	September 1999 Revision	9/7/99	P.Carser	K.Conrath	P.Carser
1	November 1998 Revision	10/29/98	J.Pellicer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	12/19/97	PGC/JPP	K.Conrath	P.Carser

PATRICK G. CARSER — NEW MEXICO — 12236 — REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date — *Patrick G. Carser, NM P.E. 12236*

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

INDEX, LEGEND AND GENERAL NOTES

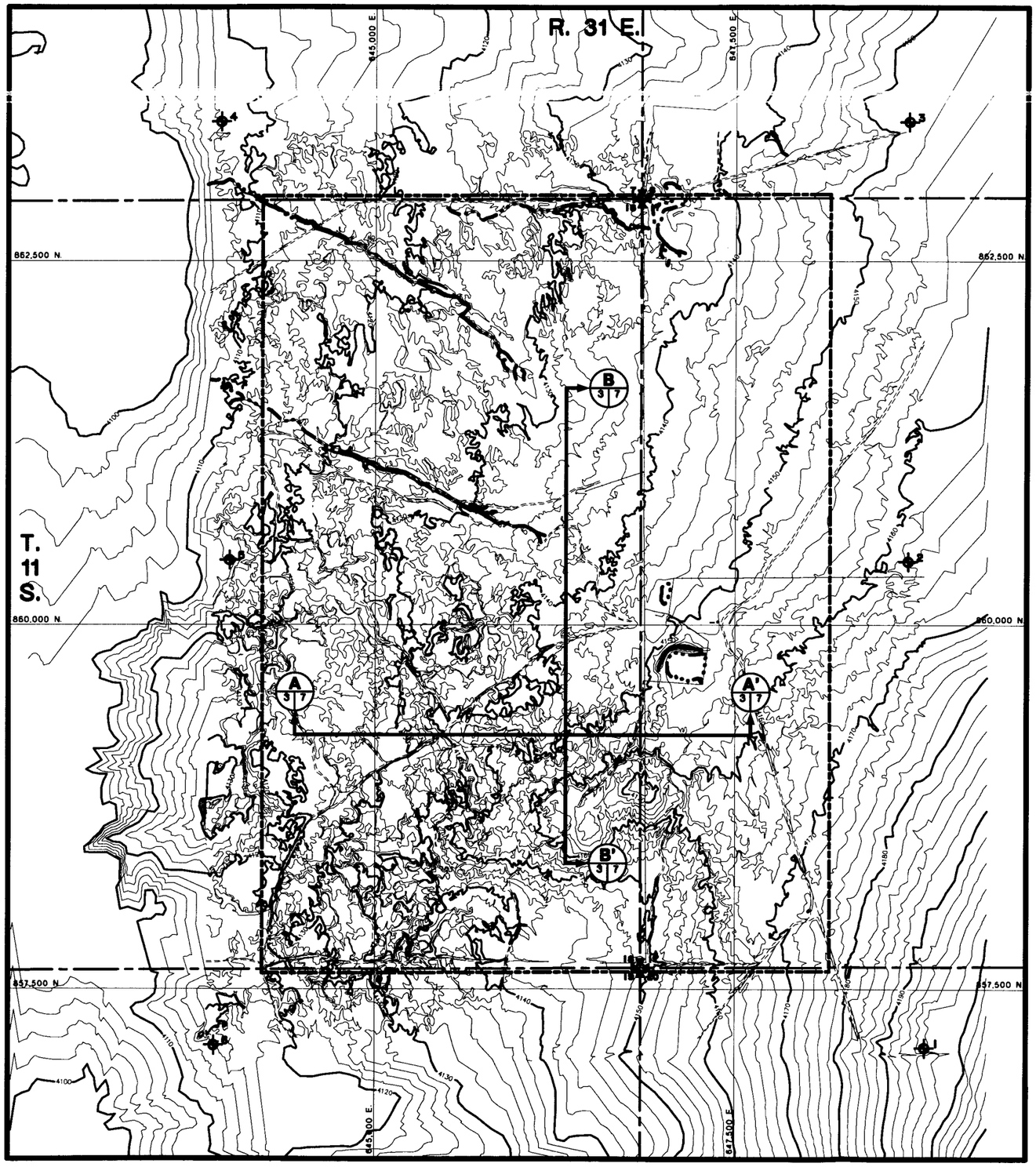
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets

SCALE: Not to Scale

DRAWING No 2

AutoCAD FILE: GANDY-01.DWG PROJECT NUMBER: 602-0200



SURVEY CONTROL POINTS

CONTROL POINT NUMBER	NORTHING	EASTING	ELEVATION
1	857,099.19	648,823.16	4,197.55
2	860,435.24	648,704.91	4,161.92
3	863,453.55	648,706.31	4,152.96
4	863,454.95	643,940.29	4,105.99
5	860,445.06	644,000.06	4,113.51
6	857,114.96	643,893.71	4,116.20

NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEY PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING. ADDITIONAL TOPO TAKEN FROM MESCALERO POINT, NEW MEXICO 7.5 MINUTE SERIES, DATED 1973.
3. SURVEY CONTROL POINTS SET IN FIELD WITH REBAR AND CAP BY JOHN WEST ENGINEERING COMPANY, AUGUST 1997.

SCALE

400' 0 400' 800'

CONTOUR INTERVAL 2 FT.

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	October 2000 Revision	10/4/00	J.Pelliser	K.Cparath	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Carser

PATRICK G. CARSER NEW MEXICO 12336 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Carser, NM P.E. 12336*

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

EXISTING TOPOGRAPHY

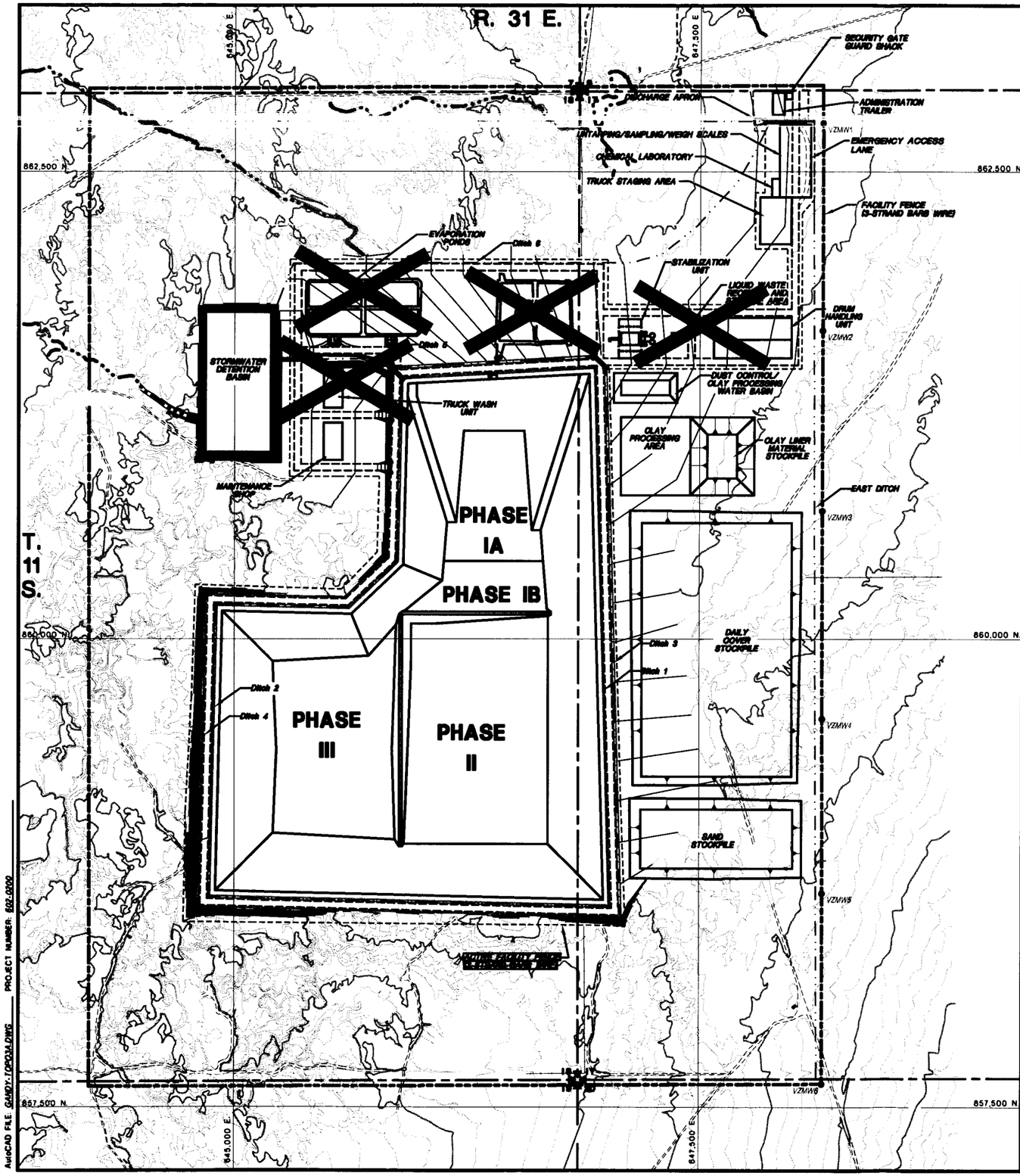
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets

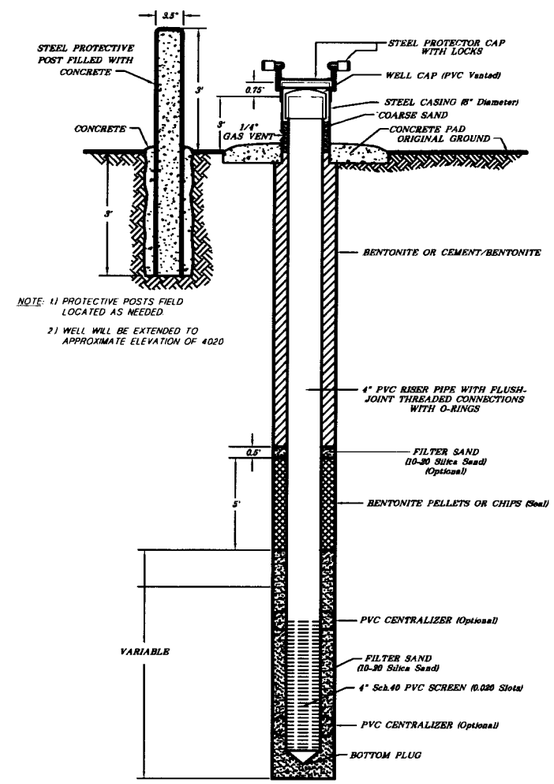
SCALE: AS NOTED

DRAWING No. 3

AutoCAD FILE: GANDY-TOPOLDWG PROJECT NUMBER: 692-0200



TYPICAL VADOSE ZONE MONITORING WELL INSTALLATION DETAIL



NOTE: 1) PROTECTIVE POSTS FIELD LOCATED AS NEEDED

2) WELL WILL BE EXTENDED TO APPROXIMATE ELEVATION OF 4020

LEGEND

- EXISTING CONTOUR
- REGRADED CONTOUR
- VZMW2 ● VADOSE ZONE MONITORING WELLS
- FACILITY AND ACTIVE FACILITY FENCES (3-Strand Barb Wire)

Drawing replaced by DBS&A for 2011 permit renewal under separate cover, including the notations shown on this sheet.

N

SCALE

300' 0 300' 600'

CONTOUR INTERVAL 2 FT.

NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.
3. THE VADOSE ZONE MONITORING WELLS WILL BE EXTEND TO ELEVATION 4020, APPROXIMATELY.

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this map was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	November 1999 Updates	11/02/99	J.Troncoso	M.Mathison	P.Carser
1	November 1998 revision	10/29/98	J.Pullar	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	10/16/97	PGC/JPP	T.Smith	P.Carser

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

FACILITY LAYOUT

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets

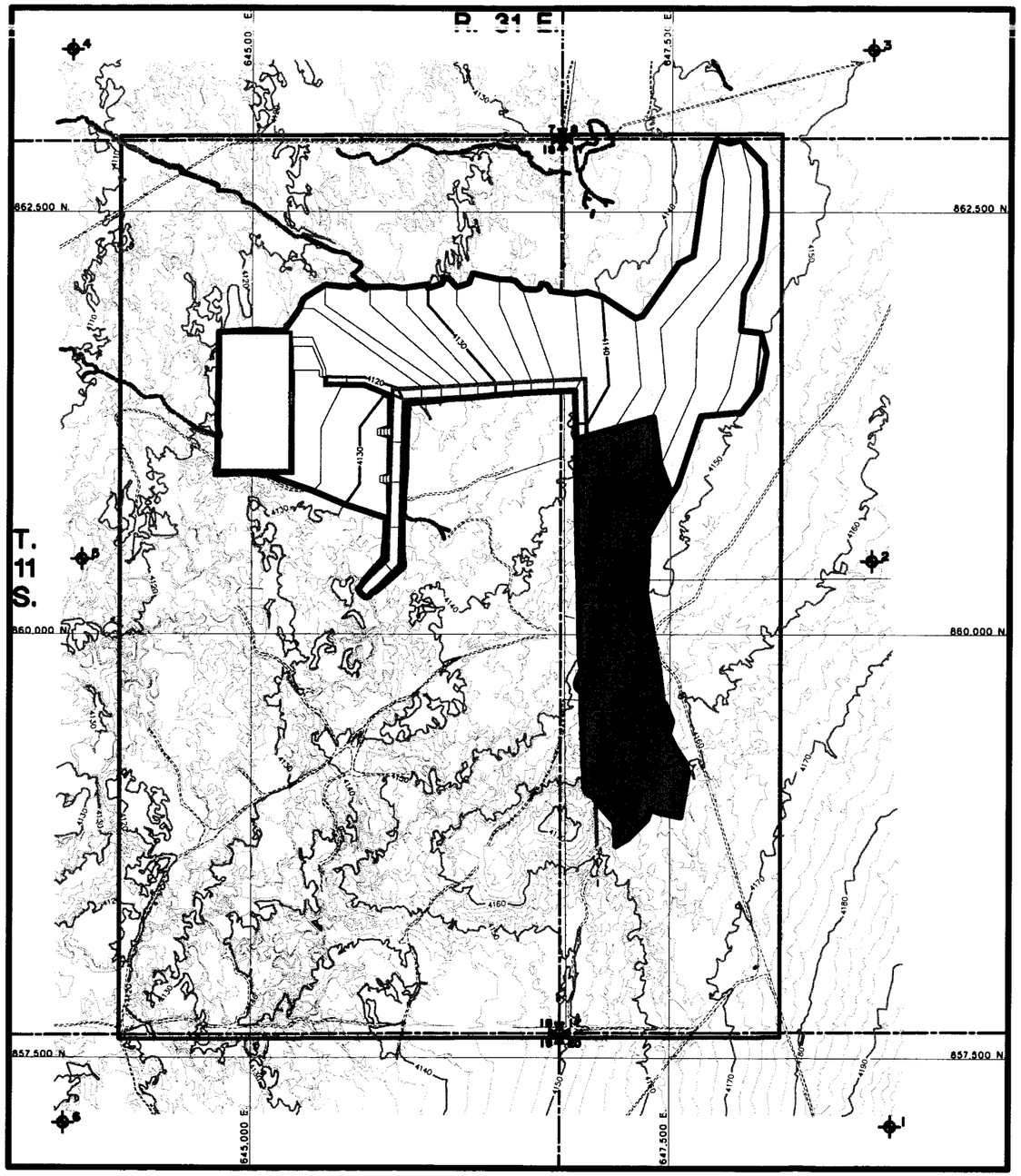
SCALE: AS NOTED

DRAWING No. 4

LEGEND

REGRADE AREA - CUT - 239,200 cy

REGRADE AREA - FILL - 75,100 cy



NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.
3. SURVEY CONTROL POINTS SET IN FIELD WITH REBAR AND CAP BY BY JOHN WEST ENGINEERING COMPANY, AUGUST 1997.

N

SCALE

400' 0 400' 800'

CONTOUR INTERVAL 2 FT.

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	October 2000 Revision	10/4/00	J.Patton	K.Conrath	P.Carser
0	PART B PERMIT APPLICATION	10/16/97	PGC/JPP	T.Smith	P.Carser

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ Patrick G. Carser, NM P.E. 12236

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

INITIAL SITE GRADING PLAN

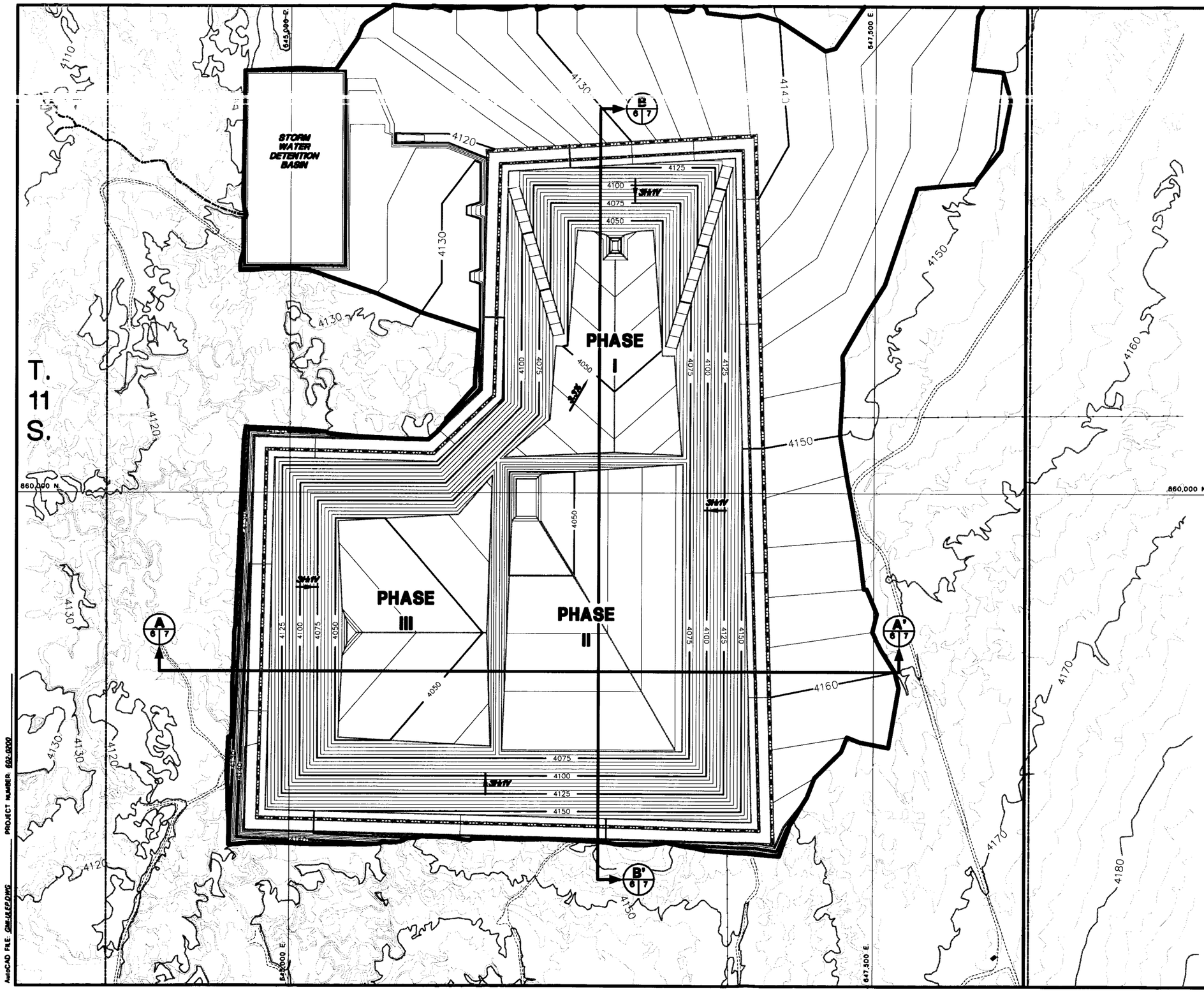
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets

SCALE: AS NOTED

DRAWING No. 5

AutoCAD FILE: GANDY-GRADE.DWG PROJECT NUMBER: 692-0200



NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE [illegible]
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.
3. BASE GRADES FOR PHASES II AND III TO BE MODIFIED PRIOR TO CONSTRUCTION TO ACHIEVE A MINIMUM OF 2%.

PATRICK G. CORSER
NEW MEXICO
12236
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Corser, NM P.E. 12236*

SCALE

200' 0 200' 400'

CONTOUR INTERVAL 5 FT.
SURFACE TOPOGRAPHY CONTOUR INTERVAL 2 FT.

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revisions	10/1/00	J.Pelliser	K.Conrath	P.Corser
1	November 1998 Revision	10/29/98	J.Pelliser	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	10/10/97	PGC/JPP	EWS	P.Corser

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:

ULTIMATE LANDFILL EXCAVATION PLAN

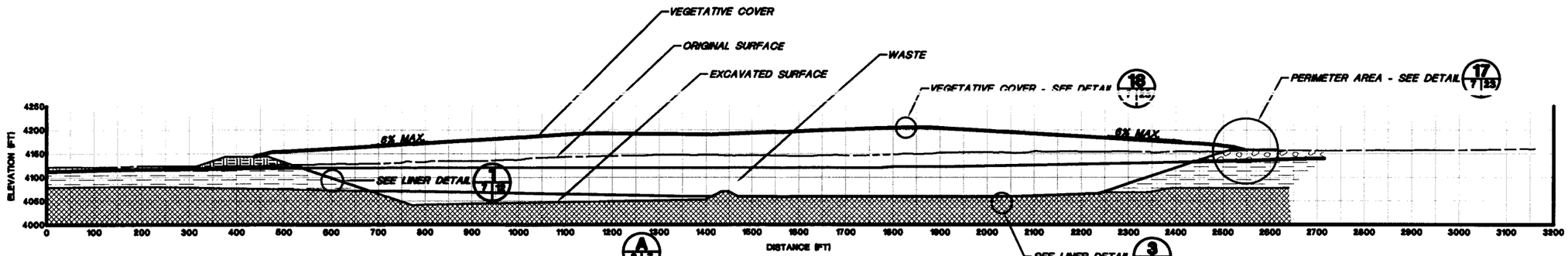
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets

SCALE: AS NOTED

DRAWING No. 6

AutoCAD FILE: GM-UEP.DWG PROJECT NUMBER: 602-0200

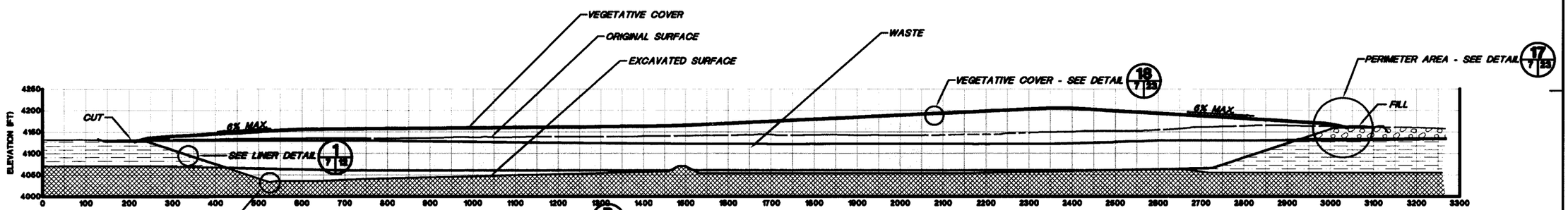


A 3 7 A 6 7 A 21 7 A 22 7

CROSS-SECTION A-A'

HORIZONTAL SCALE
0 120' 240'

VERTICAL SCALE
0 120' 240'



B 3 7 B 6 7 B 21 7 B 22 7

CROSS-SECTION B-B'

HORIZONTAL SCALE
0 120' 240'

VERTICAL SCALE
0 120' 240'

NOTES:
1. CROSS-SECTIONS NOT CUT PERPENDICULAR TO COVER CONTOURS; THEREFORE TRUE COVER SLOPES NOT SHOWN.
2. EXTENT OF GEOLOGIC UNITS IS INFERRED BASED ON SUBSURFACE EXPLORATION PROGRAM.
3. SYMBOLS FOR GEOLOGIC UNITS ARE SHOWN ON DRAWING 2.
4. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CARSER
NEW MEXICO
12236
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Carser, NM P.E. 12236*

Not For Construction

REV. No	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelicer	K.Carreth	P.Carser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelicer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Carser

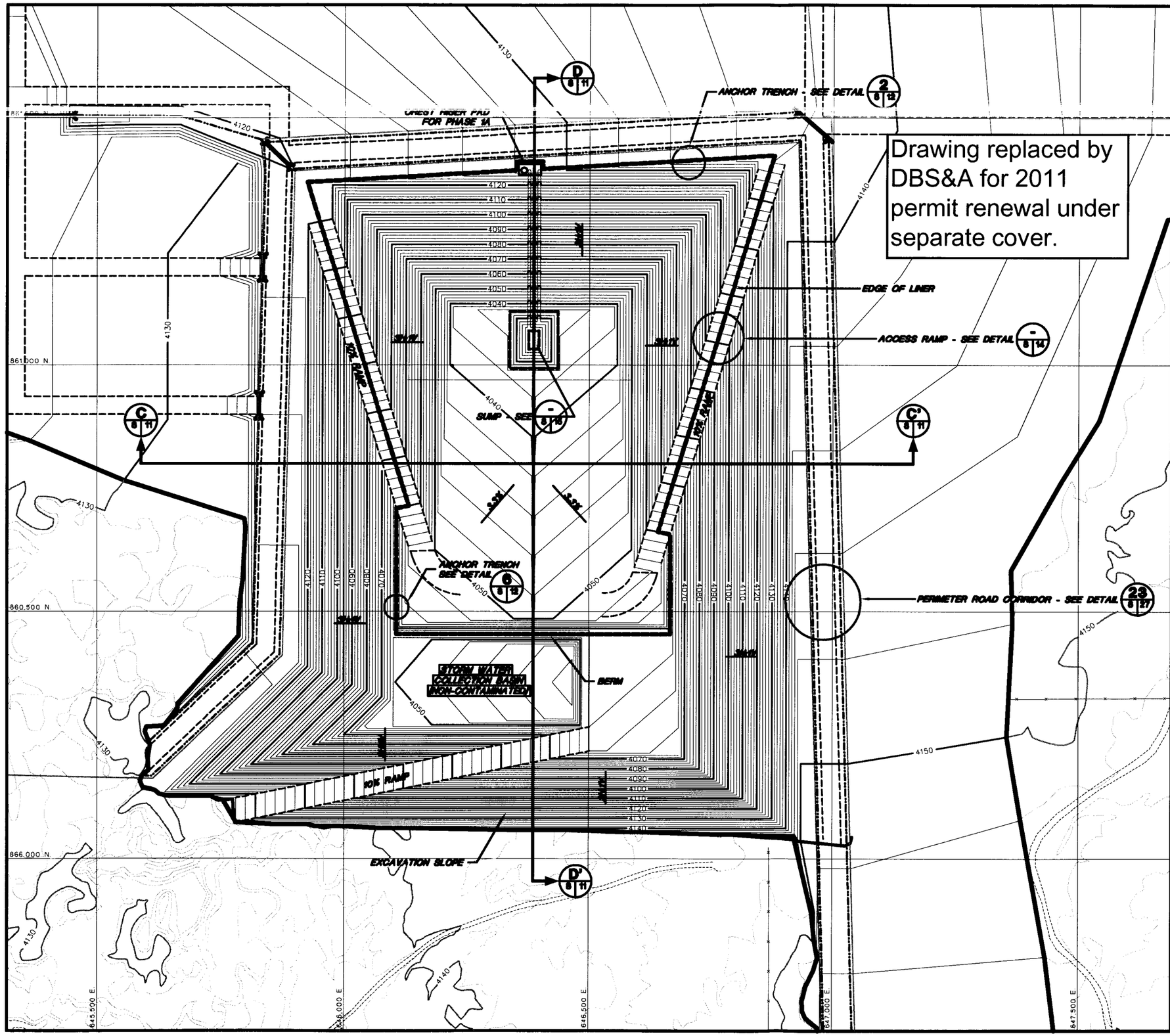
TRIASSIC PARK
WASTE DISPOSAL FACILITY

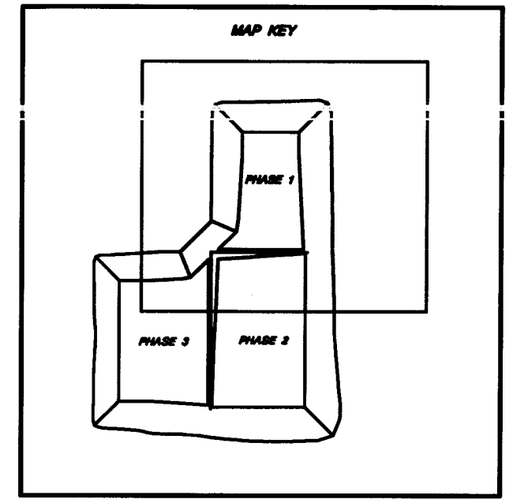
DRAWING TITLE:
LANDFILL CROSS-SECTIONS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 7

AutoCAD FILE: GANDY-TASEC2.DWG PROJECT NUMBER: 692-0200





NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.

PATRICK G. CORSER — NEW MEXICO — 12298 — REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12298

SCALE
100' 0 100' 200'
CONTOUR INTERVAL 2 FT.

Not For Construction

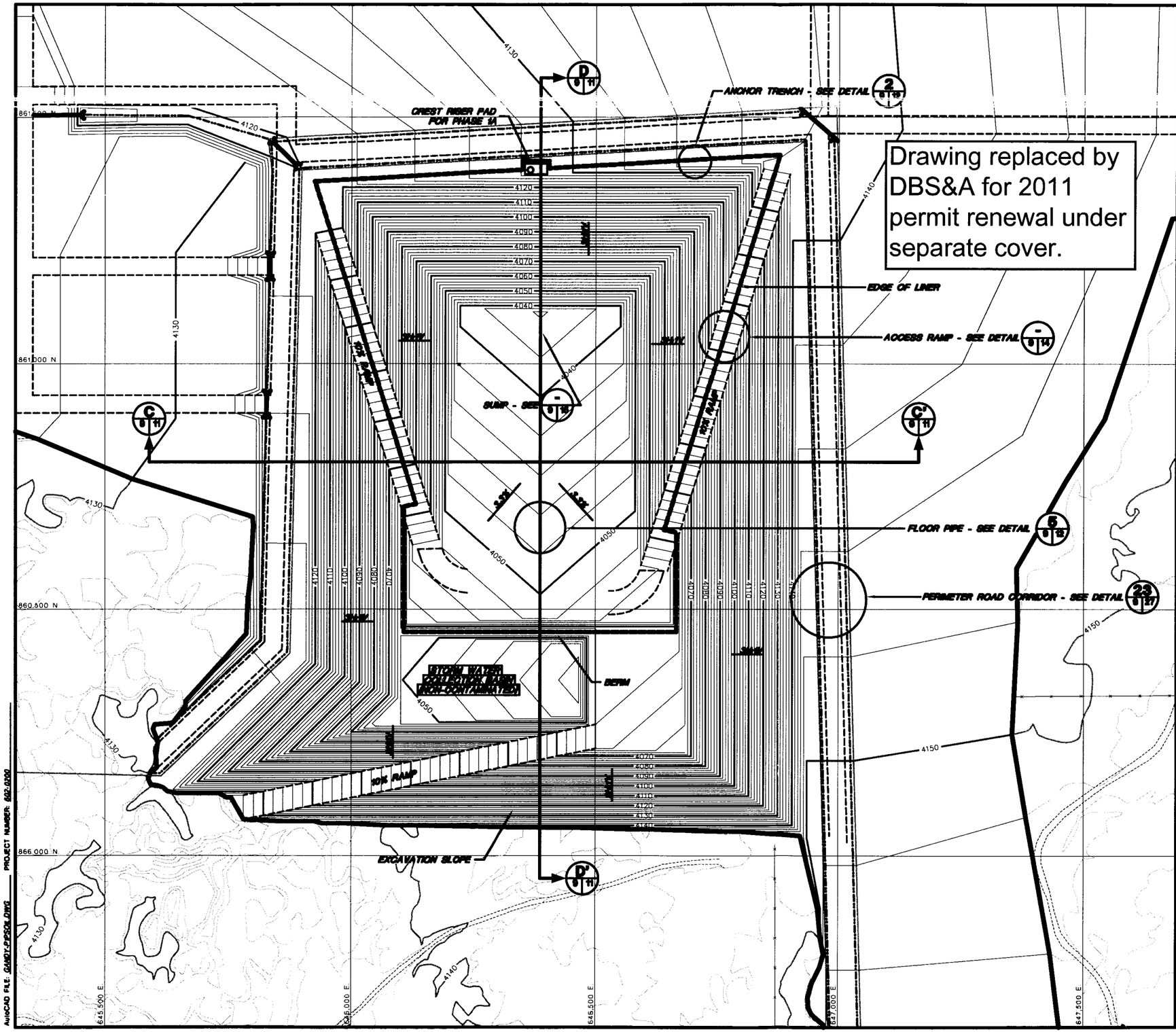
REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelizer	K.Conrath	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelizer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	10/10/97	PGC/JPP	T.Smith	P.Corser

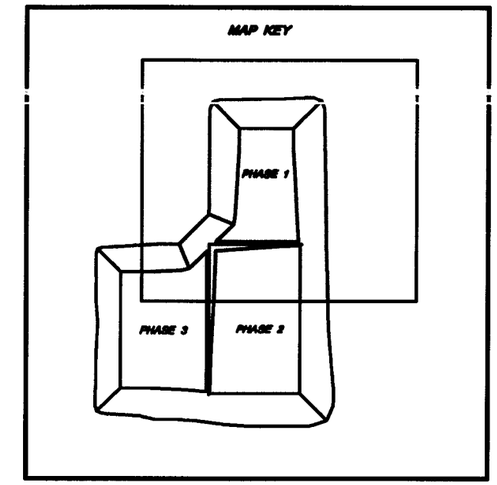
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
DETAILED EXCAVATION PLAN - PHASE 1A

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 8





NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.

PATRICK G. CORSER NEW MEXICO 12836 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12836

SCALE
100' 0 100' 200'
CONTOUR INTERVAL 2 FT.

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelton	K.Corsch	P.Corser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelton	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	10/10/97	PGC/JJP	T.Smith	P.Corser

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
TOP OF PROTECTIVE SOIL LAYER - PHASE 1A

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 9

AutoCAD FILE: GAMO1-EPSOIL.DWG PROJECT NUMBER: 602-0200

Drawing replaced by DBS&A for 2011 permit renewal under separate cover.

CREST RISER PAD FOR PHASE 1A

ANCHOR TRENCH - SEE DETAIL 2/10|11

LIMIT OF WASTE

EDGE OF LINER

ACCESS RAMP - SEE DETAIL -/10|14

~WASTE~

WASTE FILL SLOPE

10% RAMP

CONTAMINATED WATER BASIN

STORM WATER COLLECTION BASIN NON-CONTAMINATED

BERM

PERIMETER ROAD CORRIDOR - SEE DETAIL 23/10|27

EXCAVATION SLOPE

TEMPORARY DITCH

861,000 N.

860,500 N

866,000 N

645,500 E

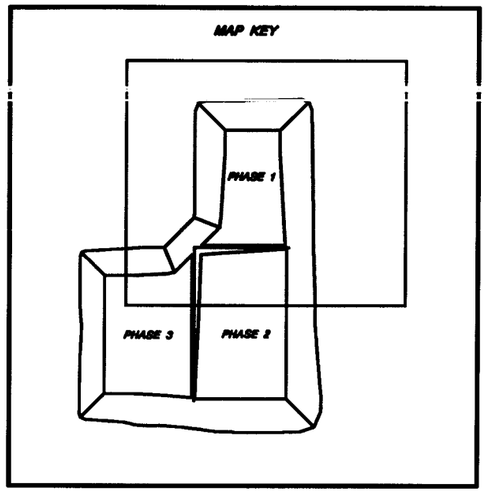
646,000 E

646,500 E

647,000 E

647,500 E

AutoCAD FILE: GAMDY-EPWASTE.DWG PROJECT NUMBER: 602-0200



NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.
3. WASTE FILL VOLUME FOR PHASE 1A: 553,200 CY

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

SCALE

100' 0 100' 200'

CONTOUR INTERVAL 2 FT.

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
4	October 2000 Revision	10/4/00	J.Pelicer	K.Conrath	P.Carser
3	November 1999 Updates	1/02/99	J.Trancoso	M.Mathison	P.Carser
2	SEPTEMBER 1998 REVISION	9/24/98	P.Carser	K.Conrath	P.Carser
1	NOVEMBER 1996 REVISION	10/29/96	J.Pelicer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Carser

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

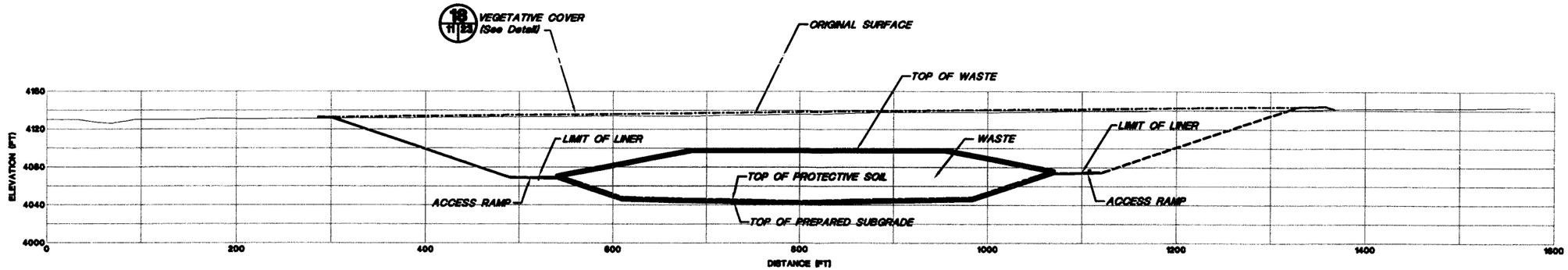
FILLING PLAN - PHASE 1A

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets

SCALE: AS NOTED

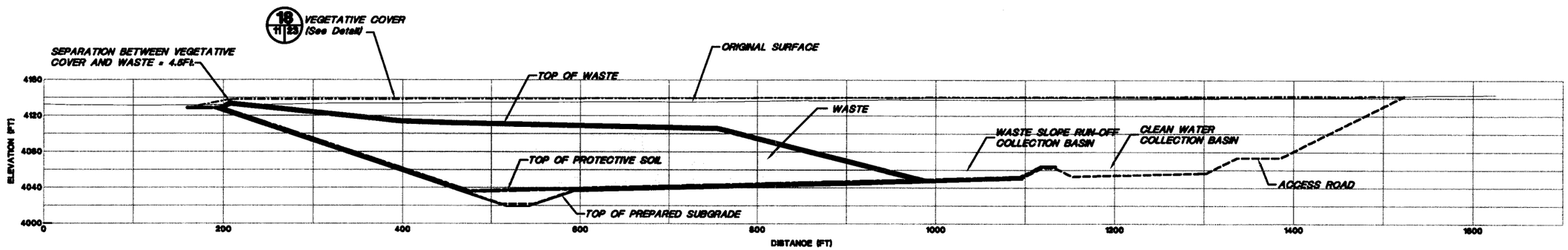
DRAWING No. 10



C 9 11 / C 10 11 PHASE 1A CROSS-SECTION C-C'

HORIZONTAL SCALE
0 60' 120'

VERTICAL SCALE
0 60' 120'



D 9 11 / D 9 11 / D 10 11 PHASE 1A CROSS-SECTION D-D'

HORIZONTAL SCALE
0 60' 120'

VERTICAL SCALE
0 60' 120'

PATRICK G. CORSER
NEW MEXICO
12256
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12256

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. DAILY COVER WILL CONSIST OF SOIL SPREAD ON TOP OF THE WASTE PLACEMENT AREA. MINIMUM DAILY COVER THICKNESS WILL BE APPROXIMATELY 0.5 FEET.

