RCRA Permit Application for the Triassic Park Waste Disposal Facility

NOV 1994
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HAZARDOUS WASTE
PROGRAM

November 1994

Prepared For:

Gandy Marley, Inc.
Tatum, New Mexico 88267

Prepared By:

The S.M. Stoller Corporation
314 W. Mermod, Suite 102
Carlsbad, New Mexico 88220

Gandy Marley, Inc.
Triassic Park Waste Disposal Facility
Certification of Permit Application

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 be 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.

Dale Gandy 11-17-94

Signature Date

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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
CQA	Construction Quality Assurance
DOT	U.S. Department of Transportation
EC	emergency coordinator
EPA	U.S. Environmental Protection Agency
HAS	health and safety
HDPE	high-density polyethylene
HELP	Hydrological Evaluation of Landfill Performance
HSWA	Hazardous and Solid Waste Amendments
LCRS	leachate collection and removal system
LDR	Land Disposal Restrictions
LDS	leak detection 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
OCD	Oil Conservation Division
OJT	on-the-job training
ONA	Outstanding Natural Area
OSHA	Occupational Safety and Health Administration
PA	public address
PMO	preventive maintenance order
PPE	personal protective equipment
PQL	practical quantitation limit
QA/QC	quality assurance/quality control

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 solid
TOC	total organic carbon
USGS	U.S. Geological Survey

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Form Approved. OMB No. 2050-0034 Expires 12-31-91
GSA No. 0246-EPA-OT

For EPA Regional Use Only

Date Received
Month Day Year

EPA
United States Environmental Protection Agency
Washington, DC 20460

Hazardous Waste Permit Application Part A

(Read the Instructions before starting)

For State Use Only

I. ID Number(s)

A. EPA ID Number

B. Secondary ID Number *(if applicable)*

II. Name of Facility

TRIASSIC PARK WASTE DISPOSAL

III. Facility Location *(Physical address not P.O. Box or Route Number)*

A. Street

US HWY 380

Street *(continued)*

36 MILES W OF TATUM

City or Town: TATUM
State: NM
ZIP Code: 88267-

County Code *(if known)*
County Name: CHAVES

B. Land Type *(enter code)*: P

C. Geographic Location
LATITUDE *(degrees, minutes, & seconds)*: 33 22 000
LONGITUDE *(degrees, minutes, & seconds)*: 103 51 000

D. Facility Existence Date
Month Day Year: 1997

IV. Facility Mailing Address

Street or P.O. Box: 1109 EAST BROADWAY

City or Town: TATUM
State: NM
ZIP Code: 88267-

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(last)*: GANDY
(first): LARRY

Job Title: VICE PRESIDENT
Phone Number *(area code and number)*: 505-398-4960

VI. Facility Contact Address *(See instructions)*

A. Contact Address
Location: [ ]
Mailing: [X]

B. Street or P.O. Box:

City or Town:
State:
ZIP Code: -

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GANDY MARLEY INC.

1109 EAST BROADWAY

TATUM NM 88267-

505-398-4960 P

GANDY MARLEY INC.

1109 EAST BROADWAY

TATUM NM 88267-

505-398-4960 P

4953	(description) REFUSE SYSTEMS	(description) NA
4226	(description) SPECIAL WAREHOUSING & STORAGE	(description) NA

NA

The Triassic Park Waste Disposal Facility will accept RCRA hazardous wastes and TSCA PCB wastes from off-site generators for treatment and permanent disposal. Temporary on-site storage in containers and tanks is provided prior to treatment and disposal.

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	DISPOSAL:	
D79	INJECTION WELL	GALLONS; LITERS; GALLONS PER DAY; OR LITERS PER DAY
D80	LANDFILL	ACRE-FEET OR HECTARE-METER
D81	LAND APPLICATION	ACRES OR HECTARES
D82	OCEAN DISPOSAL	GALLONS PER DAY OR LITERS PER DAY
D83	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	STORAGE:	
S01	CONTAINER (barrel, drum, etc.)	GALLONS OR LITERS
S02	TANK	GALLONS OR LITERS
S03	WASTE PILE	CUBIC YARDS OR CUBIC METERS
S04	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	TREATMENT:	
T01	TANK	GALLONS PER DAY OR LITERS PER DAY
T02	SURFACE IMPOUNDMENT	GALLONS PER DAY OR LITERS PER DAY
T03	INCINERATOR	SHORT TONS PER HOUR; METRIC TONS PER HOUR; GALLONS PER HOUR; LITERS PER HOUR; OR BTU'S PER HOUR
T04	OTHER TREATMENT (Use for physical, chemical, thermal or biolgical treatment processes not occurring in tanks, surface impoundment or incinerators. Describe the processes in the space provided in Item XIII.)	GALLONS PER DAY; LITERS PER DAY; POUNDS PER HOUR; SHORT TONS PER HOUR; KILOGRAMS PER HOUR; METRIC TONS PER DAY; METRIC TONS PER HOUR; OR SHORT TONS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
GALLONS PER HOUR	E
GALLONS PER DAY	U
LITERS	L
LITERS PER HOUR	H
LITERS PER DAY	V
SHORT TONS PER HOUR	D
METRIC TONS PER HOUR	W
SHORT TONS PER DAY	N
METRIC TONS PER DAY	S
POUNDS PER HOUR	J
KILOGRAMS PER HOUR	R
CUBIC YARDS	Y
CUBIC METERS	C
ACRES	B
ACRE-FEET	A
HECTARES	Q
HECTARE-METER	F
BTU's PER HOUR	K

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EPA I.D. Number *(enter from page 1)* | Secondary ID Number *(enter from page 1)*

XII. Process - Codes and Design Capacities *(continued)*

EXAMPLE FOR COMPLETING ITEM XII (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line Number		A. PROCESS CODE (from list above)			B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBER OF UNITS			FOR OFFICIAL USE ONLY
X	1	S	0	2	600	G	0	0	2	
X	2	T	0	3	20	E	0	0	1	
	1	D	8	0	8,000,000	Y	0	0	1	
	2	T	0	2	3,500,000	G	0	0	1	
	3	S	0	1	239,000	G	0	0	2	
	4	S	0	2	72,000	G	0	0	4	
	5	T	0	1	121,200	U	0	0	4	
	6									
	7									
	8									
	9									
1	0									
1	1									
1	2									

NOTE: If you need to list more than 12 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for additional treatment processes in Item XIII.

XIII. Additional Treatment Processes *(follow instructions from Item XII)*

Line Number (enter numbers in sequence with Item XII)	A. PROCESS CODE	B. TREATMENT PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	B. TREATMENT PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBER OF UNITS	D. DESCRIPTION OF PROCESS
	T 0 4	NA			
	T 0 4				
	T 0 4				
	T 0 4				

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EPA I.D. Number *(enter from page 1)*	Secondary ID Number *(enter from page 1)*

XIV. Description of Hazardous Wastes

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 column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column 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 column 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 column A select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in Item XII 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 processes 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 XIV-D(1).*
3. *Enter in the space provided on page 7, Item XIV-E, the line number and the additional code(s).*

2. **PROCESS DESCRIPTION:** *If a code is not listed for a process that will be used, describe the process in the space provided on the form (D.(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 column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.*
2. *In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column 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 XIV (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 operation. 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 HAZARD WASTE NO. (enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESS (1) PROCESS CODES (enter)									D. PROCESS (2) PROCESS DESCRIPTION (If a code is not entered in 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

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I. EPA ID Number (enter from page 1)												Secondary ID Number (enter from page 1)											

IX. Description of Hazardous Waste (continued)

Line Number	A. EPA Hazardous Waste No. (enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (enter code)	D. Processes (1) Process Codes (enter)									(2) Process Description (if a code is not entered in D(1))
1	D series	421,200	T	D	8	0	T	0	1	0	0	0	
2	F series												included with above, excluding F020,021,022,023,026,027
3	K series												included with above
4	P series												included with above
5	U series												included with above
6													
7													
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EPA I.D. Number *(enter from page 1)*	Secondary ID Number *(enter from page 1)*

XIV. Description of Hazardous Waste *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 6.

Line Number	Additional Process Codes (enter)
1	S01 S02 T02

XV. Map

Attach to this application a topographic 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 and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

XVI. Facility Drawing

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

XVII. 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). NA

XVIII. Certification(s)

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 be 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.

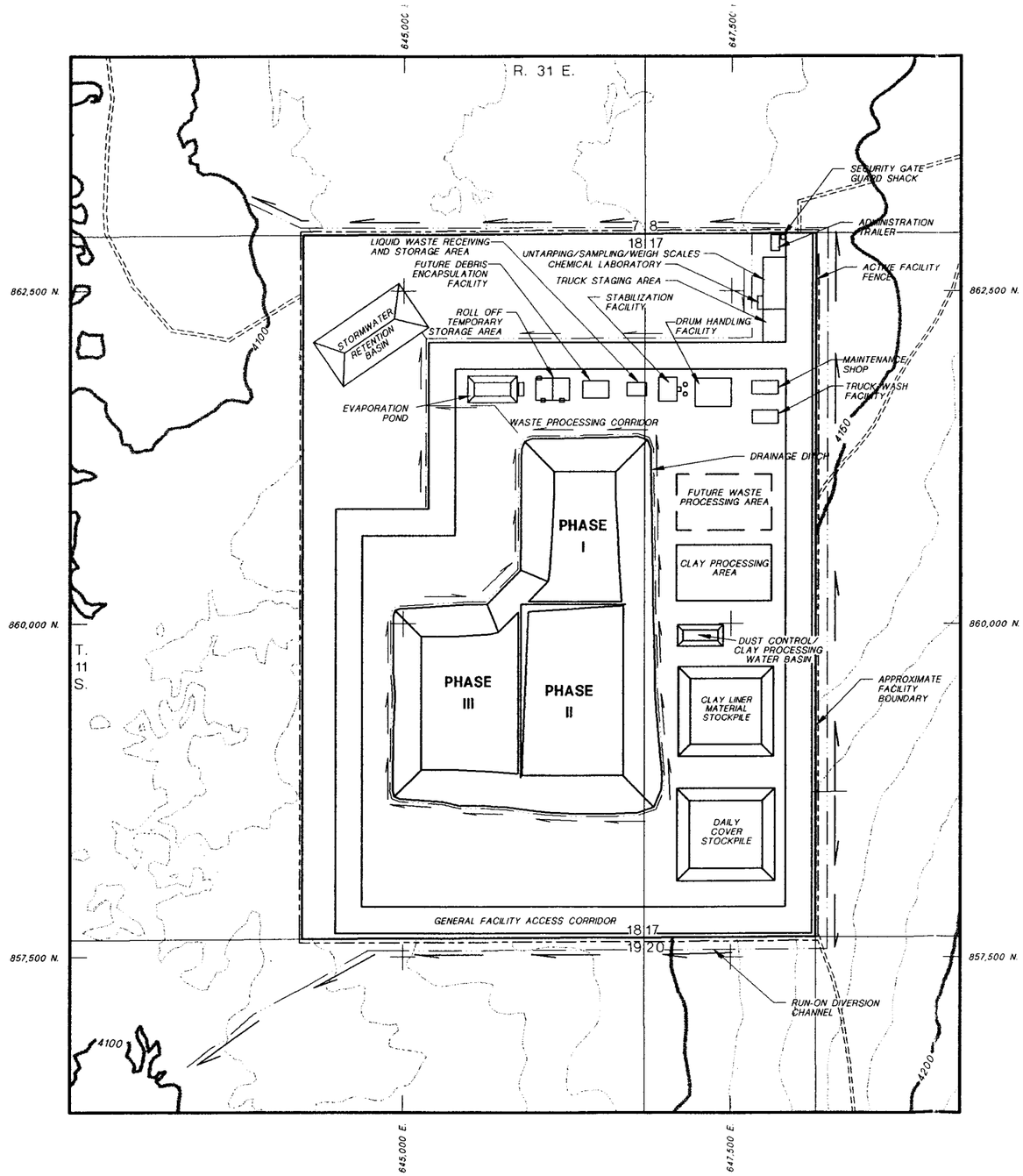
Owner Signature	Date Signed
[illegible]	11-17-94
Name and Official Title *(type or print)*	
Operator Signature	Date Signed
Name and Official Title *(type or print)*	

XIX. Comments

Part XII - The only treatment occurring at the surface impoundment is evaporation. Therefore, a treatment design capacity is not applicable and we have shown a storage capacity.

Part XIV - Wastes that do not meet LDR treatment standards will be managed at one or more permitted units prior to land disposal.

Note: Mail completed form to the appropriate EPA Regional or State Office. (refer to instructions for more information)



LEGEND

- DIRT ROAD
- FENCE
- SURFACE WATER CHANNEL AND FLOW DIRECTION
- APPROXIMATE FACILITY BOUNDARY
- ORIGINAL SURFACE CONTOURS

N

SCALE

500' 0 500' 1000'

CONTOUR INTERVAL 10FT.

NOTES:

1.) TOPOGRAPHY DIGITIZED FROM USGS 7.5 MINUTE SERIES MESCALERO POINT, NEW MEXICO, 1973.

2.) LANDFILL ACCESS RAMP LOCATIONS TO BE DETERMINED DURING FINAL DESIGN.

3.) FACILITY ROAD LOCATIONS TO BE DETERMINED DURING FINAL DESIGN.

No.	REVISION	DATE	BY	CHKD
4				
3				
2				
1				
0	CONCEPTUAL DESIGN FOR PART B APPLICATION	11/94	JGN	JJK

SCALE: SEE SCALE BAR

DESIGN BY: J.KENDALL

DRAWN BY: E.SIMONSEN

CHECK BY: P.CORSER

PROJECT No. 602-0100

FILE NAME: GFMPGAND

GM inc.

PROJECT: **TRIASSIC PARK WASTE DISPOSAL FACILITY**

DRAWING TITLE: ***CONCEPTUAL SITE MASTER PLAN***

TerraMatrix
Engineering & Environmental Services
1475 Pine Grove Road, P.O. Box 774018
Steamboat Springs, Colorado 80477

SHEET: 1 OF 1

DRAWING No.: ***FIG. 2-1***

REV.: ***0***

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
270.14		Part B General Information Requirements	Sections 1-12	
270.14(b)(1)		– General description of the facility	Section 2.1	
270.14(b)(2)	264.13(a)	– Chemical and physical analysis of hazardous wastes to be handled	Section 5	
270.14(b)(3)		– Waste analysis plan	Section 5	
	264.13(b)(1)-(5)	– Analysis parameters with rationale	5.2.1.1	Table 5-1
		– Test methods for analyzing parameters	5.5	
		– Procedure for collecting representative samples	5.4	
		– Frequency of analyses	5.2.2.3	
		– List and description of waste analyses to be generator supplied	5.2.1.1	
	264.13(b)(6) and 264.17(c)	– Waste analysis procedures for ignitable, reactive, incompatible wastes	5.2	
	264.13(c)	– Procedure to determine identity of each waste movement	5.2	
		– Procedures for collecting representative samples	5.4	
270.14(b)(4)		– Security description for active portion of facility	6.1	
	264.14(a)	– Security procedures waiver justification	Not applicable	
		– Unknowing/unauthorized contact with waste not harmful	Not applicable	
		– Unknowing/unauthorized disturbance of waste or equipment cannot cause violation of Part 264	Not applicable	
270.14(b)(4)	264.14(b)	– Description of 24-hour surveillance system	6.1.1	
		– Description of artificial or natural barriers	6.1.1	
		– Description of controlled entry/egress procedures	6.1.1	
	264.14(c)	– Description of warning signs	6.1.2	
		– List of languages on signs	6.1.2	
		– Statement of 25-foot legibility	6.1.2	
		– Description of sign locations and numbers of signs	6.1.2	
270.14(b)(5)		– General Inspection Schedule and Procedures Description	6.2	
	264.15(b)(1)	– Written schedule	6.2.1.1	
	264.15(b)(2) and 265.15(d)	– Statement as to where, at facility, inspection schedule and inspection records will be kept	6.2.1.1	
	264.15(b)(1)	– Identification of equipment/processes to be inspected	6.2	

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
	264.15(b)(3)	– Identification of types of problems each equipment/process to be checked for	6.2	
	264.15(b)(4)	– Frequency of inspection by equipment/process	6.2	
	264.15(c)	– Schedule of remedial action	6.2.1.2	
270.14(b)(5) and 270.17(d)	264.15(a) and 264.226	– Specific Inspection Requirements for Surface Impoundments	6.2.3	
		– Description of procedures for	6.2.3	
		– Inspection of liners/covers during and immediately after installation	6.2.3	
270.14(b)(5) and 270.17(d)	264.15(a) and 264.226	– Inspections weekly and after storms for	6.2.3	
		– Operation of overtopping controls	6.2.3	
		– Sudden drop in impoundment liquid level	6.2.3	
		– Presence of liquid in leak detection systems	6.2.3	
		– Integrity of dikes/containment devices	6.2.3	
		– Statement from qualified engineer that structural integrity of dikes will be certified upon construction completion	6.2.3	
		– Qualified engineer's certification of dike integrity for	6.2.3	
		– Stress	6.2.3	
		– Piping/scouring	6.2.3	
270.14(b)(5) and 270.18(e)	264.15 (a) and 264.254	– Specific Inspection Requirements for Waste Piles	Not Applicable	
		– Description of procedures for	Not Applicable	
		– Inspection of liners/covers during and immediately after installation	Not Applicable	
		– Inspections weekly and after storm for	Not Applicable	
		– Operation of run-on/run-off controls	Not Applicable	
		– Liquids in leak detection system	Not Applicable	
		– Proper functioning of wind dispersal controls	Not Applicable	
		– Leachate in and proper operation of leachate collection/removal system	Not Applicable	
270.14(b)(5) and 270.20(c)(5)	264.15(a) and 264.273(g)	– Specific Inspection Requirements for Land Treatment Units	Not Applicable	

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Description of procedures for units inspections weekly and after storms for	Not Applicable	
		– Operation of run-on/run-off controls	Not Applicable	
		– Function of wind dispersal controls	Not Applicable	
270.14(b)(5) and 270.21(d)	264.15(a) and 264.303	– Specific Inspection Requirements for Landfills	6.2.2	
		– Description of procedures for	6.2.2	
		– Inspection of liners/covers during and immediately after installation	6.2.2	
		– Inspections Weekly and after storms for	6.2.2	
		– Operation of run-on/run-off controls	6.2.2	
		– Liquids in leak detection system	6.2.2	
		– Proper functioning of wind dispersal controls	6.2.2	
		– Leachate in and proper operation of leachate collection/removal system	6.2.2	
270.14(b)(6)	Part 264 Subpart C	– Preparedness and Prevention Documentation	6.3	
		– Waiver(s) request and justification	Not Applicable	
	264.32(a)	– Description of internal communications/alarm system(s)	6.3.1	
	264.34(a)	– Documentation of personnel access to internal communication/alarm system(s)	6.3.2	
	266.32(b)	– Description of external communications/alarm system(s)	6.3.2	
	264.34(b)	– Documentation of personnel access to external communications/alarm system(s)	6.3.2	
	264.32(c)	– Description of fire control/extinguishing, spill control, and decontamination equipment	6.3	
	264.32(d)	– Documentation of adequate water volume and pressure for above equipment	6.3.4	
	264.33	– Documentation of equipment testing/maintenance schedule and procedures	6.2.8	
	264.35	– Documentation of adequate aisle space	6.3.5	
	264.37 (also 264.52 (c))	– Documentation and descriptions of arrangements or attempts at arrangements with	Appendix 7A	Arrangements will be made
		– Police department(s)	Appendix 7A	Arrangements will be made

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Fire department(s)	Appendix 7A	Arrangements will be made
		– Hospitals	Appendix 7A	Arrangements will be made
		– Local emergency response teams	Appendix 7A	Arrangements will be made
		– State emergency response teams	Appendix 7A	Arrangements will be made
		– Emergency response contractors	Appendix 7A	Arrangements will be made
		– Equipment suppliers	Not Applicable	Not Applicable
	264.37(a)(2)	– Documentation of agreements designating primary emergency authority	Appendix 7A	Agreements will be made
270.14(b)(7)	Part 264 Subpart D	– Contingency Plan Documentation	7	
	264.51 and 264.52(a)	– Criteria for implementation of contingency plan	7.3	
	264.52(d)	– Emergency Coordinators Identification	7.2 and Appendix 7B	Will be provided
		– Names	7.2 and Appendix 7B	
		– Addresses	7.2 and Appendix 7B	
		– Home/Work Phones	7.2 and Appendix 7B	
	264.55	– Documentation of Qualifications	7.2	
		– Description of Authority	7.2	
		– Description of notification procedure	7.2	
	264.52(e)	– Emergency equipment list	Appendix 7D	Will be provided
		– Documentation of equipment location	Appendix 7D	
		– Physical description of equipment	Appendix 7D	
		– Statement of equipment capabilities	Appendix 7D	
	264.52(f)	– Evacuation Plan	Appendix 7C	Will be developed
		– Criteria for implementation	Appendix 7C	
		– Description of signal(s) to implement	Appendix 7C	
		– Description of primary and alternate routes	Appendix 7C	
	264.53	– Contingency Plan Copy Location	7	
		– Description of location facility's copy of plan	7.1	
		– Number of duplicate copies distributed and their location	Appendix 7A	
	264.54	– Contingency Plan Amendment	7.7	
		– Identification of person responsible and authorized to change/amend plan	7.7	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Description of procedure to change/amend facility copy of plan	7.7	
		– Description of procedure to ensure update of all copies of plan	7.7	
270.14(b)(7)	264.56	– Detailed Emergency Procedures	7.4	
		– Procedure for facility personnel notification	7.4.1	
		– Procedure for state/local agency notification	7.4.1	
		– Procedure for identification of character, source, amount, and areal extent of released materials	7.4.2	
		– Procedure for assessment of environment/human health hazards	7.4.3	
		– Identification of On-Scene Coordinator for geographic area	7.4.4	
		– Description of specific responses and control procedures for	7.4.5	
		– Fire	7.4.5.1	
		– Explosion	7.4.5.1	
		– Spill	7.4.5.2	
		– Description of process shutdown and monitoring procedures	Appendix 7C	
		– Description of cleanup procedures and associated material treating, storing, disposal procedures	7.4	
		– Description of emergency equipment cleaning and refitting procedures	7.5.1	
		– Description of procedures to ensure incompatible waste segregation during cleanup	7.4.7	
270.14(b)(7) and 270.17(f)	264.227	– Specific Contingency Plan Requirements for Surface Impoundments	7.4.5.3	
		– Procedure for stopping waste addition to impoundment	7.4.5.3	
	264.227	– Procedure for containing leakage	7.4.5.3	
		– Procedure to prevent catastrophic failure	7.4.5.3	
		– Procedure for emptying impoundment	7.4.5.3	
		– Procedure for recertifying and reactivating impoundment	7.4.5.3	
		– Procedure for closing impoundment	9.2.2	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
(Note: There are no §122.25 requirements which parallel Part 264, Subpart E. However, the applicant should be familiar with the following sections of the regulations since the requirements in them will be enforceable under any permit received. Part 264, Subpart E, §264.70 through §264.77 Part 270, Subpart C, §270.30(j) and §270.30(1) The applicant should be prepared to respond to inquiries by the permit application reviewers regarding these requirements.)				
270.14(b)(8)		– Preventive Procedures, Structures, and Equipment Documentation, including descriptions of equipment/procedures to	6.4	
		– Prevent hazards during unloading operations	6.2.9	
		– Prevent run-off and flooding		
		– Prevent water supply contamination	6.4.4	
		– Mitigate equipment failure and power outages	6.4.5	
		– Prevent undue personnel exposure to wastes	6.4.6	
270.14(b)(9)	264.1	– Prevention of Accidental Ignition or Reaction Documentation	6.5	
		– Description of separation and protection of ignitable, reactive, incompatible wastes	6.5	
		– Description of ignitable, reactive, incompatible wastes handling procedures	6.5	
		– Description of number, location, and type of warning/prohibition signs	6.5	
		– Documentation that procedures are adequate to prevent accidental ignitions or reactions	6.5	
		– Documentation that procedures are adequate to prevent accidental ignitions or reactions	6.5	
270.14(b)(9) and 270.17(h) and 270.17(i)	264.71(b)	– Specific Ignitable/Reactive Waste Requirements for Surface Impoundments	Not Applicable	
	264.229	– Procedures that render waste nonreactive or nonignitable	Not Applicable	
		– Procedures for preventing reactions	Not Applicable	
		– Procedures for protecting wastes	Not Applicable	
		– "Emergency use only" documentation	Not Applicable	
	264.230	– Incompatible waste segregation or protection procedures	Not Applicable	
270.14(b)(9) and 270.18(g) and 270.18(h)	264.17(b)	– Specific Ignitable/Reactive Waste Requirements for Waste Piles	Not Applicable	
	264.256	– Procedures that render waste nonreactive or nonignitable	Not Applicable	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Procedures for preventing reactions	Not Applicable	
		– Procedures for protecting wastes	Not Applicable	
	264.257	– Incompatible waste segregation or protection procedures	Not Applicable	
270.14(b)(9) and 270.20(g) and 270.20(h)	264.17(b)	– Specific Ignitable/Reactive Waste Requirements for Land Treatment Facilities	Not Applicable	
	264.811	– Documentation that application to soil renders waste nonreactive/nonignitable and prevents reactions	Not Applicable	
		– Procedures for protecting wastes	Not Applicable	
	264.282	– Procedures that ensure that incompatible wastes are not applied to same treatment zone	Not Applicable	
270.14(b)(9) and 270.21(f) and 270.21(g)	264.17(b)	– Specific Ignitable/Reactive Waste Requirements for Landfills	6.5.2	
	264.312	– Procedures that render wastes nonreactive and nonignitable	6.5.2	
		– Procedures for preventing reactions	6.5	
		– Procedures for protecting wastes	6.5	
	264.313	– Procedures for ensuring that incompatible wastes will not be disposed of in same landfill cell	6.5.3	
	264.316(c)-(e)	– Procedures for identifying contents and ensuring proper landfilling of incoming labpacks	2.5.3.7	
270.14(b)(10)		– Traffic Documentation	1.5	
		– Identification of;	1.5	
		– Waste movement routes	1.5	
		– Number of movements by type vehicle	1.5	To be specified with final design.
		– Quantity of waste moved per movement per vehicle	1.5	To be specified with final design.
		– Traffic control signals and personnel	1.5	To be specified with final design.
		– Route surface composition and load bearing capacity	1.5	To be specified with final design.
270.14(b)(11)		– Facility Location Documentation	1.4	
270.14(b)(11) (i) and (ii)		– Political jurisdiction identified (new facilities only)	1.4	
		– Comparison to Appendix VI of Part 264	1.4	
		– Demonstration that faults with displacement in Holocene time are more than 3,000 feet from facility	3.5.1.2	Figure 3-7

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
	264.18(a)	– Demonstration that no faults pass within 200 feet of sites where T/S/D to be conducted	3.5.1.2	Figure 3-7
270.14(b)(11)(iii)-(iv)	264.18(b)	– Documentation of facility location relative to 100-year flood plain level or wave action flooding	1.4.1	
		– Documentation that facility can withstand the 100-year flood without washout of hazardous waste by:	Not Applicable	
		– Analysis of hydrodynamic/hydrostatic forces resulting at site from 100-year flood, and	Not Applicable	
		– Presentation of operating units and flood protection devices design and how they will prevent washout, or	Not Applicable	
		– Plan for the removal of waste before washout including,	Not Applicable	
		– Timing of removal relative to flood levels	Not Applicable	
		– Estimated time to remove all waste	Not Applicable	
		– Location to which waste will be moved and proof of compliance with Parts 122 through 124 and 264 through 267 of this Chapter	Not Applicable	
		– Detailed description of personnel, equipment, and procedures for waste removal sufficient to ensure availability in time for use	Not Applicable	
		– Analysis of potential for discharge during waste movement	Not Applicable	
270.14(b)(11)(v)		– A plan documenting how and on what time schedule the facility will comply with §264.18(b) if <u>not</u> in compliance (existing facilities only).	Not Applicable	
270.14(b)(12)	264.16	– Personnel Training Program Documentation	8	
		– Outline of introductory and continuing personnel training programs	8.3	
		– Identification and qualifications of program instructor	8.2	
		– Brief description of how training program meets actual job tasks	8.2	
		– Description of procedures to ensure all appropriate personnel receive appropriate training and receive annual training review	8.2	
		– Description of records to be kept, their location, and procedures to ensure they are retained for proper length of time	8.4	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
270.14(b)(13)	264.112	– Closure Plan Documentation	9.2	
		– Description of partial and final closure procedure	9.2	
		– Description of maximum unclosed portion during facility life	9.2	
		– Estimate of maximum waste inventory in storage/treatment during facility life	9.2	
	264.114	– Equipment decontamination procedure	9.2	
		– Estimated year of closure	9.2	
	264.113	– Description of closure schedule including:	9.5	
		– Total time to close	Fig. 9-1	
270.14(b)(13)	264.113	– Trackable intervening closure activities	Fig. 9-1	
		– Location(s) and number of copies of closure plan	9.7	
		– Identification of person responsible for storage and updating of facility copy of closure plan	9.7	
		– Procedure for updating all other copies of closure plan	9.7	
270.14(b) (13) and 270.17(g)	264.112 and 264.228(a)	– Specific Closure Plan Requirements for Surface Impoundments	9.2.2	
		– Procedure for removal and/or decontamination of all wastes and materials/equipment associated with the impoundment, or	9.2.2	
		– Detailed plans and engineering reports describing	9.2.2	
		– Elimination of free liquids	9.2.2.1	
		– Stabilization of remaining wastes	9.2.2.2	
		– Design of final cover demonstrating	Not Applicable	
		– Liquid migration minimization	Not Applicable	
		– Function with minimum maintenance	Not Applicable	
		– Drainage promotion	Not Applicable	
		– Erosion/abrasion minimization	Not Applicable	
		– Settling/subsidence accommodation	Not Applicable	
		– Permeability less than liner or subsoils	Not Applicable	
270.14(b)(13) and 270.18(i)	264.112	– Specific Closure Plan Requirements for Waste Piles	Not Applicable	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
	264.258(a)	– Procedure for removal and/or decontamination of all wastes and materials/equipment associated with the waste pile	Not Applicable	
	264.258(b)	– Procedure for closing in conformance with landfill closing requirements	Not Applicable	
270.14(b)(13) and 270.20(f)	264.112	– Specific Closure Plan Requirements for Land Treatment Facilities	Not Applicable	
	264.280(a)	– Procedures to maximize degradation of waste in treatment zone	Not Applicable	
		– Procedures to minimize waste run-off	Not Applicable	
		– Run-off system maintenance procedures	Not Applicable	
		– Wind dispersal control procedures	Not Applicable	
		– Procedures for compliance with food-chain crop growth	Not Applicable	
		– Procedures for unsaturated zone monitoring	Not Applicable	
		– Description of vegetative cover	Not Applicable	
		– Procedures for establishing vegetative cover	Not Applicable	
270.14(b)(13) and 270.21(e)	264.112 and 264.310(a)	– Specific Closure Plan Requirements for Landfills	9.2.6	
		– Detailed plans and an engineering report which describes the final cover components in detail	9.2.6	
		– Documentation that the final cover will	9.2.6	
		– Provide long-term minimization of migration of liquids through closed landfill	9.2.6	
		– Function with minimum maintenance	9.2.6	
		– Promote drainage and minimize erosion/abrasion	9.2.6	
		– Settle/subside without losing integrity	9.2.6	
		– Be less permeable than bottom liners or subsoils	9.2.6	
270.14(b)(13)	264.117 and 264.118	– Post-Closure Plan Documentation	9.3	
		– Description of groundwater monitoring activities and frequencies	9.3	
		– Description of maintenance activities and frequencies for:	9.3	
		– Final containment structures	9.3	
		– Facility monitoring equipment	9.3	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Location(s) and number of copies of post-closure plan	9.7	
		– Identification and location (address and phone number) of person responsible for storage and updating of facility copy of post-closure plan prior to closure	9.7	
		– Identification and location (address and phone number) of person responsible for storage and updating facility copy of post-closure plan during post-closure period	9.3	
		– Procedure for updating all other copies of post-closure plan	9.7	
270.14(b)(12) and 270.17(g)	264.118 and 264.228(b)	– Specific Post-Closure Plan Requirements for Surface Impoundments	Not Applicable	
		– Procedures for maintenance and repair of final cover	Not Applicable	
		– Procedures for maintenance and monitoring of leak detection system	Not Applicable	
		– Procedures for maintenance and monitoring of groundwater monitoring system	Not Applicable	
		– Procedures for compliance with Subpart F	Not Applicable	
		– Procedures for preventing run-on/run-off final cover damage	Not Applicable	
270.14(b)(13) and 270.18(i)	264.118 and 264.258(b)	– Specific Post-Closure Plan Requirements for Waste Piles	Not Applicable	
		– Procedures for post-closure care that meet the requirements for landfills	Not Applicable	
270.14(b)(13) and 270.20(f)	264.118 and 264.280(c)	– Specific Post-Closure Plan Requirements for Land Treatment Facilities	Not Applicable	
		– Procedures to enhance degradation of wastes in treatment zone	Not Applicable	
		– Procedure for maintaining vegetative cover	Not Applicable	
		– Procedure for maintaining run-on controls	Not Applicable	
		– Procedure for maintaining run-off controls	Not Applicable	
		– Procedures for wind dispersal control	Not Applicable	
		– Procedures to ensure compliance with foodchain crop prohibitions	Not Applicable	
		– Procedures for unsaturated zone monitoring	Not Applicable	
270.14(b)(13) and 270.21(e)	264.118 and 264.310(b)	– Specific Post-Closure Plan Requirements for Landfills	9.3	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Procedures for maintenance and repair of final cover	9.3	
		– Monitoring and maintenance procedures for leak detection system	9.3	
		– Procedure for leachate collection/removal system operation	9.3	
		– Procedures to maintain and monitor groundwater monitoring system	9.3	
		– Procedures for compliance with Subpart F		
		– Procedures for preventing final cap erosion due to run-on and run-off	9.3	
		– Procedures for protection and maintenance of benchmarks		
	264.310(c)	– Procedures to be undertaken if liquid is found in leak detection system	9.3	
270.14(b)(14)	264.120	– Documentation of Notice on Deed (existing facilities only)	9.2.6	
		– Statement that land used to manage wastes	9.2.6	
		– Statement of restricted use per §284.177(c)	9.2.6	
	264.119	– Documentation of type, location, and quantity of wastes filed with local authority and EPA Regional Administrator	9.2.6	
270.14(b)(15)	264.142	– Closure Cost Estimate	9.8	
	264.143 and 264.146	– Documentation of a financial assurance mechanism for closure that is:	9.9	
	264.151(a)	– Closure trust fund	9.9	
	264.151(b)	– Surety bond guaranteeing payment	9.9	
	264.151(c)	– Surety bond guaranteeing performance	9.9	
	264.151(d)	– Closure letter of credit	9.9	
	264.151(e)	– Closure insurance	9.9	
	264.151(f) and (h)	– Financial test and corporate guarantee	9.9	
		– Multiple financial mechanism for one facility	9.9	
		– Single financial mechanism for multiple facilities	9.9	
270.14(b)(16)	264.144	– Post-Closure Cost Estimate	9.8.2	
	264.145 and 264.146	– Documentation of a financial assurance mechanism for post-closure that is:	9.9	
	264.151(a)	– Closure trust fund	9.9	
	264.151(b)	– Surety bond guaranteeing payment	9.9	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
	264.151(c)	– Surety bond guaranteeing performance	9.9	
	264.151(d)	– Post-closure letter of credit	9.9	
	264.151(e)	– Post-closure insurance	9.9	
	264.151(f) and (h)	– Financial test and corporate guarantee	9.9	
		– Multiple financial mechanism for one facility	9.9	
		– Single financial mechanism for multiple facilities	9.9	
270.14(b)(17)	264.147	– Documentation of Insurance	9.9	
		– Request for variance from insurance	Not Applicable	
	264.151(i) and (j)	– Insurance for sudden/accidental occurrences	9.9	
		– Insurance for nonsudden/accidental occurences	9.9	
	264.151(g)	– Financial test for liability coverage	9.9	
270.14(b)(18)	264.149	– Documentation of a State Required Financial mechanisms for Closure, Post-Closure, or Liability including	Not Applicable	
		– EPA ID number	Not Applicable	
		– Facility name	Not Applicable	
		– Facility address	Not Applicable	
		– Amounts of liability coverage or funds assured	Not Applicable	
	264.150	– Documentation of State Assumed Responsibility for Closure, Post-Closure, or Liability including	Not Applicable	
		– Letter from State describing State's responsibilities	Not Applicable	
		– Facility EPA ID number	Not Applicable	
		– Facility name	Not Applicable	
		– Facility address	Not Applicable	
		– Amounts of liability coverage or funds assured	Not Applicable	
270.14(b)(19)		– Topographic map showing a distance of 1,000 feet around facility at a scale of not more than 1 inch equals 200 feet that clearly shows	Figure 2-1	
		– Contours	Figure 2-1	
		– Proper contour intervals	Figure 2-1	
		– Map scale and date	Figure 2-1	
		– 100-year flood plain area	1.4.1	
		– Surface waters and intermittent streams	3.6.1	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Surrounding land uses	3.4.2	
270.14(b)(19)		– Wind rose	3.3.3	3-3
		– North orientation	Figure 2-1	
		– Legal boundaries of facility site	3.2	
		– Access control	6.1.1	
		– Injection and withdrawal wells onsite and offsite	3.7.1	
		– Buildings and recreation areas	Figure 2-1	
		– Run-off control systems	Figure 2-1	
		– Access and internal roads	Figure 2-1	
		– Storm, sanitary, and process sewerage systems	Figure 2-1	
		– Loading and unloading areas	Figure 2-1	
		– Fire control facilities	6.3.4	
		– Barriers for drainage or flood control	Figure 2-1	
		– Location of past or present operational units and equipment cleanup areas	Not Applicable	
270.17		– Specific Part B Information Requirements for Surface Impoundments	2.6	
270.17(a)		– List of hazardous wastes placed or to be placed in impoundment	2.6.3	
270.17(b)	264.221	– Detailed plans and an engineering report describing	Figure 2-12	
270.17(b)(i)	264.221(a)	– Liner system construction (new only)	2.6.1.1	
	264.221(a)(l)	– Material of construction	2.6.1.1	
		– Chemical properties	2.6.1.1	
270.17(b)(l)		– Physical strength	2.6.1.1	
		– Thickness	2.6.1.1	
	264.221(a)(2)	– Foundation design/integrity	2.6.1.1	
	264.221(a)(3)	– Area covered	2.6.1	
	264.221(a)(1)	– Liner system integrity against (new only)	2.6.1.1	
		– Internal and external pressure gradients	2.6.1.1	
		– Contact with waste/leachate	2.6.1.1	
		– Climatic conditions	2.6.1.1	
		– Installation stresses	2.6.1.1	
		– Daily operational stresses	2.6.1.1	
	264.221(b)	– Liner system exemption including	Not Applicable	
		– Nature and quantity of wastes	Not Applicable	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Alternative design and operation	Not Applicable	
		– Impoundment location description	Not Applicable	
		– Hydrogeologic setting	Not Applicable	
		– Attenuative capacity of materials between impoundment and groundwater and surface water	Not Applicable	
		– Documentation of no migration to ground/surface waters at any future time	Not Applicable	
270.17(b)(2)	264.221(c)	– Procedures/equipment to prevent overtopping from	2.6.1	
		– Normal operation	2.6.1	
		– Abnormal operation	2.6.1	
		– Overfilling	2.6.1	
		– Wind/wave action	2.6.1	
		– Rainfall	2.6.1	
		– Run-on	2.6.1	
		– Equipment malfunctions	2.6.1	
		– Human error	2.6.1	
270.17(b)(3)	264.221(d)	– Structural integrity of dikes	Not Applicable	
270.17(c)	264.222(a)	– Documentation for Part 264, Subpart F exemption including	Not Applicable	
		– Impoundment and liner location above seasonal highwater table	Not Applicable	
		– Two liners meeting §264.221(a) requirements	Not Applicable	
		– Leak detection system between liners	Not Applicable	
270.18		– Specific Part B Information Requirements for Waste Piles	Not Applicable	
270.18(a)		– List of hazardous wastes placed or to be placed in each waste pile	Not Applicable	
270.18(b)	264.250(c)	– Documentation of general exemption from §264.251 and Part 264, Subpart F, including	Not Applicable	
		– Waste pile protection from precipitation	Not Applicable	
		– Procedures for ensuring liquids are not placed in pile	Not Applicable	
		– Description of run-on controls	Not Applicable	
		– Description of wind dispersal controls other than wetting	Not Applicable	
		– Decomposition/reactions do not cause leachate generation	Not Applicable	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
270.18(c)	264.251(a)	– Detailed plans and an engineering report describing	Not Applicable	
270.18(c)(1)	264.251(a)(1)	– Liner system integrity against (new only)	Not Applicable	
	264.221(a)	– Material of construction	Not Applicable	
		– Chemical properties	Not Applicable	
		– Physical strength	Not Applicable	
		– Thickness	Not Applicable	
		– Foundation design/integrity	Not Applicable	
		– Area covered	Not Applicable	
		– Liner system integrity against (new only)	Not Applicable	
		– Internal and external pressure gradients	Not Applicable	
		– Contact with waste/leachate	Not Applicable	
		– Climatic conditions	Not Applicable	
		– Installation stresses	Not Applicable	
		– Daily operational stresses	Not Applicable	
	264.251(a)(2)	– Leachate collection and removal system to maintain less than one foot of leachate on liner including,	Not Applicable	
		– Materials of construction	Not Applicable	
270.18(c)(1)		– Chemical resistance to waste/leachate	Not Applicable	
		– Strength sufficient to prevent collapse	Not Applicable	
		– Provisions to prevent clogging	Not Applicable	
	264.251(b)	– Liner system/leachate system exemption including,	Not Applicable	
		– Nature and quantity of wastes	Not Applicable	
		– Alternative design and operation	Not Applicable	
		– Pile location description	Not Applicable	
		– Hydrogeologic setting	Not Applicable	
		– Attenuative capacity of materials between pile, ground and surface waters	Not Applicable	
		– Documentation of no migration for ground/surface waters at any future time	Not Applicable	
270.18(c)(2)	264.251(c)	– System for control of run-on from peak discharge of a 25-year storm	Not Applicable	
270.18(c)(3)	264.251(d)	– System for control of run-off water volume of a 24-hour, 25-year storm	Not Applicable	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
270.18(c)(4)	264.251(e)	– Procedure to manage collection and holding facilities associated with run-on and run-off control systems	Not Applicable	
270.18(c)(5)	264.251(f)	– Wind dispersal control procedures	Not Applicable	
270.18(d)	264.252(a)	– Documentation for Part 264, Subpart F exemption including,	Not Applicable	
		– Pile and liners above seasonal high water table	Not Applicable	
		– Two liners meeting requirements of §264.251(a)(1)	Not Applicable	
		– Leak detection system between liners	Not Applicable	
		– Leachate system meeting §264.251(a)(2) requirements	Not Applicable	
	264.253(b)	– Documentation for Part 264, Subpart F exemption including,	Not Applicable	
		– Pile and liners above seasonal high water table	Not Applicable	
		– Liner meets §264.251(a)(1) requirements	Not Applicable	
		– Soil characteristics/depths	Not Applicable	
		– Leachate system meets §264.251(a)(2) requirements	Not Applicable	
		– Schedule/procedures for liner inspection by waste removal	Not Applicable	
		– Sufficient liner strength/thickness to allow periodic removal/replacement of wastes	Not Applicable	
270.18(f)		– Description of treatment carried out in or on the pile including,	Not Applicable	
		– Details of treatment process	Not Applicable	
		– Equipment used	Not Applicable	
		– Nature and quality of residuals	Not Applicable	
270.20		– Specific Part B Information Requirements for Land Treatment Facilities	Not Applicable	
270.20(a)		– Description of treatment demonstration plans by	Not Applicable	
	264.272(b)	– Field test	Not Applicable	
		– Laboratory analysis	Not Applicable	
		– Available data	Not Applicable	
		– Operating data (existing units only)	Not Applicable	
		– Submittal for laboratory analyses or field test demonstration permit including,	Not Applicable	
	264.272(c)	– Documentation of accurate simulation	Not Applicable	

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Wastes and hazardous constituents descriptions (Part 261, Appendix VIII)	Not Applicable	
		– Climatologic information	Not Applicable	
		– Topographical data	Not Applicable	
		– Operating practices	Not Applicable	
		– Type of test to be conducted	Not Applicable	
		– Test materials and methods	Not Applicable	
		– Expected completion time	Not Applicable	
		– Statement on appropriateness of demonstration	Not Applicable	
		– Statement on human health and environment protection considering,	Not Applicable	
		– Characteristics of wastes to be tested	Not Applicable	
		– Operating and monitoring during tests	Not Applicable	
		– Duration of test	Not Applicable	
		– Volume of waste used in test	Not Applicable	
		– Potential for hazardous waste migration to ground/surface waters (field tests only)	Not Applicable	
270.20(b)	264.271(a)	– Description of land treatment program	Not Applicable	
		– Wastes to be land treated	Not Applicable	
		– Design measures to maximize treatment including,	Not Applicable	
270.20(b)(2)(i)	264.273(a)	– Rate and method of waste application	Not Applicable	
		– Soil pH control measures	Not Applicable	
		– Microbial/chemical reaction enhancements	Not Applicable	
		– Treatment zone moisture control measures	Not Applicable	
270.20(b)(3)	264.278(a)-(f)	– Unsaturated zone monitoring procedures including,	Not Applicable	
		– List of and rationale for selecting compounds to be monitored	Not Applicable	
		– Monitoring equipment, procedures, frequency	Not Applicable	
		– Procedures for selecting sampling locations	Not Applicable	
		– Sample collection procedures	Not Applicable	
		– Sample preservation/shipment procedures	Not Applicable	
		– Sample chain of custody control	Not Applicable	

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Sample analysis procedures	Not Applicable	
		– Background value determination procedures	Not Applicable	
		– Statistical methods description	Not Applicable	
270.20(b)(4)		– List of hazardous constituents expected to be in, or derived from, wastes to be land treated	Not Applicable	
270.20(b)(5)	264.271(c)	– The proposed vertical and horizontal dimensions of the treatment zone with maximum depth of	Not Applicable	
		– No more than 5 feet from the initial soil surface	Not Applicable	
		– More than 3 feet above the seasonal high water table	Not Applicable	
270.20(c)	264.273(b)-(f)	– Description of land treatment unit design	Not Applicable	
		– Procedures/equipment to prevent run-on from peak discharge of 25-year storm	Not Applicable	
		– Procedures/equipment to collect and control the run-off water volume from a 24-hour, 25-year storm	Not Applicable	
		– Procedures/equipment to minimize run-off from treatment zone during active life	Not Applicable	
		– Run-on and run-off collection and control systems management plan	Not Applicable	
		– Procedures/equipment for wind dispersal control	Not Applicable	
270.20(d)	264.276(a)	– Documentation of request for growth of food-chain crops on treatment zone not receiving cadmium in wastes	Not Applicable	
		– Statement that demonstration of no risk to human health will be conducted by,	Not Applicable	
		– Field tests	Not Applicable	
		– Greenhouse studies	Not Applicable	
		– Available data	Not Applicable	
		– Operating data (existing only)	Not Applicable	
		– Demonstration program description, including	Not Applicable	
		– Soil pH	Not Applicable	
		– Cation exchange capacity of soil	Not Applicable	
		– Specific wastes to be applied	Not Applicable	
		– Waste application rates	Not Applicable	
		– Waste application methods	Not Applicable	
		– Identification of demonstration crops	Not Applicable	
		– Planting and growth procedures	Not Applicable	

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Characteristics of crop	Not Applicable	
		– Sample collection criteria	Not Applicable	
		– Sample collection procedure	Not Applicable	
		– Sample size	Not Applicable	
		– Analyses methods	Not Applicable	
		– Statistical data evaluation procedures	Not Applicable	
		– Identification of comparison crops	Not Applicable	
		– Characteristics of crop	Not Applicable	
		– Planting and growth procedures	Not Applicable	
		– Conditions of growth	Not Applicable	
		– Sample selection criteria	Not Applicable	
		– Sample collection procedures	Not Applicable	
		– Sample size	Not Applicable	
		– Analyses methods	Not Applicable	
		– Statistical data evaluation procedures	Not Applicable	
		– Request for a permit to conduct demonstration program	Not Applicable	
270.20(e)	264.276(b)	– Documentation of request for growth of food-chain crops on treatment zone if wastes contain cadium	Not Applicable	
		– Cadium concentration in waste	Not Applicable	
		– Soil pH	Not Applicable	
		– Annual application of cadium in kilograms per hectare	Not Applicable	
		– Soil cation exchange capacity	Not Applicable	
		– Identification of animal feeds to be grown	Not Applicable	
		– Plan to prevent animal feed ingestion by humans	Not Applicable	
		– Documentation of notice on deed	Not Applicable	
270.21		– Specific Part B Information Requirements for Landfills	2.5	
270.21(a)		– List of hazardous wastes to be placed in each landfill cell	2.5.1.1	
270.21(b)	264.301(a)	– Detailed plans and an engineering report describing	2.5	
270.21(b)(1)	264.301(a)(1)	– Liner system construction (new only)	2.5.1.2	
		– Material of construction	2.5.1.2	
		– Chemical properties	2.5.1.2	
		– Physical strength	2.5.1.2	
		– Thickness	2.5.1.2	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Foundation design/integrity	2.5.1.2	
		– Area covered	2.5.1.2	
		– Liner system integrity against (new only)	2.5.1.2	
		– Internal and external pressure gradients	2.5.1.2	
		– Contact with waste/leachate	2.5.1.2	
		– Climatic conditions	2.5.1.2	
		– Installation stresses	2.5.1.2	
		– Daily operational stresses	2.5.1.2	
270.21(b)(1)	264.301(a)(2)	– Leachate collection and removal system to maintain less than one foot of leachate on liner including,	2.5.1.3	
		– Materials of construction	2.5.1.3	
		– Chemical resistance to waste/leachate	2.5.1.3	
		– Sufficient strength to prevent collapse	2.5.1.3	
		– Provisions to prevent clogging	2.5.1.3	
	264.301(b)	– Liner system/leachate system exemption including,	Not Applicable	Exemption is in 264.301(d)
		– Nature and quantity of wastes	Not Applicable	
		– Alternative design and operation	Not Applicable	
		– Landfill location description	Not Applicable	
		– Hydrogeologic setting	Not Applicable	
		– Attenuative capacity of materials between landfill and ground and surface waters	Not Applicable	
		– Documentation of no migration to ground/surface waters at any future time	Not Applicable	
270.21(b)(2)	264.301(g)	– System for control of run-on from peak discharge of a 25-year storm	2.5.1.5	
270.21(b)(3)	264.301(h)	– System for control of run-off water volume from a 24-hour, 25-year storm	2.5.1.5	
270.21(b)(4)	264.301(i)	– Procedures to manage collection and holding facilities associated with run-on and run-off control systems	2.5.1.5	
270.21(b)(5)	264.301(j)	– Wind dispersal control procedures	2.5.1.6	
270.21(c)	264.302(a)	– Documentation for Part 264, Subpart F exemption including,	Not Applicable	
		– Landfill and liners above seasonal high water table	Not Applicable	
		– Two liners meeting requirements of §264.301(a)(1)	Not Applicable	

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Leak detection system between liners	Not Applicable	
		– Leachate system meeting §264.301(a)(2)	Not Applicable	
270.21(h)	264.314	– Documentation of procedures/equipment for landfilling liquid wastes	2.5.3.7	
270.21(i)	264.315	– Documentation of procedures/equipment for landfilling containers	2.5.3.7	
270.14(c)	Part 264 Subpart F	Part B Protection of Groundwater Information Requirements for Surface Impoundments, Waste Piles, Land Treatment Units, and Landfills	3.8	
270.14(c)(1)		– Interim status period groundwater monitoring data summary	Not Applicable	
270.14(c)(2)		– Identification of uppermost and hydraulically interconnected aquifiers under facility including,	3.7.22	
		– Water flow rate and direction	Not Applicable	Unsaturated conditions, flux for saturated conditions estimated in 3.7.2.4
		– Bases for identification	3.7.22	
270.14(c)(3) and 270.14(b)(19)		– Topographic map	Figure 2-1	
		– Delineation of property boundary	Figure 2-1	
	264.95(b)	– Delineation of waste management area	Figure 2-1	
	264.95(a)	– Delineation of proposed point of compliance	Not Applicable	groundwater protection stand. does not apply
		– Groundwater monitoring well locations	3.8.1	
		– Location of aquifers	3.7.2.2	
270.14(c)(4)		– Description of existing contamination	Not Applicable	
		– Delineation of plume extent	Not Applicable	
		– Appendix VIII constituents concentrations	Not Applicable	
		– Concentrations throughout plume	Not Applicable	
		– Maximum concentration in plume	Not Applicable	
270.14(c)(5)	264.97	– Detailed plans and an engineering report of Groundwater Monitoring Plan	3.8.2.2	
	264.97(a)	– Description of wells	3.8.2.2	
		– Number of wells	3.8.2.2	
		– Locations	3.8.2.2	
		– Depths	3.8.2.2	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Assurance of unaffected background water measurement	3.8.2.2	
		– Assurance of compliance point groundwater measurement	3.8.2.2	
	264.97(c)	– Casing description	3.8.2.2	
	264.97(d)	– Description of sampling/analysis procedures	3.8.2.3	
		– Sample collection methods	3.8.2.3	
		– Sample preservation/shipment	3.8.2.3	
		– Analytical procedures	3.8.2.3	
		– Chain of custody control	3.8.2.3	
	264.97(e)	– Documentation of proper/adequate analytical procedures	3.8.2.3	
	264.97(f)	– Procedure for determination of groundwater elevation with each sample	3.8.2.3	
270.14(c)(6)	264.91(a)(4) and 264.98	– Description of Detection Monitoring Program including,	3.8.2.3	
270.14(c)(6)(i)	264.93 and 264.98(a)	– List of indicator parameters, waste constituents, reaction products to be monitored for, including	3.8.2.3	
		– Type, quantities, concentrations expected in wastes	3.8.2.3	
		– Mobility, stability, persistence in unsaturated zone	3.8.2.3	
		– Detectability in groundwater	3.8.2.3	
270.14(c)(6)(iii)	264.98(a)(4) and 264.98(c)(1)	– Background groundwater concentration values and coefficients of variation established by	3.8.2.1	
	264.98(c)(3)	– Use of an appropriate groundwater monitoring system, and	3.8.2.1	
	264.97(g)(1)	– Quarterly sampling of upgradient wells for one year, or	3.8.2.1	
	264.97(g)(3)	– Quarterly sampling of other wells for one year, and	3.8.2.1	
	264.97(g)(4)	– Data from a minimum of one sample/well and minimum of four samples per quarter, or	3.8.2.1	
		– Presentation of procedures to calculate such values	3.8.2.1	
270.14(c)(6) (ii)	264.98(b)	– Description of an appropriate groundwater monitoring system to be installed at the compliance point	3.8.1	
270.14(c)(6) (iv)	264.98(d)	– Procedures for collecting semi-annual groundwater samples at the compliance point during	3.8.2.3	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
		– Active life	3.8.2.3	
		– Closure period	3.8.2.3	
		– Post-closure period	3.8.2.3	
	264.98(e)	– Procedure for annual determination of uppermost aquifer flow rate and direction	3.8.2.3	
	264.98(f) and 264.97(d)&(e)	– Documentation of sample collection and analysis procedures	3.8.2.3	
	264.98(g)	– Procedure for determining a statistically significant increase for any monitored parameter or constituent by	3.8.2.4	
		– Comparing compliance point data to background value data using the procedures in §264.97(h)(1) or (2), and	3.8.2.4	
		– Providing an estimate of the time period after sampling completion necessary to obtain results	3.8.2.3	
270.14(c)(6)	264.98(h)	– Procedure to be implemented if a statistically significant increase in any constituent or parameter is identified at any compliance point monitoring well, including	3.8.2.4	
	264.98(h)(1)	– Written notification to Regional Administrator	3.8.2.4	
	264.98(h)(2)	– Sample collection and analysis methods for all Appendix VIII constituents at all monitoring wells	3.8.2.4	
	264.98(h)(3)	– Method for establishing Appendix VIII constituent background values	3.8.2.4	
	264.98(h)(4)	– Preparation of an application for permit modification to establish compliance monitoring	Not Applicable	
270.14(c)(7)	264.91(a)(1) and 264.99	– Description of Compliance Monitoring Program, including	Not Applicable	
		– List of wastes previously handled at facility	Not Applicable	
		– Characterization of contaminated groundwater	Not Applicable	
		– Hazardous constituents identified	Not Applicable	
		– Hazardous constituents concentrations	Not Applicable	
	264.99(b)	– Description of compliance monitoring system at the compliance point	Not Applicable	
		– List of hazardous constituents to be compliance monitored	Not Applicable	

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	Part 264	Subject Requirement	Location in Application (Section)	Comments
	264.96	– Proposed compliance period	Not Applicable	
	264.99(d)	– Procedure for collecting quarterly samples at compliance point during compliance period	Not Applicable	
	264.99(c)(3)	– Procedures for establishing background concentration values for constituents that are based on	Not Applicable	
		– Use of an appropriate groundwater monitoring system, and	Not Applicable	
	264.97(g)	– Data that is available prior to permit issuance	Not Applicable	
		– Data that accounts for measurement errors in sampling and analysis	Not Applicable	
		– Date that accounts for seasonal groundwater quality fluctuations	Not Applicable	
		– Data from a minimum of one sample per well and a minimum of four samples from monitoring system, each time system is sampled	Not Applicable	
270.14(c)(7) (iv)	264.92 and 264.99(c) (1), (2)	– Proposed concentration limits for constituents with justification based on	Not Applicable	
		– §264.94(a)(1) and §264.97(g)	Not Applicable	
		– §264.94(a)(2)	Not Applicable	
		– §264.94(b) and §264.99(c)(1)	Not Applicable	
	264.99(e)	– Procedure for annual determination of uppermost aquifer flow rate and direction	Not Applicable	
	264.99(f)	– Procedure for annual testing of all compliance point wells for Appendix VIII constituents	Not Applicable	
	264.99(g)	– Documentation of all sampling and analysis procedures	Not Applicable	
	264.99(h)	– Procedures for determining a statistically significant increase for any monitored constituent by	Not Applicable	
		– Comparing compliance point data to the concentration limit using the procedure in §264.97(h)(2)	Not Applicable	
		– Providing an estimate of the time period after sampling completion necessary to obtain results	Not Applicable	
	264.99(i)	– Procedures to be implemented if the groundwater protection standard is exceeded at any compliance point monitoring well, including	Not Applicable	
	264.99(i)(1)	– Written notification to Regional Administrator	Not Applicable	

RCRA Permit Application Checklist for Gandy Marley Facility

	Part 264	Subject Requirement	Location in Application (Section)	Comments
	264.99(i)(2)	– Preparation of an application for permit modification to establish a corrective action program, including	Not Applicable	
		– Details of program to comply with groundwater protection	Not Applicable	
270.14(c)(7) (v)	264.99(i)(2) (ii)	– Details of groundwater monitoring to demonstrate effectiveness of programs	Not Applicable	
270.14(c)(8)	264.91(a)(2) and 264.100	– Description of Corrective Action Program, including	Not Applicable	
270.14(c)(8) (i)		– Characterization of contaminated groundwater	Not Applicable	
	264.100(a)(1)	– Identified hazardous constituents	Not Applicable	
		– Concentrations of hazardous constituents	Not Applicable	
270.14(c)(8) (ii)	264.100(a)(2)	– Concentration limit for each hazardous constituent	Not Applicable	
270.14(c)(8) (iii)	264.100(b)	– Detailed plan and an engineering report describing the corrective actions to be taken at the compliance point	Not Applicable	
	264.100(c)	– Time period necessary to implement corrective action program	Not Applicable	
270.14(c)(8) (iv)	264.100(d)	– Description of groundwater monitoring program that will be sufficient to assess the adequacy of corrective action	Not Applicable	
	264.91(a)(3) and 264.100(e)	– Description of corrective action to be taken for constituents in groundwater between compliance point and downgradient facility boundary	Not Applicable	
	264.100(g)	– Procedure and content for semi-annually submitting written reports to the Regional Administrator on program effectiveness	Not Applicable	
	Part B Certification and Signatures			
270.11(d)		– Certification paragraph	*ii*	
270.11(a)		– Appropriate signatory	*ii*	

Section 1
General Facility Standards

1.1 Introduction

A general description of the facility, site environment and climate, location information, traffic patterns, and the remainder of the permit application are provided in this section.

1.2 General Description

The Gandy Marley, Inc. Triassic Park Waste Disposal Facility will be a full-service Resource Conservation and Recovery Act (RCRA) waste treatment, storage, and disposal facility. The facility will also accept Toxic Substances Control Act (TSCA)-regulated PCB wastes. The facility will offer the following RCRA-regulated services, which are described in this permit application.

- Treatment

  Two treatment processes will be utilized at the facility, including a surface impoundment (i.e., evaporation pond) for managing wastewaters that meet land disposal restriction (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.

- Container Storage

  Two container storage areas will be utilized at the facility for the purpose of staging waste into 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.

- Tank Storage

  Four aboveground storage tanks will be utilized to accumulate regulated bulk liquid hazardous wastes prior to stabilization.

- Land Disposal

  A landfill will be utilized for the disposal of waste that meets LDR standards.

Support facilities and structures, which will not be RCRA permitted, include a chemical laboratory, administration building, weigh scale area, maintenance shop, truck wash facility, clay processing area, clay liner material and daily cover stock piles and a stormwater retention basin.

1.2.1 Facility Name

The facility name is Gandy Marley, Inc. Triassic Park Waste Disposal Facility

1.2.2 Facility Contact

Larry Gandy, Vice President
Gandy Marley, Inc.
Tatum, New Mexico
505/398-4960

1.2.3 Facility Mailing Address

1109 East Broadway
P.O. Box 827
Tatum, New Mexico 88267

1.2.4 Purpose of Facility

The purpose of the proposed facility will be for the treatment and permanent disposal of hazardous wastes in a manner protective of human health and the environment. Wastes that do not meet LDR standards will not be accepted for placement into the landfill or evaporation pond until after appropriate treatment is performed. Wastes such as infectious and radioactive wastes will be prohibited at this facility. The waste analysis plan contains more details regarding wastes that can be accepted at the facility and wastes that are prohibited.

1.2.5 Facility Location

The proposed facility is located in southeastern New Mexico. Approximately 480 acres are included, all on privately owned land, in Chaves County, New Mexico, Sections 17 and 18 of R31E, T11S.

This location is approximately 42 miles east of Roswell and 36 miles west of Tatum, as shown in Figure 1-1. The only major road in the vicinity of the proposed site is U.S. Highway 380, which runs east and west and is located approximately 4 miles to the north. State Highway 172, which runs north and south, is approximately 4 miles to the east and above the Caprock from the proposed site. State Highway 172 is not a major thoroughfare and does not provide access to the proposed site.

1.2.6 Hazardous Waste Generation

Some hazardous waste will be generated as a result of normal facility operations. Various treatment and handling processes and 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. Non-recyclable hazardous wastes will be disposed of onsite.

1.2.7 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 accordingly.

1.2.8 Nonhazardous Refuse Generation

Nonhazardous solid 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. Recyclable wastes, such as office paper, will be sent offsite for usable materials recovery. The disposal of nonroutine waste materials will be administratively controlled on a case-by-case basis in accordance with applicable regulatory requirements.

1.3 Site Environment and Climate

The proposed site is situated on the western edge of a geological bench known locally as the Caprock. The Caprock is characterized by rocky terrain and runs in a north-south direction.

The elevation of the site is approximately 4,150 feet above sea level. Climatic conditions of the area are typical of semi-arid regions 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. The average annual precipitation for the site ranges from 10 to 13 inches. Winter precipitation is usually characterized as 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 reaching 100°F or higher. Night temperatures during the winter months commonly fall below freezing, occasionally reaching below 0°F. The average annual temperature is around 62°F.

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 proposed facility location is within that wildlife habitat designation.

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. 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 (*Scelopurus graciosus arenicolous*) is currently listed as a candidate for protection 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 as a candidate for federal protection.

1.4 Location Information

A topographic map that has been digitized from U.S. Geological Service (USGS) 7.5 minute series, Mescalero Point, New Mexico, 1973 is illustrated in Figure 1-2, which shows facility boundaries, access roads, access control locations, internal roads, and site fences.

The proposed site is located in eastern Chaves County, in an area that has historically been utilized primarily as rangeland for livestock grazing and for limited oil and gas activities. There are no residences near the proposed site.

The proposed site encompasses 480 acres and will be enclosed within a fence. Gates will be constructed to the same height as the perimeter fence. 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 24 hours per day to prevent unauthorized entry and to report unusual events and/or emergencies. They will be responsible for conducting regular inspections and routine maintenance of the perimeter area.

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.

Approximately 2 miles northwest of the proposed 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 most predominant land use in the area of the proposed facility location is for cattle grazing. To a far lesser extent, oil and gas exploration activities are conducted in the immediate area. The nearest production well is situated three miles from the proposed site.

1.4.1 Flood Plain Information

Sections 17 and 18, T11S, R31E are included on Federal Insurance Rate Map #350125. This map has not been printed because the National Flood Insurance Program has determined that this is an area of minimal flood hazards. This information was provided to Gandy Marley, Inc. by the Director of Planning and Environmental Services, Chaves County, New Mexico.

Additionally, rainfall run-off calculations were performed to determine whether the site falls within the flood plain of a 100-year, 24-hour storm event. Using the Precipitation Frequency Atlas published by the National Oceanic and Atmospheric Association, a rainfall amount of 5.3 inches was used in the calculations. The nearest drainage to the proposed site was determined from the USGS 7.5 minute series topographic map of the Mescalero Point Quadrangle. This drainage flows in a westerly direction from Mescalero Point approximately three-quarters of a mile south of the site. Three cross-sections intercepted by the drainage were chosen in the vicinity of the site. The drainage areas for each stream section were measured using a planimeter.

Storm run-off flows were calculated for each area using the Rational Method. Run-off coefficients of 0.55 and 1.0 (no infiltration) were used in the calculations. Next, the

maximum flow that could be accommodated by each cross-section of the stream channel was determined using the Manning formula for open channel flow. In each case, the results showed the 100-year, 24-hour storm flow to be less than 1 percent of the capacity of the channel section. It may be concluded from this comparison that a flood plain does not exist for the drainage, and there are no flood plains within 1 mile of the proposed site.

1.4.2 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 of these individuals will be trained to handle emergencies and to notify appropriate authorities. Each EC will have the authority to commit resources necessary to implement the site contingency plan, described in Section 7.

In addition to onsite emergency response capabilities, cooperative agreements will be established with local emergency response organizations in surrounding communities to respond and assist in cases where emergencies may arise at the facility.

1.5 Traffic Patterns

The flow of traffic within the proposed facility boundary will not be significant except during peak times, which will coincide with 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 describe requirements cautioning 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.

1.5.1 Traffic Control

Access into 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.

1.5.2 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.

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 fingerprinting 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 the laboratory analysis verifies that the waste meets acceptance criteria and that waste characteristics are consistent with profile information from the shipment manifest.

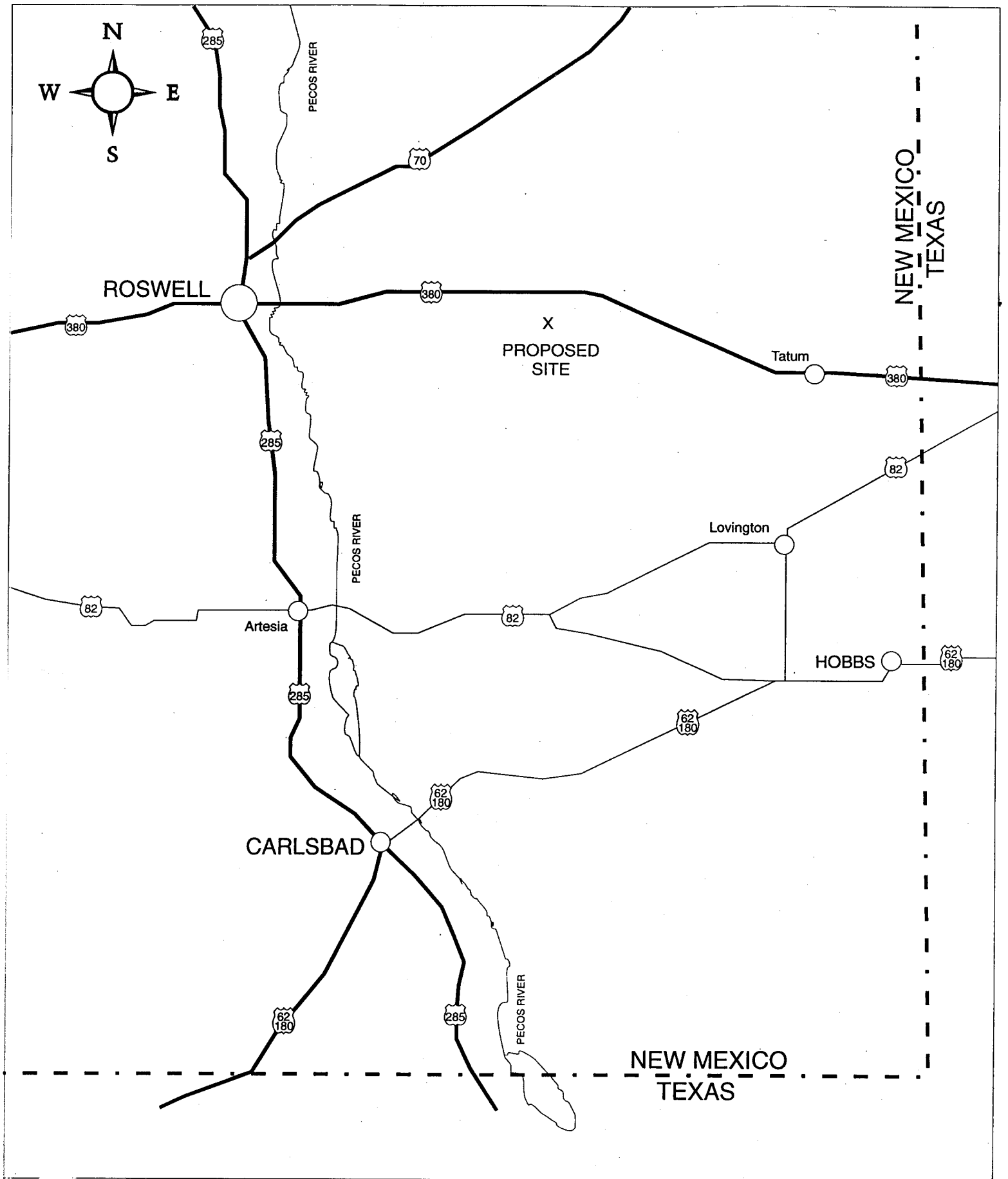
Following determination that waste acceptance criteria have been met, the truck will be directed either to the landfill, in cases where wastes can be directly landfilled (for instance, when all LDR treatment standards are met) or to another station for staging/ storage or further processing.