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
3	October 2000 Revision	10/4/00	J.Pellicer	K.Conrath	P.Corser
2	NOVEMBER 1999 UPDATES	11/08/99	J.Troncoso	M.Mathison	P.Corser
1	NOVEMBER 1998 REVISION	10/26/98	J.Pellicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Corser

TRIASSIC PARK WASTE DISPOSAL FACILITY

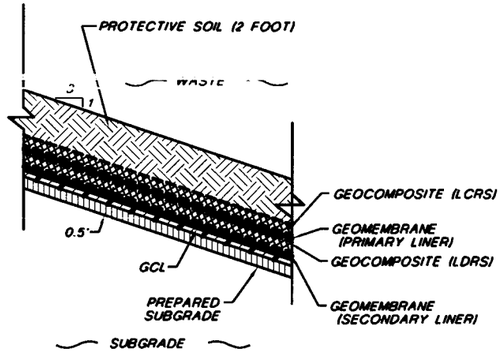
DRAWING TITLE:

PHASE 1A CROSS-SECTIONS

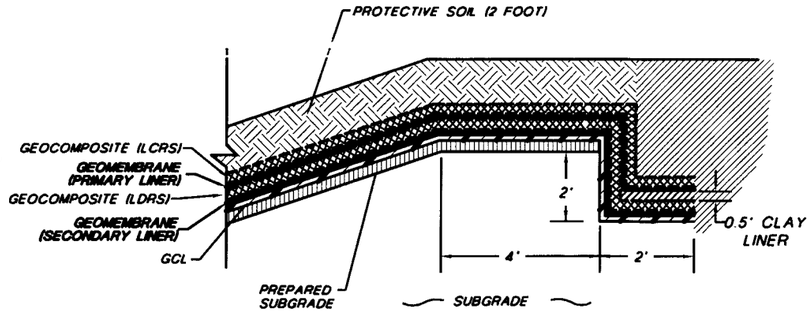
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 11

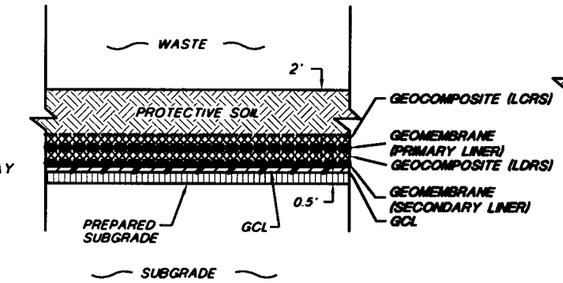
AutoCAD FILE: 0AN01-PHASEC.DWG PROJECT NUMBER: 692-0100



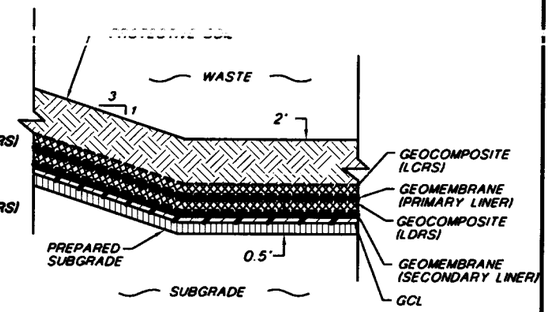
SLOPE LINER SYSTEM DETAIL
1 | 7 | 12
Not To Scale



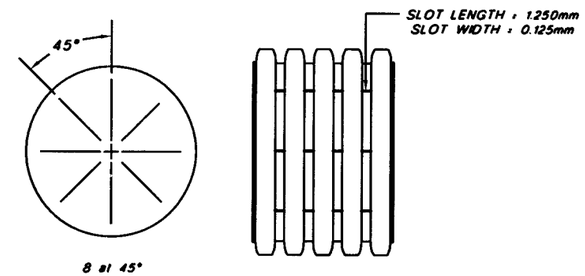
LINER ANCHOR TRENCH DETAIL
2 | 8 | 12 · 2 | 9 | 12 · 2 | 10 | 12 · 2 | 23 | 12 · 2 | 24 | 12
Not To Scale



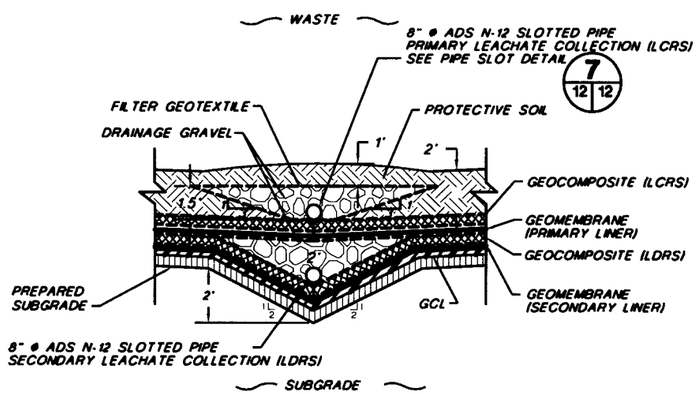
FLOOR LINER SYSTEM DETAIL
3 | 7 | 12 · 3 | 24 | 12
Not To Scale



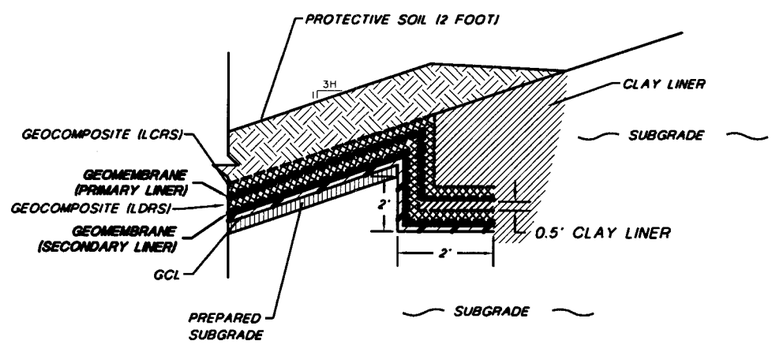
TOE OF SLOPE LINER SYSTEM DETAIL
4 | 7 | 12
Not To Scale



ADS N-12 PIPE SLOT DETAIL
7 | 12 | 12
Not To Scale



FLOOR PIPE DETAIL
5 | 9 | 12
Not To Scale



SLOPE ANCHOR TRENCH
6 | 8 | 12 · 6 | 13 | 12
Not To Scale

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CORSER · NEW MEXICO · 12236 · REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ Patrick G. Corser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pellicer	K.Cerrelli	P.Corser
1	NOVEMBER 1996 REVISION	10/29/96	J.Pellicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	K.Cerrelli	P.Corser

TRIASSIC PARK WASTE DISPOSAL FACILITY

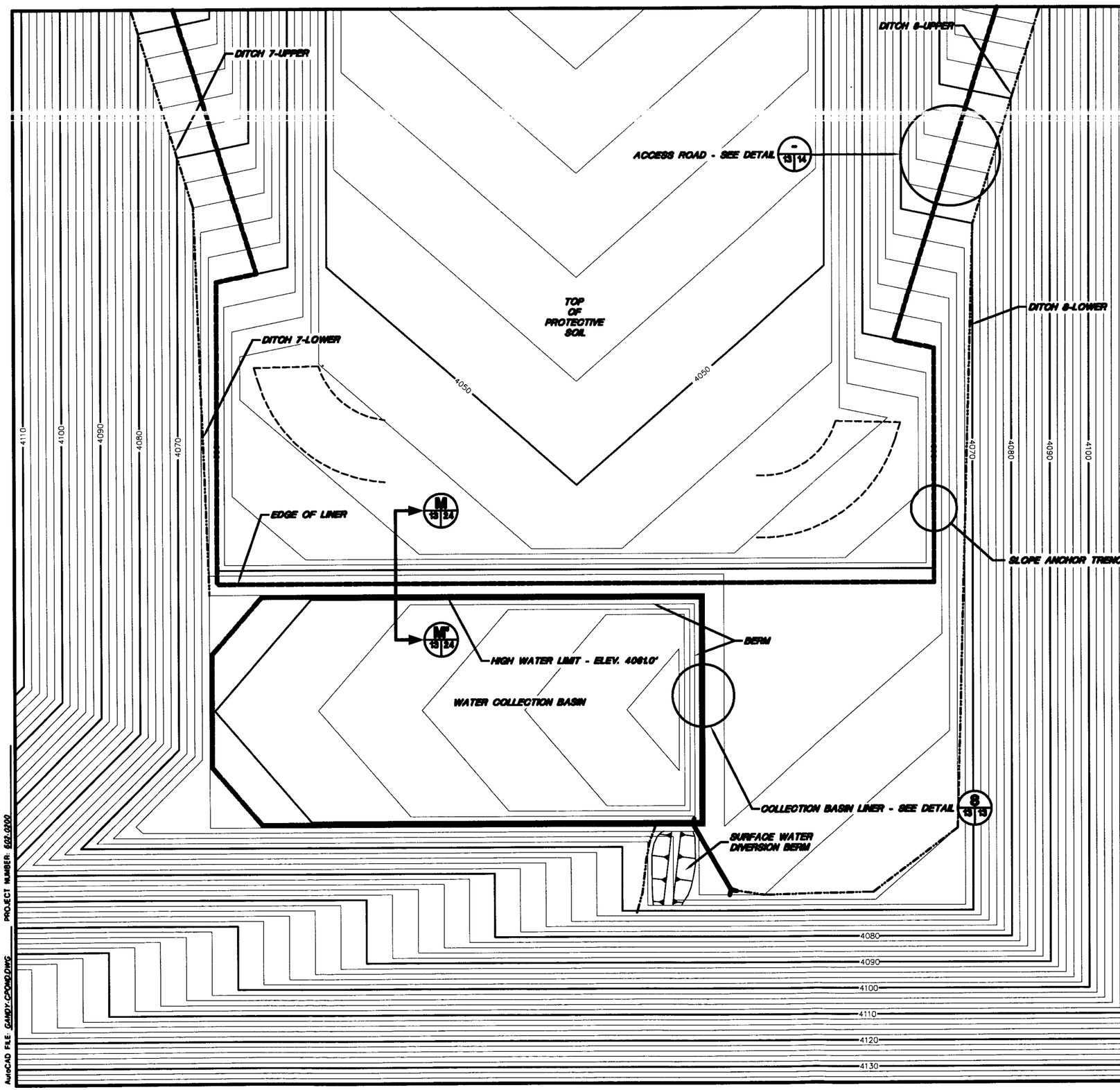
DRAWING TITLE:

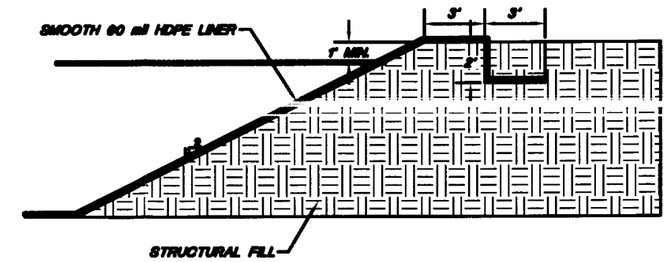
LINER DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: As Shown
DRAWING No. 12

PROJECT NUMBER: 602-0200
AutoCAD FILE: LINRDTLS.DWG





8 13/13 COLLECTION BASIN BERM DETAIL

NOT TO SCALE

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelliczer	K.Cervantes	P.Carser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelliczer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Carser

TRIASSIC PARK
WASTE DISPOSAL FACILITY

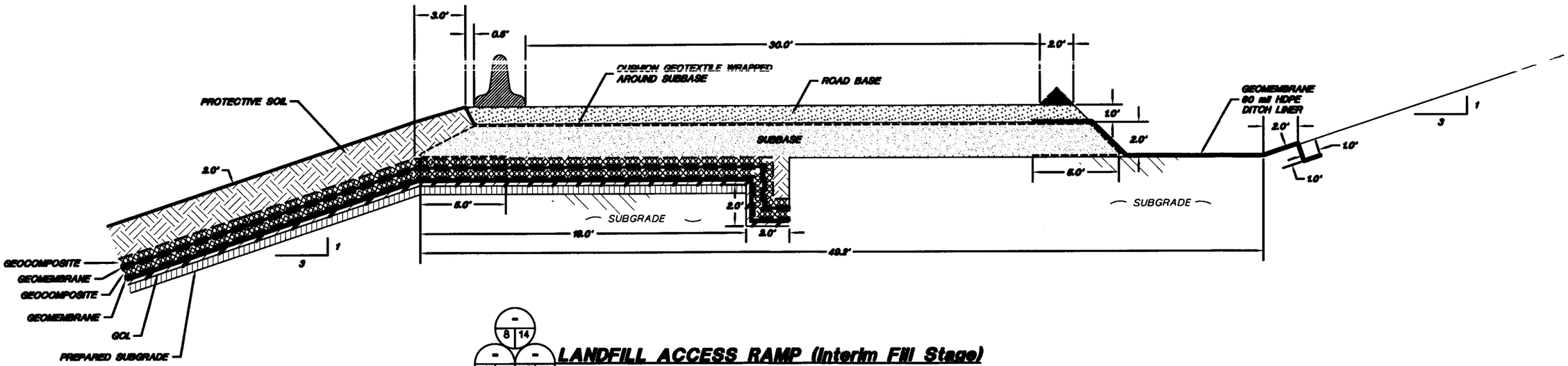
DRAWING TITLE:
COLLECTION BASIN PLAN AND DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 13

SCALE
40' 0 40' 80'
CONTOUR INTERVAL 2 FT.

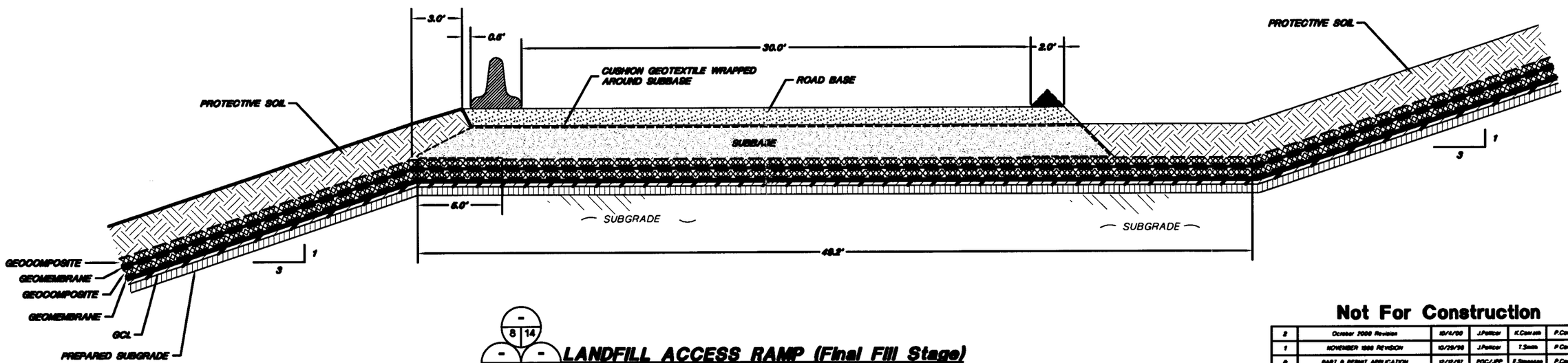
AutoCAD FILE: GANDY-CPOND.DWG PROJECT NUMBER: 602-0300



8 14 | 9 14 | 10 14 | 13 14

LANDFILL ACCESS RAMP (Interim Fill Stage)

SCALE
0 3 6
Feet



8 14 | 9 14 | 10 14 | 13 14

LANDFILL ACCESS RAMP (Final Fill Stage)

SCALE
0 3 6
Feet

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelliser	K.Conrath	P.Carser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelliser	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	E.Simonson	P.Carser

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
TYPICAL LANDFILL ACCESS RAMP DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 14

PATRICK G. CARSER
NEW MEXICO
12236
REGISTERED PROFESSIONAL ENGINEER

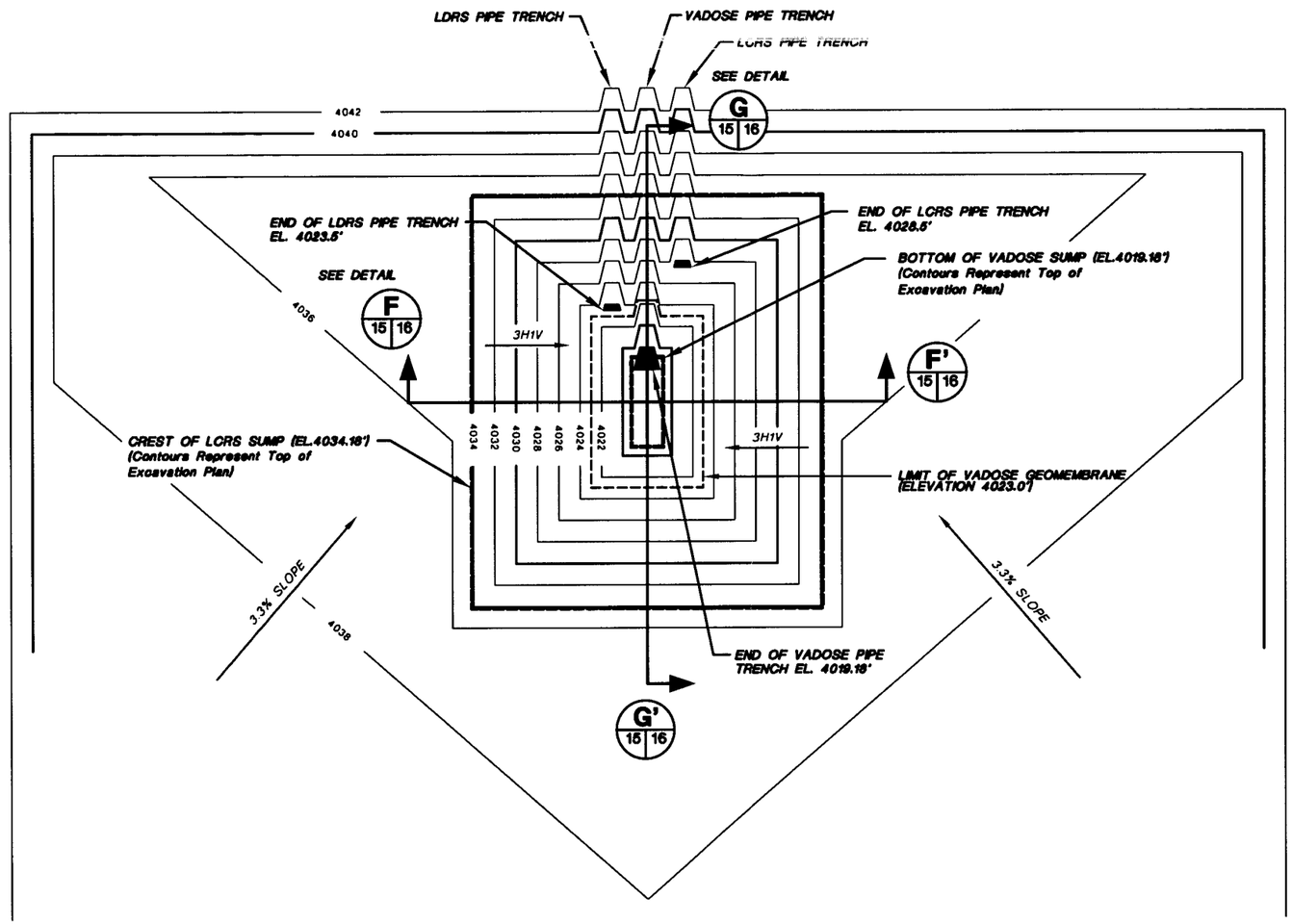
PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

AutoCAD FILE: RAMP-DETAIL.DWG PROJECT NUMBER: 602-0200



SUMP PHASE 1A - PLAN VIEW

SCALE

20' 0 20' 40'

CONTOUR INTERVAL 2Ft.

Not For Construction

NOTES:

1. THE V-TRENCH ON THE FLOOR OF LANDFILL (SEE DETAIL 6/15) WILL EXTEND INTO SUMP TO ELEVATION OF THE LDRS PIPE 4023.5. THE PIPE FROM THE FLOOR WILL EXTEND AOROSS THE BASE OF THE SUMP.
2. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER USA

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	October 2000 Revision	10/4/00	J.Pelicer	K.Carroll	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	POC/JPP	T.Smith	P.Carser

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:

SUMP PLAN VIEW - PHASE 1A

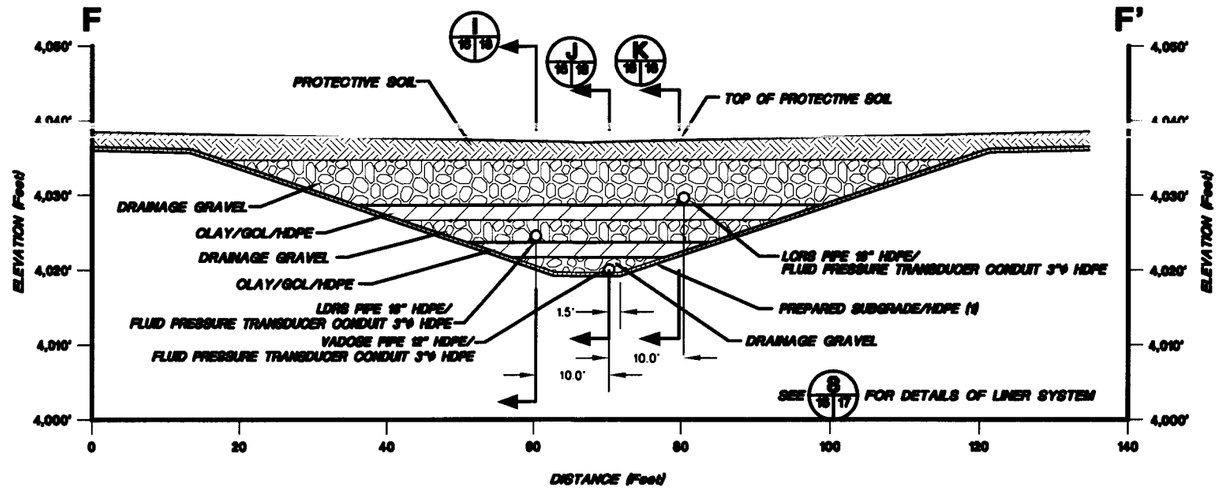
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets

SCALE: See Scale Bar

DRAWING No. 15

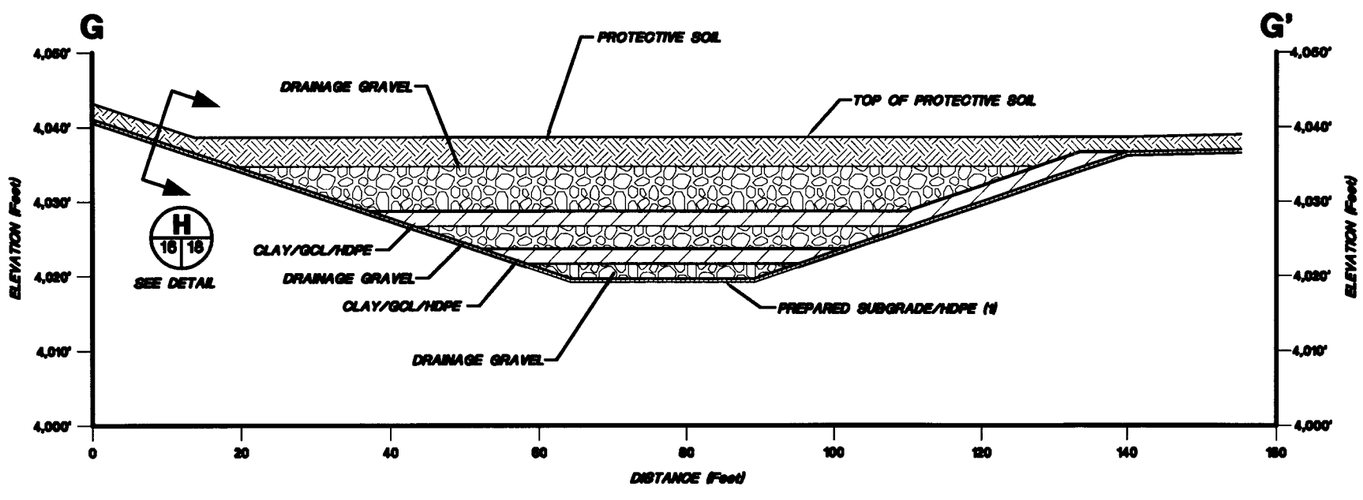
AutoCAD FILE: SUMPPLAN.DWG PROJECT NUMBER: 602-0200



F 15 16 SUMP - CROSS-SECTION F-F'

HORIZONTAL SCALE
0 10.0' 20.0'

VERTICAL SCALE
0 10.0' 20.0'



G 16 16 SUMP - CROSS-SECTION G-G'

HORIZONTAL SCALE
0 10.0' 20.0'

VERTICAL SCALE
0 10.0' 20.0'

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CORSER NEW MEXICO 12266 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12266

Not For Construction

REV. No	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/1/00	J.Pelliser	K.Carroll	P.Corser
1	NOVEMBER 1999 REPORT	10/29/99	J.Pelliser	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/18/97	PGC/JPP	E.Simpson	P.Corser

TRIASSIC PARK WASTE DISPOSAL FACILITY

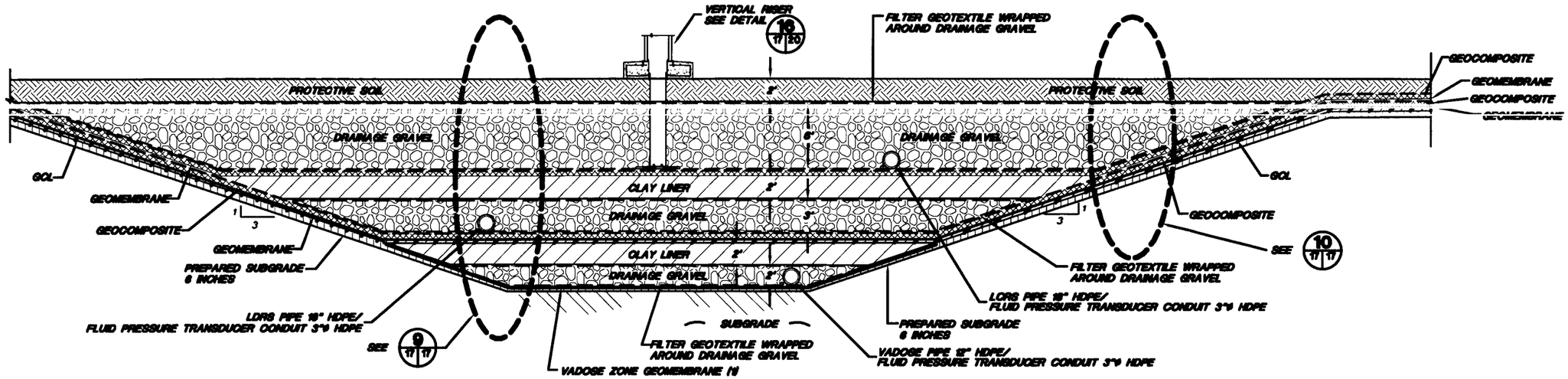
DRAWING TITLE:

SUMP CROSS-SECTIONS - PHASE 1A

TerraMatrix
MONTGOMERY WATSON
Mining Group

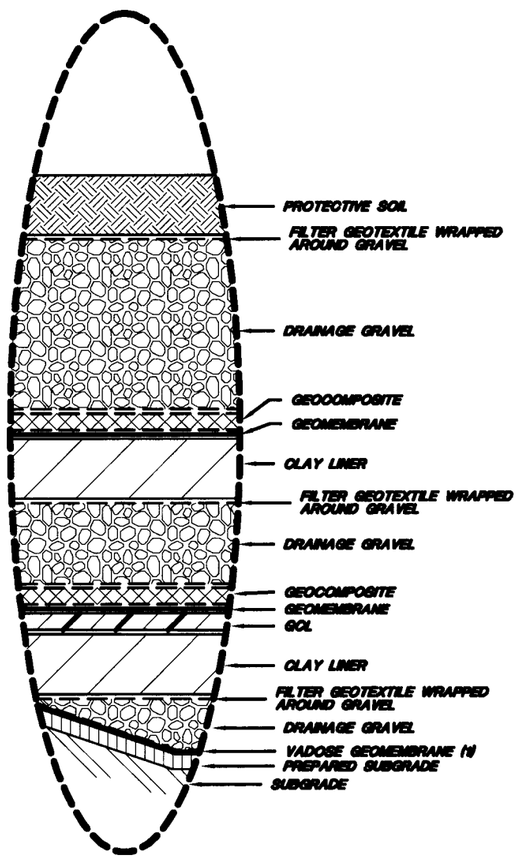
Sheet 1 Of 1 Sheets
SCALE See Scale Bar
DRAWING No. 16

AutoCAD FILE: SUMPPLAN-XSECDWG PROJECT NUMBER: 602-0200



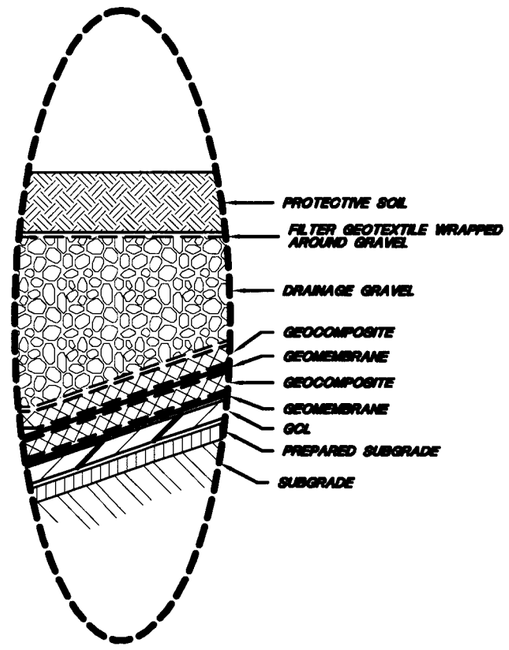
8/18 17 TYPICAL SUMP DETAIL

SCALE
0 5.0' 10.0'
Feet



9/17 17 EXAGGERATED GEOSYNTHETIC COMPONENT DETAIL

Not To Scale



10/17 17 EXAGGERATED GEOSYNTHETIC COMPONENT DETAIL

Not To Scale

NOTES:
1. THE VADOSE GEOMEMBRANE EXTENDS TO LIMITS OF THE SECONDARY CLAY LINER.
2. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No 2, "INDEX, LEGEND AND GENERAL NOTES".

Not For Construction

REV. No	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelicer	K.Conrath	P.Carser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelicer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	E.Simonson	P.Carser

PATRICK G. CARSER
12236
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

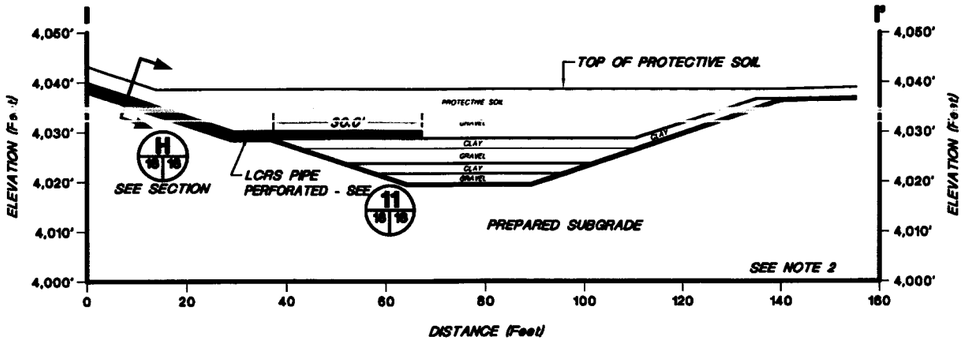
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
TYPICAL SUMP DETAIL CROSS-SECTION

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: Not To Scale
DRAWING No 17

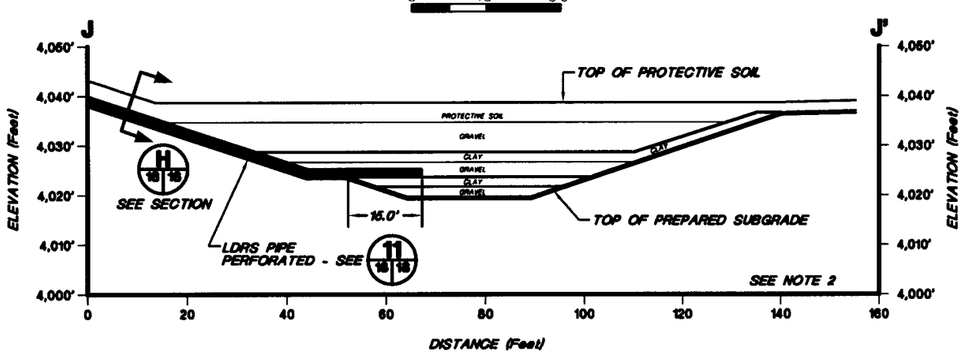
AutoCAD FILE: TYP-SUMP-DETAIL.DWG PROJECT NUMBER: 602-0200



I — LCRS PIPE PLACEMENT IN SUMP

HORIZONTAL SCALE 0 15' 30'

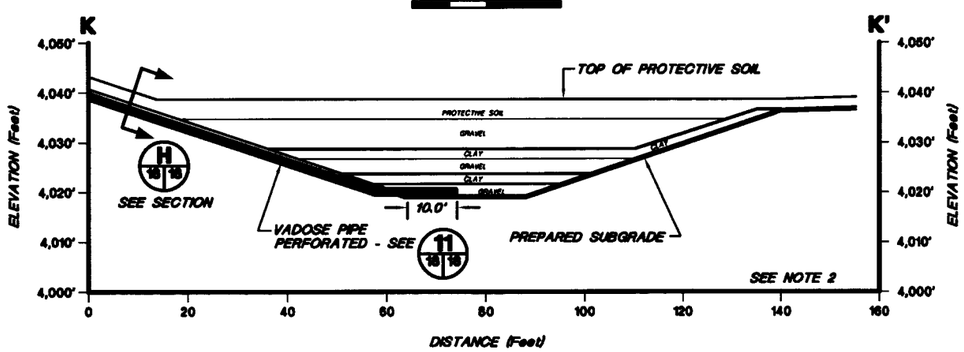
VERTICAL SCALE 0 15' 30'



J — LDRS PIPE PLACEMENT IN SUMP

HORIZONTAL SCALE 0 15' 30'

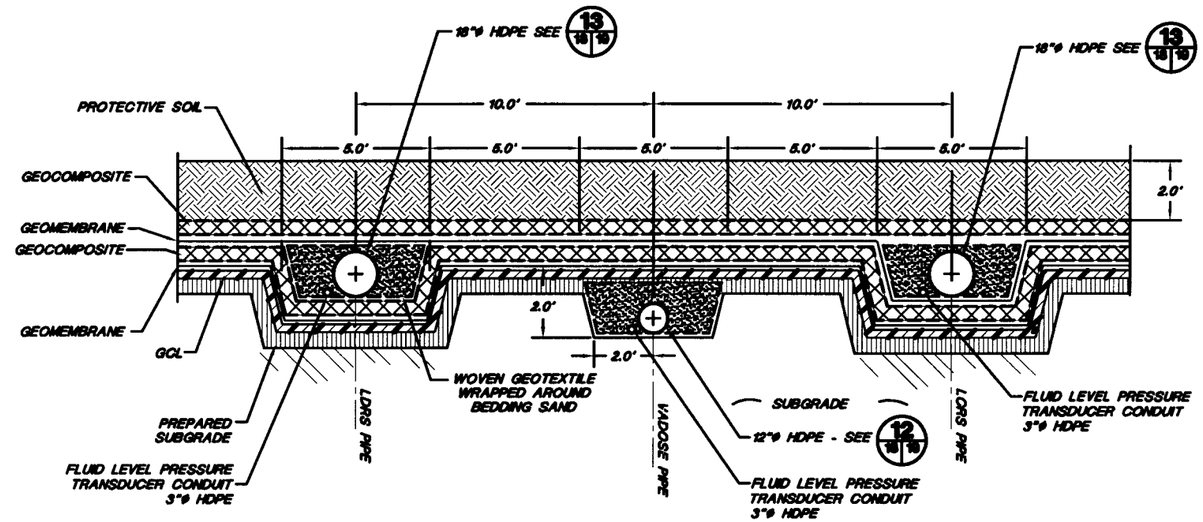
VERTICAL SCALE 0 15' 30'



K — VADOSE PIPE PLACEMENT IN SUMP

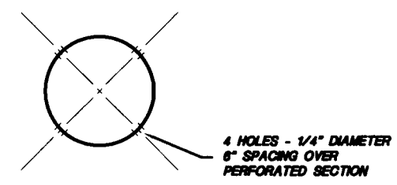
HORIZONTAL SCALE 0 15' 30'

VERTICAL SCALE 0 15' 30'



H H — LDRS, VADOSE AND LCRS PIPES SLOPE SECTION

Not To Scale



11 — PIPE PERFORATION DETAIL

Not To Scale

NOTE:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. SEE 8 FOR LINER DETAILS IN SUMP.

PATRICK G. CORSER — NEW MEXICO — 12236 — REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ Patrick G. Corser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelitzer	K.Conrath	P.Corser
1	NOVEMBER 1999 REVISION	10.29.99	J.Pelitzer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	10/12/97	PGC/JPP	K.Conrath	P.Corser

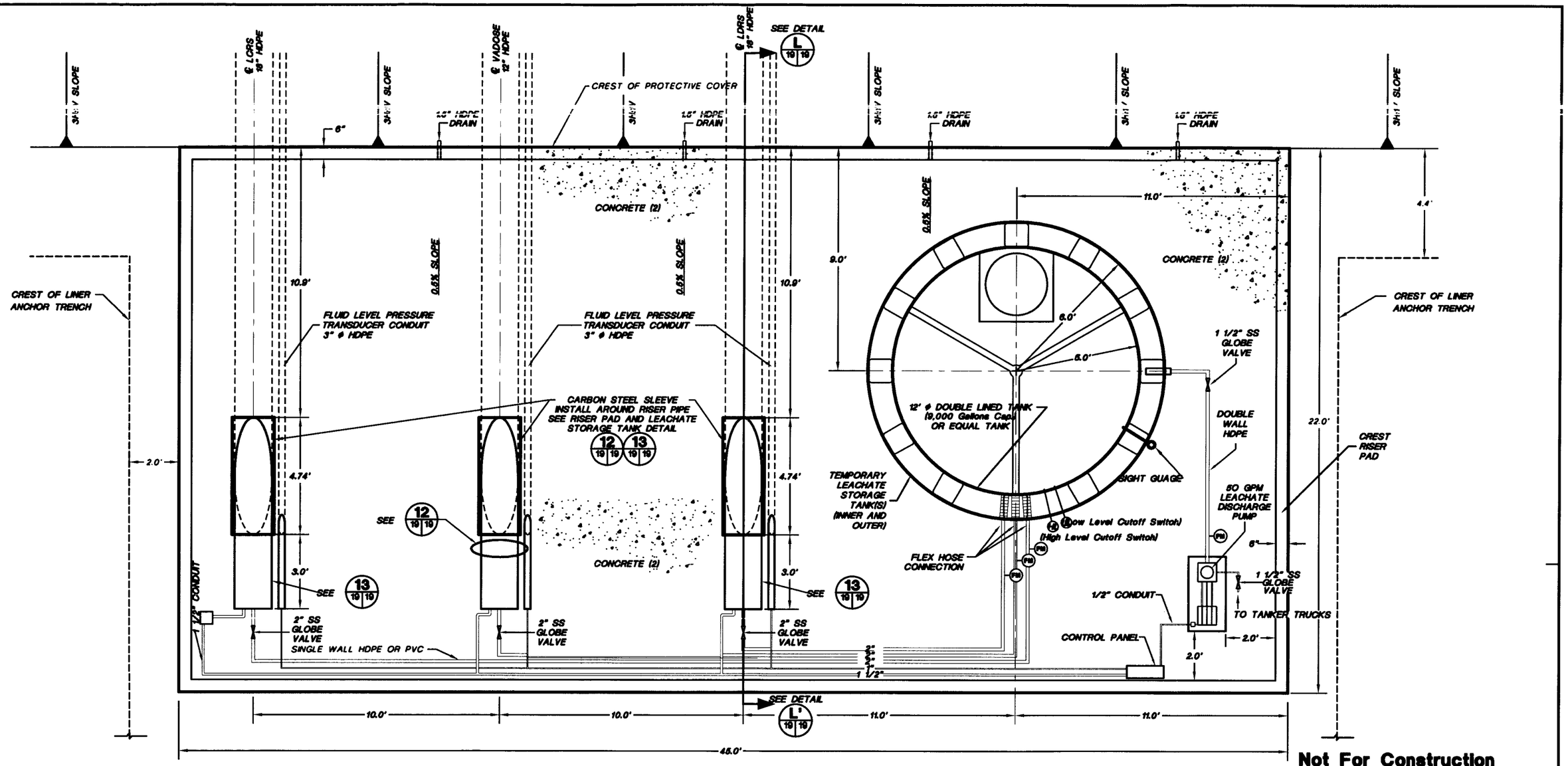
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:
VADOSE, LDRS, LCRS CROSS-SECTIONS AND DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: See Scale Bar
DRAWING No. 18

AutoCAD FILE: PS-DETAIL.DWG PROJECT NUMBER: 602-0300



Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
3	October 2000 Revision	10/4/00	J.Pellicer	K.Conrath	P.Carser
2	SEPTEMBER 1999 REVISION	09/01/99	P.Carser	T.Smith	P.Carser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pellicer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	10/10/97	PGC/JPP	M.Mathews	P.Carser

CREST RISER PAD AND LEACHATE STORAGE TANK - PLAN VIEW

SCALE
0 2.0' 4.0'
Feet

NOTE:
1) FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

2) FOR CONCRETE DETAILS SEE DRAWING 45.

3) PIPING SYSTEM WILL COMPLY WITH API PUBLICATION 1615 (NOVEMBER 1979) OR ANSI STANDARD B 31.2 AND ANSI STANDARD B 31.4.

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

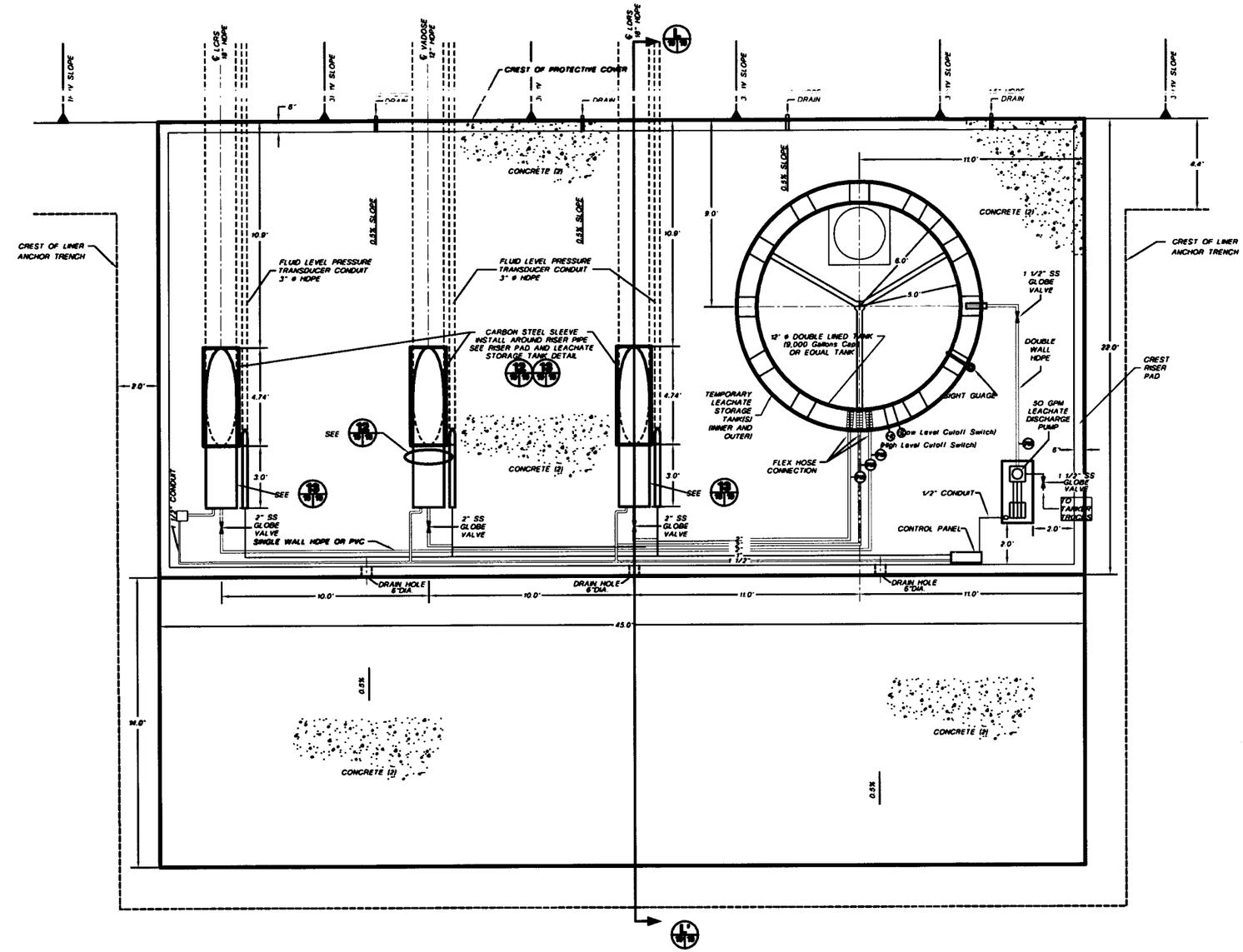
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
CREST RISER PAD AND LEACHATE STORAGE TANK PLAN VIEW AND CROSS-SECTIONS

TerraMatrix
MONTGOMERY WATSON
Mining Group

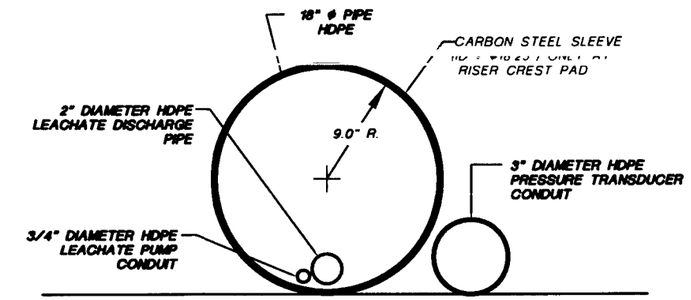
Sheet 1 Of 3 Sheets
SCALE: See Scale Bar
DRAWING No 19

AutoCAD FILE: CRR-ST-DETAIL.DWG PROJECT NUMBER: 692-0200



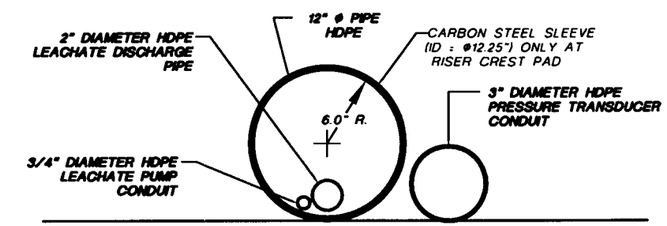
CREST RISER PAD AND LEACHATE STORAGE TANK - PLAN VIEW

SCALE
0 3.0' 6.0'
Feet



13 (19/19) LCRS AND LDRS RISER PIPE DETAIL

SCALE
0 0.5' 1.0'
Feet



12 (19/19) VADOSE RISER PIPE DETAIL

SCALE
0 0.5' 1.0'
Feet

NOTE:
1) FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2) FOR CONCRETE DETAILS SEE DRAWING 45.
3) PIPING SYSTEM WILL COMPLY WITH API PUBLICATION 1615 (NOVEMBER 1979) OR ANSI STANDARD B 31.2 AND ANSI STANDARD B 31.4.

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pettier	K.Carroll	P.Carser
1	November 1999 Updates	11/02/99	J.Trencsee	M.Mathson	P.Carser
0	September 1999 Revision	09/01/99	P.Carser	T.Smith	P.Carser

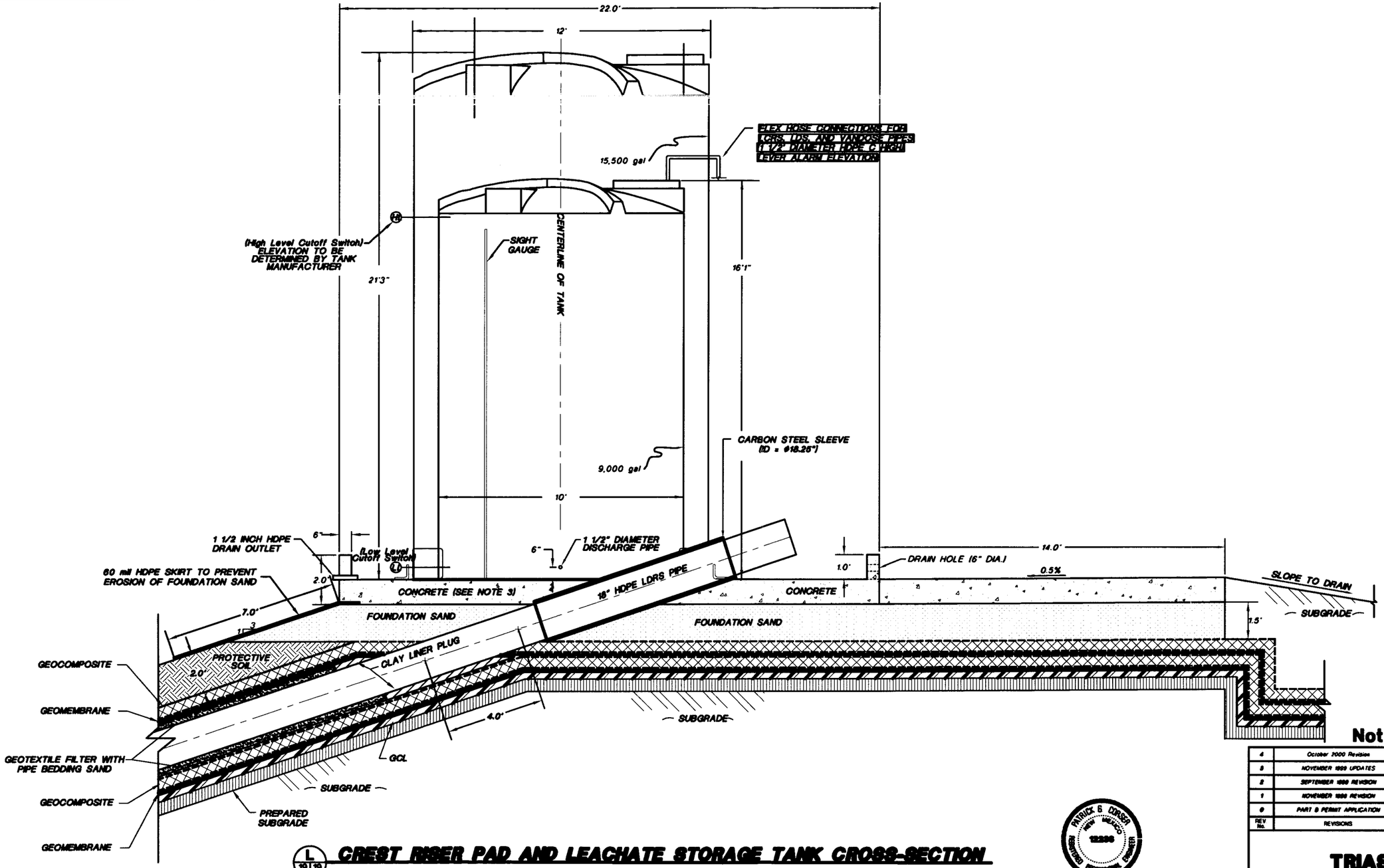
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
CREST RISER PAD AND LEACHATE STORAGE TANK PLAN VIEW AND CROSS-SECTIONS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 Of 3 Sheets
SCALE: See Scale Bar
DRAWING No. 19

AutoCAD FILE: CRS-ST-DETAIL3.DWG PROJECT NUMBER: 602-0200



CREST RISER PAD AND LEACHATE STORAGE TANK CROSS-SECTION

SCALE
0 2.0' 4.0'
Feet

NOTE:

1) FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

2) PIPE CONNECTION AND TANK ACCESSORIES TO BE SPECIFIED BY TANK SUPPLIER.

3) FOR CONCRETE DETAILS SEE DRAWING 46.

PATRICK G. CORSER NEW MEXICO 12336 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented herein is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12336

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
4	October 2000 Revision	10/4/00	J.Pelicer	K.Conrath	P.Corser
3	NOVEMBER 1999 UPDATES	11/02/99	J.Troncoso	M.Mathison	P.Corser
2	SEPTEMBER 1999 REVISION	09/01/99	P.Corser	T.Smith	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	M.Mathison	P.Corser

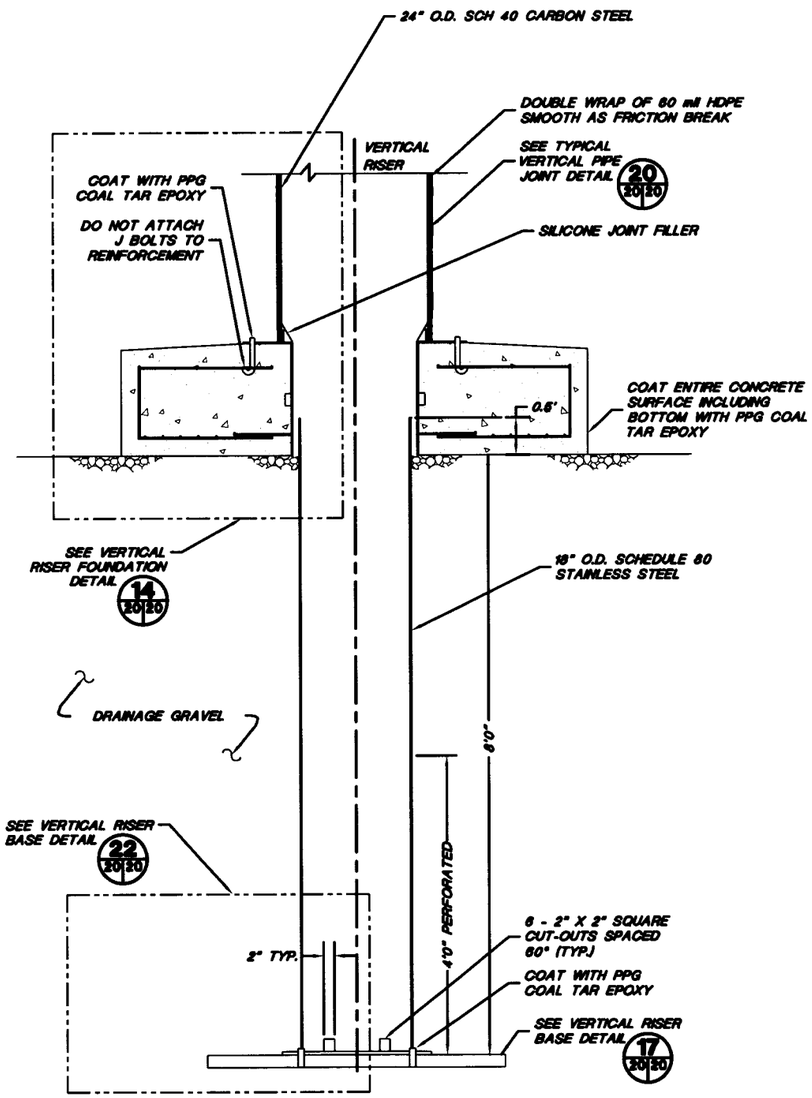
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
CREST RISER PAD AND LEACHATE STORAGE TANK PLAN VIEW AND CROSS-SECTIONS

TerraMatrix
MONTGOMERY WATSON
Mining Group

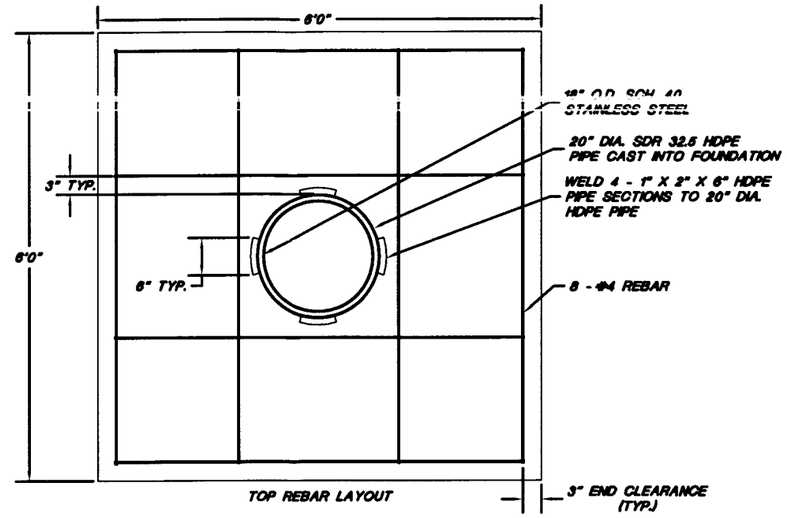
Sheet 3 Of 3 Sheets
SCALE: See Scale Bar
DRAWING No. 19

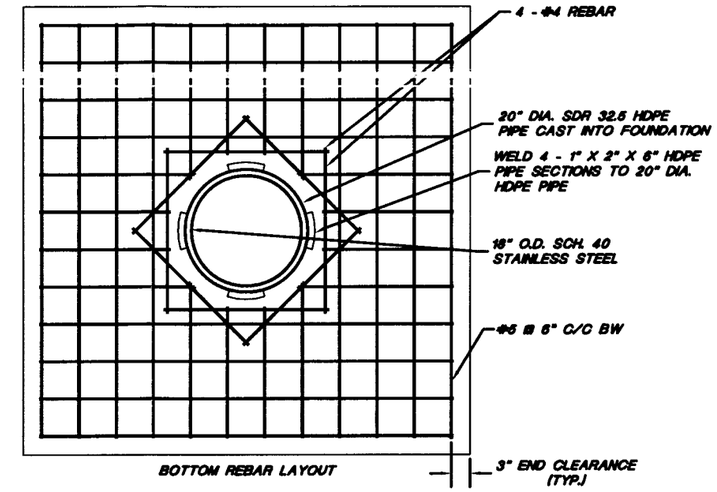
AutoCAD FILE: CRPLST-XSEC.DWG PROJECT NUMBER: 692-0200



16 17/20 VERTICAL RISER SECTION

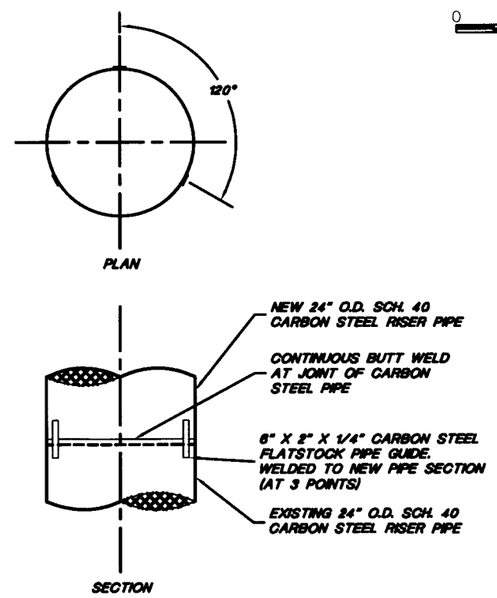
SCALE
0 1' 2'
Feet





21 20/20 VERTICAL RISER BASE DETAIL

SCALE
0 1' 2'
Feet



20 20/20 TYPICAL VERTICAL RISER PIPE JOINT

SCALE
0 1' 2'
Feet

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CURSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Curser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Curser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pettcar	K.Conrath	P.Curser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pettcar	T.Smith	P.Curser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	E.Simonson	P.Curser

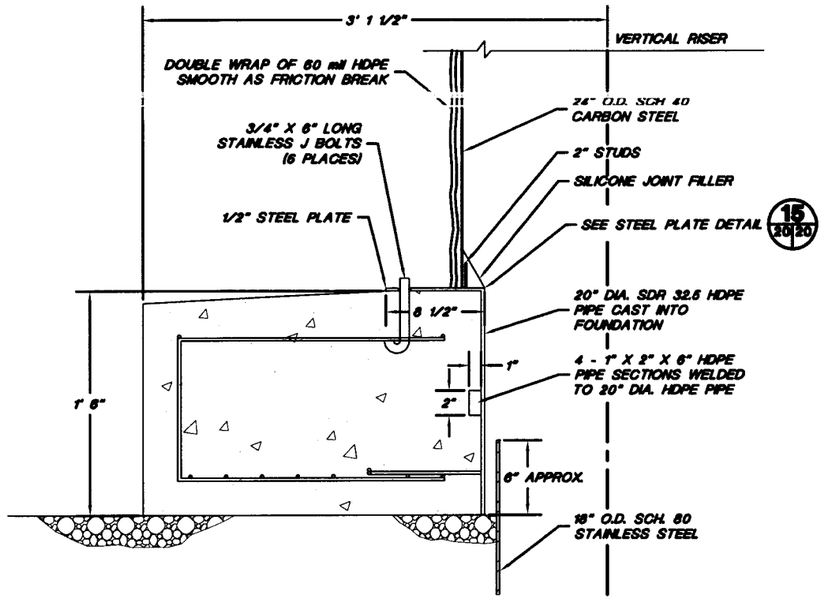
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:
VERTICAL RISER DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

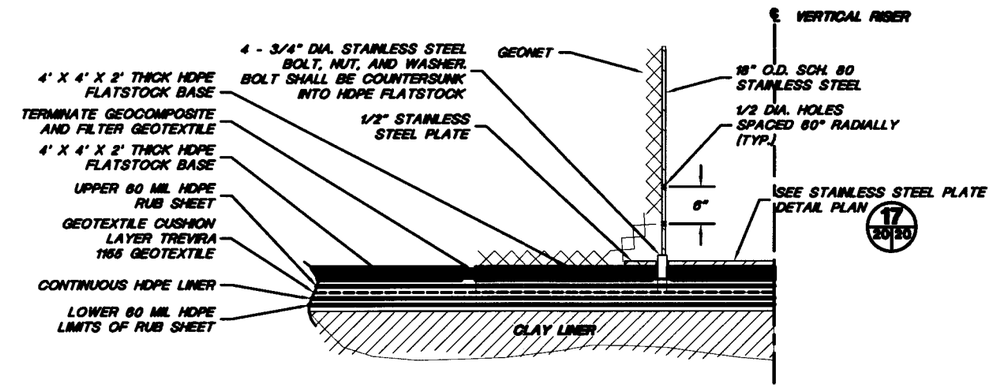
Sheet 1 Of 2 Sheets
SCALE: As Noted
DRAWING No. 20

PROJECT NUMBER: 602-0200
AutoCAD FILE: GLF-SRDLDWG



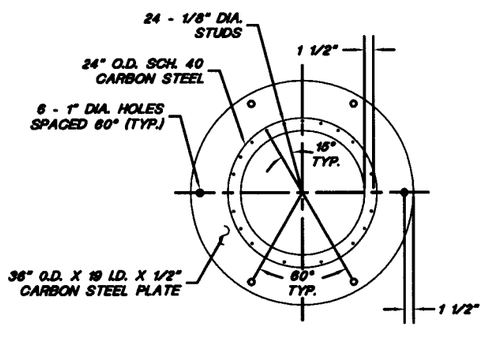
14/20/20 VERTICAL RISER FOUNDATION DETAIL

SCALE
0 0.5' 1'
Feet



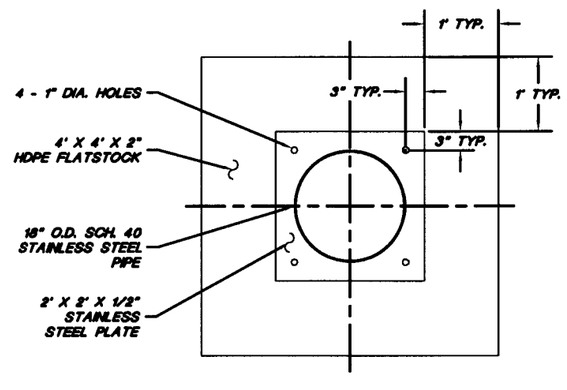
22/20/20 VERTICAL RISER BASE DETAIL

SCALE
0 0.5' 1'
Feet



15/20/20 STEEL PLATE DETAIL

SCALE
0 1' 2'
Feet



17/20/20 STAINLESS STEEL PLATE DETAIL

SCALE
0 1' 2'
Feet

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelitzer	K.Cierzak	P.Corser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelitzer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JJP	E.Simonson	P.Corser

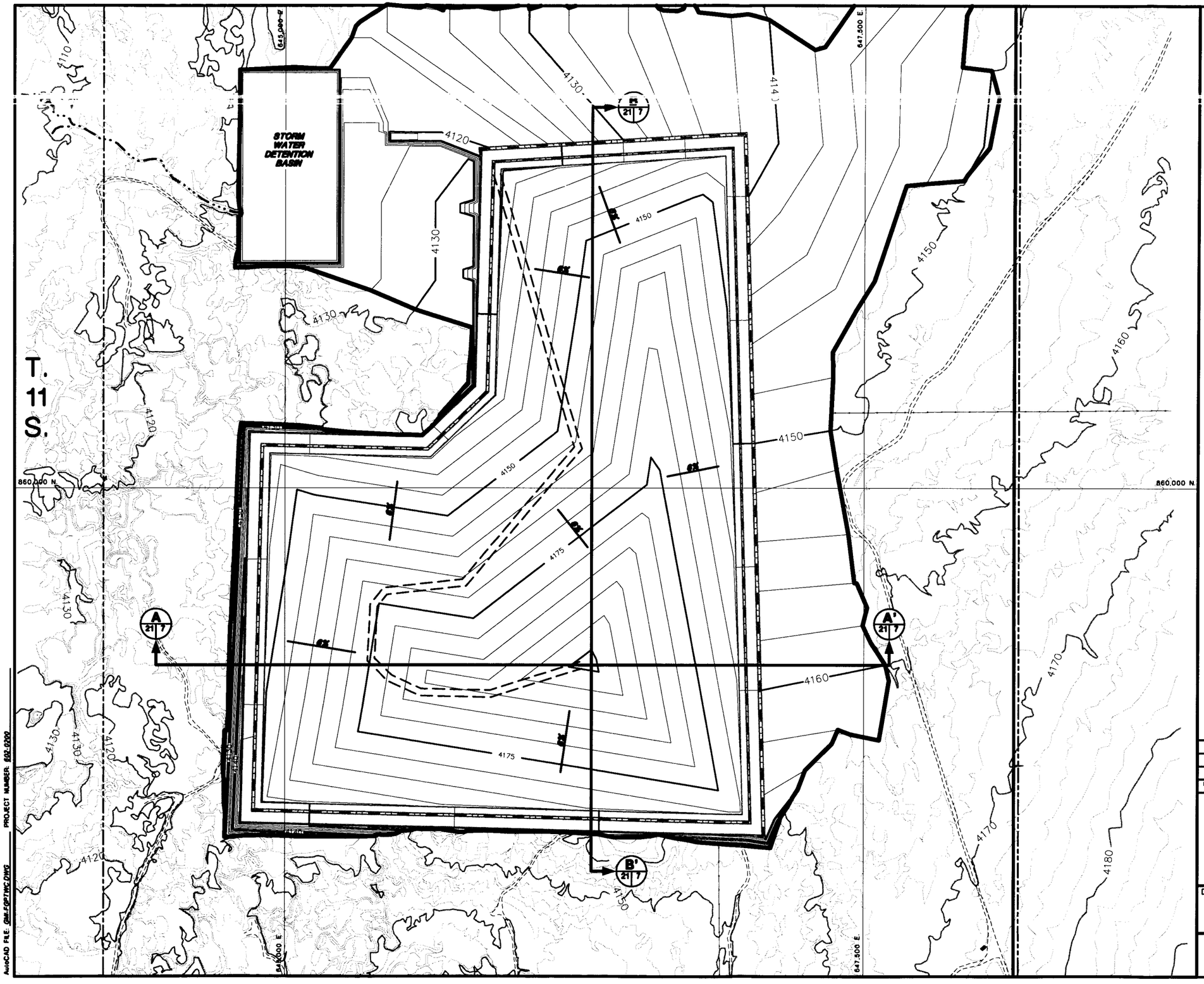
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
VERTICAL RISER DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 Of 2 Sheets
SCALE: As Noted
DRAWING No. 20

AutoCAD FILE: GLF-SRD-2A.DWG PROJECT NUMBER: 622-2200



NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2 "INDEX, LEGEND AND GENERAL NOTES"
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.

PATRICK G. CORSER NEW MEXICO 12336 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12336

SCALE
200' 0 200' 400'
CONTOUR INTERVAL 5 FT.
SURFACE TOPOGRAPHY CONTOUR INTERVAL 2 FT.

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND ISSUED BY	SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelicer	K.Conrath	P.Corser	
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelicer	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Corser	

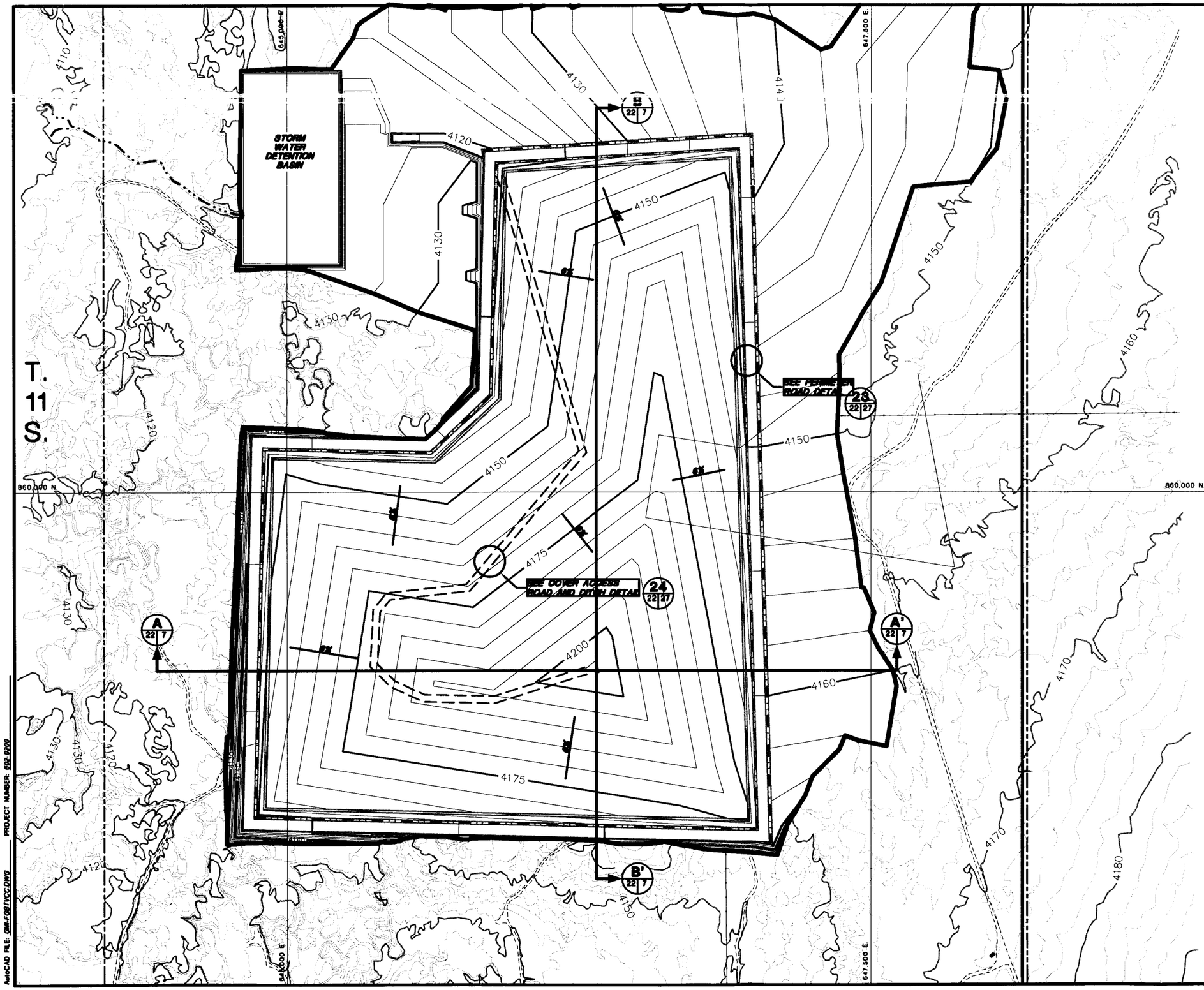
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
FINAL GRADING PLAN - TOP OF WASTE CONTOURS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 21

AutoCAD FILE: GM-FGPTWC.DWG PROJECT NUMBER: 802.0200



NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2 "INDEX, LEGEND AND GENERAL NOTES".
2. TOPOGRAPHY FROM AERIAL SURVEYS PERFORMED AUGUST 1997 BY KOOGLE AND POULS ENGINEERING.

PATRICK G. CORSER
NEW MEXICO
12336
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12336

SCALE
200' 0 200' 400'
CONTOUR INTERVAL 5 FT.
SURFACE TOPOGRAPHY CONTOUR INTERVAL 2 FT.

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelizer	K.Carrolh	P.Corser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelizer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/13/97	PGC/JPP	T.Smith	P.Corser

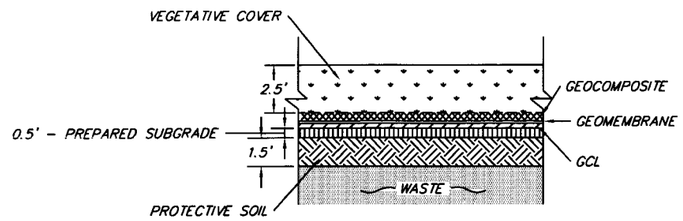
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
FINAL GRADING PLAN - TOP OF VEGETATIVE COVER CONTOURS

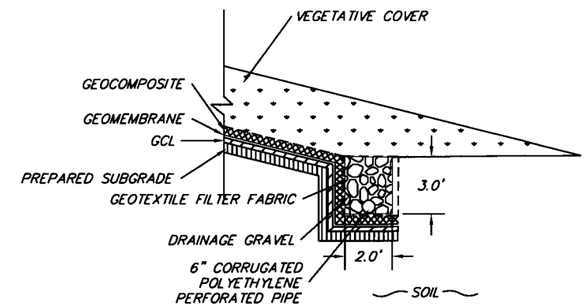
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 22

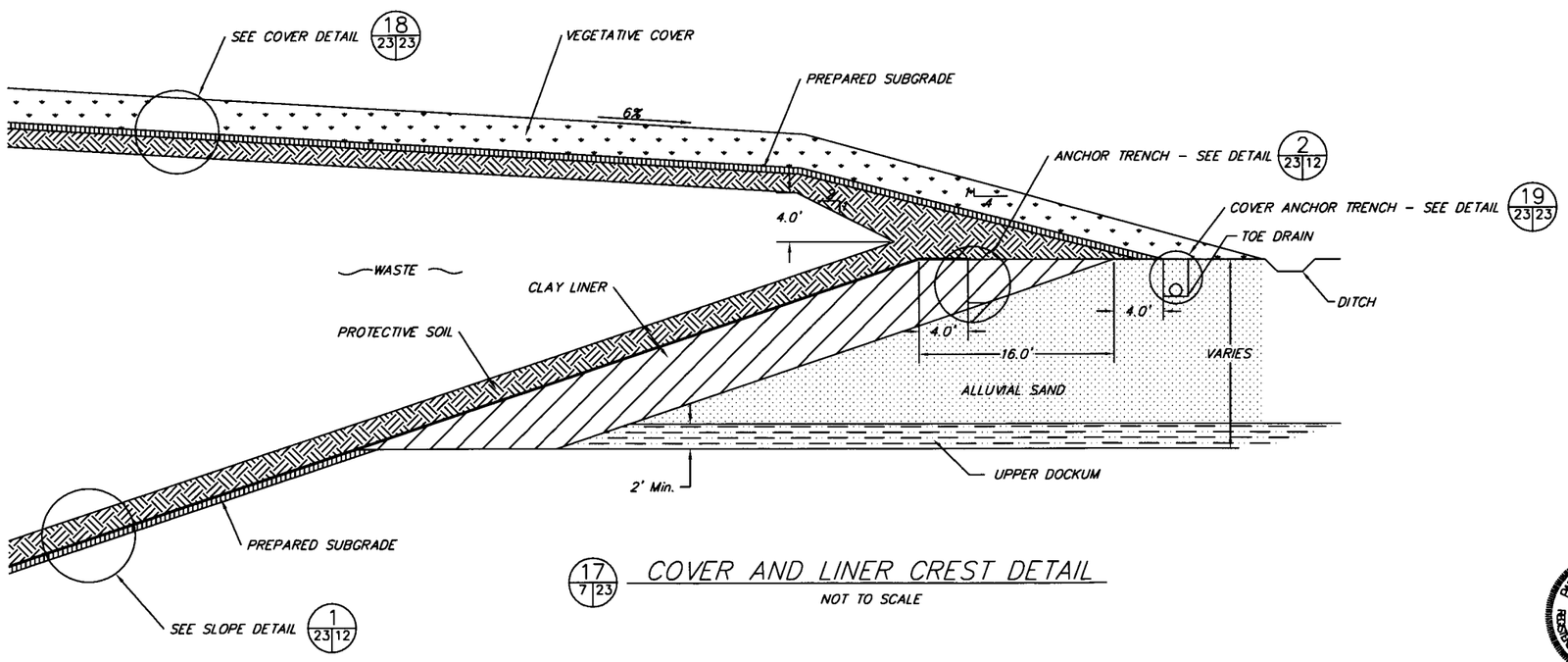
AutoCAD FILE: GM-F08TYCCC.DWG PROJECT NUMBER: 802-0200



18 / 23 23 COVER DETAIL
NOT TO SCALE



19 / 23 23 COVER ANCHOR TRENCH DETAIL
NOT TO SCALE



17 / 7 23 COVER AND LINER CREST DETAIL
NOT TO SCALE

Drawing recreated from source AutoCAD file to replace graphic containing omissions in 2002 permit files.