1.5.3 Routes

Transporters must utilize U.S. Highway 380 to reach the facility. U.S. Highway 380 runs east and west between Roswell and Tatum, New Mexico.

1.6 Remainder of Permit Application

Treatment, storage, and disposal, groundwater protection, justification for a waiver from double liner requirements, waste analysis, procedures to prevent hazards, contingency plan, personnel training, closure, waste minimization, corrective action, and organic air emissions are discussed in the remainder of the permit application. References are also provided.



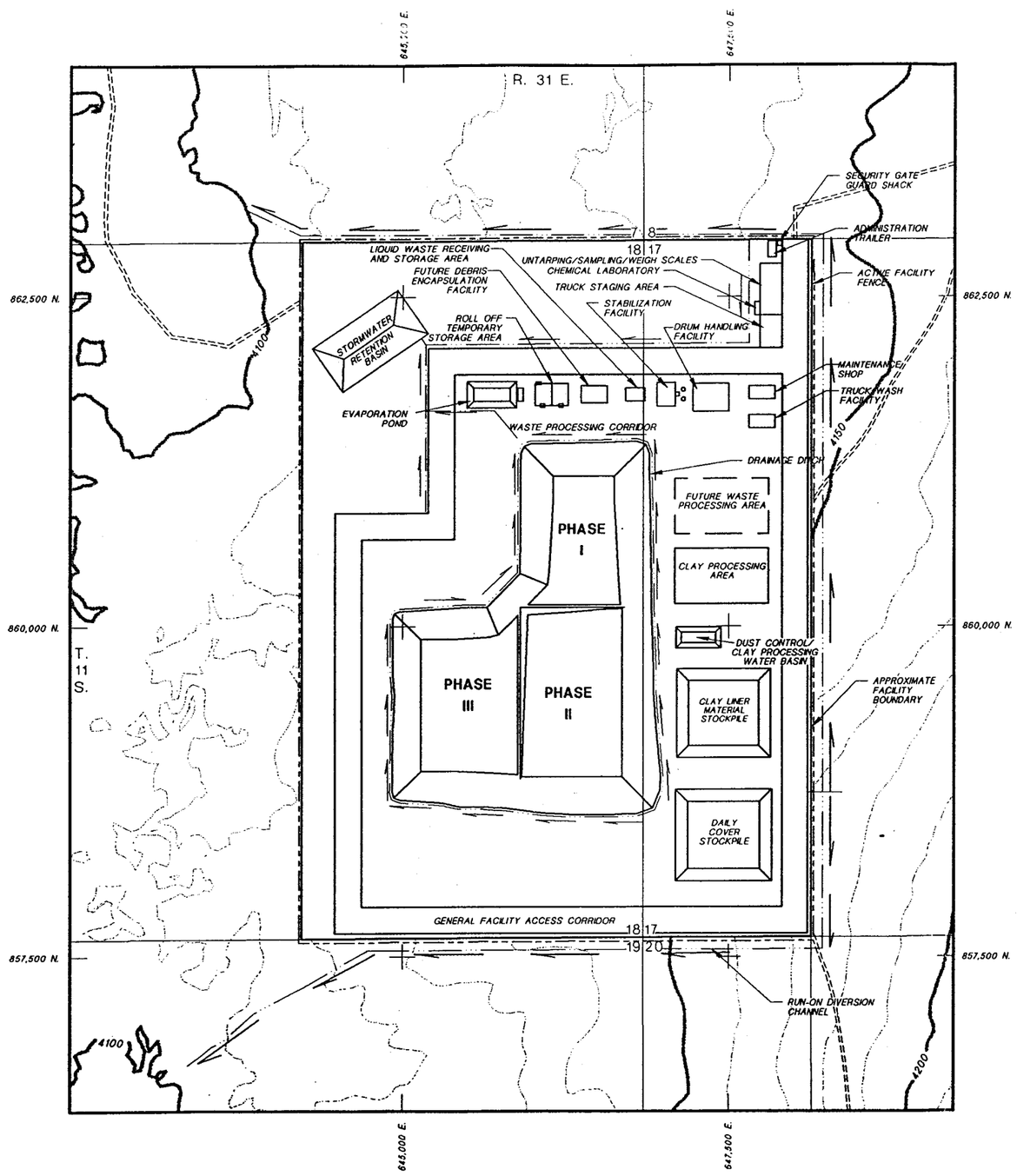
INDEX MAP - PROPOSED SITE

Figure 1-1

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

ONE INCH ≈ 16 MILES



LEGEND

- DIRT ROAD
- FENCE
- SURFACE WATER CHANNEL AND FLOW DIRECTION
- APPROXIMATE FACILITY BOUNDARY
- ORIGINAL SURFACE CONTOURS

Figure 1-2

N

SCALE

500' 0 500' 1000'

CONTOUR INTERVAL 10FT.

NOTES:

1.) TOPOGRAPHY DIGITIZED FROM USGS 7.5 MINUTE SERIES MESCALERO POINT, NEW MEXICO, 1973.

2.) LANDFILL ACCESS RAMP LOCATIONS TO BE DETERMINED DURING FINAL DESIGN.

3.) FACILITY ROAD LOCATIONS TO BE DETERMINED DURING FINAL DESIGN.

No.	REVISION	DATE	BY	CHKD
4				
3				
2				
1				
0	CONCEPTUAL DESIGN FOR PART B APPLICATION	11/94	JGN	JJK

SCALE: SEE SCALE BAR

DESIGN BY: J.KENDALL

DRAWN BY: E.SIMONSEN

CHECK BY: P.CORSER

PROJECT No. 602-0100

FILE NAME: GFMPGAND

GM inc.

PROJECT: TRIASSIC PARK WASTE DISPOSAL FACILITY

DRAWING TITLE: CONCEPTUAL SITE MASTER PLAN

TerraMatrix
Engineering & Environmental Services
1475 Pine Grove Road, P.O. Box 774018
Steamboat Springs, Colorado 80477

SHEET: 1 OF 1

DRAWING No.:

REV. 0

Section 2
Storage, Treatment, and Disposal

2.1 Facility Overview

The site master plan is shown in Figure 2-1. Waste disposal operations consist of five general categories of activities: (1) waste acceptance, (2) waste receiving, (3) waste staging/storage (4) waste treatment, and (5) waste disposal. Each activity is described below.

2.1.1 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 Section 5, 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 Resource Conservation and Recovery Act (RCRA) permit
- Verify that the facility has the capability to properly treat 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
- 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
- Develop a cost estimate for treatment and disposal

2.1.2 Waste Receiving

When the waste has been approved for acceptance at the facility, the waste can be shipped. The facility can be accessed only from New Mexico State Highway 380. When shipments arrive 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 whether to accept the shipment or reject it.

The shipment and shipping papers will be inspected to ensure that the correct inventory has been received, the hazardous waste manifest is properly completed, and a land disposal restriction (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. Waste will be processed only if fingerprint tests are consistent with information provided by the generating facility.

2.1.3 Waste Staging/Storage

Containerized wastes will be moved to the drum handling facility or the roll-off storage area. The purpose of these container storage areas is to provide safe storage of waste prior to introduction into the treatment or disposal system; to ensure adequate accumulation time is available during intervals when the treatment or disposal system is out of service; and to facilitate repackaging as necessary. Bulk solids also may be transferred to either of these container storage areas.

Containerized material and bulk solids also will be transferred directly to the landfill for disposal if all applicable LDR requirements are met, and in the case of containerized material, the container is at least 90 percent full.

2.1.4 Waste Treatment

There are two treatment processes proposed: stabilization and evaporation. Very dilute wastewaters from offsite 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 generator facilities will be treated in the stabilization process. Stabilized waste that meets LDR treatment standards and other treatment criteria will be placed in the landfill.

2.1.5 Waste Disposal

Wastes that arrive at the facility that meet LDR requirements and contain no free liquids generally will be directly landfilled. 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 down to the bottom of the active portion of the landfill. Bulk hazardous wastes will be spread on the bottom of the landfill in 5- to 10-foot layers or lifts. Containers will be placed upright in the cell using a forklift or barrel snatcher, leaving sufficient space around the containers for the placement and compaction of compatible bulk hazardous wastes or soil. In either case, a layer of cover soil sufficient to prevent wind dispersal of waste will be placed

over the bulk hazardous wastes and containers at the end of each working day. The soil cover will be deposited on top of the waste placement face and then spread and compacted with a tracked bulldozer.

The landfill will be laid out in an engineered grid system. 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. A record 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 facility and roll-off storage area. Unit descriptions and unit-specific conditions are presented in Sections 2.2.1 and 2.2.2 for the drum handling facility and roll-off storage area, respectively. Sections 2.2.3 through 2.2.14 list conditions common to both units.

2.2.1 Drum Handling Facility

The drum handling facility design is shown in Figure 2-2. The facility will be a roofed fully enclosed building to prevent run-on from precipitation with many louvers to promote ventilation. The building will be heated during colder months to prevent freezing of liquid wastes and 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 the storage of record keeping information and performance of administrative activities within the building will be located in the building.

2.2.1.1 Containment and Detection of Releases

Wastes stored in the drum handling facility will be placed in individual storage cells segregated by waste type and compatibility. Each storage cell will have a concrete floor that slopes toward a trench covered by steel grating. Each trench leads to a separate secondary containment sump for that cell where any spilled liquids will be accumulated. The secondary containment sump will be lined with an high-density polyethylene (HDPE) liner underlain by a geonet/geotextile composite material, drainage material surrounding a perforated pipe that slopes toward a collection sump pump, and another geomembrane liner. The trench and sump will be sized to contain at least 10 percent of the volume of the containers stored in the cell. Leaks and spills will be removed from the sump in as timely a manner as possible.

The TSCA cells will be surrounded by a 6-inch concrete berm, in addition to the floor trench and sump.

2.2.1.2 Dimensions

The dimensions of the container storage building will be approximately 275 feet long by 113 feet wide. The building floor and loading dock will be approximately 5 feet above the ground level to facilitate the loading and unloading of trucks and prevent run-on from precipitation. The six 12-foot rollup-type loading dock doors will be accessible over a gravel apron. Alignment of the truck beds to the building floor will be performed by an adjustable hydraulic loading platform to allow for the smooth movement of forklifts into the trucks and onto the facility floor. An overhang on the front of the building will prevent precipitation from getting on the drums and into the front area when the doors are open. The entire drum storage facility will cover approximately 60,000 square feet, including the building, truck aprons, and office area.

2.2.1.3 Storage Limits

The facility will contain seven separate containment areas measuring 32 by 63 feet. 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 Toxic Substances Control Act (TSCA) polychlorinated biphenyl (PCB) wastes. Aprons on the ends of the TSCA areas will be tapered to allow for forklift access over the concrete berms. The capacity of the drum handling facility will be 1,120 drums; 160 drums per containment cell. A typical drum layout is shown in Figure 2-2. The final design will specify actual size and orientation of the drum facility layout.

2.2.2 Roll-off Storage Area

Roll-off containers will be stored on an open pad as shown in Figure 2-3. The facility will not be covered or enclosed by walls. The pad will be divided into two sections. One-half of the pad, to be covered by this permit, will hold tarped and U.S. Department of Transportation (DOT) approved lined roll-off containers awaiting treatment at the stabilization facility. The other half of the pad, which will be operated as a RCRA 90-day storage area, will hold tarped roll-off containers of bulk stabilized solid wastes awaiting Toxicity Characteristic Leaching Procedure (TCLP) results prior to final disposal in the landfill. The area will not be equipped with fire extinguishers, telephones, alarm systems, spill control, or first aid kits because of the facility's close proximity to the stabilization facility, which will be equipped with all of this safety equipment.

2.2.2.1 *Containment and Detection of Releases*

The roll-off box storage area will be used to store unstabilized waste that may contain free liquids. Secondary containment for the incoming waste side of the roll-off box storage area is shown in Figure 2-3. The floor of the unit will consist of select fill material underlain by a geotextile, geonet/geotextile composite, and geomembrane liner. The floor will be sloped to a center drainage channel that contains a perforated pipe surrounded by drainage material. Any liquids would collect in the pipe and flow to the secondary containment sump. Leaks and spills will be removed from the sump in as timely a manner as possible. The entire roll-off storage area will be surrounded by a 4-foot compacted soil berm.

2.2.2.2 *Dimensions*

The roll-off storage area (including both halves) will measure approximately 360 feet by 200 feet from the outer edge of the berms. The berm height surrounding the area will be approximately 4 feet. The storage areas will be accessed by 35-foot-wide compacted soil ramps at the center of each storage area. The half covered by this permit will measure approximately 162 feet by 175 feet inside the berms.

2.2.2.3 *Storage Limits*

The permitted capacity of the incoming waste cell will be 44 roll-off boxes. The stabilized waste cell also will have a capacity of 44 roll-off boxes, for a total capacity of the roll-off container storage facility of 88 boxes. A typical box layout is shown in Figure 2-3. The actual number of roll-off boxes placed in the roll-off storage area may vary slightly depending on placement arrangements determined by operations.

2.2.3 Warning Signs

The container storage facilities will have signs posted containing the legend "Danger-Unauthorized Personnel Keep Out" conspicuously posted on the outside and at entrances to the building. In the areas where ignitable or reactive wastes will be stored, "No Smoking" signs will be posted. The signs will be in English.

2.2.4 Proper Waste Storage

Compatibility codes will be assigned to ensure the proper storage of containers within the facility. Containers that contain free liquids will be stored at locations that have adequate secondary containment.

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 facility property line as shown in the site master plan, Figure 2-1. "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 Section 6, Precautions to Prevent Hazards.

2.2.7 Inspection Methods

All container storage areas will be visually inspected at least weekly to monitor the condition of the stored containers and the integrity of the containment system. The inspection will be conducted by entering the area and visually inspecting 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.

2.2.8 Types of Containers

Hazardous wastes will be stored in 10-, 35-, or 55-gallon drums; 20 cubic yard, or similar roll-off boxes; or other DOT-approved containers. Overpack drums also 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 not be obstructed from view during storage.

2.2.10 Condition of Containers

All containers of hazardous waste will be managed under the following conditions:

- Containers will be maintained in good condition. If a container is not in good condition, for example, if the container has severe rust, apparent structural defects, or begins to leak, the hazardous waste will be transferred to a container that is in good condition or the waste will be managed in some other way in compliance with the conditions in this permit application.

- Containers of hazardous waste will be closed during storage, except when it is necessary to add or remove waste.

- Containers storing wastes that are prone to expansion or freezing will be stored inside the drum handling facility, which is designed to maintain the temperature above freezing.

2.2.11 Compatibility with the Container

All containers used to store hazardous waste will be compatible with the container or liner under 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.

- Hazardous waste will not be placed in an unwashed container that previously held incompatible waste or material.

2.2.12 Compatibility with Other Waste

Incompatible liquid hazardous wastes stored within the facility will be separated by a berm, catch pan, or other physical barrier adequate to prevent commingling of incompatible waste. Incompatible solid hazardous waste 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 of containers in the drum handling facility. 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. Roll-off boxes will be spaced 3 feet apart 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 storage facility is shown in Figure 2-4. It will house four aboveground tanks for the storage of regulated bulk liquid hazardous wastes prior to stabilization. The facility will not be covered by a roof or enclosed by walls.

Each tank will have a capacity of approximately 18,000-gallons. The tanks will be single-walled, and constructed of or lined with materials that are compatible with the wastes to be placed in the tanks. The tanks will be elevated above an imperviously coated reinforced concrete pad. Waste will be transferred from the tanks to the stabilization unit.

2.3.1 Containment and Detection of Releases

Secondary containment will be provided by a reinforced concrete bermed enclosure. It will have sufficient strength and thickness to prevent failure owing to pressure gradients, physical contact with waste, climatic conditions, and the stress of daily operations. It will be placed on a base capable of supporting the system, providing resistance to pressure gradients below the system, and capable of preventing failure due to settlement, compression, or uplift. The enclosure will be designed to contain 100 percent of the tank contents, with sufficient additional capacity to contain precipitation from a 25-year, 24-hour rainfall event. Each tank will have its own secondary containment and sump. Each secondary containment area will measure 25 feet by 25 feet. Each bermed area will be sloped to provide drainage to a sump. The floor and berm of the concrete secondary containment areas will be maintained in good condition and free of cracks and gaps that could impair effectiveness of the containment. The concrete will be coated with epoxy or another coating that offers equivalent protection. The coating will cover the entire floor, sump, and berm up to the minimum berm height.

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.

Daily visual inspection will be utilized to detect releases to the secondary containment. Response to releases from tank systems will be initiated within 24 hours of detection. Secondary containment will be emptied by one or more of the following methods:

- Sump - a depression or low point in the structure to which liquids will drain, equipped with a pump that removes accumulated liquids.
- Manual - the application of absorbents or use of a manually activated pump or an equivalent device.

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 system 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 using open-ended lines, 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.
- 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 and level meters.
  - 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.

- 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 the use of signs prohibiting smoking, open flames or welding, an inert atmosphere blanket, or enclosed vents isolated from sources of ignition.

2.3.6 Inspections

Tank systems and ancillary equipment will be inspected once each operating day by entering the area and visually examining each tank system, 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 Section 6, Procedures to Prevent Hazards.

2.3.7 Corrosion Protection

Corrosion protection is not required for single-walled tanks that do not contact soil or water.

2.3.8 Tank Assessments

A written assessment attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste will be provided by an independent, qualified, registered professional engineer after the final tank design drawings have been completed and prior to tank construction.

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.

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 or independent, qualified, registered professional engineer 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 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 and all materials will be removed from the tank or secondary containment within 24 hours or as soon as reasonably possible. Visible releases, if any, will be contained. The tank system will be repaired prior to returning it to service. Major repairs will be certified by an independent professional engineer. The certification will be submitted to New Mexico Environment Department (NMED) within seven days after returning the tank system to service. Major repairs include repair of a ruptured primary containment vessel, and replacement of secondary containment.

2.4 Stabilization

The stabilization building floor plan and typical bin and vault sections are shown in Figure 2-5. The process will consist of four in-ground stabilization bins, two dry reagent silos, two liquid reagent tanks, and a water tank. Trucks and other vehicles will access the facility via the gravel aprons. Additionally, there will be a control room used to direct and coordinate operations.

Bulk liquids, semi-solids and sludges, solids that do not meet LDR treatment standards, and solids that may contain free liquids will be treated in the stabilization unit. As discussed in the waste analysis plan, Section 5, wastes will be tested prior to stabilization to determine the appropriate reagent formula. Dry reagents typically include Portland cement, flyash, and/or lime. Liquid reagents typically include ferrous sulfate, which may be used to detoxify certain wastes and calcium polysufide, which may be used to precipitate certain constituents of the waste. Waste may be offloaded directly from trucks into the stabilization bins, transferred via pipeline from the liquid hazardous waste storage tanks, or transferred from the drum handling facility or roll-off box 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 to mix the waste and reagents. When the waste is sufficiently mixed, it will be tested for free liquids and sampled for TCLP tests, if necessary. It will then be transferred to a roll-off box and transferred to the roll-off box storage area to cure. The backhoe bucket and stabilization bin will be thoroughly cleaned before mixing a load of incompatible waste.

Each bin will be oblong shaped to facilitate proper mixing and will be nominally 25 feet long by 12 feet wide by 12 feet deep. The bins will be supported by a concrete vault. 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, volatile organic compounds, or acid fumes.

2.4.1 Containment and Detection of Releases

The bins will be double-walled steel tanks with sand between the walls that will serve as a primary leak detection system (LDS)/leachate collection and removal system (LCRS). The sand also will act as a cushion to protect the tanks. The concrete vault in which the bins are located will be inspectable and will be sloped so that liquids will be collected in a sump that will serve as the secondary LDS/LCRS.

The tank secondary containment (the outer shell) will have a volume sufficient to contain the contents of each 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 and provide a means to inspect and repair the secondary containment.

Releases into the secondary containment will be detected within 24 hours by liquid sensing instruments (e.g., a magnehelic gage) 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.

All ancillary equipment will be provided with secondary containment unless is it 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.

2.4.2 Management of Incompatible Wastes

No new waste will 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.

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 recipe used for stabilization prevents overfilling.

2.4.4 Feed Mechanism, Pressure Controls, and Temperature Controls

The tanks will be operated at ambient temperature and pressure. Reagents will be pumped from reagent tanks or manually fed. Liquid hazardous wastes will be pumped from the liquid waste receiving and storage facility 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 bins will be protected from sources of ignition by 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 treated to render them non-ignitable or non-reactive.

2.4.6 Inspections

Each bin will be visually inspected once each operating day as described in Section 6, Procedures to Prevent Hazards. 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 these bins because of low humidity and the fact that the units are located indoors. No corrosion protection will be provided; the thickness of the inner tank and outer shell will be increased to compensate. Additionally, as described in the inspection section, visual inspection of the empty bins will be accomplished monthly, and sonic testing will be conducted annually. The system will be designed so that the inner tank and outer shell can be easily removed and replaced, if necessary.

2.4.8 Tank Assessments

A written assessment attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste will be provided by an

independent, qualified, registered professional engineer after the final tank design drawings have been completed and prior to tank construction.

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.

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 or independent, qualified, registered professional engineer 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 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 professional engineer. The certification will be submitted to the NMED within seven days after returning the tank system to service. Major repairs include repair of a ruptured primary containment vessel and replacement of secondary containment.

2.5 Landfill

This section describes the design, construction, and operation of the landfill.

2.5.1 Design of Landfill

The landfill design specifies a double-lined facility with a LCRS above the primary liner and a leachate collection, detection, and removal system between the primary and secondary liners. Existing site topography is shown in Figure 2-6. The landfill subgrade plan is shown in Figure 2-7. The landfill fill plan cross-sections are shown in Figure 2-8. The liners do not meet minimum technological requirements; however, the regulations provide for alternative design and operating practices. Section 4 of this

application, Justification for Waiver from Double Liner Requirements, describes how design and operating practices, together with location characteristics, will prevent the migration of any hazardous constituent out of the landfill into the adjacent subsurface soil or groundwater at least as effectively as the design specified in 40 CFR 264.301(c).

2.5.1.1 Nature and Quantity of Waste

As specified in the waste analysis plan, the facility will accept RCRA hazardous waste and TSCA PCB waste, excluding the following waste types:

- radioactive waste,
- dioxin contaminated waste,
- medical waste,
- municipal garbage,
- explosive waste,
- compressed gases, and
- liquid waste containing PCBs greater than 500 parts per million.

All waste to be placed in the landfill will meet LDR treatment standards. Additional details on wastes to be accepted at the facility can be found in the waste analysis plan.

The facility will have an area of approximately 100 acres and a capacity of approximately 8 million cubic yards of waste.

2.5.1.2 Liner Systems

The landfill liner details are shown in Figure 2-9. The liner system will be installed to cover all surrounding earth that may come in contact with waste or leachate. The top liner system will be a composite consisting of 2 feet of compacted clay with a hydraulic conductivity of 1×10^{-7} cm/sec or less and a flexible membrane liner above the compacted clay on the basal portion of the landfill. The side slope liner will consist of 2 feet of compacted clay with a hydraulic conductivity of 1×10^{-7} cm/sec or less. The bottom liner will consist of the clay subgrade below the landfill site. The subgrade is part of the Lower Dockum, which contains more than 600 feet of mudstone in the project area and is very homogeneous.

The primary liner will be constructed of HDPE and compacted clay on the basal portion and compacted clay on the side slopes that have sufficient strength and thickness to prevent failure as a result of pressure gradients, physical contact with the waste or leachate to which they are exposed, climatic conditions, stress of installation, and the stress of daily operations. The compacted clay liner will provide a foundation/base capable of providing support to the synthetic liner and resistance to pressure gradients above and below the liner. This will prevent failure of the liner due to settlement,

compression, or uplifting. The landfill sides will be sloped steep enough to reduce the hydraulic head on the liner sides. Therefore, contact of liquid with and movement of contaminants through the side slope is expected to be minimal.

Stresses on geosynthetics during installation are likely to be negligible because the HDPE will be terminated, anchored, and backfilled with bentonite less than 10 feet up the side slope of the landfill. Because the slope is low at this point, little tensile stress will be exerted in the liner. The geotextile materials will be horizontally seamed, but with proper thread, overlap, and installation techniques, stresses will be minimal.

Due to the thickness of the operations layer, operational stresses to the liner systems following installation are anticipated to be negligible.

2.5.1.3 Leachate Collection and Removal System

The LCRS will be located above the primary liner system. Figure 2-10 shows typical LCRS details. A filtered LCRS layer will be constructed of a geotextile, a well-graded drainage material, and another geotextile filter. Within the LCRS layer is 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 is shown nominally as 8 inches in diameter but may be modified in the final design.

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 at the landfill; and (3) designed and operated to minimize clogging during the active life and post-closure care period.

The LCRS is sloped such that any leachate above the primary liner will drain to one of three sumps. The sumps and liquid removal methods will be of sufficient size to collect and remove liquids from the sumps and prevent liquids from backing up into the drainage layer.

The sumps will be lined with a composite liner consisting of a flexible membrane liner and two feet of compacted clay with a hydraulic conductivity less than or equal to 1×10^{-7} cm/sec. 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 sump system will be provided with a method for measuring and recording the volume of liquid removed. All pumpable liquids in the sump will be removed in a timely manner to minimize head on the primary liner.

2.5.1.4 Leak Detection System

The design of the LDS is similar to the design of the LCRS. The LDS will be capable of detecting, collecting, and removing leaks of hazardous constituents at the earliest practicable time through all areas of the top liner likely to be exposed to water or leachate during the active life and post-closure care period. A filtered LDS layer consisting of a geotextile, a well-graded drainage material, and another geotextile will be constructed below the clay liner. Within the LDS layer will be the LDS piping, which will be used to detect and remove liquids from between the primary and secondary liners. The piping is shown as nominally 8 inches in diameter but may be changed in the final design.

The LDS will be (1) constructed with a bottom slope of one percent or more; (2) constructed of granular drainage material with a hydraulic conductivity of 1×10^{-2} cm/sec or more and a thickness of 12 inches or more unless an alternate system of equal performance is approved; (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.

The sumps and liquid removal methods will be of sufficient size to collect and remove liquids from the sumps and prevent liquids from backing up into the drainage layer. A method will be provided for measuring and recording the volume of liquids present in the sump and of liquids removed. All pumpable liquids in the sump will be removed in a timely manner to minimize the head on the secondary liner.

2.5.1.5 Run-On/Run-Off Control

The run-on/run-off system will be designed, constructed, operated and maintained to control at least the water volume resulting from a 24-hour, 25-year storm.

The run-on/run-off control system is shown in the site master plan in Figure 2-1. The purpose of the run-on/run-off control system will be to ensure that the amount of liquid entering the landfill will be kept to a minimum, as the liquids could serve as a transport medium for contaminants placed in the landfill, and prevent any contamination present onsite from migrating offsite. Run-on/run-off will be managed according to its source. There would be three sources of run-on/run-off at the facility: (1) run-on originating offsite, (2) run-off from the active landfill, and (3) run-on/run-off from the facility outside of the active portion of the landfill.

Run-on originating offsite will be directed around or away from the proposed landfill area using unlined ditches. Based on the topography of the site, the run-on is expected to move from an east/southeast direction to the west/northwest. This run-off will be diverted directly offsite.

Water from outside the landfill will be prevented from entering the active portion of the landfill by the waste processing corridor drainage ditch. Run-off in the active portion of the landfill will collect in the bottom of the landfill and will be pumped out of the landfill within 24 hours of a storm event. The stormwater pumped out of the landfill will be collected in portable tanks. The water will then be sampled for contamination. Contaminated water will be treated either in the stabilization process or the evaporation pond; treatment residuals will be disposed of in compliance with appropriate regulations.

During the initial stages of the landfill's operating life, run-off from the landfill side slopes above the liner system will be channeled away from the waste by the slope drainage interceptor ditch. This water will flow to a lined containment basin located at the toe of the inter phase berm. This water will be handled as clean water, because it will not come in contact with the landfill waste.

Run-off from the facility but not from the active portion of the landfill (including run-on/run-off from the waste processing corridor drainage ditch) will be directed to the stormwater retention basin.

2.5.1.6 *Wind Dispersal Control Procedures*

Wind dispersal control will consist of a daily cover of sand and dirt from excavation and application of water to all dirt surfaces, including the landfill and roads, on an as-needed basis.

2.5.1.7 *Gas Generation Management*

It is not anticipated that gas generation will be of concern. In general, if organic hazardous or nonhazardous waste is placed in the landfill, landfill gas production can be expected. However, all hazardous wastes to be placed in the landfill will be required to meet LDRs; therefore, the concentration of organics in the hazardous waste is not expected to be high. Additionally, no municipal solid waste or putrescent waste can be placed in the landfill in accordance with the waste analysis plan.

2.5.1.8 *Cover Design*

The design of the final cover is described in Section 9, Closure and Post-Closure of Permitted Units.

2.5.1.9 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, 36 miles from the nearest community. The primary land use in this 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. The base of the proposed landfill will be designed to rest on a 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 low permeabilities of the host sediments (siltstones and mudstones) and engineered barriers such as the liner systems.

2.5.2 Construction

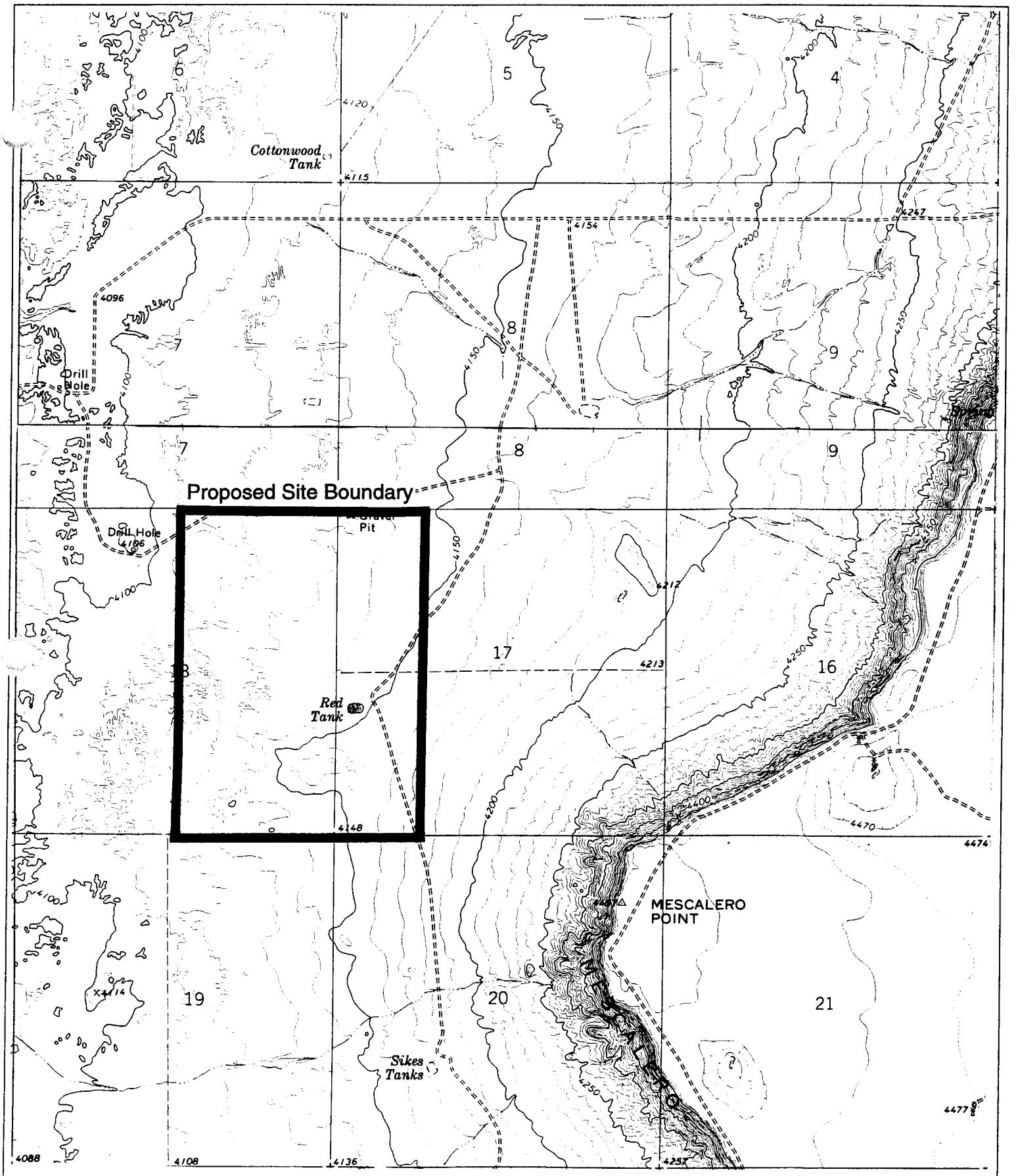
Construction activities will consist of site preparation; excavation and preparation of landfill bottoms and subsurface sides; and liner, LCRS, and LDS construction and construction quality assurance (CQA).

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 facilities will be constructed. A fence will also be installed around the entire facility.

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 later. The landfill bottom will be sloped toward the center to provide drainage of leachate. A subgrade consisting of a 600-foot-thick highly impermeable layer of mudstone will be used as the secondary liner. A LDS will be installed between the primary and secondary liners. A composite synthetic and compacted clay liner with a permeability of 1×10^{-7} cm/sec will be installed as the primary liner. The compacted clay liner will



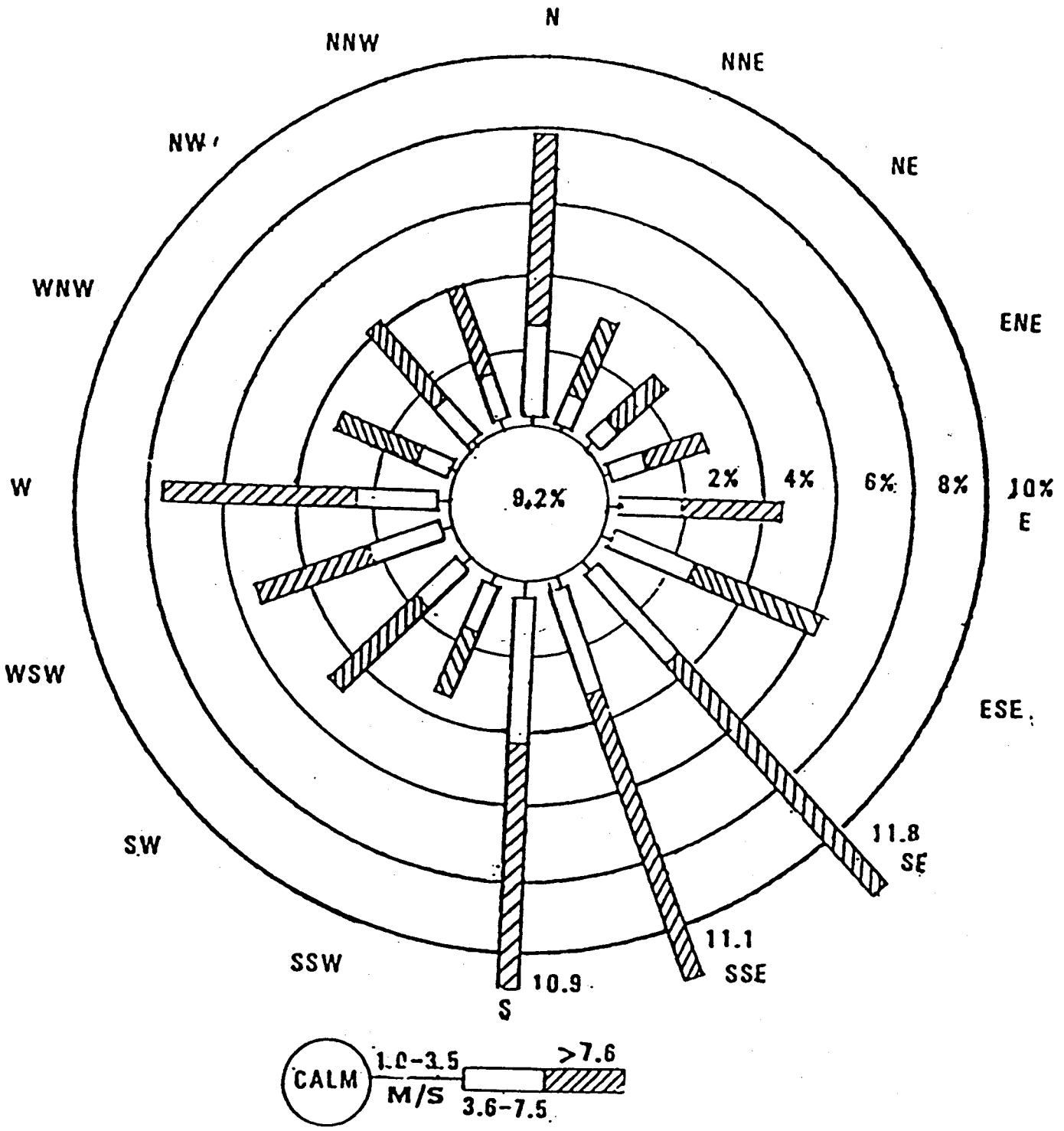
TOPOGRAPHY

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

Figure 3-2

ONE INCH = 2000'



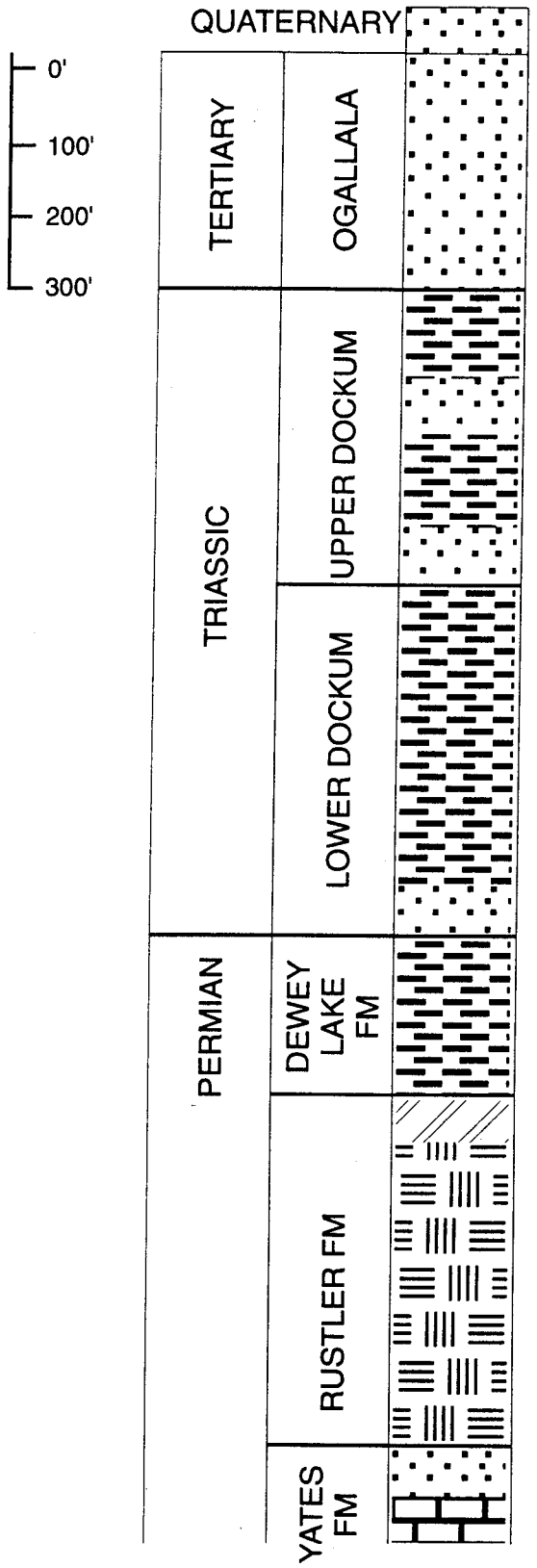
WIND ROSE

Figure 3-3

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

ONE INCH ≈ 2000'



Fine wind-blown sand

Buff colored sandstone interbedded with red-brown clays and siltstone

Red-brown mudstone interbedded with siltstone and silty sands

Red-brown mudstone with thin interbedded siltstone

Basal sand stone red-brown mudstone and siltstone

Anhydrite

Halite

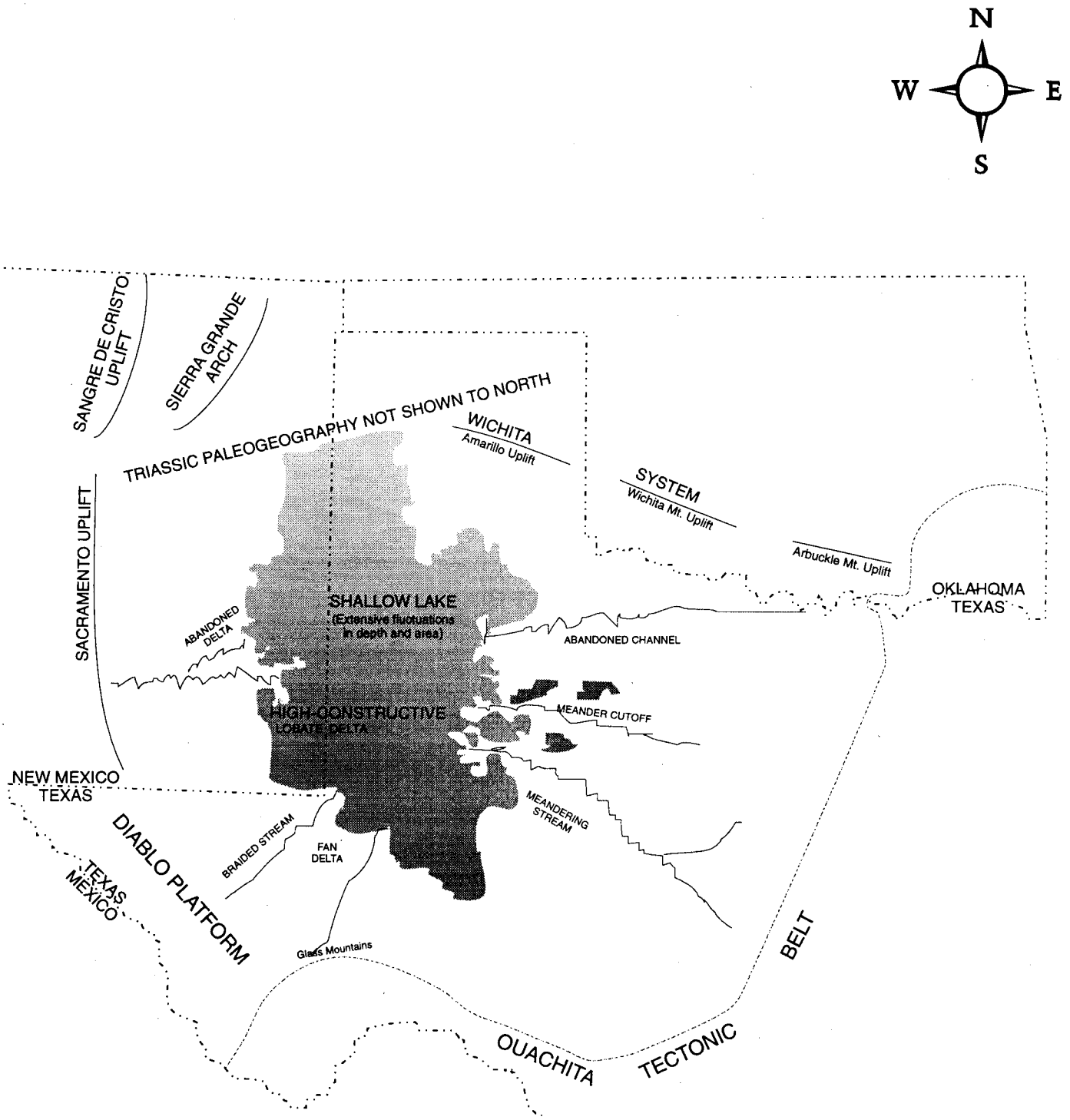
Sandstone interbedded with limestone and dolomite

STRATIGRAPHIC COLUMN

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

Figure 3-4



After McGowen (1979)

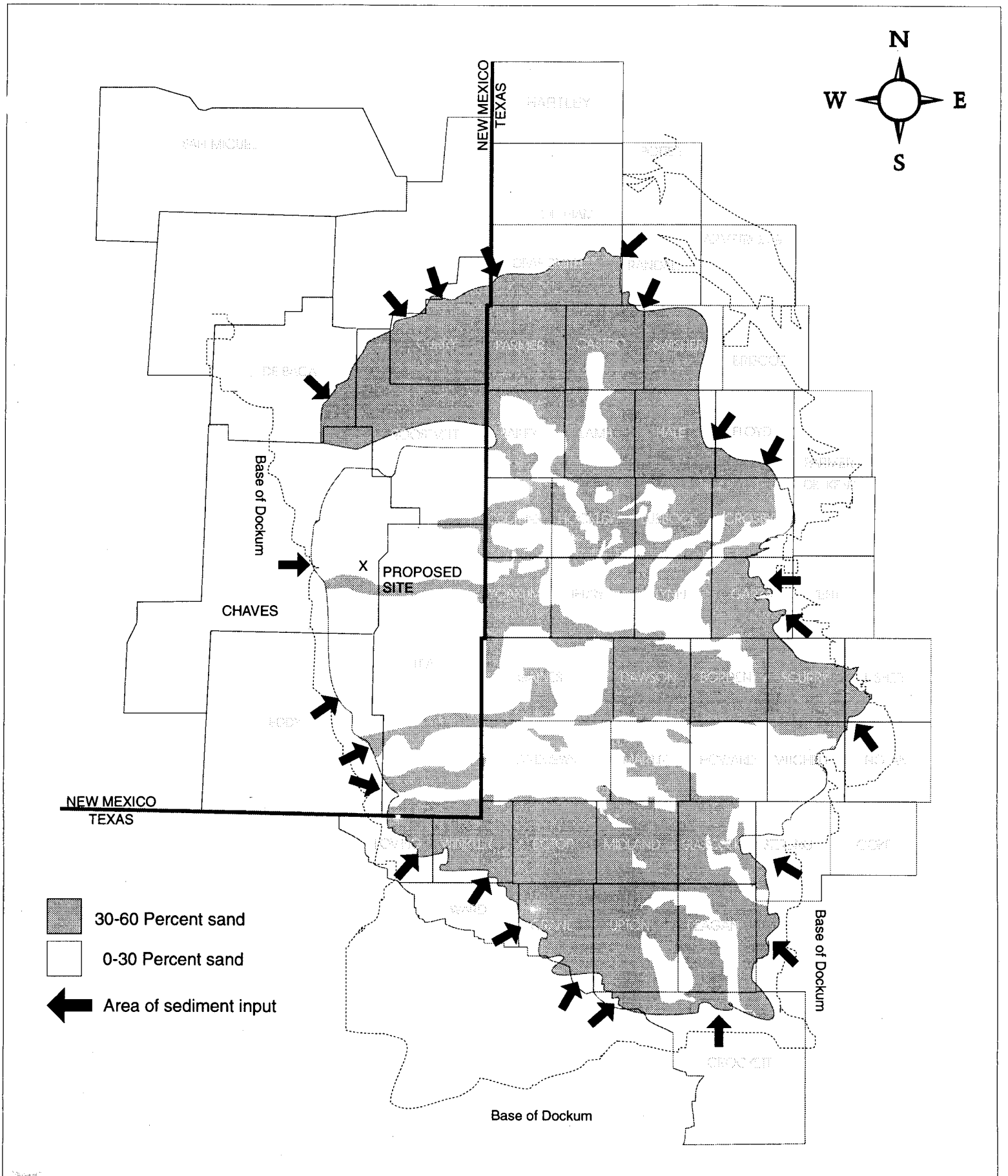
TRIASSIC BASIN-PALEOMAP

Figure 3-5

NEW MEXICO - TEXAS

GANDY MARLEY PROJECT

ONE INCH ~100 MILES



TRIASSIC BASIN-SUBSURFACE

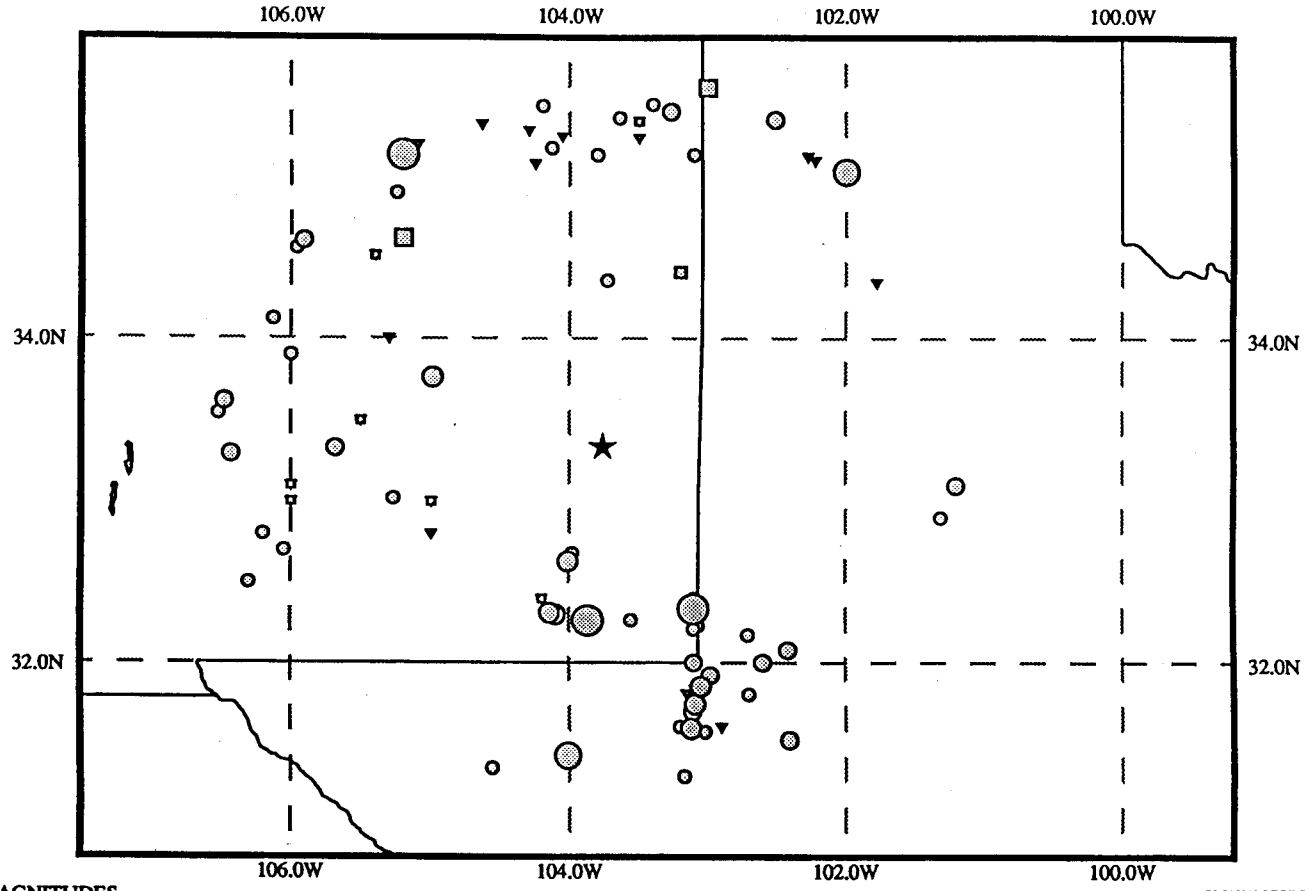
Figure 3-6

NEW MEXICO - TEXAS

GANDY MARLEY PROJECT

ONE INCH ≈ 54 MILES

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	

102 Earthquakes Plotted

NO INTENSITY OR MAGNITUDE

INTENSITIES

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

NATIONAL GEOPHYSICAL DATA CENTER / NOAA BOULDER, CO, 80303

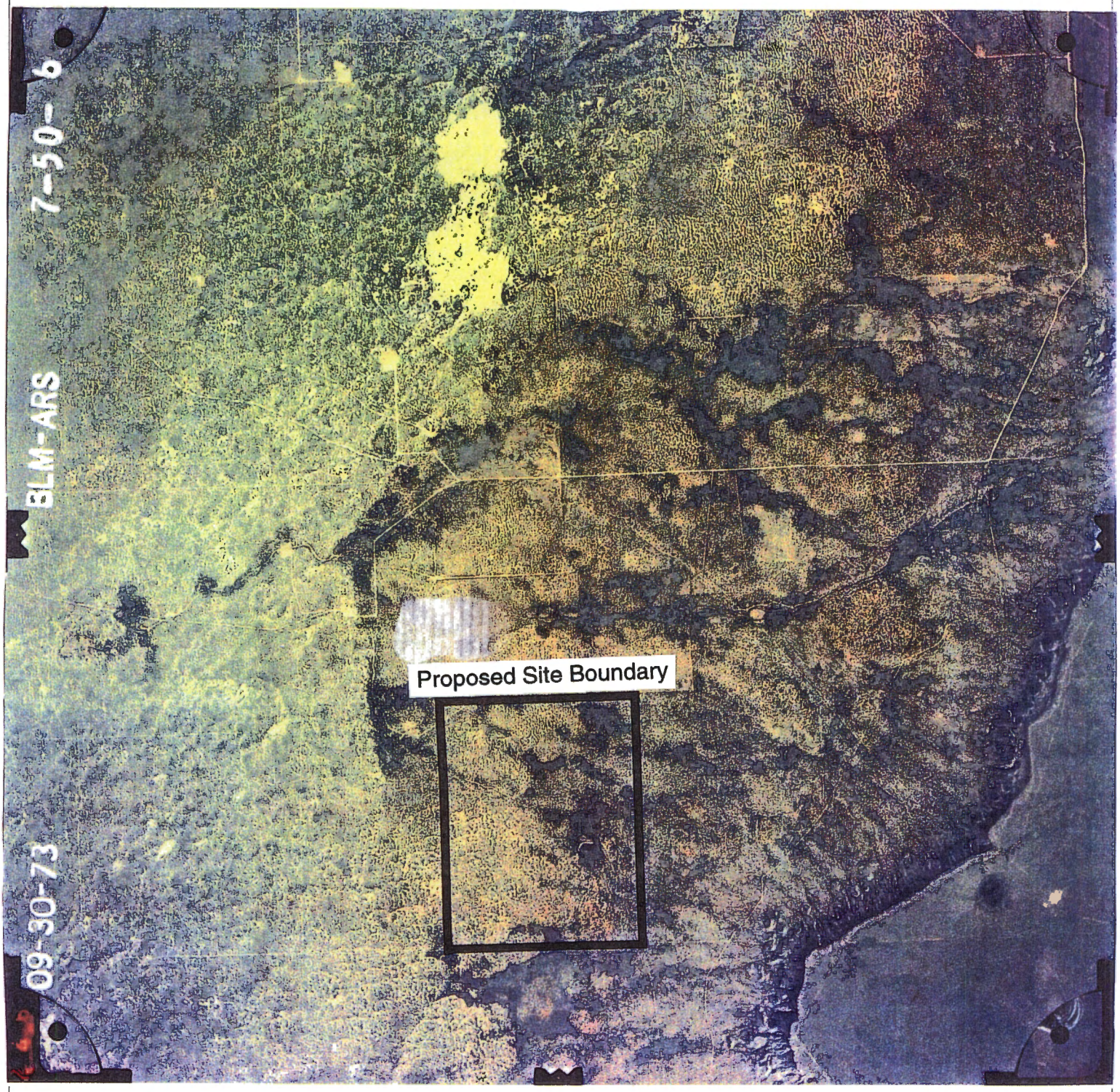
SEISMIC ACTIVITY

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

Figure 3-7

ONE INCH ≈ 2000'



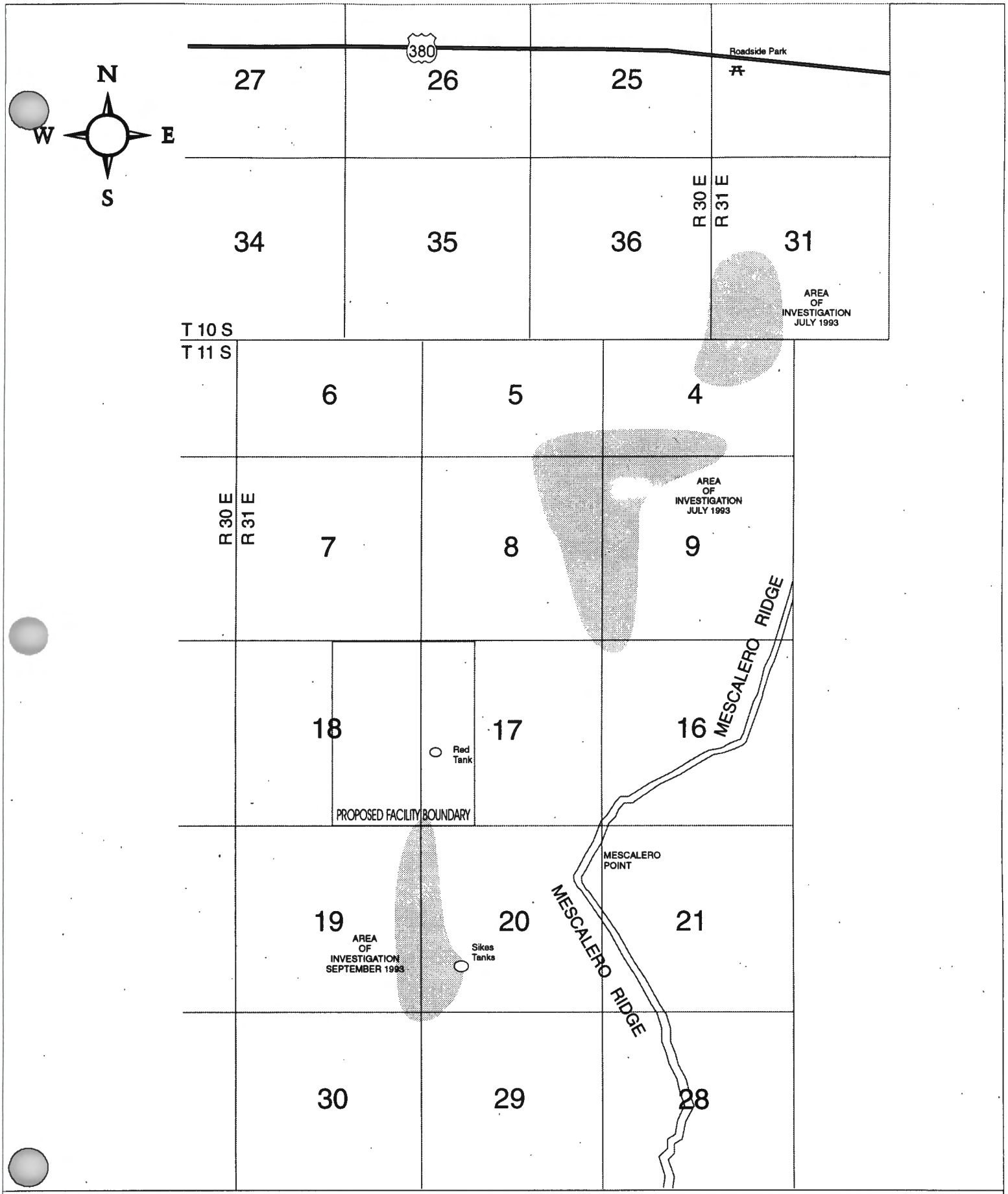
AIR PHOTO

SOUTH EAST NEW MEXICO

GANDY PROJECT

Figure 3-8

ONE INCH ≈ 2000'



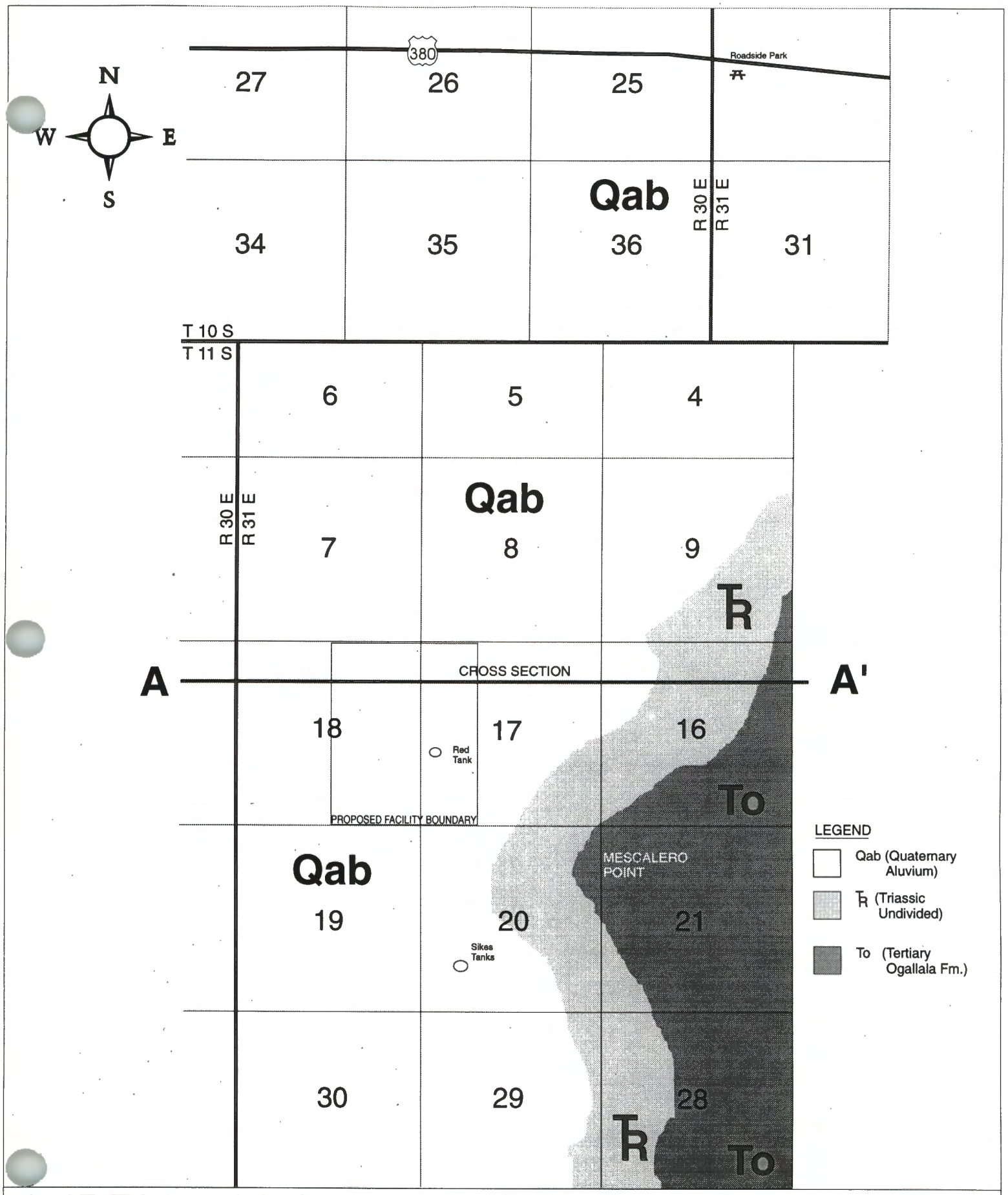
PROJECT AREA

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

Figure 3-9

ONE INCH ≈ 3500'



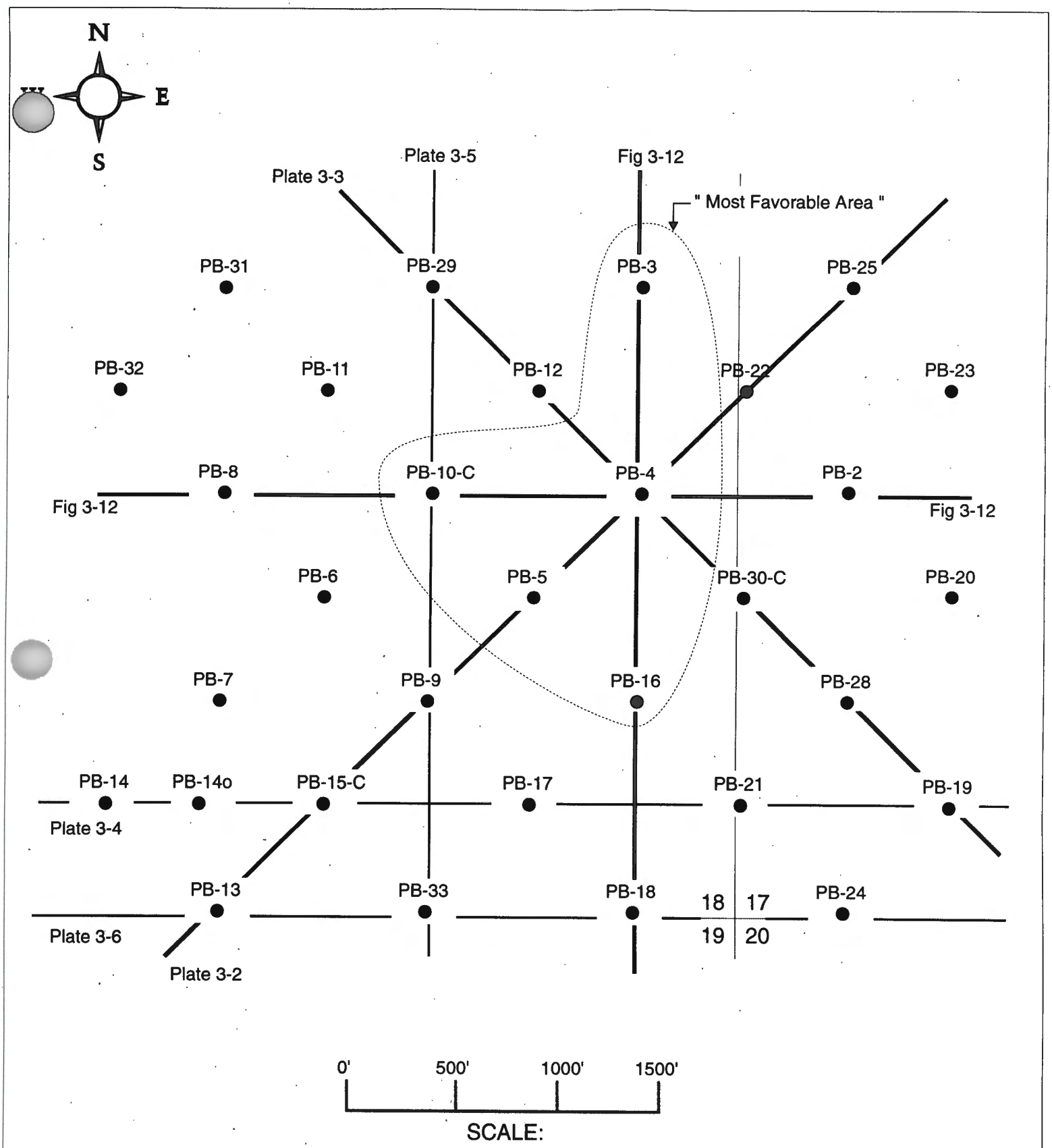
SURFACE GEOLOGY - PROJECT AREA

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

Figure 3-10

ONE INCH ≈ 3500'



"C" denotes location of a corehole

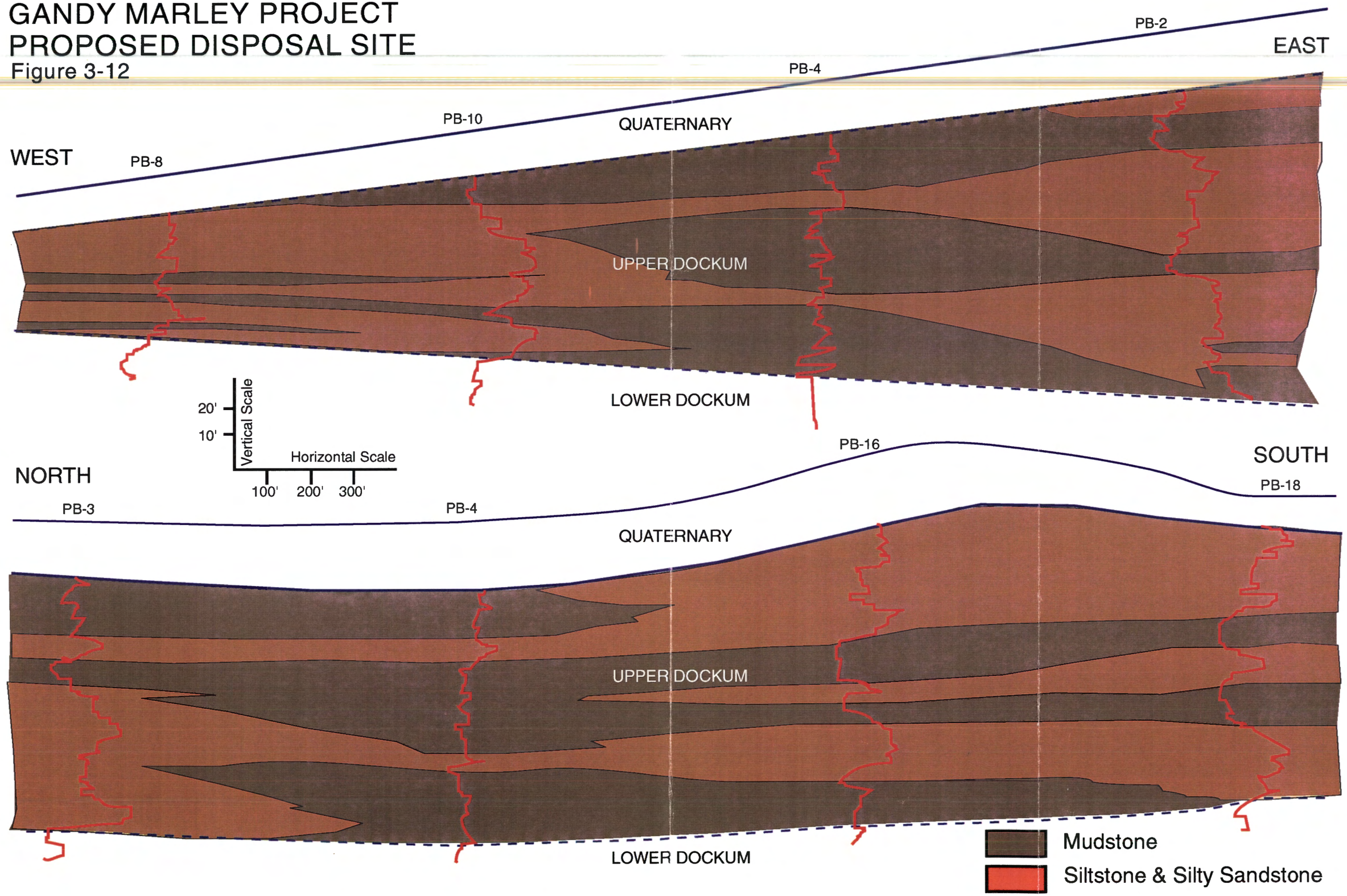
CLOSE-SPACED DRILLING PATTERN

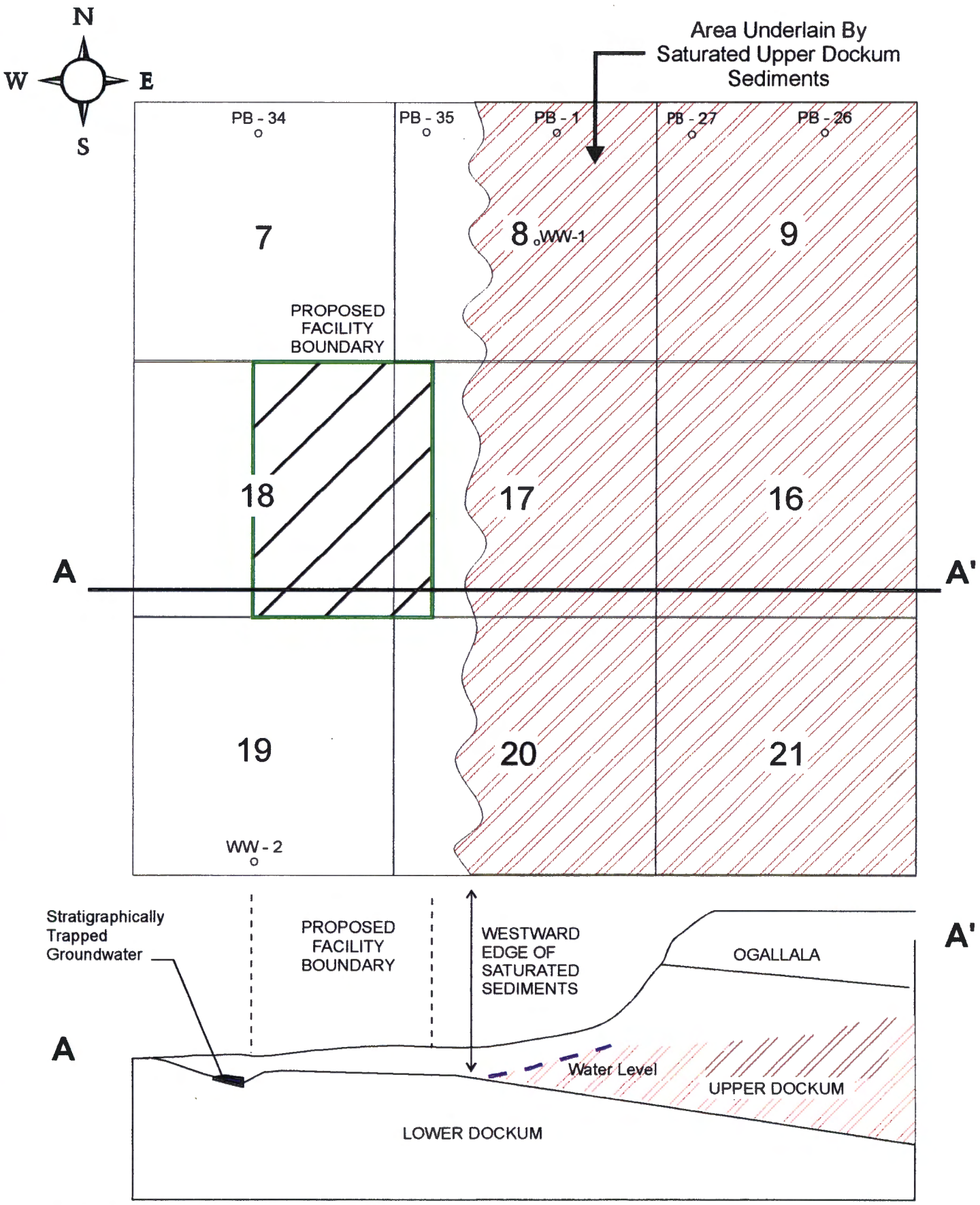
Figure 3-11

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

GANDY MARLEY PROJECT
PROPOSED DISPOSAL SITE
Figure 3-12





UPPER DOCKUM GROUNDWATER

Figure 3-13

SOUTH EAST NEW MEXICO

GANDY MARLEY PROJECT

ONE INCH ≈ 2680'

Section 4
Justification for Waiver from Double Liner Requirements

4.1 Introduction

A waiver from the double liner requirements in 40 CFR 264.301(c) is being requested in accordance with 40 CFR 264.301(d). This waiver justification is being prepared in accordance with "Guidance on Implementation of the Minimum Technological Requirements of HSWA of 1984, Respecting Liners and Leachate Collection Systems, Reauthorization Statutory Interpretation #5D." According to the document, three factors, (1) design, (2) operations, and (3) location, must be considered in evaluating the proper management of liquids that will be the key to obtaining a waiver. Therefore, Gandy Marley, Inc. will demonstrate that the design and operation of the facility ensure proper management of liquids and that the location characteristics minimize the generation of liquids and reduce the migration of hazardous constituents to groundwater.

4.2 Design

The design features discussed in the following sections provide engineered barriers to prevent surface water and groundwater from entering the landfill and from coming into contact with the disposed waste. The run-on/run-off control system will prevent surface water from running onto the site or into the active portion of the landfill. The compacted soil perimeter berm will create a barrier for infiltration of groundwater. After closure, the landfill cover will bar infiltration of precipitation.

Engineered barriers to prevent leachate from migrating from the landfill include a leachate collection and removal system, a leak detection system, and the engineered liner system.

4.2.1 Run-on/Run-off Control System

Based on the topography of the site, water run-on is expected to move from an east/southeast direction to the west/northwest. An unlined run-on diversion channel around the south, east, and northeast perimeter of the site will intercept potential run-on and direct it offsite away from the proposed landfill.

Water onsite is prevented from entering the active portion of the landfill by the waste processing corridor drainage ditch around the perimeter of the landfill. Run-off in the active portion of the landfill will collect in low spots on the clean daily cover soil layer

on top of the waste fill surface. Removal of this water will begin within 24 hours of the storm event.

4.2.2 Perimeter Berm

As discussed in Section 3.7, Groundwater, the quaternary sand layer is identified as a possible water transport layer. Although it is not considered a significant source of groundwater, a perimeter cut-off berm will be constructed that extends from the surface through the quaternary sand to the top of the Upper Dockum Layer. The berm will reduce the possibility of infiltration of water from the quaternary sand layer.

4.2.3 Final Cover

The cover will consist of 2 feet of foundation soil, a high density polyethylene flexible membrane liner, a geotextile/geonet composite, and a 2 feet vegetative layer. The foundation layer will consist of engineered fill material compacted and trimmed to provide a suitable subsurface for placement of the flexible membrane liner. The geotextile/geonet composite will act as a filtered drainage layer to remove any water that is not evaporated in the overlying vegetative layer.

4.2.4 Leachate Collection and Removal System

A leachate collection and removal system that meets all applicable requirements will be installed. The sumps and liquid removal methods will be of sufficient size to collect and remove liquids from the sumps and prevent liquids from backing up into the drainage layer.

4.2.5 Leak Detection System

A leak detection system that meets all applicable requirements will be constructed. The sumps and liquid removal methods will be of sufficient size to collect and remove liquids from the sumps and prevent liquids from backing up into the drainage layer.

4.2.6 Liner Systems

The primary liner system will be a composite consisting of 2 feet of compacted clay with a permeability of 1×10^{-7} cm/sec or less and a flexible membrane liner above the compacted clay on the basal portion of the landfill. The side slope liner will consist of 2 feet of compacted clay with a permeability of 1×10^{-7} cm/sec or less. The secondary liner will consist of the clay subgrade below the landfill site. The subgrade is part of the Lower Dockum, which contains more than 600 feet of mudstone in the project area and is very homogeneous.

A comparison of the effectiveness of the proposed alternate liner system to a Minimum Technology Requirement (MTR) liner system has been prepared based on the net leakage through the liner and the expected travel time through the liner systems. The Hydrological Evaluation of Landfill Performance (HELP) model was used to estimate leakage through rates through the two liner systems and a darcy flux calculation was used to evaluate the travel times through the two liner systems. The results are summarized below.

- The expected leakage from the bottom of the MTR liner system is approximately 0.1 gpad. The expected leakage from the bottom of the proposed alternative secondary liner system (Lower Dockum) is 0.1 gpad.

- Time of travel estimates have been made assuming a hole in any of the FML components in either the MTR liner system or the proposed alternate liner system. The results indicate that liquid would take in the range of 1,000 years to greater than one million years to reach ground water in the Lower Dockum based on leak rates calculated using the HELP model.

Based on the above results, the performance of the proposed alternative liner system is comparable to the MTR system in terms of net leakage rate through the bottom of the liner system and time of travel for liquids to reach groundwater.

4.3 Operation

The landfill will not accept bulk or non-containerized liquid waste or waste containing free liquids; any containerized waste holding free liquids will be solidified such that free-standing liquid is no longer observed prior to disposal in the landfill.

Additionally, leachate will be removed from the leachate collection sumps in a timely manner to minimize the head on the liner. The leachate collection and removal system and the leak detection system will be inspected once per day to ensure that they are functioning properly.

4.4 Location

The physical location of the proposed site in eastern Chaves County, New Mexico, provides natural barriers that help demonstrate that a waiver is justified.

4.4.1 Geographic Location

The proposed site is located in a remote, unpopulated portion of New Mexico, 36 miles from the nearest community. The primary land use in this area is ranching, which will not be impacted by landfill operations.

4.4.2 Geologic Setting

The proposed site is to be developed within impermeable, geologically stable sediments of the Dockum Group of Triassic age. The base of the proposed landfill is designed to rest on a 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 low permeabilities of the host sediments (siltstones and mudstones) and previously described engineered barriers.

4.4.3 Water Balance

The climate at the location is advantageous with respect to minimizing the driving force for contaminant transport. Precipitation data at the Roswell weather station indicate that mean annual precipitation is 10.61 inches. It is estimated that 96 percent of the annual precipitation is lost to evapotranspiration, with a net recharge to groundwater an estimated 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.

4.4.4 Groundwater

Sediments underlying the proposed landfill are unsaturated to a depth of more than 600 feet. There is no groundwater production from the proposed host sediments (Triassic age) within a 5-mile radius of the proposed site. Samples taken from saturated sediments 2,500 feet down-gradient from the proposed site indicate the presence of small quantities of poor to very-poor quality groundwater in the uppermost aquifer.

4.4.5 Contaminant Transport Analysis

The results of the analysis indicate that a solute would travel laterally at an interstitial velocity of 5.39×10^{-5} cm/sec and would require 448 years to reach the uppermost aquifer. This is an extremely conservative estimate of travel time for the following reasons: (1) it was assumed that the migration pathway was entirely within siltstones and the saturated hydraulic conductivity of the siltstone used in 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 analysis are orders of magnitude greater than unsaturated values.

4.5 Conclusion

The design and operation of the facility ensure proper management of liquids, and the location characteristics minimize the generation of liquids and reduce the migration of hazardous constituents to groundwater. Therefore, the alternative design and operating

practices, together with location characteristics, are as effective as the double liner systems required in 40 CFR 264.301(c).

Section 5
Waste Analysis Plan

5.1 Introduction

This waste analysis plan describes procedures and analytical methods that will be used to evaluate wastes received and generated at the facility. The plan summarizes the facility's waste acceptance program, waste tracking system, sampling methods, analytical methods, and quality assurance/quality control (QA/QC) procedures.

5.1.1 Regulatory Requirements

Regulatory references cited in this plan include U.S. Environmental Protection Agency (EPA) regulations found in 40 CFR Part 264 Subpart B, 40 CFR Part 268, and 40 CFR Part 261, which have been adopted by the State of New Mexico in the New Mexico Hazardous Waste Management Regulations.

40 CFR Section 264.13(a) describes the general requirements for waste analysis (i.e., sampling and analysis of the waste). Section 264.13(b) requires the owner/operator of a treatment, storage, and disposal facility to develop and follow a written waste analysis plan describing the procedures that they must carry out to comply with Section 264.13(a). Section 264.13(c) describes the requirements with which facilities accepting wastes from offsite sources must comply. Section 268 describes the land disposal restrictions (LDRs). Section 261 describes the criteria for identifying the characteristics of hazardous waste.

5.1.2 Description of Wastes Generated and Received at the Facility

The facility is expected to generate the following types of wastes:

- Leachate from the landfill and surface impoundment

  Handling of leachate from the landfill and surface impoundment are discussed in Section 5.2.3.

- Personal Protective Equipment (PPE)

  PPE may include tyvek suits, shoe covers, gloves, respirators, etc. The waste is likely to be non-hazardous, but it will be characterized and disposed of appropriately.

- Spill residues

  The type and extent of the spill will determine the necessary type of analysis, treatment, and disposal.

- Sanitary trash

  These materials will be disposed of offsite.

- Run-on and run-off

  Diversion ditches will be in place to prevent water from running onto the site or into the landfill. Run-off will be collected and tested after storm events to assure that no contaminated water leaves the site.

The facility will receive bulk solids and liquids from offsite generators. It should be noted that free liquids will not be placed in the landfill.

The following wastes will not be accepted:

- Polychlorinated biphenyl (PCB) liquids that are ignitable or have PCB concentrations > 500 ppm
- Class A explosives
- Radioactive/nuclear
- Infectious/biologic/pathogenic
- Dioxins (EPA codes F020, F021, F022, F023, F026, F027)
- Municipal garbage
- Compressed gases
- Unknown or unidentified wastes

5.2 Waste Acceptance Program

This section provides a summary of the facility waste acceptance program and includes a description of (1) requirements for offsite generators that must be met before generators will be authorized to send any waste to the facility, (2) first-time and ongoing waste acceptance procedures for offsite waste generators, and (3) waste acceptance procedures for onsite-generated waste. The waste acceptance program establishes the procedures that will be used to inspect and verify each shipment of hazardous waste received at the facility to ensure that the waste received matches the waste description provided by the generator.

5.2.1 First-time Waste Acceptance Criteria and Procedures for Offsite-Generated Waste

Offsite generators will be required to meet specific acceptance criteria before their waste will be accepted at the facility. These criteria are described below.

5.2.1.1 *Pre-Shipment Procedures*

Gandy Marley, Inc. will require that waste generators supply a waste profile sheet and a representative sample of the waste prior to sending the initial shipment of any specific waste type. The waste profile will include waste characterization data and the generator's basis for the data (i.e., process knowledge or laboratory analysis). The waste profile sheet provided in Appendix 5A may be used by generators or a form supplied by the generator with comparable information may be used. Table 5-1 lists the parameters that the generator waste profile must include at a minimum, with the rationale for each of the parameters.

Each different waste stream from each generator will be subjected to complete analysis by an independent laboratory the first time the waste stream is received at the facility. Each waste with reactive properties also will be tested for compatibility with the landfill liner. Guidance for selecting analytes and analytical methods for conducting this complete sample analysis are described in Section 5.5. The analytical results will be compared with the generator's waste profile, and discrepancies will be resolved with the generator prior to granting approval to the generator to ship the waste. The waste profile and analytical results also will be compared against the facility's permit to determine if the waste is acceptable for storage, treatment, and disposal at the facility. A flow diagram of the pre-acceptance procedures for first-time waste shipments is provided in Figure 5-1.

Generators with waste types that have been previously accepted at the facility will be required to supply a new waste profile or representative sample only if the process generating the waste has changed, or if the generator is requested to do so by the facility for an annual or biennial waste verification, as described in Section 5.2.2.3.

5.2.1.2 *Procedures to Ensure Compliance with LDR Requirements*

The waste pre-approval procedures described in Section 5.2.1.1 will be used to screen wastes for LDR compliance before the wastes are received onsite. Incoming waste procedures will require that all documentation, including the manifest and LDR certification, be reviewed against the waste profile sheet and the fingerprint test results (described in Section 5.2.2.2) to confirm the characterization. Unresolved discrepancies in the paperwork or between the paperwork and analytical results will cause the load to be rejected.

Wastes that are treated onsite in the solidification unit will be tested after treatment and before disposal to verify that LDR requirements have been met. All information obtained to document LDR compliance will be maintained in the facility operating record.

5.2.2 Ongoing Waste Acceptance Procedures for Offsite-Generated Waste

All wastes that have been authorized at the facility, whether from new or existing generators, will follow a similar path of acceptance and routing at the facility. These procedures are described in the following sections.

5.2.2.1 Incoming Waste Shipment Procedures

When a waste has been approved for treatment and/or disposal at the Gandy Marley, Inc. facility as described in Section 5.2.1.1, the waste may be scheduled for shipment. Twenty-four-hour notice will be required from the generators prior to waste shipment. This will enable the facility to prepare for receipt of the waste, which may include ensuring adequate capacity exists in the container storage area or treatment unit for the incoming waste, preparing for sample collection and fingerprint analysis, and preparing all necessary paperwork 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.

Incoming waste shipment procedures are shown in Figure 5-2. When a waste shipment arrives at the facility, the truck will be routed to a parking area outside the facility gate while paperwork is reviewed. The paperwork required to be submitted includes a waste manifest, an LDR certification, and a copy of the waste profile sheet (or waste profile number if already on file) for the waste in the shipment. The paperwork will be reviewed for completeness and checked against the waste shipment to verify that the number of containers and waste labels match the description on the manifest. If the paperwork is in order, the truck will be routed to a sampling parking area inside the gate. If a significant 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. If a discrepancy with the manifest cannot be resolved within 15 days of receiving the waste, a letter will be submitted to New Mexico Environment Department (NMED) describing the discrepancy and any 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). All discrepancy resolutions will be documented in writing and maintained in the operating record.

At the truck sample station, the load will be visually inspected and sampled by facility personnel. Certain loads may not be sampled, at the discretion of the facility manager or laboratory supervisor, for environmental and safety reasons. In these cases, the generator will be required to provide a signed certification that the load conforms with the waste profile sheet.

5.2.2.2 *Fingerprint Testing*

Samples will be collected from each different waste stream in a waste shipment for fingerprint testing of parameters that will be appropriate for the waste type. Sampling procedures, including types of samples and composite and random sampling methods, are described in Section 5.4.

Fingerprint tests will serve as a check to assure that the generator description of the waste is correct. This check will assure that (1) incompatible wastes will be correctly segregated; (2) only approved EPA codes will be accepted; and (3) other characteristics that affect storage, treatment, or disposal will be properly identified. The waste will be fingerprinted for parameters selected from the parameters that the generator analyzed as reported on the waste profile sheet. The selected parameters must have an associated analytical method listed in Section 5.5 to be included in the fingerprint test.

One qualitative and one quantitative parameter must be analyzed at a minimum, as listed in Table 5-2. The selection of parameters should involve consideration of the following factors:

- The identity of certain waste types that are not permitted (this may require selection of parameters not reported by the generator)
- A determination of whether the wastes are within the management unit's operational acceptance limits
- Potential ignitability, reactivity, or incompatibility of the wastes
- An indication of any changes in waste composition that may have occurred during transportation or storage

One of two possible methods will be used for fingerprint testing to determine waste compatibility. The first method will involve process knowledge and the second will involve chemical analysis.

Process knowledge or assessment information provided on the waste profile sheet may be used to assign compatibility codes to each waste type based on Appendix V of 40 CFR Part 264. Potentially incompatible wastes will not be stored, treated, or disposed in the same location.

Chemical analysis will be accomplished in three steps, as appropriate for the waste being analyzed. The first step will involve an analysis of the waste for reactive cyanide and sulfide, which 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).

The second step will involve evaluation of the reactivity characteristics of the waste through process knowledge and a series of analytical procedures that will be used to test for the presence of reactive chemical groups. The procedures in the EPA document *Design and Development of a Hazardous Waste Reactivity Testing Protocol*, February 1984, EPA-600/2-84-057 will be followed with the results used to assign the waste a reactivity group designation. Figure 5-3 summarizes the reactivity testing protocol.

The third step will involve use of the reactivity group designation to evaluate compatibility of the waste with other wastes by comparison to the compatibility matrix, which is provided in Figure 5-4. Refer to EPA document *A Method for Determining the Compatibility of Hazardous Wastes*, April 1980, EPA-600/2-80-076 and Appendix V of 40 CFR Part 264 for additional information on waste compatibility. A waste may be rejected from acceptance at the facility based on incompatibility with other wastes as determined from this process.

Sorbents that have been added to any waste must be nonbiodegradable as defined in 40 CFR Part 264.314. The waste profile sheet must specify whether or not a sorbent was added to the waste. If a sorbent was added, the type of sorbent must be identified and whether it is biodegradable must be indicated. If any of this information is not present, the generator will be contacted for clarification. When an uncertainty remains as to the biodegradability of added sorbent but the type of sorbent is known, 40 CFR 264.314(e)(1)(i-iii) will be reviewed. These sections provide a list of sorbents that are known to be biodegradable. If the sorbent's biodegradability cannot be determined from the list or if the name of the sorbent is unknown, the material must be analyzed to assure that it is not biodegradable following one of the American Society for Testing and Materials (ASTM) tests referenced in 40 CFR Part 264.314(e)(2). If the waste is determined to contain biodegradable sorbents, it must be rejected.

If the fingerprint test confirms the generator information provided on the waste profile and manifest, the shipment will be accepted and the manifest will be signed by facility personnel. The waste will then be sent to the container area to await treatment and/or disposal or will be transferred directly to the treatment or disposal area.

If the fingerprint test conflicts with the waste profile information, the facility may take 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.

- 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.

5.2.2.3 *Ongoing Complete Waste Analysis*

Periodically the facility will perform corroborative testing of incoming waste streams, to confirm the information provided by the offsite generator on the waste profile sheet.

Retesting of each waste stream will also occur. The frequencies for retesting are outlined below. If one or more waste shipments in a calendar year from any single generator does not match the fingerprint tests, full sample analysis of each waste stream from that generator will be performed annually. Waste analysis performed by an independent analytical laboratory for purposes of resolving discrepancies between generator information and fingerprint tests, as described in Section 5.2.2.2., will be adequate to meet this requirement.

If all waste shipments in any given calendar year from a single generator match the fingerprint analyses, full sample analysis of each waste stream from that generator will be performed biennially.

A generator must notify Gandy Marley, Inc. if the process generating a waste stream changes significantly. The generator must send the facility a revised waste profile sheet and a representative sample of the waste prior to the first shipment of the waste after the process changes. The waste must pass the requirements for the initial receipt of a new waste, as described in Section 5.2.1.1., for the facility to continue to accept the waste stream.

5.2.3 Waste Acceptance Procedures for Onsite-Generated Waste

Wastes that are to be treated at the stabilization unit prior to disposal in the landfill may be tested to determine an appropriate treatment "recipe" prior to accepting the waste. Selection of treatment reagents and quantities will be established based on the waste profile and on the post-treatment LDR requirements.

After wastes have been treated at the stabilization unit, they must be retested to determine if they meet LDR requirements prior to placement in the landfill. All solidified wastes will be tested for the presence of free liquids using the paint filter test, and will be analyzed for other parameters based on the characterization of the waste before solidification. For most materials, the toxicity characteristic leaching procedure (TCLP) extraction method will be performed, followed by analysis of the leachate for the appropriate parameters. Refer to EPA test method 1311, 40 CFR Part 261, Appendix II. The EPA universal treatment standards promulgated on September 19, 1994, will be met for wastes treated onsite.

Leachate will be generated from the landfill and surface impoundment. It will be pumped out of the unit sumps into tanks or tanker trucks. It will then be tested to assure compliance with LDR requirements as defined in 40 CFR Part 268 for F039 listed wastes. A procedure will be developed to address the frequency and required parameters for leachate analysis. Leachate that is analyzed and meets applicable requirements will be placed in the surface impoundment. Leachate that does not meet applicable requirements will be treated before landfilling.

5.3 Waste Tracking System

Each incoming batch of waste (same waste stream in a shipment) will be tracked using a unique numeric or alpha-numeric designation. This designation will be recorded on (1) all incoming paperwork from the generator, (2) samples received from the generator, (3) samples taken onsite, and (4) site-generated paperwork and records.

A file will be maintained for each batch of waste received, including all generator supplied information, results of fingerprint and additional analyses performed, and documentation concerning the final disposition of the batch.

5.4 Sampling Methods

Sampling methods that will be used will follow Appendix I of 40 CFR Part 261. Table 5-3 lists waste matrices and appropriate sampling methods. The methods and equipment used for sampling wastes will vary with the form and consistency of the material to be sampled.

Random sampling will allow for the collection of a set of unbiased samples to obtain a representative sample for an entire batch of waste; EPA-approved ASTM method D 140-70 identifies the method for estimating the number of containers to sample.

Composite sampling is the process of taking several samples and combining them into one sample, which is then analyzed for constituents of concern. It is a valid method for homogeneous samples.

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 first. Afterward, samples will be disposed with compatible waste batches. Records of the date the samples are removed from storage and the date and method of disposal will be maintained.

5.5 Analytical Methods

Table 5-2 lists analytical methods for fingerprint samples. Methods appropriate for a given sample type and composition will be selected from this table.

Analytical methods used for the full characterization will follow Test Methods for Evaluating Solid Waste: Physical and Chemical Methods (SW-846, EPA). Methods appropriate to the waste type will be selected using process knowledge. Examples of parameters and corresponding analytical methods that could be used are provided in Table 5-4. Table 3 of 40 CFR Part 261, Appendix III contains a list of SW-846 methods appropriate for waste characterization.

5.6 Quality Assurance/Quality Control

All sampling and analytical procedures will include provisions for sound quality assurance/quality control practices.

The onsite laboratory manager will have responsibility for developing and implementing a written QA/QC program for the laboratory. The laboratory manager will have the following additional responsibilities:

- Ensuring that laboratory personnel are adequately trained to perform sampling and analytical procedures
- Ensuring that equipment and instrumentation under their control are calibrated and functioning properly
- Coordinating internal and external quality assurance audits
- Reviewing procedures and QA plans of outside laboratories used

The laboratory QA/QC plan will include procedures for sample management, including document creation, bottle preparation, sample preservation, sample receipt, sample storage, chain-of-custody documentation, reporting, and sample and records retention.

QA/QC practices will be considered during the selection of independent analytical laboratories. QA/QC practices that will be reviewed include written procedures, certifications, internal and external audits conducted, personnel training, and chain-of-custody procedures.

Table 5-1
Parameters Required on Generator Waste Profile

Parameter	Rationale
EPA hazardous waste code(s)	The EPA hazardous waste code for each hazardous constituent must be identified, along with the concentration of those constituents in the waste to be disposed of.
Waste type/waste description	A description of the waste based on both process knowledge and analyses must be provided. The waste description is used in the assignment of compatibility codes. A primary emphasis of the fingerprint analysis is to verify the generator waste description.
Waste subject to the land disposal restrictions	Wastes subject to the land disposal restrictions must be treated to meet requirements listed in 40 CFR Part 268 prior to land disposal. Wastes received for direct disposal at this facility must meet these treatment requirements. Wastes subject to land disposal restrictions that are received for treatment at this facility must be so designated on the shipping papers. These wastes may only be stored at this facility for the purpose of accumulating quantities of waste necessary to facilitate proper treatment and disposal.
Physical state of waste/ presence of free liquids	This facility can only accept waste containing free liquids for treatment, not for direct disposal (except small amounts in lab packs).

Table 5-2
Analytical Methods for Fingerprint Samples

Test	Method and Description	Qualitative or Quantitative
Appearance	Physical identification, color, viscosity, phase, and odor (ASTM D4979)	Qualitative
Free Liquids	Paint filter test, penetrometer, or visual	Qualitative
Ignitability	Match test, Pansky-Martens closed cup or Set-a-flash	Qualitative
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	Quantitative
pH	Electrode or pH paper (ASTM D4980)	Quantitative
Radioactivity	Geiger counter	Quantitative
Specific Gravity	Hydrometer	Quantitative
Sulfide screen	ASTM 4978	Quantitative

Table 5-3
Sampling Methods

Waste Material	Sampling Method	Sampling Equipment
Extremely viscous liquid or sludge	ASTM D140-70	Coliwasa, 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
Flyash-like material	ASTM D2234-76	Tube sampler, trier, auger, scoop, shovel
Containerized liquids	SW-846	Coliwasa, tube sampler, weighted bottle, dipper, thief

Table 5-4
Some Parameters and Methods for Full Characterization

Parameters	Method Description	SW-846 Method
Volatile organics	GC-MS	8240
Semivolatile organics	GC-MS	8270
Pesticides and PCB's	GC-ECD	8080
Dioxins	GC-MS	8280
Total Metals	ICP/Graphite Furnace	3000/7000
Total and amenable cyanide	colorimetric	9010
Total Organic Halides (TOX)		9020
Extractable metals	extraction/ICP analysis	1311/6010
Extractable volatiles	extraction/TCLP volatiles	1311/8240
Extractable semivolatiles	extraction/TCLP BNA	1311/8270
Extractable pesticides and PCB's	extraction/GC-ECD	1311/8080

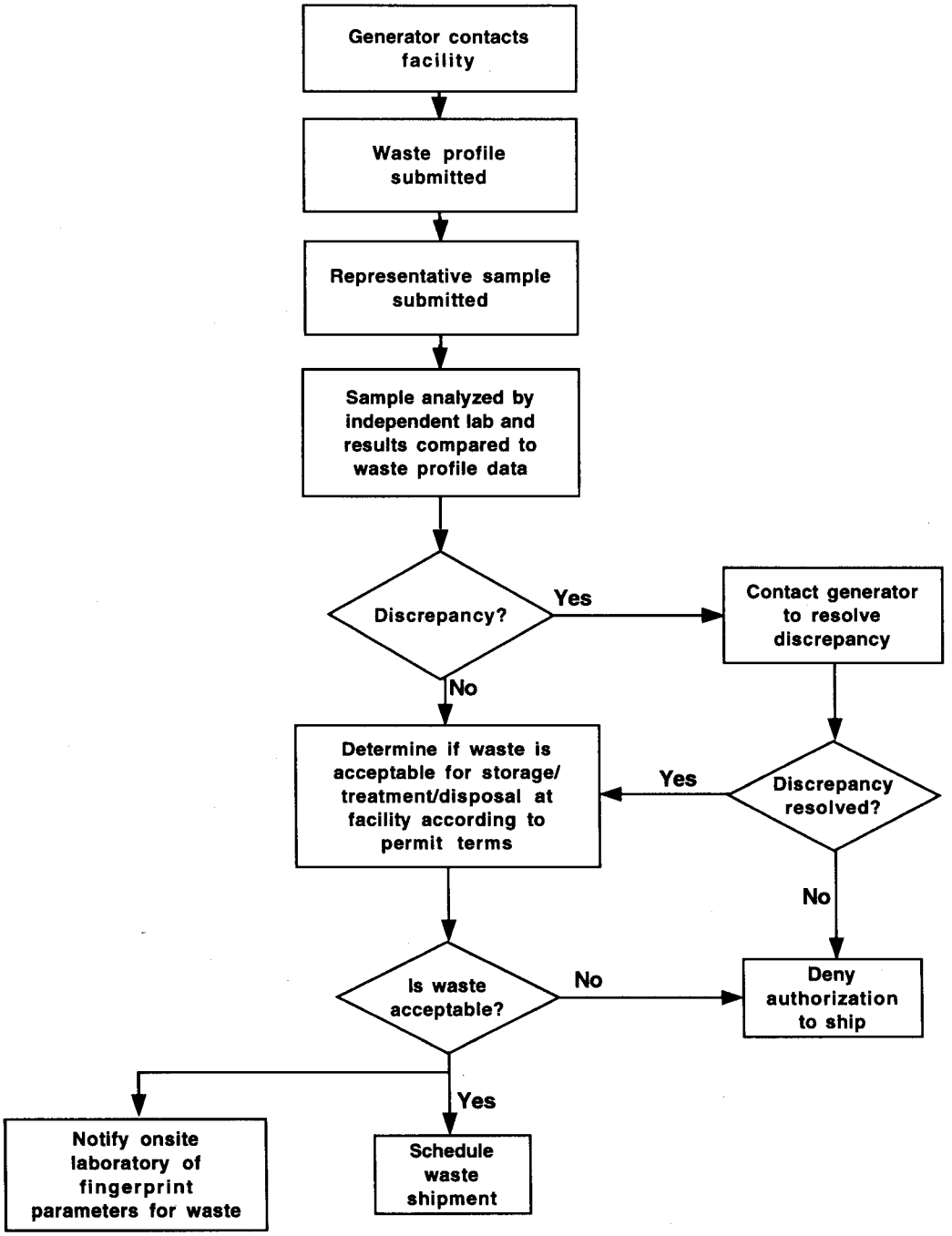


Figure 5-1
Pre-Acceptance Procedure for First Time Waste

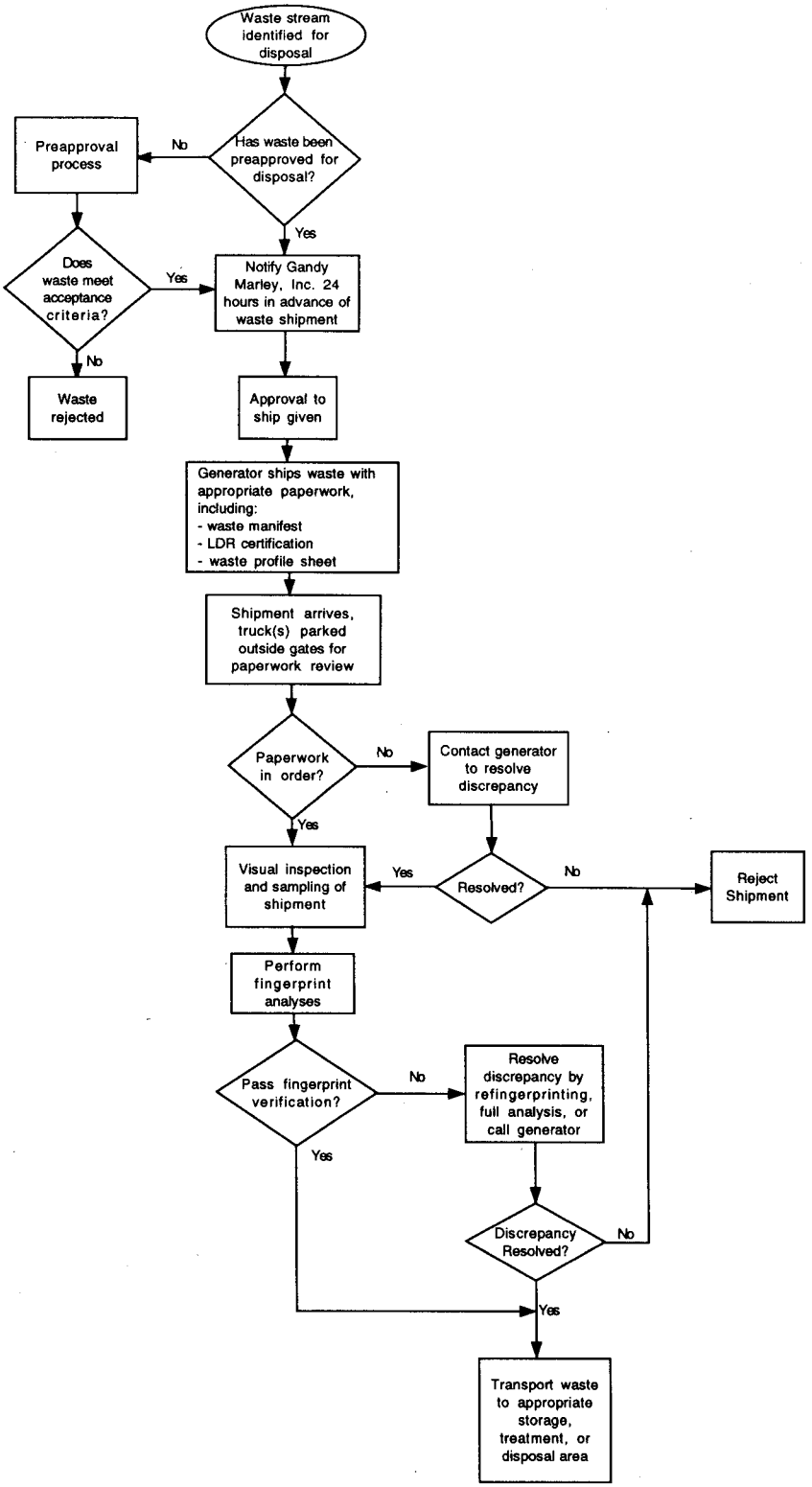
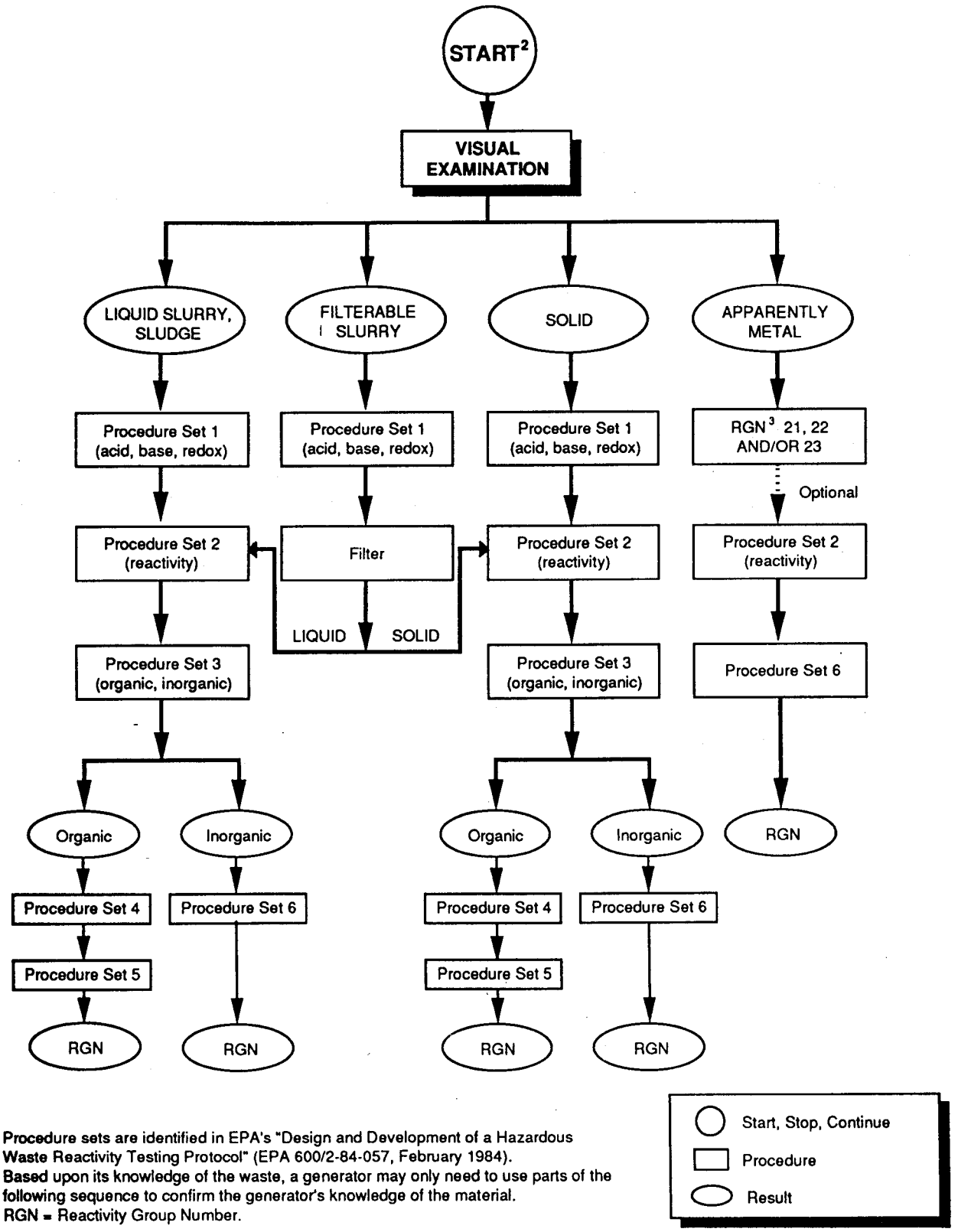


Figure 5-2
Incoming Waste Shipment Procedures



[1] Procedure sets are identified in EPA's "Design and Development of a Hazardous Waste Reactivity Testing Protocol" (EPA 600/2-84-057, February 1984).
[2] 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.
[3] RGN = Reactivity Group Number.

Figure 5-3
Sequence of Procedures Sets for Determining Reactivity Group[1]

Figure 5-4
Reactivity Group Designation and Waste Compatibility Matrix[1]

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	HP	4																																					
5	Aldehydes	HP	HF	HP		5																																				
6	Amides	H	H GT				6																																			
7	Amines, Aliphetic 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 GT		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 G	H F GT	H G	H P			H P	H G		H P G	H G	U						18																							
19	Keytones	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	GF H F	GF H F	GF H F	GF H F	GF H F	GF H	GF H	GF H	GF H	GF H	GF H	GF H GT	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, Drops, Moldings, etc.	GF H F	GF H F						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	GT GF F	H F GT	H							U											H F			S	GF H	26															
27	Nitro Compounds, Organic		H E 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 G	H E		H P	H G		H GT	H F E	H F GT		H F E GT	H F E GT					H E	H	H E	H F E GT	H E	H G		H G	H GF F	H F E 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 F		H F	H F					H F	H F	U	H F	34						
101	Combustibles and Flammable Materials, Miscellaneous	H G	H GT						H G F													H G F				H GF F				H E 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 E GT	H E GT	H E	H E GT		H E GT	H E GT	H F	H F		H F	H GT	H E GT	H F	H E GT	H F E	H F E	H F		H F E	H E GT	H E	H F	H G	H F	H E GT	H E GT	H F G	H E	H P GT	104			
105	Reducing Agents, Strong	H GF	H E GT	H GF	H GF F	GF H F	GF 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	H GF E		H	GF H	H E	H P GF	H F E	105		
106	Water and Mixtures Containing Water	H	H						G										H G			GF H	GF H		S	GF H							GT GF							GF GT	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	Explosion
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 groups 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.

Appendix 5A
Example Waste Profile Sheet

Example Waste Profile Sheet *

1. WASTE PROFILE #:_____

EPA Facility ID #: _____

DO NOT LEAVE BLANK SPACES. PLEASE SUBMIT THIS FORM TYPE-WRITTEN.

I. GENERATOR INFORMATION

2. Generator Name: _____ 3. EPA ID #: _____

4. Mailing Address: _____

5. Plant Address: _____

6. Business Contact: _____ Phone #: _____

7. Technical Contact: _____ Phone #: _____

The following information is required to comply with RCRA 40 CFR §§264/265.13 (O.A.C. 3745-65-13) General Waste Analysis.

II. GENERAL WASTE INFORMATION

8. Waste Material Name: _____ 9. Generator Code: _____ (Optional)

10. Describe process that generates waste: _____ 11. SIC Code: _____

12. Is your company the original generator of the waste? ☐ No ☐ Yes If not, provide the name of the original generator:

_____

13. If this waste is a still bottom, are you the original generator of the feed stock? ☐ No ☐ Yes

14. Rate of Generation: _____ Current accumulation: Drums _____ Bulk _____ (Gal.)

15. Check all types of containerization for which you request quotation.

_____ 55-Gallon Steel Drum (SC)
_____ 30-Gallon Steel Drum
_____ 85-Gallon Steel Drum (Without inside container)
_____ 85-Gallon Salvage Drum (With fiber or steel drums inside)
_____ 55-Gallon Fiber Drum
_____ 5-Gallon Pail
_____ Bulk (For bulk shipments, waste viscosity must be < 5000 cps)
_____ Other (Specify)
_____ Palletized small containers
Overall dimensions of material on pallet: _____ x _____ x _____ (High)
Dimensions of pallet only: _____ x _____ x _____ (High)
What are the small containers on the pallet? _____(1 qt. Bottles, 8 oz. Aerosol Cans, etc.)

III. WASTE STREAM CHEMICAL COMPOSITION**

16. COMPONENTS INCLUDING 40 CFR 261 APPENDIX VII HAZARDOUS CONSTITUENTS	CONCENTRATION RANGE (UNITS)	AVERAGE % MUST TOTAL 100%	TLV (IF PUBLISHED) ACGIH	OSHA
_____	_____ to _____	_____	_____	_____
_____	_____ to _____	_____	_____	_____
_____	_____ to _____	_____	_____	_____
_____	_____ to _____	_____	_____	_____
_____	_____ to _____	_____	_____	_____
_____	_____ to _____	_____	_____	_____
_____	_____ to _____	_____	_____	_____

* If applicable, this Waste Profile Sheet is a new revision of a previously submitted Waste Profile Sheet dated_____. Attach to this Form any additional information which must be known to treat, store, or dispose of the waste in accordance with RCRA §§264/265.13, including but not limited to data developed under RCRA Part 261, Laboratory Analysis Technical Publications or Material Safety Data Sheets.

** 40 CFR 261 Appendix VIII constituents should be identified for combustion facilities, even if not present in high enough concentrations to significantly contribute to the 100% composition.

WASTE PROFILE #:_____

IV. SPECIFIC ANALYSIS OF WASTE

17. Method used to obtain a representative sample of the analyzed waste (i.e., grab, composite, etc.) Sampling methods are described in RCRA 40 CFR 261 Appendix 1.

Generator's Knowledge & MSDS

In completing the next two items, do not leave blanks. If the specific element is not present, indicate "None".

18.

Organic Bound	CONCENTRATION RANGE			AVERAGE
Sulfur	_____	to	_____	_____
Chlorine	_____	to	_____	_____
Fluorine	_____	to	_____	_____
Bromine	_____	to	_____	_____
Iodine	_____	to	_____	_____
Nitrogen	_____	to	_____	_____
Phosphorus	_____	to	_____	_____

(Base % WT on Molecular Structure)

19. Metals (Actual Content)

Arsenic	_____	ppm	Mercury	_____	ppm
Barium	_____	ppm	Nickel	_____	ppm
Cadmium	_____	ppm	Selenium	_____	ppm
Chromium	_____	ppm	Silver	_____	ppm
Lead	_____	ppm	Thallium	_____	ppm
Aluminum	_____	%	Silicon	_____	%
Magnesium	_____	%	Sodium	_____	%

20. Does this waste contain PCBs?
❑ No ❑ Yes. If yes, give the concentration regardless of amount and attach supporting documentation:
_____ ppm

21. Does this waste contain insecticides, pesticides, herbicides, or rodenticides?
❑ No ❑ Yes. If yes, identify each in the space below and the concentrations:
_____ ppm
_____ ppm
(Include Safety Data Sheets for each)

22. Does this waste contain Dioxin? ❑ No ❑ Yes

23. Does this waste contain free cyanide> 250 ppm?
❑ No ❑ Yes

24. Does this waste contain free sulfide > 250 ppm?
❑ No ❑ Yes

V. TOXICITY

25. Check Applicable Data

_____ Eye Explain _____
_____ Inhalation Explain _____
_____ Dermal Explain _____
_____ Ingestion Explain _____
_____ Other Explain _____
_____ Carcinogen (suspected or known) Explain
_____
_____

VI. PHYSICAL PROPERTIES

26. Physical state at 70° F (Circle)

Liquid	Semisolid	Solid
Slurry	Sludge	Gas

Viscosity at 70° F _____ CPS

27. Is material pumpable? ❑ No ❑ Yes
Varies (Explain): _____

28. Is waste multi-layered? ❑ No ❑ Yes
If yes, please describe and quantify each layer:
1. (Top) _____ %
2. _____ %
3. _____ %

29. Dissolved Solids: _____ % WT
30. Suspended Solids: _____ % WT
31. BTU Value/lbs: _____
32. Ash Content (% by WT): _____
33. Flash Point: _____ °F
34. Vapor Pressure at 70° F: _____
35. Specific Gravity: _____
36. pH: _____
37. Corrosivity: _____ mpy
38. Color: _____

VII. REACTIVITY AND STABILITY

39. What is the Reactivity Group Number(s) for this waste?
_____

In accordance with **"Design and Development of Hazardous Waste Reactivity Testing Protocol,** "EPA Document No. EPA-600/2-84-057, February 1984.

40. Is this material stable? ❑ No ❑ Yes
If no, explain: _____
_____
_____
_____
_____

41. Is this material shock sensitive? ❑ No ❑ Yes
If yes, explain: _____
_____
_____
_____
_____

WASTE PROFILE #:_____

VIII. EPA INFORMATION

42. Is this waste hazardous as defined by RCRA 40 CFR Part 261? ☐ No ☐ Yes

If yes, list the applicable EPA Hazardous Waste Number(s) and explain why you have assigned the number(s). For example, if you assign D001, the reason for selection is that the flash point is less than 140° F. If you assign F002, the reason for selection may be that the waste is the still bottom from the recovery of methylene chloride:

EPA Hazardous Waste Number(s)	Reason for Selection

43. If the answer to #42 is yes, list CERCLA reportable quantities, found in 40 CFR §302.4:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

44. If the waste is not hazardous as defined by federal regulations but is hazardous as defined by state regulations in which the waste was generated, please provide the state hazardous waste number(s). Also provide any state hazardous numbers that are not included in the federal regulations:

State Hazardous Waste Number(s)	Reason for Selection

IX. SAMPLING INFORMATION

45. Sample source (e.g., drum, lagoon, pond, tank, vat, etc.): _____

Date Sampled: _____ Sampler's Name/Company: _____

46. Generator's Agent Supervising Sampling: _____ 47. ☐ No sample required (Provide rationale)

X. LAND DISPOSAL RESTRICTIONS INFORMATION

48. Identify ALL characteristic and listed EPA hazardous waste numbers that apply (as defined by 40 CFR 261). For each waste number, identify the subcategory (as applicable, check none, or write in the description from 40 CFR 268.41, 268.42, and 268.43).

REF #	A. EPA HAZARDOUS WASTE CODE(S)	B. SUBCATEGORY ENTER THE SUBCATEGORY DESCRIPTION IF NOT APPLICABLE CHECK NONE		C. APPLICABLE TREATMENT STANDARDS			D. HOW MUST THE WASTE BE MANAGED? ENTER THE APPROPRIATE LETTER (A-D) FROM BELOW
				PERFORMANCE-BASED (CHECK AS APPLICABLE)		SPECIFIED TECHNOLOGY IF APPLICABLE ENTER THE CFR 268.42 TABLE 1 TREATMENT CODE(S)	
		DESCRIPTION	NONE	268.41(a)	268.43(a)	268.42	
1							
2							
3							
4							
5							
6							

WASTE PROFILE #:_____

To list additional EPA waste numbers and categories, use additional page and check here: _____

Management under the land disposal restrictions:

A. RESTRICTED WASTE REQUIRES TREATMENT? ☐ No ☐ Yes

B.1. RESTRICTED WASTE TREATED TO PERFORMANCE STANDARDS? ☐ NO ☐ Yes Method _____

B.2. RESTRICTED WASTES FOR WHICH THE TREATMENT STANDARD IS EXPRESSED AS A SPECIFIED TECHNOLOGY (AND THE WASTE HAS BEEN TREATED BY THAT TECHNOLOGY) ☐ NO ☐ Yes Method ____

B.3. GOOD FAITH ANALYTICAL CERTIFICATION FOR INCINERATED ORGANICS? ☐ NO ☐ Yes Method _____

C. RESTRICTED WASTE SUBJECT TO A VARIANCE? ☐ No ☐ Yes Date/Type _____

D. RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT? ☐ No ☐ Yes

XI. DOT INFORMATION

In accordance with the Department of Transportation 49 CFR Parts 171 through 177, complete the following:

49. DOT Proper Shipping Name: _____

50. DOT Hazard Class: _____

51. DOT UN or NA Number: _____

52. Container Label(s): _____

(For containers of 110 gallons or less)

Additional Description _____

53. Placards: _____

Generator's hazardous waste shipments must also comply with the labeling requirements of RCRA 40 CFR Part 262.

54. Is this waste a soil and/or debris? No: ___ Yes, Soil: ___ Yes, Debris: ___ Yes, Both: ___

55. COMPLETE ONLY FOR WASTES INTENDED FOR FUELS OR INCINERATION

	TOTAL
Antimony as Sb	_____ ppm
Beryllium as Be	_____ ppm
Potassium as K	_____ ppm
Sodium as Na	_____ ppm
Bromine as Br	_____ *ppm/%
Chlorine as Cl	_____ *ppm/%
Fluorine as F	_____ *ppm/%
Sulfur as S	_____ *ppm/%

* Indicate ppm or %.

56. RECLAMATION, FUELS OR INCINERATION PARAMETERS (Provide if information is available)

RANGE

A. Heat Value (BTU/lb.) _____ _____

B. Water: _____

C. Viscosity (cps): _____ @ _____ °F ____ 100°F _____ 150°F

D. Ash: _____ %

E. Settleable solids: _____ %

F. Vapor Pressure @ STP (mm/Hg): _____

G. Is this waste a pumpable liquid? ☐ No ☐ Yes

H. Can this waste be heated to improve flow? ☐ No ☐ Yes

I. Is this waste soluble in water? ☐ No ☐ Yes

J. Particle size: Will the solid portion of this waste pass through a 1/8-inch screen: ☐ No ☐ Yes

57. Special Handling Information _____

WASTE PROFILE #:_____

ACCOUNTABILITY STATEMENT

58. I hereby certify that all information submitted in this and all attached documents contains true and accurate descriptions of this waste. Any sample submitted is representative as defined in 40 CFR 261 Appendix I or by using an equivalent method. All relevant information regarding known or suspected hazards in the possession of the generator has been disclosed. I authorize (_____) to obtain a sample from any waste shipment for purposes of recertification.

_____	_____	_____
Authorized Signature	Printed (or typed) Name and Title	Date

Section 6
Procedures to Prevent Hazards

6.1 Security Procedures to Prevent Hazards

Security at the Gandy Marley, Inc. facility will be accomplished by a security guard, fences surrounding the facility, and warning signs. Each of these is described in the following sections.

6.1.1 Barrier and Means to Control Entrance

The boundary of the Gandy Marley, Inc. facility will be surrounded by a three-strand barbed-wire cattle fence. The active portion of the facility, or processing area, will be surrounded by a 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. 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 per day. The fence, gates, and guard will provide adequate access control and will prevent unknowing 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 while at the facility unless other arrangements are made with Gandy Marley, Inc. personnel.

6.1.2 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.

6.2 Inspection Requirements

This section of the permit application provides written inspection guidelines and an inspection schedule for the Gandy Marley, Inc. facility in accordance with New Mexico Hazardous Waste Management Regulation Part V, Section 501.

6.2.1 General Inspection Requirements

Gandy Marley, Inc. personnel will conduct regular inspections of all equipment and structures that are necessary to prevent, detect, or respond to environmental or human health hazards. Inspection records that describe malfunctions, deteriorations, operator errors, and discharges that may cause or lead to a release of hazardous waste constituents to the environment or may be a threat to human health will be kept at Gandy Marley, Inc.'s administration building for three years from the date of the inspection. Specific inspection requirements are outlined in Sections 6.2.2 through 6.2.9.

Personnel will receive general training concerning hazardous waste inspections as part of the Gandy Marley, Inc. hazardous waste training program. Personnel responsible for inspecting particular equipment or areas of the facility will receive on-the-job training in inspection procedures. Inspection procedures will be kept in the operating manual, which will be located in the emergency coordinator's (EC) office.

Gandy Marley, Inc. guards will make rounds of the facility at least 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.

6.2.1.1 Inspection Checklist

Inspection checklists and an inspection schedule will be developed to ensure that inspections occur at appropriate frequencies. An example inspection schedule matrix is provided in Table 6-1. 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, frequency of use, and importance of the equipment in preventing environmental incidents. The inspections will, however, occur frequently enough so that problems can be identified in time to correct them before harm is done to human health or the environment. Example checklists are provided in Appendix 6A.

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. The inspection schedules will be kept in the EC's office.

When new or modified equipment is installed or used at Gandy Marley, Inc., the inspection procedures, forms, and schedule will be revised to reflect these changes.

6.2.1.2 Remedial Action

Gandy Marley, Inc. personnel will remedy any deterioration or malfunction of equipment or structures that are revealed 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.

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 whether the contingency plan should be implemented and/or how to correct the situation.

6.2.2 Landfill Inspection Requirements

Landfill liners and the cover will be inspected during and immediately after installation in accordance with construction quality assurance (CQA) requirements, which are discussed in Section 2.5.2.3 of the permit application.

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 weekly and after storms for such items as spills, leaks, odors, wind-blown particulate matter, and to identify any evidence of deterioration of the landfill itself and any malfunction or improper operation of the run-on/run-off control systems.

During the active life and during closure of the landfill, the leachate collection and removal system (LCRS) and leak detection system (LDS) will be checked at least weekly and after storm events 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 by magnehelic gages, or other liquid

detection devices, if they are installed. An inspection plan will be developed as the facility design is finalized. The leachate collection tank will be inspected in accordance with the requirements outlined in Section 6.2.5, while storing waste.

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 in such a way as to control the dispersal. One option for wind dispersal control will be the wetting of the landfill surface with water from a sprayer truck. If the dispersion is noted during an inspection, the landfill supervisor will notify the sprayer truck operator to rectify the situation.

The stormwater collection and holding unit associated with the run-off/run-on control systems will be inspected to ensure that liquid has not unknowingly accumulated. The collection system will be emptied as quickly as possible to ensure that the design capacity of the system is maintained.

A typical inspection checklist for the landfill is provided in Appendix 6A.

6.2.3 Surface Impoundment Inspection Requirements

Surface impoundment liners will be inspected during and immediately after construction and installation in accordance with CQA requirements, which are discussed in Section 2.5.2.3 of the permit application.

While the surface impoundment is in operation, it will be inspected weekly and after storms to (1) ensure that overtopping does not occur, (2) detect any sudden drops in the level of the impoundment's contents, and (3) detect severe erosion or other signs of deterioration in the berms. The surface of the waste will be visually checked for any sign of the primary liner floating, which may indicate a leak in the liner. Leachate collection pipes and the sump will be inspected for leaks or deterioration, and for the accumulation of liquids. Details pertaining to inspection of the LCRS and LDS are described in Section 6.2.2.

The surface impoundment berms will be inspected for any sign of abnormal deterioration, which may include excessive sloughing or the development of significant cracks. Such problems could indicate liner slippage.

The area surrounding the pond will be inspected weekly for any signs of deterioration, leaks, erosion, etc.

A typical inspection checklist for the surface impoundment is provided in Appendix 6A.

6.2.4 Container Storage Area Inspection Requirements

Weekly visual inspections of container storage areas will be performed to identify the status of warning signs, condition of containers and labels, availability and accessibility of spill control and personal protective equipment (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. A typical inspection checklist for container areas is provided in Appendix 6A.

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 the storage of liquids will be stored in a secondary containment area described in Section 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 Gandy Marley, Inc.'s administration building.

6.2.5 Tank Inspection Requirements

Tanks containing or treating waste will be inspected daily. 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. Specifically, the following items will be inspected: overfill control, equipment condition to detect any signs of corrosion or releases of waste from the tanks or ancillary equipment, and data gathered from monitoring and leak detection equipment to ensure that the tank system is being operated in accordance with design specification.

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 Gandy Marley, Inc.'s administration building. A typical inspection checklist for tanks is provided in Appendix 6A.

6.2.6 Stabilization Unit Inspection Requirements

Inspection of the stabilization unit will be conducted according to the requirements specified in Section 6.2.5. The inspections will be conducted on days when the unit is operating and daily when storing waste. Additional inspection requirements are described in Section 2.4.6.

Inspection records will be maintained in Gandy Marley, Inc.'s administration building for each unit.

6.2.7 Security Equipment Inspection Requirements

Security inspections will be conducted regularly 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

Records of inspections will be maintained in Gandy Marley, Inc.'s administration building for each unit.

6.2.8 Safety and Emergency Response Equipment Inspection Requirements

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, the inspection of 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, the pressure gauge indicates that the unit is adequately charged, and 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 per 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 each night to ensure that the units are operating properly.

6.2.9 Loading and Unloading Area Inspection Requirements

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. When hazardous waste is not being transferred or processed, the area(s) will not be inspected.

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.

6.3 Preparedness and Prevention Requirements

Preparedness and prevention encompass a wide range of requirements, from communication to equipment to arrangements with local authorities. These requirements are discussed in the following sections.

6.3.1 Internal Communications

Internal communication will be accomplished in different ways for the various locations of the Gandy Marley, Inc. facility. First, a PA system will be used in the major buildings to alert employees of potential or actual emergencies. Second, for areas with high noise or in remote areas of the facility, hand-held two-way radios will be used to communicate emergencies. Third, an audible fire alarm will be located in the major 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 primary systems, mentioned above, are malfunctioning. Periodic equipment tests will be conducted to assure that internal communication systems are functioning properly.

6.3.2 External Communications

A telephone will be immediately available for operations that occur inside the major buildings. Hand-held two-way radios capable of summoning emergency assistance from local police departments, fire departments, or state or local emergency response teams will be available at all outdoor processing areas that are not in close proximity to a telephone.

A map identifying the location of telephones at the facility will be provided to New Mexico Environment Department (NMED) prior to acceptance of waste at the facility.

6.3.3 Emergency Equipment

Gandy Marley, Inc. emergency response equipment includes fire extinguishers and other fire control equipment, spill cleanup kits, and decontamination kits. Each processing area and Resource Conservation and Recovery Act (RCRA) storage unit will be equipped with fire control and spill response equipment. Equipment in the stabilization unit will be used at the tank storage area and roll-off box storage area, because of their close proximity. The details of this equipment, including the content and type, are included in Appendix 7D of the contingency plan.

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.

6.3.4 Water for Fire Control

Major 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 for larger fires will be available in a water truck. The truck generally will be used for landfill emergencies.

6.3.5 Required Aisle Space

Aisle space of 30 inches between double rows of containers will be maintained in the drum handling facility and roll-off boxes will be placed 3 feet apart and 4 feet from the edge of the berm to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in the event of an emergency.

6.3.6 Arrangements with Local Authorities

Gandy Marley, Inc. will make arrangements with local authorities as detailed in Appendix 7A of the contingency plan.

6.4 Preventive Procedures, Structures, and Equipment

To prevent accidents at the Gandy Marley, Inc. facility, all individuals responsible for material and waste handling will receive general 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 Act (OSHA) 40-hour training. These individuals also will be trained in the general 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 efforts, and any problems relating to specific areas of the site.

6.4.1 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 6.2.9.

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.

Wastes will be transferred in approved vehicles over approved routes. 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.

6.4.2 Run-off and Run-on

Run-off and run-on for units in buildings and those located outdoors are described in the following sections.

6.4.2.1 Tank Storage, Container Storage, and Treatment Areas

Run-off and run-on will be prevented in container and tank storage areas and the treatment unit because exterior drainage systems will be located at the perimeters of these areas, outside the containment systems.

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 a hazardous waste. If the liquid is determined to be 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.

6.4.2.2 The Landfill and Surface Impoundment

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 25-year storm. The run-on control system will consist of unlined ditches for diverting run-on from offsite around the facility. Water from outside the landfill will be prevented from entering the active portion of the landfill by the waste processing corridor drainage ditch.

The run-off management system will be capable of collecting at least the water volume resulting from a 24-hour, 25-year storm. Run-off in the active portion of the landfill will be collected in the leachate collection system.

The run-on and run-off control system for the landfill is described in greater detail in Section 2.5.1.5 of this permit application.

6.4.3 Wind Dispersal Control System

Whenever particulate matter from the landfill is dispersed by the wind, the active portion of the landfill will be either covered or managed in such a way as 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.

6.4.4 Water Supply Protection

The domestic water supply (via underground water line from a spring in the Ogallala formation located approximately one mile east of the facility) will be protected by (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.

- The Upper Dockum unit is unsaturated beneath the proposed 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 proposed landfill.
- The nearest surface water is the Pecos River, approximately 30 miles to the west of the facility.

Second, the alluvial material on the surface of the proposed disposal site (less than 10-feet thick) will be removed prior to construction of the cells. This will eliminate the possibility of hazardous constituents entering the alluvium and migrating away from the facility.

Third, free liquids 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.

Finally, any releases to the soil will be immediately cleaned up to prevent the spread of contamination. Section 7, Contingency Plan, in this permit application, details the equipment and personnel available to ensure prompt clean up of any spill.

6.4.5 Mitigation of Effects of Equipment Failure and Power Outages

The Gandy Marley, Inc. facility will utilize 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 that are 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 7.4.5.4 of the contingency plan of this permit application.

6.4.6 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, this will involve 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 a determination is made as to the types of contaminants present, 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 Gandy Marley, Inc.'s personnel training program, areas of the facility or the entire facility may be evacuated, if necessary, at the direction of the EC. In such cases, professional emergency response personnel will be notified to respond to the emergency.

6.4.7 Special Requirements for Bulk and Containerized Liquids Disposed in Landfills

As previously stated, bulk or non-containerized liquids will not be disposed 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.

6.4.8 Special Requirements to Limit Releases to the Atmosphere

Operations at the Gandy Marley, Inc. facility will be conducted in such a way as to minimize the potential for releases to the environment. This objective will be achieved by making use of 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 emissions, if necessary. If releases to the air occur, they will be handled in accordance with appropriate regulations.

6.5 Precautions to Prevent Ignition or Reaction of Ignitable, Reactive, or Incompatible Wastes

Hazardous wastes will be handled only by properly trained Gandy Marley, Inc. personnel. The Gandy Marley, Inc. training program is outlined in Section 8 of this permit application. Individuals will be instructed in how to identify incompatible wastes, how to properly label them, and how to properly handle 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.

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 6.5.1. More specific requirements for the landfill and stabilization unit are described in Section 6.5.2. Handling of incompatible waste is described in Section 6.5.3.

6.5.1 General Requirements

Precautions will be taken to avoid the following reactions: (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 facility; (5) reactions that threaten human health or the environment through any other means.

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 only 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's property line.

6.5.2 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 261.2 or 261.23, or the general requirements outlined above for ignitable, reactive, or incompatible wastes are complied with.

6.5.3 Incompatible Waste Handling

Generator waste profile forms will provide Gandy Marley, Inc. waste handlers with the necessary information to avoid mixing containers of incompatible wastes. Gandy Marley, Inc. 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. Such wastes will be separated adequately to avoid all possibility of commingling in the landfill. Any leachate generated from the landfill will be sufficiently dilute by the time it reaches the LCRS that problems associated with incompatibles in the LCRS sump are not anticipated.

Containers with incompatible wastes will be stored in separate containment areas to prevent the potential for mixing. Incompatible wastes or incompatible materials and wastes will not be placed in the same container, nor will hazardous waste be placed in an unwashed container that previously held an incompatible waste or waste material.

Table 6-1
Gandy Marley, Inc. Facility Inspection Schedule

Landfill	
liners and cover systems for uniformity, damage, and imperfections	during construction and installation
liners and cover for deterioration and malfunction	during and immediately after construction
spills, leaks, odors, windblown particulate	weekly
deterioration, malfunction, or improper operation of run-on/run-off control system (includes stormwater collection unit)	weekly and after storms
LCRS/LDS for presence of liquid	weekly and after storms
leachate collection tank (while holding waste) for condition and proper function	daily
Surface Impoundment	
liners and cover systems for uniformity, damage, and imperfections	during construction and installation
pond freeboard for level for changes	weekly and after storms
area surrounding pond	weekly
LCRS/LDS for presence of liquid	weekly and after storms
berms	weekly
Container Storage Areas	
condition of containers, signs, other safety equipment aisle space	weekly
secondary containment condition	weekly
Tanks	
condition of tanks, signs, other safety equipment, access routes, overfill control	daily (when storing)
secondary containment condition	daily (when storing)
Stabilization	
condition of unit when in operation	daily (when storing)
condition of unit when empty	monthly

Appendix 6A
Example Inspection Checklists

Draft Landfill Inspection Checklist
(Inspection Frequency: Weekly and After Storms)

Inspector _____

Date _____ Time _____

Physical Inspection (check each of the following)	**Yes**	**No****	**N/A**
Evidence of deterioration or other abnormalities?	☐	☐	☐
Evidence of malfunction?	☐	☐	☐
Evidence of spills, leaks, odors?	☐	☐	☐
Evidence of improper operation of run-on and run-off control systems?	☐	☐	☐
Any sign of stormwater collection and holding unit liquid level increases?	☐	☐	☐
Area warning signs correct, present, and legible (both danger and no smoking signs)?	☐	☐	☐
Spill equipment available and accessible?	☐	☐	☐
Perimeter fence in good structural condition?	☐	☐	☐
Evidence of particulate matter dispersion due to wind from landfill?	☐	☐	☐
Leachate collection systems functioning properly?*	☐	☐	☐
Amount of liquids removed from leak detection system	_____		☐

**For any "no" answer, complete the Remedial Actions section below.

Remedial Actions

Describe corrective action taken. _____

_____

_____

Date corrective action was taken. _____

Supervisor notified of problem Date _____ Time _____

Emergency Coordinator notified of problem (if appropriate) Date _____ Time _____

Container Storage Inspection Checklist
(Inspection Frequency: Weekly)

Inspector _____

Date _____ Time _____

Container Storage Location (Building and Room, where applicable) _____

Container Storage I.D. Number _____

Physical Inspection (check each of the following)	**Yes**	**No****	**N/A**
Container(s) located within authorized boundaries?	☐	☐	☐
Area warning signs correct, present, and legible? (both danger and no smoking signs?)	☐	☐	☐
Secondary containment for containers with free liquids free of cracks and gaps (only applies to liquid storage areas)?	☐	☐	☐
Secondary containment free of liquids (only applies to liquid storage areas)?	☐	☐	☐
Container hazardous waste labels correct and legible?	☐	☐	☐
EPA codes present on label?	☐	☐	☐
All containers free of corrosion, buckles, dents, holes, damaged seams, or other structural defects or deterioration?	☐	☐	☐
Any signs of over pressurization in the drum(s)?	☐	☐	☐
Area free of spillage, leakage, or other accumulated liquid?	☐	☐	☐
Aisle space adequate and clear of obstructions?	☐	☐	☐
Perimeter of building and roof in good structural condition?	☐	☐	☐
Spill response equipment and PPE adequate, accessible, and in good working condition?	☐	☐	☐

**For any "no" answer, complete the Remedial Actions section below.

Remedial Actions

Describe corrective action taken. _____

_____

_____

Date corrective action was taken. _____

Supervisor notified of problem Date _____ Time _____

Emergency Coordinator notified of problem (if appropriate) Date _____ Time _____

Tank Storage Inspection Checklist
(Inspection Frequency: Daily)

Inspector _____

Date _____ Time _____

Tank Location (Building and Room, where applicable) _____

Tank I.D. Number _____

Physical Inspection (check each of the following)	**Yes**	**No****	**N/A**
Area warning signs correct, present, and legible? (both danger and no smoking signs?)	☐	☐	☐
Secondary containment free of cracks, gaps, erosion, or corrosion?	☐	☐	☐
Secondary containment free of liquids?	☐	☐	☐
Tank and ancillary equipment in good condition?	☐	☐	☐
Hazardous waste compatible with tank?*	☐	☐	☐
Evidence of leakage from tank?	☐	☐	☐
Evidence of leakage from ancillary equipment?	☐	☐	☐
If visual inspection is means of leak detection, was last inspection within 24 hours?	☐	☐	☐
Tank accessible (i.e., is the area leading to and in front of the tank clear of obstructions)?	☐	☐	☐
Overfill prevention equipment present and operable?	☐	☐	☐
Spill response equipment adequate, accessible, and in good working condition?	☐	☐	☐

* Signs of incompatibility include temperature increases, fuming, or reactions.
**For any "no" answer, complete the Remedial Actions section below.