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
3	October 2000 Revision	10/4/00	J.Pellicer	K.Conroth	P.Corser
2	SEPTEMBER 1999 REVISION	9/21/99	P.Corser	K.Conroth	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pellicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Corser

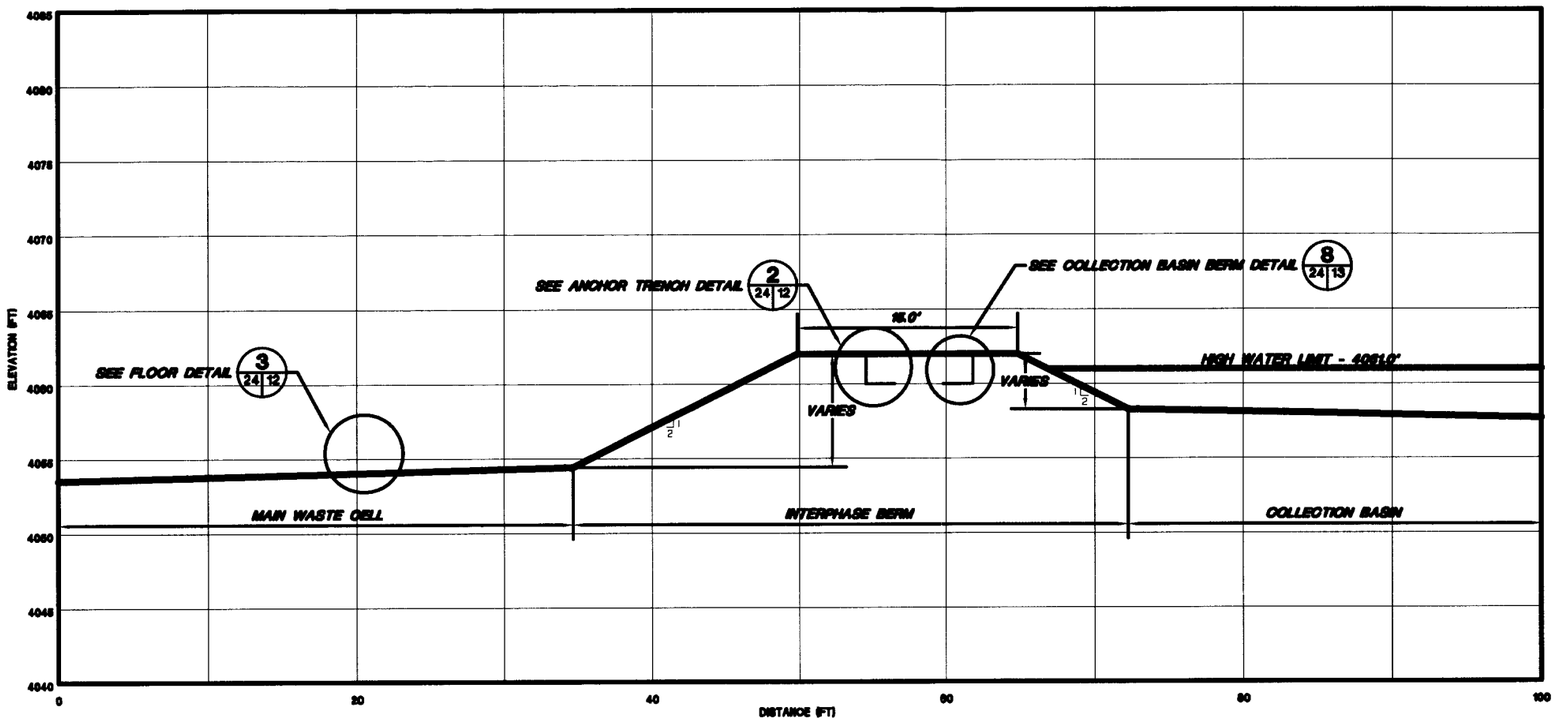
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
FINAL COVER DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 23

AutoCAD FILE: GANDY-COVERDETAIL PROJECT NUMBER: 602-0200



M 13 24 INTERPHASE BERM CROSS-SECTION M

HORIZONTAL SCALE
0 5 10

VERTICAL SCALE
0 5 10

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pellicer	K.Conrath	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pellicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Corser

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:

INTERPHASE BERM SECTION

PATRICK G. CORSER — NEW MEXICO — 12266 — REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

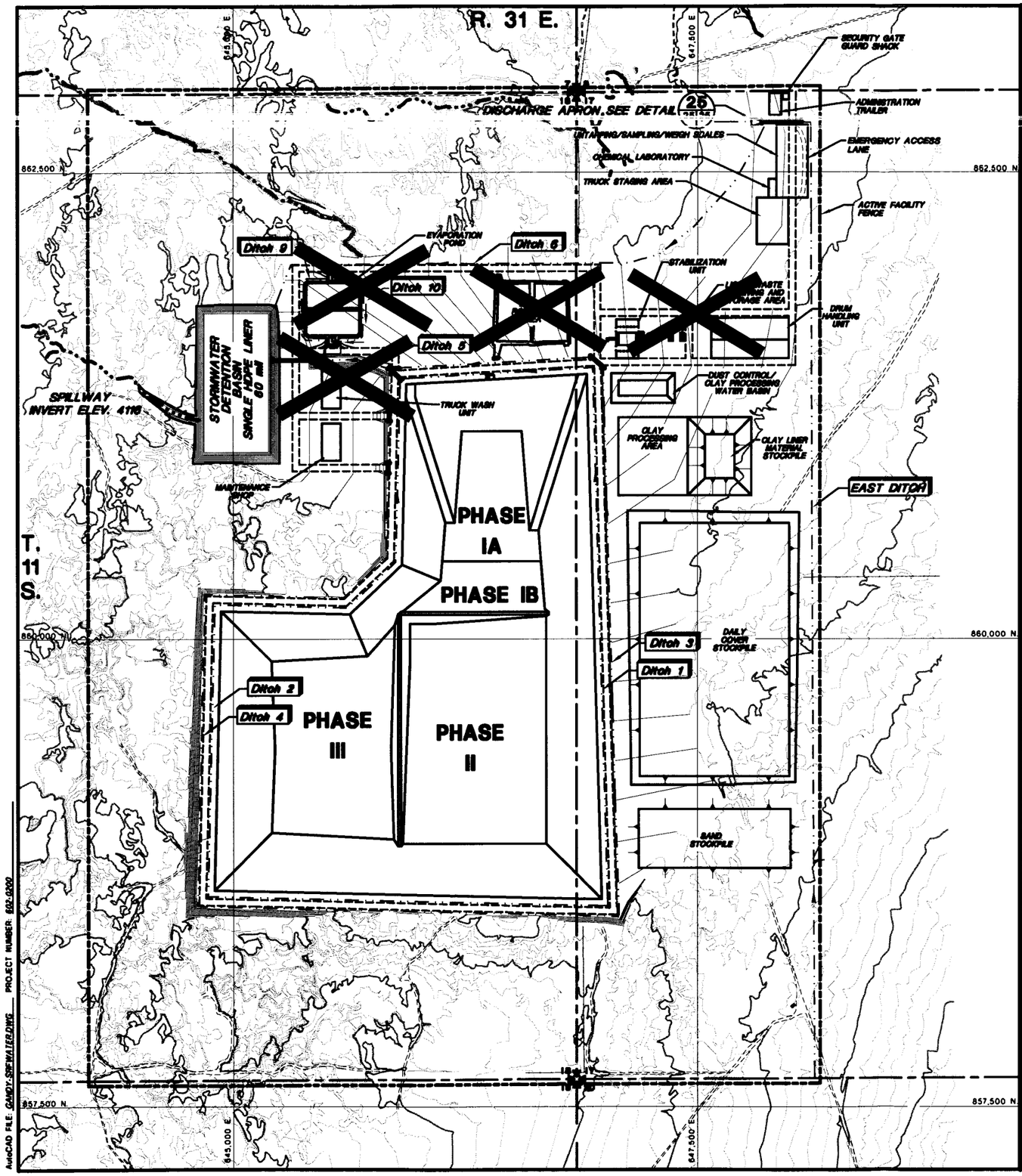
Date _____ Patrick G. Corser, NM P.E. 12266

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: As Shown
DRAWING No. 24

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

AutoCAD FILE: GANDY-IPBERM PROJECT NUMBER: 602-0200



Drawing replaced by DBS&A for 2011 permit renewal under separate cover, including the notations shown on this sheet.

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. DITCHES 7 & 8 ARE SHOWN ON DRAWING 13.

N

SCALE

300' 0 300' 600'

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
4	October 2000 Revision	10/4/00	J.Pelliccer	K.Conrath	P.Carser
3	NOVEMBER 1999 UPDATES	11/02/99	J.Trencosso	M.Mathisen	P.Carser
2	SEPTEMBER 1999 REVISION	9/24/99	P.Carser	K.Conrath	P.Carser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelliccer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	05/18/97	PGC/JPP	T.Smith	P.Carser

PATRICK G. CARSER NEW MEXICO 12388 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12388

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

SURFACE WATER CONTROL FEATURES

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 2 Sheets
SCALE: AS NOTED
DRAWING No. 25

AutoCAD FILE: GANDY-SRFWATER.DWG PROJECT NUMBER: 602-0200

CHANNEL DESIGNS

Ditch	25-yr,24-hr Flow Q (cfs)	Slope (%)	Bottom Width (BW) (ft)	Sideslope H:1V	Depth of Flow (D) (ft) 1	Velocity (fps) 2	Freeboard (ft)	Maximum Total Depth (ft)	Erosion Protection	2-yr,24-hr Flow Q (cfs)	Velocity (fps)
1	34.2	0.5-2.0	0	2	2.1	6.7	1.0	3.1	None	4.9	4.1
2	62.2	0.5-1.0	0	2	2.6	6.0	1.0	3.6	None	8.3	3.6
3	126.6	0.5-1.0	5.0	3	2.4	5.8	1.0	3.4	None	40.0	4.8
		1.1-2.0	5.0	3	2.1	6.6	1.0	3.1	Riprap D50=6"		
4	6.8	0.5-1.0	0	2	1.1	3.5	1.0	2.1	None	7	7
5	217.3	0.5-1.0	10.0	3	2.3	7.3	1.0	3.3	None	53.6	4.8
6	30.1	0.5-1.0	0	2	2.0	5.0	1.0	3.0	None	7	7
7 Lower	7.3	1.0	0	1.5	0.9	6.0	1.0	1.9	HDPE	7	7
7 Upper	7.3	10	0	1.5	0.6	14.2	1.0	1.6	HDPE	7	7
8 Lower	19.3	1.0	0	1.5	1.3	7.6	1.0	2.3	HDPE	7	7
8 Upper	19.3	10	0	1.5	0.8	18	1.0	1.8	HDPE	7	7
East	272.8	0.5-0.8	16.0	3	2.5	5.5	1.0	3.5	Gravel D50=3"	7	7
Final Cover Road Side	31.5	0.5-2.4	0	3	1.8	5.5	1.0	2.8	Gravel D50=3"	7	7
Spillway	358(6)	0.5	20.0	3	2.6	4.9	1.0	3.4	Gravel D50=3"	7	7
~~9,10~~	~~98.4~~	~~0.5~~	~~3.0~~	~~3~~	~~2.1~~	~~4.7~~	~~1.0~~	~~3.1~~	~~NONE~~	~~7~~	~~7~~

Ditches 9 and 10 eliminated for 2011 permit renewal.

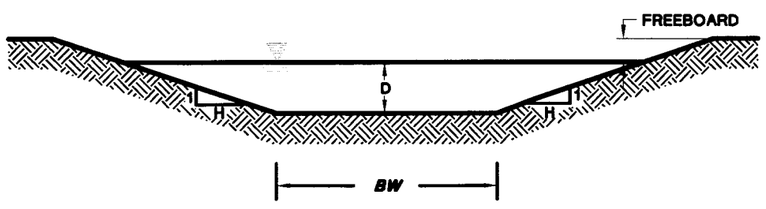
NOTES:
(1) Maximum allowable velocity for channels without erosion protection 5 fps
(2) Channels with velocities greater than 5 fps for the 25-yr event and less than the 5 fps for the 2 year storm will not be lined.
(3) Maximum allowable velocity for gravel lined channels is 6 fps.
(4) Depth of Flow determined from minimum grade of Channel.
(5) Flow Velocity determined from maximum grade of Channel.
(6) Design Flow for Spillway is 100YR - 24 HR.
(7) The velocity calculations were not required for the 2-year storm because the 25YR-24HR rain event flow velocity was less than 5 fps, so the 2YR-24HR rain event flow event flow velocity would also be less than 5 fps, or because erosion protection had already been specifed.

GENERAL NOTES:
1. STORM WATER DETENTION BASIN TO BE LINED WITH SINGLE 60 mil HDPE LINER.

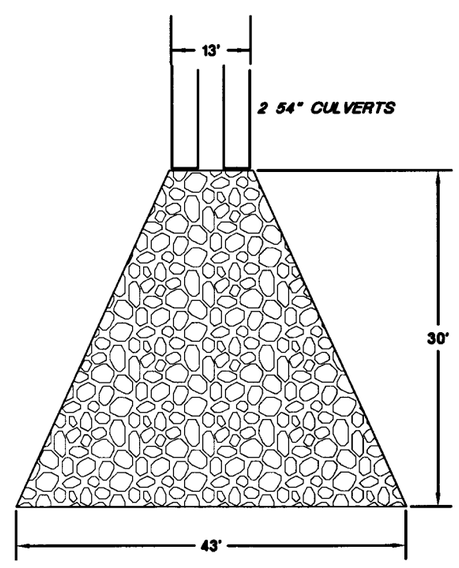
CULVERT DESIGNS

Culvert On Ditch	Flow (cfs)	Culvert Capacity (cfs)	No. Of Culverts	Culvert Diameter (in)	Total Capacity (cfs)
East	272.8	155	2	54	310
3	126.6	50	3	36	150
4	6.8	9	1	18	9
5	217.3	135	2	54	270
1 and 2	96.4	50	2	36	100
8	19.3	50	1	36	50
~~9 and 10~~	~~99.1~~	~~50~~	~~2~~	~~36~~	~~100~~

NOTES: (1) Culverts were sized assuming a Headwater/Culvert Diameter= 1.5.



TYPICAL CHANNEL



NOTE:
RIP RAP D_{50} = 2', DEPTH OF ROCK 3'

25 SH 25 RIP RAP OUTLET APRON DETAIL
Not To Scale

PROFESSIONAL ENGINEER'S STATEMENT
I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12290

PATRICK G. CORSER NEW MEXICO 12290 REGISTERED PROFESSIONAL ENGINEER

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
3	October 2000 Revision	10/4/00	J.Pellicer	K.Carreto	P.Corser
2	NOVEMBER 1999 UPDATES	11/03/99	J.Trancoso	M.Mulhollan	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pellicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/18/97	PGC/JPP	K.Carreto	P.Corser

TRIASSIC PARK WASTE DISPOSAL FACILITY

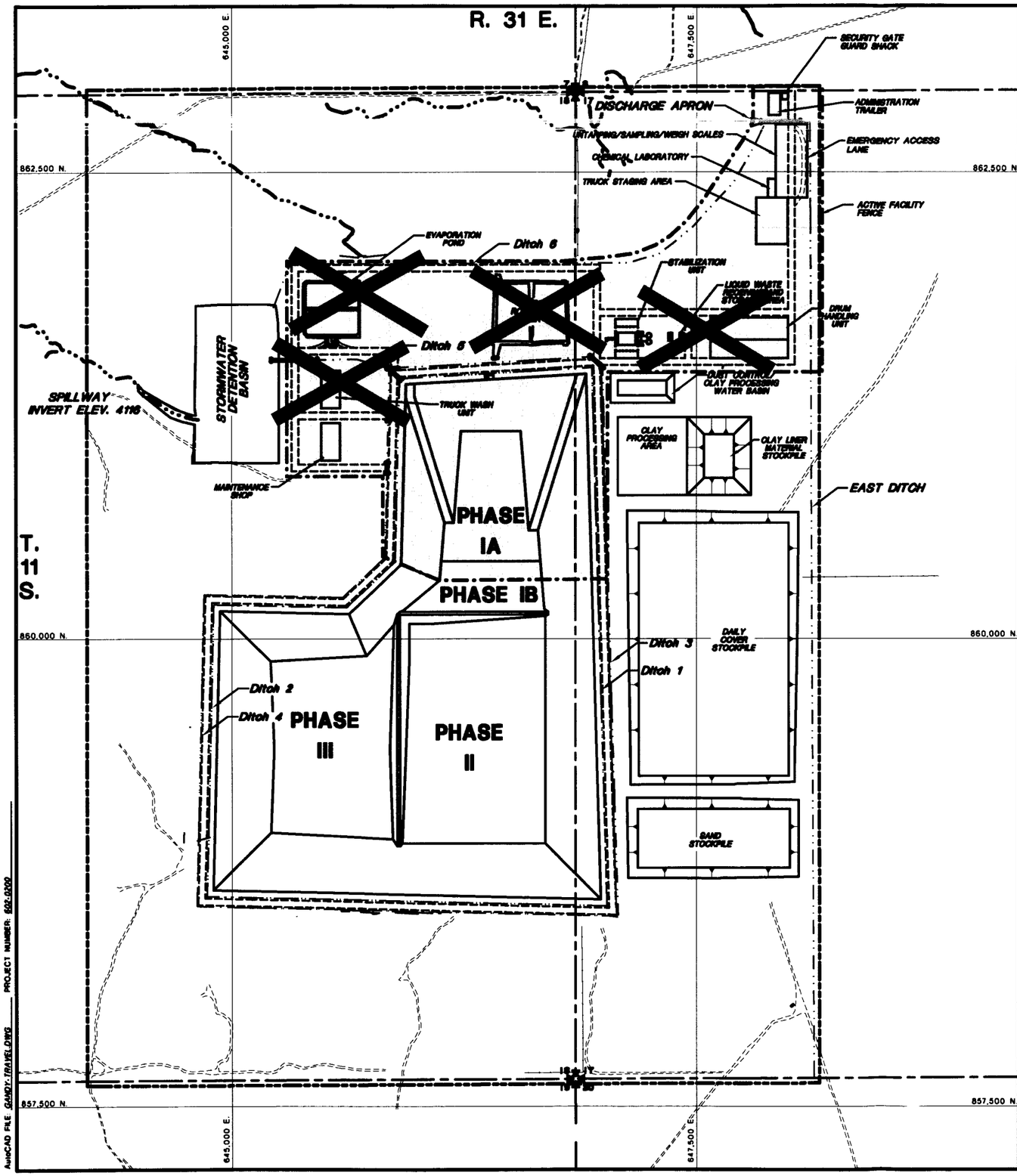
DRAWING TITLE:
SURFACE WATER CONTROL DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 Of 2 Sheets
SCALE: Not to Scale
DRAWING No. 25

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2. "INDEX, LEGEND AND GENERAL NOTES".

AutoCAD FILE: GANDY-SDFWTROTLS.DWG PROJECT NUMBER: 692-0200



LEGEND

LIMITS OF LANDFILL OPERATIONS AND WASTE PROCESSING AREA

CONSTRUCTION OPERATIONS AREA

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

Drawing replaced by DBS&A for 2011 permit renewal under separate cover, including the notations shown on this sheet.

N

SCALE
300' 0 300' 600'

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/11/00	J.Pelliser	K.Conrath	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelliser	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	10/15/97	PGC/JPP	T.Smith	P.Corser

PATRICK G. CORSER NEW MEXICO 12336 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12336

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

TRAFFIC PLAN

TerraMatrix
MONTGOMERY WATSON
Mining Group

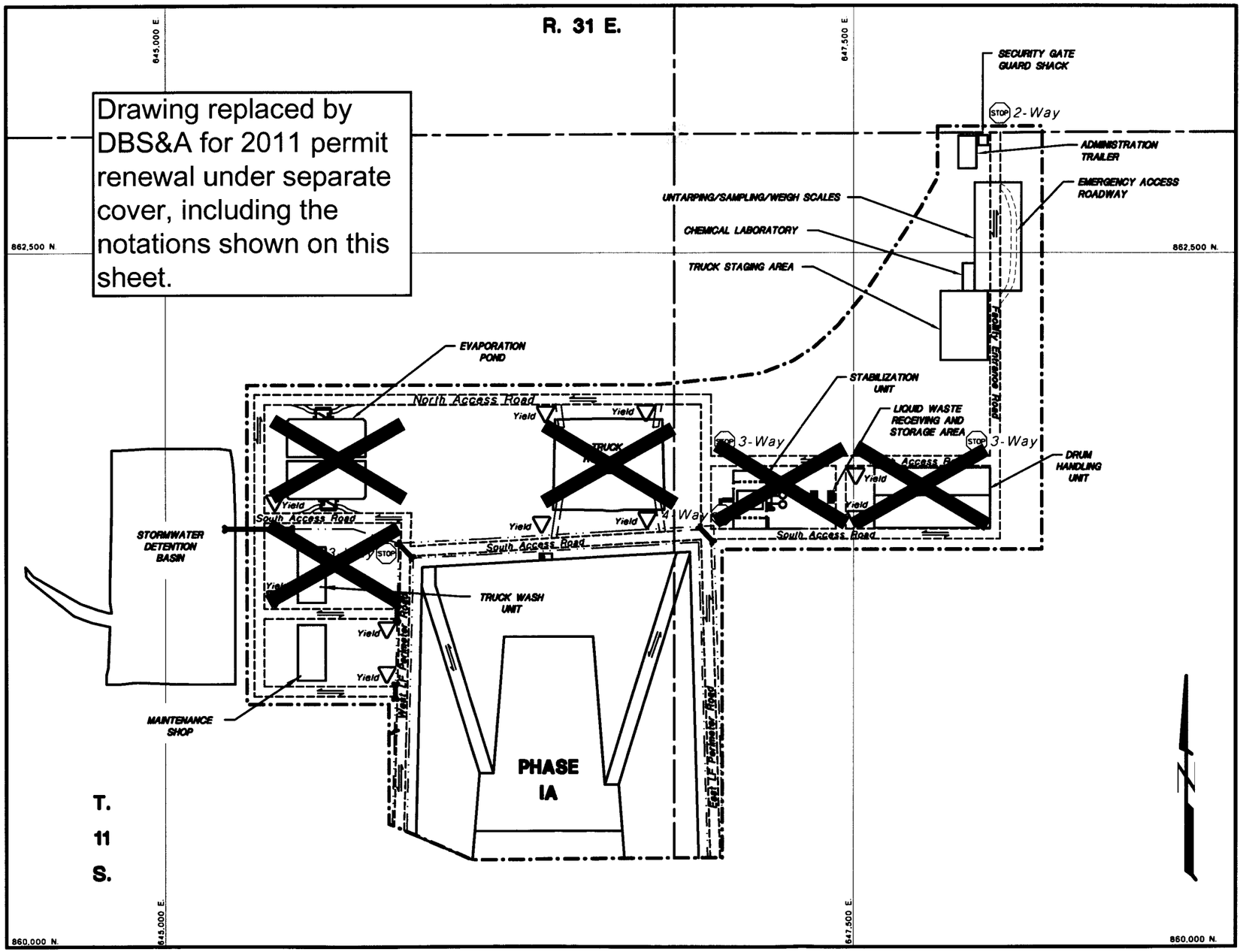
Sheet 1 Of 2 Sheets

SCALE: AS NOTED

DRAWING No. 26

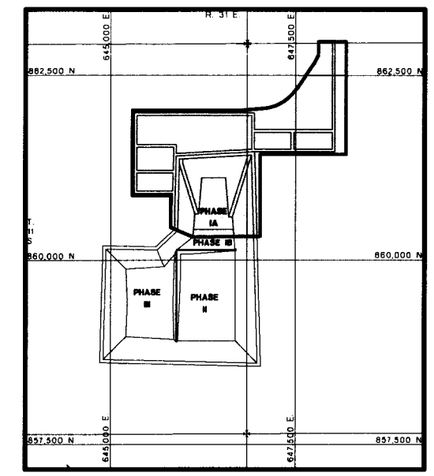
AutoCAD FILE: GAMOY-TRAVEL.DWG PROJECT NUMBER: 692-0202

Drawing replaced by DBS&A for 2011 permit renewal under separate cover, including the notations shown on this sheet.



SCALE
0 200 400
Feet

MAP KEY



NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. UNIMPROVED ROADS AND CONSTRUCTION HAUL ROADS NOT SHOWN. GRAVEL LINED ACCESS ROADS ARE 2 WAY TRAFFIC. ALL SITE ACCESS ROADS SPEED LIMIT IS 15 MPH, CONSTRUCTION HAUL ROAD SPEED LIMIT IS 35 MPH.

PATRICK G. CARSER — NEW MEXICO — 15880 — PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 15880

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/11/00	J.Pelliser	K.Conroth	P.Carser
1	NOVEMBER 1999 REVISION	10/25/99	J.Pelliser	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	12/10/97	PGC/JPP	K.Conroth	P.Carser

TRIASSIC PARK WASTE DISPOSAL FACILITY

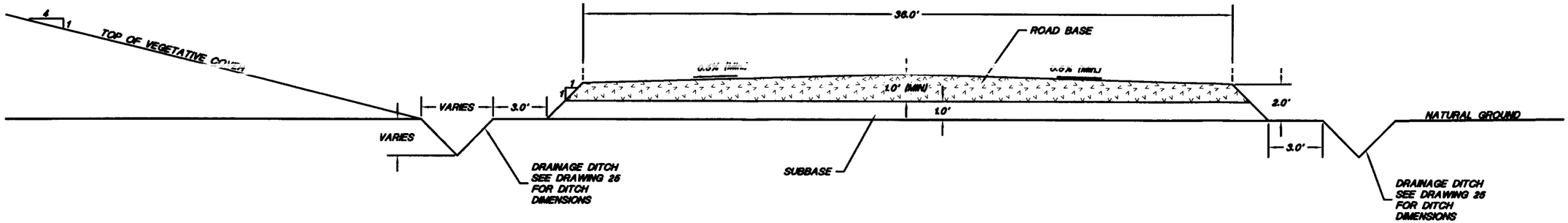
DRAWING TITLE:

TRAFFIC PLAN

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 Of 2 Sheets
SCALE: As Noted
DRAWING No. 26

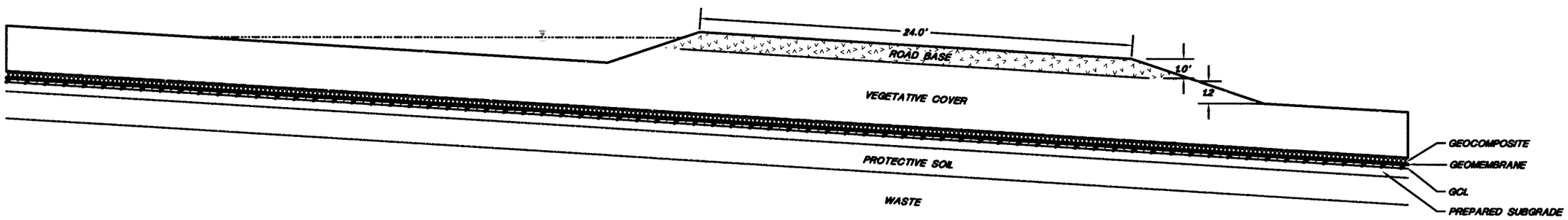
AutoCAD FILE: GANDY-TRAFFIC.DWG PROJECT NUMBER 60C-0000



23 (22|27) PERIMETER ROAD DETAIL

HORIZONTAL SCALE
0 3' 6'

VERTICAL SCALE
0 3' 6'



24 (22|27) COVER ACCESS ROAD AND DITCH DETAIL

HORIZONTAL SCALE
0 3' 6'

VERTICAL SCALE
0 3' 6'

NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. ROADBASE GRAVEL THICKNESS MAY BE REDUCED BASED ON EVALUATION OF SUBGRADE CONTOURS.

PATRICK G. CORSER NEW MEXICO 12266 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12266

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelicer	K.Conrads	P.Corser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	10/2/97	PGC/JPP	TWS	PGC

TRIASSIC PARK
WASTE DISPOSAL FACILITY

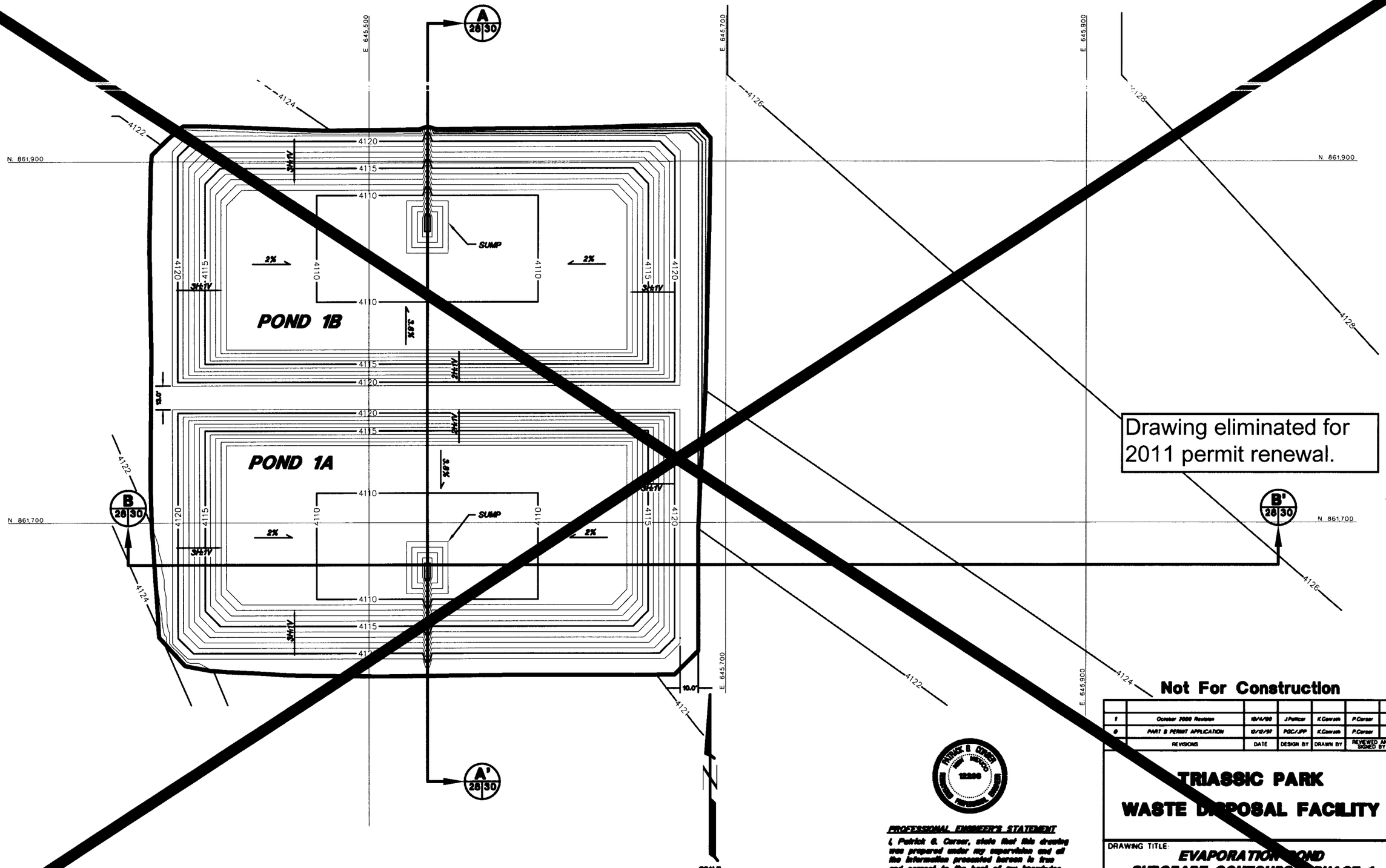
DRAWING TITLE:

PERIMETER ROAD DETAILS

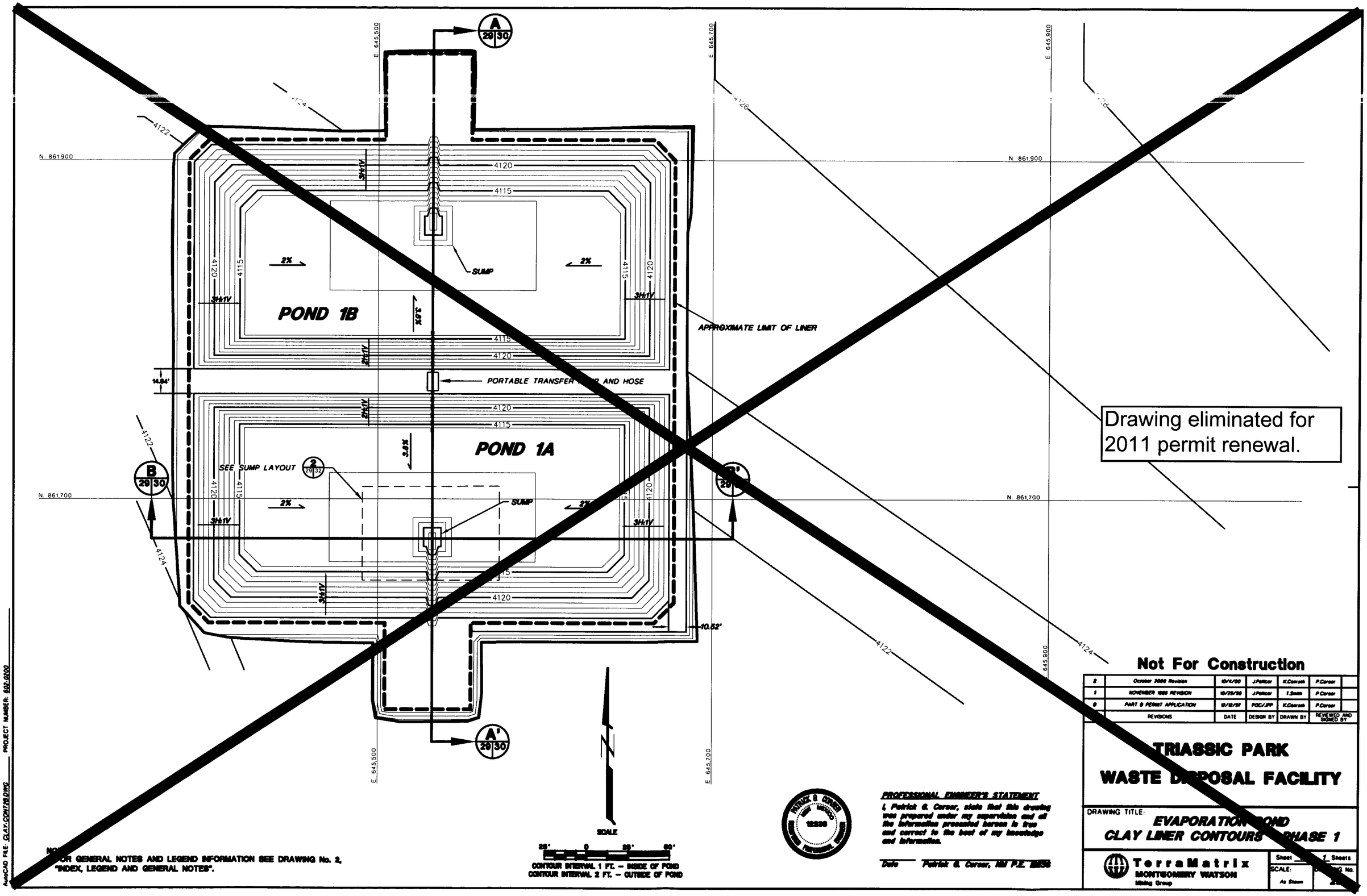
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 1 Sheets
SCALE: AS NOTED
DRAWING No. 27

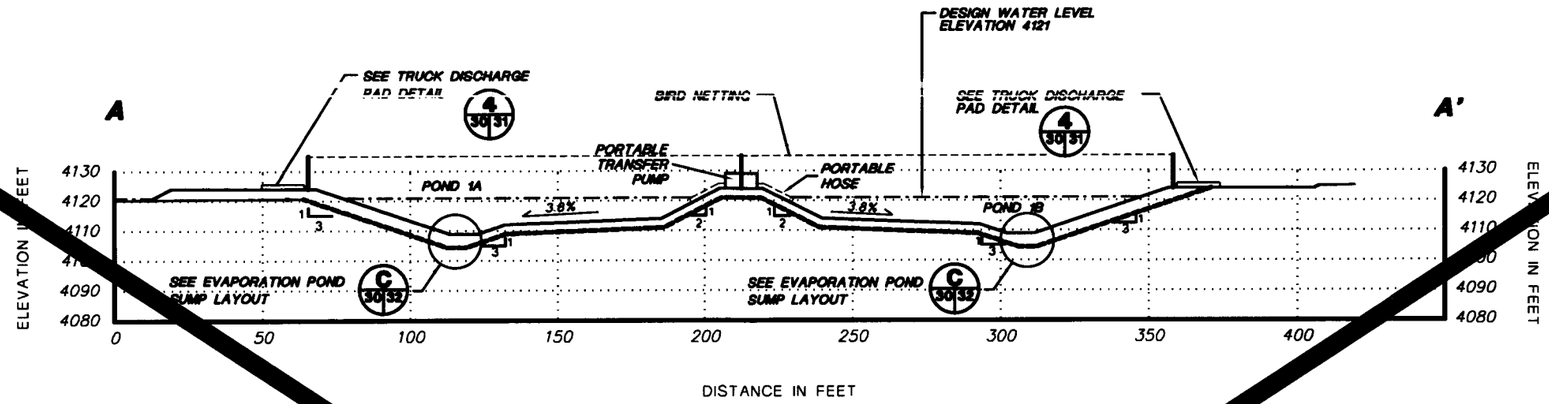
AutoCAD FILE: GANDY-ACCESSROAD.DWG PROJECT NUMBER: 692-0200



NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".



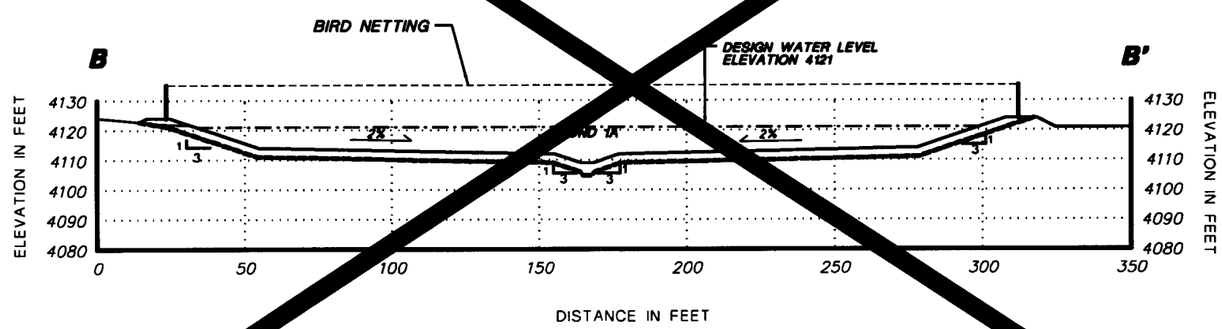
Drawing eliminated for 2011 permit renewal.



A A 28 30 29 30 CROSS-SECTION A-A'

HORIZONTAL SCALE
0 25' 50'

VERTICAL SCALE
0 25' 50'



B B 28 30 29 30 CROSS-SECTION B-B'

HORIZONTAL SCALE
0 25' 50'

VERTICAL SCALE
0 25' 50'

Drawing eliminated for 2011 permit renewal.