Remedial Actions

Describe corrective action taken. _____

_____

_____

Date corrective action was taken. _____

Supervisor notified of problem Date _____ Time _____

Emergency Coordinator notified of problem (if appropriate) Date _____ Time _____

Draft Surface Impoundment Inspection Checklist
(Inspection Frequency: Weekly and After Storms)

Inspector _____

Date _____ Time _____

Physical Inspection (check each of the following)	**Yes**	**No****	**N/A**
Evidence of deterioration, severe erosion, or signs of containment malfunction?	☐	☐	☐
Evidence of overtopping?	☐	☐	☐
Evidence of sudden liquid level drop?	☐	☐	☐
Proper free board (2 feet) maintained?	☐	☐	☐
Liquid in leachate collection system? (Daily)*	☐	☐	☐
Any leaks or malfunctions noted in leachate collection system?*	☐	☐	☐
Any excessive sloughing or development of significant cracks developing in berms (could indicate liner slippage)?	☐	☐	☐
Any sign of deterioration, leaks, or erosion in area surrounding surface impoundment?	☐	☐	☐
Any sign of primary liner floating (could indicate leaks)?	☐	☐	☐
Spill equipment available and accessible?	☐	☐	☐
Area warning signs correct, present, and legible (both danger and no smoking signs)?	☐	☐	☐
Amount of liquids removed from leak detection system	_____		☐

**For any "no" answer, complete the Remedial Actions section below.

Remedial Actions

Describe corrective action taken. _____

_____

_____

Date corrective action was taken. _____

Supervisor notified of problem Date _____ Time _____

Emergency Coordinator notified of problem (if appropriate) Date _____ Time _____

Section 7
Contingency Plan

7.1 Purpose and Introduction

The purpose of the Gandy Marley, Inc. 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 significantly reduced.

This contingency plan was specifically developed for the Gandy Marley, Inc. facility. 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 will be provided in Appendix 7A of this plan prior to acceptance of waste at the facility.

The plan will specify the Gandy Marley, Inc. personnel who will be responsible for implementation of the plan. The plan will also specify the actions these individuals will take in the event of an emergency at the facility. The plan will include a description of the facility layout; the location of possible hazards; the location of emergency and decontamination equipment; evacuation plans and routes; agreements with local emergency personnel; and an up-to-date list of names, addresses, and telephone numbers of Gandy Marley, Inc. personnel qualified to act as emergency coordinator (EC).

7.2 General Responsibilities of the Emergency Coordinator

The Gandy Marley, Inc. facility will have a minimum of five employees who will 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. The others will be specified as alternate ECs. A list of the personnel qualified to act as EC will be provided in Appendix 7B. The individuals will be listed in the order in which they will assume responsibility with their addresses and telephone numbers. The list will be provided to the director of the New Mexico Environment Department (NMED) or designee (henceforth "the 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 and in close proximity to the facility 24 hours per day, 365 days per 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, coordinating the emergency response activities, and completing 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 in the capacity of 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.

7.3 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 (i.e., if the amount of waste is greater than one pound);
- An indoor spill, leak, or other release of hazardous waste occurs to a secondary containment area that is not removed within 24 hours;
- A hazardous waste incident occurs resulting in an injury requiring more than basic first aid.

The plan may 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 also may 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 Resource Conservation and Recovery Act (RCRA) Contingency Plan.

7.4 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
- offsite notification and evacuation criteria
- response and control procedures
- measures to prevent recurrence or spread
- storage and treatment of released hazardous waste

7.4.1 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 nonlife threatening. The steps taken in each of these scenarios are briefly described below, although they are likely to vary from circumstance to circumstance.

7.4.1.1 Life-Threatening Situations

Upon discovery of a life-threatening situation or life-threatening release of materials, all Gandy Marley, Inc. employees will be instructed and trained to first relocate to a safe area, as 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 Gandy Marley, Inc. 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 Gandy Marley, Inc. facility and a remote alarm signal at the fire department. When the alarm is activated, fire department personnel will respond immediately. Fire-pull stations are likely to be located at the administration building, the entrance to the landfill, the drum handling facility, and the stabilization area. Other possible locations of fire-pull stations will be determined and provided to the emergency response organizations with which the site will have agreements.

Automatic fire detection/sprinkler system—All Gandy Marley, Inc. permanent 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 possibly to one of the local fire departments. 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 inform personnel who are out of voice communication or PA range or are working in areas with noise levels such that the PA system would not be audible in emergency situations.

During non-operational hours, the EC will be notified using any of the following means: pager, radio, cellular telephone, or regular telephone. The EC will be at the scene as soon as is possible to direct and coordinate emergency response activities.

If the EC determines that additional assistance from an offsite agency or emergency response organization is needed or if immediate action is required to protect a local community population, the EC will contact the appropriate agencies or organizations. A list of these organizations is provided in Appendix 7A. During response activities, two-way radios will be used for communication between responding groups and the EC.

7.4.1.2 Nonlife-Threatening Situations

Upon discovery of a nonlife-threatening release of materials or other nonlife-threatening but potentially serious emergency situation, all Gandy Marley, Inc. 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.

7.4.2 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); observation; review of facility records, including material safety data sheets (MSDSs) and manifests; and/or chemical analysis of the material, if this becomes necessary:

- the character and amount of released waste
- the exact source and extent of any released material
- whether the release could move offsite; if it is determined that the release could move offsite, the EC must determine if any containment procedures have been implemented or whether such procedures should be implemented
- any injuries resulting from the incident

All containers of waste and material at the Gandy Marley, Inc. 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 various operations locations throughout the site. The information in these documents will be used to prepare a course of action.

7.4.3 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 run-off 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 and;
- 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 Appendix 7A or by utilizing various spill control reference textbooks and MSDSs located in the EC's office.

7.4.4 Offsite 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 onsite or offsite 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 plans are provided in Appendix 7C).
- The on-scene coordinator for the geographical area will be notified with the following information:
  - the name and telephone number of the reporter,
  - the name and address of the Gandy Marley, Inc. 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 outside the facility.

Coordinating agreements will be signed with federal, state, and local emergency response organizations. The agencies with which Gandy Marley, Inc. will enter these agreements are listed in Appendix 7A. The agreements outline the conditions under which the agencies will be contacted and the roles they will assume during various emergency scenarios at the Gandy Marley, Inc. facility. The agreements establish the

EC as the lead coordinator of all emergency response activities at the Gandy Marley, Inc. 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 7A, if additional assistance is needed at the site to protect community populations.

7.4.5 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, a list of which is provided in Appendix 7D. This list also includes equipment descriptions and locations.

For the purposes of this section of the plan, 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.

Gandy Marley, Inc. personnel and supervisors will be trained in safety classes to respond to and handle various emergency situations that are not of a serious nature. In addition to the training, Gandy Marley, Inc. employees will participate in emergency response drills on a periodic basis. These drills will involve internal responses and those in conjunction with external emergency response personnel. Key Gandy Marley, Inc. personnel will be familiar with and responsible for 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 facility or unit will not receive hazardous waste until the minimum required equipment for safe operation is fully functional.

7.4.5.1 Fire and/or Explosion Control Procedure

If a fire or explosion occurs at the Gandy Marley, Inc. facility that may impact an active hazardous waste management unit or hazardous material storage area, the contingency plan will be immediately implemented, as outlined previously in Section 7.4. The EC will assess the situation and direct the emergency response effort. The EC also will 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 is close to enveloping ignitable waste, the EC may choose to evacuate the area, as described in Appendix 7C.

Gandy Marley, Inc. 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.

Re-entry into the facility 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.

7.4.5.2 *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 to reduce the likelihood of an incident. However, on occasion, such incidents may still occur. This section describes Gandy Marley, Inc.'s procedures for responding to spills, leaks, or other releases to containment areas or to the environment.

If Gandy Marley, Inc. employees observe a spill, leak, or other release, whether during a formal inspection or other routine work, they have been instructed to contact the EC immediately and describe the situation in as much detail as possible, including 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, as necessary, by the EC), the EC will determine whether it is necessary 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 have been 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 into the unit(s) 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 in as timely a manner as is 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.

- 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.

Releases to the Environment

The EC will implement 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 Gandy Marley, Inc. personnel, the EC will contact one of the emergency response organizations listed in Appendix 7A 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. This 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. Generally, this will involve placing the wastes into U.S. Department of Transportation (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:

  - Released waste from a tank system that could result in further release(s) to the environment if not removed will be removed within 24 hours of detection of the leak or, if this is not possible (must be adequately demonstrated to NMED), at the earliest practicable time. In this case, as much of the waste as is necessary to prevent further releases to the environment will be removed. This will enable inspection and repair of the tank system.

  - The EC will report the release to the 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.

- A written report will be filed with the Director within 30 days of detection, as described in Section 7.5.2.

- 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 Gandy Marley, Inc. employee will be assigned to report on the situation and determine what, if any, follow-up actions are necessary after cleanup.

7.4.5.3 Surface Impoundment Failure Control Procedure

The surface impoundment will be removed from service if the level of liquids in the impoundment suddenly drops and the drop cannot be attributed to known flowrate changes into or out of the impoundment. When an impoundment must be removed from service, the following steps will be taken:

- The flow of waste into the impoundment 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.
- In the event that the leak cannot be stopped by any other means, the impoundment will be emptied.
- The Director will be notified in writing of the problem within seven days after detecting the problem.

A written procedure for complying with the objectives stated above will be prepared prior to the acceptance of waste at the facility.

If the surface impoundment 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 264.22[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 impoundment will not be repaired, it will be closed in accordance with the provisions of 264.228 and the approved closure plan.

7.4.5.4 Power or Equipment Failure Control Procedure

The Gandy Marley, Inc. facility will be equipped with at least one backup generator for emergency power generation to critical equipment only, which may include laboratory

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.

In the event of a power failure, all waste processing equipment will be shut down and all waste transfer and management activities will cease until power is restored.

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, the emergencies will be handled as described in previous sections.

7.4.6 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, 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 7.4.5.2
- removing or isolating containers from the emergency at hand, as described in Section 7.4.5.1; 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.

To prevent an incident from occurring, 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.

7.4.7 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 of Section 5. The waste will be placed in DOT-approved containers and stored as RCRA-regulated until the 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 in accordance with RCRA regulations.

If the waste generated during the cleanup is determined to be incompatible with other wastes stored or treated at the Gandy Marley, Inc. facility, the incompatible waste will be labeled as such and physically separated from 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 until cleanup activities are completed and the cleanup waste is safely containerized and segregated from the existing waste.

7.5 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. Various reports will also be prepared and filed at the Gandy Marley, Inc. facility and with regulatory agencies. These post-implementation procedures are detailed in the following sections.

7.5.1 Post-Emergency Equipment Maintenance

All emergency equipment listed in Appendix 7D of this contingency plan will be cleaned, repaired, or replaced so that it is fit for its intended use before plant operations in the affected area are resumed. If the equipment cannot be adequately cleaned, it will be disposed as hazardous waste. If it cannot be repaired and is not contaminated, it will be disposed as nonhazardous waste.

Notification that post-emergency equipment maintenance has been performed will be provided to NMED prior to resumption of operations in the affected area of the plant.

7.5.2 Required Reports and Notification

During and after certain emergency situations, as described in previous sections of this plan, specific types of reports or notification are required. The EC will determine when or if offsite 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 ease of compliance.

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 that is greater than a quantity of 1 pound must be reported to the Director within 24 hours of its 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.

Within 15 days of the incident, the EC must submit a written report on the incident to the Director. 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 name and quantity of material(s) involved; (5) the extent of injuries, if any; (6) an assessment of actual or potential hazards to human health or the environment, where this is applicable; and (7) 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 must be submitted to the 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 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 Director and state and local authorities must be notified that 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 until cleanup procedures are completed, and all equipment must be fit for its intended use prior to resuming operations.

7.6 Documents to be Maintained Onsite as Part of the Permit

Following the resolution of emergencies, various documents must be prepared and maintained onsite 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.

A list of authorized ECs and their home telephone numbers will be maintained in the administration building, all other buildings and emergency stations at the site, and in all controlled copies of the contingency plan.

A list of coordinating agreements that outlines 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. The list will be submitted to the NMED within 30 days of the effective date of this permit.

A list of criteria for determining when offsite evacuations are necessary will be maintained in the EC's office. This list will be submitted to NMED within 30 days of the effective date of this permit.

A current version of the emergency and spill response equipment list of Appendix 7D, will be maintained in the EC's office and in each of the controlled copies of the contingency plan.

7.7 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 in such a way as to materially increase the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or 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. Inaccurate or out-of-date pages will be directly replaced with new pages containing the modified or additional information. The corrected pages will be issued to all agencies and organizations that have controlled copies of the plan. Old pages will be removed from copies of the plan and discarded. This will ensure that each organization has a current version of the plan.

Appendix 7A
Coordinating Agreements

Arrangements will be made with local, state, and federal agencies for responding to emergencies that might occur at the Gandy Marley, Inc. facility. These arrangements will be made with the following organizations and will be detailed and provided to New Mexico Environment Department (NMED) and all organizations with controlled copies of the contingency plan prior to acceptance of waste at the facility.

- Eastern New Mexico Medical Center Hospital (and flight for life)
  405 W. Country Club Road
  Roswell, NM 88201
  (505) 622-8170
- Ambulance Service
- Fire Department
- Police or Sheriff
  - Regional Communications Center - if available
- Local and State Emergency Planning Committee - if available
- State Patrol
- County Health Department
- New Mexico State Air Division
- New Mexico State Environment Dept., Hazardous and Radioactive Materials Bureau
- Harold Runnels Building
  1190 St. Frances Drive
  P.O. Box 26110
  Santa Fe, NM 87502
  (505) 827-4308
- U.S. EPA, Region VI
- Emergency Response Branch
  Mail Code 6E-E
  1445 Ross Ave.
  Dallas, TX 47202
  (214) 655-6444
- U.S. EPA/National Response Division

Appendix 7B
List of Emergency Coordinators

The names, addresses, pager numbers, and telephone numbers (office and home) of all Gandy Marley, Inc. personnel who are qualified to act as emergency coordinator (EC) will be provided in this appendix prior to receipt of hazardous waste at the facility. The list will specify the primary EC and alternates in the order in which they will assume responsibility. This list will be provided to the Director at the time of certification and kept current in all controlled copies of the contingency plan.

Appendix 7C
Evacuation Plans

Evacuation plans are pre-established procedures designed to direct employees to safe assembly areas to ensure their personal safety and/or to enhance the response effort in the event of an emergency. Major emergencies that could threaten human health or the environment may require the evacuation of areas, buildings, the entire facility, or local areas surrounding the facility. Specific building and area evacuation plans and maps will be prepared for each processing area or building, as appropriate, and will be maintained and updated at the affected facilities. The evacuation plans and specific evacuation routes will be addressed in area-specific training courses. A master copy of all of the evacuation plans for the facility will be maintained and updated by the emergency coordinator (EC).

Upon notification of an incident, the EC will determine if the incident poses a potential threat to human health or the environment and will evacuate the affected area(s). Employees will assemble outside buildings and away from processing areas as indicated in specific evacuation plans.

The evacuation plans will describe the signals to be used to begin evacuations, evacuation routes, and alternate evacuation routes for various scenarios, including (1) fires and/or explosions; (2) spills, leaks, or other releases; and (3) power or equipment failures.

Four types of evacuation plans will be prepared prior to acceptance of waste at the facility. In each case, the plans will address the proper response of employees to (1) public address (PA) announcements, (2) various types of and sounds associated with alarms in their areas, (3) the specific evacuation routes available to them, (4) assembly areas, and (5) other safety-related issues. The four types of evacuation plans are outlined below.

1. Process Area Shutdowns and Evacuations

   Emergency shutdown procedures will be prepared by each area supervisor and maintained at the specific processing location. These procedures will be used during on-the-job training to instruct and inform operations employees of the evacuation procedures for their specific area.

2. Building Evacuation

   Building-specific evacuation procedures will be prepared prior to acceptance of waste at the facility and will be maintained in the building for which they are prepared and in the EC's office. The procedures will be used during on-the-job training to instruct employees of their proper response to a building evacuation.

The evacuation of buildings will be initiated in one or more of the following ways: (1) by a PA announcement from the EC, an emergency responder, or other operations personnel, as necessary; (2) an evacuation or emergency alarm; or (3) the employee's own decision to evacuate for personal protection.

When an evacuation is announced, all employees will immediately leave their work areas and assemble at designated assembly areas. Supervisors will account for all Gandy Marley, Inc. personnel, and the facility sign in log will be used as a means to account for all visitors.

3. Evacuation of the Gandy Marley, Inc. Facility

Evacuation of the entire facility will proceed similarly to evacuation of individual buildings, although additional means of communication will be utilized. In addition to PA announcements, personnel in areas without PA systems or in areas of high noise will be notified via hand-held radio, telephone, alarms, or messenger, as necessary.

Employee and visitor evacuations will, in general, proceed in the following manner. If the incident site is upwind of the current building location, employees will evacuate in a direction perpendicular to the wind direction, as indicated by windsocks at various locations throughout the facility. If the incident site is downwind from the current location, employees will evacuate in an upwind direction.

If it is possible, employees will then relocate to the northeast entrance gate to the facility and await further instructions. If this location and/or routes leading to this location are unsafe, personnel will be instructed using the various means of communication described above to assemble in a safe location so that all personnel may be present and accounted for.

4. Evacuation of Local Areas

If the EC's assessment indicates that evacuation of local areas may be advisable, the EC will immediately notify appropriate local authorities. The EC will be available to help appropriate officials decide whether local areas should be evacuated and will immediately notify either the government official designated as the on-scene coordinator for the geographical area or the National Response Center (1-800-424-8802), as appropriate.

Appendix 7D
Location, Description, and Capabilities of Emergency Equipment

Details pertaining to the specific locations, physical descriptions, and capabilities of the emergency response equipment listed in this appendix will be provided to New Mexico Environment Department (NMED) and response agencies when the facility design is finalized.

This preliminary list provides the types and possible locations for emergency response equipment that will be available at the facility. It includes fire extinguishing systems; spill control equipment; personal protective equipment (PPE); communications and alarm systems, both internal and external; and decontamination equipment.

After the list is finalized, if equipment changes occur, the list will be updated to reflect the changes and provided to each organization that has been issued a controlled copy of the contingency plan.

Fire Control Equipment

- sprinkler systems (all buildings)
- fire suppression chemicals (possibly at the stabilization unit)
- fire extinguishers (all buildings and landfill emergency station)
- possible building fire hoses
- landfill bulldozer (will be used in routine operations and to suppress fires in the landfill, if necessary)
- mobile fire suppression (water and/or foam truck or trailer unit for landfill use)

Spill Control/Decontamination Equipment (all buildings except administration, and the landfill emergency station)

- industrial absorbents
- sorbent dam
- 55-gallon recovery drums and 85-gallon overpack drums
- Portland cement
- shovels
- decontamination equipment for personnel and areas, including wash basins, soap, scrub brushes, plastic sheeting, trash bags

Personal Protective Equipment (all buildings except administration, and the landfill emergency station)

- tyvek suits and hoods
- saranex suits and hoods
- boot covers
- duct tape
- plastic tape
- respiratory protection, including SCBAs (as necessary) and respirators with various cartridges
- splash shields
- hard hats
- various types of gloves

Safety Equipment (all buildings except administration, and the landfill emergency station)

- eyewashes
- safety showers
- first aid kit

Communications Equipment

- public address (PA) or paging system (all buildings)
- telephones (all buildings)
- hand-held radios (as needed)
- fire-pull stations (to be determined)

Alarm Systems (all alarms will be indicated in guard shack and have local audible alarms)

- onsite firebell system (all buildings and landfill area)
- possible treatment or tank alarms
- possible spill alarms
- possible accident or emergency alarm (other than firebell system)

Section 8
Personnel Training

8.1 Introduction

The personnel training program was 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 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 8-1, personnel will be divided into three categories for the purposes of the Resource Conservation and Recovery Act (RCRA) training: facility personnel, visitors, and offsite emergency response personnel. Facility personnel will be categorized further based on whether or not they will handle hazardous waste. The different personnel categories will receive training appropriate to their level of involvement in handling hazardous waste. All facility personnel will be required to complete classroom training on an annual basis. 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 Occupational Safety and Health Administration (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 within six months of their effective date of employment at the facility.

Section 8.2 describes job titles, qualifications, and duties; Section 8.3 describes training content and frequency; and Section 8.4 describes record keeping procedures.

8.2 Job Titles and Duties

To facilitate safe and effective facility operation, the training program is designed to provide training commensurate with job responsibilities. Qualifications, duties, and special training required for appropriate personnel will be developed and maintained onsite prior to commencement of operations. This section includes a description of the qualifications and responsibilities of the RCRA training officer, the emergency coordinator, 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.

8.2.1 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 implement the following responsibilities:

- develop and implement the RCRA training program, including classroom training development and revision;
- establish course curricula;
- conduct training;
- maintain and update, 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;
- review any new job classifications to determine if OJT is required (supervisors may also request that employees receive OJT);
- schedule training;
- ensure that all personnel with RCRA responsibilities are trained within six months of the effective date in a position and are annually updated; and
- conduct an annual review to determine which personnel require OJT.

8.2.2 Emergency Coordinator

The emergency coordinator will coordinate all emergency response measures and will have the authority to commit the resources necessary to implement the contingency plan. The facility will appoint a primary emergency coordinator as well as secondary emergency coordinators to ensure that someone is always available to serve as the emergency coordinator. The secondary emergency coordinators must meet the same qualifications and responsibilities, outlined below, as the primary coordinator.

The emergency coordinator 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 emergency coordinator; and
- 40-hour OSHA training, annual refreshers, and OSHA supervisor training.

The emergency coordinator will have responsibility to:

- be either on the facility premises or available to respond to an emergency by reaching the facility within a short period of time;
- notify all appropriate facility personnel upon awareness of an emergency situation;
- notify all appropriate state or local agencies with designated response roles;
- identify the character, exact source, amount, and extent of any released materials;
- assess possible hazards to human health and the environment that may result from a release, fire, or explosion;
- notify local authorities if a release, fire, or explosion has occurred that could threaten human health or the environment;
- notify the National Response Center if a release, fire, or explosion occurs that could threaten human health or the environment;

- take 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, monitor for leaks, pressure build-up, gas generation, or ruptures in equipment;
- provide 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;
- ensure 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;
- notify New Mexico Environment Department (NMED) and appropriate local authorities before operations are resumed;
- note in the operating record the time, date, and details of any incident that requires implementing the contingency plan; and
- submit a written report within 15 days of implementing the contingency plan to the NMED.

8.2.3 Waste Handlers

The 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 responsibility to:

- verify waste received;
- test emergency equipment;
- inspect facility and emergency equipment;
- manage containers in such a way as to prevent leaks, spills, and ruptures;
- inspect container storage areas, tanks, the surface impoundment, and the landfill;
- ensure that safe operating practices are implemented;
- maintain run-off management system, control wind dispersal, and ensure compliance with other operational requirements specific to the RCRA permit;
- assist in maintaining the operating record; and
- prepare biennial reports, unmanifested waste reports, and other reports as necessary.

8.2.4 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 be responsible to:

- control entry, at all times, through gates or other entrances to the active portion of the facility,
- ensure site security,
- inspect the perimeter fence to prevent the unknowing entry and minimize the unauthorized entry of persons or livestock onto the active portion of the facility, and
- initially locate and then maintain 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.

8.2.5 Laboratory Specialist

The laboratory specialist will help to assure that wastes received at the facility are consistent with waste profiles supplied by generator facilities.

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 responsibility to:

- develop sampling, characterization, and testing procedures for waste received and generated at the facility;
- direct or perform sampling, characterization, and testing for the facility;
- determine if waste is acceptable for treatment, storage, and disposal based upon the waste profile submitted by the generator;

- determine if fingerprint testing confirms generator information provided on the waste profile and manifest; and

- implement the laboratory quality assurance/quality control (QA/QC) program.

8.2.6 Maintenance Personnel

Maintenance personnel will maintain all equipment, buildings, and roads.

Maintenance personnel will possess the following qualifications:

- high school diploma or equivalent and
- two years experience in an industrial setting.

Maintenance personnel will be responsible to:

- develop maintenance procedures, and
- perform maintenance-type activities, including repairs, preventive maintenance, and corrective actions associated with RCRA inspections.

8.3 Training Content and Frequency

Section 8.3.1 describes the training program for facility personnel, Section 8.3.2 describes training for visitors, and Section 8.3.3 describes training for offsite emergency response organizations.

8.3.1 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, OJT, OSHA 40-hour training, and annual refresher training for all three. The 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. Within six months of 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.

8.3.1.1 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:

- develop a basic understanding of the regulatory requirements for a treatment, storage, and disposal facility;
- promote understanding of policies and procedures necessary to protect human health and the environment;
- ensure proper management of hazardous waste; and
- educate 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 offsite as well as management of waste generated onsite;
- 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 U.S. Department of Transportation (DOT) requirements; and

- maintaining 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 coordinator to ensure that it is still current and appropriate.

8.3.1.2 Job-Specific Training

The RCRA classroom training will be supplemented with OJT tailored to each employee's actual job responsibilities. All employees who handle hazardous waste and supervisors of personnel who handle hazardous waste will be required to complete OJT; employees who will not handle hazardous waste and will not directly supervise personnel who will handle hazardous waste will not receive OJT. The purpose of OJT is not to demonstrate to personnel how to perform their duties, but rather 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 based on the employees responsibilities; however, it is anticipated that OJT will take approximately 1 to 2 hours.

A checklist developed by the work area supervisor will be used for OJT. 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 OJT. The OJT checklist will be reviewed at least annually to ensure that it is still current and appropriate for the subject job classification.

The OJT 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;
- response to leaks, spills, and overflows;
- waste analysis plan procedures; and
- inspection and maintenance procedures.

After the OJT checklist has been completed, both the employee and the supervisor will sign it. The checklist will be provided to the RCRA training officer, who will be responsible for maintaining training records.

8.3.1.3 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.

8.3.2 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 onsite unless they are escorted by facility personnel or other arrangements have been made with facility personnel. The briefing will include the following information:

- hazards that may be encountered at the facility;
- how emergencies are signaled or announced, how to summon help, what information to give, and to whom to give the information;
- where to report during an emergency;
- how to safely evacuate from the facility;
- standard operating procedures for visitors;

- check-in/check out locations; and
- required safety equipment.

8.3.3 Training for Offsite Emergency Response Organizations

Training will be established for offsite emergency response organizations through agreements with local agencies and contracts with vendors. This training will include, as appropriate, the following documentation:

- site layout and site-specific hazards,
- the contingency plan,
- facility emergency procedures,
- facility decontamination procedures, and
- appropriate response techniques.

8.4 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.

8.4.1 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.

8.4.2 Training Documentation

Records that document RCRA classroom training and OJT given to and completed by facility personnel will be kept by the RCRA training coordinator. 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.

8.4.3 Other Documentation

Other documentation will be maintained at the facility, including 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 or infrequently
  - basic 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

Figure 8-1
Gandy Marley Facility RCRA Training Program

Section 9
Closure and Post-Closure of Permitted Units

9.1 Introduction

This closure plan describes specific activities required for closure of the drum handling facility, roll-off storage area, stabilization treatment unit and associated liquid waste receiving and storage facility, evaporation surface impoundment, and landfill in compliance with Resource Conservation and Recovery Act (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 9.2. A post-closure care plan for the landfill is included in Section 9.3. Section 9.4 presents the closure performance standard, and Section 9.5 discusses the closure schedule. Closure certification and modifications are discussed in Sections 9.6 and 9.7, respectively. Closure and post-closure cost estimates are discussed in Section 9.8, and compliance with financial assurance requirements is discussed in Section 9.9.

9.2 Closure Activities

At the end of the active life of the facility, it is envisioned that all facilities and structures will be closed and dismantled. For the purposes of this closure plan, the closure date is estimated to be 2030. Solid hazardous waste and debris will be placed in the landfill, and non-hazardous waste will be sent offsite for reuse, recycle, or disposal. Liquids generated during closure (decontamination solutions and evaporation pond liquid) will generally be treated onsite. 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; the schedule is described in more detail in Section 9.5.

9.2.1 Drum Handling Facility

The following steps will be necessary to complete closure of the drum handling facility:

1. removal of remaining waste and other material in the storage area,
2. decontamination of equipment in the area and dismantling of the building structure,
3. dismantling of the concrete floor and secondary containment, and
4. sampling of soil beneath the floor to determine if contamination is present.

9.2.1.1 Removal of Inventory

Closure of the drum handling facility will commence with removal of any inventory or other materials stored in the area according to standard operating procedures. Remaining inventory will be removed within 90 days after receiving the final volume of hazardous wastes at the unit. For the purposes of this plan, it is assumed that all wastes remaining in inventory either can be disposed directly in the landfill, treated at the onsite treatment facility prior to disposal in the landfill, or returned to the generator if unsuitable for either of the previous two options. Closure cost estimates and waste volumes for disposal were based on the worst-case scenario of all wastes requiring stabilization at the onsite treatment unit prior to landfilling. The maximum inventory that could be in the drum handling facility at the time closure is initiated is equal to the permitted capacity of the unit.

9.2.1.2 Decontamination of Equipment and Dismantling of Building Structure

Equipment present in the area that may have contacted hazardous waste, such as pallets or drum moving equipment, either will be decontaminated or disposed as hazardous waste. Major equipment such as the fork trucks will be decontaminated; disposal as waste would be the preferred option only for items that are difficult to decontaminate such as wood pallets.

The building structure (roof and walls) is not expected to be contaminated with hazardous waste but will be cleaned and rinsed prior to or during dismantling. The dismantled building structure either will be reused elsewhere or recycled as scrap metal.

Cleaning will be accomplished using a high-pressure detergent wash and water rinse until all visible residue is removed. All decontamination solutions will be collected in containers or portable tanks. The decontamination solutions either will be treated onsite or will be trucked to an approved offsite facility for treatment. The expected volume of decontamination solutions that may be generated during closure are provided in Table 9-1.

9.2.1.3 Dismantling of Concrete Floor and Secondary Containment

Secondary containment for the drum handling facility will be provided by a flexible membrane lined trench and collection sump system. Drums will be stored on an uncoated concrete floor that drains to the trench and sump system. Because the concrete will not be coated, decontamination at closure is not proposed; rather, the concrete will be broken up and removed as hazardous debris. Upon certification of compliance with the land disposal restriction (LDR) requirements, the concrete will be disposed in the landfill. The liner and collection sump system will also be removed at

closure and disposed in the landfill. The expected volume of solid hazardous waste that will be generated during closure is provided in Table 9-1.

9.2.1.4 Soil Sampling

After removal of the drum handling facility structure and containment, soil samples will be collected and analyzed for constituents that may have been present in the stored wastes to determine if any contamination occurred from releases. Seven samples will be collected from locations that correspond to the floor drain sumps. Sample results will be compared against the closure performance standard presented in Section 9.4.

9.2.2 Evaporation Surface Impoundment

The primary steps required to complete closure of the evaporation surface impoundment are:

1. removal of remaining liquid waste,
2. removal and solidification of sludge,
3. removal and disposal of liner and leachate collection system, and
4. sampling of soil beneath the unit to determine if contamination is present.

9.2.2.1 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 less 10 inches of precipitation). The liquid in the evaporation pond has a depth of 8 feet, and it is assumed that at closure there will be 2 feet of sludge in the bottom of the pond, leaving 6 feet of liquid (72 inches). Therefore, 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.

9.2.2.2 Removal and Solidification of Sludge

Following evaporation of the pond liquid, the sludge will be dredged from the bottom and solidified in the treatment unit. The stabilized waste will be placed in roll-off boxes for disposal in the landfill. The expected volume of sludge that will be removed and disposed in the landfill is shown in Table 9-1; this is based on an estimated sludge depth of 2 feet.

9.2.2.3 Removal and Disposal of Liner and Leachate Collection System

The pond liner and leachate collection system will be dismantled and removed as hazardous debris. 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 9-1.

9.2.2.4 Soil Sampling

After removal of the liquid, sludge, and surface impoundment liners, soil samples will be collected and analyzed for constituents that may have been present in the stored wastes to determine if any contamination occurred from releases. Ten samples will be collected, two from locations that correspond to the leachate collection sump and the tanker pad fill line and eight at random locations. Sample results will be compared against the closure performance standard presented in Section 9.4.

9.2.3 Liquid Waste Receiving and Storage Facility

The following activities will occur during closure of the liquid waste receiving and storage facility associated with the stabilization treatment unit:

1. removal and treatment of tank contents,
2. dismantling and removal of tanks, ancillary equipment, and concrete containment area, and
3. sampling of soil beneath the unit to determine if contamination is present.

9.2.3.1 Removal of Inventory

Closure of the liquid waste receiving and storage facility will commence with removal of any inventory in the tanks according to standard operating procedures. Remaining inventory will be removed within 90 days after receiving the final volume of hazardous wastes in the tanks. It is assumed that all wastes remaining in inventory can be treated at the onsite stabilization treatment facility 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 inventory that could be in each tank at the time closure is initiated is equal to the permitted capacity of the tanks.

9.2.3.2 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 requirements. After removal of the tanks, the concrete containment will be broken up and removed as hazardous debris. Upon certification of compliance with the LDR requirements, the concrete will be disposed in the landfill. The expected volume of solid hazardous waste that will be generated during closure is provided in Table 9-1.

9.2.3.3 Soil Sampling

After removal of the tanks and containment, soil samples will be collected and analyzed for constituents that may have been present in the stored wastes to determine if any contamination occurred from releases. Four samples will be collected from locations that correspond to the containment sumps. Sample results will be compared against the closure performance standard presented in Section 9.4.

9.2.4 Stabilization Treatment Unit

The primary steps required to complete closure of the stabilization treatment unit are:

1. removal of remaining waste inventory,
2. decontamination and removal of equipment and building structure,
3. dismantling of the tanks and secondary containment area, and
4. sampling of soil beneath the floor to determine if contamination is present.

9.2.4.1 Removal of Inventory

Closure of the stabilization treatment unit will commence with removal of any inventory remaining in the tanks according to standard operating procedures. Remaining inventory will be stabilized and removed within 90 days after receiving the final volume of hazardous wastes at the unit. The stabilized waste will be placed in roll-off boxes for disposal in the landfill. The maximum inventory that could be in the tanks at the time closure is initiated is equal to the working capacity of the unit, which is approximately one-third full, because adequate space must remain for addition of reagents and for mixing.

9.2.4.2 Decontamination of Equipment and Dismantling of Building Structure

Equipment present in the area that may have contacted hazardous waste, such as the waste mixing equipment, either will be cleaned or disposed as hazardous waste. The building structure (roof and walls) is not expected to be contaminated with hazardous waste, but it will be cleaned and rinsed prior to dismantling. The building structure will be dismantled after cleaning and either will be reused elsewhere or will be recycled as scrap metal. Building components and associated reagent silos that did not contact hazardous waste will be dismantled and removed from the site.

Cleaning will be accomplished using a high-pressure detergent wash and water rinse until all visible residue is removed. All decontamination solutions will be collected in containers or portable tanks. The decontamination solutions either will be treated onsite or will be trucked to an approved offsite facility for treatment. The expected volume of decontamination solutions that may be generated during closure is provided in Table 9-1.

9.2.4.3 Dismantling of Tanks and Secondary Containment Area

The tanks, 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 9-1.

9.2.4.4 Soil Sampling

After removal of the treatment unit structure, tanks, and containment, soil samples will be collected and analyzed for constituents that may have been present in the stored wastes to determine if any contamination occurred from releases. Two samples will be collected from locations that correspond to the vault and floor drain sumps. Sample results will be compared against the closure performance standard presented in Section 9.4.

9.2.5 Roll-off Storage Area

Closure of the roll-off storage area will be identical to the drum handling facility, except that the roll-off storage area does not have a building 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 in Section 9.2.1. Estimated waste volumes for closure of the roll-off storage area are included in Table 9-1. One soil sample will be collected from a location corresponding to the containment sump.

9.2.6 Landfill

At closure of the landfill, a final cover will be placed 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 top cover, a middle drainage layer, and a lower liner. The final cover will meet the following requirements:

- The vegetative cover will have a minimum thickness of 2 feet and final upper slopes of between 3 and 5 percent after settlement and subsidence of the waste. Native grasses will be planted.

- The middle drainage layer will consist of a high-density polyethylene (HDPE) liner overlaid by a textile/net composite and will be designed to allow lateral flow and discharge of liquids.

- The bottom layer will consist of a soil foundation with a minimum thickness of 2 feet.

- 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 run-off across the cap without forming rills and gullies.

Leachate will be pumped from the primary and secondary collection systems throughout the closure period and will continue throughout post-closure care.

A treatment system will be designed and built onsite to treat the leachate generated during closure and post-closure. The leachate will be used to irrigate the cap vegetation and any excess will be released to the stormwater retention basin.

After the landfill cap is completed, 10 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.

No later than the submission of the certification of closure of the landfill, the facility will submit to the local zoning authority and to the New Mexico Environment Department (NMED), a survey plat indicating the location and dimensions of the landfill with respect to permanently surveyed benchmarks. 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 indicating that the land has been used to manage hazardous wastes, and its use is restricted.

9.3 Post-Closure Activities

Post-closure care involves long-term maintenance, monitoring, and reporting activities that are carried out after closure is completed. Post-closure care is only anticipated to be needed for the landfill after closure. However, if clean closure cannot be certified for any unit components or secondary containment areas associated with the drum handling facility, tank storage area, stabilization treatment unit, evaporation pond, or roll-off storage area, then those closure activities that have been completed will be certified, and post-closure activities will be implemented for those portions of the units that do not meet the closure performance standard.

The post-closure care period for the landfill will be 30 years. The following activities will be conducted during post-closure:

- 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

monthly and after heavy precipitation events, and repairs will be scheduled in a timely manner upon noting deficiencies to ensure that the final cover maintains its effectiveness.

- The leachate collection and removal system will be operated until leachate is no longer detected. Leachate pumps will be inspected for proper operation and operated at least monthly. The volume of leachate pumped will be recorded in a site log, and after records indicate that the sump has remained dry for two consecutive months, the frequency of inspection and operation of the sump pumps will be changed to quarterly. If the sumps are dry for two consecutive quarters inspections will be changed to semi-annually. Any leachate collected will be pumped to aboveground storage tanks and transferred to the onsite leachate treatment unit.

- During the post-closure care period, the leak detection system beneath the landfill primary liner will initially be monitored and inspected monthly 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 leachate collection and removal system, the volume of leachate pumped from the secondary leak detection system will be recorded in a site log, and after records indicate that the sump has remained dry for two consecutive quarters, then the frequency of inspection and operation of the leak detection system will be changed to semi-annually.

- The groundwater monitoring system will be maintained and monitored throughout the post-closure care period. The wells will be visually inspected monthly to ensure that they have not been tampered with. Groundwater samples will be collected from each well semi-annually to test for the presence of contaminants in the groundwater.

- The perimeter diversion ditch around the landfill will be maintained during the post-closure period to prevent erosion due to run-on.

- The surveyed benchmarks will be maintained and protected during the post-closure period.

- The facility perimeter fence and warning signs will be inspected and maintained throughout the post-closure period.

A post-closure facility record will be maintained that includes the dates and times of inspections, inspection findings, name of inspector, volumes of leachate pumped, disposition of leachate, sampling results of leachate and groundwater samples, and dates and nature of any corrective actions taken.

During the post-closure care period, the facility contact organization will be:

Gandy Marley, Inc.
1109 East Broadway
Tatum, New Mexico 88267
(505) 398-4960

9.4 Closure Performance Standard

The closure performance standard 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 closure performance standard for the drum handling facility, roll-off storage area, tank storage area, stabilization treatment unit, and evaporation surface impoundment is based on sampling soil from beneath the units. The landfill will not be clean-closed; therefore, no closure performance standard is applicable.

Indicator parameters will be selected for each unit at closure that are representative of the wastes stored and/or treated at the unit during its operating life, based on the operating record. For soil, analytical results that show that these selected constituents are within three standard deviations of the mean constituent concentration in clean background soil will constitute demonstration of clean closure. Clean background soil samples will be collected from the surrounding area outside the facility fence line.

9.5 Closure Schedule

Closure of all units at the facility will be based on when the landfill nears its final capacity, because the other units exist only to support landfill disposal activities. In other words, the drum handling facility, roll-off storage area, liquid waste receiving and storage facility, stabilization treatment unit, and evaporation surface impoundment 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 during closure activities. Expected waste volumes that will be generated during closure are shown in Table 9-1.

At the time of final facility closure, the drum handling facility will be closed first, as wastes from this area may need to be processed through the stabilization treatment unit prior to disposal onsite. Concurrent with the drum handling facility, the evaporation surface impoundment 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 must be collected in tanks and shipped offsite. Following closure of the drum handling facility and during evaporation of the liquid in the ponds, the liquid waste receiving and storage facility will be closed. After the pond sludge has been removed and treated, the stabilization treatment unit will be closed, and finally the roll-off storage area will be closed. The landfill cover will be constructed when all closure wastes have been placed in the landfill.

The anticipated final closure schedule is shown in Figure 9-1. Notification will be provided to the NMED in writing at least 60 days prior to beginning closure of the entire facility. Closure of the drum handling facility, liquid waste receiving and storage facility, stabilization treatment unit, and roll-off storage area will proceed sequentially, and each will be completed within a period of 180 days. Although it is expected that closure of each unit can be accomplished in less than 180 days, this time has been scheduled to allow for analytical result turnaround time, contractor scheduling difficulties due to the site's remote location, and contingencies. The evaporation pond is estimated to require one year for evaporation of the pond liquid and an additional 180 days for the remaining closure activities (removal of sludge and liner and soil sampling). Finally, the landfill will be closed, which will be completed within 360 days. After closure, post-closure care activities for the landfill will be continued for the period specified in Section 9.3.

The closure regulations allow a period of 180 days from receipt of the final volume of waste at each unit for closure activities, unless the closure activities will, of necessity, take longer than 180 days (40 CFR Section 264.113(b)(1)). Closure of the evaporation pond and landfill at the Triassic Park facility is projected to take longer than 180 days each for closure, as outlined in this closure plan. The facility requests closure schedules of 540 days and 360 days for the evaporation pond and landfill, respectively.

9.6 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 hazardous waste management unit or facility has been closed in accordance with the approved closure plan. The certification will be signed by the owner or operator and by an independent registered professional engineer. Post-closure will also be certified at the end of the 30-year post-closure care period.

9.7 Modifications to the 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.

9.8 Closure Cost Estimates

The closure costs are described in the following sections.

9.8.1 Closure Costs

Table 9-1 summarizes the closure cost estimates for the drum handling facility, roll-off storage area, liquid waste receiving and storage facility, stabilization treatment facility, evaporation pond, and landfill. These estimates are based on 1994 dollars and will be updated annually as required in 40 CFR Part 264.142(b).

These estimates are based on costs for closure when each 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 based on the costs of hiring a third party to close the facility, although in reality it is expected that facility personnel will perform many closure tasks. 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 projected to be generated through closure activities is also shown in Table 9-1.

9.8.2 Post-Closure Costs

Table 9-2 summarizes the post-closure cost estimate for the landfill. The costs include 30 years of monitoring and maintenance activities, as described in Section 9.3.

9.9 Financial Assurance

Gandy Marley, Inc., will submit required documentation demonstrating financial assurance for closure and post-closure 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 Subpart H. Gandy Marley, Inc., will also submit evidence of the required liability coverage for sudden and nonsudden accidental occurrences at least 60 days prior to receiving the first hazardous waste at the facility.

Table 9-1
Closure Cost Estimates and Closure-Generated Waste Volumes

Permitted Area For Closure	Inventory	Residual For Disposal In Landfill (yd3)	Total Cost (1994 $)
Container Storage Area			
Removal and treatment of remaining waste	Waste in 1120 drums	610	$7,600
Removal and disposal of remaining drums	1120 drums	130	$1,700
Decontamination of equipment and dismantling of structure	Roof and walls	N/A	$3,200
Dismantling of concrete floor and secondary containment	Concrete floor	1,147	$47,400
Soil sampling after demolition of the concrete floor	N/A	N/A	$3,900
Certification of final closure	N/A	N/A	$3,500
Contingency (10%)			$6,700
Container Storage Area Subtotal			$74,000
Evaporation Surface Impoundment			
Removal and solidification of sludge	2-foot layer of sludge	7,052	$113,300
Removal of liner and leachate collection system	Liner/LCS	3,125	$23,800
Decontamination of operational equipment	N/A	N/A	$1,100
Soil sampling beneath unit after removal of liner	N/A	N/A	$6,100
Certification of final closure	N/A	N/A	$4,500
Contingency (10%)			$14,900
Evaporation Pond Subtotal			$163,700
Storage Tanks			
Removal and treatment of tank contents	4 full tanks w/waste	713	$9,600
Dismantling of tanks and ancillary equipment	4 empty tanks	10	$9,400
Demolition of concrete containment area	Containment area	151	$34,300
Decontamination of pumps and lines	N/A	N/A	$1,100
Soil sampling after demolition of concrete containment	N/A	N/A	$2,300
Certification of final closure	N/A	N/A	$4,500
Contingency (10%)			$6,100
Storage Tank Subtotal			$67,300

Permitted Area For Closure	Inventory	Residual For Disposal In Landfill (yd3)	Total Cost (1994 $)
Stabilization Treatment Unit			
Treatment and removal of remaining waste inventory	4 full bins	296	$4,000
Decontamination of equipment and dismantling of structure	Roof and walls	N/A	$3,800
Dismantling of bins and ancillary equipment	4 empty bins	85	$26,700
Demolition of concrete containment area and vault	Containment area	715	$134,200
Soil sampling after demolition of concrete containment	N/A	N/A	$1,300
Certification of final closure	N/A	N/A	$4,500
Contingency (10%)			$17,500
Stabilization Treatment Unit Subtotal			$192,000
Roll-off Box Storage Area			
Removal of remaining waste and boxes	44 full boxes	880	$0
Decontamination of operational equipment	N/A	N/A	$400
Demolition of select fill floor and secondary containment	Select fill floor	2,667	$40,900
Soil sampling after demolition of the select fill floor	N/A	N/A	$700
Certification of final closure	N/A	N/A	$2,500
Contingency (10%)			$4,500
Roll-off Box Storage Area Subtotal			$49,000
Landfill			
Collection and treatment of leachate during closure	N/A	N/A	$826,900
Disposal of closure generated waste	All closure waste	17,582	$92,300
Decontamination of operational equipment	N/A	N/A	$1,300
Groundwater monitoring during closure of landfill (1year)	N/A	N/A	$47,300
Soil sampling around the landfill	N/A	N/A	$5,400
Final survey plat	N/A	N/A	$1,600
Certification of final closure	N/A	N/A	$27,900
Placement of final cover	N/A	N/A	$5,928,300
Contingency (10%)			$693,100
Landfill Subtotal			$7,624,100
Total Closure Cost And Disposal Waste		17,582	$8,170,100

Table 9-2
Post-Closure Cost Estimates

Post-closure Items	Total Cost (1994 $)
Annual Post-closure Costs	
Facility inspection	$6,300
Routine maintenance and repairs	$31,500
Severe erosion damage repair	$1,200
Leachate pumping and treatment	$60,700
Leachate collection system inspection and maintenance	$700
Groundwater monitoring and well maintenance	$36,400
Annual Subtotal	$136,800
30 Year Post-closure Subtotal	$4,104,000
One Time Post-closure Costs	
Notation on property deed	$800
Decontamination and demolition of treatment unit	$2,500
Certification of post-closure	$21,300
One Time Closure Cost Subtotal	$24,600
Subtotal Post-closure Cost	$4,128,600
Contingency (10%)	$412,900
Total	$4,541,500

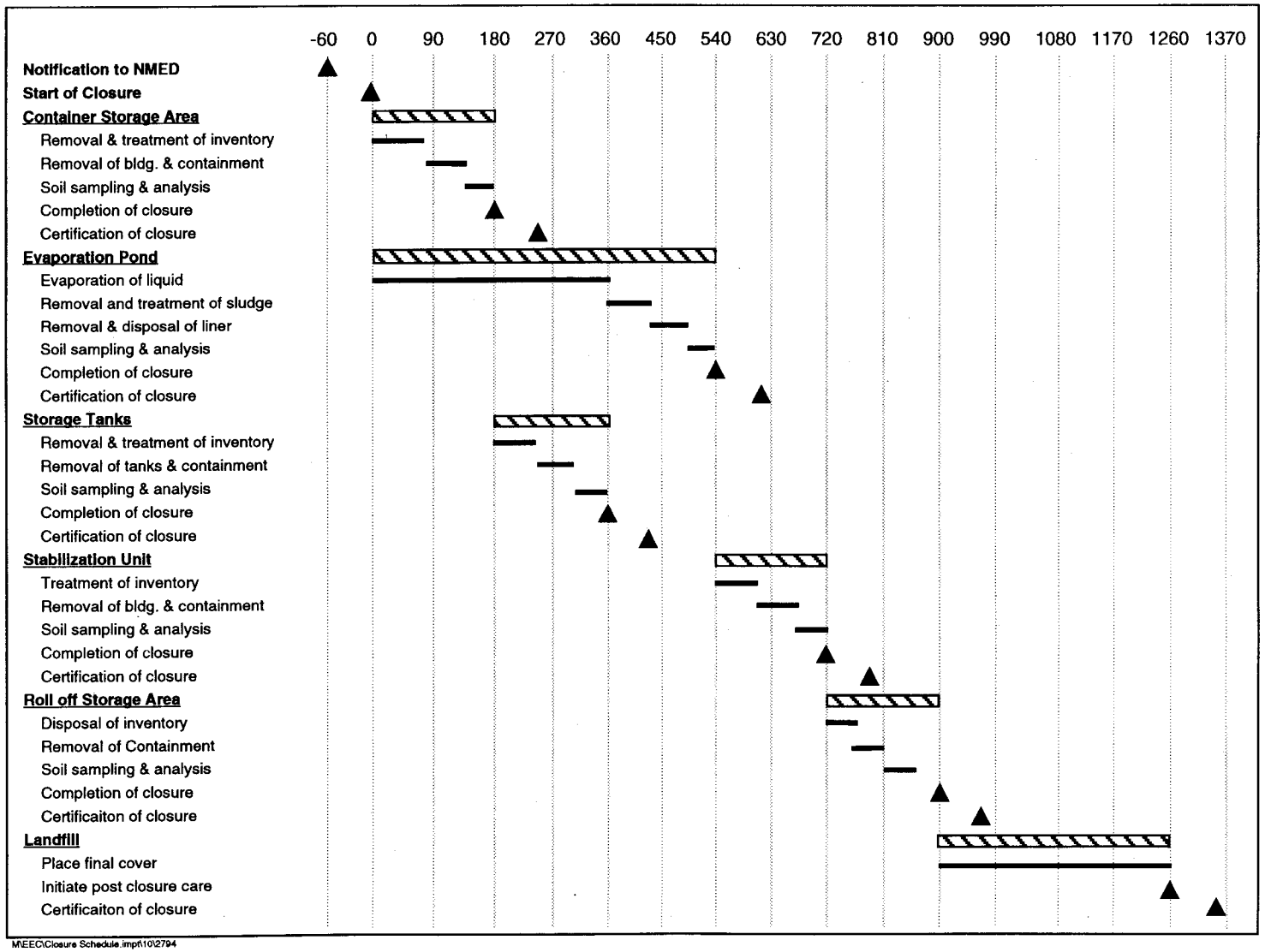


Figure 9-1
Closure Schedule (Days)

Section 10
Waste Minimization

10.1 Introduction

Gandy Marley, Inc. is committed to minimizing 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. Section 10.1 describes the procedure to establish a waste minimization program, Section 10.2 defines the methods to draft a written policy statement, and Section 10.3 presents the elements necessary to develop a written waste minimization program plan.

It is not anticipated that significant 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, 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 in accordance with applicable regulations. Waste minimization efforts will include all forms of waste, not just those wastes defined as hazardous in the New Mexico Hazardous Waste Act.

10.2 Establishing a Waste Minimization Program

A waste minimization program will be developed, including the following elements: (1) establishing support for the program at all levels in the company, (2) organizing the program, (3) setting goals and objectives, (4) performing an assessment of waste minimization opportunities, (5) implementing select opportunities, and (6) measuring progress.

Some approaches that may be used in minimizing waste include (1) reducing or eliminating the use of hazardous materials; (2) implementing recycling programs for paper, aluminum cans, cardboard, scrap metals, oil, batteries, and surplus materials and chemicals; (3) installing air conditioning refrigerant reclaim systems; and (4) minimizing the quantities of virgin products and raw materials allowed into the disposal area; and (5) removing packaging materials from chemicals, products, and equipment before they are introduced into the disposal area or contamination-control areas to avoid cross contamination.

10.3 Establishing a Written Policy

A written policy statement will be developed that describes why a waste minimization 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 Resource Conservation and Recovery Act (RCRA) training and annual refresher training.

10.4 Developing a Waste Minimization Program Plan

A formal written waste minimization plan will be prepared that includes the following elements: (1) the written policy statement; (2) a description of roles and responsibilities; (3) a description of how all groups will work together to reduce waste generation and energy consumption; (4) a plan for publicizing and gaining support for the program; (5) a plan for communicating the successes and failures of waste minimization efforts; (6) a description of the ways in which wastes are generated, including a clear definition of the amounts and types of materials under consideration; (7) a list of treatment, disposal, and recycling facilities currently used; (8) a review of the costs of waste control and disposal, both onsite and at other facilities; (9) an evaluation of the effectiveness of waste minimization activities; and (10) criteria for prioritizing candidate processes, activities, and waste streams for waste minimization projects.

Section 11
Corrective Action

This facility is a new facility; therefore, hazardous wastes have not yet been received on the property. Additionally, the predominant land use in the project area has been cattle grazing. Therefore, it is unlikely that releases of hazardous waste or hazardous waste constituents have occurred.

Should releases from solid waste management units (SWMUs) be identified in the course of future groundwater monitoring, field investigation, environmental audits, or other means, the facility will notify the administrative authority in writing within 30 days of discovery. The following information will be provided:

- The location of the release to the environment relative to the SWMU;
- The type and function of the unit;
- The general dimensions, capacities, and structural description of the unit;
- The period during which the unit was operated;
- Information on the wastes that have been or are being managed at the SWMU; and
- Results of any sampling and analysis to determine whether releases of hazardous waste or hazardous waste constituents have occurred or may occur.

The facility will also notify the administrative authority verbally, within 24 hours of discovery, of any release of hazardous waste or hazardous waste constituents that has the potential to migrate offsite. The facility will take immediate action to protect human health and the environment unless the facility is unable to obtain access to a release that has migrated offsite.

Additionally, when a release occurs, the Resource Conservation and Recovery Act (RCRA) permit will be modified to include appropriate corrective action requirements.

Section 12
Organic Air Emissions

12.1 40 CFR 264 Subpart AA

The Gandy Marley, Inc. 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, or air or steam stripping operations.

12.2 40 CFR Subpart BB

The Gandy Marley, Inc. facility will be subject to 40 CFR 264 Subpart BB regulations because the facility will utilize equipment such as pumps, compressors, pressure relief devices, sampling connecting systems, and valves that contain or contact hazardous wastes with organic concentrations of 10 weight percent or greater.

It is assumed that affected equipment will be in light liquid service, will consist mainly of pumps and valves associated with the liquid waste storage tanks, and that no equipment will be in gas/vapor service. A program will be developed to ensure compliance with Subpart BB. Program elements are described in the following sections.

12.2.1 Equipment List

An equipment list will be prepared and kept in the operating log that includes equipment identification numbers, hazardous waste management unit identification numbers, approximate location of the equipment at the facility, type of equipment, percent by weight total organics, hazardous waste state, and method of compliance with the appropriate standard in 40 CFR 264.1052 through 40 CFR 264.1062 for all equipment subject to Subpart BB requirements.

12.2.2 Equipment Controls

During final design of the facility, consideration will be given to applying the following equipment controls for fugitive emissions sources:

- leakless technology for valves and pumps;
- plugs, caps, blinds, etc. for open-ended lines;
- rupture disks and soft seats for pressure relief devices;

- dual mechanical seals with barrier fluids/degassing vent systems for rotary equipment; and
- closed-loop sampling systems.

If the above equipment is utilized, no inspection or monitoring is required.

12.2.3 Equipment Marking

Each piece of affected equipment will be marked after the tank system is installed in such a manner that it can be readily distinguished from other pieces of equipment. Such marking will include hanging a plastic or metal tag on the equipment. The tags will provide the equipment identification number for each piece of affected equipment.

When a leak is detected, the equipment also will be marked to identify it as leaking. The identification on a valve may be removed after it has been monitored for two successive months and no leak has been detected during this time. The identification on equipment other than a valve may be removed after it has been repaired.

12.2.4 Leak Detection and Repair

A leak detection and repair program will be developed that includes the following elements:

- weekly visual monitoring of pumps in light liquid service in accordance with 40 CFR 264.15,

- monthly monitoring of pumps and valves in light liquid service in accordance with Reference Method 21 in 40 CFR 60,

- monitoring of pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors in accordance with Reference Method 21 in 40 CFR 60 within five days of discovery of evidence of a leak,

- compliance with other standards found in 40 CFR 264.1052 through 264.1062, as appropriate,

- utilization of alternative standards for valves in light liquid service (percentage of valves allowed to leak or skip period leak detection) if operating experience demonstrates that such alternatives are appropriate, and

- repair of leaks in accordance with standards in 40 CFR 264.1052 through 264.1062.

The monthly monitoring will be conducted once per calendar month if waste containing 10 weight percent or greater organics is stored in the tank system during that calendar

month. When waste is not received or stored in the tank system during a calendar month, no monitoring will be performed.

12.2.5 Record Keeping and Reporting

Record keeping will be conducted in accordance with requirements in 40 CFR 264.1064.

Records that will be kept in the facility operating record include:

- the equipment list discussed in Section 12.2.1,
- results of weekly inspection of pumps,
- results of monthly monitoring of pumps and valves,
- other records required to demonstrate compliance with standards in 40 CFR 264.1052 through 264.1062, as necessary,
- records that demonstrate compliance with the alternative standards for valves in light liquid service, if such standards are utilized,
- information regarding leaks and repairs,
- information regarding equipment designated as having no detectable emissions,
- justification for valves designated as unsafe to monitor or difficult to monitor,
- criteria for failure of seal system or barrier system or both if seeking an exemption from 40 CFR 264.1052(a) using a dual mechanical seal system that includes a barrier fluid system, and
- information on other equipment for which exemptions are sought and justifications for the exemptions.

The facility will provide a semi-annual report to the U.S. Environmental Protection Agency and New Mexico Environment Department if any leaks from valves, pumps, and compressors are not repaired as required in 264.1057(d), 264.1052(c) and (d), or 264.1053(g) and if any hazardous waste management unit shutdowns occurred within that semi-annual reporting period.

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Appendix A
Construction Quality Assurance Plan

Prepared for

GANDY MARLEY CORPORATION

CONSTRUCTION QUALITY ASSURANCE PLAN

TRIASSIC PARK DISPOSAL FACILITY
CHAVES COUNTY, NEW MEXICO

October 1994

Prepared by

TerraMatrix Inc.
1475 Pine Grove Road, Suite 109
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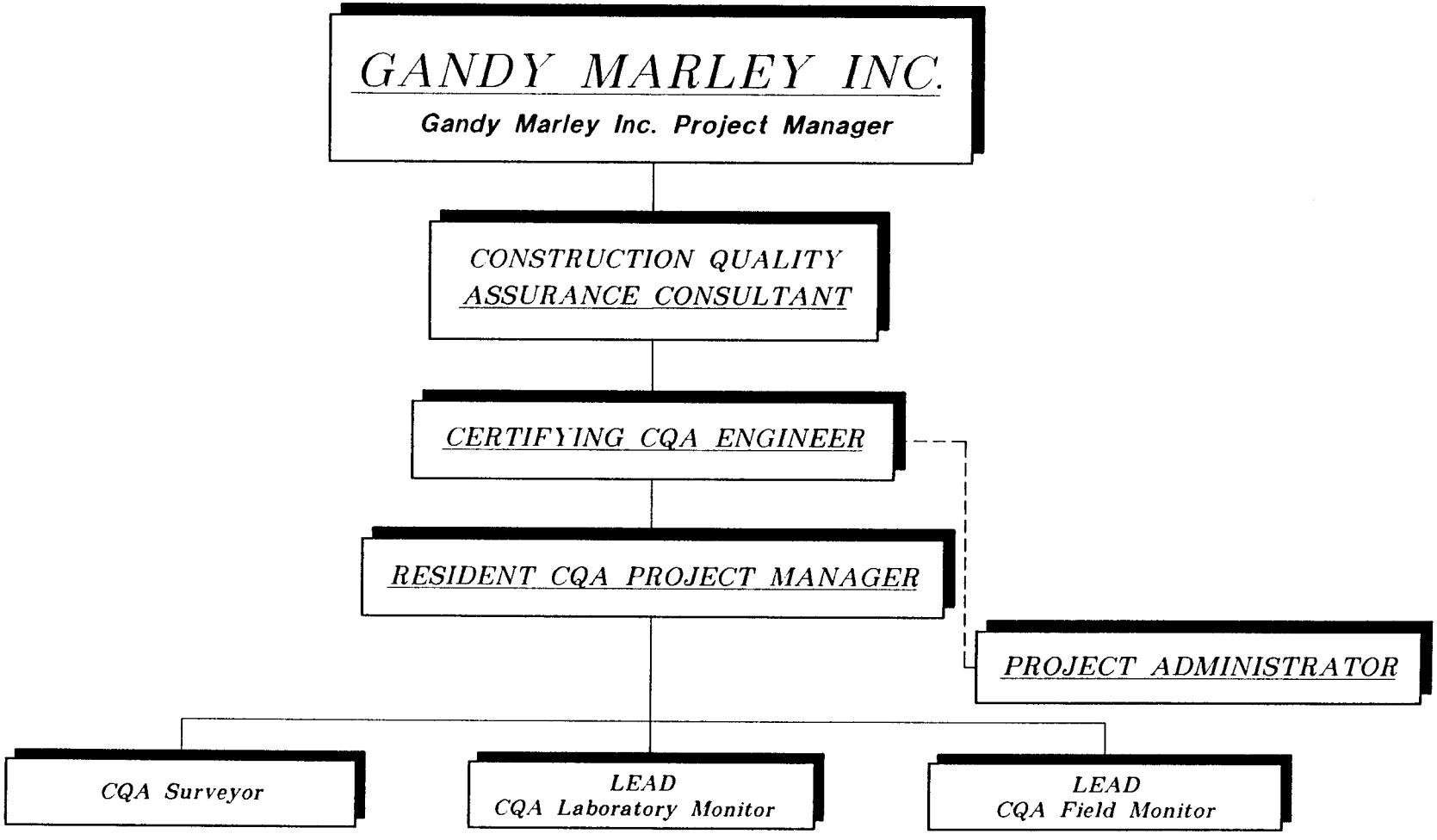

LEGEND

DIRECT AUTHORITY

COMMUNICATION

Project No.: 602-0100	Design By: John J. Kendall	Scale: Not to Scale
File: GAN-QAC	Drawn By: Joe Nagengast	Date: October 1994

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FIGURE 1

GANDY MARLEY INC.

QUALITY ASSURANCE ORGANIZATION CHART

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1.0 INTRODUCTION

This manual describes Construction Quality Assurance (CQA) procedures for the installation of the soil and geosynthetic components of lining and final cover systems in hazardous waste landfills, surface impoundments, and other facilities requiring subsurface containment systems comprised of soils and geosynthetic components, constructed at the Gandy Marley Inc. Triassic Park Waste Disposal Facility in Tatum, New Mexico. This manual addresses both the soil components and the geosynthetic components of liner and cover systems and includes manufacturing quality assurance guidelines for purchased geosynthetic materials. Design guidelines for piping or structures are covered in other documents.

The main emphasis of the *CQA Manual* is careful documentation during the entire quality assurance process, from the selection of materials through the installation of the final cover.

At completion of the work, a certification report is prepared which documents that the earthwork and geosynthetic system has been constructed in accordance with the procedures outlined in this manual. Preparation of this report is the responsibility of the Construction Quality Assurance Consultant (CQAC).

2.0 GENERAL DESCRIPTION OF ORGANIZATION RESPONSIBILITIES, AND CONTROL PROCEDURES

The purpose of this section is to present Gandy Marley Inc.'s Quality Control Guidelines and Procedures as applicable to document preparation including drawings and specifications and laboratory testing. This section describes Gandy Marley Inc.'s CQA program, and discusses the general approach taken in implementing CQA and technical procedures. This manual is produced under the direction of Gandy Marley Inc. management, who are responsible for periodic revisions as required to address changes in regulatory guidelines and changing organizational needs. The manual and its revisions require the final approval of the President of Gandy Marley Inc. or his designee.

2.1 ORGANIZATION

Figure 1 shows the general CQA program organization for the Triassic Park Waste Disposal Facility (WDF). The direct functional lines of authority are shown as well as the lines of communication between CQA staff and the technical groups for a typical project. The CQA Certifying Engineer is responsible for over all implementation of the CQA plan. He provides direction to the Resident CQA Project Manager and is responsible for final review of all sdeliverables required by the CQA plan. The Resident CQA Project Manager is responsible for the management and administration of all field and data collection activities and is responsible for day to day coordination of all field monitoring staff. The Resident CQA Project Manager reports directly to the CQA Certifying Engineer and receives appropriate technical guidance or support as required. The CQA Certifying Engineer reports directly to the Gandy Marley Inc. Project Manager on project status.

A detailed description of responsibilities follows:

2.1.1 Gandy Marley Inc. Project Manager

The Gandy Marley Inc.'s Project Manager is the owner/operator's official representative who is responsible for coordinating schedules, meetings, and field activities. This responsibility includes communications to other members in the owner/operator's organization, owner's representative, permitting agency, materials suppliers, general contractor, specialty subcontractors or installers and CQA consultant.

2.1.2 CQA Certifying Engineer

The CQA Certifying Engineer is a member of a 3rd party CQA firm who reports to the Gandy Marley Inc. Project Manager on the performance of the project. The CQA Certifying Engineer is the prime contractual interface with the owner, and is responsible directly to the owner for overall contractual performance of the project. The CQA Certifying Engineer has direct day-to-day access to the Resident CQA Project Manager and Staff, and he assures that the full resources are available to meet the project's technical CQA needs.

The CQA Certifying Engineer is responsible for certifying to the owner/operator and permitting agency that, in his or her opinion the facility has been constructed in accord with plans and specifications and CQA document approved by the permitting agency.

FIGURE 1

2.1.3 Resident CQA Project Manager

The Resident CQA Project Manager is responsible for technical requirements, project planning and control, personnel performance, quality of results, and project completion within budgetary and scheduling requirements. The Resident CQA Project Manager will review and approve all of the laboratory and field data testing summaries prior to submitting it to the CQA Certifying Engineer. The Resident CQA Project Manager is also responsible for effective implementation by project staff of the CQA program elements applicable to the project.

The Resident CQA Project Manager is responsible for reviewing the CQA Plan as well as general plans and specifications for the Project so that the CQA Plan can be implemented with no contradictions or unresolved discrepancies. The most important duty of the Resident CQA Project Manager is to confirm that the facility was constructed in accordance with plans and specifications. In the event of non-conformance, the Resident CQA Project Manager will notify the Gandy Marley Inc. Project Manger and the CQA Certifying Engineer.

2.1.4 Project Administrator

Depending on the size, complexity, and duration of a project, the Resident CQA Project Manager may assign certain responsibilities to a Project Administrator, who establishes budget and cost controls, defines administrative parameters for the project, and prepares status reports. The Project Administrator is responsible for assuring that all portions of the project are completed on time and within budget.

2.1.5 CQA Monitoring Personnel (CQA Monitors)

Construction quality assurance personnel (CQA Monitors) are responsible for making observations and performing field tests to ensure that a facility is constructed in accord with the plans and specifications.

2.2 CQA PROGRAM

Gandy Marley Inc.'s CQA program for the Triassic Park WDF is designed to comply with agency requirements.

The overall objectives of the CQA Program include:

- The provision of a clearly defined organizational structure within which the project can be planned and completed in ways which fulfill regulatory requirements.
- 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 by regulatory guidelines.
- Assurance that the required documentation of quality performance is properly generated, and that such documentation is adequate and complete for the activity involved.

- Provision of permanent project CQA document files identifiable and traceable to each activity.

- Systematic control of items, equipment, materials, or activities not in conformance 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.

- Assurance that subcontractors and consultants used in assisting project activities have an acceptable CQA program or are participating in accordance with Gandy Marley Inc.'s CQA Program guidelines.

2.3 DESIGN CONTROL

As applied to geotechnical activities related to landfill design and hazardous waste facility containment design, design control is interpreted to mean those methods used to assure that research, analyses, and evaluations which satisfy applicable regulatory requirements, are consistent with good professional practice, and are technically valid and correct. These methods include the use of various planning documents which provide the direction and schedules for all work within projects, periodic review of work activities against project plans, identification of pertinent regulatory criteria requirements in project plans, development of specific work instructions, and systematic review of the results for technical validity and correctness. The Project CQA Plan may be prepared by the CQA Certifying Engineer or Resident CQA Project Manager and they are reviewed and approved by the Gandy Marley Inc. Project Manager prior to implementation.

2.4 DOCUMENT CONTROL

All project-related correspondence and communications are documented and controlled. The review, approval, issue, and revision of documents controlling quality is subject to procedural control to assure the adequacy and accuracy of quality requirements. Provisions are established within individual procedures that identify those individuals responsible for review, approval, issue, and revision. All revisions of documents are reviewed and approved by the same or equally qualified personnel that performed the original review. Obsolete or superseded documents are destroyed or marked to prevent inadvertent use. Responsibility for updating controlled documents lies with the recipient. Control is provided through the use of signed transmittal sheets and are periodically verified during internal reviews. When field work requires on-site references or other documents, site supervisors will be responsible for assuring that required CQA and project documents are available at the location where the activity will be performed prior to commencing work activity. "Controlled" documents are interpreted to include such documents as CQA Procedures, and technical procedures.

3.0 DOCUMENTATION

An effective construction quality assurance 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 quality assurance activities. The CQA Consultant shall document that all quality assurance requirements have been addressed and satisfied.

3.1 DAILY INSPECTION REPORTS

Standard reporting procedures will include preparation of a daily log which, at a minimum, shall consist of the following:

- Field notes: including memoranda of meetings and/or discussions with the Earthwork Contractor;
- Observation and testing data sheets; and
- Construction problems and resolution data sheets.

This information will be regularly submitted to and reviewed by the Gandy Marley Inc. Project Manager.

3.1.1 Daily Summary Reports

Observation and testing data sheets will be prepared daily. At a minimum, these data sheets will include the following information:

- An identifying sheet number for cross referencing and document control;
- Date, project name, location and other identification;
- Data on weather conditions;
- A reduced-scale Site Plan showing all proposed work areas and test locations;
- Descriptions and locations of ongoing construction;
- Equipment and personnel in each work area, including subcontractors;
- Descriptions and specific locations of areas, or units, of work being tested and/or observed and documented (identified by lift and location);
- Locations where tests and samples were taken;
- A summary of test results;

- Calibrations or recalibrations of test equipment, and actions taken as results of recalibration;
- Off-site materials received, including quality verification and documentation;
- Decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality; and
- The Resident CQA Project Manager and/or CQA Monitor signature.

The above items should be formulated into data sheets so that none are overlooked.

3.2 PHOTOGRAPHIC REPORTING DATA SHEETS

Photographic reporting data sheets, where used, shall be cross-referenced with observation and testing data sheet(s) and/or construction problem and solution data sheet(s).

These photographs 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 records shall be presented to the Gandy Marley Inc. Project Manager upon completion of the project.

3.3 DESIGN AND/OR SPECIFICATION CHANGES

Design and/or specification changes may be required during construction. In such cases, the CQA Certifying Engineer shall notify the Gandy Marley Inc. Project Manager and Design Engineer.

Design and/or specification changes shall be made only with written agreement of the Gandy Marley Inc. Project Manager and the Design Engineer, and shall take the form of an addendum to the specifications and/or *CQA Manual*.

3.4 CERTIFICATION AND SUMMARY REPORT

At the completion of the work, the CQA Certifying Engineer shall submit to the Gandy Marley Inc. Project Manager a final certification and summary report. This report shall certify that the work has been performed in compliance with the plans and specifications, and physical sampling and testing, except as properly authorized and implemented, and that the summary document provides the necessary supporting information.

At a minimum, this report shall include the following:

- Summaries of all construction activities;
- Observation and testing data sheets including sample location plans;
- Construction problems and solutions data sheets;
- Changes from design and material specifications;
- As-built drawings; and
- Certification statement sealed and signed by a Professional Engineer registered in the State of New Mexico.

The as-built drawings shall include scale drawings depicting the location of the construction and details pertaining to the extent of construction (depths, plan dimensions, elevations, soil component thicknesses, etc.). All surveying and base maps required for development of the as-built drawings shall be done by a qualified land surveyor. This document shall be prepared by the CQA Certifying Engineer and included as part of the CQA plan certification report documentation.

3.5 STORAGE OF RECORDS

All handwritten data sheet originals, especially those containing signatures, should be stored by the Gandy Marley Inc. Project Manager in a safe repository on site. Other reports may be stored by any standard method which will allow for easy access.

4.0 MEETINGS

4.1 PRE-BID MEETING

The first meeting is held to discuss the CQA Plan and resolve differences of opinion before the project is let for bidding. The pre-bid meeting is held after the permitting agency has issued a permit for a waste containment facility and before a construction contract has been awarded. The pre-bid meeting is held before construction bids are prepared so that the companies bidding on the construction will better understand the level of CQA to be employed on the project.

4.2 RESOLUTION MEETING

Following the completion of the Design Drawings and Specifications for the project, a resolution meeting shall be held. The Design Engineer, Gandy Marley Inc. Project Manager, and CQA Certifying Engineer shall all be present at this meeting. The purpose of this meeting is to:

- Provide all parties with any relevant documents;
- Review the plans and Design Drawings and Specifications provided by the Design Engineer;
- Make any appropriate modifications to the CQA Plan (i.e., ensure that site-specific considerations are added to the plans or specifications);
- Review the CQA Plan and quality control procedures;
- Develop site specific addenda for the proposed project to review and assign responsibilities of each party to establish procedures for documentation and reporting of information;
- Establish methods for distribution and storage of documents and reports;
- Prepare a time schedule for all operations to establish work area security and safety protocol to discuss and select the qualified Earthwork Contractors who will be asked to bid;
- Review any special permit conditions or state/federal requirements that may need to be included in CQA work; and
- Select testing equipment and review protocol for testing and placement of the soil materials.

The meeting shall be documented by the CQA Monitor or a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties.

4.3 PRE-CONSTRUCTION MEETINGS

A pre-construction meeting shall be held at the site. At a minimum, the meeting shall be attended by the Earthwork Contractor, the CQA Certifying Engineer, Resident CQA Project Manager, and the Gandy Marley Inc. Project Manager. The resolution meeting and the pre-construction meeting may be held concurrently. The purpose of the pre-construction meeting is to:

- Discuss any appropriate modification of the CQA Plan (i.e., ensure that site-specific considerations are added, and review any special permit conditions or state/federal requirements that may need to be included);
- Review the responsibilities of each party;
- Review procedures for documentation and reporting of information;
- Review distribution and storage of documents and reports;
- Establish protocol for testing;
- Establish protocol for handling construction deficiencies, and repairs and retesting;
- Conduct a site walk-around to discuss work plans and inspect material handling, borrow, and stockpiling locations;
- Establish areas for stockpiling and development of test fill, as well as areas that may be required for temporary storage or use;
- Review a time schedule for all operations;
- Review work area security and safety protocol;
- Discuss and establish procedures for material processing (moisture condition, soil blending, etc.);
- Discuss and establish procedures for care and control of water, protection from wind, drying, dust control, and general liner protection and housekeeping;
- Review health and safety requirements applicable to all parties;
- Develop site-specific addenda to the *CQA Manual* for the proposed project; and
- Make a list of action items that require resolution and assign responsibility for these items.

The meeting shall be documented by the CQA Monitor or a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties prior to the start of construction.

4.4 PROGRESS MEETINGS

Weekly progress meetings should be held. Weekly meetings can be helpful in maintaining lines of communication, resolving problems, identifying action items, and improving overall quality management. When numerous critical work elements are being performed, the frequency of these meetings can be increased to biweekly, or even daily. Persons who should attend this meeting are those involved in the specific issues being discussed. At all times the Gandy Marley Inc. Project Manager, or designated representative will be present.

5.0 SAMPLE CUSTODY

All samples shall be identified as described in the CQA Plan. Whenever a sample is taken, a chain of custody record should be made for that sample. If the sample is transferred to another individual or laboratory, records shall be kept of the transfer so that chain of custody can be traced. The purpose of keeping a record of sample custody is to assist in tracing the cause of anomalous test results or other testing problem, and to prevent accidental loss of test samples.

Destructive testing samples of geosynthetic materials will be taken in triplicate, with one sample tested by Installer personnel, one tested by CQA personnel, and the third retained in storage as prescribed in the CQA Plan.

6.0 EARTHWORKS CONSTRUCTION QUALITY ASSURANCE

6.1 GENERAL

Construction of the hazardous waste disposal cell, surface impoundment, or specified earthwork must be in accordance with the Design Drawings and Specifications. This, in part, shall be accomplished by quality control testing before and during construction.

Quality control testing within these categories shall consist of material evaluation, construction quality evaluation, hydraulic conductivity evaluation, and any special testing required.

6.2 MATERIAL EVALUATION

6.2.1 General

The types of soils used in lining systems include general earthfill, clay liner and cover materials, drainage materials, protective cover materials, and vegetative cover soil. Prior to construction, sources for each of these materials shall be identified, and samples of each material from each source shall be tested to determine whether they meet project Specifications. All material evaluation tests are to be performed in a geotechnical laboratory which has been approved by the Gandy Marley Inc. Project Manager or his representative.

6.2.2 Laboratory Soils Tests

Tests to confirm the adequacy of materials shall be performed on each material from each source area. All tests shall be documented, and the material shall be accepted or rejected according to the results of these tests. The following tests shall be performed in the evaluation of material properties for construction purposes (Tables 1 and 2 present the type and minimum number of tests required for each type of material):

TEST	ASTM Standard No.[1]
Laboratory Determination of Water (Moisture) Content of Soil and Rock	D 2216
Determination of Water (Moisture) Content of Soil by the Microwave Oven Method	D 4643
Particle-Size Analysis of Soils	D 422
Amount of Material in Soils Finer than the No. 200 Sieve	D 1140
Liquid Limit, Plastic Limit and Plasticity Index of Soils	D 4318
Shrinkage Factors of Soils	D 427
Specific Gravity of Soils	D 854

(1) The most current version of the ASTM standard shall be used unless specified.

6.2.3 Soils Selection Criteria

All soil materials used during construction shall meet the following general criteria, unless otherwise indicated in the project Specifications.

6.2.3.1 General Earthfill

General earthfill shall consist of random, well-graded granular or cohesive material taken from on-site or approved off-site excavations or stockpiles. This material shall be relatively free of organics (less than 3 percent by volume), trash, clayballs (larger than 6 inches), or other deleterious matter. If required, this material shall be processed such that it does not contain particles greater than 6 inches in smallest dimension.

6.2.3.2 Clay Liner/Cover Material

Natural Soil

Soils used in clay liners, and in the final clay cover shall consist of a clean, select material free of organics, trash, excess silt, or other deleterious matter. It should be classified according to the Unified Soil Classification System (USCS) as CL or CH. Organic soils shall not be used as clay liner material. Sand and silt soils (SC, ML, and MH) may be suitable to achieve the specified permeability described below. If required, the clay liner/cover materials shall be processed so that they do not contain particles greater than 4 inches in the smallest dimension. The clay liner shall have a compacted coefficient of permeability (k) equal to or less than 1×10^{-7} cm/sec.

Soil/Bentonite Admix Material

If the native on-site soil exhibits a compacted permeability of greater than 1×10^{-7} cm/sec, its permeability can be lowered to $k = 1 \times 10^{-7}$ cm/sec or less by mixing the soil with bentonite. This should be done only with the written approval of the Gandy Marley Inc. Project Manager.

The optimum soil-bentonite ratio should be established by a laboratory testing program. The testing program would include compaction tests and laboratory permeability tests on fabricated samples.

Mixing shall be performed in areas prepared near the soil borrow or construction area. Any necessary moisture conditioning of the admix material shall be performed in the processing area at least 24 hours before its use.

The admix stockpiles shall be surface-graded and compacted to minimize drying. Any material which is allowed to dry out shall be selectively spoiled for moisture conditions as directed by the CQA Monitor.

Test Fill

A test fill shall be constructed to provide field verification of the moisture/density/permeability relationship obtained from laboratory tests. The test fill shall be constructed utilizing borrow material dedicated for use in the proposed project. The test fill shall be used to evaluate the material handling and placement requirements, compaction equipment and procedures, number of

passes of equipment necessary to achieve results, permeability, provide test samples for laboratory permeability testing.

The test fill shall have approximate plan dimensions of 20 feet by 60 feet and be constructed at a location designated by the Gandy Marley Inc. Project Manager. The Contractor shall construct the test fill using the same equipment and procedures that will be utilized during project construction. Observation and testing shall be conducted by the CQA Monitor.

6.2.3.3 Drainage Material

Drainage materials are used in the primary and secondary leachate collection systems and in the drainage layer above the final cover. All drainage material shall consist of clean sands and/or gravels or other permeable material classified as SW, SP, GW, or GP that contain less than 5 percent (by dry weight) passing the U.S. No. 200 sieve and with 100 percent by dry weight passing the 3-inch sieve.

Gravel placed in pipe trenches shall be classified as GW or GP, contain less than 5 percent fines, and be of a gradation whereby 95 percent of the material is larger than the perforations of the drainage pipe.

All drainage layer materials shall have a coefficient of permeability, $k \geq 1 \times 10^{-2}$ cm/sec.

6.2.3.4 Protective Cover

This material may be used to protect the geomembrane or clay liner components in landfills, surface impoundments or other containment systems. It shall typically be a fine-grained earthfill having a maximum rounded or subrounded particle size of 1/4 inch in least dimension unless a protective geotextile is first placed over the geomembrane, in which case a maximum particle size of 1 inch is permissible. Processing to remove larger particles may be required. The particles shall not be angular or have sharp edges or points.

6.2.3.5 Vegetative Cover

This material shall be topsoil and/or soil capable of providing the proper base for establishing surficial grasses for erosion protection.

6.3 CONSTRUCTION EVALUATION

Construction quality evaluation shall be performed on all components of the construction. Criteria to be used for determination of acceptability of the construction work shall be as identified in the project specifications. Construction evaluation testing shall consist of the following; inspection of the work, investigations into the adequacy of layer bonding; field and laboratory tests.

All field and laboratory tests shall be conducted on samples taken from material during the course of the work.

6.3.1 Inspection of the Work

Inspection of the construction work includes the following: inspection of the water content and other physical properties of the soil during processing, placement, and compaction; inspection of the thickness of lifts as loosely placed and as compacted; inspection of the action of the compaction and heavy hauling equipment on the construction surface (sheepsfoot penetration, pumping, cracking, etc.); inspection of the number of coverages used to compact each lift.

6.3.2 Evaluation of Layer Bonding

Evaluation of layer bonding may be determined by using test pits to make visual observations. All test pits shall be excavated in a manner acceptable to the CQA Monitor. Test pits shall be at least 1 foot in depth. All pits shall be backfilled and compacted in accordance with the project specifications. The backfill shall compacted using hand compaction equipment or other methods approved by the CQA Monitor.

6.3.3 Laboratory and Field Tests

Laboratory field tests will be conducted at the testing frequencies presented in Tables 2 and 3.

At locations where the field testing indicates densities below the requirements of the specification, the failing area shall be reworked. For clay liners where the field testing indicates the moisture contest is below the requirements, the area shall be scarified, moisture conditioned, and recompacted. Alternately, at the Resident CQA Project Manager and Gandy Marley Inc. Project Manager's option, undisturbed samples of in-place material shall be obtained and permeability and/or strength tests conducted. The density requirements may be waived if the permeability and strength tests reveal acceptable results.

Tables 2 and 3 describe in detail the types and number of tests required for each liner component during construction evaluation. Except for the subgrade, the criteria for these tests are identified in the project specifications.

6.3.4 Subgrade

During construction, the subgrade soil shall be tested to confirm that its soil characteristics are equivalent to those utilized in the design of the liner.

At a minimum, the CQA monitor shall determine the suitability of the subgrade for fill placement by continuous visual inspection during proof rolling, pocket penetrometer or Torvane shear tests in suspect soil areas.

The following tests may also be performed on the subgrade material if required:

PARAMETER	METHOD	ASTM STANDARD NO.[1]
Compaction (Moisture/Density Relationships using 5.5-pound hammer and 12-inch drop)	Standard Proctor Test	D 698
Compaction (Moisture/Density Relationships using 10-pound hammer and 18-inch drop)	Modified Proctor	D 1557
Liquid Limit, Plastic Limit, Plasticity Index	Atterberg Limits	D 4318
Particle Size:	Sieve Analysis Percent Passing the No. 200 sieve	D 422 D 1140

(1) The most recent version of the ASTM test method shall be used unless specified.

The following testing is typically performed in the field during construction:

PARAMETER	METHOD	ASTM STANDARD NO.[1]
Strength Tests	Pocket penetrometer Trovane shear	--- ---
Field Moisture/Density Determination	Drive cylinder Nuclear methods Rubber balloon	D 2937 D 2922 D 3017 D 2167

(1) The most recent version of the ASTM test method shall be used unless specified.

Nuclear density methods shall be preferred for all density testing due to the ease of testing and the relatively large number of tests which can be run in a specified time. Questions concerning the accuracy of any single test shall be addressed by retesting in the same or another location. Periodic (one per 20 nuclear density tests, or a minimum of one per day) checks using the rubber balloon method shall be performed to verify the nuclear density results. Wherever a conflict exists, rubber balloon results shall be accepted over nuclear density results.

- Laboratory tests
  - Compaction tests (standard Proctor) on each material type
- Field Tests
  - Moisture/density tests - 1 per 10,000 cubic yards or 10,000 square feet
  - Pocket penetrometer tests - one per moisture/density test

6.4 HYDRAULIC CONDUCTIVITY EVALUATIONS

As shown in Tables 1 and 2, hydraulic conductivity (permeability) evaluations shall be conducted on all materials proposed for use or used in the construction of the clay liners or runoff control berms. Hydraulic conductivity evaluations shall be performed on samples obtained from the

constructed test fill and/or clay liner. Laboratory manufactured clay liner samples shall be used only for evaluation during material selection. Criteria to be used for determination of acceptability shall be as identified in this document and in the project Specifications.

The following laboratory tests shall be used to assess hydraulic conductivity of materials during pre-construction:

TEST	ASTM STANDARD NO.[1]
Permeability of Granular Soils (Constant Head Test)	D 2434
Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter	D 5084

[1] The most recent version of the ASTM test method shall be used unless specified.

Other tests conducted on permeability samples shall consist of Atterberg limits and particle size analysis.

6.5 SPECIAL TESTING

Construction evaluation involving special testing shall be conducted at the direction of the Owner or his representative, or as required by the project specifications.

The following tests shall be performed to provide data for geotechnical evaluations.

TEST	ASTM STANDARD NO.[1]
Unconfined Compressive Strength of Cohesive Soil	D 2166
One-Dimensional Consolidation Properties of Soils	D 2435
Direct Shear Test of Soils (Consolidated, Drained)	D 3080
Shear, Triaxial Compression	
- Consolidated Drained (CD)	---
- Consolidated Undrained (CU)	D 4767
- Unconsolidated Undrained (UU)	D 2850

[1] The most recent version of the ASTM test method shall be used unless specified.

6.6 QUALITY CONTROL TESTING FREQUENCY

All quality control testing shall be conducted in accordance with the project Specifications or as directed by the Gandy Marley Inc. Project Manager and/or his CQA representative.
Routine testing frequencies for material evaluation and construction quality evaluation are presented in Tables 1, 2, and 3. In these tables, the terms "layer" and "lift" are used. These terms are defined as follows:

- A "layer" is defined as a compacted stratum composed of several lifts constructed without construction joints and without changes of grade exceeding 5 percent in any direction.

- A "lift" is defined as a constructed segment of a layer comprised of clay materials placed in a 6-inch compacted thickness.

Sampling locations shall be selected by the CQA Monitor. Additional testing for suspected areas shall be considered when:

- Rollers slip during rolling operation;
- Lift thickness is greater than specified;
- Earthfill is at improper and/or variable moisture content;
- Less than specified number of roller coverages are made;
- Dirt-clogged rollers are used to compact material;
- Rollers may not have used optimum ballast;
- Fill materials differ substantially from those specified;
- The degree of compaction is doubtful; or
- Directed by the Gandy Marley Inc. Project Manager or the CQA Monitor.

During construction, the frequency of testing may also be increased in the following situations:

- Adverse weather conditions;
- Breakdown of equipment;
- At the start and finish of grading;
- Material fails to meet specifications; or
- The work area is reduced.

6.7 CLAY LINER PERFORATIONS

Perforations that must be filled shall be included, but not limited to the following:

- Nuclear density test probe locations;

- Permeability sampling locations; and

- Test pit locations.

All clay liner perforations shall be made in accordance with the testing methods and frequencies identified in Tables 2 and 3. Construction permeability samples shall be taken such that the sample tube is inserted into the liner normal (perpendicular) to the plane of the constructed surface.

Unless otherwise noted in the project Specifications, or as directed by the Owner or his representative, all perforations of the clay liner by probe or sample tube shall be backfilled with a soil-bentonite mixture. The clay mixture will be compacted in-place with a tamping rod, modified or standard Proctor hammer as specified, or hand tamper, depending on the size of the perforation. Test pit excavations shall be backfilled with the same material and using the same procedures for the material being tested or examined.

6.8 REPAIRS AND RETESTING

The Earthwork Contractor shall correct the deficiency to the satisfaction of the CQA Monitor. If a project specification criteria cannot be met, or unusual weather conditions hinder work, then the CQA Monitor shall develop and present to the Gandy Marley Inc. Project Manager suggested solutions for his approval.

All retests by the CQA Monitor must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The CQA Monitor shall also verify that all installation requirements are met and that all submittals are provided.

The CQA Monitor will notify the Resident CQA Project Manager of any condition which does not comply with the project plans and specifications. The Resident CQA Project Manager will in turn notify both the Gandy Marley Inc. Project Manager and the Certifying CQA Engineer.

TABLE 1
PRE-CONSTRUCTION TESTING FREQUENCY FOR MATERIAL EVALUATION FOR SOIL COMPONENTS OF LINING AND FINAL COVER SYSTEMS

Test and ASTM No.	Subgrade	General Earthfill	Clay Line/Cover Stockpile	Sand Stockpile	Gravel Stockpile
Moisture Content (D 2216)	--	1 per 10,000 yd^3*	1 per 2,500 yd^3*	1 per 2,500 yd^3 (minimum 1 per source)**	1 per 2,500 yd^3 (minimum 1 per source)**
Particle Size (Clays - D 1140 Other - D 422)	--	1 per 10,000 yd^3*	1 per 7,500 yd^3*	1 per 2,500 yd^3 (minimum 1 per source)**	1 per 2,500 yd^3 (minimum 1 per source)**
Atterberg Limits (D 4318)	--	1 per 10,000 yd^3*	1 per 7,500 yd^3*	--	--
Compaction (D 1557 or D 698)	1 per 10,000 yd^3	1 per 10,000 yd^3*	1 per 7,500 yd^3	--	--
Laboratory Permeability (D 5084)	--	--	1 per 15,000 yd^3 per material type	1 per 2,500 yd^3 (minimum 1 per source)** (ASTM D 2434)	1 per 2,500 yd^3 (minimum 1 per source)** (ASTM D 2434)
Calcium Carbonate (D 4373)	--	--	--	1 per 2500 yd^3 (minimum 1 per source)**	1 per 2500 yd^3 (minimum 1 per source)**

* Minimum one test per material type
** In addition to quarry certification

TABLE 2
CONSTRUCTION TESTING FREQUENCY FOR MATERIAL EVALUATION OF SOIL COMPONENTS OF LINING AND FINAL COVER SYSTEMS

Test and ASTM No.	General Earthfill	Clay Liner/Cover in Place	Sand in Place	Gravel in Place	Cover Over Geomembrane	Vegetative Cover
Moisture Content (D 2216, D 4043)	1 per 5,000 yd^3**	1 per 1,000 yd^3	1 per 10,000 ft^2*	1 per 750 yd^3	--	--
Particle Size (Clays - D 1140 Other - D 422)	1 per 5,000 yd^3**	1 per 1,000 yd^3	1 per 10,000 ft^2*	1 per 750 yd^3	1 per 10,000 yd^3**	1 per 5,000 yd^3*
Atterberg Limits (D 4318)	1 per 5,000 yd^3**	1 per 1,000 yd^3	--	--	--	--
Compaction (D 1557 or D 698)	1 per 5,000 yd^3**	1 per 5,000 yd^3 or changes**	--	--	As necessary	--
Laboratory Permeability (ASTM No.)	--	1 per 5,000 yd^3 (D 5084)	1 per source (D 2434)	1 per 2,000 yd^3 (D 2434)	--	--
Calcium Carbonate (D 4373)	--	--	1 per 2,500 yd^3	1 per 2,500 yd^3	--	--

* Minimum two tests per layer per subcell
**Minimum one test per source
A subcell is a unit within a landfill or surface impoundment which is physically separated from other portions of the facility by an intermediate berm.

TABLE 3
CONSTRUCTION TESTING FREQUENCY FOR QUALITY EVALUATION FOR SOIL COMPONENTS OF LINING AND FINAL COVER SYSTEMS

Test and ASTM No.	Subgrade	General Earthfill	Clay Liner/Cover Material	Sand	Drainage Material Gravel	Protective Cover
Nuclear Field Moisture Content/Density D 3017 D 2422	1 per 10,000 ft^2 or minimum of 6 per lift whichever is greater	1 per 10,000 ft^2 or minimum of 6 per lift whichever is greater	1 per 10,000 ft^2 or minimum of 6 per lift whichever is greater	--	--	1 per 10,000 ft^2 or minimum of 6 per lift whichever is greater
Calibration and Check						
Rubber Balloon D 2167		1 per day of fill placed	1 per 20 nuclear density tests	--	--	--
Oven Moisture Content D 2216		1 per day of fill placed	1 per 10 nuclear moisture tests	--	--	--
Penetrometer or Torvane Shear	Weak or suspect areas	--	1 per moisture/density test	--	--	--
Surveys* As-built Condition Elevation Monitoring		All appurtenant components 50 feet center to center or minimum 6 points per grade at least at the following location: - base of excavation - top of first clay lift for each layer - top of compacted clay layers - top of all collection systems - base and top of all sumps and drains - as directed by the Owner or his representative				
Density Test and Permeability Sample Locations		As selected by the Inspector				
Layer Bonding Compacted Clay		As noted in Test Fill description				
* To be performed by a qualified land surveyor						

7.0 GEOMEMBRANE QUALITY ASSURANCE

7.1 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geomembrane material, the Manufacturer or Installer shall provide the Resident CQA Project Manager with the following information:

- The origin (resin supplier's name and resin production plant), identification (brand name and number), and production date of the resin;
- Copies of the quality control certificates issued by the resin supplier;
- Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geomembrane meets the project Specifications;
- Reports on quality control tests conducted by the Manufacturer to verify that the geomembrane manufactured for the project meets the project Specifications;
- A statement indicating that the amount of reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness and does not exceed 2 percent by weight;
- A list of the materials which comprise the geomembrane, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives;
- A specification for the geomembrane which includes all properties contained in the project Specifications measured using the appropriate test methods;
- Written certification that minimum values given in the Specification are guaranteed by the Manufacturer;
- A characterization of the geomembrane based on the results of fingerprinting tests; and
- Quality control certificates, signed by a responsible party employed by the Manufacturer. Each quality control certificate shall include roll identification numbers, sampling procedures, and results of quality control tests. At a minimum, results shall be given for:
    - Density (ASTM D 1505)
    - Carbon black content (ASTM D 1603)
    - Carbon black dispersion (ASTM D 3015 and D 2663)
    - Thickness (ASTM D 5199)
    - Tensile properties (ASTM D 638)
    - Tear resistance (ASTM D 1004)

These quality control tests shall be performed in accordance with the test methods specified in the design specifications for every 40,000 ft^2 (4,000 m^2) of geomembrane produced.

The Manufacturer shall identify all rolls of geomembranes with the following:

- Manufacturer's name
- Product identification
- Thickness
- Roll number
- Roll dimensions

The Resident CQA Project Manager will provide copies of these documents to the CQA Certifying Engineer and the Gandy Marley Inc. Project Manager.

The CQA Certifying Engineer shall review these documents and shall report any discrepancies with the above requirements to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall verify that:

- Property values certified by the Manufacturer meet all of its guaranteed specifications;

- Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable;

- Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it;

- Rolls are appropriately labeled; and

- Certified minimum properties meet the project Specifications.

7.2 CONFORMANCE TESTING

Upon delivery of the rolls of geomembrane, conformance test samples will be obtained by the CQA Monitor for the geomembrane and shall be forwarded to the Geosynthetic laboratory for testing to ensure conformance to the project Specifications.

The conformance test sampling may be performed at the manufacturing plant. This may be advantageous in expediting the installation process for very large projects.

The following conformance tests shall be conducted:

- Density (ASTM D 1505)
- Carbon black content (ASTM D 1603)
- Carbon black dispersion (ASTM D 3015 and D 2663)
- Thickness (ASTM D 5199)
- Tensile characteristics (ASTM D 638)

7.2.1 Sampling Procedures

Samples shall be taken across the entire width of the roll and shall not include the first 3 feet (1 m). Unless otherwise specified, samples shall be 3 feet (1 m) long by the roll width. CQA Monitor who selects the sample, shall mark the machine direction on the samples with an arrow.

A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not to exceed one conformance test per 100,000 ft^2 (10,000 m^2) of geomembrane.

7.2.2 Test Results

All conformance test results shall be reviewed and accepted or rejected by the CQA Certifying Engineer.

The CQA Certifying Engineer shall examine all results from laboratory conformance testing and shall report any nonconformance to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out of specification and rejected. Alternatively, at the option of the Gandy Marley Inc. Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that his procedure is valid only when all rolls in the lot are consecutively produced and numbered form one manufacturing line). To isolate the out of specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

7.3 SUBGRADE PREPARATION

7.3.1 Surface Preparation

The Earthwork Contractor shall be responsible for preparing the supporting soil for geomembrane placement.

Before the geomembrane installation begins it will be verified that:

- A qualified land surveyor has verified all lines and grades.
- A qualified geotechnical engineer has verified that the supporting soil meets the density specified in the project specifications.

- The surface to be lined has been rolled, compacted, or handworked so as to be free from irregularities and protrusions.
- The surface of the supporting soil does not contain stones which may be damaging to the geomembrane.
- There is no area excessively softened by high water content.
- There is no area where the surface of the soil contains desiccation cracks with dimensions exceeding those allowed by the project specifications.

The Installer shall certify in writing that the surface on which the geomembrane will be installed is acceptable.

After the supporting soil has been accepted by the Installer, it is the Installer's responsibility to indicate to the Resident CQA Project Manager any change in the supporting soil condition that may require repair work.

7.3.2 Anchor Trench

The CQA Certifying Engineer shall verify that the anchor trench has been constructed according to the design drawings and specifications.

If the anchor trench is excavated in a clay material susceptible to desiccation, the amount of trench open at any time should be minimized. The CQA Certifying Engineer shall inform the Gandy Marley Inc. Project Manager of any signs of significant desiccation associated with the anchor trench construction.

Slightly rounded corners shall be provided in the trench so as to avoid sharp bends in the geomembrane. Excessive amounts of loose soil shall not be allowed to underlie the geomembrane in the anchor trench.

The anchor trench shall be adequately drained to prevent ponding or softening of the adjacent soils while the trench is open. The anchor trench shall be backfilled and compacted as outlined in the project Specifications.

Care shall be taken when backfilling the trenches to prevent any damage to the geosynthetics. The CQA Monitors shall observe the backfilling operation and advise the Resident CQA Project Manager of any problems. Any problems shall be documented by the CQA Certifying Engineer and the Gandy Marley Inc. Project Manager in his daily report.

7.4 GEOMEMBRANE DEPLOYMENT

7.4.1 Panel Nomenclature

A field panel is defined as a unit 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.

Each field panel will be given an identification code (number or letter-number) consistent with the layout plan. This identification code shall be agreed upon by the Gandy Marley Inc. Project Manager, Installer and CQA Certifying Engineer. This field panel identification code shall be as simple and logical as possible. In general, it is nor appropriate to identify panels using roll numbers since roll numbers established in the manufacturing plant are usually cumbersome and are not related to location in the field. A table or chart showing correspondence between roll numbers and field panel identification codes will be developed. The field panel identification code shall be used for all quality assurance records.

The CQA Certifying Engineer shall verify that field panels are installed at the locations indicated on the Installer's layout plan, as approved by the Gandy Marley Inc. Project Manager.

7.4.2 Panel Deployment Procedures

The CQA Certifying Engineer shall review the panel deployment progress of the Installer (keeping in mind issues relating to wind, rain, clay liner desiccation, and other site-specific conditions) and advise the Gandy Marley Inc. Project Manger on its compliance with the approved panel layout drawing and its suitability to the actual field conditions. Once approved, only the Gandy Marley Inc. Project Manager can authorize changes to the panel deployment procedure.

The identification code, location, and date of installation of each field panel will be recorded.

7.4.3 Deployment Weather Conditions

Geomembrane deployment shall not proceed at a sheet temperature below 32°F (0°C) or above 122°F (50°C) unless otherwise authorized, in writing, by the Gandy Marley Inc. Project Manager. Geomembrane placement shall not be performed during any precipitation, in the presence of excessive moisture (e.g., fog, dew) in an area of ponded water, or in the presence of excessive winds. Geomembrane deployment shall not be undertaken if weather conditions will preclude material seaming following deployment. The CQA Monitor shall verify that the above conditions are fulfilled.

7.4.4 Method of Deployment

During handling, the CQA Monitor will observe and verify that the Installer's personnel handle the geomembrane with care and that equipment to be used on the site is adequate and does not pose risk of damage to the geomembrane.

In addition, the CQA Monitor shall verify the following:

- Any equipment used does not damage the geomembrane by handling, trafficking, excessive hear, leakage of hydrocarbons, or other means;
- The prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement;
- Any geosynthetic elements immediately underlying the geomembrane are clean and free of debris;

- All personnel do not smoke or wear damaging shoes while working on the geomembrane, or engage in other activities which could damage the geomembrane;

- The method used to unroll the panels does not cause excessive scratches or crimps in the geomembrane and does not damage the supporting soil;

- The method used to place the panels minimized wrinkles (especially differential wrinkles between adjacent panels);

- Adequate temporary loading and/or anchoring (e.g., sand bags, tires), not likely to damage the geomembrane, has been placed to prevent uplift by wind. In case of high winds, continuous loading, e.g., by sand bags, is recommended along edges of panels to the minimize risk of wind flow under panels; and

- Direct contact with the geomembrane is minimized, and the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials, in areas where excessive traffic may be expected.

7.4.5 Damage and Defects

Damaged or defective geomembrane will not be installed.

7.5 FIELD SEAMING

7.5.1 Seam Layout

Before installation begins, the Installer must provide the Gandy Marley Inc. Project Manager and the CQA Certifying Engineer with a panel layout drawing, i.e., a drawing of the facility to be lined showing all expected seams. The CQA Certifying Engineer shall review the panel layout drawing and verify that it is consistent with accepted state-of-practice. No panels may be seamed without the written approval of the panel layout drawing by the Gandy Marley Inc. Project Manager. In addition, panels not specifically shown on the panel layout drawing may not be used without the Gandy Marley Inc. Project Manager's prior approval.

In general, seams should be oriented parallel to the line of maximum slope, i.e., oriented along, not across, the slope. In corners and odd shaped geometric locations, the number of seams should be minimized. No horizontal seam should be less than 5 feet (1.5 m) from the toe of the slope, or areas of potential stress concentrations, unless otherwise authorized by the Gandy Marley Inc. Project Manager.

7.5.2 Accepted Seaming Methods

Approved processes for field seaming are extrusion welding and fusion welding. Proposed alternate processes shall be documented and submitted by the Installer to the Gandy Marley Inc. Project Manager for approval. Only apparatus which have been specifically approved by make and model shall be used.

7.5.2.1 Extrusion Welding Process

The Geosynthetic CQA Monitors shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Resident CQA Project Manager.

The Geosynthetic CQA Monitors shall verify that:

- The Installer maintains on-site the number of spare operable seaming apparatus decided upon at the pre-construction meeting;
- Equipment used for seaming is not likely to damage the geomembrane;
- Prior to beginning a seam, the extruder is purged until all heat-degraded extrudate has been removed from the barrel;
- Clean and dry welding rods or extrudate pellets are used;
- The electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
- Grinding shall be completed no more than 1 hour prior to seaming;
- A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage;
- The geomembrane is protected from damage in heavily trafficked areas;
- Exposed grinding marks adjacent to an extrusion weld shall be minimized. In no instance shall exposed grinding marks extend more than 1/4-inch from the seamed area;
- In general, the geomembrane panels are aligned to have a nominal overlap of 3 inches (75 mm) for extrusion welding. In any event, the final overlap shall be sufficient to allow peel tests to be performed on the seam;
- No solvent or adhesive is used unless the product is approved in writing by the Gandy Marley Inc. Project Manager prior to use (samples shall be submitted to the Gandy Marley Inc. Project Manager for testing and evaluation); and

- The procedure used to temporarily bond adjacent panels together does not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any temporary welding apparatus is controlled such that the geomembrane is not damaged or degraded.

7.5.2.2 Fusion Welding Process

The CQA Monitors shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Resident CQA Project Manager.

The CQA Monitors shall also verify that:

- The Installer maintains on-site the number of spare operable seaming apparatus decided upon at the pre-construction meeting;
- Equipment used for seaming is not likely to damage the geomembrane;
- For cross seam, the edge of the cross seam is ground to an incline prior to welding;
- The electric generator is placed on a smooth base such that no damage occurs to the geomembrane;
- A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage;
- The geomembrane is protected from damage in heavily trafficked areas;
- A movable protective layer is used as required by the Installer directly below each overlap shall be sufficient to allow peel tests to be performed on the seam; and
- No solvent or adhesive is used unless the product is approved in writing by the Gandy Marley Inc. Project Manager prior to use (samples shall be submitted to the Gandy Marley Inc. Project Manager for testing and evaluation).

7.5.3 Seam Preparation

The geosynthetic monitor shall verify that prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris or foreign material of any kind. If seam overlap grinding is required, the CQA Monitor must ensure that the process is completed according to the Manufacturer's instructions within one hour of the seaming operation, and in a way that does not damage the geomembrane. The CQA Monitor shall also verify that seams are aligned with the fewest possible number of wrinkles and "fishmouths".

7.5.4 Trial Seams

Trial seams shall be made on fragment pieces of geomembrane liner to verify that conditions are adequate for production seaming. Such trial seams shall be made at the beginning of each seaming period, and at least once each five hours, for each production seaming apparatus used that day. Each seamer shall make at least one trial seam each day. Trial seams shall be made under the same conditions as actual seams.

The trial seam sample shall be at least 3 feet (1.0 m) long by 1 foot (0.3 m) wide (after seaming) with the seam centered lengthwise.

Two specimens shall be cut form the sample with a 1 inch (25 mm) wide die. The specimens shall be cut by the Installer at locations selected randomly along the trial seam, sample by the CQA Monitor. The specimens shall be tested in peel using a field tensiometer. The tensiometer shall be capable of maintaining a constant jaw separation rate of two inches per minute. If a specimens fails, the entire operation shall be repeated. If the additional specimen fails, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial weld are achieved. The CQA Monitor shall observe all trial seam procedures.

The remainder of the successful trial seam sample shall be cut into three pieces, one to be retained in the Gandy Marley Inc. Project Manager's archives, one to be given to the Installer, and one to be retained by the CQA Monitor for possible laboratory testing. Each portion of the sample shall be assigned a number and marked accordingly by the CQA Monitor, who shall also date, hour, ambient temperature, number of seaming unit, name of seamer, and pass or fail description.

7.5.5 General Seaming Procedures

During general seaming, the CQA Monitor shall be aware of the following:

- For fusion welding, it may be necessary to place a moveable protective layer of plastic directly below each overlap of geomembrane that is to be seamed. This is to prevent any moisture buildup between the sheets to be welded and prevent debris from collecting around the pressure rollers;

- If required, a firm substrate shall be provided by using a flat board, a conveyor belt, or similar hard surface directly under the seam overlap to achieve proper support;

- Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same geomembrane extending a minimum of 6 inches (150 mm) beyond the cut in all directions;

- If seaming operations are carried out at night, adequate illumination shall be provided;

- Seaming shall extend to the outside edge of panels placed in the anchor trench;

- All cross seam tees should be extrusion welded to a minimum distance of 4 inches on each side of the tee; and,

- No field seaming shall take place without the Master Seamer being present.

The CQA Monitor shall verify that the above seaming procedures (or any other procedures agreed upon and indicated in the project *CQA Manual*) are followed, and shall inform the Resident CQA Project Manager of any nonconformance.

7.5.6 Seaming Weather Conditions

7.5.6.1 Normal Weather Conditions

The normal required weather conditions for seaming are as follows:

- Sheet temperature between 32°F (0°C) and 122°F (50°C);
- Dry conditions, i.e. no precipitation or other excessive moisture, such as for or dew; and
- No excessive winds.

The Resident CQA Project Manager shall verify that these weather conditions are fulfilled and notify the Gandy Marley Inc. Project Manager in writing if they are not. Ambient temperature shall be measured by the CQA Monitor in the area in which the panels are to be placed. The Resident CQA Project Manager will then decide if the installation is to be stopped or special procedures used.

7.5.6.2 Cold Weather Conditions

To ensure a quality installation, if seaming is conducted when the ambient temperature is below 32°F (0°C), the following conditions must be met:

- Geomembrane surface temperatures shall be determined by the CQA Monitor at intervals of at least once per 100 foot of seam length to determine if preheating is required. For extrusion welding, preheating is required if the surface temperature of the geomembrane is below 32°F (0°C);

- If preheating is required, the CQA Monitor shall inspect all areas of geomembrane that have been preheated by a hot air device prior to seaming, to ensure that they have not been overheated;

- Care shall be taken to confirm that the surface temperatures are not lowered below the minimum surface temperatures specified for welding due to winds or other adverse conditions. It may be necessary to provide wind protection for the seam area;

- All preheating devices shall be approved prior to use by the Gandy Marley Inc. Project Manager;

- Additional destructive tests shall be taken at the discretion of the CQA Monitor;

- Sheet grinding may be performed before preheating, if applicable; and

- Trial seaming shall be conducted under the same ambient temperature and preheating conditions are the actual seams. Under cold weather conditions, new trial seams shall be conducted if the ambient temperature drops by more than 5°F from the initial trial seam test conditions.

7.5.6.3 Warm Weather Conditions

At ambient temperatures above 104°F, no seaming of the geomembrane shall be permitted unless the Installer can demonstrate to the satisfaction of the Gandy Marley Inc. Project Manager that geomembrane seam quality is not compromised

At the option of the CQA Monitor, additional destructive tests may be required for any suspect areas.

7.6 NONDESTRUCTIVE SEAM TESTING

7.6.1 General

The Installer shall nondestructively test all field seams over their full length using a vacuum test unit, air pressure test (for double fusion seams only), or other approved method. Vacuum testing and air pressure testing are described below. The purpose of nondestructive tests is to check the continuity of seams. It does not provide quantitive information on seam strength. Nondestructive testing shall be carried out as the seaming work progresses, not at the completion of all field seaming.

For all seams, the CQA Monitor shall:

- Observe nondestructive testing procedures;
- Record location, data, test unit number, name of tester, and outcome of all testing; and
- Inform the Installer and Resident CQA Project Manager of any required repairs.

7.6.2 Vacuum Testing

The following procedures are applicable to vacuum testing.

- The equipment shall consist of the following:
  - A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, a porthole or valve assembly, and a vacuum gauge;
  - A pump assembly equipped with a pressure controller and pipe connections;
  - A rubber pressure/vacuum hose with fittings and connections;
  - A soapy solution; and
  - A bucket and wide paint brush, or other means of applying the soapy solution.

- The following procedures shall be followed:

  - Energize the vacuum pump and reduce the tank pressure to approximately 5 psi (10 inches of Hg) (35 kPa) gauge;

  - Wet a strip of geomembrane approximately 13 inches x 48 inches (0.33 m x 1.2 m) with the soapy solution;

  - Place the box over the wetted area;

  - Close the bleed valve and open the vacuum valve;

  - Ensure that a leak-tight seal is created;

  - For a period of not less than 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches (75 mm) overlap, and repeat the process; and,

  - All areas where soap bubbles appear shall be marked and repaired.

7.6.3 Air Pressure Testing

The following procedures are applicable to double fusion welding which produces a double seam with an enclosed space.

- The equipment shall consist of the following:

  - An air pump (manual or motor driven), equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi (160 and 200 kPa) and mounted on a cushion to protect the geomembrane;

  - A rubber hose with fittings and connections; and,

  - A sharp hollow needle, or other approved pressure feed device.

- The following procedures shall be followed:

  - Seal both ends of the seam to be tested;

  - Insert needle or other approved pressure feed device into the air channel created by the fusion weld;

  - Insert a protective cushion between the air pump and the geomembrane;

  - Energize the air pump to a pressure between 25 and 30 psi (160 and 200 kPa), close valve, allow 2 minutes for pressure to stabilize, and sustain pressure for at least 5 minutes;

- If loss of pressure exceeds 4 psi (30 kPa) or does not stabilize, locate faulty area and repair;

- Cut opposite end of tested seam once testing is completed to verify continuity of the air channel. If air does not escape, locate blockage and retest unpressurized area. Seal the cut end of the air channel; and

- Remove needle or other approved pressure feed device and seal.

7.6.4 Test Failure Procedures

For repairs, the CQA Monitor shall:

- Observe the repair and testing of the repair;
- Mark on the geomembrane that the repair has been made; and,
- Document the repair procedures and test results.

7.7 DESTRUCTIVE SEAM TESTING

7.7.1 General

Destructive seam tests shall be performed at selected locations. The purpose of these tests is to evaluate seam strength. Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming.

7.7.2 Location and Frequency

The CQA Monitor shall select locations where seam samples will be cut out for laboratory testing. Those locations shall be established as follows:

- A minimum frequency of one test location per 500 feet (150 m) of seam length performed by each welder. This minimum frequency is to be determined as an average taken throughout the entire facility.

- Test locations shall be determined during seaming at the CQA Monitor's discretion. Selection of such locations may be prompted by suspicion of overheating, contamination, offset welds, or any other potential cause of imperfect welding.

The Installer shall not be informed in advance of the locations where the seam samples will be taken

7.7.3 Sampling Procedures

Samples shall be cut by the Installer at locations chosen by the CQA Monitor as the seaming progresses so that laboratory test results are available before the geomembrane is covered by another material. The CQA Monitor shall:

- Observe sample cutting;

- Assign a number to each sample, and mark it accordingly;

- Record sample location on layout drawing; and

- Record reason for taking the sample at this location (e.g., statistical routine, suspicious feature of the geomembrane).

All holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired. The continuity of the new seams in the repaired area shall be tested.

7.7.4 Sample Dimensions

At a given sampling location, two types of samples shall be taken by the Installer. First, two samples for field testing should be taken. Each of these samples shall be cut with a 1 inch (25 mm) wide die, with the seam centered parallel to the width. The distance between these two samples shall be 42 inches (1.1 m). If both samples pass the field test, a sample for laboratory testing shall be taken.

The sample for laboratory testing shall be located between the samples for field testing. The sample for laboratory testing shall be 12 inches (0.3 m) wide by 42 inches (1.1 m) long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:

- One portion to the Installer for optional laboratory testing, 12 inches x 12 inches (0.3 m x 0.3 m);
- One portion for Geosynthetic Laboratory testing, 12 inches x 18 inches (0.3 m x 0.5 m);
- One portion to the Project Manager for archive storage, 12 inches x 12 inches (0.3 m x 0.3 m).

Final determination of the sample sizes shall be made at the pre-construction meeting.

7.7.5 Field Testing

The two 1-inch (25 mm) wide strips mentioned above shall be tested in the field using a tensiometer for peel. The tensiometer shall be capable of maintaining a constant jaw separation rate of two inches per minute. If the test passes in accordance with this section, the sample qualifies for testing in the laboratory. If it fails, the seam should be repaired in accordance with the plan.

The CQA Monitor shall witness all field tests and mark all samples and portions with their number. The CQA Monitor shall also log the date and time, ambient temperature, number of seaming unit, name of seamer, welding apparatus temperatures and pressures, and pass or fail description, and attach a copy to each sample portion.

Laboratory testing shall include "Seam Strength" and "Peel Adhesion". These terms are defined in the Specifications. The minimum acceptable values to be obtained in these tests are indicated in the design specifications. At least 5 specimens shall be tested in each shear and peel. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear...). A passing test shall meet the minimum acceptable values in at least 4 of the 5 specimens tested for each method.

The Geosynthetic Laboratory shall provide verbal test results no more than 24 hours after they receive the samples. The CQA Certifying Engineer shall review laboratory test results as soon

as they become available, and make appropriate recommendations to the Gandy Marley Inc. Project Manager.

7.7.6 Destructive Test Failure Procedures

The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted by the Geosynthetics Laboratory or by field tensiometer. The Installer has two options:

- The Installer can repair the seam between any two passing test locations.
- The Installer can trace the welding path to an intermediate location (at 10 feet (3 m) minimum from the point of the failed test in each direction) and take a sample with a 1 inch (25 mm) wide die for an additional field test at each location. If these additional samples pass the test, then full laboratory samples are taken. If these laboratory samples pass the test, then the seam is repaired between these locations. If either sample fails, then the process is repeated to establish the zone in which the seam should be repaired.

All acceptable repaired seams shall be bound by two locations from which samples passing laboratory destructive tests have been taken. Passing laboratory destructive tests of trial seam samples taken as indicated above may be used as a boundary for the failing seam. In cases exceeding 150 feet (50 m) of repaired seam, a sample taken from the zone in which the seam has been repaired must pass destructive testing.

The CQA Monitor shall document all actions taken in conjunction with destructive test failures.

7.8 DEFECTS AND REPAIRS

7.8.1 Identification

All seams and non-seam areas of the geomembrane shall be examined by the CQA Monitor for identification 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 shall be clean at the time of examination. The geomembrane shall be cleaned by the Installer if the amount of dust or mud inhibits examination.

7.8.2 Evaluation

Each suspect location both in seam and non-seam areas shall be non-destructively tested. Each location which fails the nondestructive testing shall be marked by the CQA Monitor and repaired by the Installer. Work shall not proceed with any materials which will cover locations which have been repaired until appropriate nondestructive and laboratory test results with passing values are available.

7.8.3 Repair Procedures

Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to

the appropriate repair procedure shall be agreed upon between the Gandy Marley Inc. Project Manager, Installer, and CQA Certifying Engineer.

- The repair procedures available include:
  - Patching: used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter;
  - Spot welding or seaming: used to repair small tears, pinholes, or other minor, localized flaws;
  - Capping: used to repair large lengths of failed seams;
  - Extrusion welding the flap: used to repair areas of inadequate fusion seams, which have an exposed edge. Repairs of this type shall be approved by the CQA Certifying Engineer; and,
  - Removing bad seam and replacing with a strip of new material welded into place.
- For any repair method, the following provisions shall be satisfied:
  - Surfaces of the geomembrane which are to be repaired using extrusion methods shall be abraded no more than one hour prior to the repair;
  - All surfaces shall be clean and dry at the time of the repair; and
  - Patches or caps shall extend at least 6 inches (150 mm) beyond the edge of the defect, and all corners of patches shall be rounded with a radius of approximately 3 inches (75 mm).

7.8.4 Repair Verification

Each repair shall be numbered and logged. Each repair shall be nondestructively tested. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 150 feet long may be of sufficient extent to require destructive test sampling, at the discretion of the CQA Certifying Engineer. Failed tests indicate that the repair shall be redone and retested until a passing test results. The CQA Monitor shall observe all nondestructive testing of repairs and shall record the number of each repair, date, and test outcome.

7.8.5 Large Wrinkles

When seaming of the geomembrane is completed, and prior to placing overlying materials, the Resident CQA Project Manager shall indicate to the Gandy Marley Inc. Project Manager which wrinkles should be cut and reseamed by the Installer. The number of wrinkles to be repaired should be kept to an absolute minimum. Wrinkles are considered to be large when the geomembrane can be folded over on to itself. This is generally the case for a wrinkle that extends 12 inches from the subgrade. Seams produced while repairing wrinkles shall be tested as outlined above.

8.0 GEOTEXTILE QUALITY ASSURANCE

8.1 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geotextile, the Manufacturer or Installer shall provide the Resident CQA Project Manager with the following information:

- The origin (Resin Supplier's name and resin production plant) and identification (brand name and number) of the resin used to manufacture the geotextile;
- Copies of the quality control certificates issued by the Resin Supplier;
- Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geotextile meets the Manufacturer's resin specifications;
- Reports on quality control tests conducted by the Manufacturer to verify that the geotextile manufactured for the project meets the project specifications;
- A statement indicating that the reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness;
- A list of the materials which comprise the geotextile, expressed in the following categories as percent by weight: base polymer, carbon black, other additives;
- A specification for the geotextile which includes all properties contained in the project Specifications measured using the appropriate test methods;
- Written certification that minimum average roll values given in the specification are guaranteed by the Manufacturer;
- For non-woven geotextiles, written certification that the Manufacturer has continuously inspected the geotextile for the presence of needles and found the geotextile to be needle free; and
- Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for:
    - Mass per unit area (ASTM D 5261);
    - Grab tensile strength (ASTM D 4632);
    - Trapezoidal tear strength (ASTM D 4533);
    - Burst strength (ASTM D 3786);
    - Puncture strength (ASTM D 4833);
    - Thickness (ASTM D 5199);
    - Apparent opening size (ASTM D 4751); and
    - Permittivity (ASTM D 4491).

Quality control tests shall be performed in accordance with the test methods specifies in the project specifications for at least every 100,000 ft^2 (10,000 m^2) of geotextile produced.

The Manufacturer shall identify all rolls of geotextile with the following:

- Manufacturer's name;
- Product identification;
- Roll number; and
- Roll dimensions.

The Resident CQA Project Manager will provide copies of these documents to the CQA Certifying Engineer and the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall review these documents and shall report any discrepancies with the above requirements to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall verify that:

- Property values certified by the Manufacturer meet all of its guaranteed specifications;

- Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable;

- Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it;

- Roll packages are appropriately labeled; and

- Certified minimum average roll properties meet the project specifications.

8.2 CONFORMANCE TESTING

Upon delivery of the rolls of geotextile, the CQA Monitor shall ensure that conformance test samples are obtained for the geotextile. These samples shall then be forwarded to the Geosynthetics Laboratory for testing to ensure conformance to the project specifications.

At a minimum, the following conformance tests shall generally be performed on geotextiles:

- Mass per unit area (ASTM D 5261);
- Grab tensile strength (ASTM D 4632);
- Trapezoidal tear strength (ASTM D 4533);
- Burst strength (ASTM D 3786);
- Puncture strength (ASTM D 4833);
- Thickness (ASTM D 5199);
- Apparent opening size (ASTM D 4751); and
- Permittivity (ASTM D 4491).

These conformance tests shall be performed in accordance with the test methods specified in the project Specifications. Other conformance tests may be required by the project Specifications.

8.2.1 Sampling Procedures

The rolls to be samples shall be selected by the CQA Monitor. Samples shall be taken across the entire width of the roll and shall not include the first complete revolution of fabric on the roll. Samples shall not be taken form any portion of a roll which has been subjected to excess pressure or stretching. Unless otherwise specified, samples shall be 3 feet (1 m) long by the roll width. The CQA Monitor shall mark the machine direction on the samples with an arrow. All lots of material and the particular test sample that represents each lot should be defined before the samples are taken.

A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. Alternatively, a lot may be designated by the CQA Monitor based on a review of all roll information including quality control documentation and manufacturing records.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not to exceed one conformance test per 100,000 ft^2 (10,000 m^2) of geotextile.

8.2.2 Test Results

All conformance test results shall be reviewed and accepted or rejected by the CQA Certifying Engineer prior to the deployment of the geotextile.

The CQA Certifying Engineer shall examine all results from laboratory testing and shall report any nonconformance to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications. Nonconforming materials will not be accepted.

8.3 GEOTEXTILE DEPLOYMENT

During shipment and storage, the geotextile shall be protected from ultraviolet light exposure, precipitation and other inundation, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions. Geotextile rolls shall be shipped and stored in relatively opaque and watertight wrappings. Wrappings shall be removed shortly before deployment.

The CQA Monitor shall observe rolls upon delivery at the site and any deviation from the above requirements shall be reported to the Gandy Marley Inc. Project Manager.

The Installer shall handle all geotextiles in such a manner as to ensure they are not damaged in any way, and the following shall be complied with:

- On slopes, the geotextiles shall be securely anchored and then unrolled down the slope in such a manner as to continually keep the geotextile sheet in tension;
- In the presence of wind, all geotextiles shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during deployment and shall remain until replaced with cover material;
- Geotextiles shall be cut using a geotextile cutter (hook blade) only. If in place, special care shall be taken to protect other materials from damage which could be caused by the cutting of the geotextiles;

- The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geotextile;

- During placement of geotextiles, care shall be taken not to entrap, in or beneath the geotextile, stones, excessive dust, or moisture that could damage the geomembrane, cause clogging of drains or filters, or hamper subsequent seaming; and

- A visual examination of the geotextile shall be carried out over the entire surface, after installation, to ensure that no potentially harmful foreign objects, such as stones and needles, are present.

8.4 SEAMING PROCEDURES

On slopes steeper than 10H (horizontal):1V (vertical), all geotextiles shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 3 inches (75 mm) prior to seaming. In general, no horizontal seams shall be allowed on side slopes (i.e., seams shall be along, not across, the slope), except as part of a patch.

On bottoms and slopes shallower than 10H:1V, geotextiles shall be seamed as indicated above (preferred), or thermally bonded with the written approval of the Gandy Marley Inc. Project Manager.

The Installer shall pay particular attention at seams to ensure that no earth cover material is inadvertently beneath the geotextile.

Any sewing shall be done using polymetric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the geotextile. Sewing shall be done using machinery and stitch types specified in the project Specifications or as approved in writing by the Gandy Marley Inc. Project Manager and the CQA Certifying Engineer.

8.5 DEFECTS AND REPAIRS

Any holes or tears in the geotextile shall be repaired as follows:

- On slopes, a patch made from the same geotextile shall be sewn into place in accordance with the project Specifications. Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced; and

- Care shall be taken to remove any soil or other material which may have penetrated the torn geotextiles.

The CQA monitor shall observe any repair and report any noncompliance with the above requirements in writing to the Gandy Marley Inc. Project Manager.

8.6 GEOTEXTILE PROTECTION

All soil materials located on top of a geotextile shall be deployed in such a manner as to ensure:

- The geotextile and underlying materials are not damaged;

- Minimal slippage of the geotextile on underlying layers occurs; and
- No excess tensile stresses occur in the geotextile.

9.0 GEONET QUALITY ASSURANCE

9.1 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geonet, the Manufacturer or Installer shall provide the Resident CQA Project Manager with the following information:

- The origin (Resin Supplier's name and resin production plant), identification (brand name and number), and production date of the resin;
- Copies of the quality control certificates issued by the Resin Supplier;
- Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geonet meets the project Specifications;
- Reports on quality control tests conducted by the Manufacturer to verify that the geonet manufactured for the project meets the project Specifications;
- A statement indicating that the amount of reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness and does not exceed 2 percent by weight;
- A list of the materials which comprise the geonet, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives;
- A specification for the geonet which includes all properties contained in the project Specifications measured using the appropriate test methods;
- Written certification that minimum values given in the project Specification are guaranteed by the Manufacturer; and
- Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for:
  - Density (ASTM D 1505);
  - Mass per unit area (ASTM D 5261);
  - Thickness (ASTM D 5199); and
  - Carbon black content (ASTM D 1603).

Quality control tests shall be performed in accordance with the test methods specified for every 40,000 ft^2 (4,000 m^2) of geonet produced.

The Manufacturer shall identify all rolls of geonets with the following:

- Manufacturer's name;
- Product identification;

- Roll number; and
- Roll dimensions.

The Resident CQA Project Manager will provide copies of these documents to the CQA Certifying Engineer and the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall review these documents and shall report any discrepancies with the above requirements to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall verify that:

- Property values certified by the Manufacturer meet all of its guaranteed specifications;
- Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable;
- Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it;
- Roll packages are appropriately labeled; and
- Certified minimum properties meet the project specifications.

9.2 CONFORMANCE TESTING

Upon delivery of the rolls of geonet, the CQA Monitor shall ensure that conformance test samples are obtained for the geonet. These samples shall then be forwarded to the Geosynthetic Laboratory for testing to ensure conformance with to the project specifications.

At a minimum, the following tests shall be performed:

- Density (ASTM D 1505);
- Mass per unit area (ASTM D 5261); and
- Thickness (ASTM D 5199)

9.2.1 Sampling Procedures

The rolls to be samples shall be selected by the CQA Monitor. Samples shall be taken across the entire width of the roll and shall not include the first 3 feet (1 m) long by the roll width. The CQA Monitor shall mark the machine direction on the samples with an arrow.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not to exceed one conformance test per 100,000 ft^2 (10,000 m^2) of geonet.

9.2.2 Test Results

All conformance test results shall be reviewed and accepted or rejected by the CQA Certifying Engineer prior to the deployment of the geonet. The CQA Certifying Engineer shall examine all results from laboratory conformance testing and shall report any nonconformance to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall be responsible for checking

that all test results meet or exceed the property values listed in the project specifications. Nonconforming materials will not be accepted.

9.3 GEONET DEPLOYMENT

The CQA Monitor shall examine rolls upon delivery and any deviation from the above requirements shall be reported to the Resident CQA Project Manager.

Geonet cleanliness is essential to its performance. Therefore, the geonet rolls should be protected against dust and dirt during shipment and storage.

The CQA Monitor shall verify that the geonet is free of dirt and dust prior to installation. The CQA Monitor shall report the outcome of this verification to the Resident CQA Project Manager, and if the geonet is judged dirty or dusty, it shall be washed by the Installer prior to installation.

The Installer shall handle all geonet in such a manner as to ensure that it is nor damaged in any way, and the following shall be complied with:

- On slopes, the geonet shall be secured and un-rolled down the slope in such a manner as to continually keep the geonet sheet in tension. If necessary, the geonet shall be positioned by hand after being unrolled to minimize wrinkles;

- In the presence of wind, all geonet shall be weighted with sandbag or the equivalent. Such sandbag shall be installed during deployment and shall remain until replaced with cover material;

- Unless otherwise specified, geonet shall not be welded to geomembrane;

- Geonet shall only be cut using scissors or other cutting tools approved by the Resident CQA Project Manager that will not damage the underlying geosynthetics. Care shall be taken not to leave tools in the geonet;

- The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geonet; and

- During placement of geonet, care shall be 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 should be hosed clean prior to placement of the next material on top of it. In this regard, care shall be taken with the handling of sandbags, to prevent rupture or damage of the sandbag.

9.4 SEAMS AND OVERLAPS

Adjacent geonet shall be joined according to construction drawings and specifications. At a minimum, the following requirements shall be met:

- Adjacent roll edges shall be overlapped by at least 4 inches (100 mm);

- Adjacent roll ends shall be overlapped by at least 8 inches (200 mm);
- Overlaps shall be secured by tying;
- Tying can be achieved by plastic fasteners or polymer braid. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed;
- Tying shall be every 5 feet (1.5 m) along the slope, every 6 inches (0.15 m) in the anchor trench, and every 6 inches (0.15 m) along end-to-end seams on the base of the landfill;
- In general, no horizontal seams shall be allowed on side slopes;
- In the corners of the side slopes of rectangular landfills, where overlaps between perpendicular geonet strips are required, an extra layer of geonet shall be unrolled along the slope, on top of the previously installed geonet, from top to bottom of the slope; and
- When more than one layer of geonet is installed, joints shall be staggered.

When several layers of geonet are stacked, care shall be taken to prevent strands of one layer from penetrating the channels of the next layer, thereby significantly reducing the transmissivity. This cannot happen if stacked geonet are placed in the same direction. A stacked geonet shall never be laid in perpendicular directions to the underlying geonet (unless otherwise specified by the Designer).

9.5 DEFECTS AND REPAIRS

Any holes or tears in the geonet shall be repaired by placing a patch extending 1 foot (0.3 m) beyond the edges of the hole or tear. The patch shall be secured to the original geonet by tying every 6 inches (0.15 m). If the hole or tear width across the roll is more than 50 percent of the width of the roll, the damaged area shall be repaired as follows:

- On the base of the landfill, the damaged area shall be cut out and the two portions of the geonet shall be joined; and
- On side slopes, the damaged geonet shall be removed and replaced.

The CQA Monitor shall observe any repair and report any noncompliance with the above requirements in writing to the Gandy Marley Inc. Project Manager.

9.6 GEONET PROTECTION

Soil should never be placed in direct contact with geonet. Soil materials near the geonet shall be placed in such a manner as to ensure:

- The geonet and underlying lining materials are not damaged;
- Minimal slippage of the geonet on underlying layers occurs; and
- No excess tensile stresses occur in the geonet.

10.0 GEOCOMPOSITE QUALITY ASSURANCE

10.1 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geocomposite, the Manufacturer or Installer shall provide the Resident CQA Project Manager with the following information:

- The origin (Resin Supplier's name and resin production plant), identification (brand name and number), and production date of the resin;
- Copies of the quality control certificates issued by the Resin Supplier.
- Reports on tests conducted by the Manufacturer to verify that the quality of the resin used to manufacture the geocomposite meets the project Specifications;
- Reports on quality control tests conducted by the Manufacturer to verify that the geocomposite manufactured for the project meets the project specifications;
- A statement indicating that the amount of reclaimed polymer added to the resin during manufacturing was done with appropriate cleanliness and does not exceed 2 percent by weight;
- A list of the materials which comprise the geocomposite, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives;
- A specification for the geocomposite which includes all properties contained in the project Specifications measured using the appropriate test methods;
- Written certification that minimum values given in the project Specification are guaranteed by the Manufacturer; and
- Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for:

  - Specific Gravity of Net (ASTM D 1505);
  - Melt Flow Index of Net (ASTM D 1238 E);
  - Thickness of Net (ASTM D 374);
  - Carbon black content (ASTM D 1603);
  - Transmissivity (ASTM D 4716);
  - Permeability of Geotextile (ASTM D 4491); and,
  - Ply Adhesion (ASTM D 413 or F 904).

  Quality control tests shall be performed in accordance with the test methods specified for every 40,000 ft^2 (4,000 m^2) of geocomposite produced.

The Manufacturer shall identify all rolls of geocomposite with the following:

- Manufacturer's name;
- Product identification;
- Roll number; and
- Roll dimensions.

The Resident CQA Project Manager will provide copies of these documents to the CQA Certifying Engineer and the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall review these documents and shall report any discrepancies with the above requirements to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall verify that:

- Property values certified by the Manufacturer meet all of its guaranteed specifications;

- Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable;

- Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it;

- Roll packages are appropriately labeled; and

- Certified minimum properties meet the project Specifications.

10.2 CONFORMANCE TESTING

Upon delivery of the rolls of geocomposite, the CQA Monitor shall ensure that conformance test samples are obtained for the geocomposite. These samples shall then be forwarded to the Geosynthetic Laboratory for testing to ensure conformance with to the project Specifications.

At a minimum, the following tests shall be performed:

- Permeability of Geotextile (ASTM D 4491);
- Transmissivity (ASTM D 4716);
- Ply Adhesion (ASTM D 413 or F 904)

10.2.1 Sampling Procedures

The rolls to be samples shall be selected by the CQA Monitor. Samples shall be taken across the entire width of the roll and shall not include the first 3 feet (1 m) long by the roll width. The CQA Monitor shall mark the machine direction on the samples with an arrow.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not to exceed one conformance test per 100,000 ft^2 (10,000 m^2) of geocomposite.

10.2.2 Test Results

All conformance test results shall be reviewed and accepted or rejected by the CQA Certifying Engineer prior to the deployment of the geonet. The CQA Certifying Engineer shall examine all results from laboratory conformance testing and shall report any nonconformance to the Gandy Marley Inc. Project Manager. The CQA Certifying Engineer shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications. Nonconforming materials will not be accepted.

10.3 GEONET DEPLOYMENT

The CQA Monitor shall examine rolls upon delivery and any deviation from the above requirements shall be reported to the Resident CQA Project Manager.

Geocomposite cleanliness is essential to its performance. Therefore, the geocomposite rolls should be protected against dust and dirt during shipment and storage.

The CQA Monitor shall verify that the geocomosite is free of dirt and dust prior to installation. The CQA Monitor shall report the outcome of this verification to the Resident CQA Project Manager, and if the geocomposite is judged dirty or dusty, it shall be washed by the Installer prior to installation.

The Installer shall handle all geocomposite in such a manner as to ensure that it is nor damaged in any way, and the following shall be complied with:

- On slopes, the geocomposite shall be secured and un-rolled down the slope in such a manner as to continually keep the geocomposite sheet in tension. If necessary, the geocomposite shall be positioned by hand after being unrolled to minimize wrinkles;

- In the presence of wind, all geocomposite shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during deployment and shall remain until replaced with cover material;

- Unless otherwise specified, geocomposite shall not be welded to the geocomposite;

- Geocomposite shall only be cut using scissors or other cutting tools approved by the Resident CQA Project Manager that will not damage the underlying geosynthetics. Care shall be taken not to leave tools on the geocomposite; and

- The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geocomposite.

The CQA Monitor will document any non-compliance with the above requirements and report it to the Gandy Marley Inc. Project Manager.

10.4 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. Each component will be required to be secured or seamed to the like component at overlaps.

Adjacent geocomposite shall be joined according to construction drawings and specifications. Horizontal seams shall not be allowed on side slopes, unless approved by the Gandy Marley Inc. Project Manager. At a minimum, the following requirements shall be met:

Geonet Components:

- Adjacent roll edges shall be overlapped by at least 4 inches (100 mm);
- Adjacent roll ends shall be overlapped by at least 8 inches (200 mm);
- Overlaps shall be secured by tying;
- Tying can be achieved by plastic fasteners or polymer braid. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed;
- Tying shall be every 5 feet (1.5 m) along the slope, every 6 inches (0.15 m) in the anchor trench, and every 6 inches (0.15 m) along end-to-end seams on the base of the landfill;
- In the corners of the side slopes of rectangular landfills, where overlaps between perpendicular geonet strips are required, an extra layer of geonet shall be unrolled along the slope, on top of the previously installed geonet, from top to bottom of the slope; and,
- When more than one layer of geocomposite is installed, joints shall be staggered at least 1 foot.

Geotextile Components:

- The bottom layers of the geotextile shall be overlapped 6 inches and heat sealed.
- The top layers of geotextiles shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 6 inches prior to sewing.

Any sewing shall be done using polymetric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the geotextile. Sewing shall be done using machinery and stitch types specified in the project Specifications or as approved in writing by the Gandy Marley Inc. Project Manager and the CQA Certifying Engineer.

The CQA Engineer will document that the geocomposite is overlapped and secured or seamed in accordance with the project Specifications.

10.5 DEFECTS AND REPAIRS

Any holes or tears in the geocomposite shall be repaired by placing a patch extending 1 foot (0.3 m) beyond the edges of the hole or tear. The patch shall be secured to the original geonet by tying fasteners through the geocomposite patch every 6 inches (0.15 m). A larger geotextile patch shall be placed over the geocomposite patch and shall be heat sealed to the top geotextile of the geocomposite needing repair. If the hole or tear width across the roll is more than 50 percent of the width of the roll, the damaged area shall be repaired as follows:

- On the base of the landfill, the damaged area shall be cut out and the two portions of the geonet shall be joined;

- On side slopes, the damaged geocomposite shall be removed and replaced;

The CQA Monitor will verify that any holes or tears in the geocomposite are repaired in accordance with the project Specifications; and

The CQA Monitor will observe any repair, document any noncompliance with the above requirements, and report the noncompliance to the Gandy Marley Inc. Project Manager.

10.6 GEOCOMPOSITE PROTECTION

Soil materials near the geocomposite shall be placed in such a manner as to ensure:

- The geocomposite and underlying lining materials are not damaged;
- Minimal slippage of the geocomposite on underlying layers occurs; and
- No excess tensile stresses occur in the geocomposite.

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:_____

TERRAMATRIX INC.
STEAMBOAT SPRINGS, CO.