Not For Construction

3	October 2000 Revision	10/4/00	J.Pelliccer	K.Cenrath	P.Corser	
2	NOVEMBER 1999 UPDATES	11/02/99	J.Trancoso	M.Mathison	P.Corser	
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelliccer	T.Swan	P.Corser	
0	PART B PERMIT APPLICATION	10/12/97	PGC/JPP	K.Cenrath	P.Corser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

PATRICK G. CORSER NEW MEXICO 12396 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12396

TRIASSIC PARK WASTE DISPOSAL FACILITY

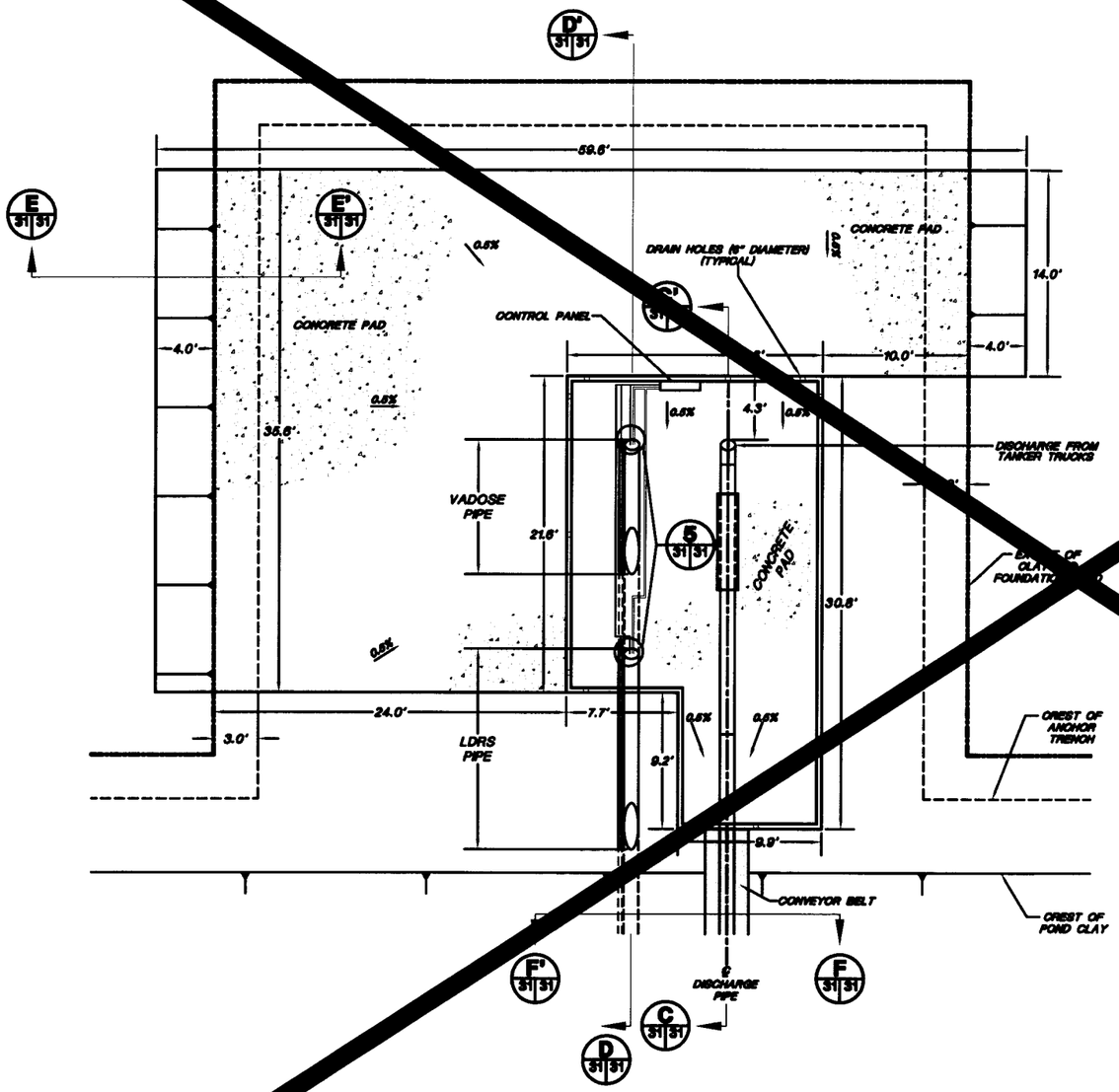
DRAWING TITLE:
EVAPORATION POND CROSS SECTION

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 of 1 Sheets
SCALE: As Shown
Drawing No. 30

NOTE: FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

AutoCAD FILE: EPSECS01.DWG PROJECT NUMBER: 802-0200

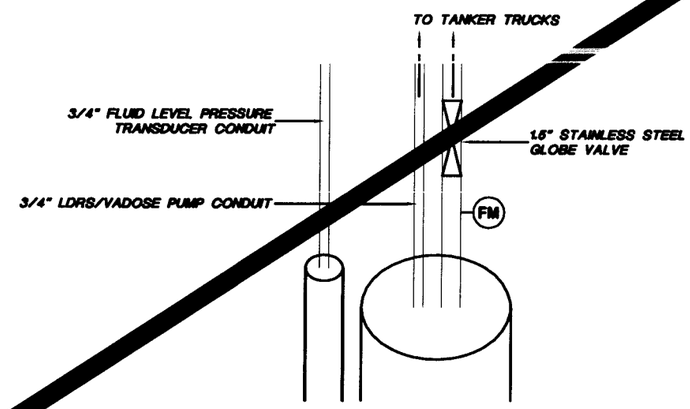


4 30 31 **TRUCK DISCHARGE STATION LAYOUT**

SCALE

5' 0 5' 10'

CONTOUR INTERVAL N.A.



5 31 31 **PIPE CONDUIT DETAIL**

NOT TO SCALE

Drawing eliminated for 2011 permit renewal.

NOTES:

1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. FOR CONCRETE DETAILS SEE DRAWING 4B.
3. PIPING SYSTEM WILL COMPLY WITH API PUBLICATION 1615 (NOVEMBER 1979) OR ANSI STANDARD B31.2 AND ANSI STANDARD B31.4.

PATRICK G. CORSER NEW MEXICO 12386 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented herein is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12386

Not For Construction

3	October 2000 Revision	10/4/00	J.Pelliser	K.Conrath	P.Corser
2	SEPTEMBER 1999 REVISION	9/99	P.Corser	T.Clark	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelliser	T.Smith	P.Corser
0	PART B Permit	11/13/97	PGC/JDC/JP	K.Conrath	P.Corser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRIASSIC PARK

WASTE DISPOSAL FACILITY

DRAWING TITLE:

EVAPORATION POND
TRUCK DISCHARGE STATION

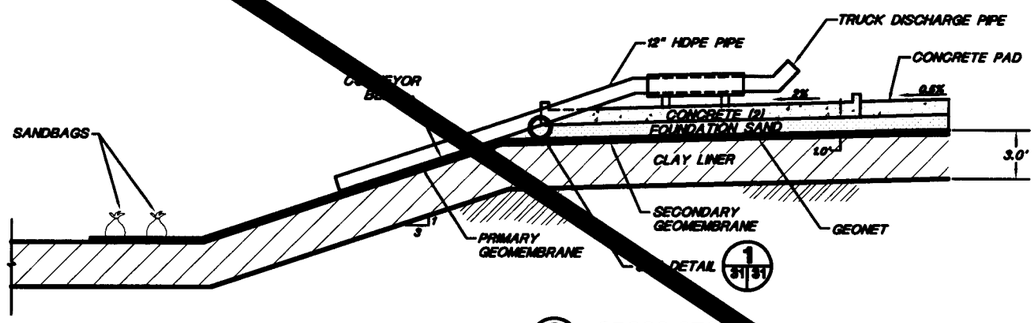
TerraMatrix
MONTGOMERY WATSON
Natural Resources Group

Sheet ___ of 2 Sheets

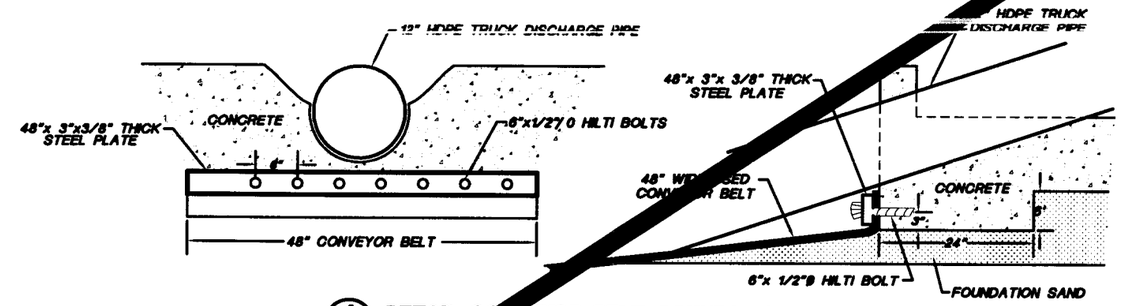
SCALE: As Shown

DRAWING No.: 3

AutoCAD FILE: TANKPAD2.DWG PROJECT NUMBER: 692.0200



C 31 31 CROSS-SECTION C-C'
Not To Scale



1 31 31 DETAIL CONVEYOR BELT CONNECTION
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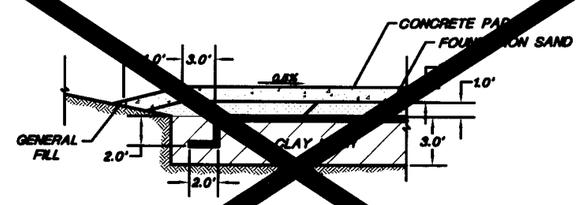
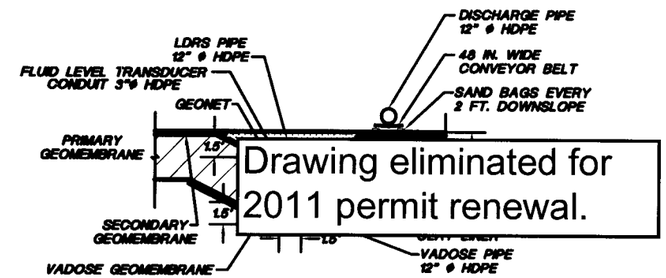
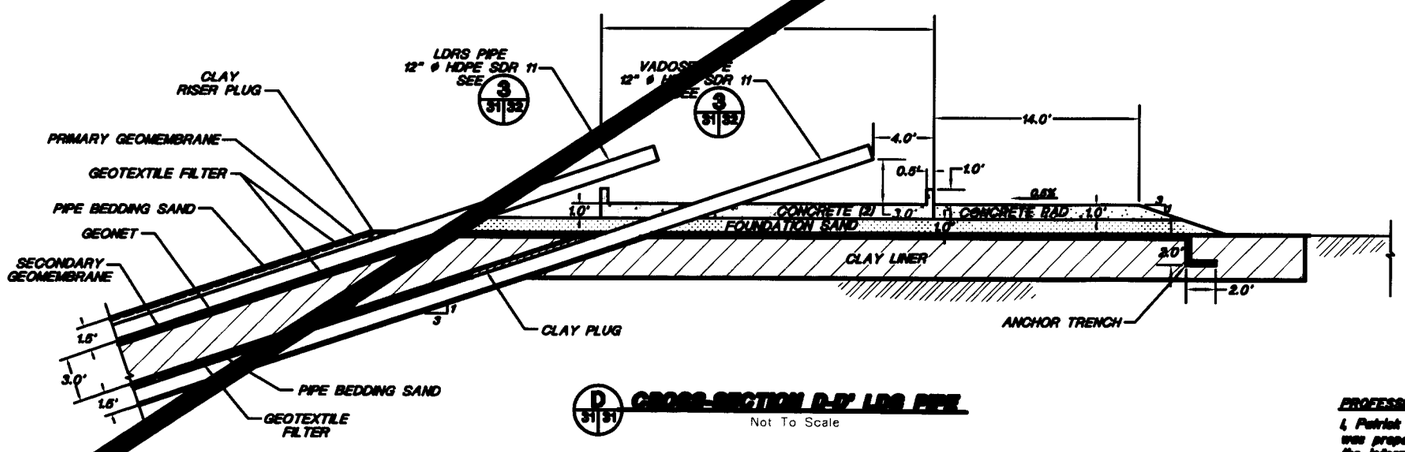


E 31 31 CROSS-SECTION E-E' ACCESS RAMP
Not To Scale



Drawing eliminated for 2011 permit renewal.

F 31 31 CROSS-SECTION F-F' CONVEYOR BELT
Not To Scale



D 31 31 CROSS-SECTION D-D' LDS PIPE
Not To Scale

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2 "INDEX, LEGEND AND GENERAL NOTES".
2. FOR CONCRETE DETAILS SEE DRAWING No. 45.

Not For Construction

4	October 2000 Revision	10/4/00	J.Pellicer	K.Conrath	P.Corser	
3	NOVEMBER 1999 UPDATES	11/02/99	J.Troncoso	M.Melchiben	P.Corser	
2	SEPTEMBER 1999 REVISION	9/99	P.Corser	T.Clark	P.Corser	
1	NOVEMBER 1998 REVISION	10/29/98	J.Pellicer	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	12/18/97	PGC/JPP	K.Conrath	P.Corser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
EVAPORATION POND
TRUCK DISCHARGE STATION

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 of 2 Sheets
SCALE As Shown
DRAWING No 3

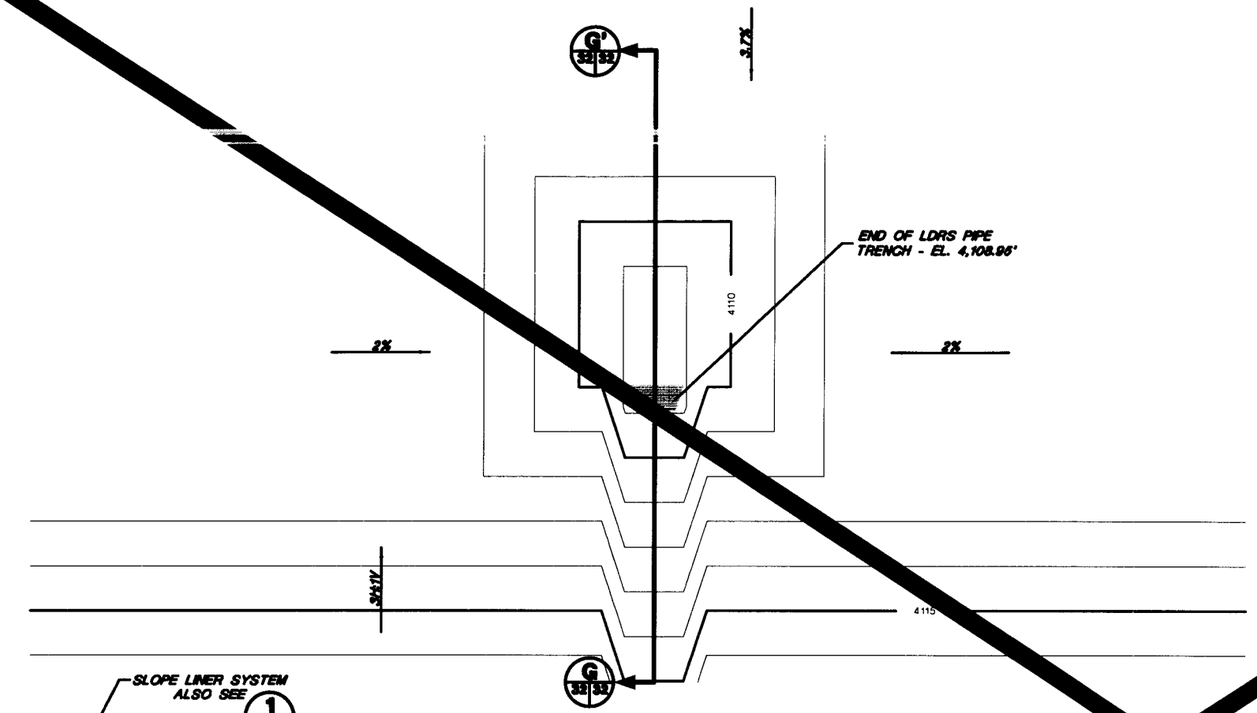
PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12296

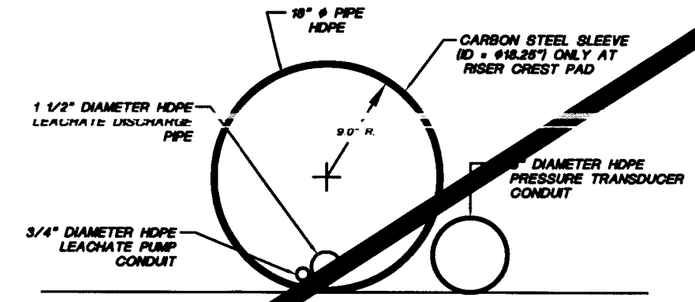
PATRICK G. CORSER NEW MEXICO 12296 REGISTERED PROFESSIONAL ENGINEER

AutoCAD FILE: TAMCPA03.DWG PROJECT NUMBER: 802.0300



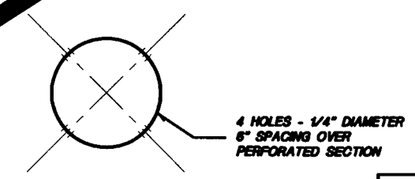
2 32/32 EVAPORATION POND SUMP LAYOUT

SCALE 0 5' 10' Feet



3 31/32 LCRS AND LDRS RISER PIPE DETAIL

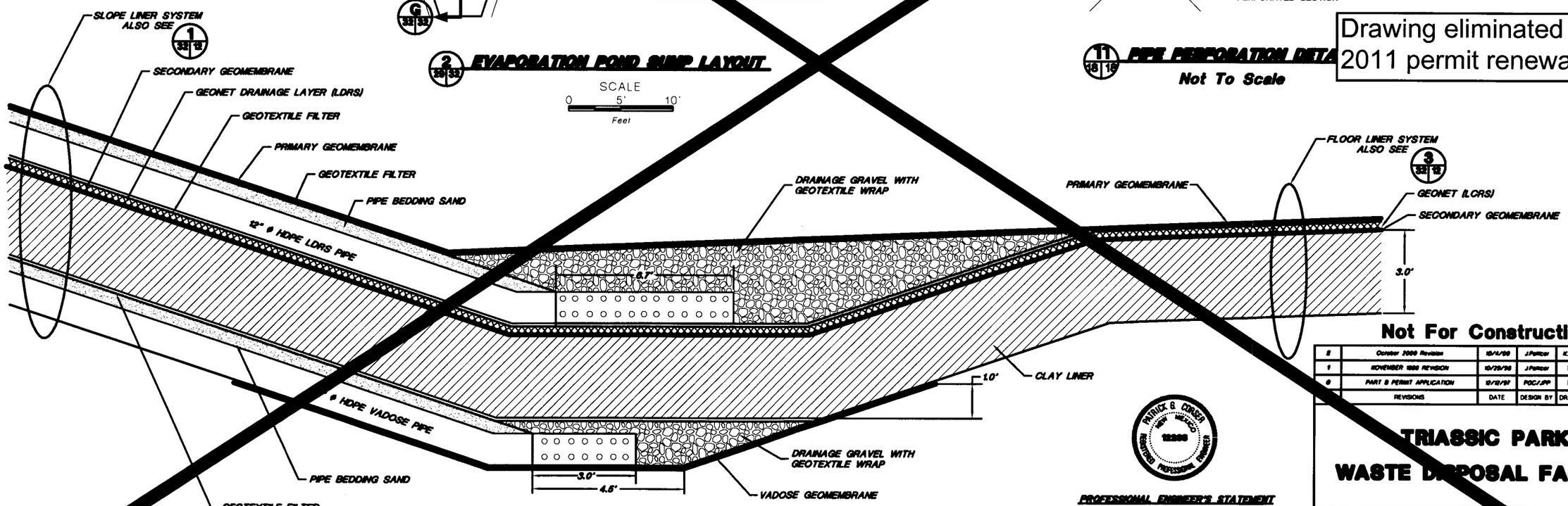
SCALE 0 0.5' 1.0' Feet



11 18/18 PIPE PERFORATION DETAIL

Not To Scale

Drawing eliminated for 2011 permit renewal.



G 32/32 EVAPORATION POND SUMP CROSS-SECTION

Not To Scale

NOTE: FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ Patrick G. Corser, NM P.E. 12266

PATRICK G. CORSER NEW MEXICO 12266 REGISTERED PROFESSIONAL ENGINEER

Not For Construction

2	October 2000 Revision	10/4/00	J.Pelicer	K.Cserek	P.Corser
1	NOVEMBER 1999 REVISION	10/29/99	J.Pelicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.Smith	P.Corser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: **EVAPORATION POND LDRS AND VADOSE PLAN AND DETAILS**

TerraMatrix MONTGOMERY WATSON Mining Group

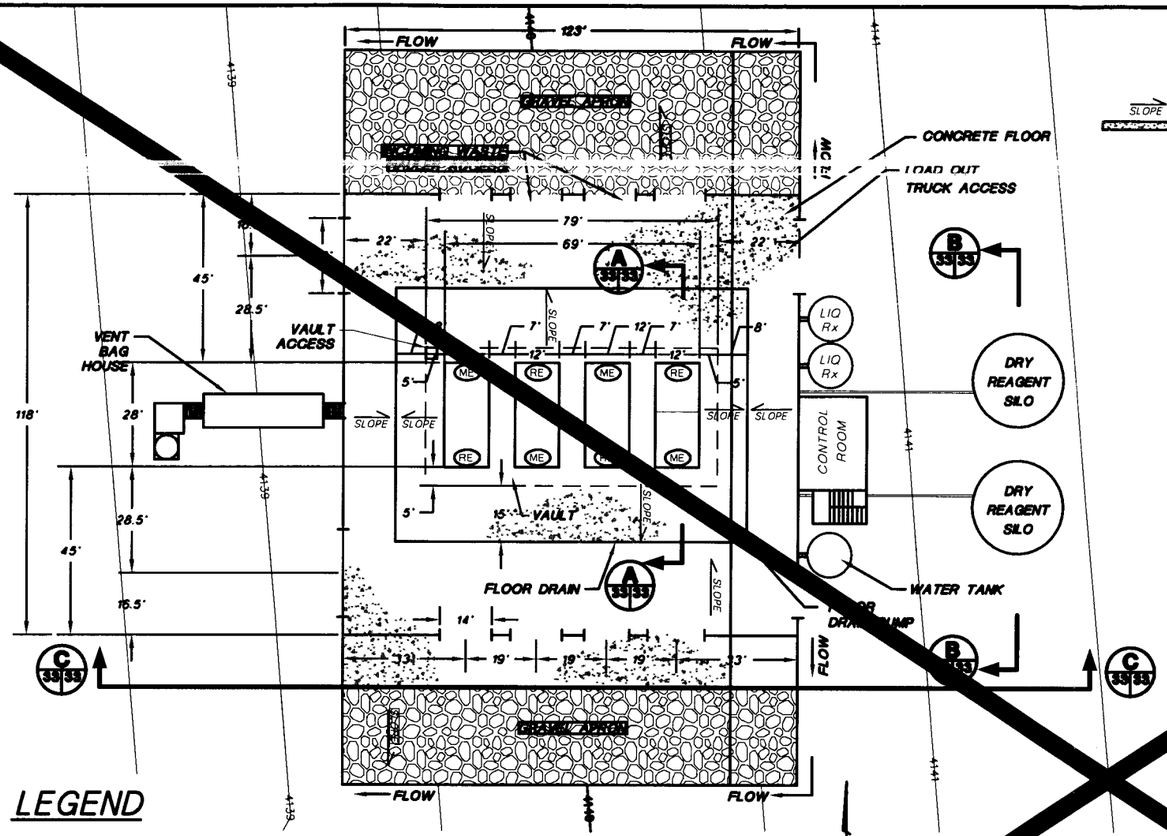
Sheet ___ of ___ Sheets

SCALE: As Shown

DRAWING No.

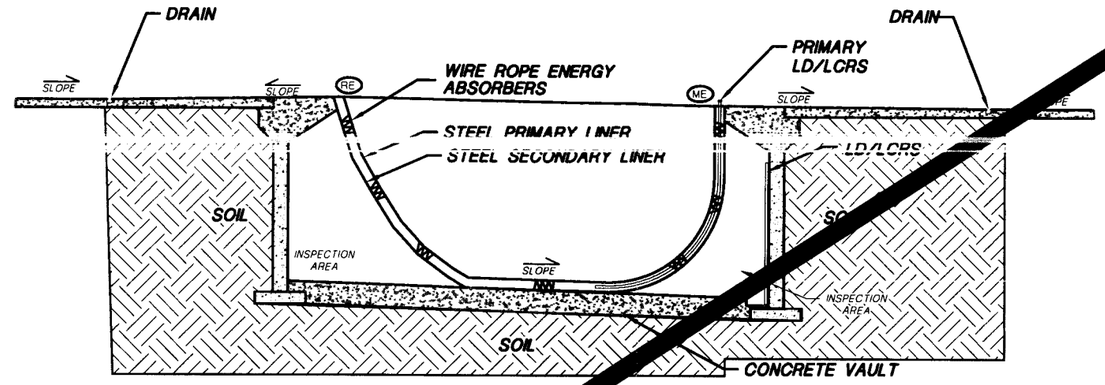
PROJECT NUMBER: 532-0200

AutoCAD FILE: LDSPLAN.DWG



STABILIZATION BUILDING FLOOR PLAN

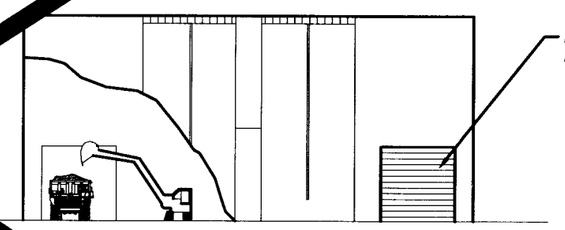
SCALE 20' 0 20' 40'



TYPICAL BIN & VAULT SECTION

SCALE 0 5' 10'

NOTE:
SEE DRAWING 36 FOR BIN DETAILS



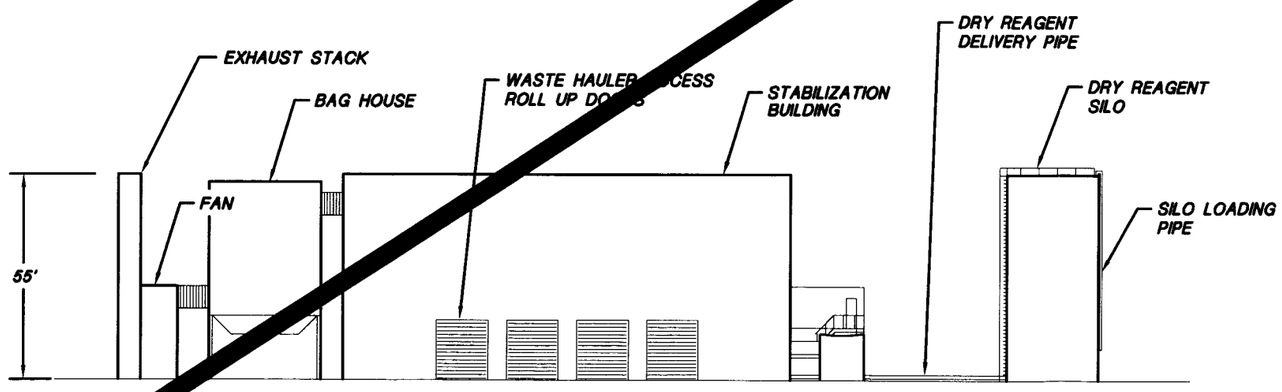
Drawing eliminated for 2011 permit renewal.

TYPICAL END ELEVATION

Not To Scale

LEGEND

RE RECEIVING END
ME MIXING END



TYPICAL FRONT ELEVATION

Not To Scale

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12836

PATRICK G. CARSER NEW MEXICO 12836 REGISTERED PROFESSIONAL ENGINEER

Not For Construction

4	October 2000 Revision	10/4/00	J.Pellicer	K.Conrath	P.Carser	
3	NOVEMBER 1999 UPDATES	11/02/99	J.Troncoso	M.Mathison	P.Carser	
2	SEPTEMBER 1999 REVISION	9/99	P.Carser	T.Clark	P.Carser	
1	NOVEMBER 1998 REVISION	10/29/98	J.Pemcer	T.Smith	P.Carser	
0	PART B PERMIT APPLICATION	10/18/97	PBC/JPP	K.Conrath	P.Carser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

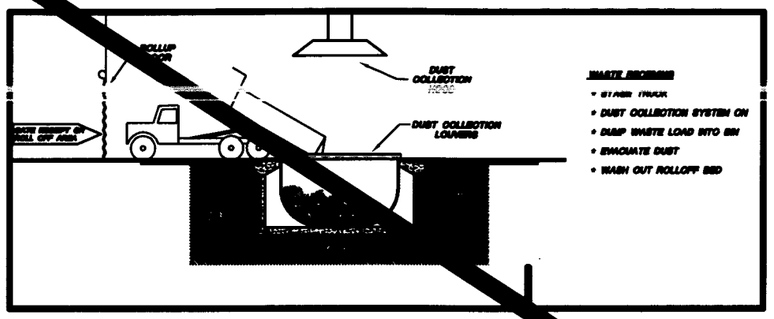
TRIASSIC PARK
WASTE DISPOSAL FACILITY

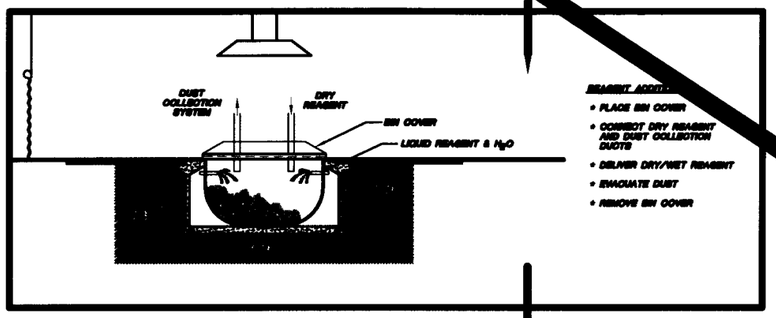
DRAWING TITLE:
STABILIZATION UNIT GENERAL ARRANGEMENT

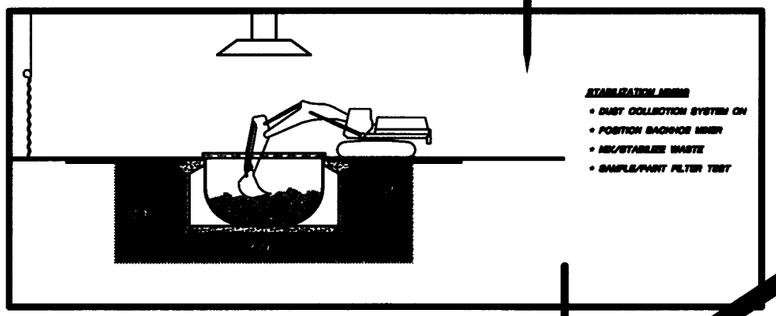
TerraMatrix
MONTGOMERY WATSON
Mining Group

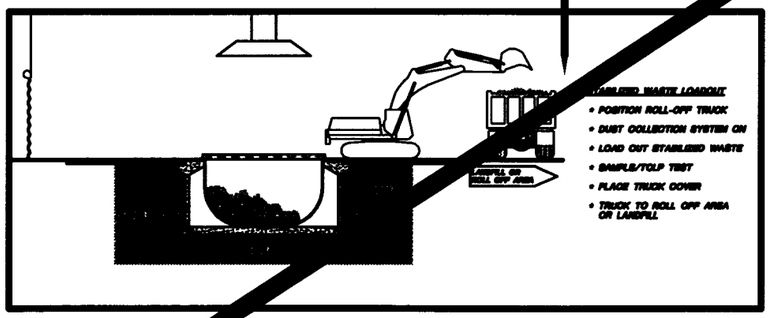
Sheet ___ of ___ Sheets
SCALE: As Shown
DRAWING No. 35

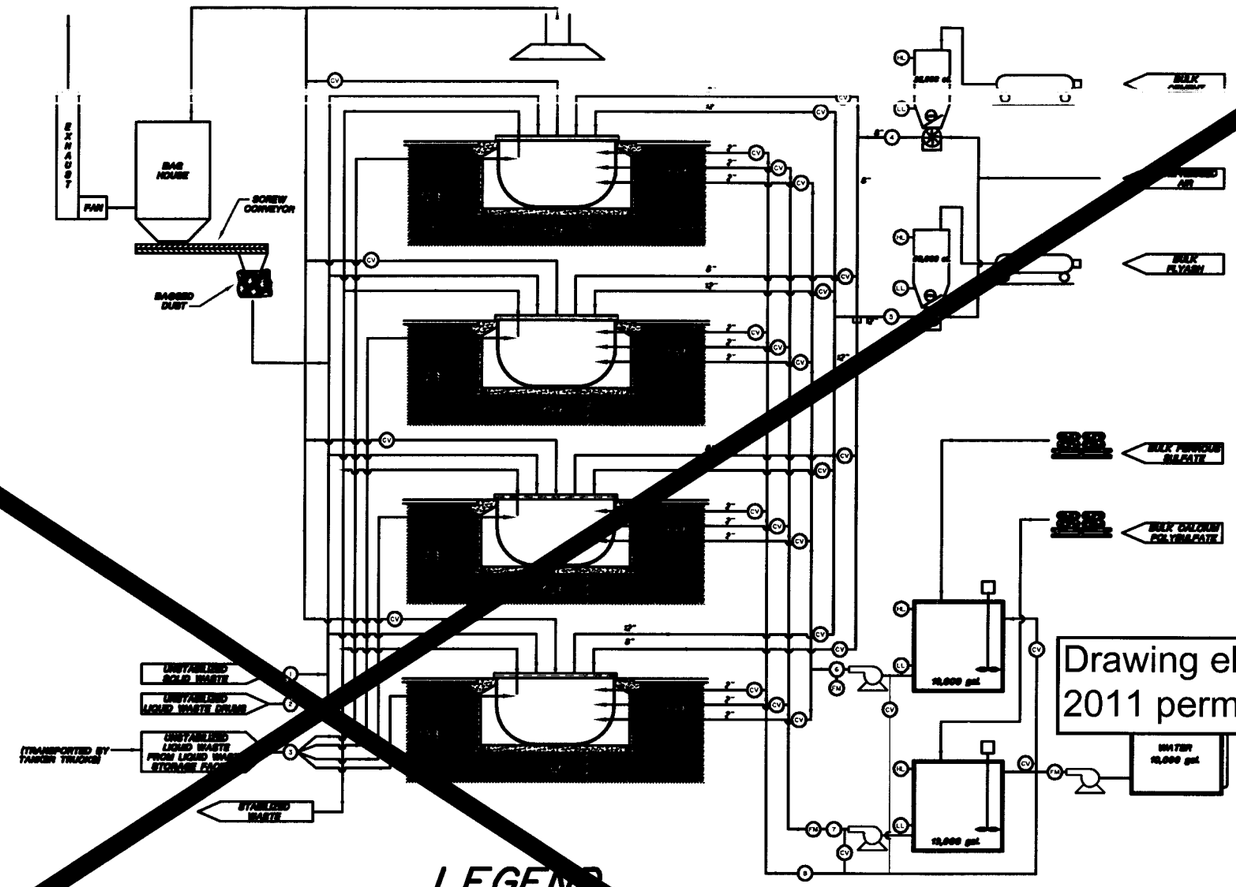
AutoCAD FILE: COMCSTABE.DWG PROJECT NUMBER: 692-0200











Drawing eliminated for 2011 permit renewal.

LEGEND

- (HL) HIGH LEVEL CUT OFF
- (LL) LOW LEVEL CUT OFF
- (WM) WEIGHT METER
- (FM) FLOW METER
- (CV) CONTROL VALVE
- (SG) SIGHT GAUGE

NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. ACTUAL REAGENT: WASTE RATIOS ARE DEPENDENT ON SPECIFIC CHARACTERISTIC OF WASTE.
3. PIPING WILL BE INSTALLED ACCORDING TO API PUBLICATION 1615 (NOVEMBER 1979) AND ANSI STANDARD B31.2 AND ANSI STANDARD B31.4.
4. PIPING LOCATION WILL BE DETERMINED IN THE FIELD.
5. REAGENTS MAY BE MANUALLY FED DIRECTLY TO THE BINS.

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ Patrick G. Corser, NM P.E. 12236

Not For Construction

3	October 2000 Revision	10/1/00	J.Pelicer	K.Conrath	P.Corser
2	SEPTEMBER 1999 REVISION	9/99	P.Corser	T.Clark	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/19/97	PGC/JPP	K.Conrath	P.Corser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

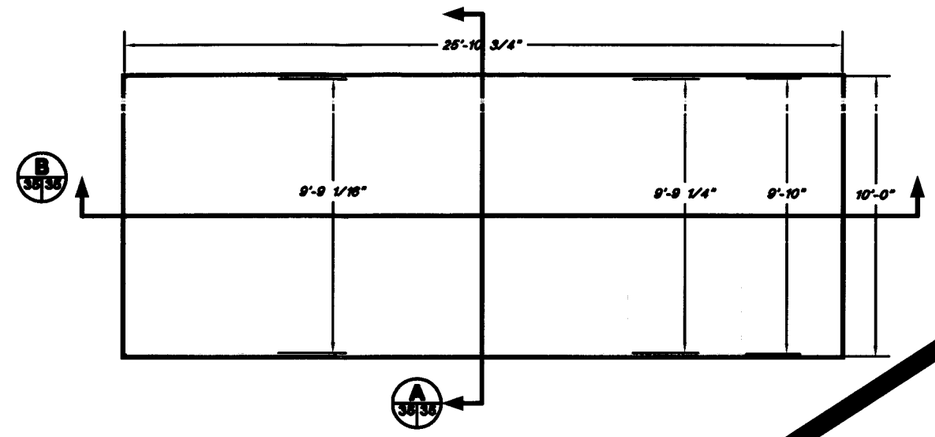
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: **STABILIZATION PLANT WASTE FLOW DIAGRAM**

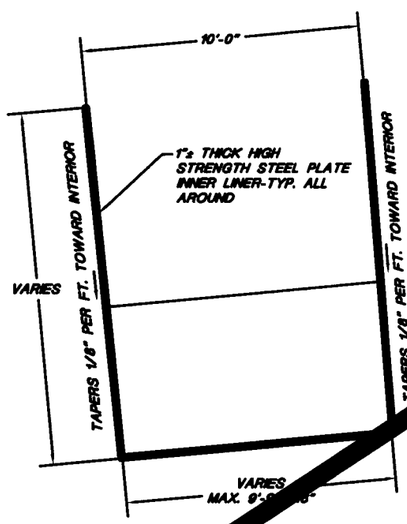
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet ___ of ___ Sheets
SCALE: As Shown
DRAWING No.

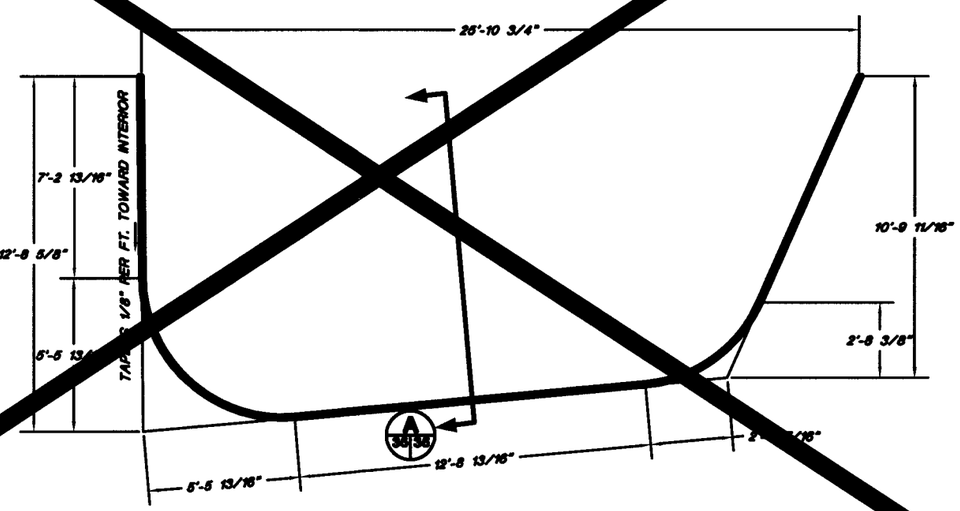
AutoCAD FILE: GM-FLOW.DWG PROJECT NUMBER: 602-0200



PLAN VIEW - INNER LINER



A 38/38 CROSS SECTION - INNER LINER



B 38/38 LONGITUDINAL SECTION - INNER LINER

Drawing eliminated for 2011 permit renewal.