GANDY MARLEY INC.
Job No. 602

TRIASSIC PARK WASTE DISPOSAL FACILITY CQA MONITORING
DAILY FIELD REPORT

REPORT NUMBER

MONDAY, , 1994

TO:

---

1. STAFF ASSIGNMENTS

NAME	ASSIGNMENT	NAME	ASSIGNMENT

2. WEATHER

TEMPERATURE RANGE: °F to °F
SKIES:
WIND:

3. CONTRACTORS ON SITE

NAME	HOURS	TASKS

4. CQA ACTIVITIES - EARTHWORKS

ACTIVITIES	DESCRIPTION

5. CQA EARTHWORKS MONITORING RESULTS

SHIFT D/N	TROXLER #	NO. NUCLEAR TESTS	NUMBER PASS/FAIL	NO. GREY TESTS	RUBBER BALLOON	SHELBY TUBES	MATERIAL SOURCE

6. LIFT SUMMARY

PLACEMENT AREA	NUMBER OF LIFTS	STATUS

7. OUTSTANDING FAILURES

TEST NUMBER	LOCATION	REASON

8. LOAD COUNT SUMMARY

NO. OF LOADS	YDS³/LOAD	VOLUME (YDS)	FROM	TO	COMMENTS
TOTAL YDS³ CLAY					

9. TRIM AREAS

GENERAL LOCATION	AREA (FT^2)

10. GEOSYNTHETIC ACTIVITY SUMMARY

- ☐ INVENTORY
- ☐ WELDING - EXTRUSION
- ☐ WELDING - FUSION
- ☐ REPAIRS
- ☐ NON-DESTRUCTIVE TESTING - VACUUM TEST
- ☐ NON-DESTRUCTIVE TESTING - AIR TEST
- ☐ DEPLOYMENT HDPE
- ☐ DEPLOYMENT GEOTEXTILE
- ☐ DEPLOYMENT GEOCOMPOSITE
- ☐ GUTTER INSTALLATION

11. DEPLOYMENT SUMMARY

MATERIAL	PANEL NOS	DAILY FT^2	SECTION NUMBER	CUMULATIVE (FT^2)

12. WELDING SUMMARY

MACHINE	LINEAR FEET	CARRYOVER (FT)	DESTRUCT NO.
EXTRUSION			
FUSION			

13. DESTRUCTIVES

TEST NUMBER	PASS/FAIL

14. EQUIPMENT SUMMARY

SEE ATTACHED FORM

15. MEETINGS

☐ Construction meeting today, notes are attached.
☐ No meeting today.

16. MISCELLANEOUS NOTES:

PREPARED BY:_____
TERRAMATRIX INC.

MEMORANDUM

GANDY MARLEY INC.
TRIASSIC PARK WASTE DISPOSAL FACILITY

To: Date: _____

Subject:

*TerraMatrix Inc. * P.O. Box 774018 * Steamboat Springs, Colorado 80477 * (303) 879-6260 * (303) 879-9048 (fax)*

CERTIFICATE OF ACCEPTANCE
OF SOIL SURFACE
TRIASSIC PARK WASTE DISPOSAL FACILITY

OWNER: GANDY MARLEY INC. **INSTALLER:**

LOCATION: CHAVES COUNTY, NM

I, the Undersigned, the duly authorized representative of _____, have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

This certificate is based on observations of the surface of the subgrade only. No subterranean inspection or tests have been performed by _____, and ____ makes no representations or warranties regarding conditions which may exist below the surface of the subgrade. _____ shall be responsible for subgrade surface upon acceptance of any given area. _____ accepts no responsibility for conformance of the subgrade to this project's specification.

Area being accepted:_____

_____

_____

NAME	SIGNATURE	TITLE	DATE

CERTIFICATE OF ACCEPTANCE RECEIVED BY QA/QC MANAGER

NAME	SIGNATURE	TITLE	DATE

CERTIFICATE OF ACCEPTANCE RECEIVED BY OWNER

NAME	SIGNATURE	TITLE	DATE

*TerraMatrix Inc. * P.O. Box 774018 * Steamboat Springs, Colorado 80477 * (303) 879-6260 * (303) 879-9048 (fax)*

CERTIFICATE OF COMPLETION

Type: Partial [ ] Substantial [ ] Final [ ]

PROJECT:_____

SITE:_____

AGREEMENT NO.:_____ DATE:_____

DESCRIPTION OF WORK COMPLETED:_____

_____

_____

SUBMITTED BY: SUPPLIER'S REPRESENTATIVE

SIGNATURE:_____ Date:_____

NAME (print):_____

TITLE:_____

REPRESENTING: _____

We have observed and performed field and laboratory tests on the above work per the CQA Plan. Based on the observations and test results, it is our opinion that it has been installed in accordance with the plans and specifications. It is also our opinion that all required testing has been completed and the results are in substantial compliance with the plans and specifications.

BY: CQA ENGINEER

SIGNATURE:_____ Date:_____

NAME (PRINT):_____

TITLE:_____

REPRESENTING: _____

ACCEPTED BY: OWNER'S REPRESENTATIVE

SIGNATURE:_____ Date:_____

NAME (PRINT):_____

TITLE:_____

REPRESENTING: _____

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 LIMIITS	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:

SPECIAL INSTRUCTIONS:

SAMPLES DELIVERED BY:_____

SAMPLES RECEIVED BY:_____

*TerraMatrix Inc. * P.O. Box 774018 * Steamboat Springs, Colorado 80477 * (303) 879-6260*

MOISTURE CONTENT ANALYSIS - ASTM D 2216 (OVEN)

TRIASSIC PARK WASTE DISPOSAL FACILITY CQA

Project Number: 602

Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							
Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							
Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							
Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							

Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							
Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							
Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							
Date							
Sample No.							
Depth of Sample							
Container No.							
Weight Wet Soil & Tare							
Weight Dry Soil & Tare							
Weight Water							
Tare							
Weight Dry Soil							
Water Content (%)							

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)

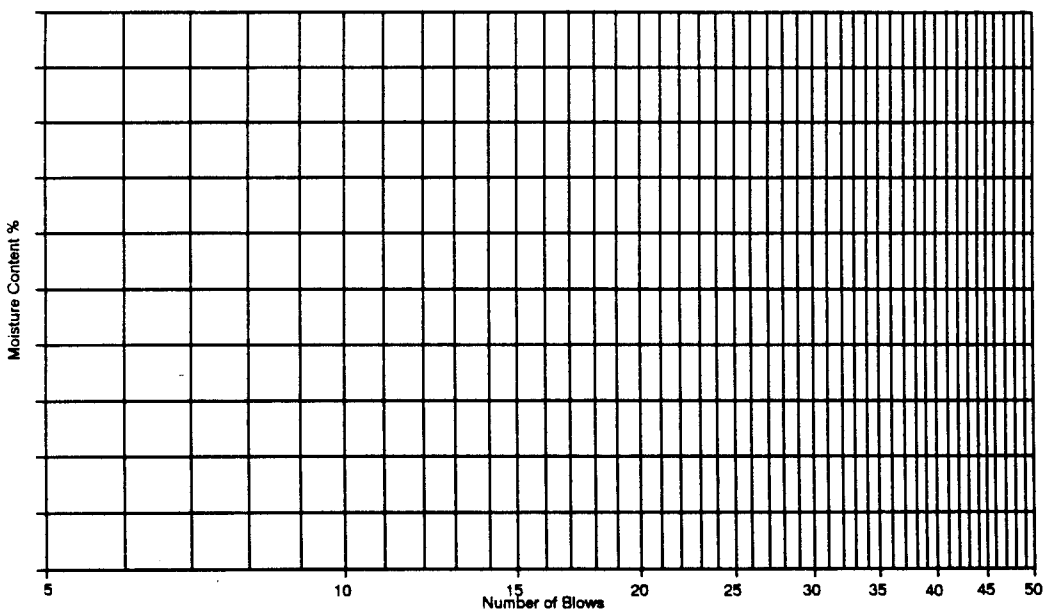
PROJECT: TRIASSIC PARK WASTE DISPOSAL FACILITY CQA

PROJECT NO. 602 DATE:_____ TESTED BY:_____

TERRAMATRIX
1475 Pine Grove Road
Steamboat Springs, Colorado 80477

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

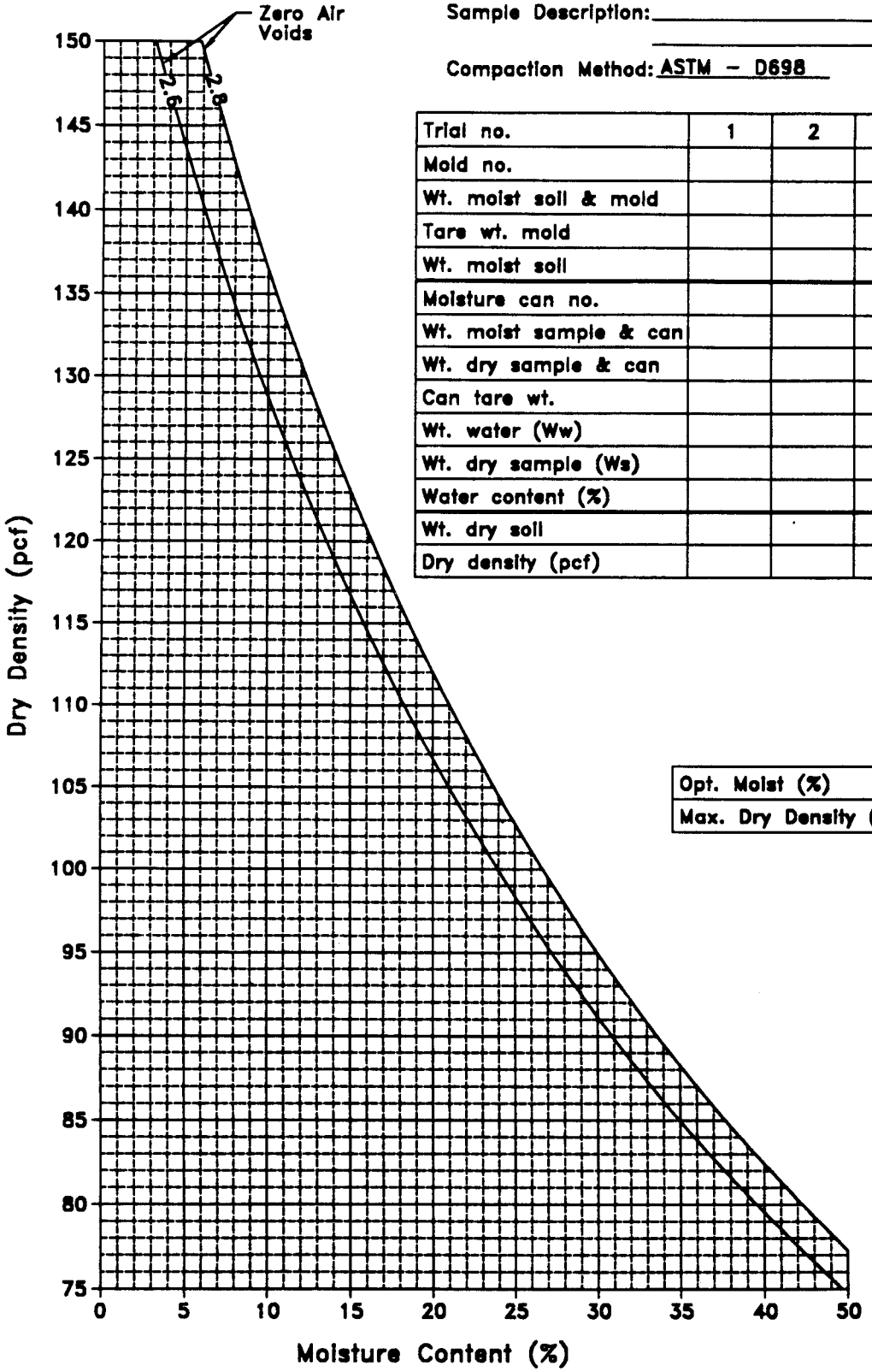
Project: TRIASSIC PARK WASTE DISPOSAL FACILITY CQA
Project No.: DATE: TESTED BY: TERRAMATRIX

Sample Number:_____

Sample Description:_____

Compaction Method: ASTM – D698

Trial no.	1	2	3	4	5	6
Mold no.						
Wt. moist soil & mold						
Tare wt. mold						
Wt. moist soil						
Moisture can no.						
Wt. moist sample & can						
Wt. dry sample & can						
Can tare wt.						
Wt. water (Ww)						
Wt. dry sample (Ws)						
Water content (%)						
Wt. dry soil						
Dry density (pcf)						



Opt. Moist (%)	
Max. Dry Density (pcf)	

MOISTURE-DENSITY RELATIONSHIP OF SOIL

Project Name TRIASSIC PARK WASTE DISPOSAL FACILITY

Project No. 602 Date _____ Tested By _____ Approved 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

SUMMARY NUCLEAR GAUGE (ASTM D 2922, D 3017)
TRIASSIC PARK WASTE DISPOSAL FACILITY

OWNER: GANDY MARLEY INC. PROJECT NO. ____

NUCLEAR GAUGE MODEL_____ SERIAL NO.:_____DATE ARRIVED ON SITE:_____ DATE DEPART SITE:_____ Page ___ of ___

		FIELD				LABORATORY		PROCTOR			
MONITOR ID	SAMPLE NUMBER	WET DENSITY	DRY DENSITY	MOISTURE CONTENT	PERCENT COMPACTION	DRY DENSITY	OVEN MOISTURE	MAX DRY DENSITY/ OPT MOISTURE	MOISTURE CHANGE	PERCENT COMPACTION	P/F

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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

NUCLEAR FIELD DEN /MOISTURE TEST DATA
TRIASSIC PARK WAS DISPOSAL FACILITY
(ASTM 2922, D3017)

PROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION:

CONTRACTOR:_____

SHEET NUMBER_____ **OF**_____

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												

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IN-SITU DENSITY TESTS - RUBBER LOON METHOD (ASTM D 2167)
TRIASSIC PARK WAS.. .SPOSAL FACILITY

OWNER: GANDY MARLEY INC. PROJECT NUMBER: 602

DATE:_____ MATERIAL TESTED:_____ OPTIMUM WATER CONTENT:____ MAX DRY DENSITY (pcf):___

TESTED BY:_____ REVIEWED BY:_____ WEATHER:_____ PAGE___ OF ___

TEST NUMBER	RUBBER BALLOON	NUCLEAR DENSITY	RUBBER BALLOON	NUCLEAR DENSTIY	RUBBER BALLOON	NUCLEAR DENSITY
ELEVATION						
LOCATION						
FINAL READINGS (ft^3)						
AVERAGE FINAL READING (ft^3)						
INITIAL READING (ft^3)						
CORRECTED VOLUME (ft^3)						
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						

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GEOSYNTHETIC INVENTORY CONTROL LOG
TRIASSIC PARK WASTE DISPOSAL FACILITY

ROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION: CHAVES COUNTY, NM

CONTRACTOR:_____

SHEET NUMBER_____

MATERIAL TYPE: GEOMEMBRANE GEONET GEOTEXTILE OTHER_____

DATE OF ARRIVAL:_____

DATE OF INVENTORY_____

MATERIAL MANUFACTURER:_____

INVENTORY MONITOR:____

PRODUCT IDENTIFICATION :_____

CONDITION IN TRUCK_____

TRUCK TYPE:_____

GEOMEMBRANE PANEL LOG
TRIASSIC PARK WASTE DISPOSAL FACILITY

PROJECT NUMBER: 602 CONTRACTOR:_____
OWNER: GANDY MARLEY INC.
LOCATION: CHAVES COUNTY, NM SHEET NUMBER_____

PANEL NUMBER	ROLL NUMBER	DEPLOYMENT DATE	MONITOR	VISUAL PANEL CONDITION	VERIFICATION OF REPAIRS		REMARKS
					DATE	QA MONITOR	

REVIEWED BY_____ DATE_____

GEOMEMBRANE PANEL DEPLOYMENT LOG
TRIASSIC PARK WASTE DISPOSAL FACILITY

PROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION: CHAVES COUNTY, NM

CONTRACTOR:_____

SHEET NUMBER_____

GEOMEMBRANE: SECONDARY PRIMARY CLOSURE OTHER_____

SUBGRADE CONDITION (SURFACE COMPACTION, PROTRUSIONS, DESICCATION, EXCESSIVE MOISTURE):

REMARKS:_____

DESCRIPTION	PANEL NUMBER	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER			
DEPLOYED LENGTH			
AMBIENT AIR TEMP			
VISUAL OBSERVATION			
OBSERVED OVERLAP			
MONITOR			
REMARKS			

SHEET THICKNESS (MILS)	LEAD	L SIDE	R SIDE	TRIAL	LEAD	L SIDE	R SIDE	TRIAL	LEAD	L SIDE	R SIDE	TRIAL
AVERAGE												

DESCRIPTION	PANEL NUMBER	PANEL NUMBER	PANEL NUMBER
ROLL NUMBER			
DEPLOYED LENGTH			
AMBIENT AIR TEMP			
VISUAL OBSERVATION			
OBSERVED OVERLAP			
MONITOR			
REMARKS			

SHEET THICKNESS (MILS)	LEAD	L SIDE	R SIDE	TRIAL	LEAD	L SIDE	R SIDE	TRIAL	LEAD	L SIDE	R SIDE	TRIAL
AVERAGE												

REVIEWED BY_____ DATE_____

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DAILY SUMMARY GEOSYNTHETICS

PROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION: CHAVES COUNTY, NM

CONTRACTOR:_____

SHEET NUMBER_____

DATE:_____

DEPLOYMENT:

FUSION WELDING MACHINE NO.	FT. WELDED	TEST NO.	CARRYOVER

EXTRUSION WELDING MACHINE NO.	FT. WELDED	TEST NO.	CARRYOVER

NEXT TRIAL SEAM NUMBERS

DESTRUCTIVE RESULTS:

TEST NUMBER	PASS/FAIL

RE-ISSUE DEFECT SHEETS:

NEXT DESTRUCTIVES:

GEOSYNTHETIC INSTALLATION MONITORING SUMMARY

PROJECT NUMBER: 602 PROJECT TITLE: TRIASSIC PARK WASTE DISPOSAL FACILITY

OWNER: GANDY MARLEY INC. CONTRACTOR: _____

LOCATION: CHAVES COUNTY, NM DATE: _____ PAGE___ OF ___

COMPILED BY: _____ S M T W T F S ☐ Day ☐ Night

INSTALLER ON SITE _____
INSTALLER OFF SITE _____
INSTALLER'S CREW SIZE _____
NUMBER OF LABORERS _____
NO. OF OPERABLE FUSION WELDERS_____
NO. OF OPERABLE EXTRUSION WELDERS____

WEATHER

TEMPERATURE (F)
MORNING_____ CLOUD COVER_____
AFTERNOON_____ WIND_____
EVENING_____ RAIN/SNOW_____

DEPLOYMENT SUMMARY (SQ. FT)

	DAILY	CUMULATIVE
SEC. GEOMEMBRANE		
SEC. GEOTEXTILE		
SEC. GEOTEXTILE		
SEC. GEONET		
SEPARATOR GEOTEXTILE		
PRI. GEOMEMBRANE		
PRI. GEOTEXTILE		
PRI. GEOTEXTILE		
TOP GEOTEXTILE		

GEOMEMBRANE PANELS DEPLOYED
_____ THRU _____

SUMMARY OF DESTRUCTIVE TEST RESULTS

DESTRUCTIVE TEST NUMBER	MACHINE NUMBER	TEST STATUS

SUMMARY OF CURRENT DESTRUCTIVE FAILURES

DESTR.# _____
MACHINE # _____

TRACKING DESTRUCTIVE NUMBER	SEAM NUMBER	TEST STATUS

REMARKS: _____

IS DESTRUCTIVE BOUNDED BY PASSING TEST?
YES NO

DESTR.# _____
MACHINE# _____

TRACKING DESTRUCTIVE NUMBER	SEAM NUMBER	TEST STATUS

REMARKS: _____

IS DESTRUCTIVE BOUNDED BY PASSING TEST?
YES NO

DESTR.# _____
MACHINE# _____

TRACKING DESTRUCTIVE NUMBER	SEAM NUMBER	TEST STATUS

REMARKS: _____

IS DESTRUCTIVE BOUNDED BY PASSING TEST?
YES NO

GEOMEMBRANE EXTRU N SEAM/REPAIR LOG
TRIASSIC PARK WASTE DISPOSAL FACILITY

ROJECT NUMBER: 602
WNER: GANDY MARLEY INC.
OCATION: CHAVES COUNTY, NM

CONTRACTOR:_____

SHEET ____ OF _____

MACHINE NUMBER_____ CARRYOVER_____ DATE_____ QA MONITOR_____

ASSING TRIAL SEAMS

NO.	TIME	TECH ID

SEAM NUMBER	SEAM SECTION* FROM	TO	DEFECT CODE	START TIME	TECH ID	TEMPERATURES					APPROX LENGTH WELDED	DESTR NUMBER	REPAIR TYPE	ENTIRE SEAM COMPLETE		REPAIR SIZE	REMARKS
						PRE-HEAT	DIGITAL SET		INDICATOR					NO	YES		
							BARREL	NOZZEL	BARREL	NOZZEL							
/	-						:		:								
/	-						:		:								
/	-						:		:								
/	-						:		:								
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/	-						:		:								
/	-						:		:								
/	-						:		:								

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER OR A POINT LOCATION ON THE SEAM (REFERENCE POINT, DISTANCE FROM REFERENCE POINT).

REVIEWED BY_____ DATE_____

GEOMEMBRANE FUSI SEAM/REPAIR LOG

TRIASSIC PARK WASTE DISPOSAL FACILITY

PROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION: CHAVES COUNTY, NM

CONTRACTOR:_____

SHEET NUMBER_____

MACHINE NUMBER____ CARRYOVER_____DATE_____ QA MONITOR____ SHEET NUMBER_____

ASSING TRIAL SEAMS

NO.	TIME	TECH ID

SEAM NUMBER	SEAM SECTION* FROM TO	DEFECT CODE	START TIME	TECH ID	TEMPERATURES			APPROX LENGTH WELDED	DESTR NUMBER	REPAIR TYPE	ENTIRE SEAM COMPLETE		REPAIR SIZE	REMARKS
					PRE-HEAT	DIGITAL SET	INDICATOR							
						BARREL NOZZEL	BARREL NOZZEL				NO	YES		
/	-					:	:							
/	-					:	:							
/	-					:	:							
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/	-					:	:							

* REFERENCE SEAM ENDPOINTS FROM AN END OF SEAM (EOS), A REPAIR NUMBER OR A POINT LOCATION ON THE SEAM (REFERENCE POINT, DISTANCE FROM REFERENCE POINT).

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GEOMEMBRANE SE VACUUM TEST LOG
TRIASSIC PARK WASTE DISPOSAL FACILITY

PROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION: CHAVES COUNTY, NM

CONTRACTOR:_____

SHEET ____ OF _____

VACUUM BOX NUMBER_____

SEAMS									REPAIRS						
SEAM NUMBER	SEAM SECTION * FROM TO	TEST DATE	TECH ID	DEFECTS**	SEAM COMPLETE NO YES	OBS TEST	MON	REMARKS	DEFECT CODE	TEST DATE	TECH ID	DEFECTS**	OBS TEST	MON	REMARKS
/	-				/										
/	-				/										
/	-				/										
/	-				/										
/	-				/										
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* 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 LEKS DETECTED AND REFERENCE NEW DEFECT CODE IN REMARKS.

REVIEWED BY_____ DATE_____

GEOMEMBRANE DEFECT LOG
TRIASSIC PARK WASTE DISPOSAL FACILITY

PROJECT NUMBER: 602
OWNER: GANDY MARLEY INC.
LOCATION: CHAVES COUNTY, NM

CONTRACTOR:_____

SHEET NUMBER_____

DEFECT CODE	DEFECT LOCATION		DEFECT TYPE	LOG DATE	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 FML PENETRATION
CO CHANGE OF OVERLAP
CR CREASE
D INSTALLATION DAMAGE
DS-# 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_____

Appendix B
Oil Well Log

TO VIEW THE MAP AND/OR MAPS WITH THIS DOCUMENT, PLEASE CALL THE HAZARDOUS WASTE BUREAU AT 505-476-6000 TO MAKE AN APPOINTMENT

Appendix C
Lithology Logs

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-1 Section NW NE 8 T 11S R 31E

Project Gandy Marley Elevation 4152

Driller Larry JAB Date 07/11/94

Comments

GSA Color	Lith		Description
5R4/6			tn gr. red-brn ss
5YR4/1			brn-gray siltstone
5Y6/1			tn gr. lt. olive gray sc
10R5/4		50'	pale red brn mudstone
10R4/2			grayish red mudstone
10R4/6			mod red-brn mudstone
10R3/4			dk red-brn mudstone
10R4/6		100'	mod red-brn mudstone
10R3/4			dk red-brn mudstone
5Y6/1		150'	grn-gray siltstone damp @ 158'
10R4/6			mod red-brn mudstone
10R3/4			dk red-brn mudstone
		200'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-2 Section NW SW 17 T 11 S R 31 E

Project Gandy Marley Elevation 4150

Driller Larry JAB Date 07/11/94

Comments

GSA Color	Lith		Description
10R 5/4			red-brn soil
10R 3/4			pale red-brn siltstone
			dk red-brn mudstone
10R 4/6			mod red-brn mudstone
		50'	
10R 4/2			gray-red siltstone
10YR 5/4			mod yell-brn mudstone
10R 3/4			dk red-brn siltstone
10R 3/4		100'	dk red-brn clayey siltstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-3 Section SE NE 18 T 11S R 31E

Project Gandy Marley Elevation 4135

Driller Larry JAB Date 07/11/94

Comments

GSA Color	Lith		Description
			lt brn soil & fn sd
10R 5/4			pale red-brn mudstone
10R 5/4			
5R 5/4			mod red siltstone
10R 4/6		50'	mod red-brn mudstone
10R 5/4			
10R 5/4			pale red-brn siltstone
10R 5/4			pale red-brn mudstone
			pale red-brn siltstone
10R 4/6		100'	mod red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-4 Section NE SE 18 T 11 S R 31 E

Project Gandy Marley Elevation 4139

Driller Larry JAB Date 07/12/94

Comments

GSA Color	Lith		Description
10R 6/6			mod red-org surface ss
10R 6/2			red-brn silty ss
10R 5/4			
			pale red-brn mudstone
10R 4/2		50'	gray-red silty mudstone
			mod red-brn mudstone
10R 4/2			gray-red silty mudstone
10R 4/6			mod red-brn mudstone
10R 4/2			gray-red mudstone
10R 4/6		100'	mod red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-5 Section NE SE 18 T 11S R 31E

Project Gandy Marley Elevation 4142

Driller Larry DATB Date 07/12/94

Comments

GSA Color	Lith		Description
10 R 5/4			lt gray to pale red-brn silt w/ gravel @ 25'
10 R 5/4			pale red-brn mudstone
10 R 4/6		50'	mod red-brn mudstone
10 R 4/2			gray-red siltstone
10 R 4/6			mod red-brn mudstone
10 R 5/4		100'	pale red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-6 Section NW SE 18 T 11S R 31E

Project Gandy Marley Elevation 4120

Driller Larry DAB Date 07/12/94

Comments 50' N + 35' E of grid point (7' below grid pt.)

GSA Color	Lith	Description
10R 4/6		mod red-org surface ss
10R 4/6		mod red-brn mudstone
10R 6/2		pale red siltstone
	50'	
10R 4/6		mod red-brn mudstone
10R 3/4		dk red-brn mudstone
	100'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-7 Section SW SE 18 T 11S R 31E

Project Gandy Marley Elevation 4118

Driller Larry JAB Date 07/17/94

Comments 140' E + 25' N of grid pt.

GSA Color	Lith		Description
			fn tan surface ss + gravel
10 R 4/2			gray-red siltstone
5 YR 6/1			lt gray-brn siltstone
10 R 4/6		50'	mod red-brn mudstone
10 R 6/2			pale red-brn mudstone
10 R 4/6			mod red-brn mudstone
10 R 4/2		100'	gray-red mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-8 Section NW SE 18 T 11S R 31E

Project Gandy Morley Elevation 4117

Driller Larry JAB Date 07/13/94

Comments 50' S + 10' W of grid point

GSA Color	Lith		Description
			surface ss + gravel
10 R 4/2			gray-red siltstone
5 YR 6/1		50'	lt gray-brn siltstone
10 R 4/6			mod red-brn mudstone
10 R 4/2		100'	gray-red mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-9 Section SW SE 18 T 11 S R 31 E

Project Gandy Morley Elevation 4138

Driller Larry JAB Date 07/13/94

Comments 50' E of grid point

GSA Color	Lith		Description
			surface ss & gravel
10R 4/2			gray-red siltstone
10R 4/6			mod red-brn mudstone & silty clay
		50'	
10R 4/2			gray-red siltstone
N7			lt gray mudstone
10 R 3/4			dk red-brn mudstone
10 R 4/6		100'	mod red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-10 Section NW SE 18 T 11S R 31E

Project Gandy Marley Elevation 4131

Driller Larry JAB Date 07/13/94

Comments

GSA Color	Lith		Description
			sandy soil
10R 4/6			mod red-brn mudstone
10R 4/2			gray-red siltstone
10R 4/2		50'	gray-red mudstone
5YR 6/1			lt brn-gray siltstone
10R 4/6			mod red-brn mudstone
10R 4/2			gray-red mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-11 Section SW NE 18 T 11S R 31E

Project Gandy Marley Elevation 4119

Driller Larry JAB Date 07/13/94

Comments 5' lower than grid point

GSA Color	Lith		Description
10R 4/6			sandy ss w/ caliche
			mod red-Sra mudstone
10R 4/2			gray-red siltstone
5YR 6/1		50'	lt gray-Sra siltstone
10R 4/6			mod red-Sra mudstone
10R 5/4			pale red-Sra mudstone
10R 4/6			mod red-Sra mudstone
10R 5/4			pale red-Sra mudstone
10R 4/2		100'	gray-red mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-12 Section NE SE 18 T 11S R 31E

Project Grandy Morley Elevation 4132

Driller Larry JAB Date 07/14/94

Comments

GSA Color	Lith	Description
		surface ss & gravel
10R 5/4		pale red-brn siltstone
	50'	
10R 4/2		gray-red siltstone
5YR 4/1		lt gray brn siltstone
10R 4/2		gray-red siltstone
10R 4/6		mod red-brn mudstone
10R 4/2		gray-red siltstone
10R 4/6	100'	mod red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-13 Section SW SE 18 T 11S R 31E

Project Gandy Marley Elevation 4119

Driller Larry JAB Date 07/14/94

Comments

GSA Color	Lith		Description
			surface ss
10R 4/2			gray-red siltstone
5YR 6/1		50'	lt gray 5yr siltstone
10R 5/4			pale red-5yr mudstone
10R 4/6		100'	med red-5yr mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-14 Section SE SW 18 T 11S R 31E

Project Gandy Morley Elevation 4116

Driller Larry JAB Date 07/14/94

Comments 50' S & 80' E of grid point

GSA Color	Lith		Description
			surface ss & gravel
10R 4/2			gray-red siltstone
5YR 6/1		50'	lt gray-5m siltstone and very fn gr. ss
10R 4/2			gray-red siltstone
10R 4/6		100'	mod red-5rn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-140 Section SW SE 18 T 11 S R 31 E

Project Gandy Marley Elevation 4118

Driller Larry JAB Date 07/17/94

Comments 400' East of PB-14

GSA Color	Lith	Description
10R 4/6		surface ss & gravel
		mod red-brn mudstone
10R 4/2		gray-red siltstone
	50	
		dk gray mudstone
10R 4/6		mod red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-15 Section SW SE 18 T 11S R 31E

Project Gandy Marley Elevation 4129

Driller Larry JAB Date 07/14/94

Comments 25' S + 20' W of grid point

GSA Color	Lith		Description
			red-brn silty soil
10R 4/6			mod red-brn mudstone
5YR 4/1		50'	brn gray siltstone
10R 5/4			pale red-brn mudstone
10R 4/6		100'	mod red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-16 Section SE SE 18 T 11S R 31E

Project Gandy Marley Elevation 4161

Driller Larry JAB Date 07/14/94

Comments 5' lower than grid point

GSA Color	Lith		Description
			surface ss + gravel
10R 5/4			pale red-brn siltstone
10R 4/2		50'	gray-red siltstone
10R 4/6			mod red-brn mudstone
10R 4/2			gray-red siltstone
		100'	lt gray mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-17 Section SE SE 18 T 11 S R 31 E

Project Gandy Marley Elevation 4141

Driller Larry JAB Date 07/14/94

Comments

GSA Color	Lith		Description
			surface ss + gravel
10R 4/2			gray-red siltstone
10R 4/6			mod red-brn mudstone
		50'	
10R 4/2			gray-red siltstone
10R 4/6			mod red-brn mudstone
10R 5/4		100'	pale red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-18 Section SE SE 18 T 11 S R 31 E

Project Gandy Morley Elevation 4142

Driller Larry JDB Date 07/15/94

Comments

GSA Color	Lith		Description
			tan surface ss + gravel
			tan siltstone + ss w/ gravel
10R 4/6			mod red-brn mudstone
10R 5/4		50'	pale red-brn siltstone
10R 4/6			mod red-brn mudstone
10R 4/2			gray-red siltstone
10R 5/4		100'	pale red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-19 Section SW SW 17 T 21S R 31E

Project Gandy Marley Elevation 4152

Driller Larry JAB Date 07/15/94

Comments

GSA Color	Lith		Description
			surface ss + gravel
10R 5/4		50'	pale red-5yr mudstone
10R 4/2			gray-red siltstone
		100'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-20 Section NW SW 17 T 11S R 31E

Project Gandy Marley Elevation 4157

Driller Larry JAB Date 07/15/94

Comments

GSA Color	Lith		Description
			surface ss & gravel
			lt gray-tan siltstone & ss
			dk gray mudstone
10R 4/6		30'	mod red-5R mudstone w/ silt & sand
10R 5/4			pale red-5R siltstone
10R 4/6			mod red-5R mudstone
10R 4/2			gray-red siltstone
		100'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-21 Section SWSW 17 T 11S R 31E

Project Gandy Marley Elevation 4148

Driller Larry JAB Date 07/15/94

Comments 500' N of section corner

GSA Color	Lith		Description
			surface ss & gravel
10R 4/6			mud red-brn mudstone
10R 4/2			gray-red siltstone
10R 5/4			pale red-brn mudstone
		50'	
10R 4/2			gray-red siltstone
			dk red-brn mudstone
10R 3/4			
			lt gray mudstone
10R 4/2		100'	gray-red siltstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-22 Section NW SW 17 T 11S R 31E

Project Gandy Marley Elevation 4143

Driller Larry DAB Date 07/15/94

Comments

GSA Color	Lith		Description
			surface ss & gravel
10R 4/6			mod red-5yr mudstone
10R 4/2			gray-red siltstone
10R 5/4			pale red-lm siltstone
10R 4/6		50'	mod red-5m mudstone
			gray-red siltstone
10R 4/2			
		100'	lt gray siltstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-23 Section NW SW 17 T 11S R 31E

Project Gandy Marley Elevation 4151

Driller Larry JAB Date 07/16/94

Comments

GSA Color	Lith		Description
			surface & lt tan ss
10R 4/2			gray-red siltstone
10R 4/6			
10R 4/2			mod red-brn to gray-red mudstone
10R 4/6		50'	gray-red siltstone
10R 4/6			mod red-brn mudstone
10R 5/4			pale red-brn siltstone
			gray-red siltstone
		100'	dk red-brn to lt gray mudstone
			gray-red siltstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-24 Section SW SW 17 T 11 S R 31 E

Project Gandy Morley Elevation 4154

Driller Larry JAB Date 07/15/94

Comments

GSA Color	Lith		Description
			surface ss + gravel
10R 4/6			mod red-brn mudstone
		50'	gray-red siltstone
			mod red-brn mudstone
		100'	gray-red siltstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-25 Section SW/NW 17 T 11S R 31E

Project Gandy Marley Elevation 4144

Driller Larry JAB Date 07/16/94

Comments

GSA Color	Lith		Description
			surface ss & gravel
10R 5/4			pale red-5R mudstone
10R 4/6			mod red-5R mudstone
10R 4/2			gray-red siltstone
10R 4/2		50'	mod-red-5R mudstone to gray-red siltstone
10R 4/6			mod red-5R mudstone
10R 5/4			pale red-5R to gray-red siltstone
10R 4/2		100'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-26 Section NW NW 9 T 11 S R 31 E

Project Gandy Morley Elevation 4183

Driller Larry JAB Date 07/16/94

Comments

GSA Color	Lith	Description
		surface ss & gravel
10 R 4/2		gray-red siltstone
5 Y 6/4	50'	dusky yellow fn ss.
5 Y R 6/1		lt brn gray siltstone
		dk brn-gray fn ss
	100'	
10 R 4/2		gray-red fn ss
10 R 4/2		lt gray-red fn ss
10 R 4/6		med red-brn fn ss
10 R 5/4	150'	pale red-brn fn ss
10 R 4/6		med red-brn siltstone fn ss
5 Y R 6/1		lt brn-gray
10 R 4/2		gray-red fn ss
		med red-brn mudstone
10 R 4/6	200'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-27 Section NW NE 9 T 11S R 31E

Project Gandy Marley Elevation 4144

Driller Larry JAB Date 07/16/94

Comments

GSA Color	Lith		Description
			surface ss & gravel
			lt yell-brn ss
10R 4/2			gray-red mudstone
10R 4/2		50'	gray-red siltstone
10R 5/4			pale red-brn mudstone
10R 4/2			gray-red siltstone & fn ss
		100'	lt gray siltstone
10R 4/2			gray-red siltstone
10R 4/6			med red-brn mudstone
10R 5/4		150'	pale red-brn siltstone
10R 4/2			gray-red siltstone
		200'	lt gray silt to fn ss

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-28 Section SW SW 17 T 11S R 31E

Project Gandy Morley Elevation 4159

Driller Larry JAB Date 07/16/94

Comments 4' lower than grid pt.

GSA Color	Lith		Description
			surface ss & gravel
			dk gray mudstone
10R 4/6			mod red-brn mudstone
10R 5/4		50'	pale red-brn siltstone
			pale red-brn siltstone
10R 5/4			mod red-brn mudstone @ 53'
10R 4/6			mod red-brn mudstone
		100'	grayish red siltstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-29 Section SW NE 18 T 11S R 31E

Project Gandy Marley Elevation 4129

Driller Larry JAB Date 07/17/94

Comments 5' lower than grid pt.

GSA Color	Lith		Description
			surface ss & gravel
10R 4/6			mod red-brn mudstone
10R 4/2		50'	gray-red siltstone w/ lt gray tn ss @ bottom
10R 4/6			mod red-brn mudstone
10R 4/2			gray-red mudstone
		100'	dk red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-30 Section NW SW 17 T 11S R 31E

Project Gandy Marley Elevation 4152

Driller Larry DAB Date 07/17/94

Comments

GSA Color	Lith		Description
			surface ss
			dk gray mudstone
10R 4/6			mod red-sm mudstone
10R 5/4			pale red-sm siltstone
10R 4/6		50'	mod red-sm mudstone
10R 4/2			gray-red siltstone
10R 4/6			mod red-sm mudstone
			lt gray mudstone
10R 4/2		100'	gray-red siltstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-31 Section SW NE 18 T 11 S R 31 E

Project Gandy Marley Elevation 4115'

Driller Larry DAB Date 07/17/94

Comments 4' lower than grid pt.

GSA Color	Lith		Description
			surface ss
10R 5/4			pale red-brn siltstone
10R 4/2		50'	lt gray-red siltstone
10R 4/6			med red-brn mudstone
10R 3/4			dk red-brn mudstone
10R 4/6		100'	med red-brn mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-32 Section NE SW 18 T 11S R 31E

Project Gandy Marley Elevation 4108

Driller Larry JAB Date 07/17/94

Comments

GSA Color	Lith		Description
			surface ss.
			pale red-brn silt & gravel
			dk gray siltstone
			lt gray siltstone
		50'	
10R 3/4			dk red-brn mudstone
10R 5/4			pale red-brn mudstone
10R 4/2		100'	gray red mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-33 Section SWSE 18 T 11S R 31E

Project Gandy Marley Elevation 4134

Driller Larry JAB Date 07/17/94

Comments

GSA Color	Lith		Description
			surface ss
10R 4/6			mod red-brn mudstone
10R 4/2		50'	gray-red siltstone with clay @ 40'
10R 4/6			mod red-brn mudstone
			lt gray mudstone
10R 5/4			pale red-brn mudstone
10R 4/2		100'	gray-red mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-34 Section NW NE 7 T 11S R 31E

Project Gandy Marley Elevation 4100

Driller Larry JAB Date 07/17/94

Comments

GSA Color	Lith		Description
			yell-brn-tan surface ss
			lt brn siltstone
		50'	lt brn tan ss w/ gravel
		Tr	
10R 4/2			gray-red mudstone
10R 5/4		100'	pale red-brn mudstone
10R 4/6			mod red-brn mudstone
		150'	
10R 4/2			gray-red mudstone
			lt gray mudstone
			lt gray siltstone
		200'	lt gray mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. PB-35 Section NW NW 8 T 11S R 31E

Project Gandy Marley Elevation 4124

Driller Larry JAB Date

Comments

GSA Color	Lith	Description
		top surface ss
		pale red-brn siltstone & gravel
		pale red-brn siltstone
10R 4/2	50'	grayish red siltstone
10R 4/6		mod red-brn mudstone
		lt gray siltstone & tr ss
	100'	
		dk gray mudstone
10R 4/6		mod red-brn mudstone
10R 4/2	150'	grayish red mudstone
10R 5/4		pale red-brn mudstone
10R 4/2	200	grayish red mudstone

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. WW-1 Section NW SE 8 T 11 S R 31 E

Project Gandy Marley Elevation 4154

Driller Larry JAIB Date 09/26/93

Comments

GSA Color	Lith	Description
		lt gray surface ss
		red clay
		purple clay
	50'	lt gray fn ss
		red clay (damp @ 50-55')
	100'	red gray siltstone
		lt gray siltstone
	150'	lt gray siltstone + fn ss
		dk red clay
	200'	lt gray clay @ 203-205'
		dk red clay
	250'	
		dk purple clay
	300'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. WW-1 Section NW SE 8 T 11 S R 31 E

Project Gamby Morley Elevation 4154

Driller Larry JAB Date 09/26/93

Comments

GSA Color	Lith	Description
		dk red clay
		red clay
	350'	dk red clay
		lt gray clay
	400'	reddish purple clay
		red clay
		dk reddish-purple clay
	450'	blue clay
		purple clay w/ trace lt gray @ 475-450'
	500'	purple clay
	550'	red clay
		lt gray clay 570-575
	600'	dk red clay

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. WW-1 Section NW SE 8 T 11 S R 31 E

Project Grandy Morley Elevation 4154

Driller Larry DAB Date 09/26/93

Comments

GSA Color	Lith	Description
		red - dk red clay
	650'	
	700'	lt red - tan clay
		red clay
		gray - lt gray clay
	750'	dk red clay
		red clay
		gray clay
	800'	red clay
		gray to dk gray clay
		red-tan clay
	TD	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. WW-2 Section SW SE 19 T 11S R 31E

Project Gandy Marley Elevation 4110

Driller Larry JAB Date 09/28/93

Comments

GSA Color	Lith	Description
		lt gray - yell-brn surface ss w/ lt brn silt
	50'	
		red clay
		red-brn silt
	100'	gray clay
		red-brn clay
		red clay
		reddish purple clay
	150'	
		purple clay
	200'	
		red clay
		purple clay
	250'	
		red clay
		lt gray clay
	300'	purple clay

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. WW-2 Section SWSE 19 T 11S R 31E

Project Gandy Marley Elevation 4110

Driller Larry JAB Date 09/28/93

Comments

GSA Color	Lith	Description
		purple clay
		red clay
	350'	purple clay w/ lt gray @ 355'
	400'	reddish purple clay
		red clay
		purple clay
	450'	
	500'	red clay
	550'	
	600'	

S.M. Stoller Corporation

LITHOLOGY LOG

Hole No. WW-2 Section SW SE 19 T 11S R 31E

Project Gandy Marley Elevation 4110

Driller Larry JAB Date 07/28/93

Comments

GSA Color	Lith		Description
			red clay
	no return	650'	circulation lost @ 620' - no sample return 620-740'
		700'	
	TD		

Appendix D
Geophysical Logs

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MEDICALERO RIM
WELL: PB-2

LOCATION SEC 17 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

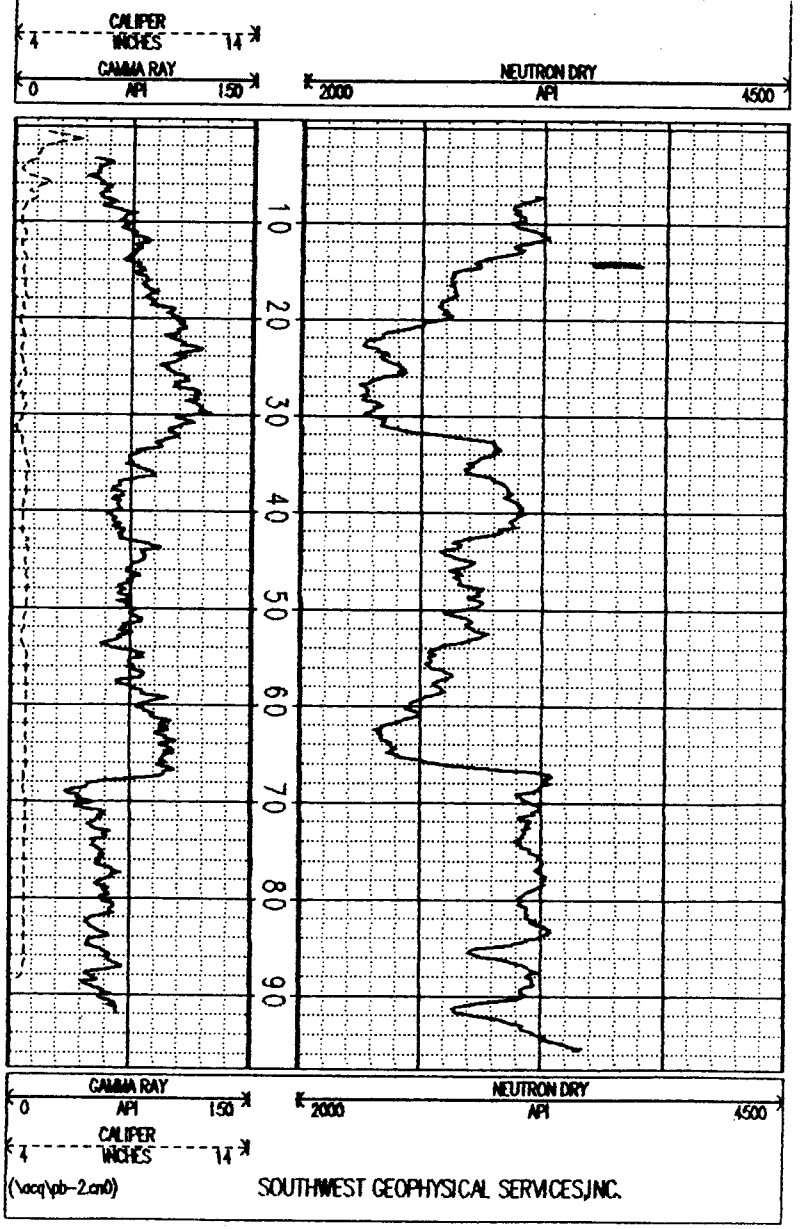
COMPANY GANDY CORPORATION
WELL: PB-2

	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carrba
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-2.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-2.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-3

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-3

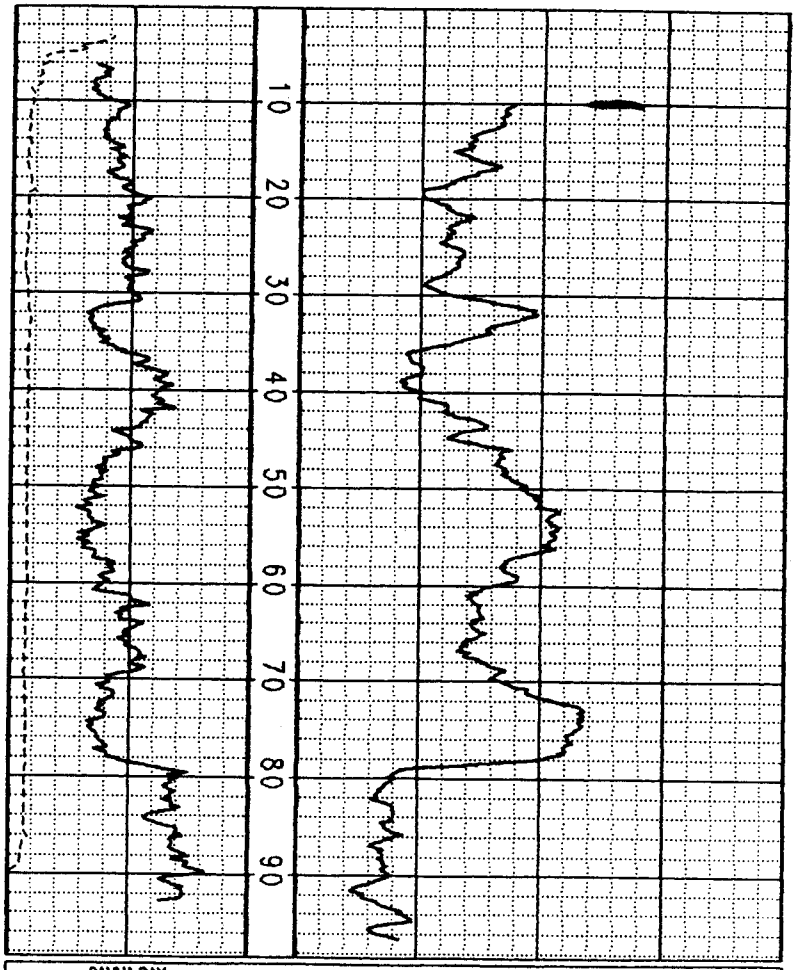
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98.2 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.7 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-3.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-3.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-4
LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-4

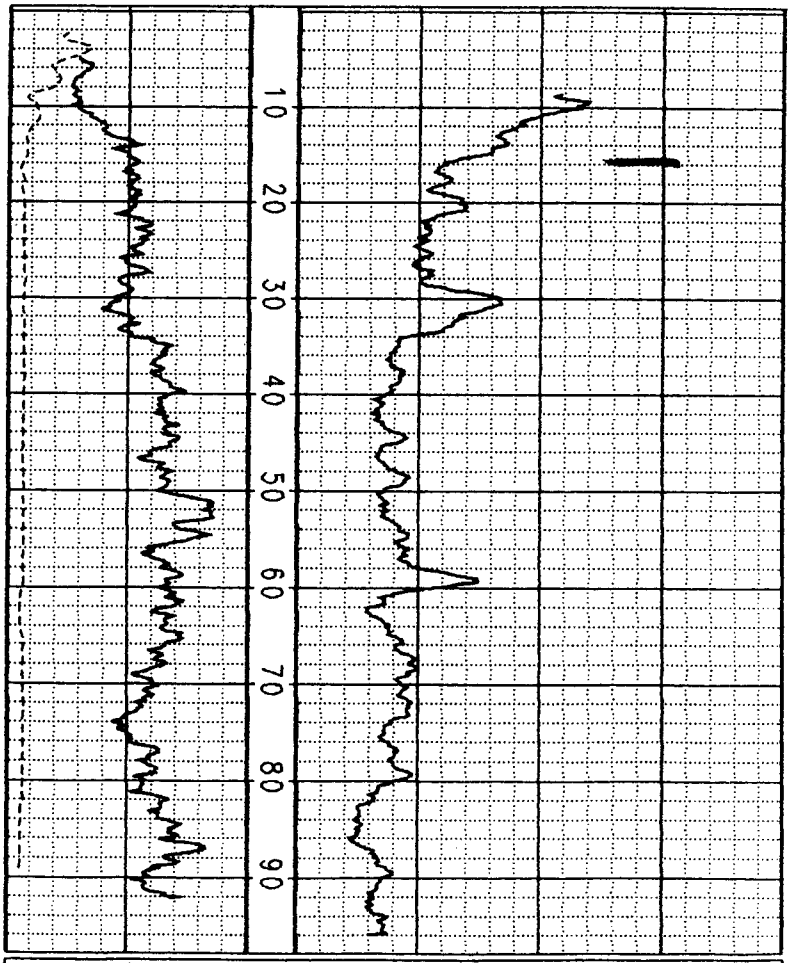
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carrbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-4.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-4.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-5

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

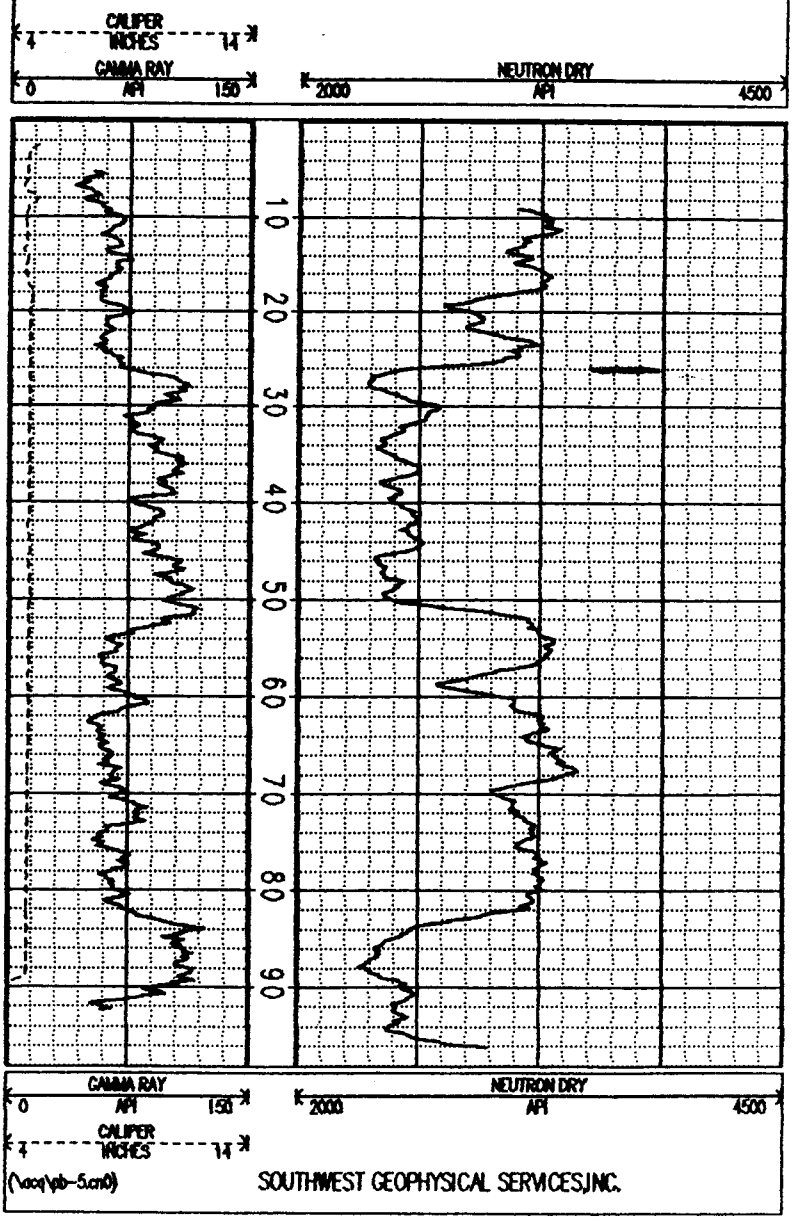
COMPANY GANDY CORPORATION
WELL: PB-5

	RUN NO. 1		RUN NO. 1
DATE	07/16/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.7 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.2 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Corrbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-5.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-5.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG: GAMMA RAY NEUTRON RESISTANCE CALIPER	PERM. DATUM: GROUND LEVEL LOG MEASURED FROM: G.L. ELEVATION:	OTHER SERVICES:

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-6

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-6

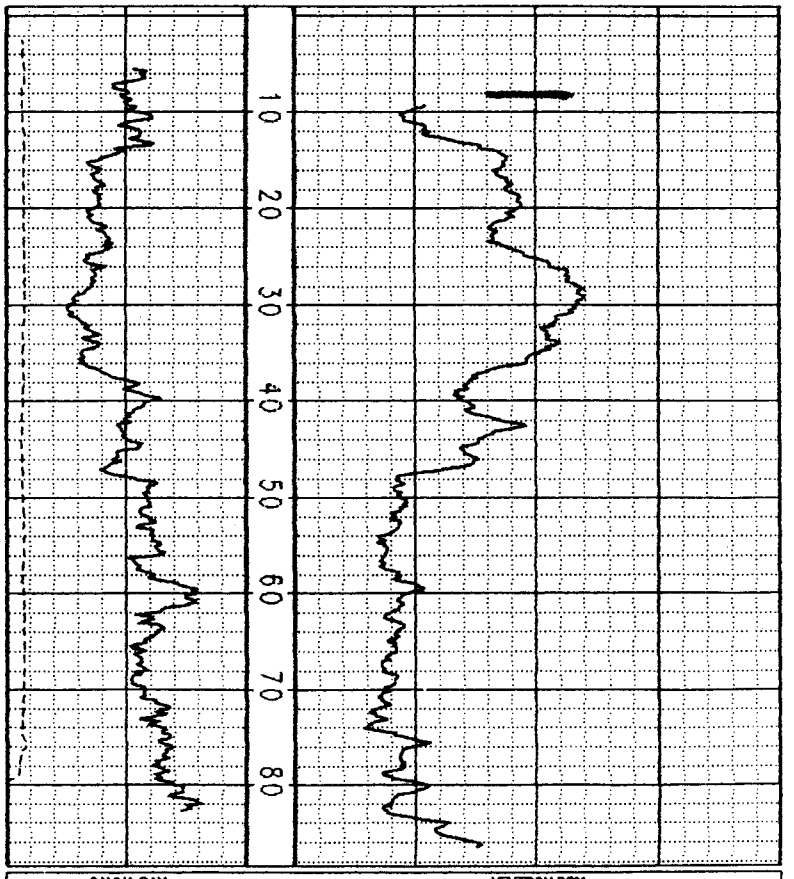
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	88.2 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	88.7 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\ACQ\PB-6.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 14
GAMMA RAY API 0 150
NEUTRON DRY API 2000 4500



GAMMA RAY API 0 150
NEUTRON DRY API 2000 4500
CALIPER INCHES 4 14

(\ACQ\PB-6.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG: GAMMA RAY NEUTRON RESISTANCE CALIPER	PERM. DATUM: GROUND LEVEL LOG MEASURED FROM: G.L. ELEVATION:	OTHER SERVICES:

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-7

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-7

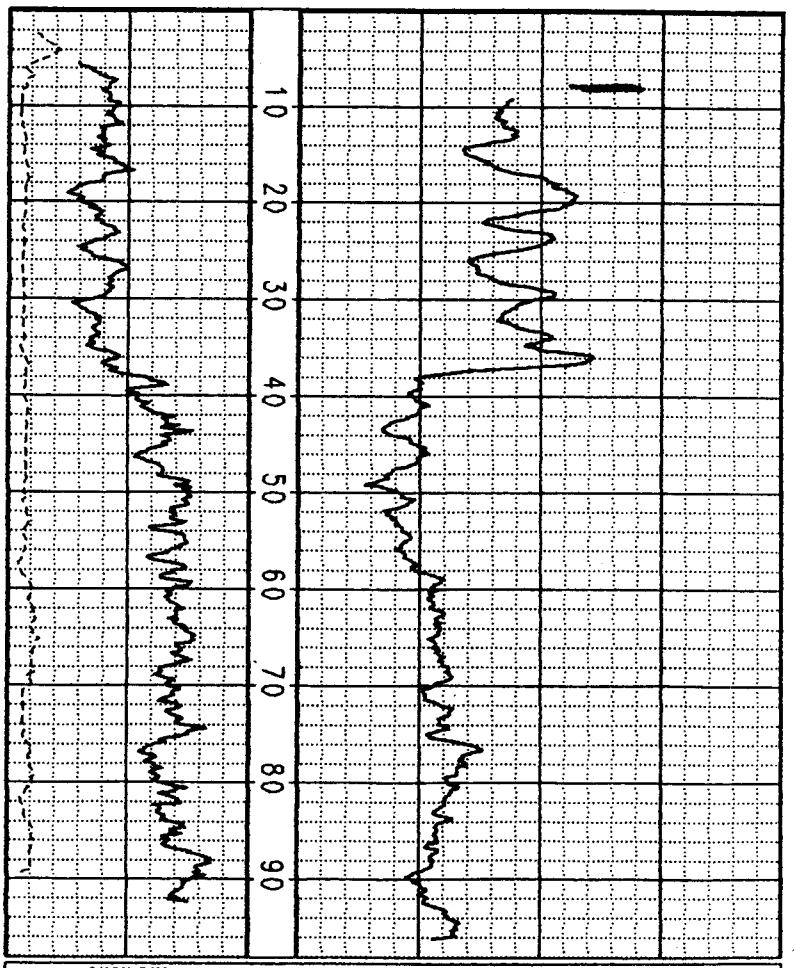
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	96.2 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-7.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-7.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-8

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

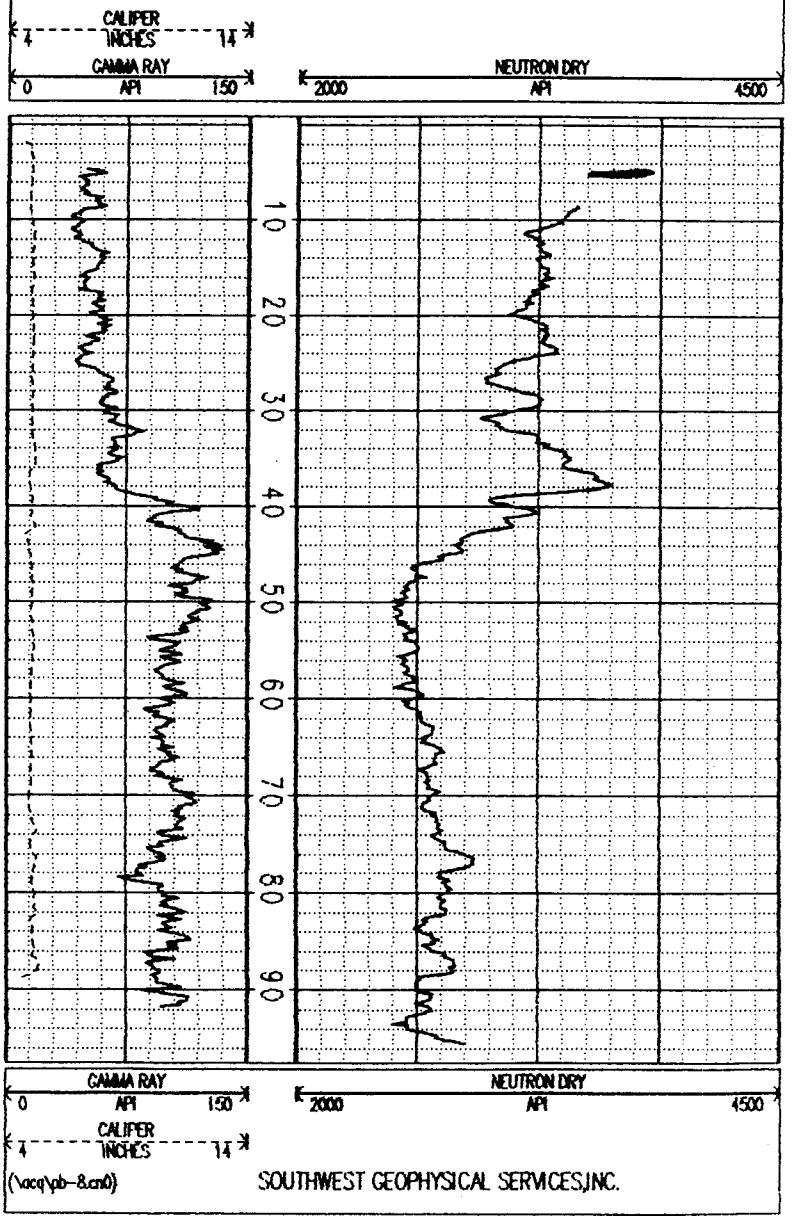
COMPANY GANDY CORPORATION
WELL: PB-8

	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL	Corba
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-8.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-8.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-9
LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL PB-9

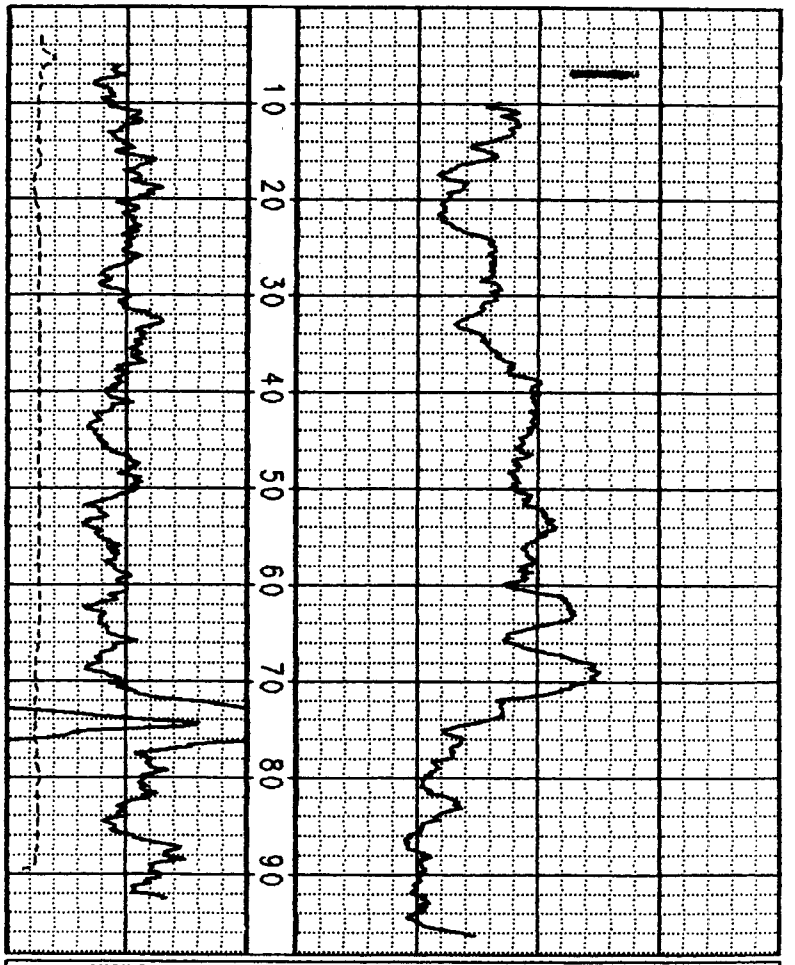
	RUN NO. 1		RUN NO. 1
DATE	07/16/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.7 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	96.2 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-9.cal) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 – 14
GAMMA RAY API 0 – 150
NEUTRON DRY API 2000 – 4500



GAMMA RAY API 0 – 150
NEUTRON DRY API 2000 – 4500
CALIPER INCHES 4 – 14

(\acq\pb-9.cal) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-10

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

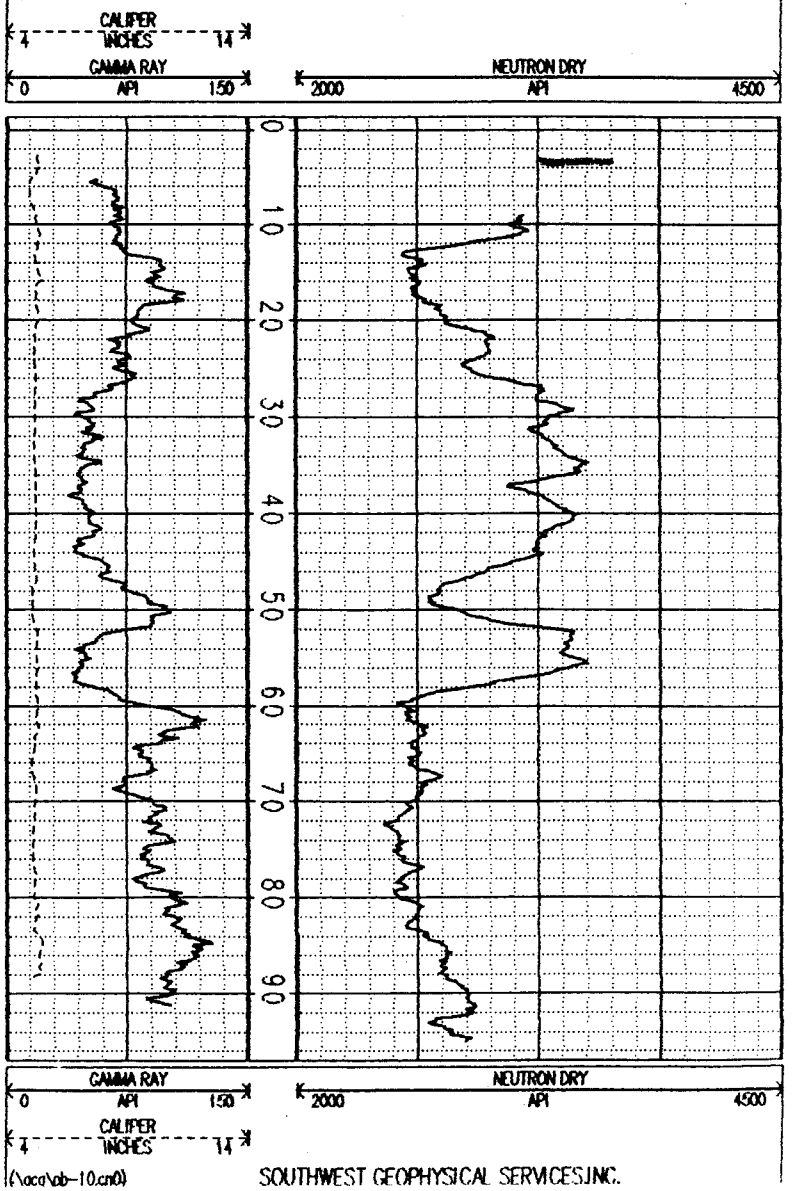
	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	96.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-10

(\acq\pb-10.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-10.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-11

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-11

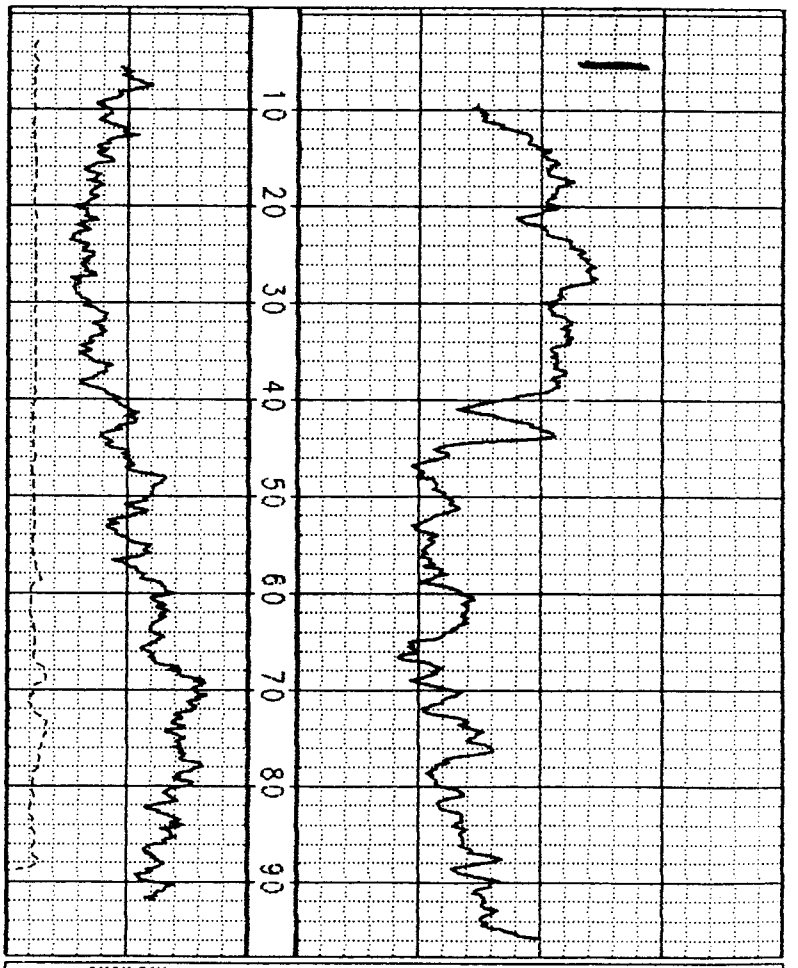
	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.3 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.8 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carrbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-11.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-11.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-12

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

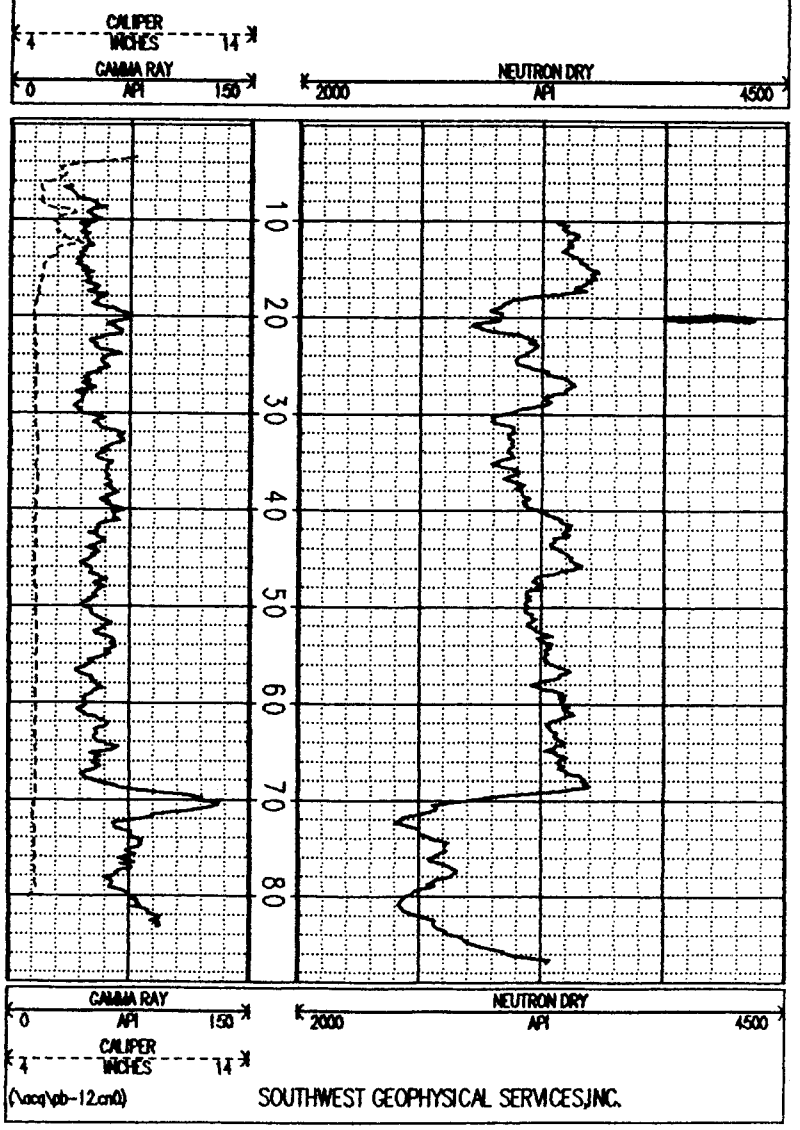
COMPANY GANDY CORPORATION
WELL: PB-12

	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	88.2 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	88.7 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-12.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-12.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-13

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

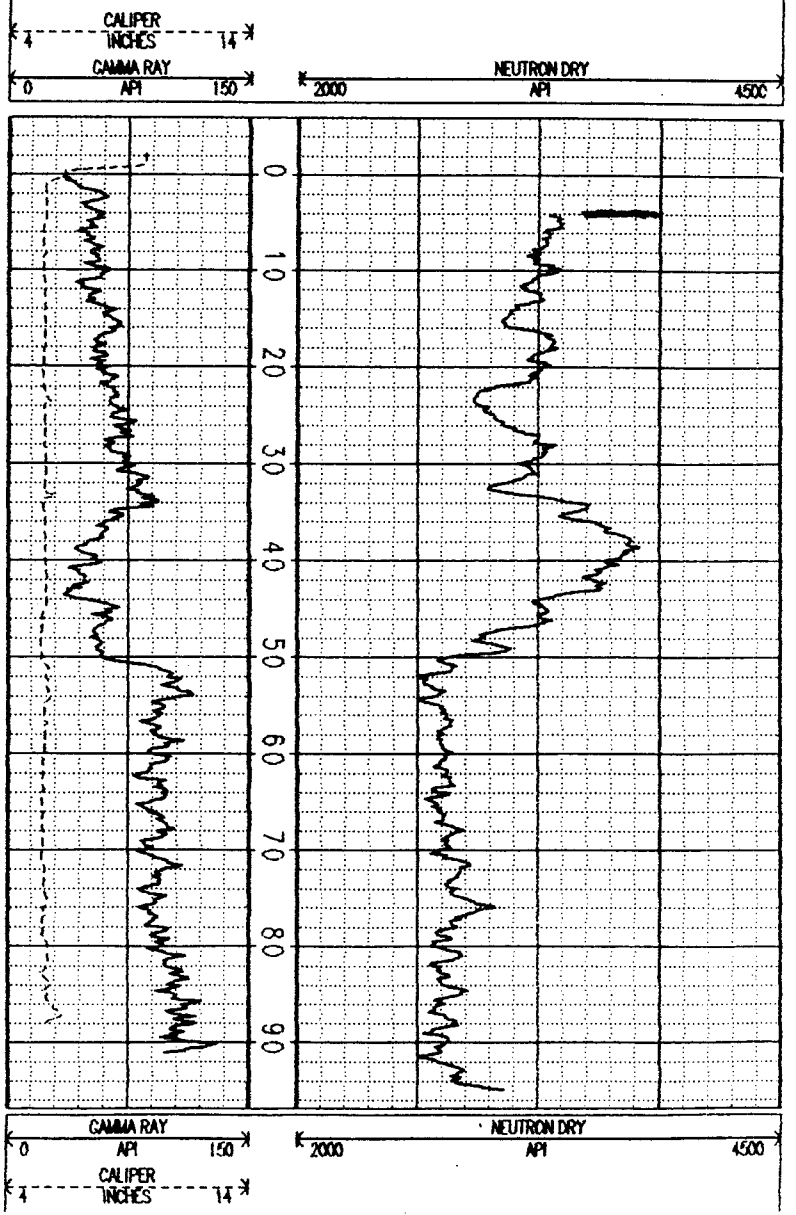
	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	96.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-13

(\acq\pb-13.cnl) SOUTHWEST GEOPHYSICAL SERVICES,INC.



Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-14

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-14

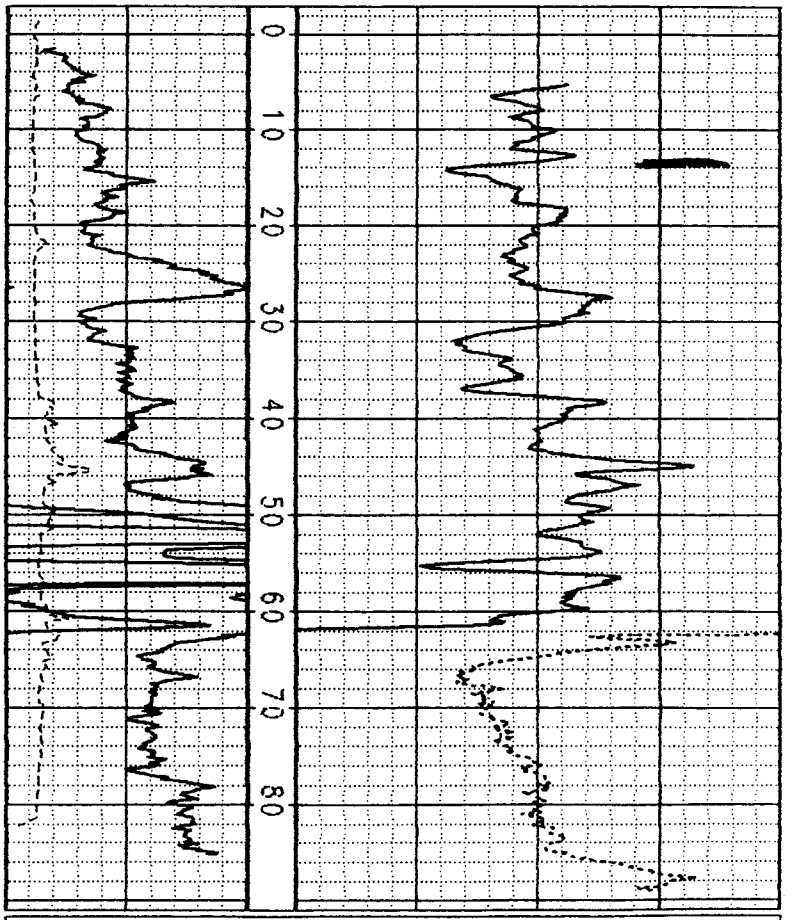
	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	82 FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	NAT'L WATER
DEPTH LOGGER	90.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	89 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Corbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\ACQ\PB-14.CNO) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 – 14
NEUTRON DRY API 2000 – 4500
GAMMA RAY API 0 – 150
NEUTRON WET API 200 – 800



GAMMA RAY API 0 – 150
NEUTRON WET API 200 – 800
CALIPER INCHES 4 – 14
NEUTRON DRY API 2000 – 4500

(\ACQ\PB-14.CNO) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-14 OFFSET

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-14 OFFSET

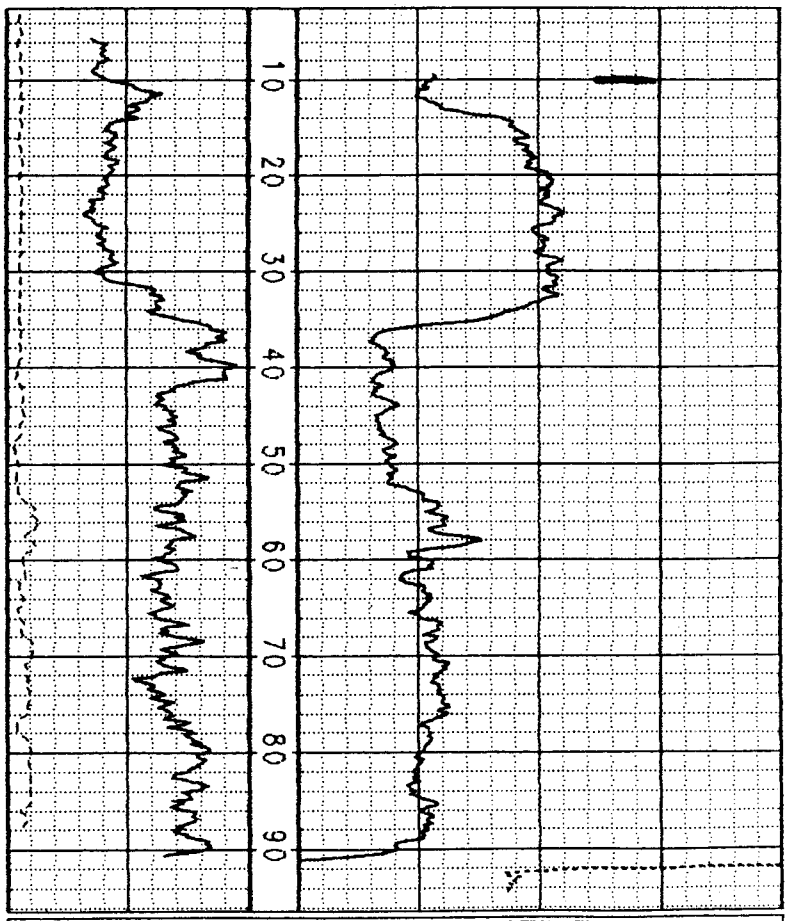
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	94.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\ACQ\PB-14OFF.CNO) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 – 14
NEUTRON DRY API 2000 – 4500
GAMMA RAY API 0 – 150
NEUTRON WET API 200 – 800



GAMMA RAY API 0 – 150
NEUTRON WET API 200 – 800
CALIPER INCHES 4 – 14
NEUTRON DRY API 2000 – 4500
(\ACQ\PB-14OFF.CNO) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-15

LOCATION SEC:18 T:11 S R:31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

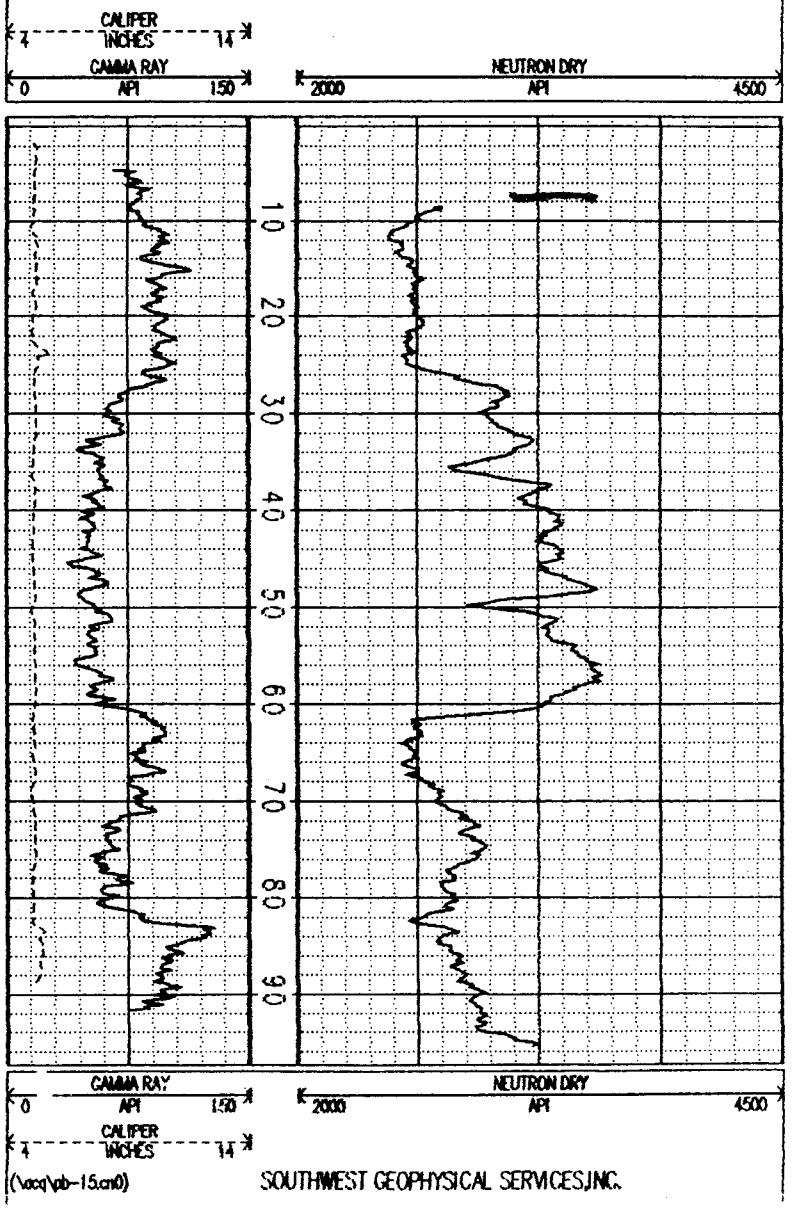
	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carrbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-15

(\acq\pb-15.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-15.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-16

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

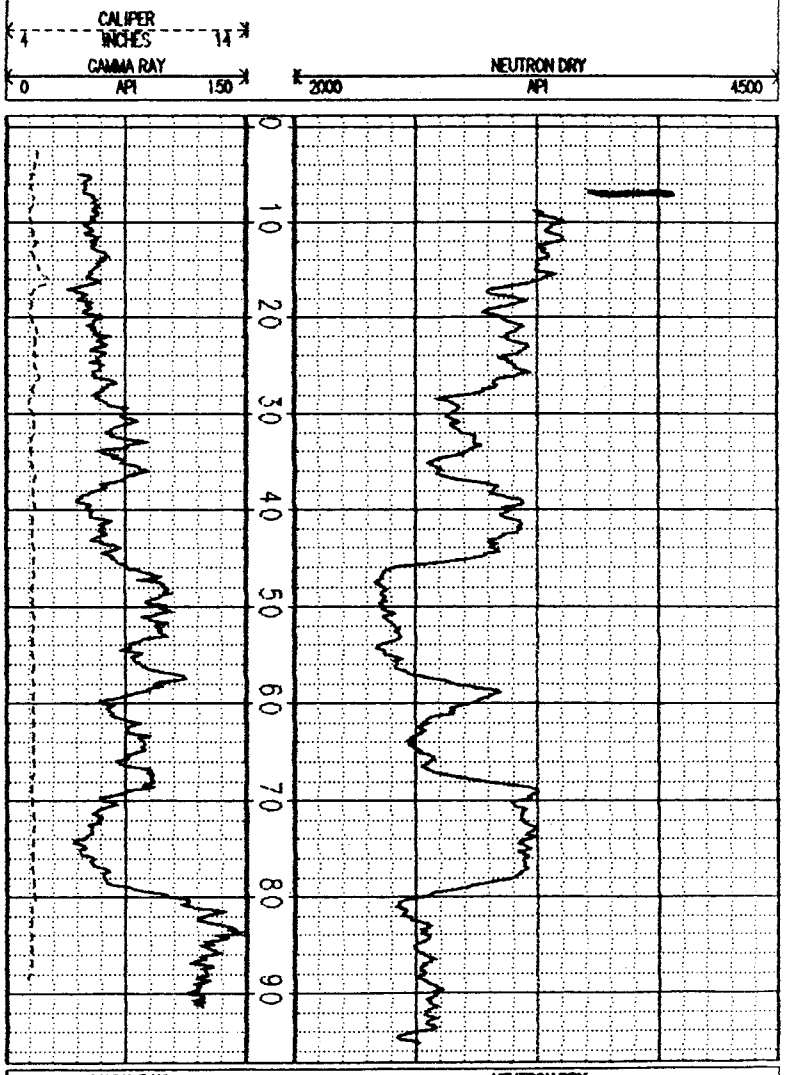
COMPANY GANDY CORPORATION
WELL: PB-16

	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Corbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-16.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-16.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-17

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

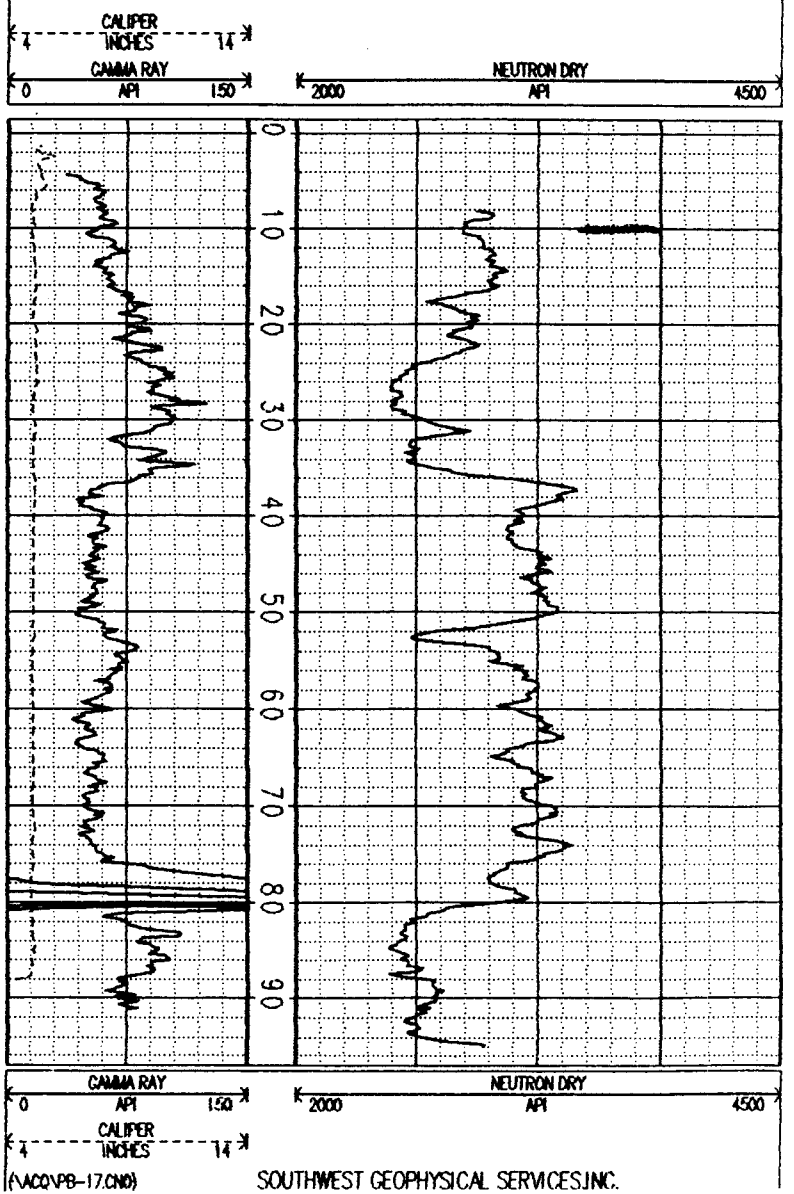
	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	96.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carrba
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-17

(\ACQ\PB-17.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\ACQ\PB-17.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-18

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

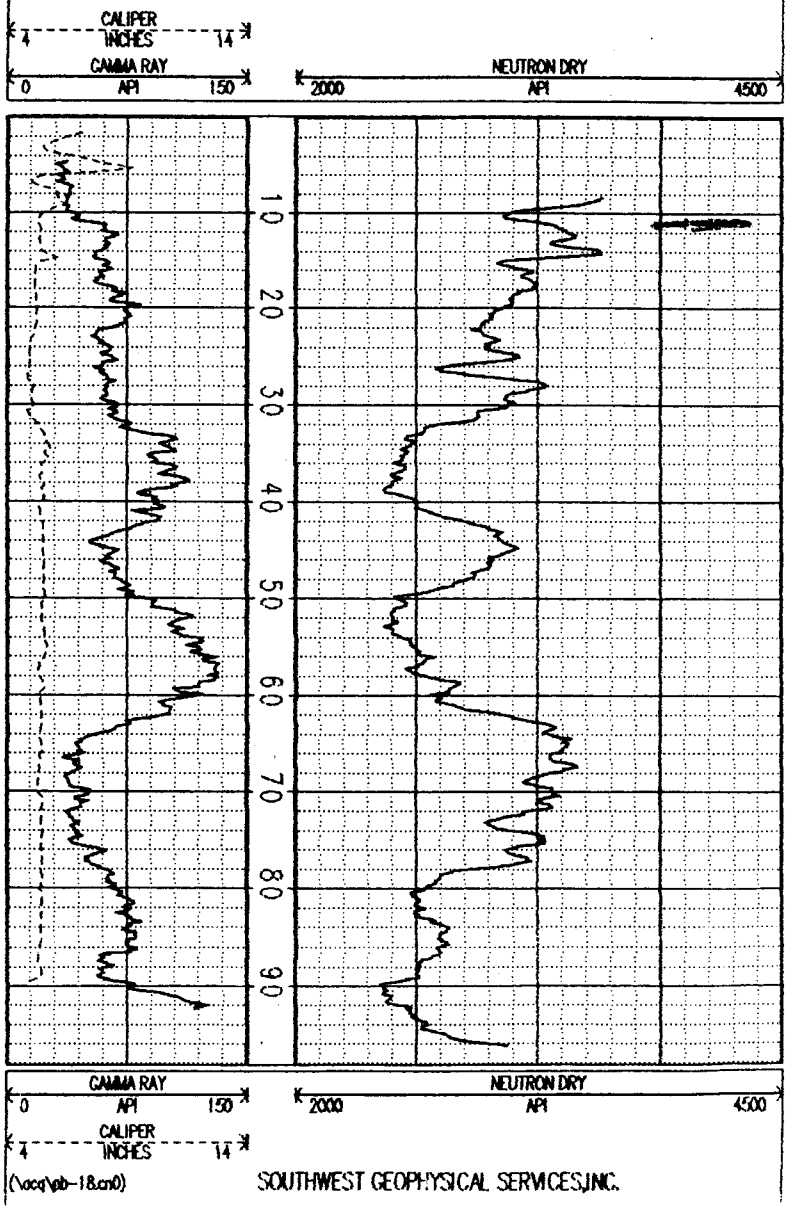
	RUN NO. 1		RUN NO. 1
DATE	07/15/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.8 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	96.3 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Combo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-18

(\acq\pb-18.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-18.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-19

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

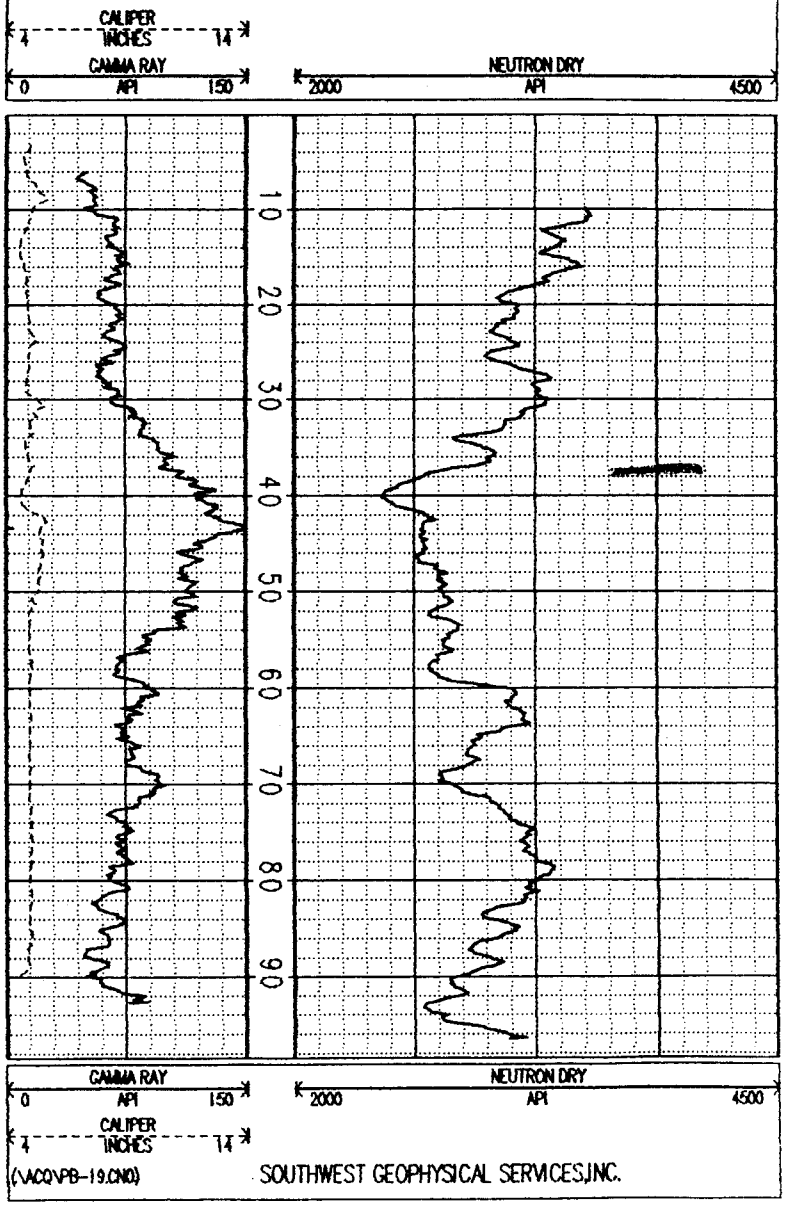
COMPANY GANDY CORPORATION
WELL: PB-19

	RUN NO. 1		RUN NO. 1
DATE	07/16/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	97 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Corba
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\ACQ\PB-19.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\ACQ\PB-19.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG: GAMMA RAY NEUTRON RESISTANCE CALIPER	PERM. DATUM: GROUND LEVEL LOG MEASURED FROM: G.L. ELEVATION:	OTHER SERVICES:

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-20

LOCATION SEC 17 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

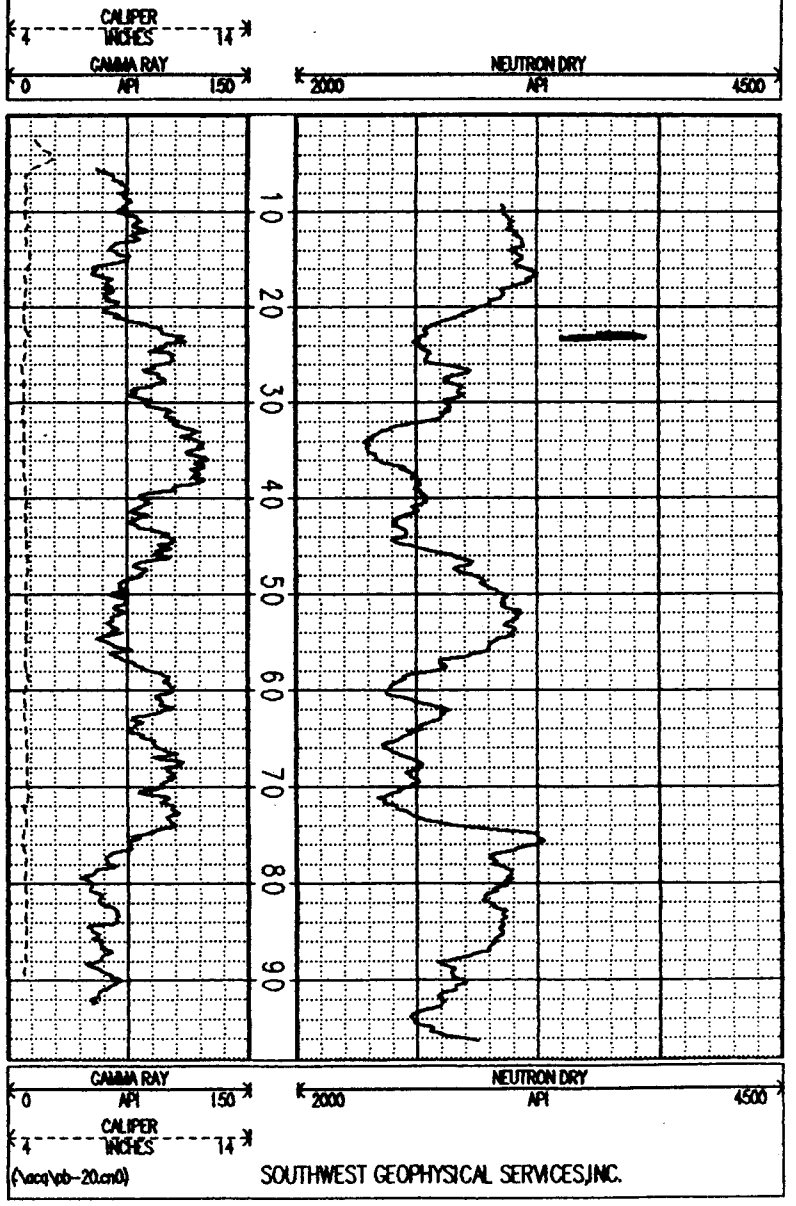
COMPANY GANDY CORPORATION
WELL: PB-20

	RUN NO. 1		RUN NO. 1
DATE	07/18/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Combo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-20.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-20.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-21

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

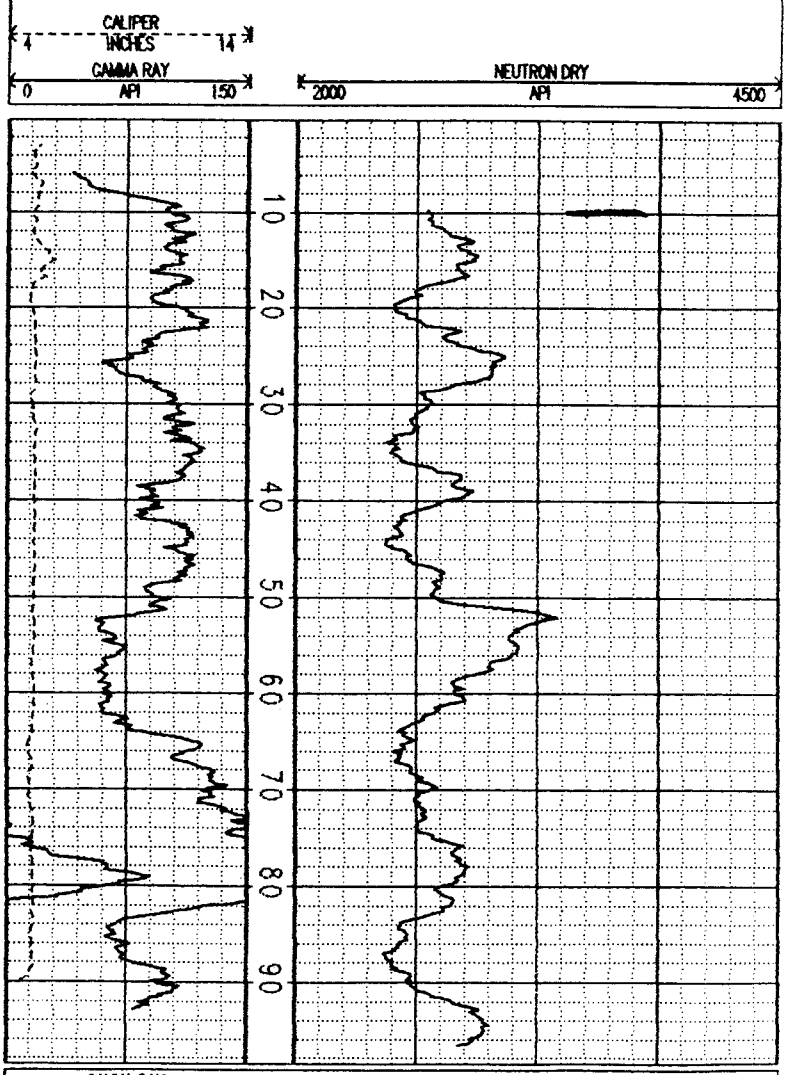
COMPANY GANDY CORPORATION
WELL: PB-21

	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98.2 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	96.7 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\ACQ\PB-21.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\ACQ\PB-21.CN0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-22

LOCATION SEC:16 T:11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

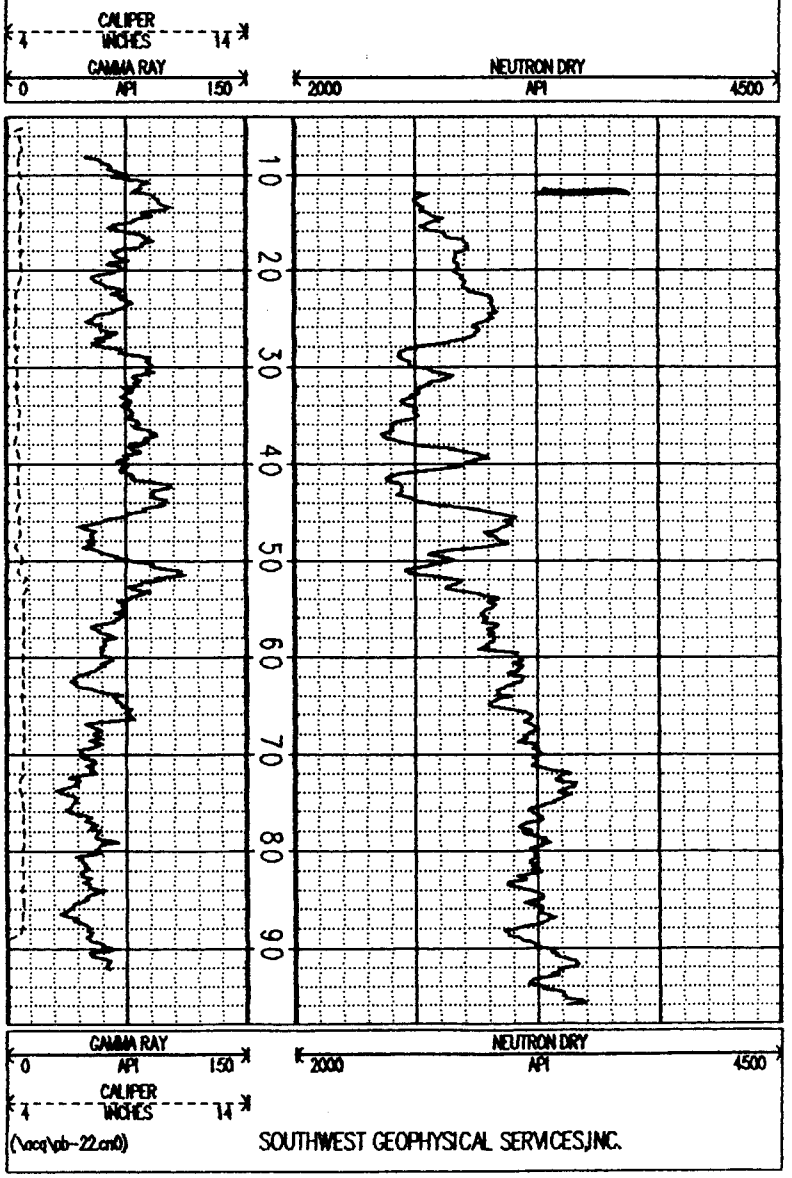
COMPANY GANDY CORPORATION
WELL: PB-22

	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	96 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Combo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-22.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-22.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-23
LOCATION SEC: 17 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-23

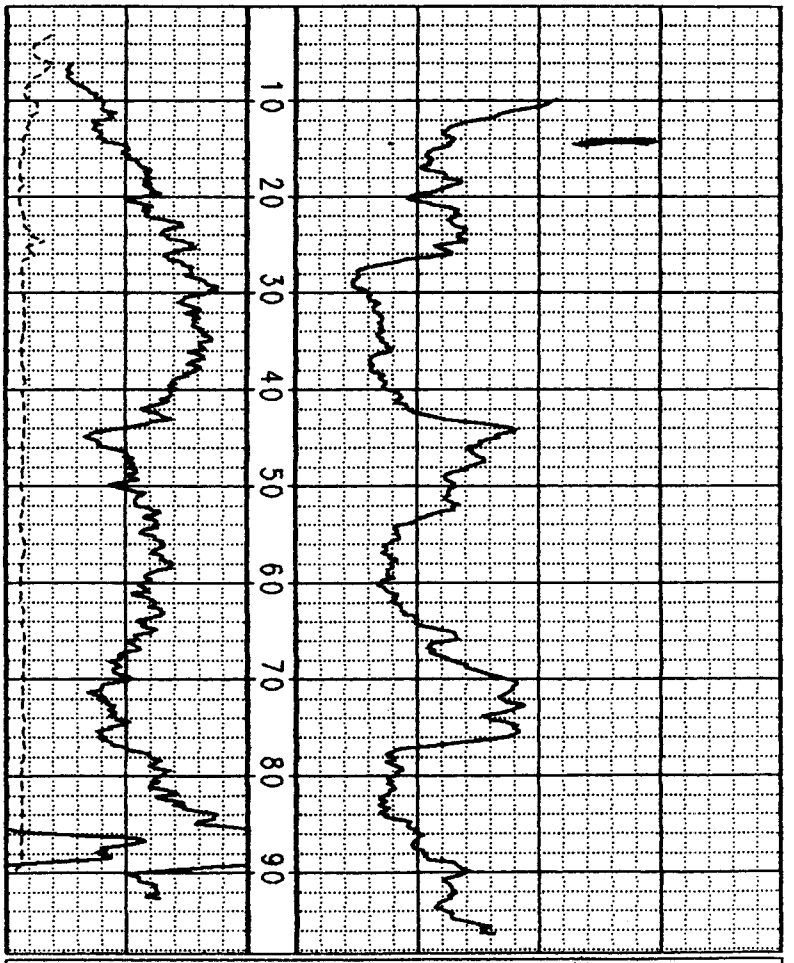
	RUN NO. 1		RUN NO. 1
DATE	07/16/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Combo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-23.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-23.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-24
LOCATION SEC: 7 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

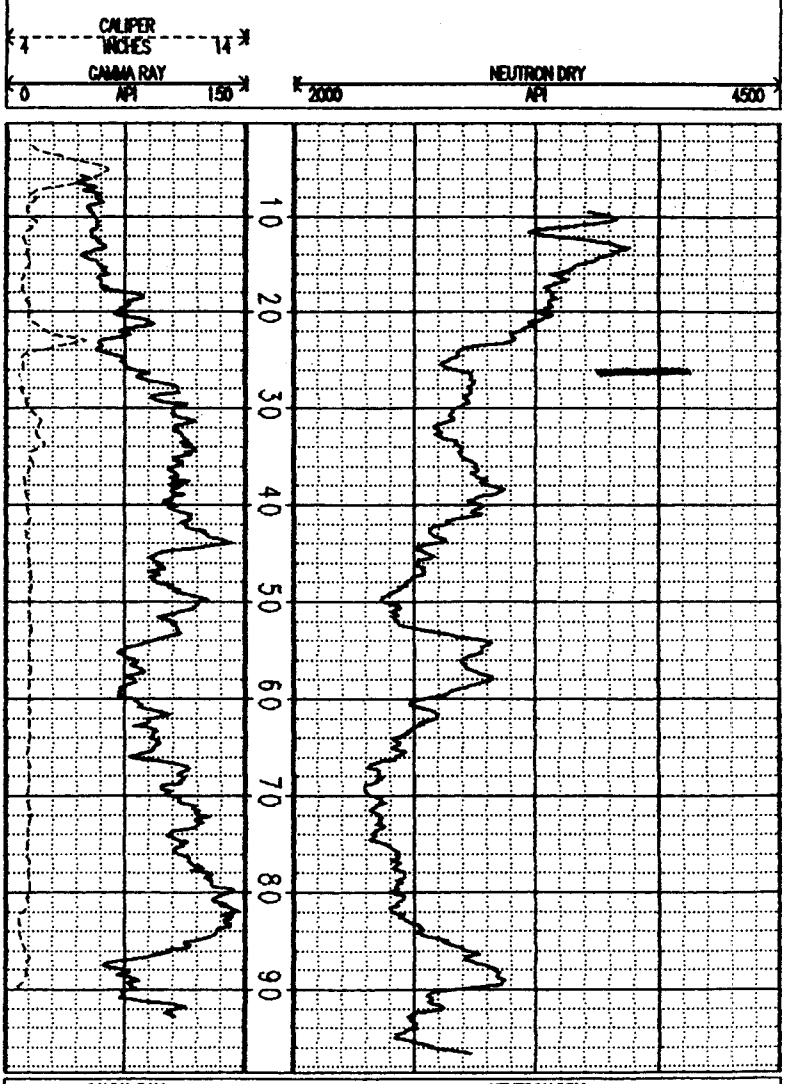
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Combo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-24

(\acq\pb-24.cal) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-24.cal) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-25

LOCATION SEC: 17 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

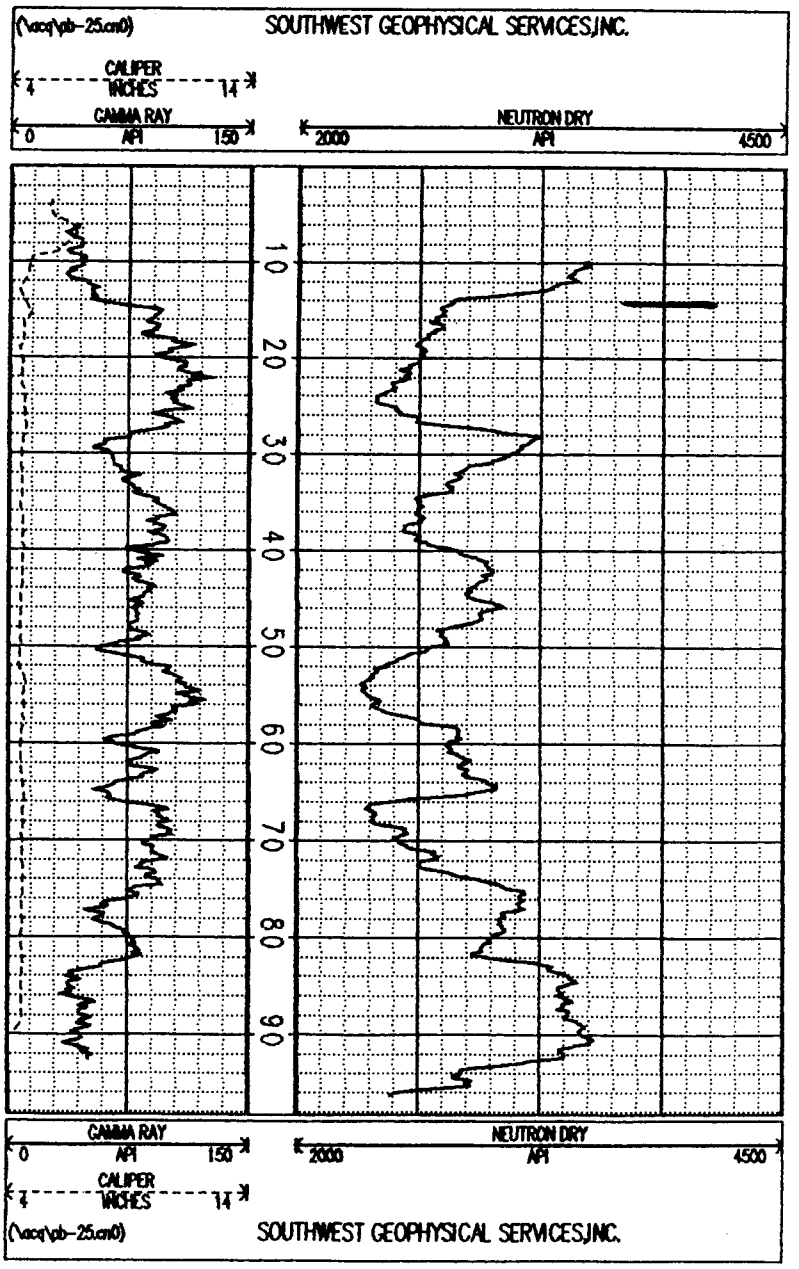
ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-25

	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU



Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-28
LOCATION SEC: 7 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

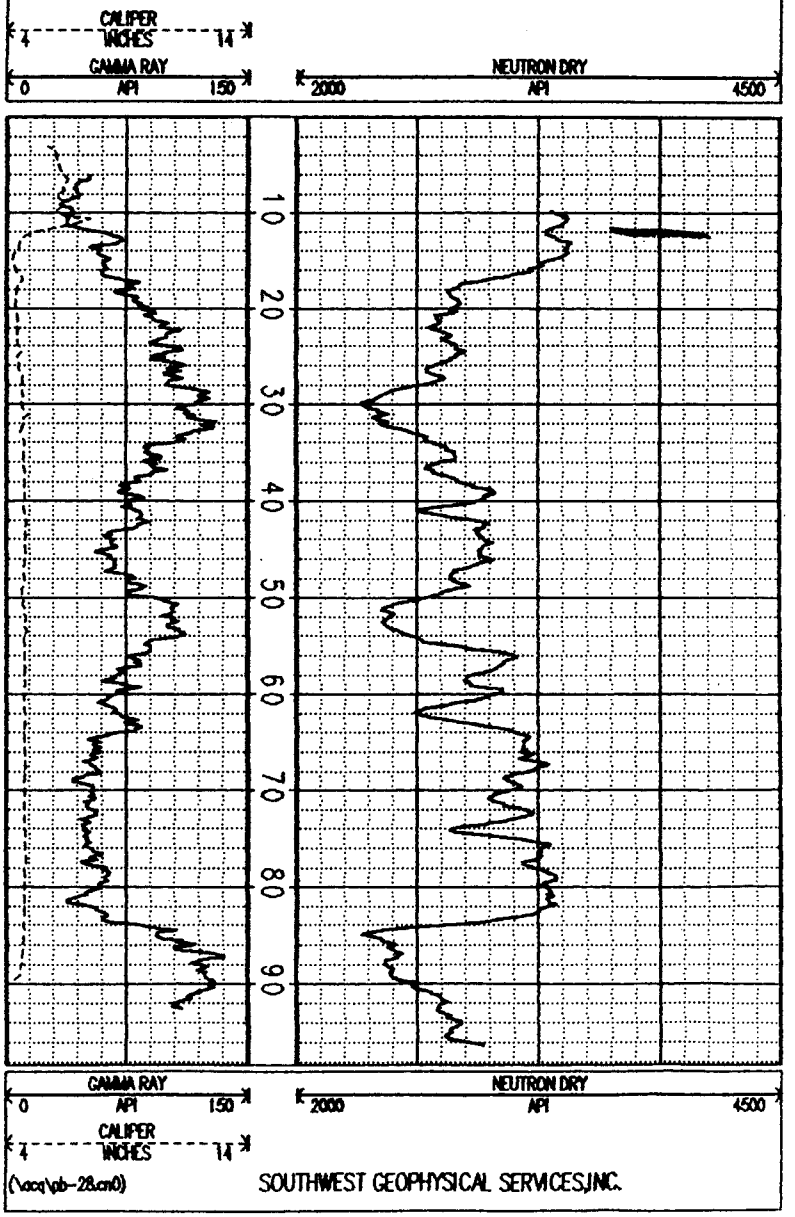
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	98 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Combo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-28

(\acq\pb-28.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-28.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-29

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-29

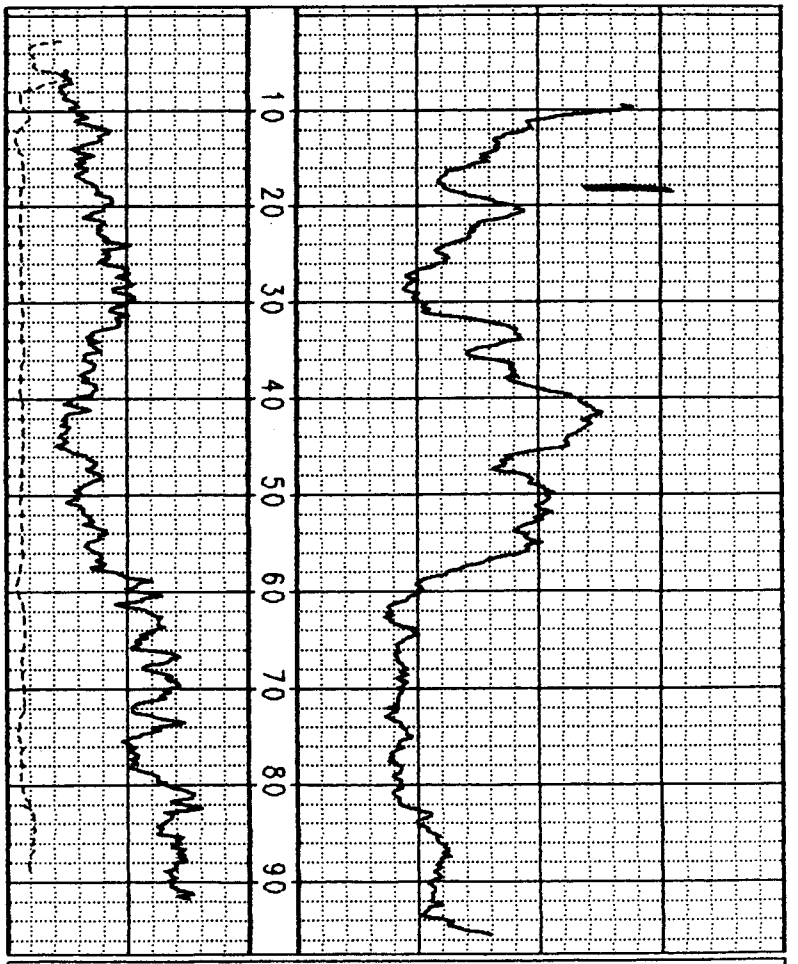
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.2 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.7 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-29.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-29.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG: GAMMA RAY NEUTRON RESISTANCE CALIPER	PERM. DATUM: GROUND LEVEL LOG MEASURED FROM: G.L. ELEVATION:	OTHER SERVICES:

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-30

LOCATION SEC 17 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

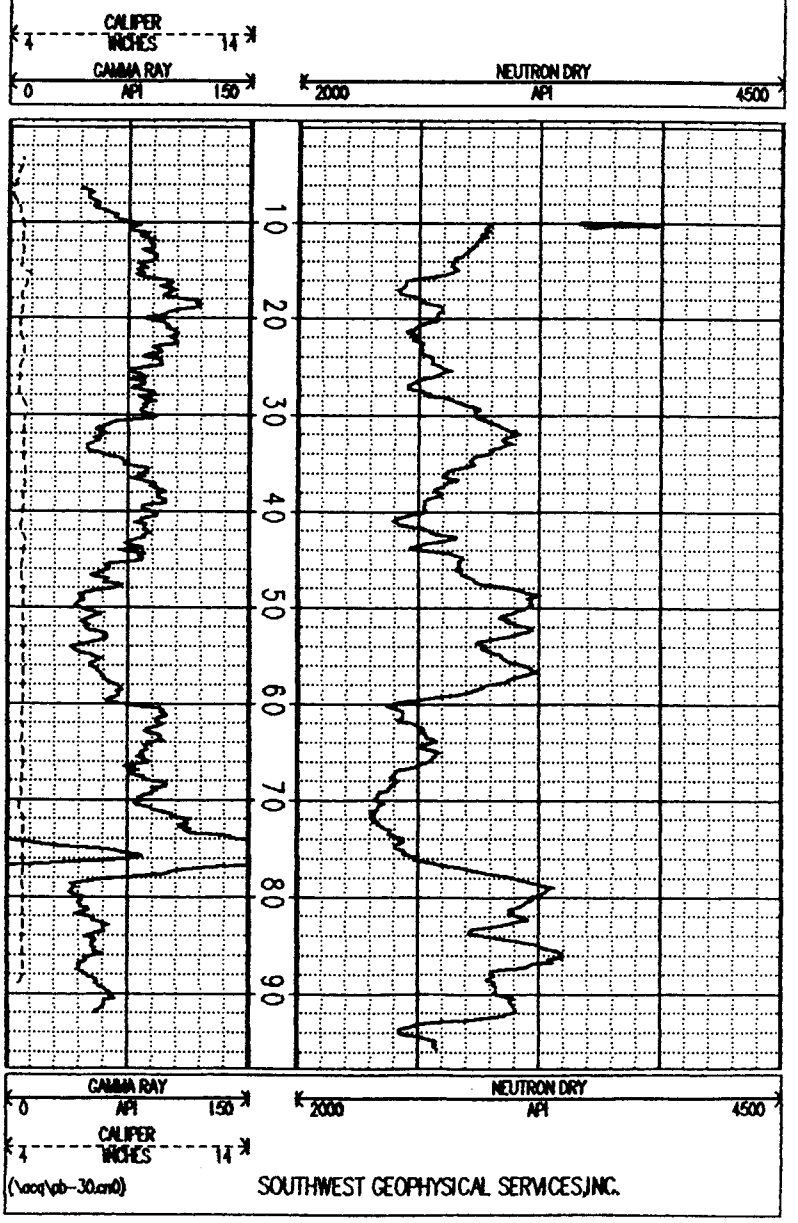
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	96.5 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Corrbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-30

(\acq\pb-30.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-30.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-31

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-31

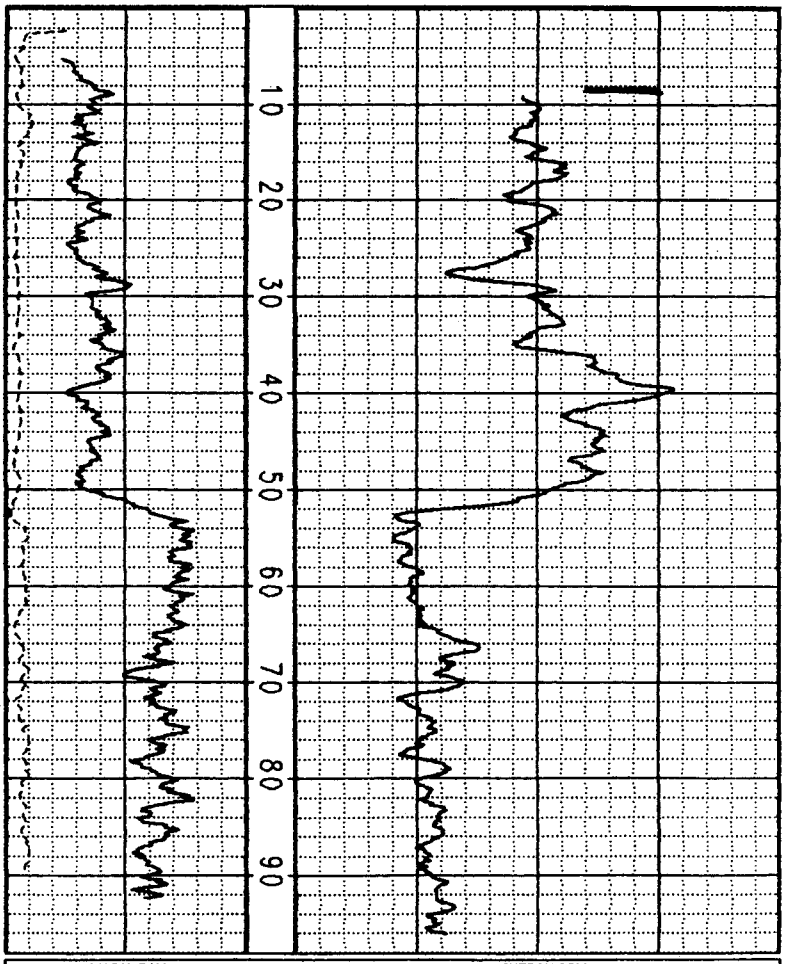
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97.7 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	98.2 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Combo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-31.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-31.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-32

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

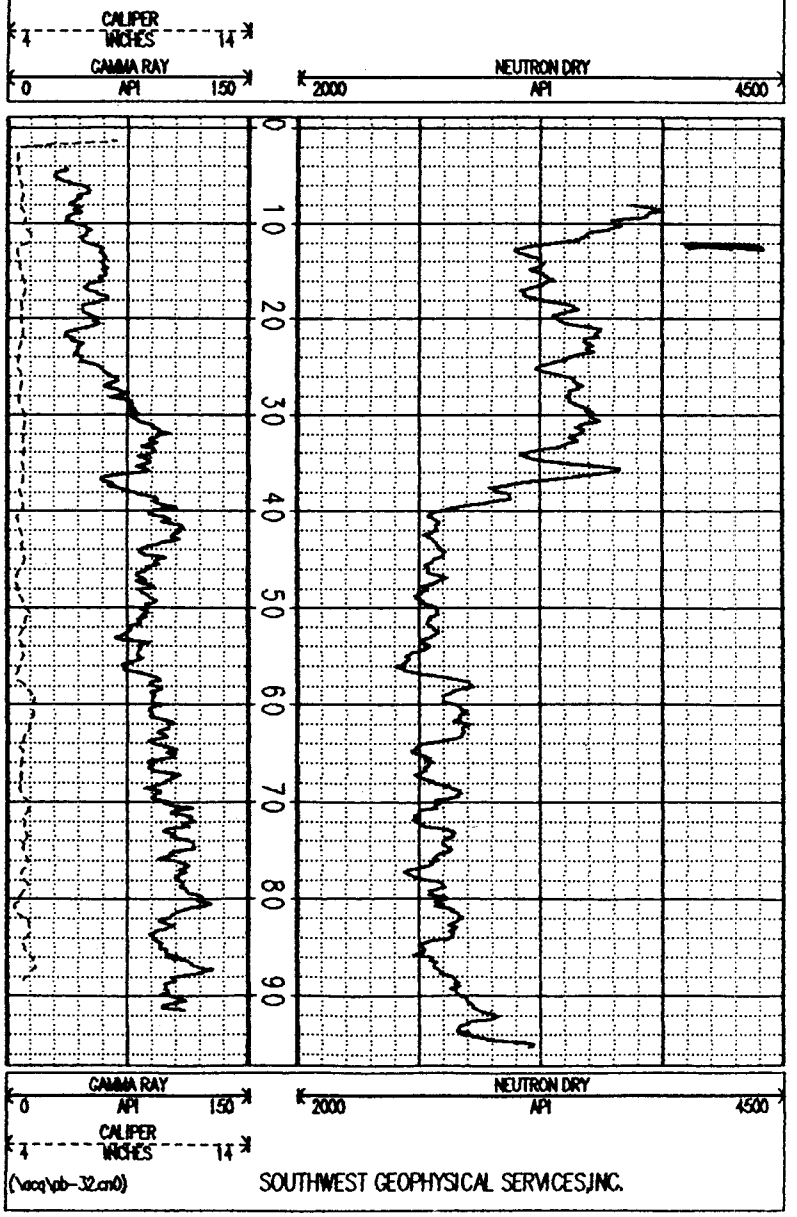
	RUN NO. 1		RUN NO. 1
DATE	07/18/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	96.8 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.3 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

COMPANY GANDY CORPORATION
WELL: PB-32

(\acq\pb-32.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.



(\acq\pb-32.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Southwest Geophysical Services, Inc.

GEOPHYSICAL WELL LOG:	PERM. DATUM: GROUND LEVEL	OTHER SERVICES:
GAMMA RAY NEUTRON RESISTANCE CALIPER	LOG MEASURED FROM: G.L. ELEVATION:	

COMPANY: GANDY CORPORATION
PROJECT/FIELD: MESCALERO RIM
WELL: PB-33

LOCATION SEC: 18 T: 11 S R: 31 E
COUNTY: CHAVEZ STATE: NM

ELEVATION KB:
DF:
GL:

COMPANY GANDY CORPORATION
WELL: PB-33

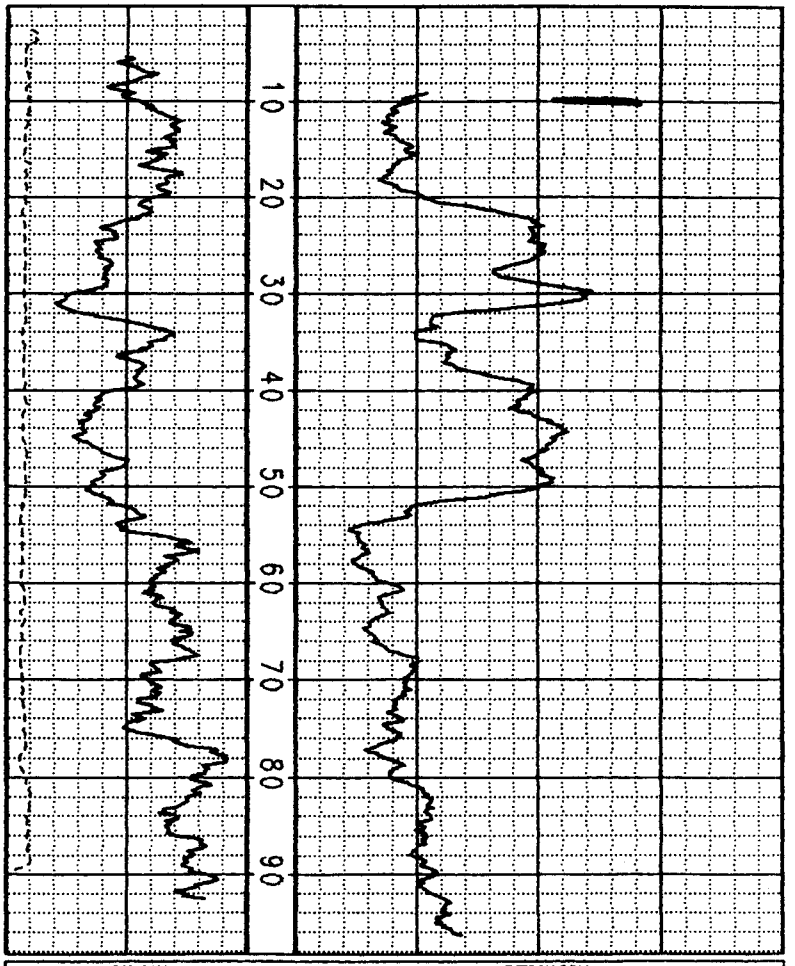
	RUN NO. 1		RUN NO. 1
DATE	07/17/94	FLUID LEVEL	NONE FT.
DEPTH DRILLER	100 FT.	FLUID NATURE	
DEPTH LOGGER	97 FT.	FLUID VISCOSITY	
BOTTOM LOGGED	95.5 FT.	FL. RESISTIVITY	
TOP LOGGED INT.	Surface	FL. RES. @ B.H.T.	
CASING LEVEL	NONE FT.	CIRCULATION TEMP.	
CASING SIZE		BOT HOLE TEMP	
CASING SIZE			
BIT SIZE	4 3/4"	TOOL #	Carbo
BIT SIZE		LOGGED BY:	S.STUBBERUD
		WITNESSED BY:	JIM BONNER

REMARKS:
LOCATION:

THANK YOU

(\acq\pb-33.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

CALIPER INCHES 4 — 14
GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500



GAMMA RAY API 0 — 150
NEUTRON DRY API 2000 — 4500
CALIPER INCHES 4 — 14

(\acq\pb-33.cn0) SOUTHWEST GEOPHYSICAL SERVICES,INC.