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12236

Not For Construction

SCALE

4' 0 2' 4' 6'

2	October 2000 Revision	10/4/00	J.Pelliar	K.Conrath	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelliar	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/18/97	PGC/JPP	K.Conrath	P.Corser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: **STABILIZATION UNIT BIN DESIGN**

TerraMatrix MONTGOMERY WATSON Mining Group

Sheet 1 of 1 Sheets

SCALE: As Shown

DRAWING No.

FRED H. SCHOTT & ASSOCIATES
CIVIL and STRUCTURAL ENGINEERS • LAND PLANNERS & SURVEYORS
[illegible] Road, Suite A San Luis Obispo, CA [illegible]
(805) 544-[illegible] FAX (805) 544-[illegible]

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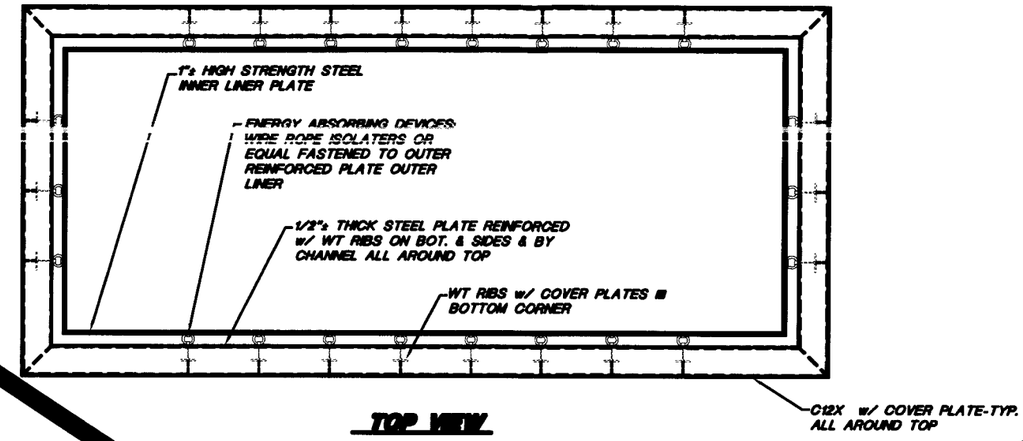
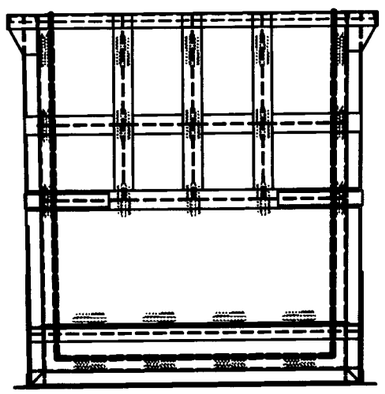
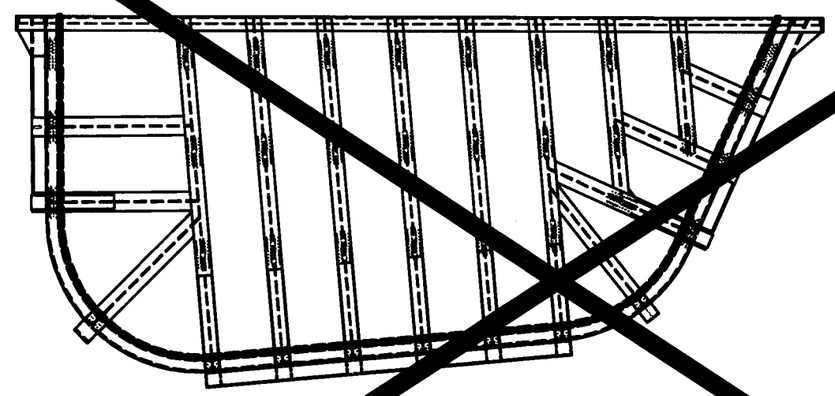
AutoCAD FILE: GM-BIN1.DWG PROJECT NUMBER: 602-0300



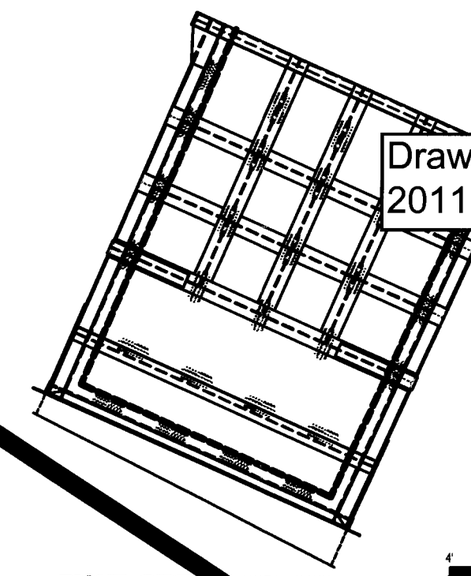
TOP VIEW



LEFT SIDE ELEVATION

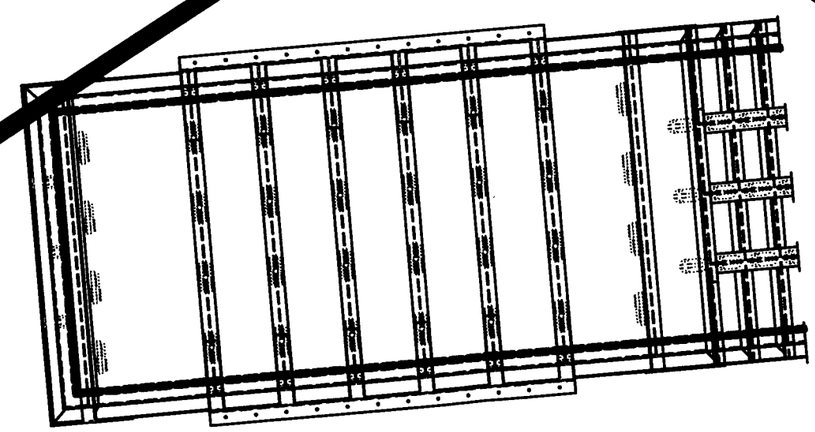


TYPICAL SIDE ELEVATION



RIGHT SIDE ELEVATION

Drawing eliminated for 2011 permit renewal.



VIEW OF BOTTOM

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12236

Not For Construction

SCALE

4' 0 2' 4' 6'

2	October 2000 Revision	10/4/00	J.Pelizer	K.Conrath	P.Corser
1	NOVEMBER 1998 REVISION	10/29/98	J.Pelizer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	10/10/97	PGC/JPP	K.Conrath	P.Corser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: **STABILIZATION UNIT BIN DESIGN DETAILS**

FRED H. SCHOTT & ASSOCIATES
CIVIL and STRUCTURAL ENGINEERS • LAND PLANNERS & SURVEYORS
[illegible] Road, Suite A San Luis Obispo, CA [illegible]
(805) 541-[illegible] FAX (805) 541-[illegible]

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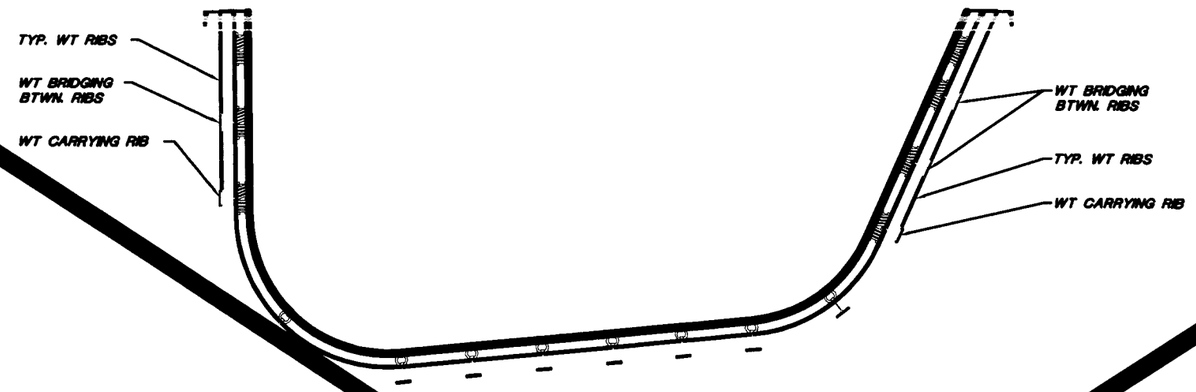
TerraMatrix
MONTGOMERY WATSON
Mining Group

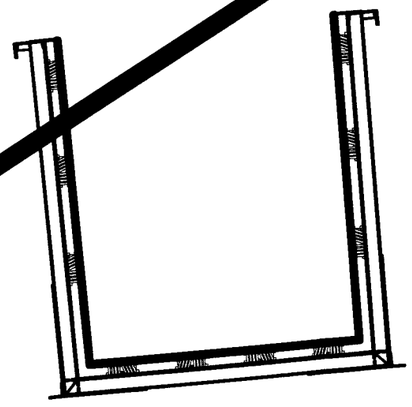
Sheet [illegible] of 2 Sheets
SCALE As Shown
Drawing No [illegible]

AutoCAD FILE: GM-BIN2.DWG PROJECT NUMBER: 592-0200



LONGITUDINAL SECTION - INNER/OUTER LINERS & FRAMING

Drawing eliminated for 2011 permit renewal.



LATTERAL SECTION - INNER/OUTER LINERS & FRAMING

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12236

Not For Construction

SCALE

4' 0 2' 4' 6'

2	October 2000 Revision	10/4/00	J.Pelicer	K.Cerwin	P.Corser
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0	PART B PERMIT APPLICATION	12/19/91	PGC/JPP	K.Cerwin	P.Corser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRIASSIC PARK

WASTE DISPOSAL FACILITY

DRAWING TITLE: ***STABILIZATION UNIT BIN DESIGN DETAILS***

FRED H. SCHOTT & ASSOCIATES

CIVIL and STRUCTURAL ENGINEERS • LAND PLANNERS & SURVEYORS

250 Sebastian Road, Suite A San Luis Obispo, CA 93401

(805) 541-5200 FAX (805) 541-5204

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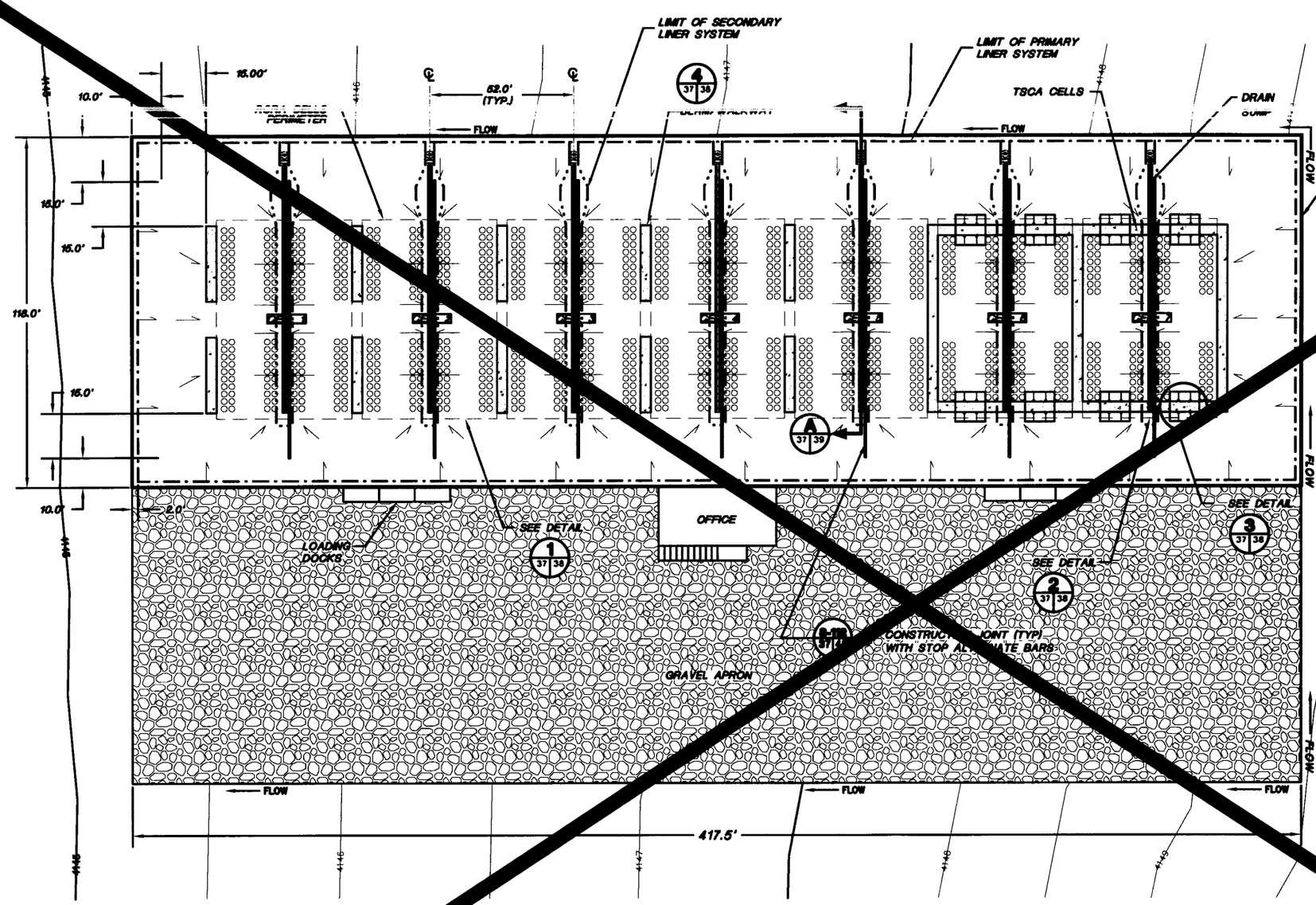
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 of 2 Sheets

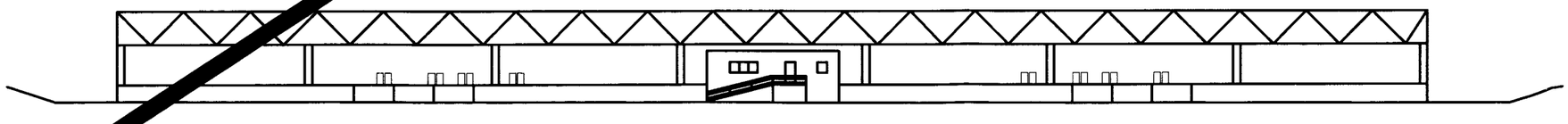
SCALE As Shown

Dwg. No 3

AutoCAD FILE: GM-BIN2.DWG PROJECT NUMBER: 692-0200



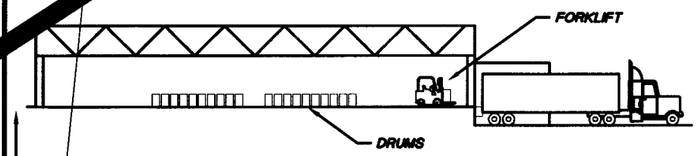
TYPICAL DRUM FLOOR LAYOUT



TYPICAL FRONT ELEVATION

LEGEND

- DRAINAGE FLOW DIRECTION ON TOP OF CONCRETE
- EXTENT OF PRIMARY GEOMEMBRANE
- EXTENT OF SECONDARY GEOMEMBRANE
- DRUMS



TYPICAL SIDE ELEVATION

Drawing eliminated for 2011 permit renewal.

PATRICK G. CORSER NEW MEXICO 12280 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ Patrick G. Corser, NM P.E. 12280

Not For Construction

REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
3 October 2000 Revision	10/4/00	J.Pelicer	K.Conrath	P.Corser
2 SEPTEMBER 1999 REVISION	09/01/99	P.Corser	T.Smith	P.Corser
1 NOVEMBER 1998 REVISION	10/30/98	J.Pelicer	T.Smith	P.Corser
0 PART B PERMIT APPLICATION	12/19/97	PSC/JPP	K.Conrath	P.Corser

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: **DRUM HANDLING UNIT GENERAL ARRANGEMENT**

TerraMatrix MONTGOMERY WATSON Mining Group

Sheet ___ of ___ Sheets

SCALE: As Shown

DRAWING No.

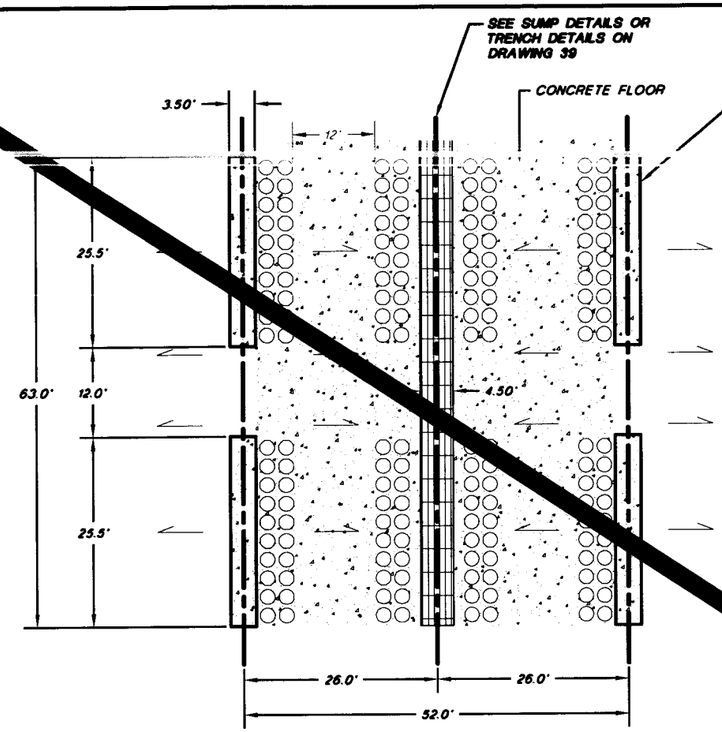
NOTES:

1) FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

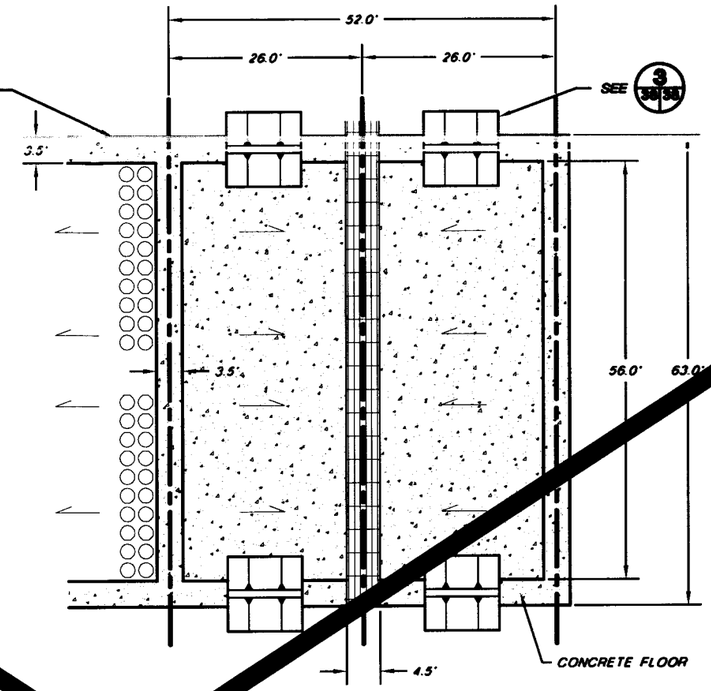
2) EACH CELL SHALL BE LABELED ACCORDING TO THE TYPE OF WASTE BEING STORED.

3) INCOMPATIBLE WASTES WILL BE STORED IN SEPARATE CELLS.

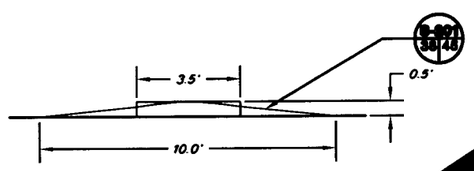
AutoCAD FILE: GM-DHF.DWG PROJECT NUMBER: 602-0200

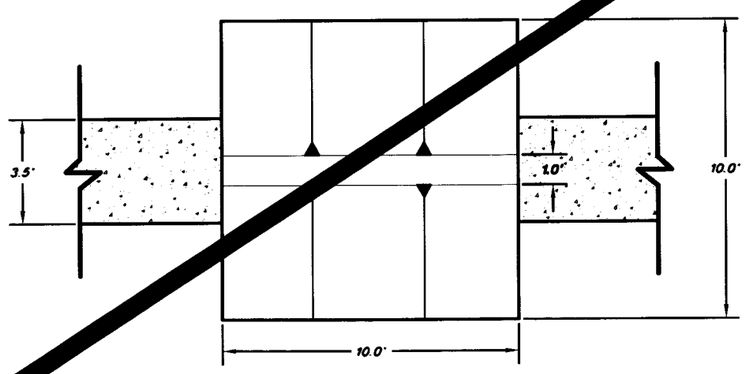


1 37/38 TYPICAL RCRA CELL DETAIL
Not To Scale

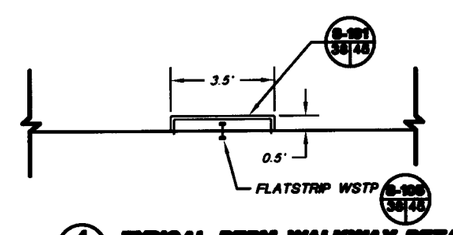


2 37/38 TYPICAL TRCA CELL DETAIL
Not To Scale





3 37/38 TYPICAL TRCA CELL ACCESS RAMP DETAIL
Not To Scale



4 37/38 TYPICAL BERM WALKWAY DETAIL
Not To Scale

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

LEGEND

DRAINAGE FLOW DIRECTION
TOP OF CONCRETE
CENTERLINE
DRUMS

SCALE

Drawing eliminated for 2011 permit renewal.

PATRICK G. CORSER
NEW MEXICO
12266
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12266

Not For Construction

3	October 2000 Revision	10/1/00	J.Pelliter	K.Cerrath	P.Corser	
2	SEPTEMBER 1999 REVISION	9/99	P.Corser	T.Clark	P.Corser	
1	NOVEMBER 1998 REVISION	10/30/98	J.Pelliter	T.Smith	P.Corser	
0	PART B Permit APPLICATION	12/12/97	PGC/JPP	K.Cerrath	P.Corser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

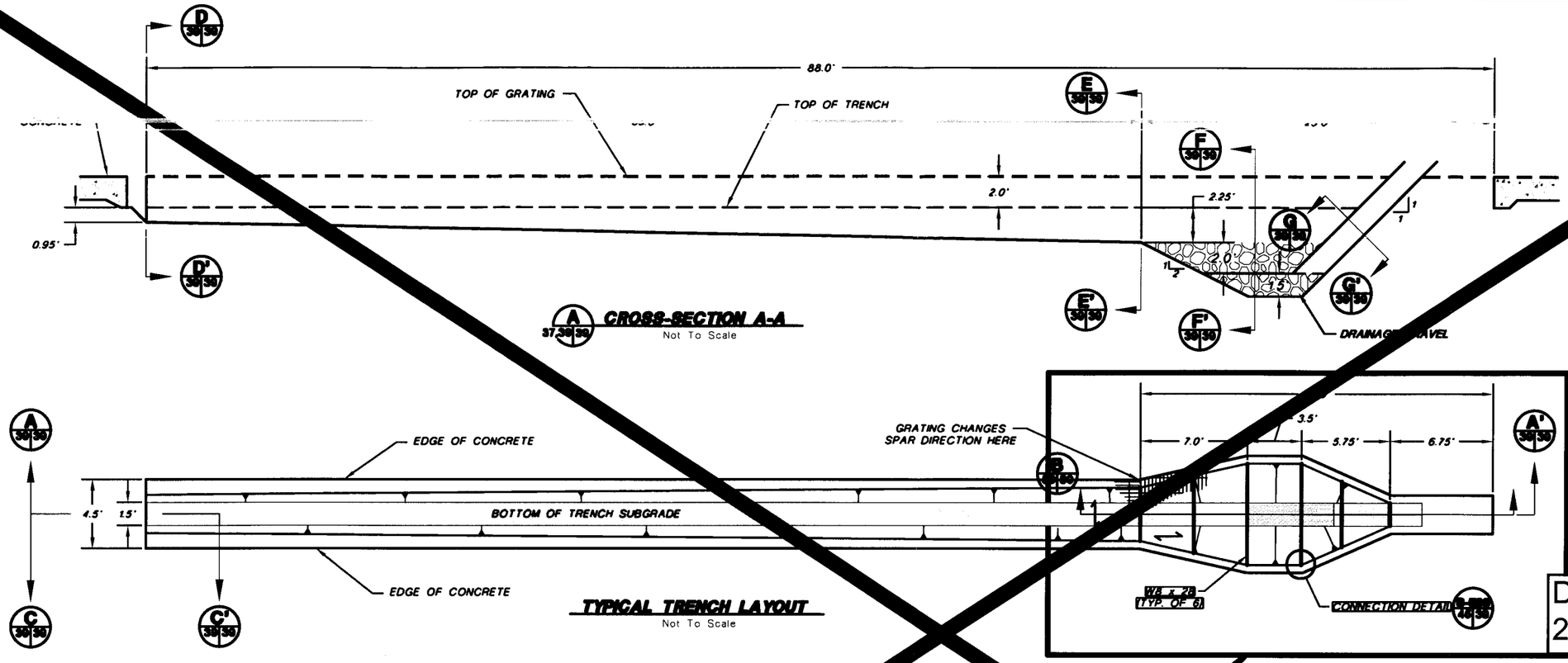
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:
DRUM HANDLING UNIT DETAILS

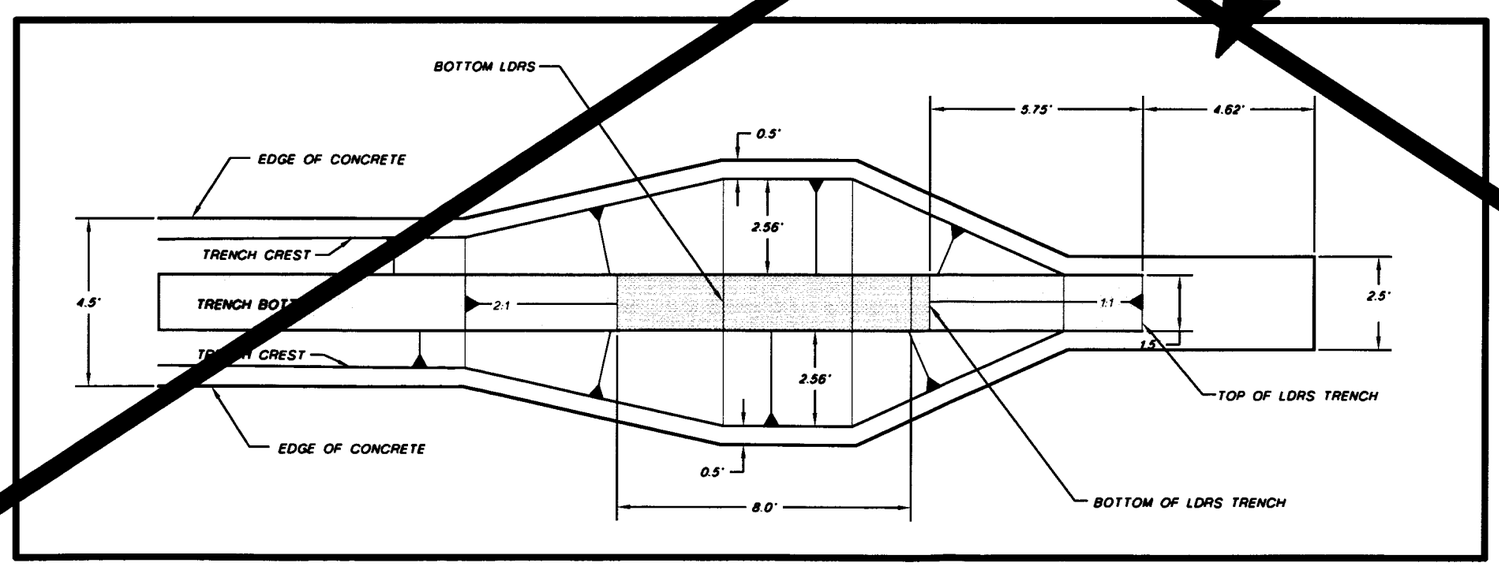
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 of 7 Sheets
SCALE: As Shown
DRAWING No. 3

AutoCAD FILE: GIN-DHF2.DWG PROJECT NUMBER: 602-0200



Drawing eliminated for 2011 permit renewal.



NOTE: FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carver, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Carver, NM P.E. 12836*

2	October 2000 Revision	10/4/00	J.Pelicer	K.Conrath	P.Carver	
1	NOVEMBER 1999 REVISION	10/20/99	J.Pelicer	T.Stein	P.Carver	
0	PART B PERmit APPLICATION	12/12/97	PGC/JPP	K.Conrath	P.Carver	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

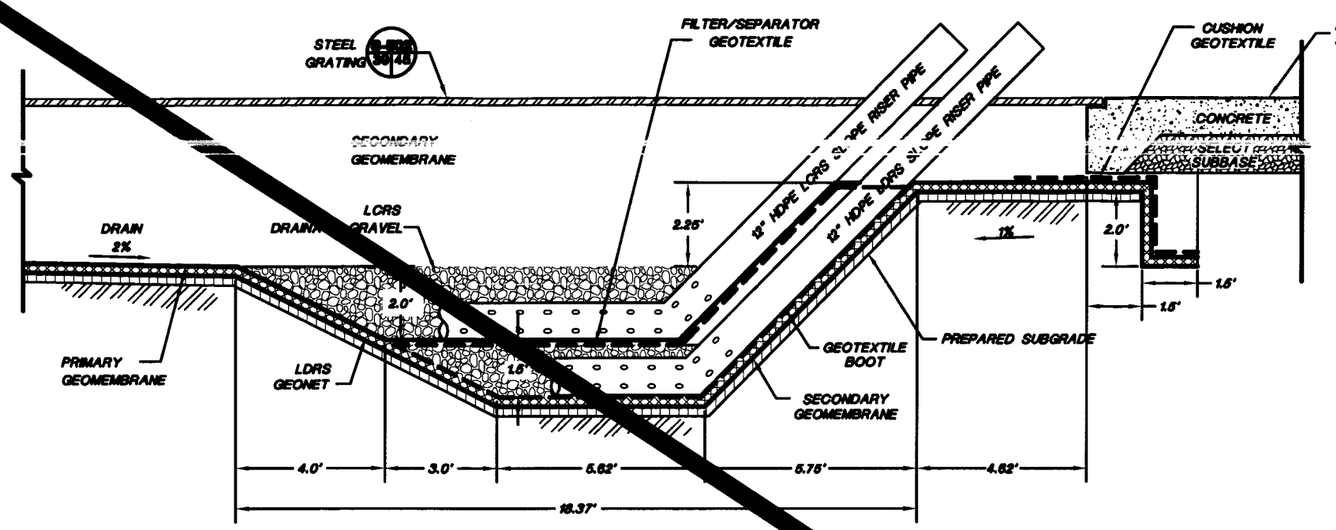
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: **DRUM HANDLING UNIT SUMP DETAILS**

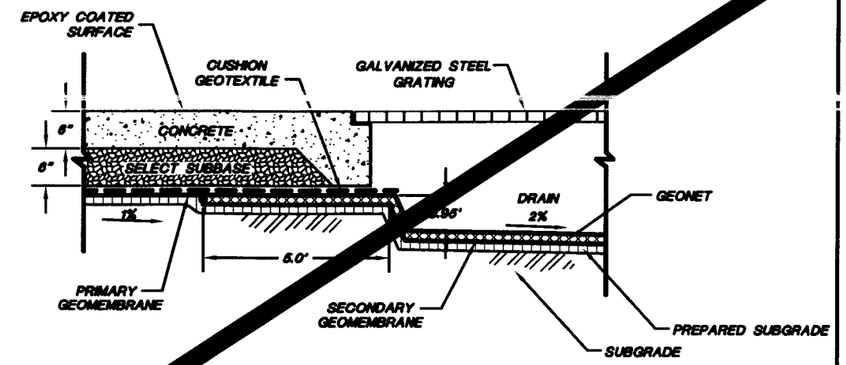
TerraMatrix MONTGOMERY WATSON Mining Group

Sheet 2 of 2 Sheets
SCALE: As Shown
DRAWING No.

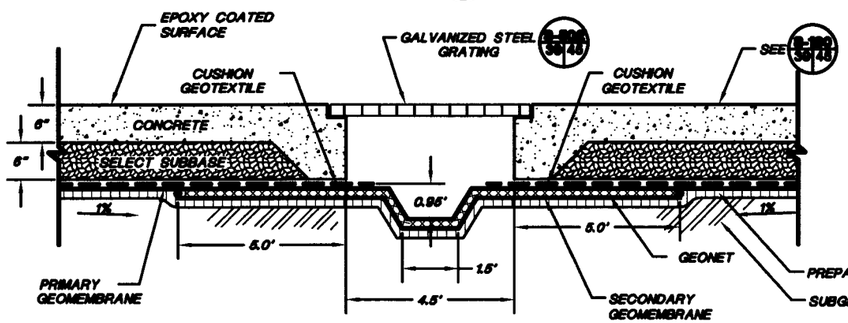
AutoCAD FILE: TRN-DTL#2.DWG PROJECT NUMBER: 622-0200



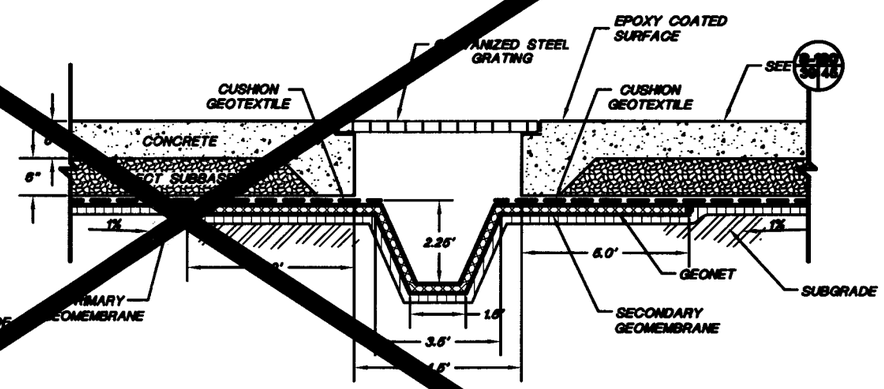
B 38/38 CROSS-SECTION B-B'
Not To Scale



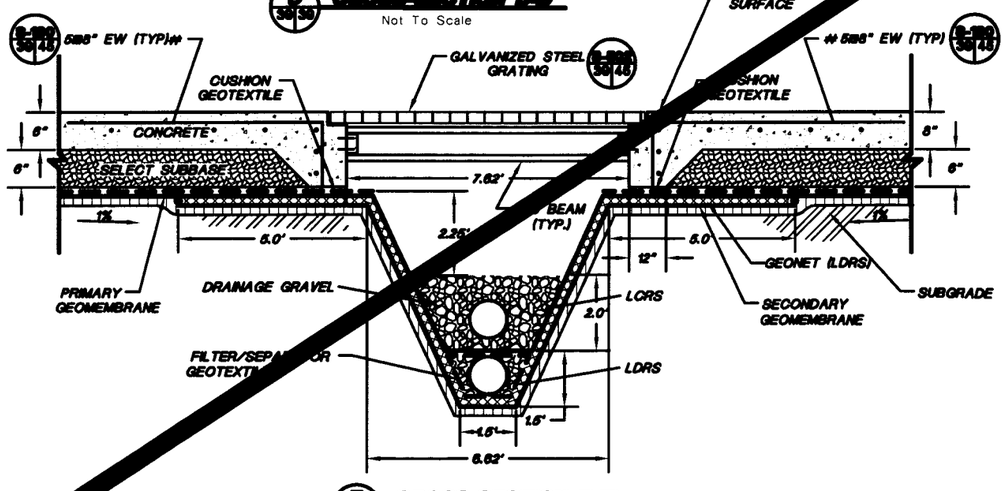
C 38/38 CROSS-SECTION C-C'
Not To Scale



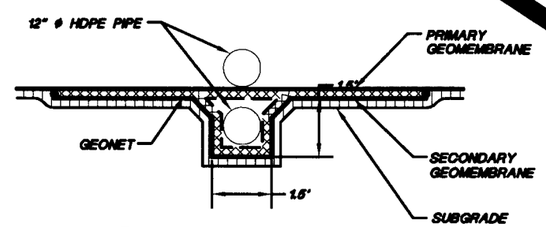
D 38/38 CROSS-SECTION D-D'
Not To Scale



E 38/38 CROSS-SECTION E-E'
Not To Scale



F 38/38 CROSS-SECTION F-F'
Not To Scale



G 38/38 CROSS-SECTION G-G'
Not To Scale

Drawing eliminated for 2011 permit renewal.

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Corser, NM P.E. 12236*

Not For Construction

3	October 2000 Revision	10/4/00	J.Pellicer	K.Cornish	P.Corser	
2	SEPTEMBER 1999 REVISION	9/99	P.Corser	T.Clark	P.Corser	
1	NOVEMBER 1998 REVISION	10/30/98	J.Pellicer	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	10/12/97	PGC/JPP	K.Cornish	P.Corser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

TRIASSIC PARK
WASTE DISPOSAL FACILITY

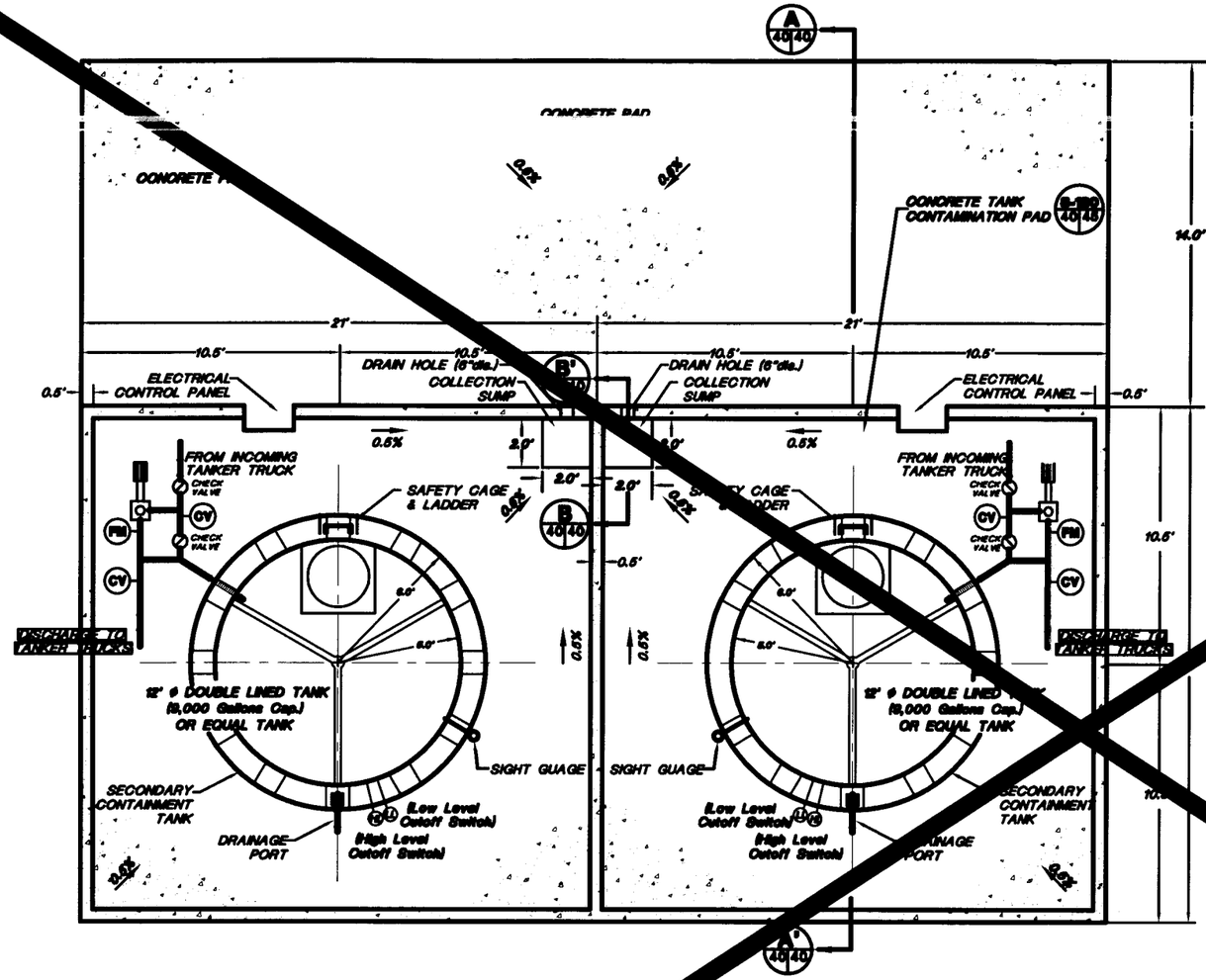
DRAWING TITLE:
DRUM HANDLING UNIT SUMP DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

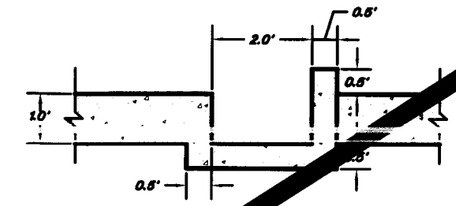
Sheet ___ of ___ Sheets
SCALE: As Shown
DWG No.

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

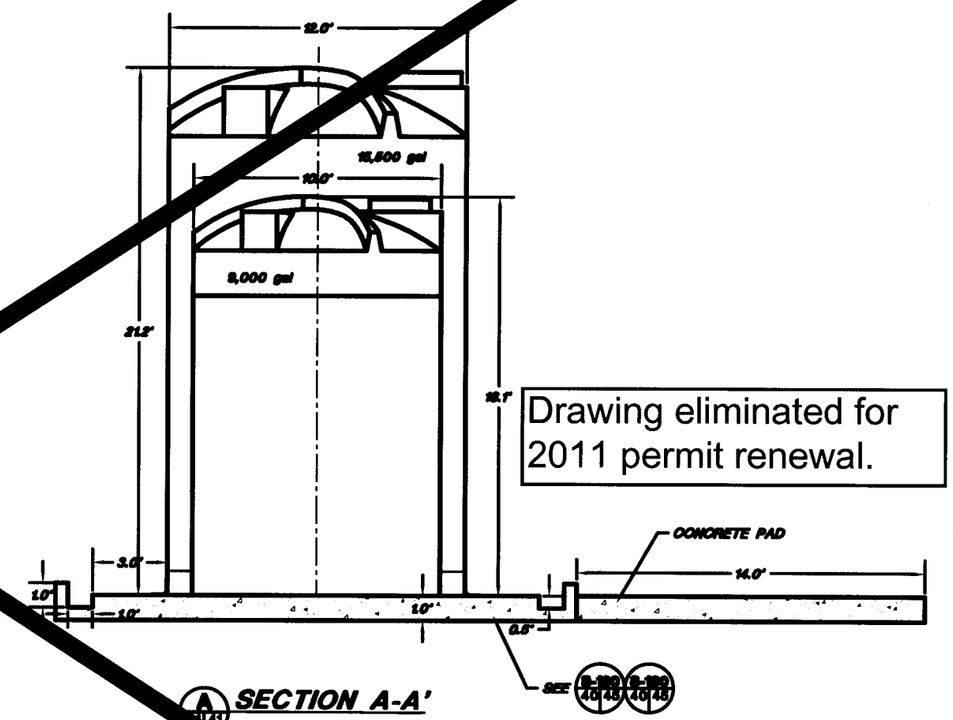
AutoCAD FILE: TRK-DTL2BLDWG PROJECT NUMBER: 602-0200



LIQUID WASTE RECEIVING & STORAGE AREA



SECTION B-B'



SECTION A-A'

Drawing eliminated for 2011 permit renewal.

SCALE 0 3' 6'

NOTES:

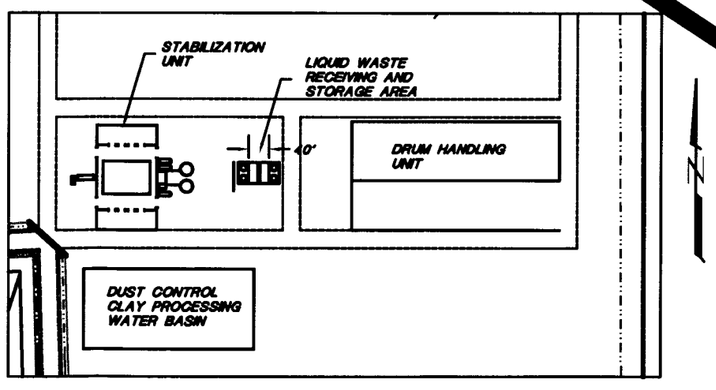
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. FOR CONCRETE DETAILS SEE DRAWING 45.
3. TWO TANKS WILL BE CONSTRUCTED INITIALLY TO SERVICE SITE EXCAVATIONS. TWO ADDITIONAL TANKS MAY BE ADDED AT A LATER DATE TO ACCOMODATE ANY INCREASES IN LIQUID WASTE VOLUME.
4. PIPING WILL BE INSTALLED ACCORDING TO API PUBLICATION 1615 (NOVEMBER 1987) OR ANSI STANDARD B 31.2 AND ANSI STANDARD B 31.4.
5. PIPING LOCATION WILL BE DETERMINED IN THE FIELD.
6. DETAILS OF THE DOUBLE LINED TANKS ARE PROVIDED IN SHEET 2.

PATRICK G. CORSER NEW MEXICO 12336 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12336



LIQUID WASTE RECEIVING & STORAGE AREA LOCATION

Not For Construction

4	October 2000 Revision	10/4/00	J.Pellicer	K.Carreth	P.Corser
3	NOVEMBER 1999 UPDATES	11/03/99	J.Troncoso	M.McMahon	P.Corser
2	SEPTEMBER 1999 REVISION	09/01/99	P.Corser	T.Smith	P.Corser
1	NOVEMBER 1998 REVISION	10/30/98	J.Pellicer	T.Smith	P.Corser
0	PART B PERMIT APPLICATION	12/18/97	PGC/JPP	E.Stanonge	P.Corser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRIASSIC PARK

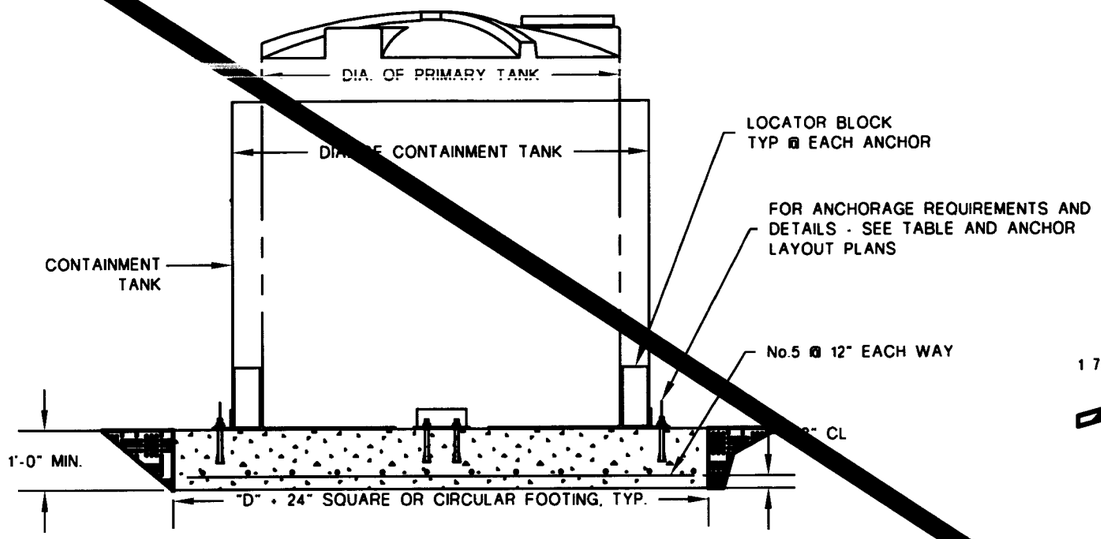
WASTE DISPOSAL FACILITY

DRAWING TITLE:
LIQUID WASTE RECEIVING AND STORAGE UNIT LAYOUT

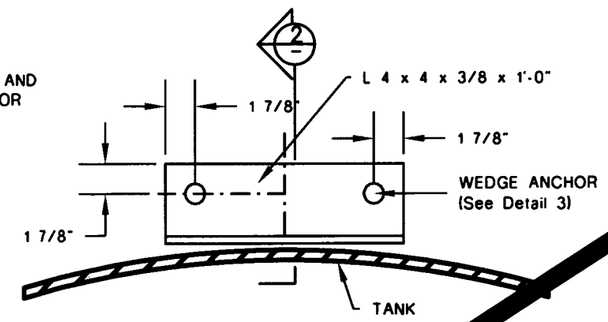
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 of 2 Sheets
SCALE See Scale Bar
DWG. No. 46

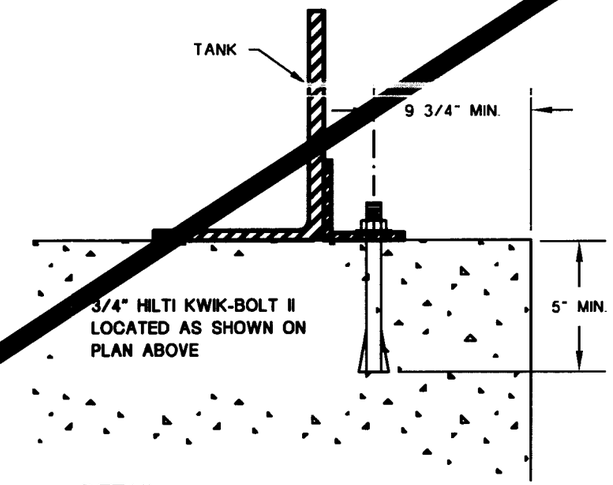
AutoCAD FILE: GLF-LWRSF1.DWG PROJECT NUMBER: 692-0000



1 ELEVATION



S2 ANCHOR TYPE



1 DETAIL

Drawing eliminated for 2011 permit renewal.

TANK DATA						ANCHORAGE REQUIREMENTS		
PRIMARY MODEL NO.	SECONDARY MODEL NO.	CAPACITY (GALS.)	DIAMETER (FT.)	HEIGHT (FT.)	WEIGHT (LBS.)	ANCHOR LAYOUT	Hs	CABLE DIAMETER
10 VCT 09K	12 VOC 15E	9000	10	16.08	7000	D		

GENERAL NOTES

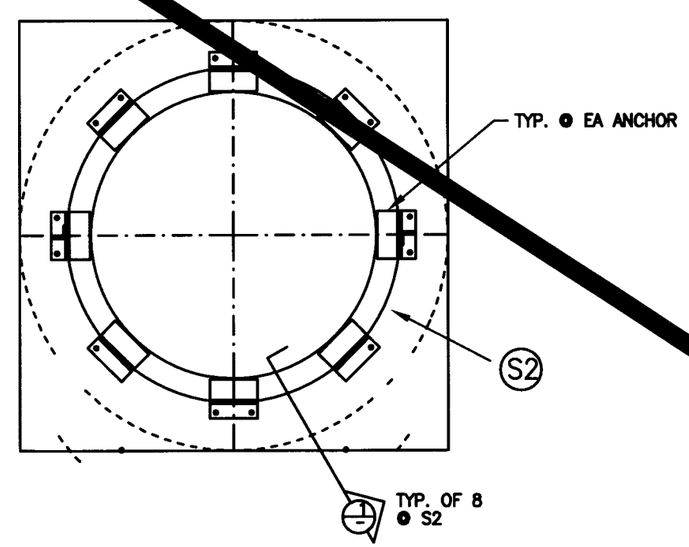
1. TANK RESTRAINT ANCHORAGES, CABLES DESIGNED FOR SEISMIC AND WIND FORCES PER THE UNIFORM BUILDING CODE, 1997 EDITION.
2. MATERIALS SHALL CONFORM TO THE REQUIREMENTS OF THE UBC AND THE FOLLOWING CRITERIA:

   STRUCTURAL STEEL: ASTM A36

   CONCRETE: COMPRESSIVE STRENGTH (f'c) = 2500 PSI MAX. SLUMP = 4 INCHES

   REINFORCEMENT: ASTM A615. YIELD STRENGTH (fy) = 40,000 PSI

   ANCHORS: HILTI "KWIK-BOLT" OR WEJ-IT "ANKR-TITE". INSTALL PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.
3. REMOVE ALL SHARP EDGES THAT MAY DAMAGE OR CAUSE WEAR TO CABLES.
4. ALL GALLONAGES AND DIMENSIONS ARE NOMINAL.



C ANCHOR LAYOUT 'C'

PATRICK G. CORSER NEW MEXICO 12296 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Corser, NM P.E. 12296*

Not For Construction

4	October 2000 Revision	10/4/00	J.Pellicer	K.Corsetti	P.Corser	
3	NOVEMBER 1999 UPDATES	11/02/99	J.Troncoso	M.Mathieson	P.Corser	
2	SEPTEMBER 1999 REVISION	09/09/99	P.Corser	T.Smith	P.Corser	
1	NOVEMBER 1998 REVISION	10/30/98	J.Pellicer	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	12/18/97	PGC/JPP	E.Simonson	P.Corser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

TRIASSIC PARK

WASTE DISPOSAL FACILITY

DRAWING TITLE:

LIQUID WASTE RECEIVING AND STORAGE UNIT LAYOUT

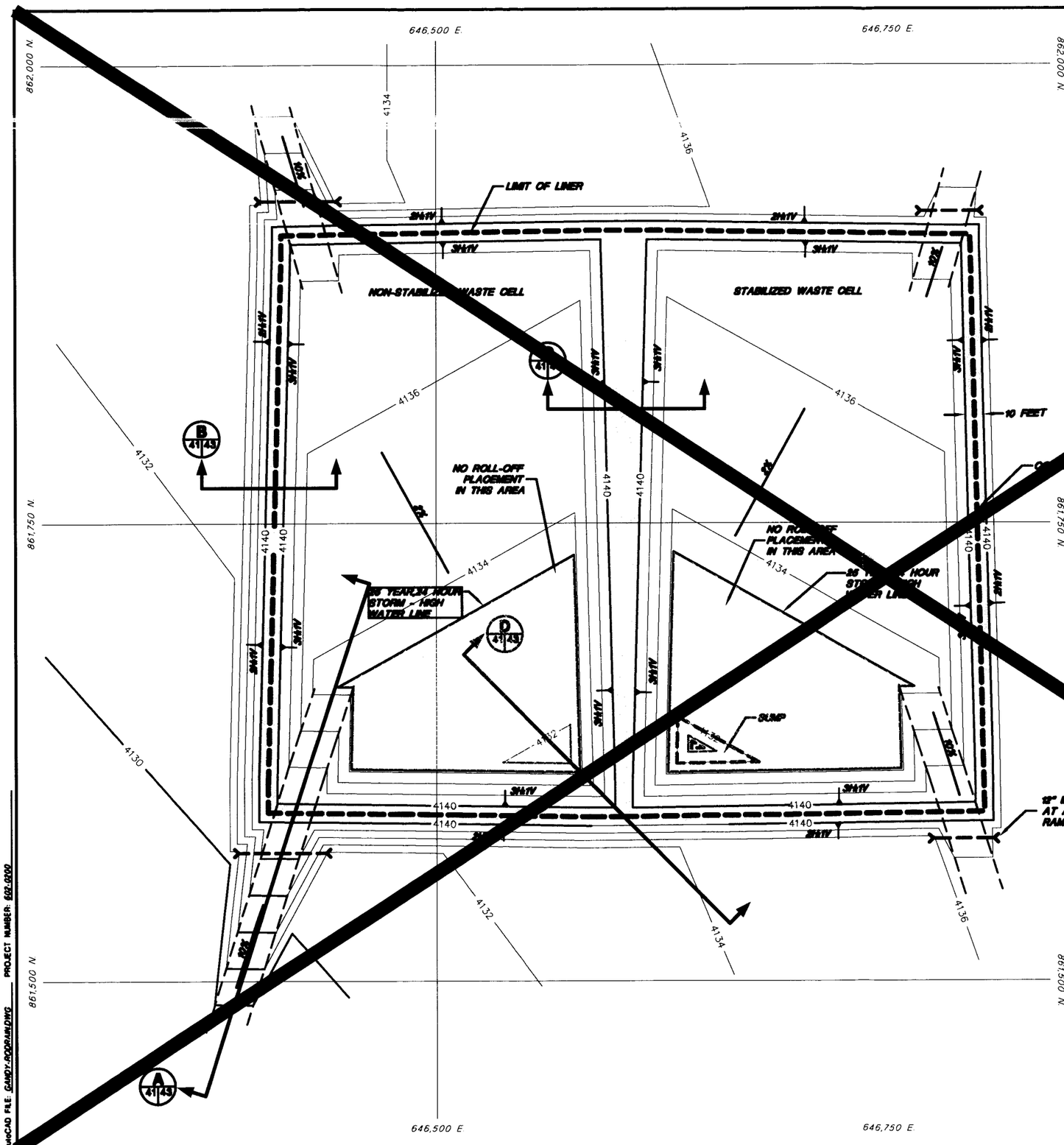
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 of 2 Sheets

SCALE: See Scale Bar

DRAWING NO. 4

AutoCAD FILE: GLF-LWRSF\sheet2 PROJECT NUMBER: 802-0200



NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

Drawing eliminated for 2011 permit renewal.

SCALE
30' 0 30' 60'
CONTOUR INTERVAL 2 FT.

Not For Construction

3	October 2000 Revision	10/1/00	J.Pelliccer	K.Cassata	P.Corser	
2	SEPTEMBER 1999 REVISION	09/01/99	P.Corser	T.Smith	P.Corser	
1	NOVEMBER 1998 REVISION	10/30/98	J.Pelliccer	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.SMITH	P.CORSER	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

PATRICK G. CORSER NEW MEXICO 12260 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12260

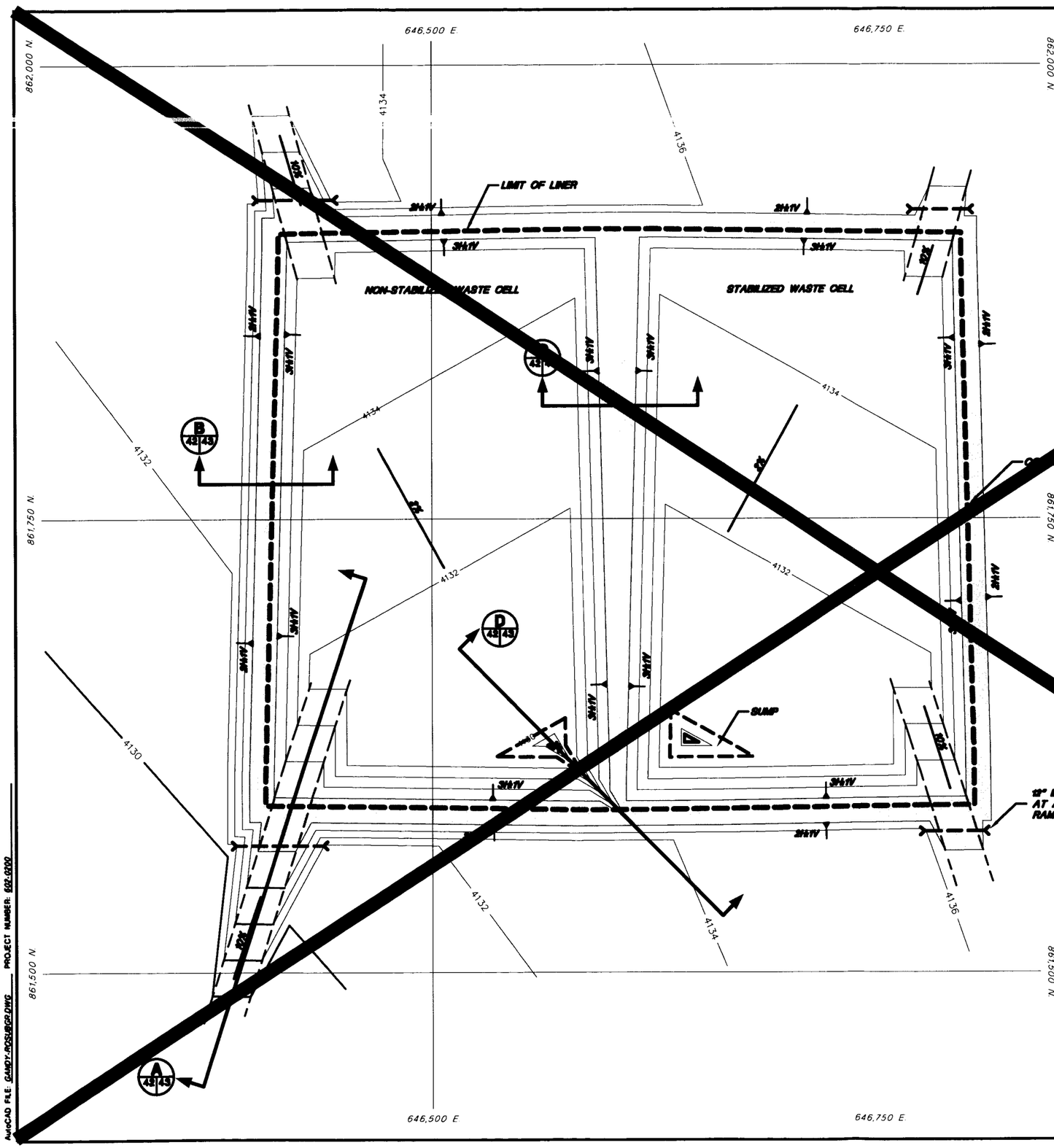
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:
TRUCK ROLL-OFF AREA DRAINAGE SURFACE CONTOURS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 7 of 7 Sheets
SCALE: AS NOTED
DWG. No.

AutoCAD FILE: GAMOY-RODRAW.DWG PROJECT NUMBER: 602-0200



NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

Drawing eliminated for 2011 permit renewal.

N

SCALE

30' 0 30' 60'

CONTOUR INTERVAL 2 FT.

Not For Construction

3	October 2000 Revision	10/4/00	J.Pelicer	K.Cowsh	P.Corser	
2	SEPTEMBER 1999 REVISION	09/01/99	P.Corser	T.Smith	P.Corser	
1	NOVEMBER 1998 REVISION	11/01/98	J.Pelicer	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	T.SMITH	P.CORSER	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12236

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:

TRUCK ROLL-OFF AREA SUBGRADE CONTOURS

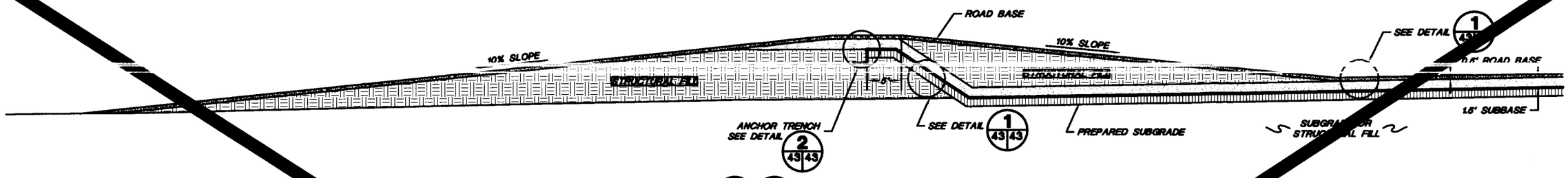
TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 of 1 Sheets

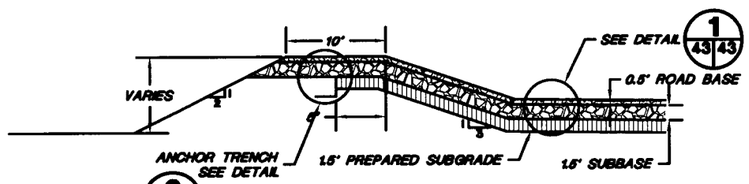
SCALE: AS NOTED

DRAWING No. 4

AutoCAD FILE: GANDY-ROSURGR.DWG PROJECT NUMBER: 602-0200

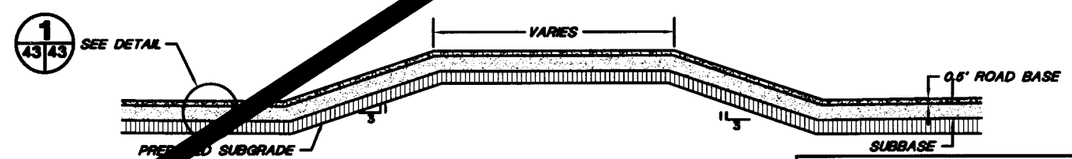


A 41 43 A 42 43 ACCESS ROAD DETAIL



B 41 43 B 42 43 BERM DETAIL

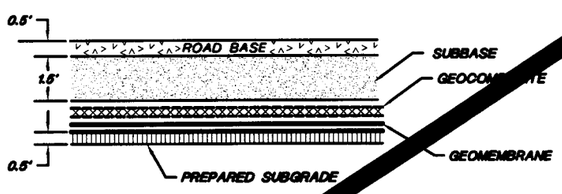
SCALE
0 7.5' 15'
Feet



C 41 43 C 42 43 INNER FACILITY BERM DETAIL

Drawing eliminated for 2011 permit renewal.

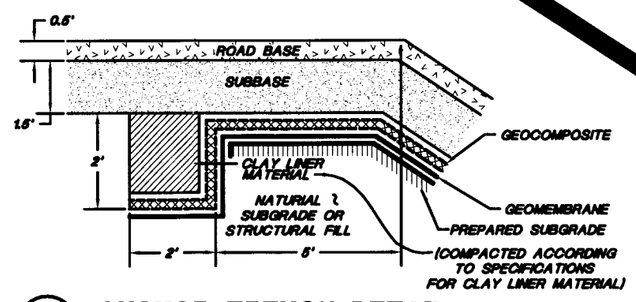
SCALE
0 7.5' 15'
Feet



FLOOR AND SLOPE NON-STABILIZED WASTE CELL LINER & DRAIN CROSS-SECTION

1 43 43

NOT TO SCALE



2 43 43 ANCHOR TRENCH DETAIL

NOT TO SCALE

Not For Construction

2	SEPTEMBER 1999 REVISION	9/99	P.Carser	T.Clark	P.Carser	
1	NOVEMBER 1998 REVISION	11/01/98	J.Pettner	T.Smith	P.Carser	
0	PART B PERMIT APPLICATION	12/18/97	PSC/JPP	T.Smith	P.Carser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

PATRICK G. CARSER NEW MEXICO 12298 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12298

TRIASSIC PARK WASTE DISPOSAL FACILITY

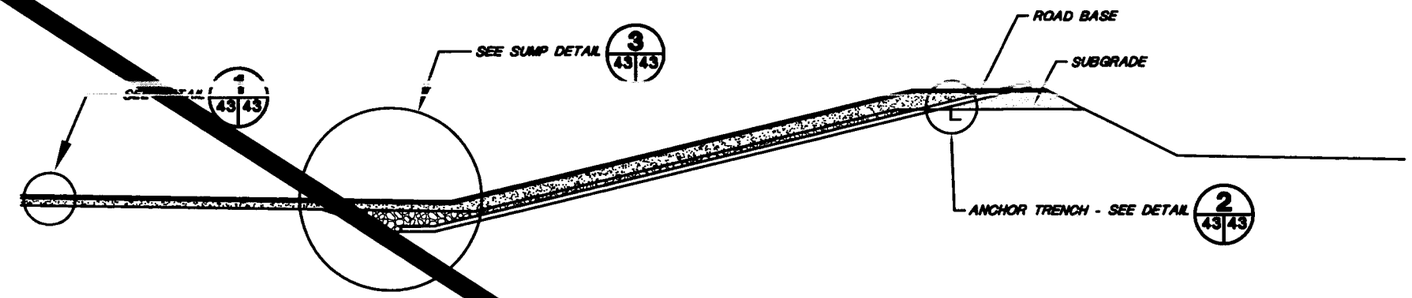
DRAWING TITLE: TRUCK ROLL-OFF AREA LINER DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 of 2 Sheets
SCALE As Shown
DRAWING No. 4

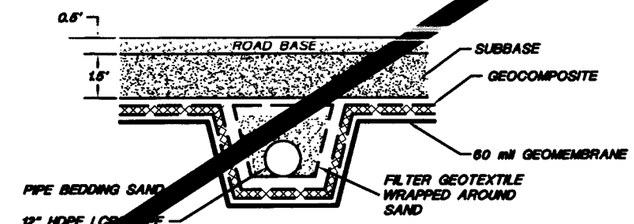
NOTE: FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

AutoCAD FILE: ROLLOFFDTL.DWG PROJECT NUMBER: 602-0300



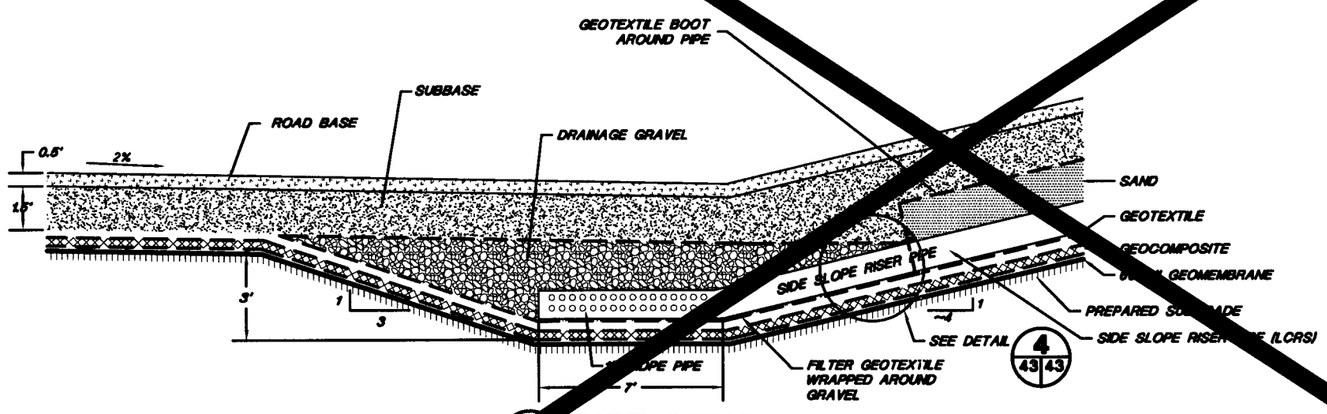
CROSS-SECTION D

SCALE
0 7.5' 15'
Feet



PIPE TRENCH DETAIL

NOT TO SCALE



SUMP DETAIL

SCALE
0 2.5' 5'
Feet

Drawing eliminated for 2011 permit renewal.

Not For Construction

3	October 2000 Revision	10/1/00	J.Pollicar	K.Corcoran	P.Corser	
2	SEPTEMBER 1999 REVISION	9/99	P.Corser	T.Clark	P.Corser	
1	NOVEMBER 1998 REVISION	11/01/98	J.Pollicar	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	12/18/97	PGC/JPP	T.Smith	P.Corser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:
TRUCK ROLL-OFF AREA LINER DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet ___ of ___ Sheets
SCALE: As Shown
Drawing No.

PATRICK G. CORSER
NEW MEXICO
12388
REGISTERED PROFESSIONAL ENGINEER

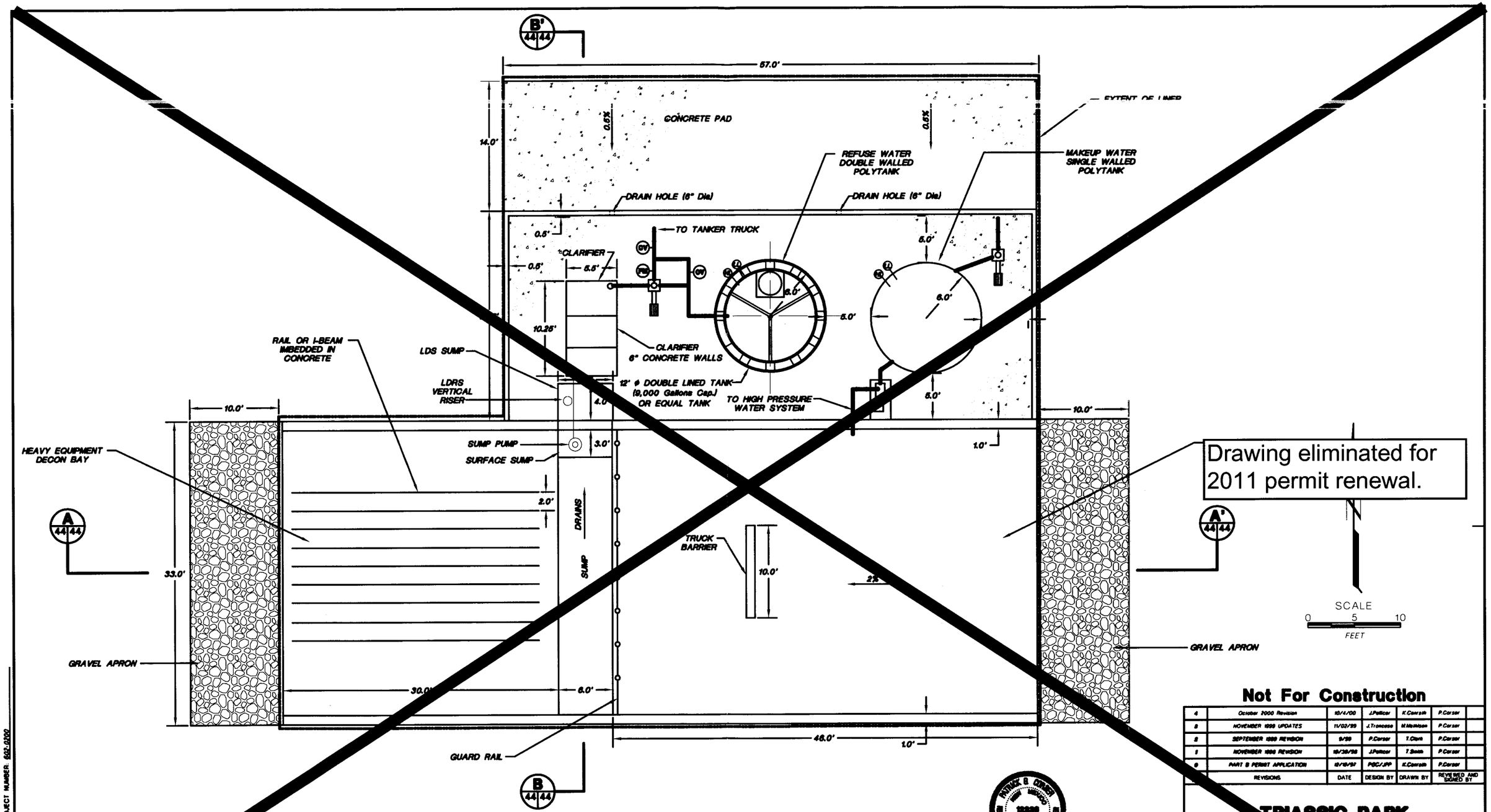
PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Corser, NM P.E. 12388

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

AutoCAD FILE: ROLLOFFDTL2.DWG PROJECT NUMBER: 602-0200



Not For Construction

4	October 2000 Revision	10/4/00	J.Pellicer	K.Cowsill	P.Corser	
3	NOVEMBER 1999 UPDATES	11/02/99	J.Troncoso	M.McMahon	P.Corser	
2	SEPTEMBER 1999 REVISION	9/99	P.Corser	T.Clark	P.Corser	
1	NOVEMBER 1998 REVISION	10/30/98	J.Pellicer	T.Smith	P.Corser	
0	PART B PERMIT APPLICATION	12/18/97	PBC/JPP	K.Cowsill	P.Corser	
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY	

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
TRUCK WASH EMPOUT AND DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet ___ of 2 Sheets
SCALE: Not to Scale
Drawing No. 44

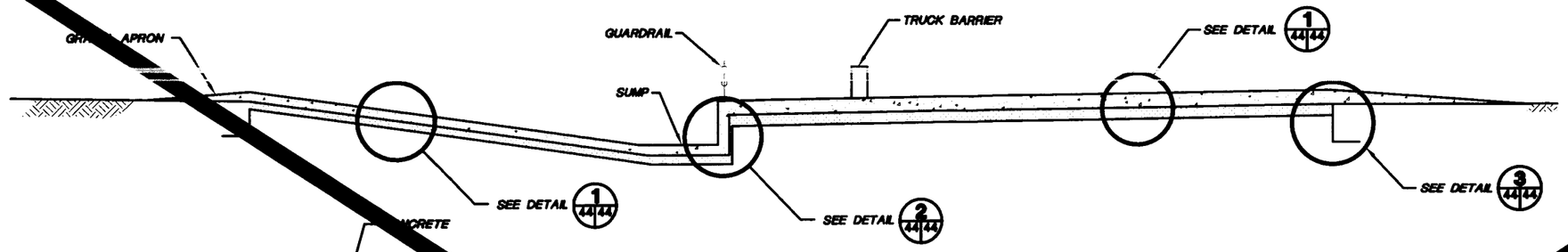
PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick B. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick B. Corser, NM P.E. 12236

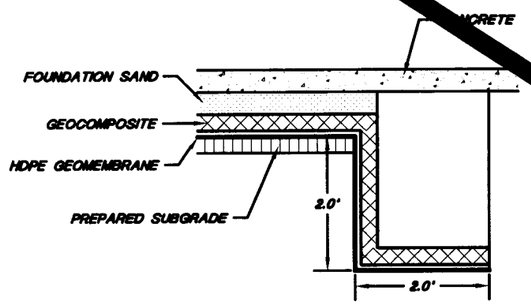
NOTES:
1. FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".
2. FOR CONCRETE DETAILS SEE DRAWING 46.
3. PIPING SYSTEM WILL COMPLY WITH API PUBLICATIONS 1615 (NOVEMBER 1979) OR ANSI STANDARD B31.2 AND ANSI STANDARD B31.4.

AutoCAD FILE: TRKWASHOUT PROJECT NUMBER: 602-0200



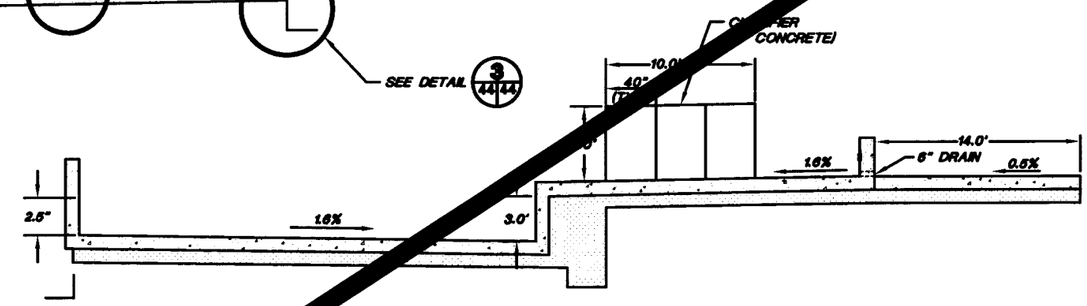
A 44/44 TRUCK WASH CROSS-SECTION

SCALE
0 5 10
FEET



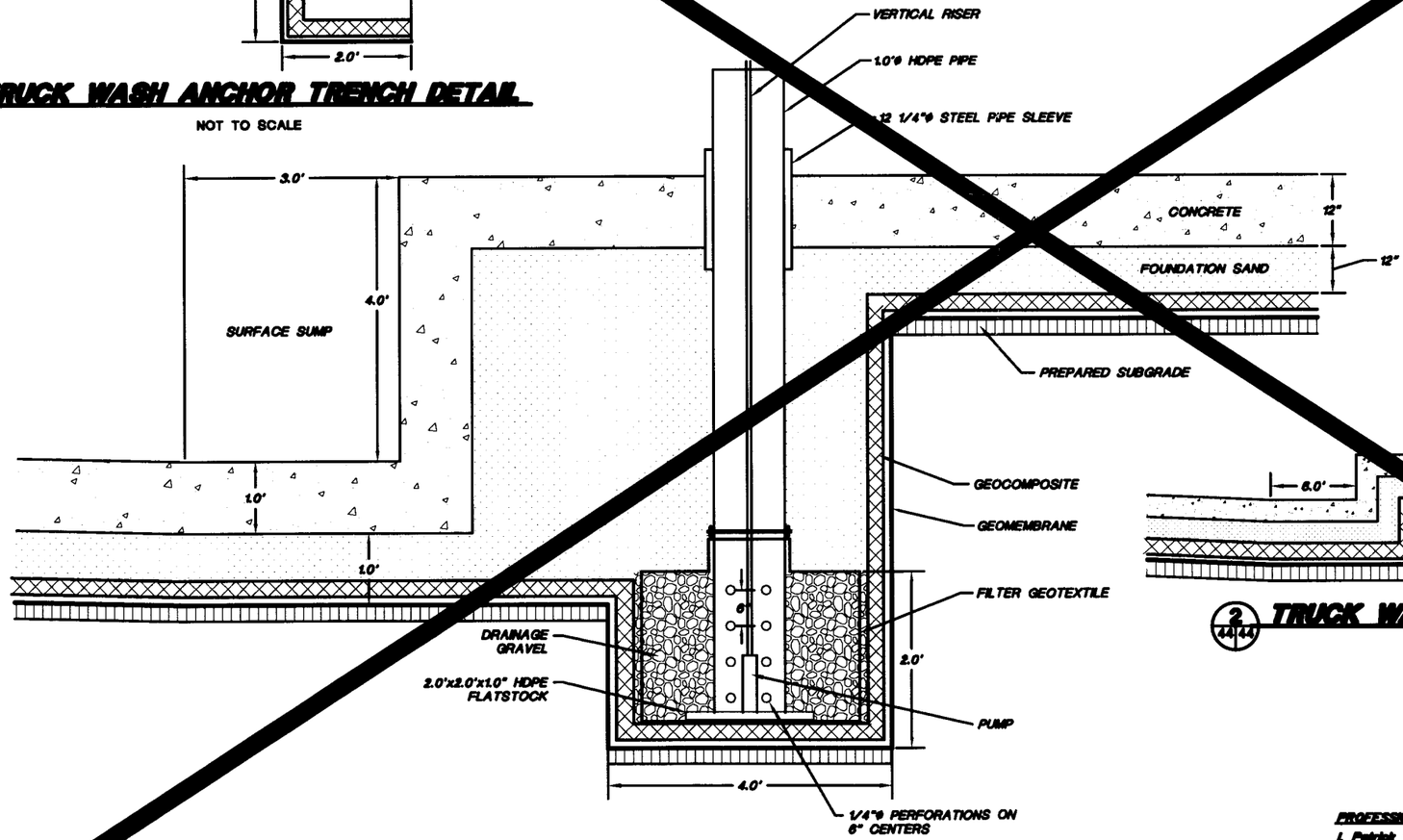
3 44/44 TRUCK WASH ANCHOR TRENCH DETAIL

NOT TO SCALE



B 44/44 TRUCK WASH SUMP CROSS-SECTION

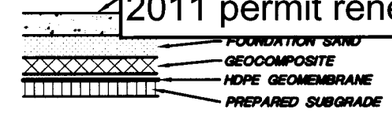
SCALE
0 5 10
FEET



TRUCK WASH LEAK DETECTION SUMP

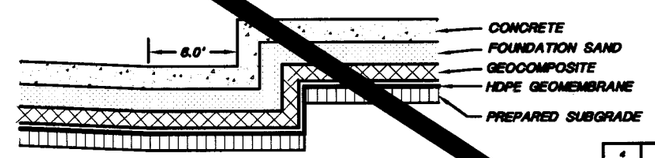
SCALE
0 1 2
FEET

Drawing eliminated for 2011 permit renewal.



1 44/44 TRUCK WASH LINER DETAIL

NOT TO SCALE



2 44/44 TRUCK WASH SUMP DETAIL

NOT TO SCALE

Not For Construction

4	October 2000 Revision	10/4/00	J.Pellicer	K.Cerrath	P.Carser
3	NOVEMBER 1999 UPDATES	11/02/99	J.Trancoso	M.Mattheson	P.Carser
2	SEPTEMBER 1999 REVISION	9/99	P.Carser	T.Clark	P.Carser
1	NOVEMBER 1998 REVISION	10/30/98	J.Pellicer	T.Smith	P.Carser
0	PART B PERMIT APPLICATION	10/10/97	PGC/JPP	K.Cerrath	P.Carser
	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

PATRICK G. CARSER
NEW MEXICO
12336
PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12336

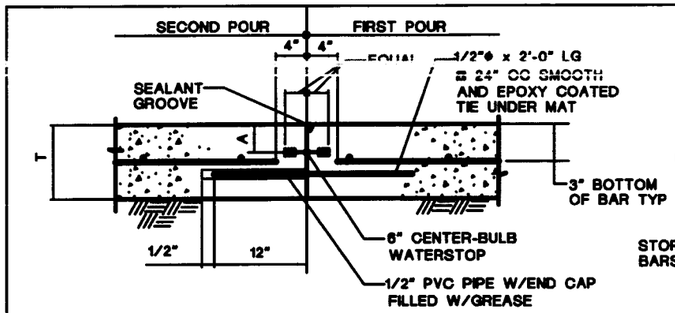
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:
TRUCK WASH LAYOUT AND DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 of 2 Sheets
SCALE: Not to Scale
DRAWING No.

AutoCAD FILE: TRKWSHOTLS.DWG PROJECT NUMBER: 602.0700

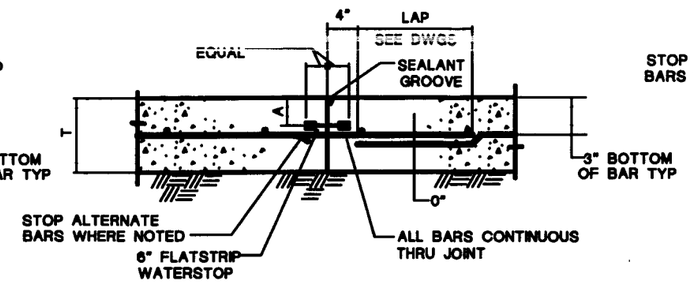


SINGLE MAT REINF - SLEEVE - TYPE JOINT

(TYP CONSTRUCTION JOINT UNLESS OTHERWISE NOTED)

S-110 / - / 45 **WITH WATERSTOP AND SEALANT GROOVE**

S-111 / - / 45 **NO WATERSTOP OR SEALANT GROOVE**

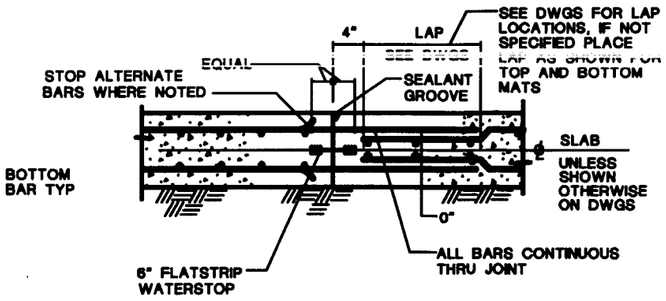


SINGLE MAT REINF - CONTINUOUS THRU JOINT

(ONLY WHEN SPECIFIED ON DRAWINGS)

S-112 / - / 45 **WITH WATERSTOP AND SEALANT GROOVE**

S-113 / - / 45 **NO WATERSTOP OR SEALANT GROOVE**



DOUBLE MAT REINF

S-114 / - / 45 **WITH WATERSTOP AND SEALANT GROOVE**

S-115 / - / 45 **NO WATERSTOP OR SEALANT GROOVE**

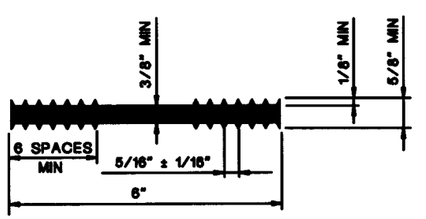
T	A
6"	2"
7"	2 1/2"
8"	2 1/2"

NOTES:

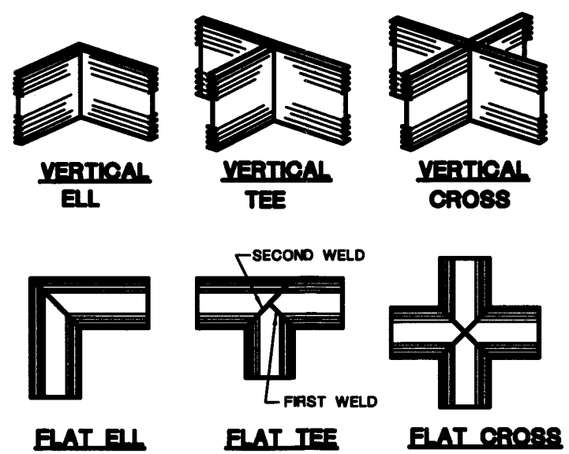
1. IN ALL CONSTRUCTION JOINTS WITH WATERSTOPS, APPLY 2 COATS OF BOND BREAKER TO FACE OF JOINT, AVOID COATING WATERSTOP (AND SEALANT GROOVE WHERE USED)
2. WATERSTOPS AND SEALANT GROOVES TO BE PROVIDED IN ALL WATER RETAINING SLABS, SEE DRAWINGS, FOR OTHER LOCATIONS WHERE THEY MAY BE REQUIRED
3. STAGGER SPLICES UNLESS NOTED OTHERWISE

SLAB-ON-GRADE CONSTRUCTION JOINTS

REV 011696



S-108 / 45 **6" FLATSTRIP WATERSTOP**



S-108 / 45 **PREFABRICATED WATERSTOPS JOINTS**

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

PATRICK G. CARSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented herein is true and correct to the best of my knowledge and information.

Date *Patrick G. Carser, NM P.E. 12236*

DETAIL/SECTION NUMBER — A / 6 6

DRAWING No. WHERE DETAIL/SECTION IS REFERENCED

DRAWING No. WHERE DETAIL/SECTION IS SHOWN

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	October 2000 Revision	10/4/00	J.Potter	K.Conrath	P.Carser
0	PART B PERMIT APPLICATION	10/16/97	PGC/JPP	J.BEVER	P.CORSER

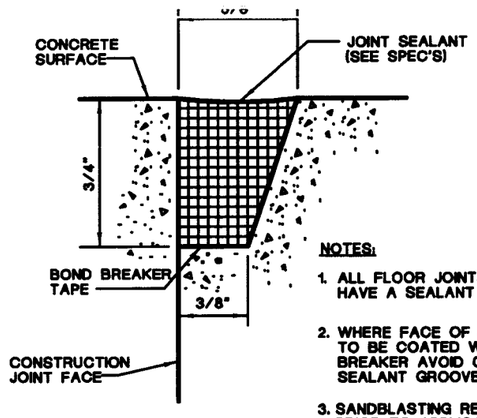
TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
CONCRETE AND GRATING DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 1 Of 6 Sheets
SCALE: AS NOTED
DRAWING No. 45

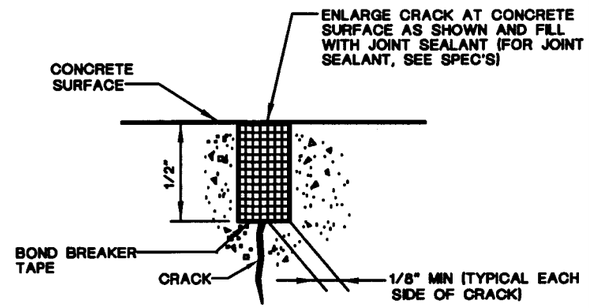
AutoCAD FILE: CONC-DTLS-MJ.DWG PROJECT NUMBER: 602-0200



NOTES:

1. ALL FLOOR JOINTS SHALL HAVE A SEALANT GROOVE
2. WHERE FACE OF JOINT IS TO BE COATED WITH BOND BREAKER AVOID COATING SEALANT GROOVE
3. SANDBLASTING REQUIRED PRIOR TO APPLICATION OF PRIMER
4. USE BONDBREAKER TAPE ONLY ON SLIP DOWEL JOINTS

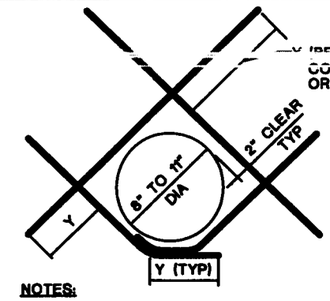
S-131 / 45 SEALANT GROOVE



NOTE:

PRIOR TO USE, STRUCTURES SHALL HAVE ALL CRACKS REPAIRED AS SHOWN IN THIS DETAIL

S-132 / 45 CONCRETE CRACK REPAIR



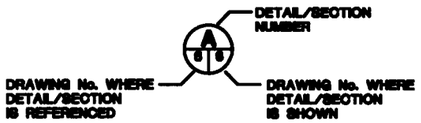
BAR SIZE	Y
	GRADE 60
No.4	15"
No.5	21"
No.6	24"
No.7	27"
No.8	36"
No.9	42"

NOTES:

1. CUT NORMAL REINFORCEMENT 2" CLEAR OF OPENING
2. DIAGONAL BARS TO BE PLACED:
   A) AT CENTERLINE OF WALL OR SLAB WHERE ONE LAYER OF REINFORCEMENT IS PROVIDED
   B) AT EACH FACE OF WALL OR SLAB WHERE TWO LAYERS OF REINFORCEMENT ARE PROVIDED
3. UNLESS OTHERWISE NOTED, SIZE OF DIAGONAL BARS SHALL BE THE SIZE OF THE LARGEST NORMAL REINFORCING BAR CUT
4. THIS DETAIL TO BE USED ONLY WHEN CALLED FOR ON THE DRAWINGS OR WHEN NO OTHER DETAIL IS SPECIFIED

S-142 / 45 DIAGONAL REINFORCEMENT AT CIRCULAR OPENINGS (8" - 11" DIA)

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".



Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	October 2000 Revision	10/11/00	J.Potter	K.Corsch	P.Corser
0	PART B PERMIT APPLICATION	10/15/97	PSC/JPP	J.BEVER	P.CORSER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date _____ *Patrick G. Corser, NM P.E. 12236*

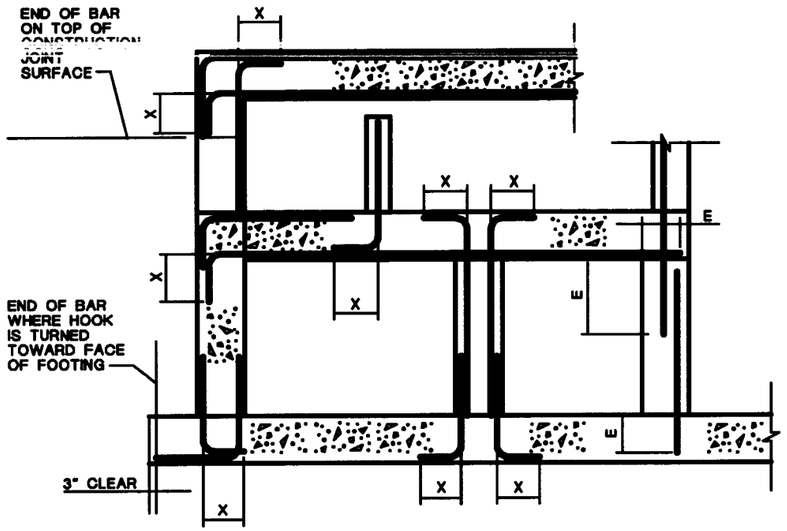
TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE:
CONCRETE AND GRATING DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 2 Of 6 Sheets
SCALE: AS NOTED
DRAWING No. 45

AutoCAD FILE: CONC-DTLS-B.DWG PROJECT NUMBER: 682-0000



SECTION

LENGTH (INCHES)			
BAR SIZE	HOOK X	LAP	EMBEDMENT E
No.3	6"	18"	12"
No.4	8"	18"	14"
No.5	10"	23"	18"
No.6	12"	28"	22"
No.7	14"	33"	26"
No.8	16"	SEE TABLE BELOW	SEE TABLE BELOW
No.9	19"		
No.10	22"		
No.11	24"		

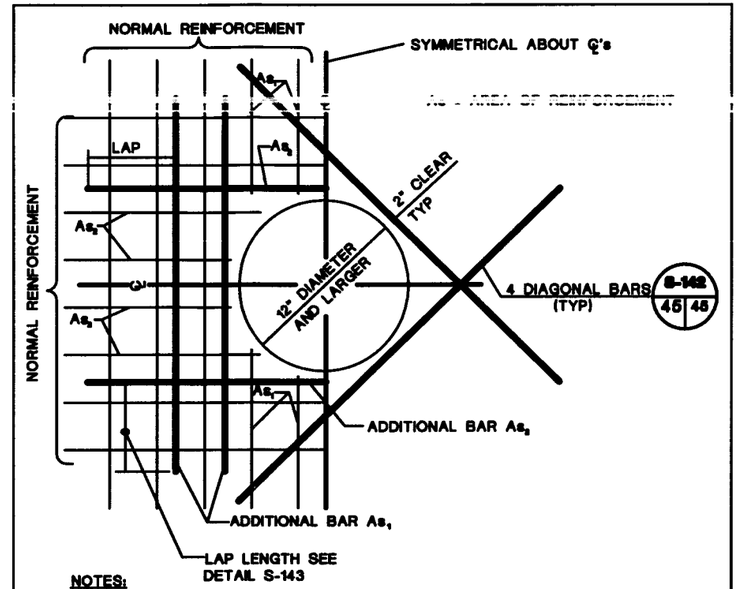
LENGTH (INCHES)						
REBAR SIZE	FOR 1" TO < 2" CONCRETE COVER		FOR 2" TO < 3" CONCRETE COVER		FOR 3" AND LARGER CONCRETE COVER	
	REBAR SPACING (CENTER TO CENTER)		REBAR SPACING (CENTER TO CENTER)		REBAR SPACING (CENTER TO CENTER)	
	< 6"	≥ 6"	< 6"	≥ 6"	< 6"	≥ 6"
LAP						
No.8	62"	62"	37"	37"	37"	37"
No.9	99"	79"	69"	55"	49"	42"
No.10	125"	100"	88"	70"	63"	50"
No.11	154"	123"	108"	86"	77"	62"
EMBEDMENT E						
No.8	48"	48"	29"	29"	29"	29"
No.9	77"	61"	54"	43"	38"	33"
No.10	97"	77"	68"	54"	49"	39"
No.11	119"	95"	84"	67"	60"	48"

NOTES:

1. USE LAP LENGTHS AS DETERMINED FROM THESE TABLES UNLESS SHOWN OTHERWISE
2. THE TABLES SHOWN ARE FOR f'C=4000 PSI AND fy=60,000 PS1
3. MULTIPLY THE LAP & E SHOWN IN THESE TABLES BY 1.3 FOR WALL HORIZONTAL REBARS AND SLAB BARS WITH 12" OR MORE FRESH CONCRETE UNDERNEATH
4. WHEN BARS OF DIFFERENT SIZE ARE LAP SPLICED, LAP LENGTH SHALL BE THE LARGER OF:
   EMBEDMENT LENGTH OF LARGER BAR
   LAP LENGTH OF SMALLER BAR
5. UNLESS NOTED OTHERWISE USE REBAR COUPLERS FOR SPLICES OF No.11 AND LARGER BARS
6. ALL DOWEL BARS SHALL EXTEND AN EMBEDMENT LENGTH E INTO ANOTHER MEMBER OR ACROSS A CONSTRUCTION JOINT UNLESS SHOWN TO SPLICE WITH OTHER BARS OR TO EXTEND TO THE FAR FACE OF THE MEMBER AND END WITH A STANDARD HOOK

S-143 / - / 45 **STANDARD 90° BAR HOOKS, EMBEDMENT LENGTHS AND LAP LENGTHS**

UNLESS OTHERWISE NOTED ON DRAWINGS



NOTES:

1. CUT NORMAL REINFORCEMENT AT OPENINGS:
   As1 AND As2 = 1/2 AREA OF CUT BARS TO BE ADDED ON EACH SIDE OF OPENING
2. ADDITIONAL BARS As1 AND As2 TO BE PLACED:
   A) AT CENTERLINE OF WALLS OR SLABS WHERE ONE LAYER OF REINFORCEMENT IS PROVIDED
   B) AT EACH FACE OF WALLS OR SLABS WHERE TWO LAYERS OF REINFORCEMENT ARE PROVIDED
3. INCREASE SIZE OF ADDITIONAL BARS AS NEEDED TO FIT WITHIN A DISTANCE OF 2 X WALL/SLAB THICKNESS FROM OPENING, PROVIDE 2" MIN CLEAR BETWEEN BARS
4. THIS DETAIL TO BE USED ONLY WHEN NO OTHER DETAIL IS INDICATED ON THE DRAWINGS
5. WHERE A SLAB OR INTERSECTING WALL CONNECTS WITHIN ONE WALL THICKNESS OF THE OPENING, ADDITIONAL BARS ON THAT SIDE MAY BE OMITTED

S-144 / - / 45 **ADDITIONAL REINFORCEMENT AT CIRCULAR OPENINGS (12" DIA OR LARGER)**

Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	October 2000 Revisions	10/4/00	J.Pelliser	K.Cameth	P.Corser
0	PART B PERMIT APPLICATION	10/10/91	PGC/JPP	J.SEVER	P.CORSER

PATRICK G. CORSER, NEW MEXICO, 12236, REGISTERED PROFESSIONAL ENGINEER

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: ***CONCRETE AND GRATING DETAILS***

TerraMatrix MONTGOMERY WATSON Mining Group

Sheet 3 Of 6 Sheets

SCALE: AS NOTED

DRAWING No. 45

PROFESSIONAL ENGINEER'S STATEMENT

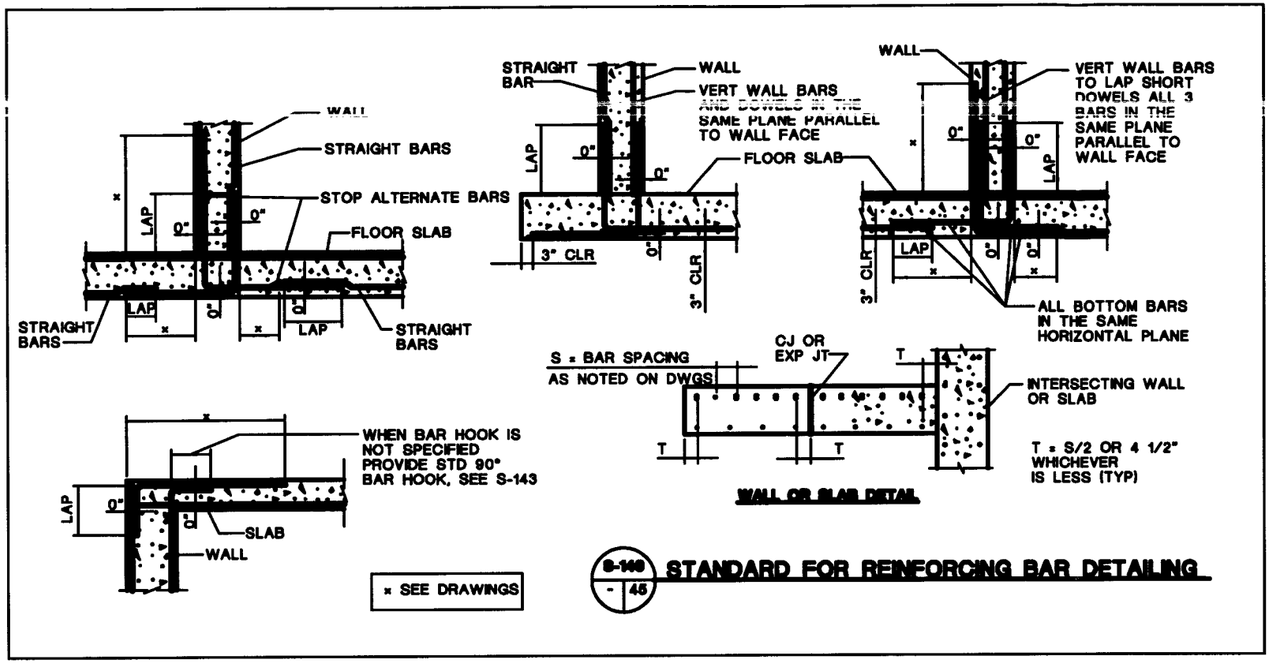
I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Corser, NM P.E. 12236*

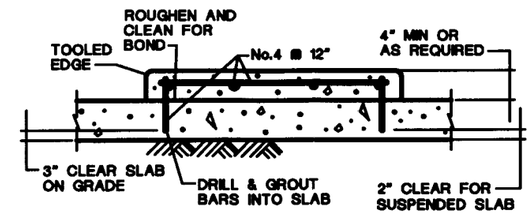
NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

A / 6 / 6
DETAIL/SECTION NUMBER
DRAWING No. WHERE DETAIL/SECTION IS REFERENCED
DRAWING No. WHERE DETAIL/SECTION IS SHOWN

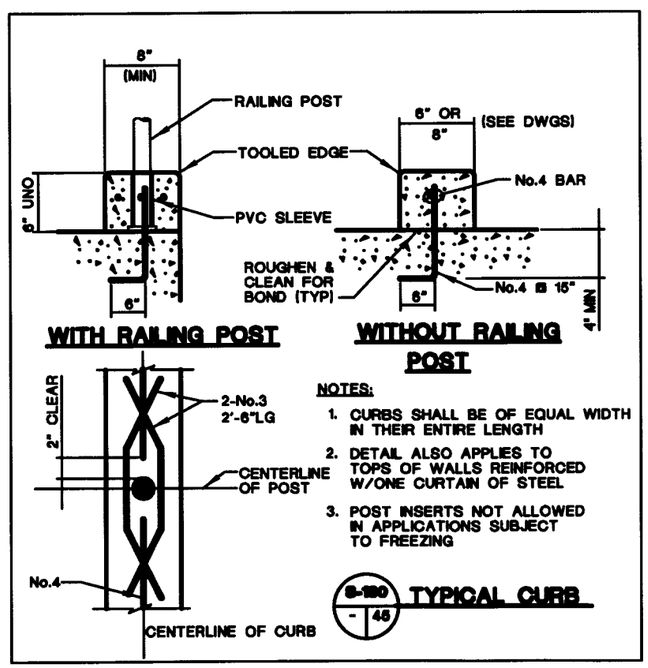
AutoCAD FILE: CONC-DTLS-6.DWG PROJECT NUMBER: 692-0200



S-140 / 45 STANDARD FOR REINFORCING BAR DETAILING



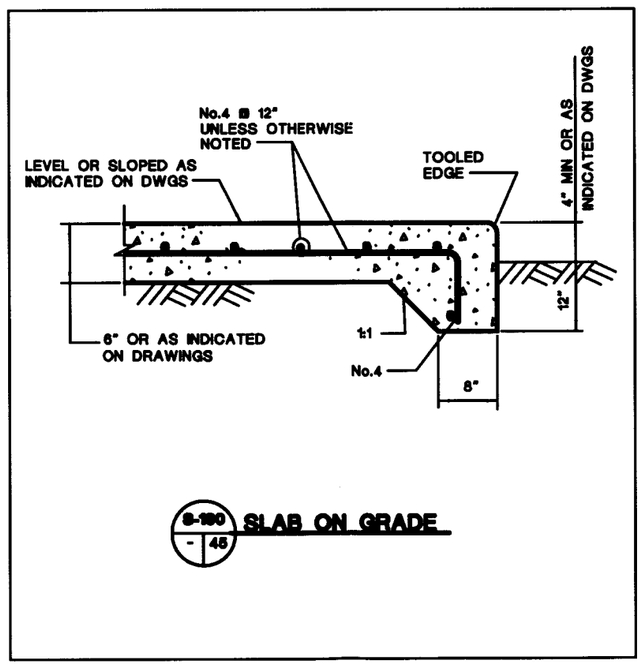
S-191 / 45 HOUSEKEEPING PAD



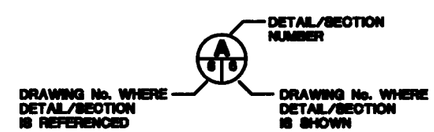
NOTES:

1. CURBS SHALL BE OF EQUAL WIDTH IN THEIR ENTIRE LENGTH
2. DETAIL ALSO APPLIES TO TOPS OF WALLS REINFORCED W/ONE CURTAIN OF STEEL
3. POST INSERTS NOT ALLOWED IN APPLICATIONS SUBJECT TO FREEZING

S-190 / 45 TYPICAL CURB



S-190 / 45 SLAB ON GRADE



Not For Construction

REV No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
1	October 2000 Revision	10/4/00	J.Pelliser	K.Cornish	P.Corser
0	PART B PERMIT APPLICATION	10/15/97	PGC/JPP	JBEWER	P.CORSER

PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Corser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date *Patrick G. Corser, NM P.E. 12236*

PATRICK G. CORSER NEW MEXICO 12236 REGISTERED PROFESSIONAL ENGINEER

TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: ***CONCRETE AND GRATING DETAILS***

TerraMatrix MONTGOMERY WATSON Mining Group

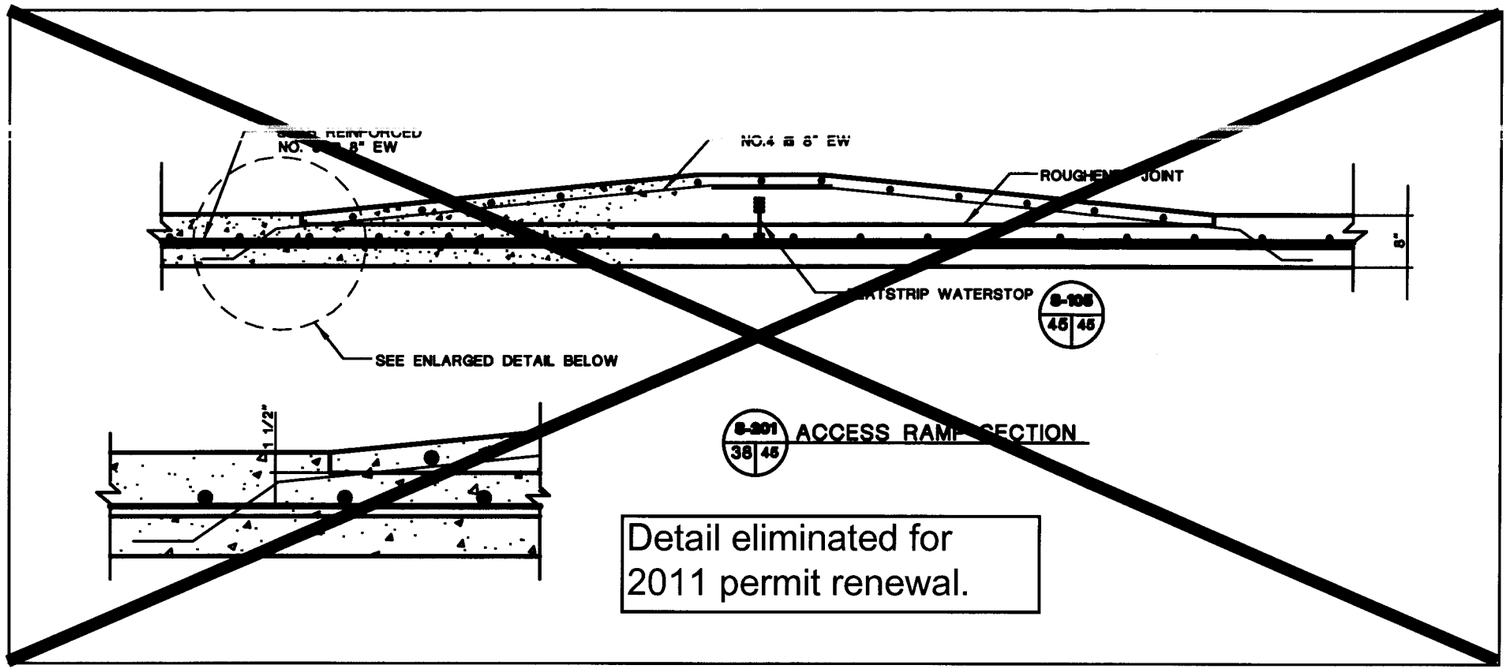
Sheet 4 Of 5 Sheets

SCALE: AS NOTED

DRAWING No. 45

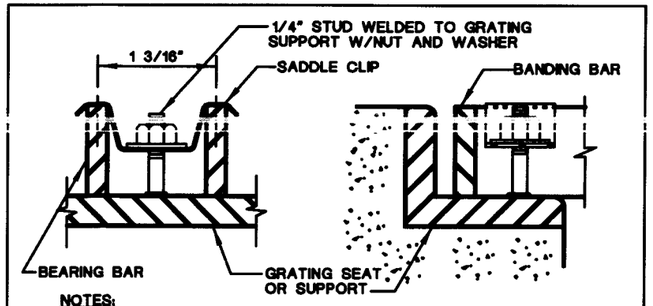
NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".

AutoCAD FILE: CONC-DTLS-SQ.DWG PROJECT NUMBER: 502-0200



ACCESS RAMP SECTION

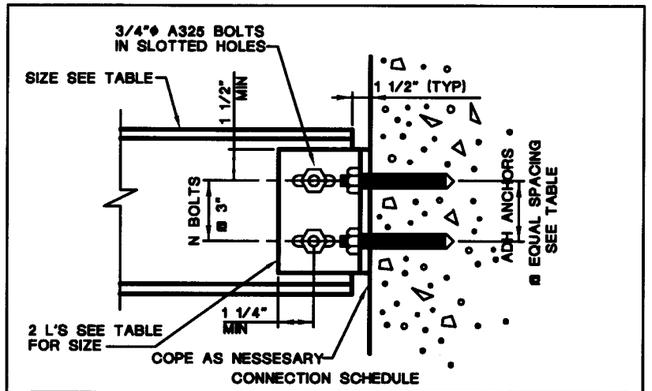
Detail eliminated for 2011 permit renewal.



NOTES:

1. PROVIDE 4 CLIPS PER GRATING PANEL, APPROX 4" FROM PANEL CORNERS. MAXIMUM CLIP SPACING AT 36" OC
2. STUD, NUT, WASHER AND CLIP TO BE THE SAME MATERIAL AS THE GRATING EXCEPT FOR ALUMINUM USE SS

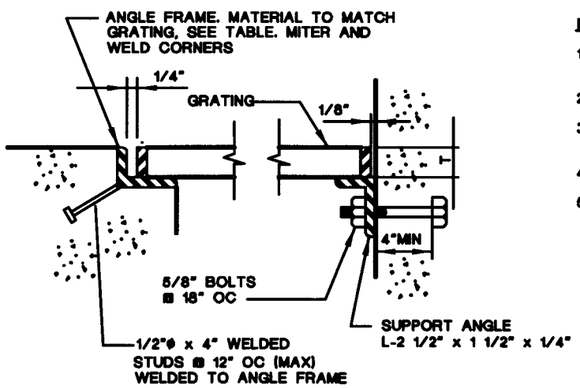
S-517 - 45 GRATING ANCHOR DETAIL



CONNECTION SCHEDULE

BEAM SIZE	ANGLE SIZE	NO. OF BOLTS (N)	ADHESIVE ANCHORS NUMBER AND SIZE
W8	3 1/2 x 3 1/2 x 3/8	2	2 - 3/4" ϕ @ 6"

S-503 - 45 BEAM TO CONCRETE CONNECTION



NOTES:

1. GRATING DEPTH TO BE DETERMINED BY MANUFACTURER AND APPROVED BY ENGINEER (UNO)
2. ALL ENDS AND OPENINGS SHALL BE BANDED
3. ALL GRATING SHALL BE SECURED IN PLACE WITH REMOVABLE FASTENERS, SEE DETAIL S-517
4. GRATING SHALL BE DESIGNED FOR A 5-TON FORKLIFT LOAD
5. BEARING BARS SHALL BE DEPTH T x 3/16" @ 1 3/16" OC CROSS BARS SHALL BE @ 4" OC

S-502 - 45 GALVANIZED STEEL GRATING

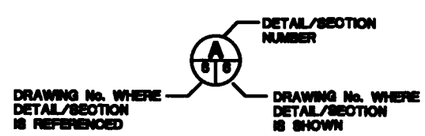
USE STEEL ANGLE SUPPORTS AND BOLTS GALVANIZE AFTER FABRICATION

GRATING FRAME TABLE

GRATING DEPTH T	FRAME ANGLE	GRATING DEPTH T	FRAME ANGLE
1"	1 3/4 x 1 1/4 x 1/4	2"	*2 1/2 x 2 1/2 x 1/2
1 1/4"	2 x 1 1/2 x 1/4	2 1/4"	2 1/2 x 2 1/2 x 1/4
1 1/2"	1 3/4 x 1 3/4 x 1/4	2 1/2"	3 x 2 1/2 x 1/2
1 3/4"	2 x 2 x 1/4		

* OR USE 2 1/2 x 2 1/2 x 1/4 WITH 1/4" SHIM PLATE WELDED TO BOTTOM

NOTE:
FOR GENERAL NOTES AND LEGEND INFORMATION SEE DRAWING No. 2, "INDEX, LEGEND AND GENERAL NOTES".



PROFESSIONAL ENGINEER'S STATEMENT

I, Patrick G. Carser, state that this drawing was prepared under my supervision and all the information presented hereon is true and correct to the best of my knowledge and information.

Date Patrick G. Carser, NM P.E. 12236

Not For Construction

REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY
2	October 2000 Revision	10/4/00	J.Pelitzer	K.Conrath	P.Carser
1	NOVEMBER 1999 UPDATES	11/02/99	J.Trancoso	M.Mbamiego	P.Carser
0	PART B PERMIT APPLICATION	12/12/97	PGC/JPP	JSEVER	P.CORSER

TRIASSIC PARK
WASTE DISPOSAL FACILITY

DRAWING TITLE:
CONCRETE AND GRATING DETAILS

TerraMatrix
MONTGOMERY WATSON
Mining Group

Sheet 6 Of 6 Sheets
SCALE: AS NOTED
DRAWING No. 45

AutoCAD FILE: CONC-DTLS-E.DWG PROJECT NUMBER: 602-0200