Appendix E
Geotechnical Results

TABULATION OF TEST RESULTS
BULK SAMPLES
Job No. C94-5318

Project Gandi Project (Part I)

Material Bulk Samples
Source Lab No. 7932

HOLE	LOCATION	DEPTH	UNIFIED CLASS	LL	PI	SIEVE ANALYSIS - ACCUM. % PASSING 200	100	40	10	4	3/8	1/2	3/4	1	1-1/2	MOIST.	LAB NO.
	PB-2		SC	36	21	41	61	98	99	100						7.6%	7932-2
	PB-4		SM	NV	NP	27	34	96	97	99	100					7.5%	7932-4
	PB-6		CL-ML	24	6	76	84	89	93	97	99	100				6.6%	7932-6
	PB-7		CL-ML	28	6	61	75	98	100	100						9.6%	7932-7
	PB-8		SC	28	9	48	65	96	98	99	100					6.4%	7932-8
	PB-9		SM	NV	NP	38	76	92	95	96	96	97	97	97	100	5.5%	7932-9
	PB-10		CL	30	13	56	80	95	99	100	99					6.5%	7932-10
	PB-11		CL	32	12	50	86	94	97	98	99	99	100			5.5%	7932-11
	PB-13		SM	NV	NP	21	36	75	99	100						4.4%	7932-13
	PB-14		SM	NV	NP	18	24	98	99	99	99	99	100			8.7%	7932-14
	PB-15		CL	32	9	56	77	90	98	100						6.6%	7932-15
	PB-21		SM	24	3	21	33	64	75	84	93	95	98	100		4.0%	7932-21
	PB-30		SC-SM	28	6	21	36	99	100							5.3%	7932-30
	PB-31		SM	NV	NP	21	31	97	99	99	100					5.4%	7932-31
	PB-33		CL-ML	24	4	68	77	91	96	97	99	100				7.5%	7932-33

AGRA
Earth & Environmental

TABULATION OF TEST RESULTS
UNDISTURBED SAMPLES
LABORATORIES TESTS SUMMARY
Job No. C94-5318

Project Gandi Project (Part II)

Material Source Undisturbed Samples

SAMPLE NO.	DEPTH (ft)	LL	PI	% PASSING #200	UNIFIED CLASS	DRY DENSITY (PCF)	MOISTURE (%)	SPECIFIC GRAVITY	POROSITY (%)
PB-10	14-15	37	14	91	CL	121.7	7.5	2.676	27.1
PB-10	19-20	32	9	80	CL	129.5	7.4	2.660	22.0
PB-15	14-15	29	8	87	CL	106.0	7.1	2.696	37.0
PB-15	19-20	35	12	86	CL	109.4	7.5	2.692	34.9
PB-30	14-15	60	19	99	CH	100.4	20.8	2.656	39.4
PB-30	19-20	47	17	98	CL	89.3	6.6	2.690	46.8
PB-10	28-29	29	4	32	SM	130.9	5.9	2.640	20.5
PB-10	38-39	31	8	48	SM	133.8	6.9	2.663	19.5

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SUMMARY OF GANDY SAMPLE PERMEABILITY TEST RESULTS

Hole Number	Depth (ft)	Lithology	Confining Pressure (pci)	Initial Moisture Content (%)	Initial Dry Density (pcf)	Initial Void Ratio	B-Parameter After Saturation	Final Moisture Content (%)	Final Dry Density (pcf)	Least Hydraulic Gradient	Greatest Hydraulic Gradient	Coefficient of Permeability (cm/sec)
PB10	23.4-23.7	Siltstone	5.0	7.2	120	0.431	96	16.6	118	6.0	10.5	7.10E-05
			25.0					14.8	122	15.1	16.6	9.10E-07
	29.5-29.6	Sandy Silt	5.0	11.1	123	0.378	100	17.6	115	8.9	11.6	2.70E-05
			25.0					12.6	126	8.8	11.1	5.80E-06
PB15	11.5-14.0	Mudstone	5.0	5.6	143.2			9.9	143.3	2.421		2.00E-07
	26.5-29.0	Siltstone/ Sandy Silt	4.9	7.7	129.8			15.2	128.4	0.458		8.70E-07
PB30	19.9-20.2	Mudstone	5.0	6.4	117	0.470	96	14.3	124	17.8	18.4	3.90E-07
			25.0					12.7	128	16.9	18.0	1.90E-07
	30.9-31.1	Sandy Silt	5.0	5.8	118	0.425	96	12.2	127	10.3	19.1	8.80E-06
			25.0					12.1	127	15.0	17.2	3.10E-06
	37.3-37.6	Siltstone	5.0	13.2	105	0.594	100	17.3	114	1.8	5.1	1.50E-04
			25.0					17.3	114	3.3	8.2	1.30E-04
	40.5-40.8	Siltstone	5.0	9.9	121	0.425	96	16.6	118	8.7	12.3	3.10E-06
			25.0					15.4	121	12.8	14.1	9.20E-07

SUMMARY OF GANDY SAMPLE ORGANIC CONTENT TEST RESULTS

Hole Number	Depth (feet)	Lithology	Organic Content (%)
PB10	21.5 - 24	Siltstone	1.14
	29 - 31.5	Sandy Silt	0.53
PB30	19 - 21.5	Mudstone	1.74
	29.5 - 31	Sandy Silt	0.77
	36.5 - 39	Siltstone	1.27
	39 - 41.5	Siltstone	0.76

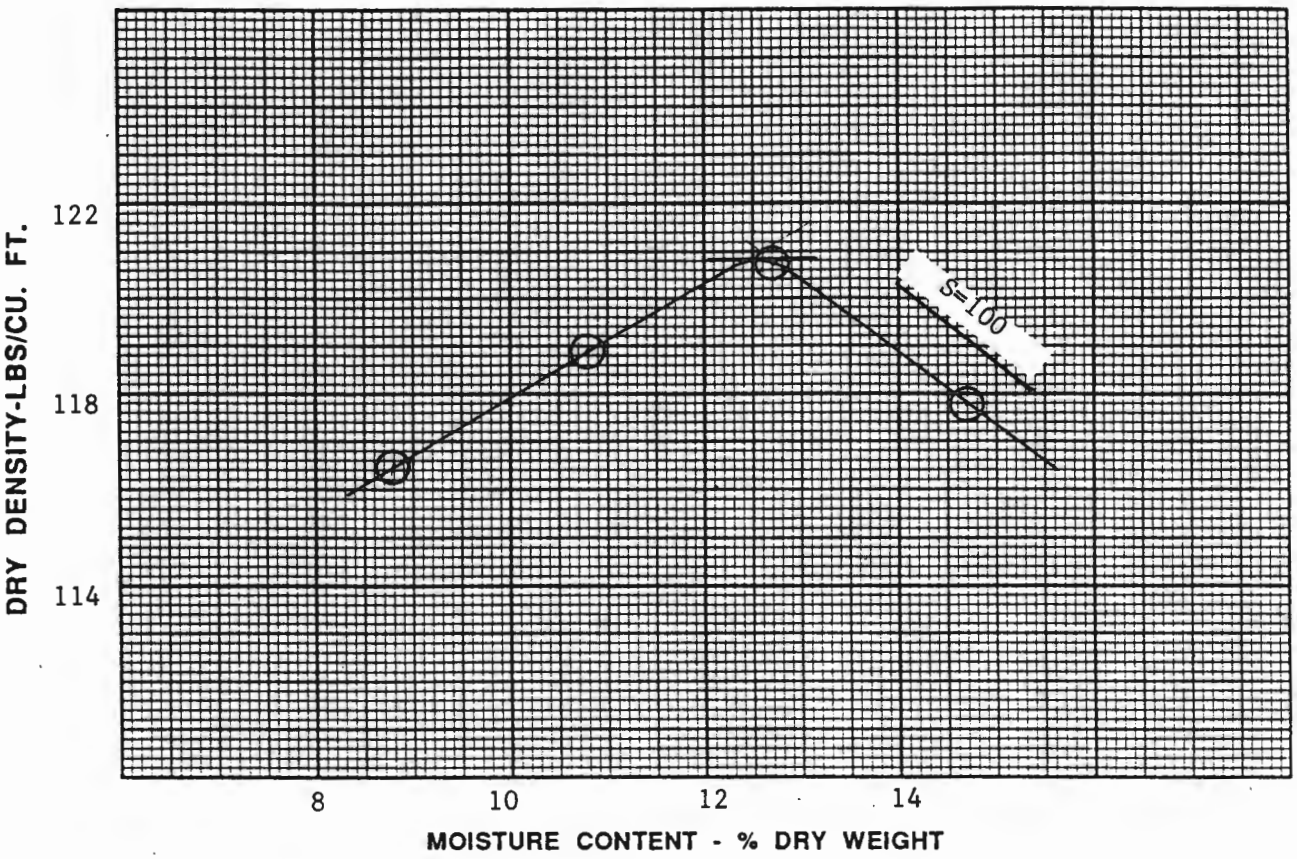
MAXIMUM DENSITIES SUMMARY
ASTM D-698

LOCATION	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE (%)
PB-2	116.6	12.6
PB-4	112.4	14.1
PB-6	122.1	12.8
PB-7	112.6	13.7
PB-8	117.2	13.6
PB-9	114.7	12.2
PB-10	113.6	16.7
PB-11	119.9	12.9
PB-13	116.7	12.2
PB-14	110.6	14.9
PB-15	116.9	15.5
PB-21	122.6	10.4
PB-30	112.5	14.9
PB-31	117.2	12.4
PB-33	117.8	12.5

PROCTORS

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-33	12.5	117.8	ASTM D698	A	7932-33

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

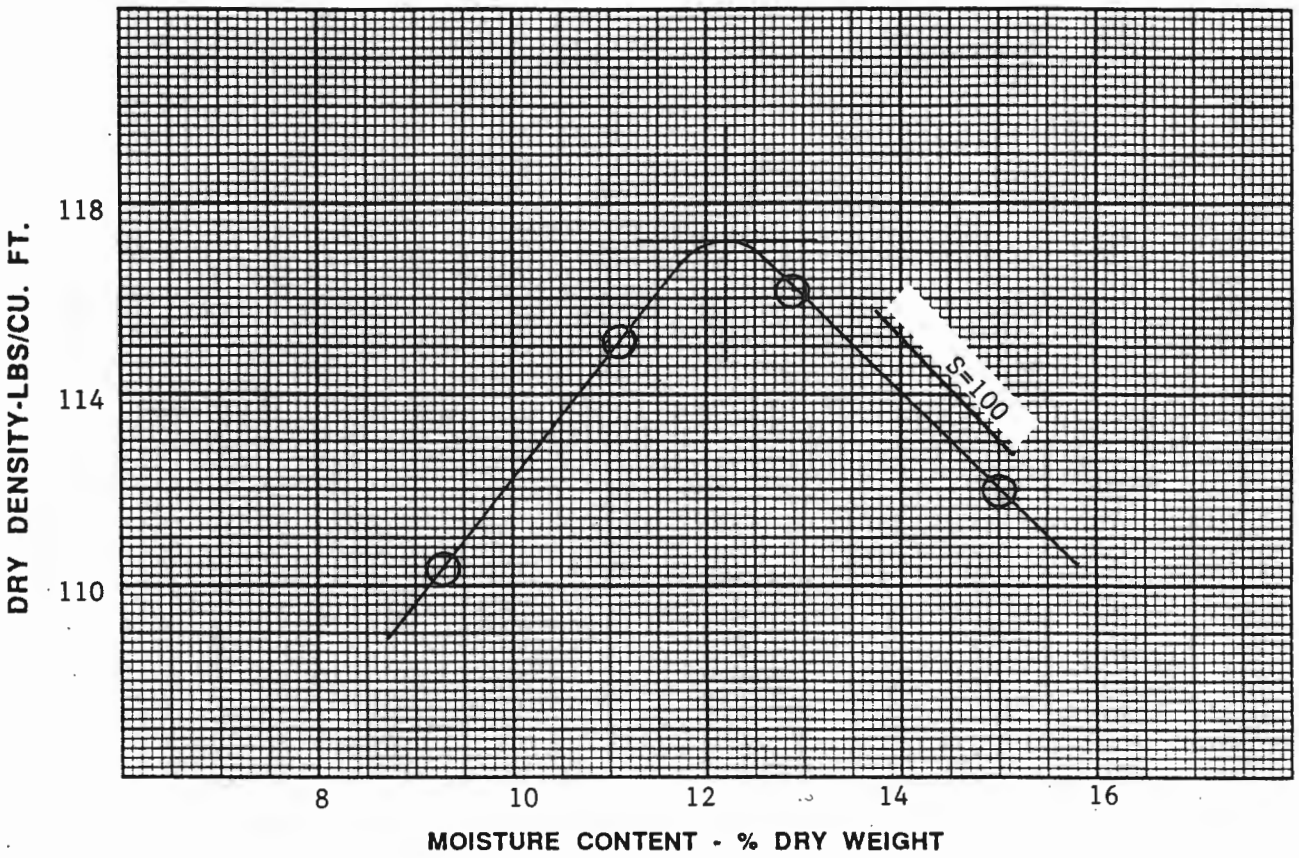
ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

AGRA
Earth & Environmental

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-31	12.4	117.2	ASTM D698	A	7932-31

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

AGRA
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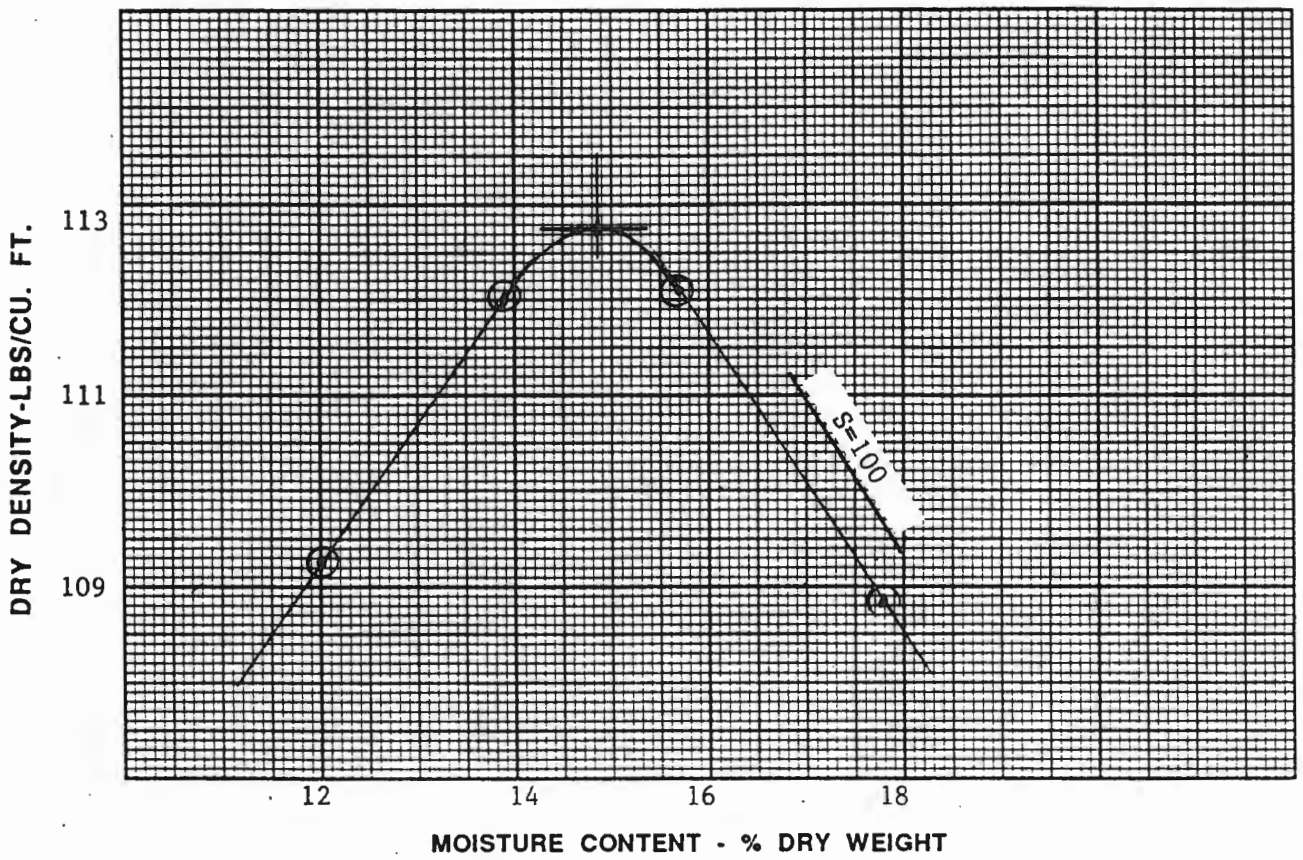
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT JOB NO. C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-30	14.9	112.5	ASTM D698	A	7932-30

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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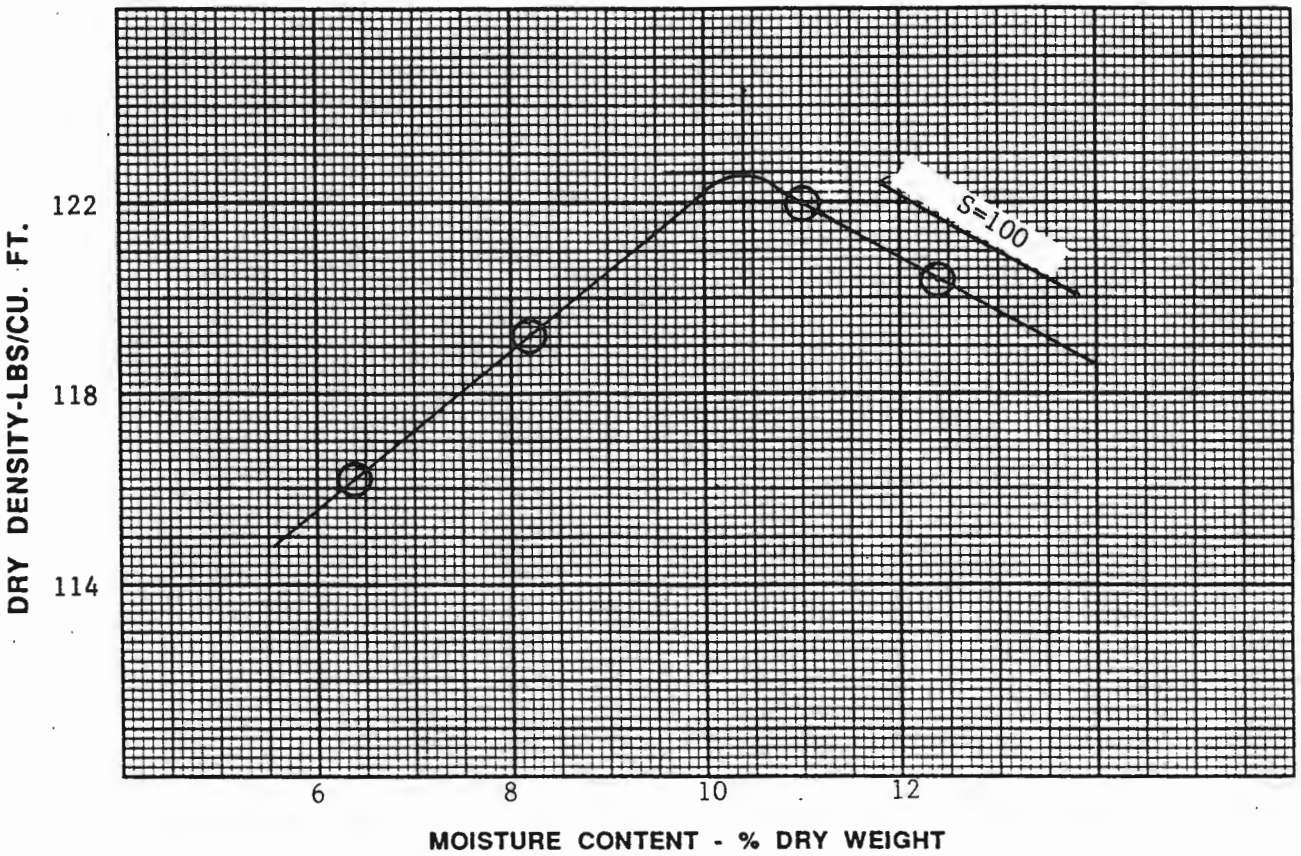
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-21	10.4	122.6	ASTM D698	A	7932-21

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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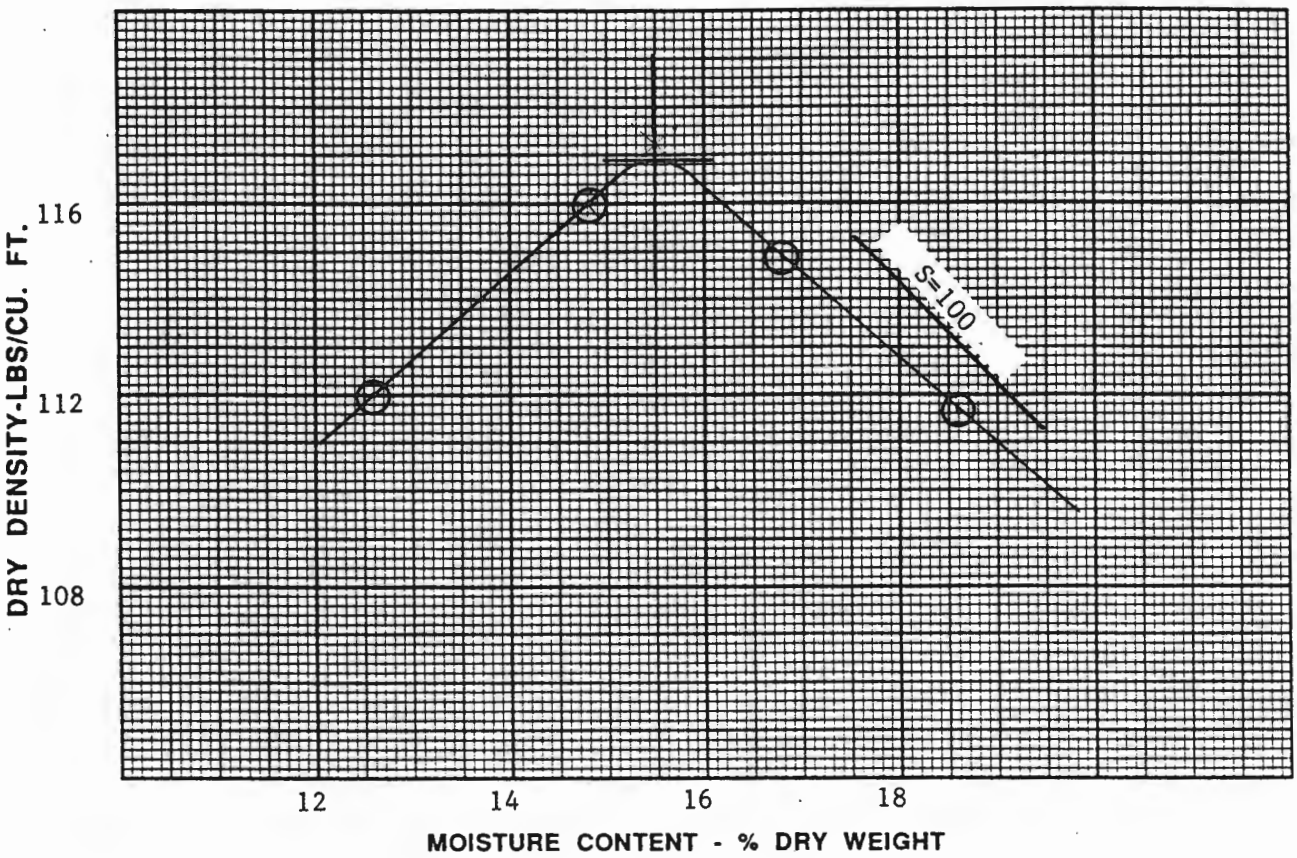
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-15	15.5	116.9	ASTM D698	A	7932-15

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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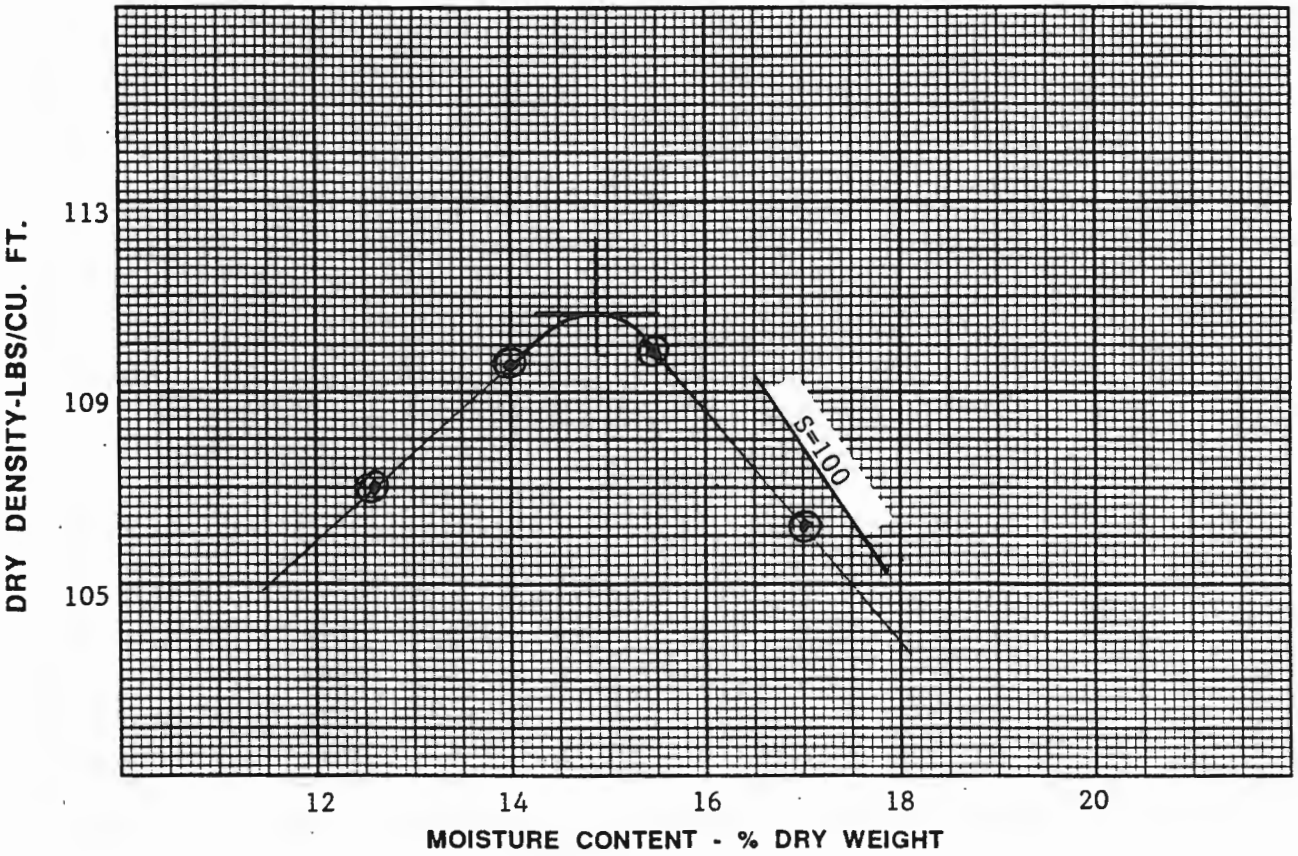
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-14	14.9	110.6	ASTM D698	A	7932-14

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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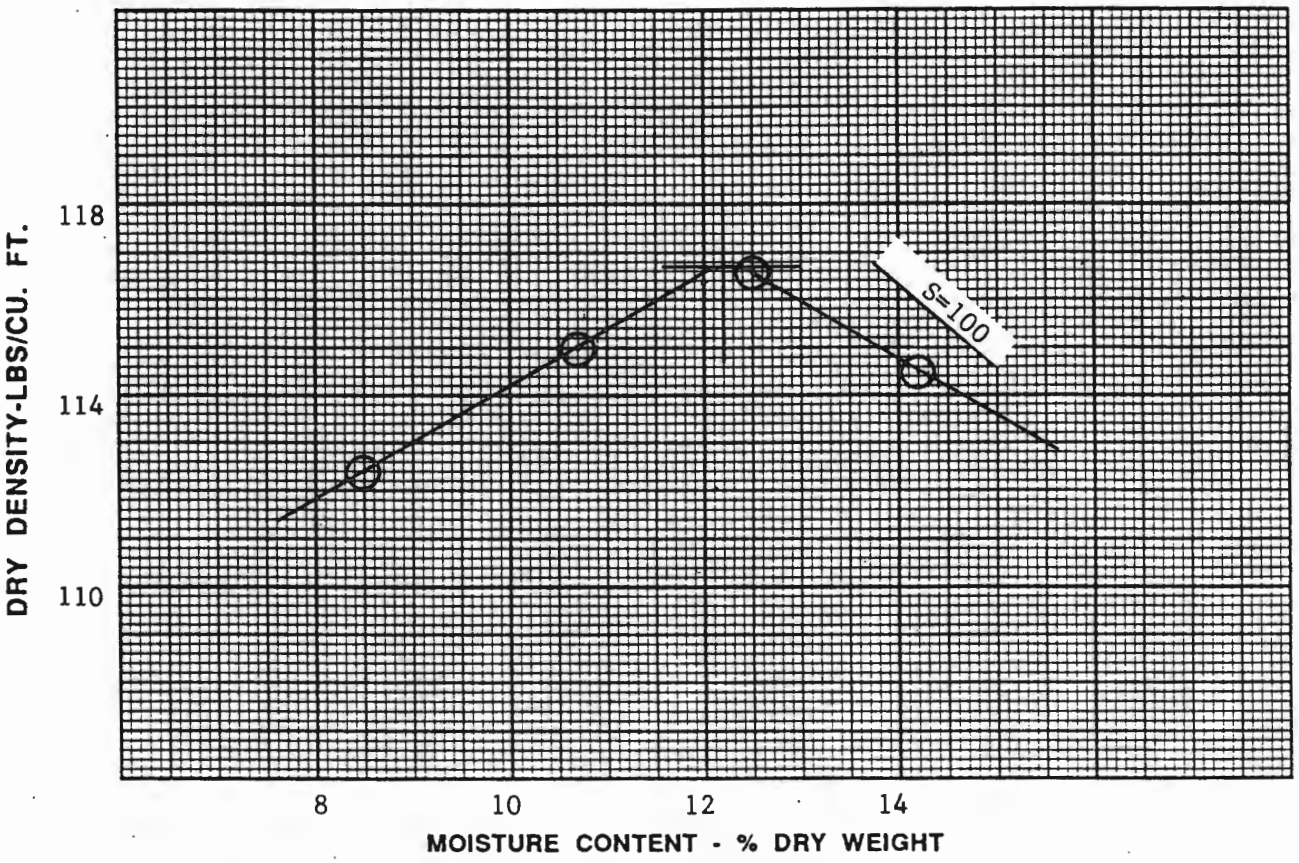
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT JOB NO. C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-13	12.2	116.7	ASTM D698	A	7932-13

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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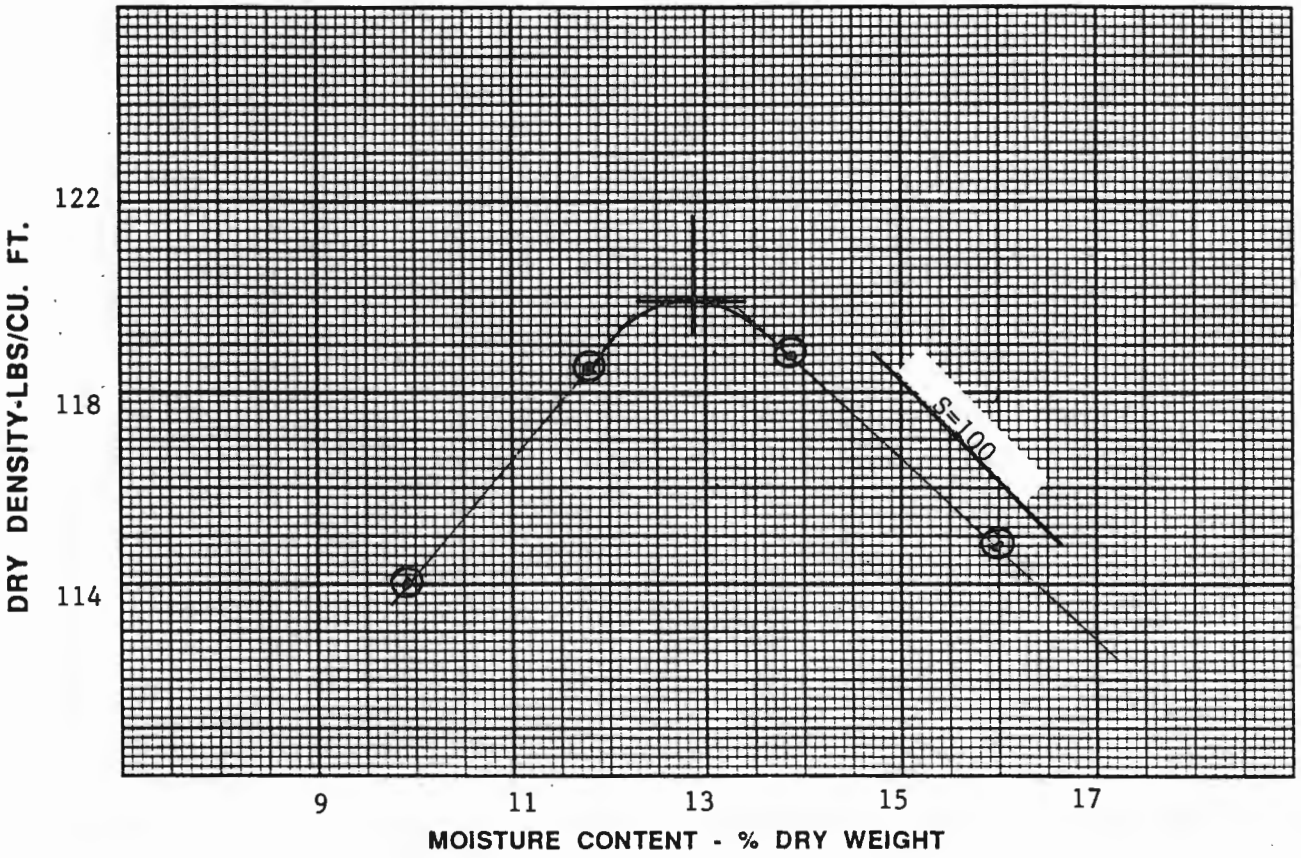
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-11	12.9	119.9	ASTM D698	A	7932-11

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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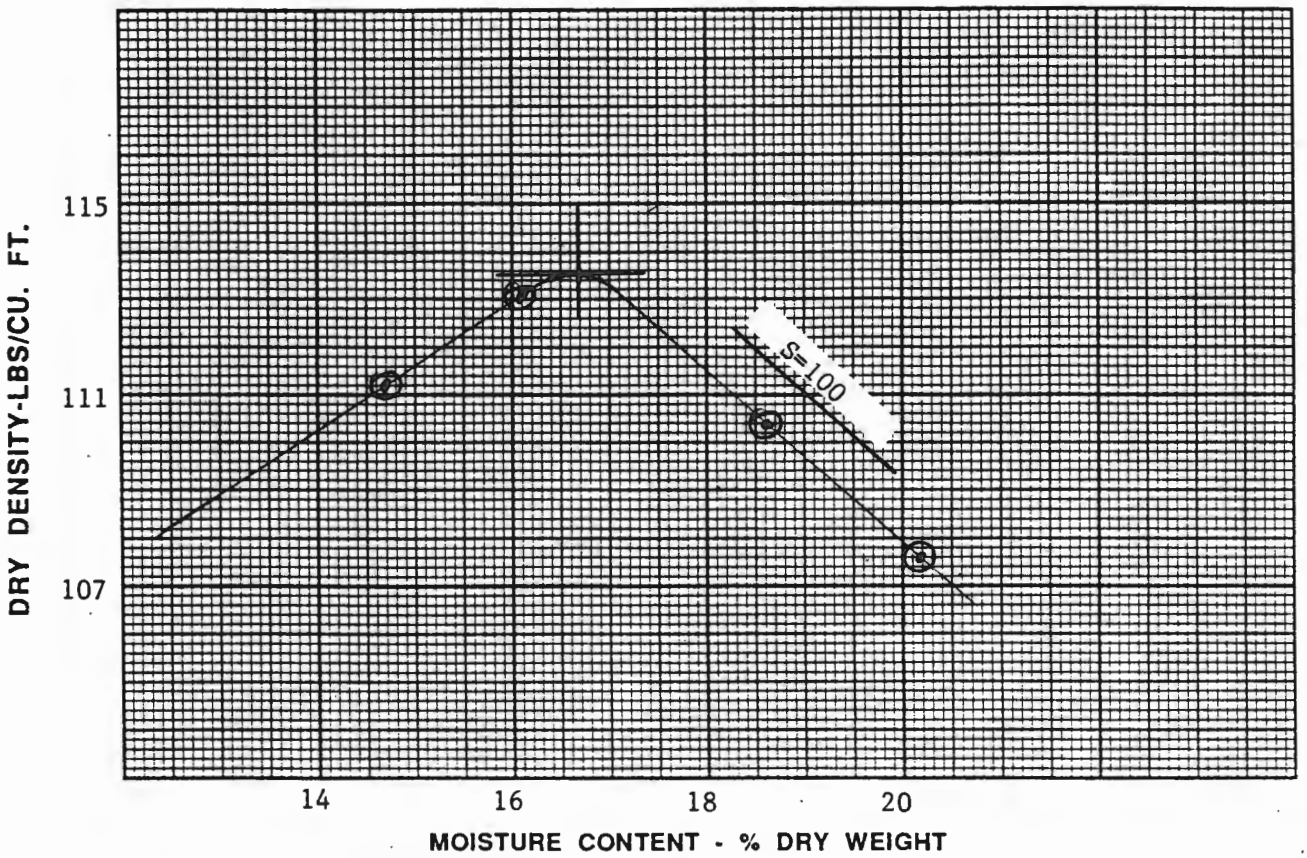
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-10	16.7	113.6	ASTM D698	A	7932-10

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
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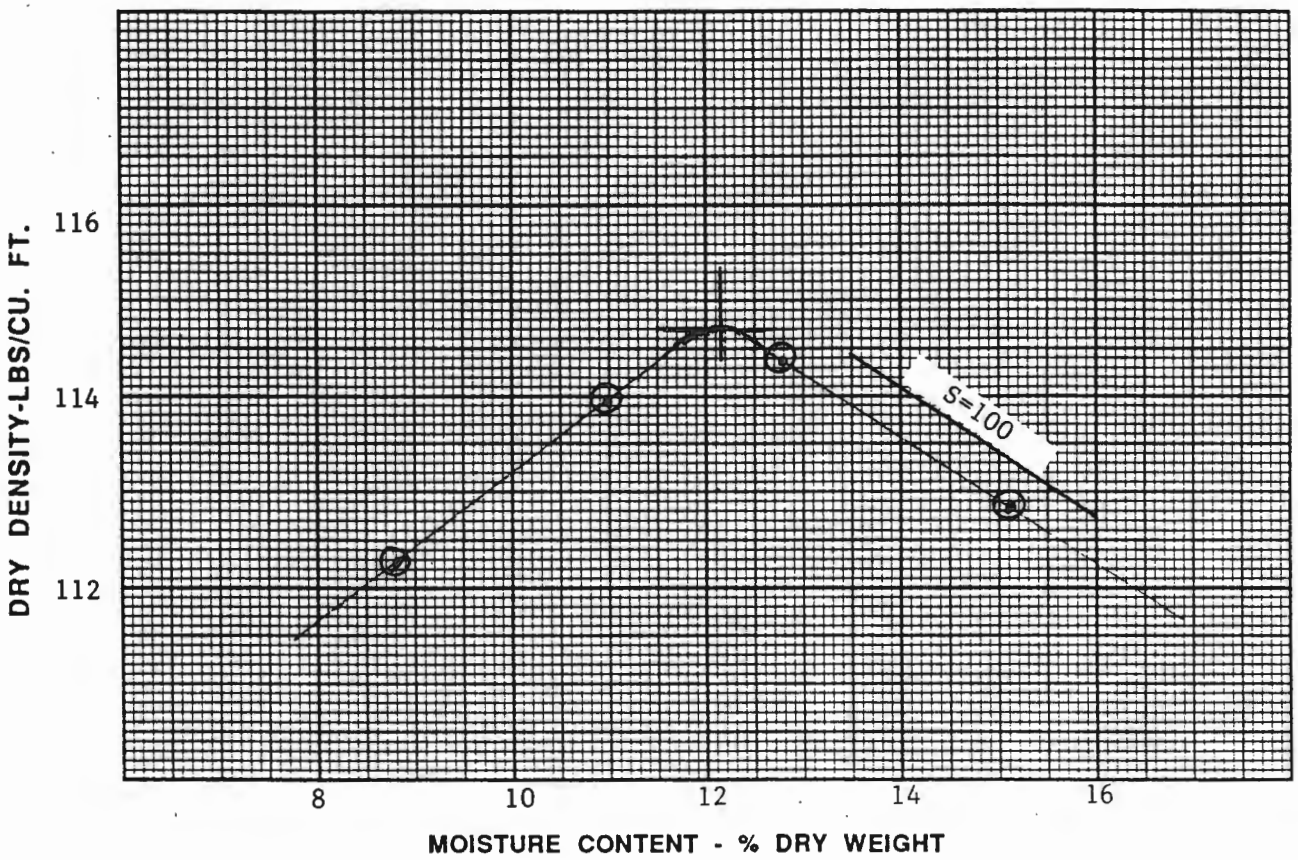
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT JOB NO. C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-9	12.2	114.7	ASTM D698	A	7932-9

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
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B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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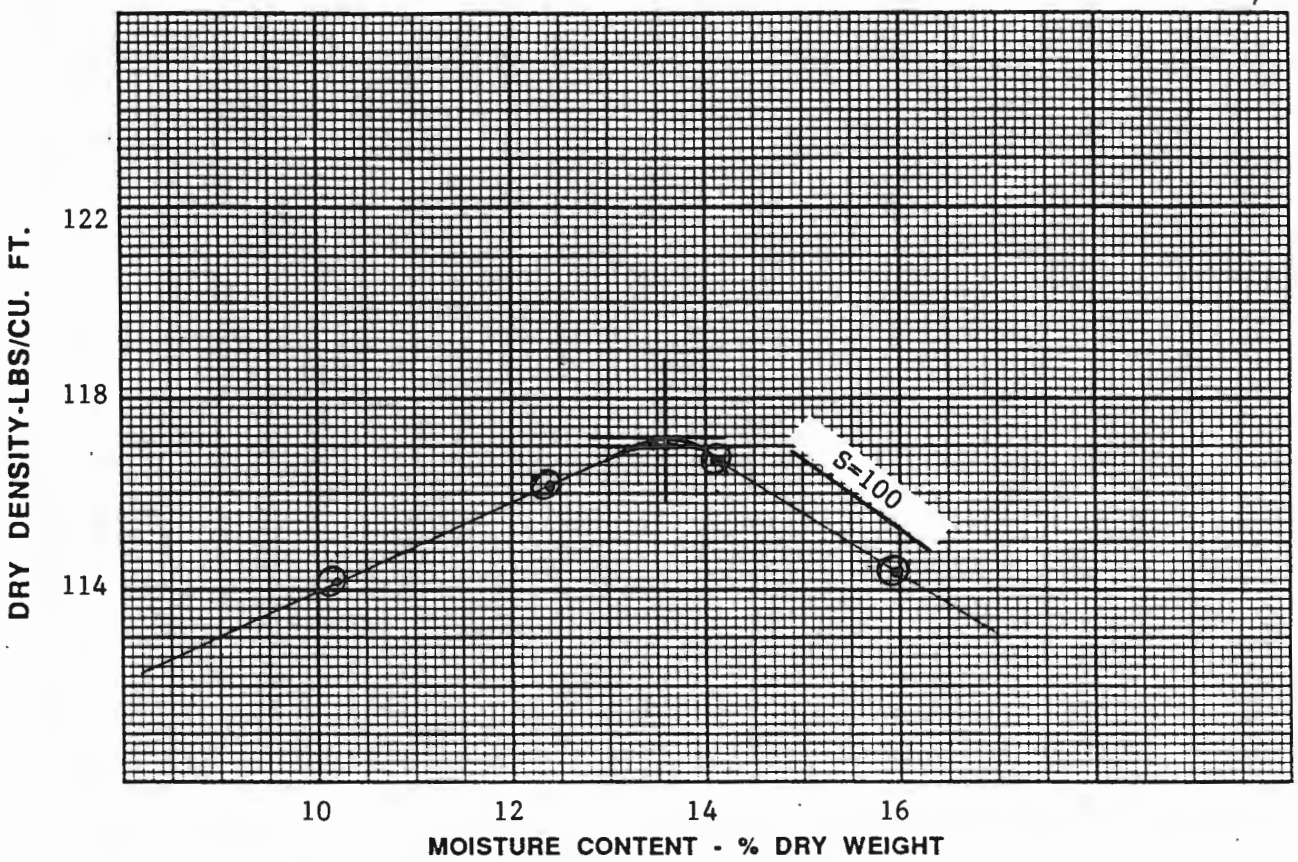
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT JOB NO. C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-8	13.6	117.2	ASTM D698	A	7932-8

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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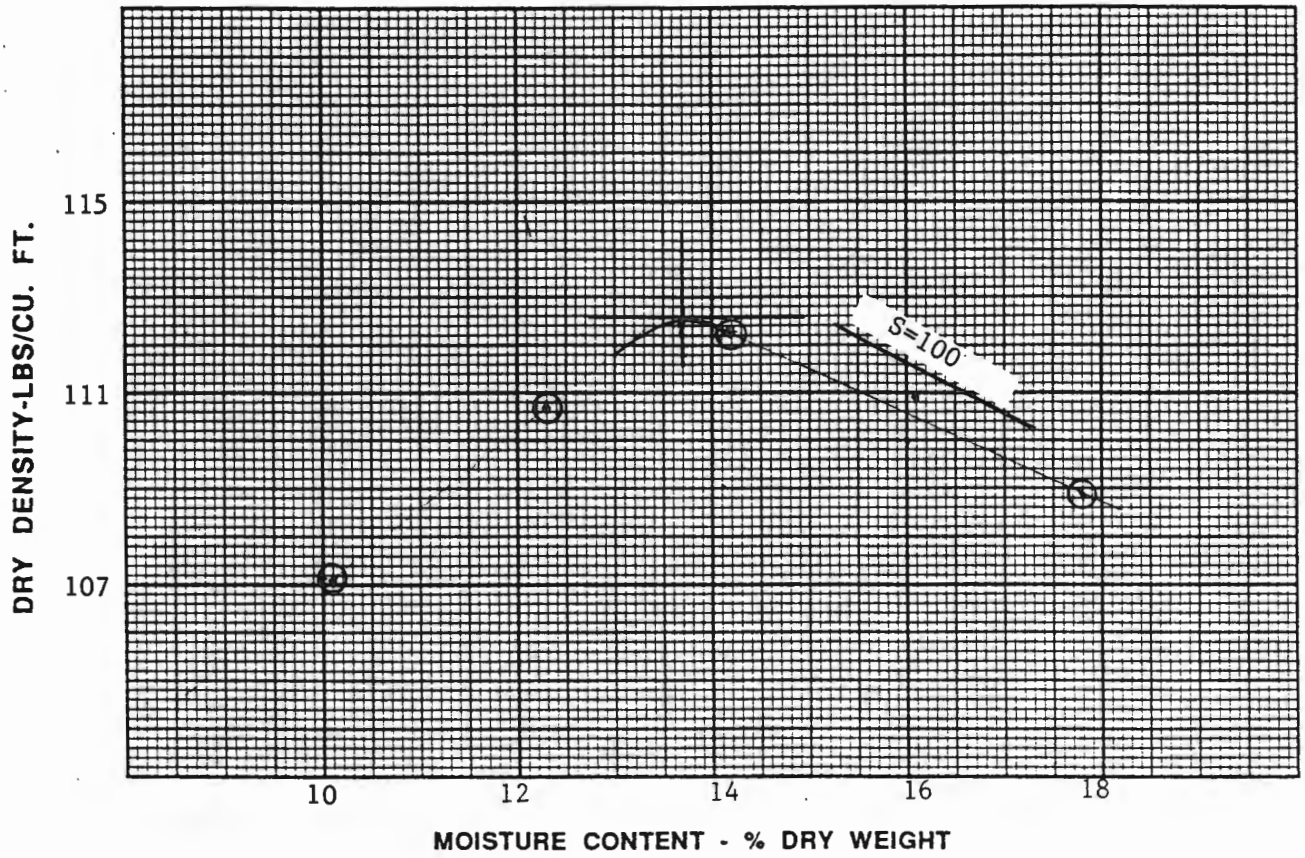
Earth & Environmental

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT JOB NO. C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-7	13.7	112.6	ASTM D698	A	7932-7

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

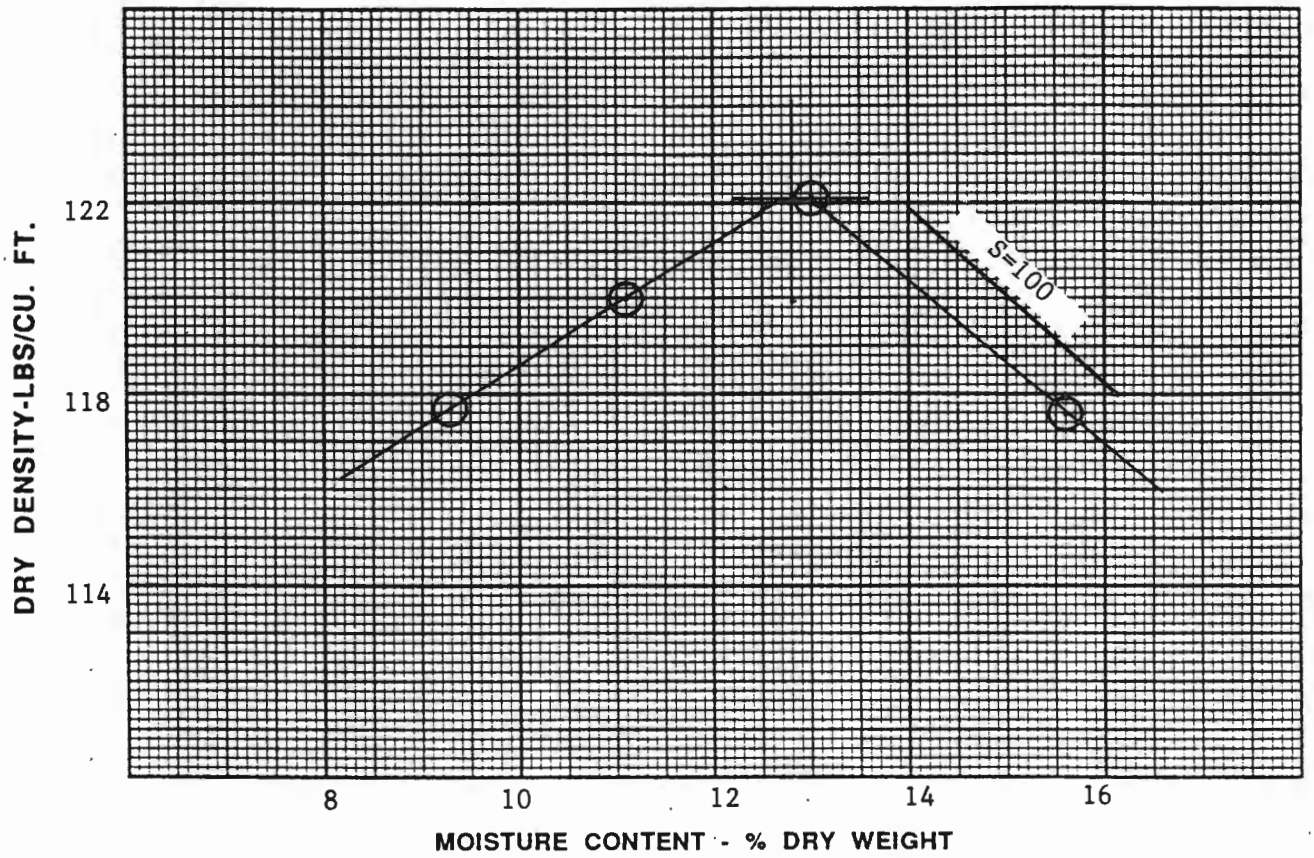
ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

AGRA
Earth & Environmental

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-6	12.8	122.1	ASTM D698	A	7932-6

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

AGRA
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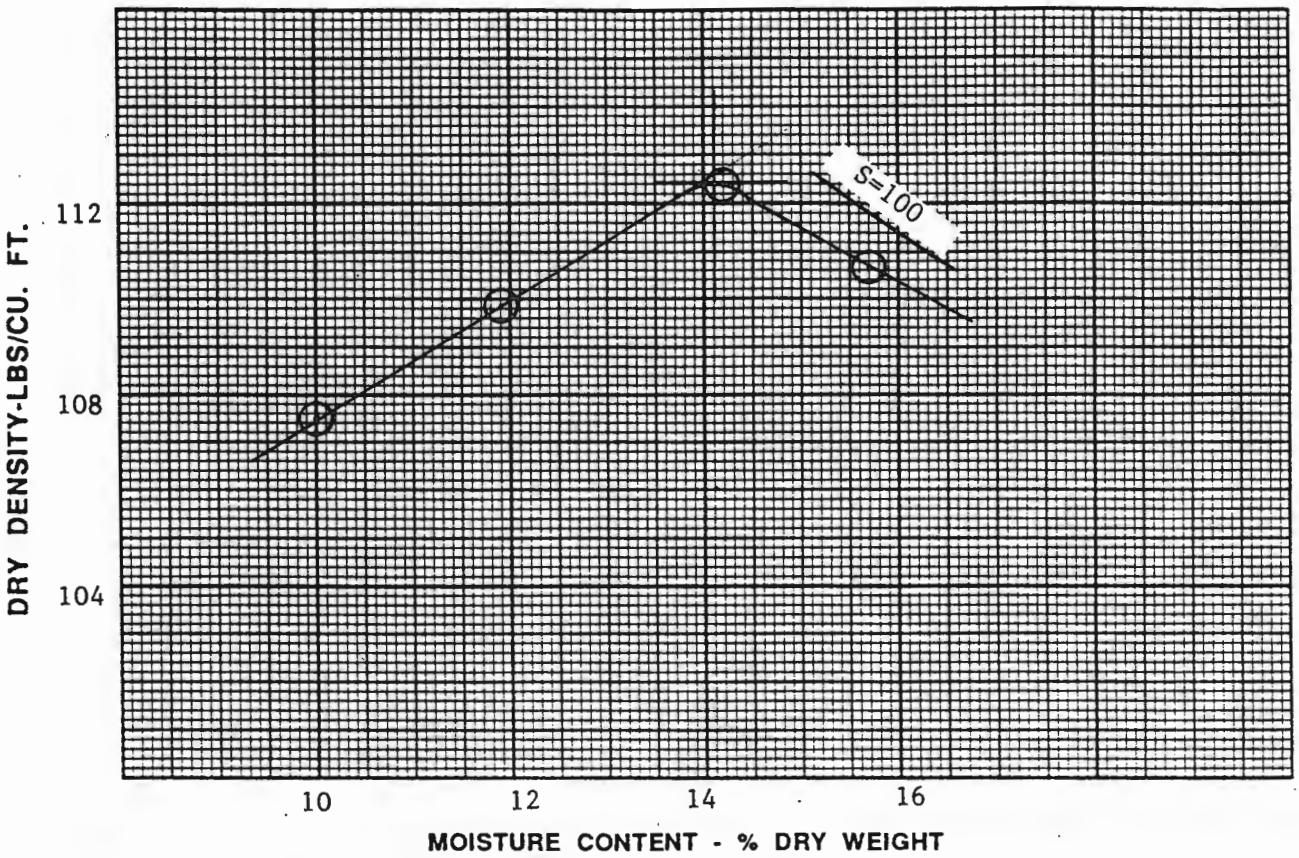
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT **JOB NO.** C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-4	14.1	112.4	ASTM D698	A	7932-4

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
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B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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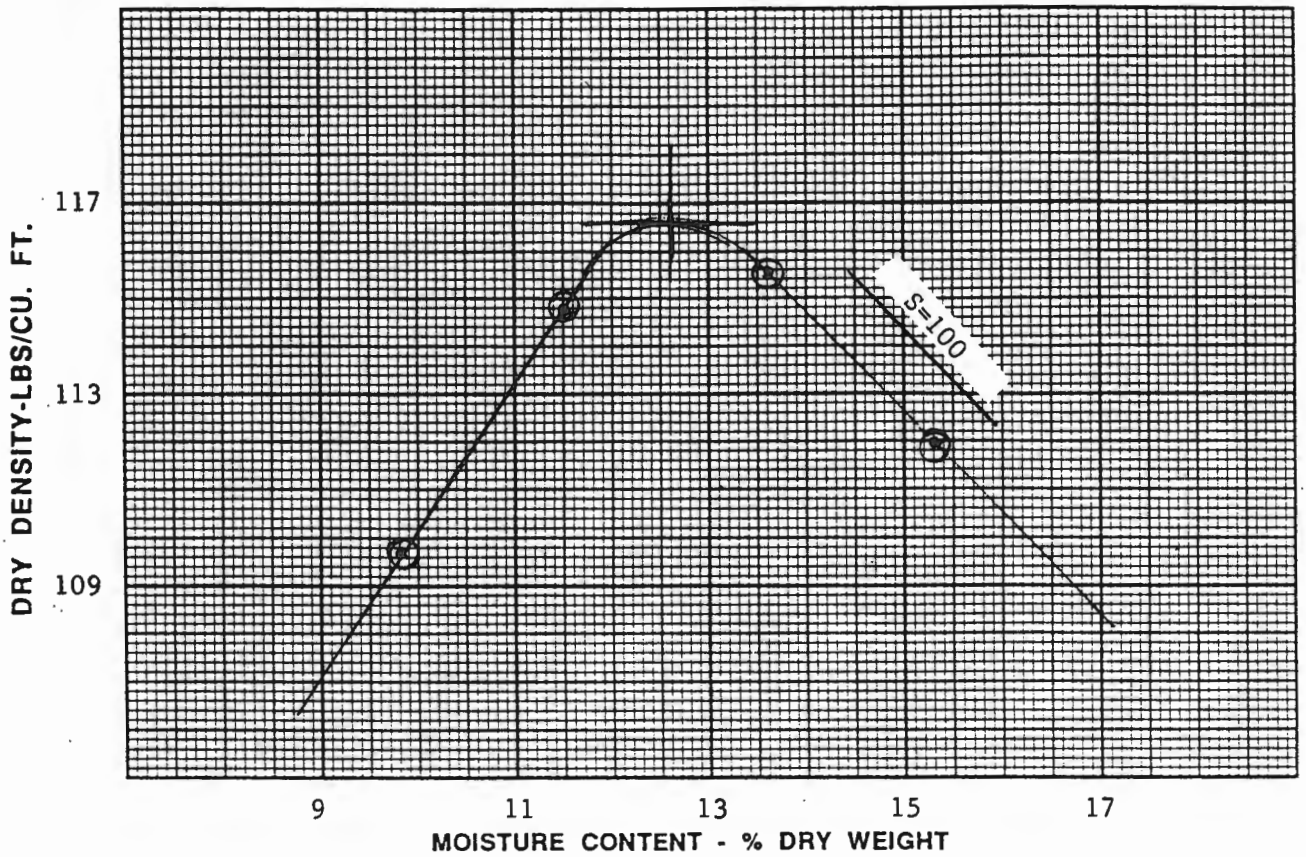
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT GANDI PROJECT JOB NO. C94-5318



SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
PB-2	16.6	116.6	ASTM D-698	A	7932-2

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-3/8	4"	4.58"	5	25	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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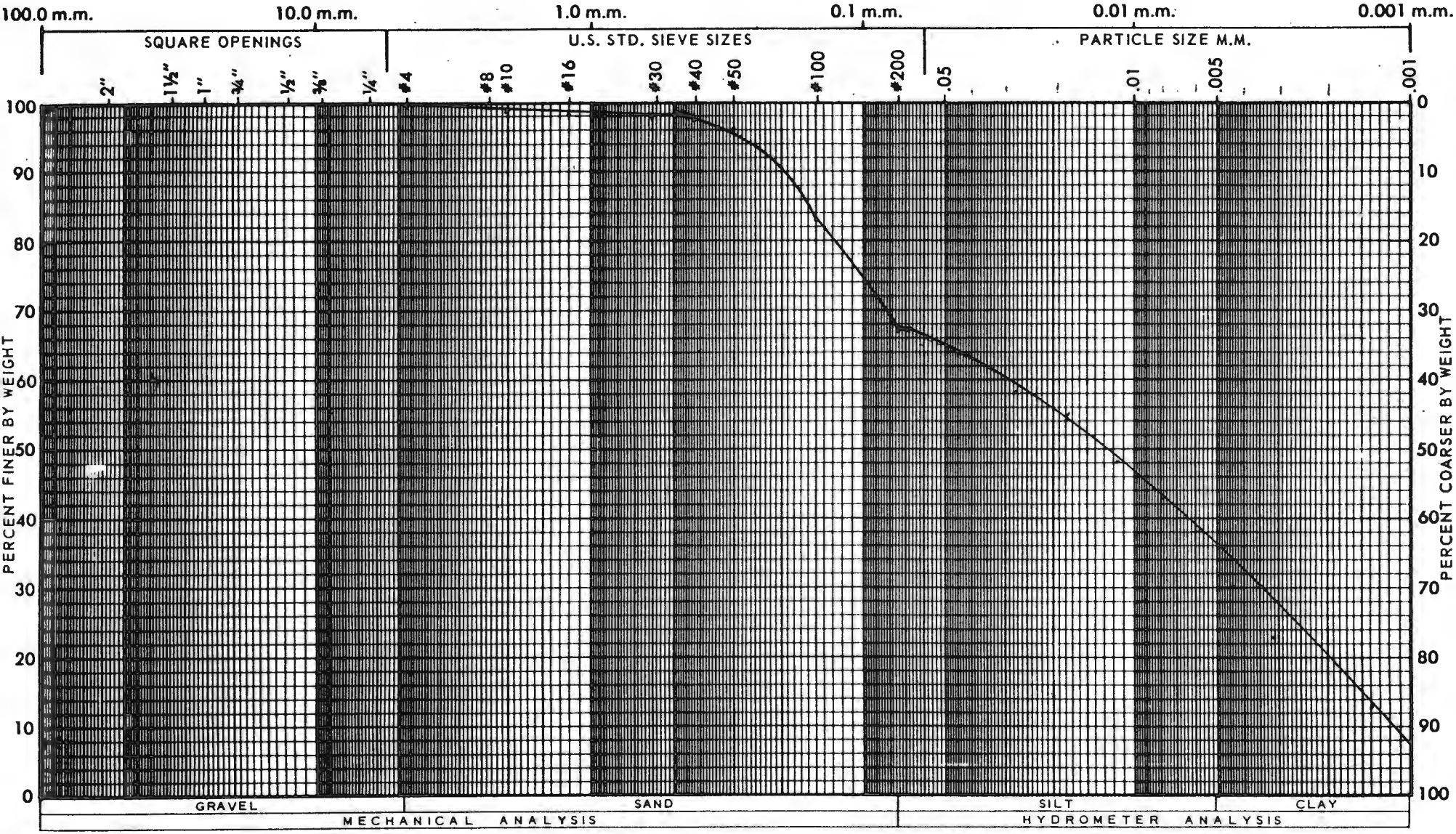
HYDROMETER

JOB NO. [illegible]

PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-33	24	4		CL-ML	7932-33

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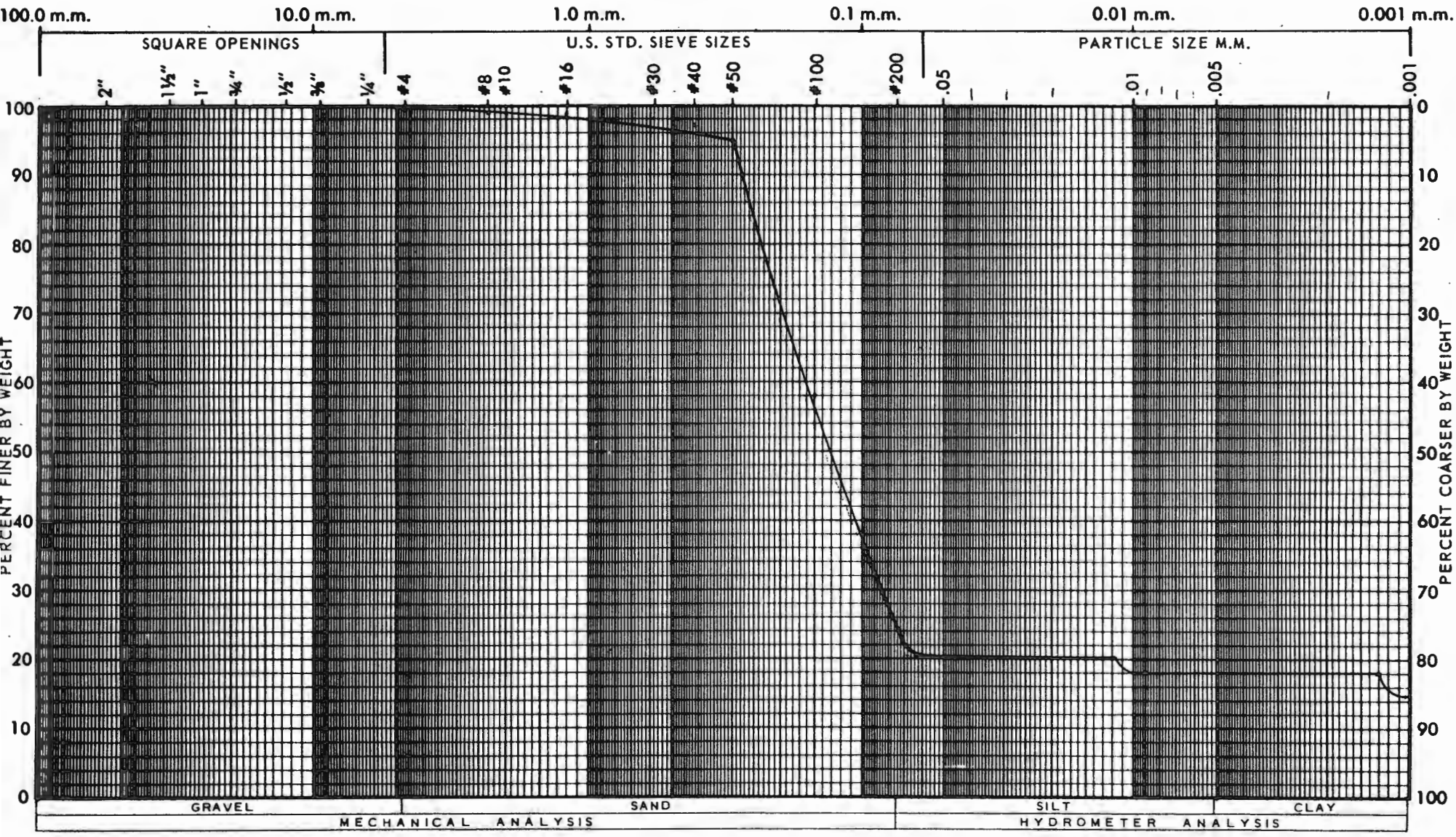
JOB NO. G. . 5

PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-31	NV	NP		SM	7932-31

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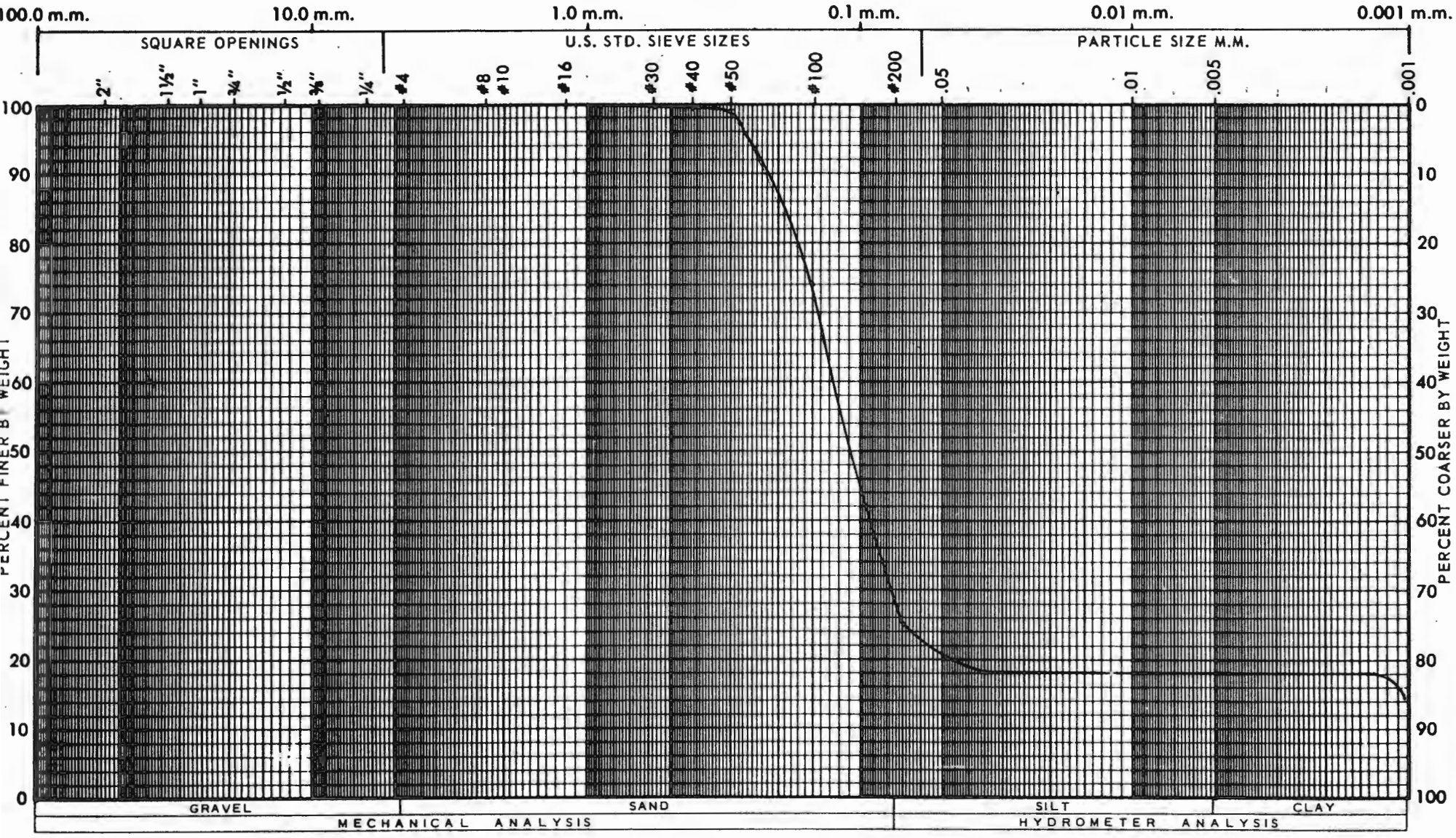
JOB NO. 624-5

PARTICLE SIZE RIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-30	28	6		SC-SM	7932-30

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PARTICLE SIZE DISTRIBUTION CURVE

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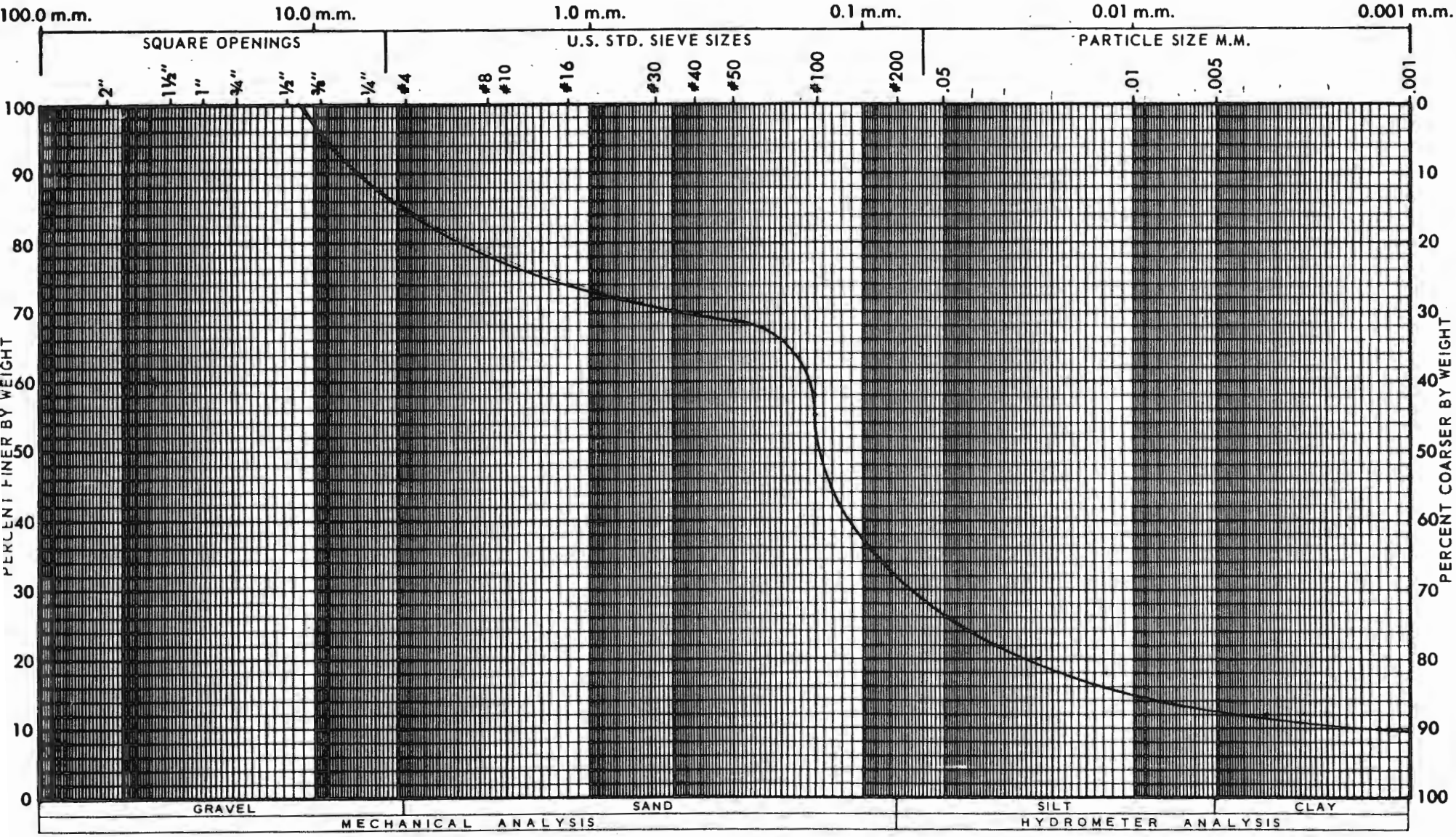

CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-21	24	3		SM	7932-21

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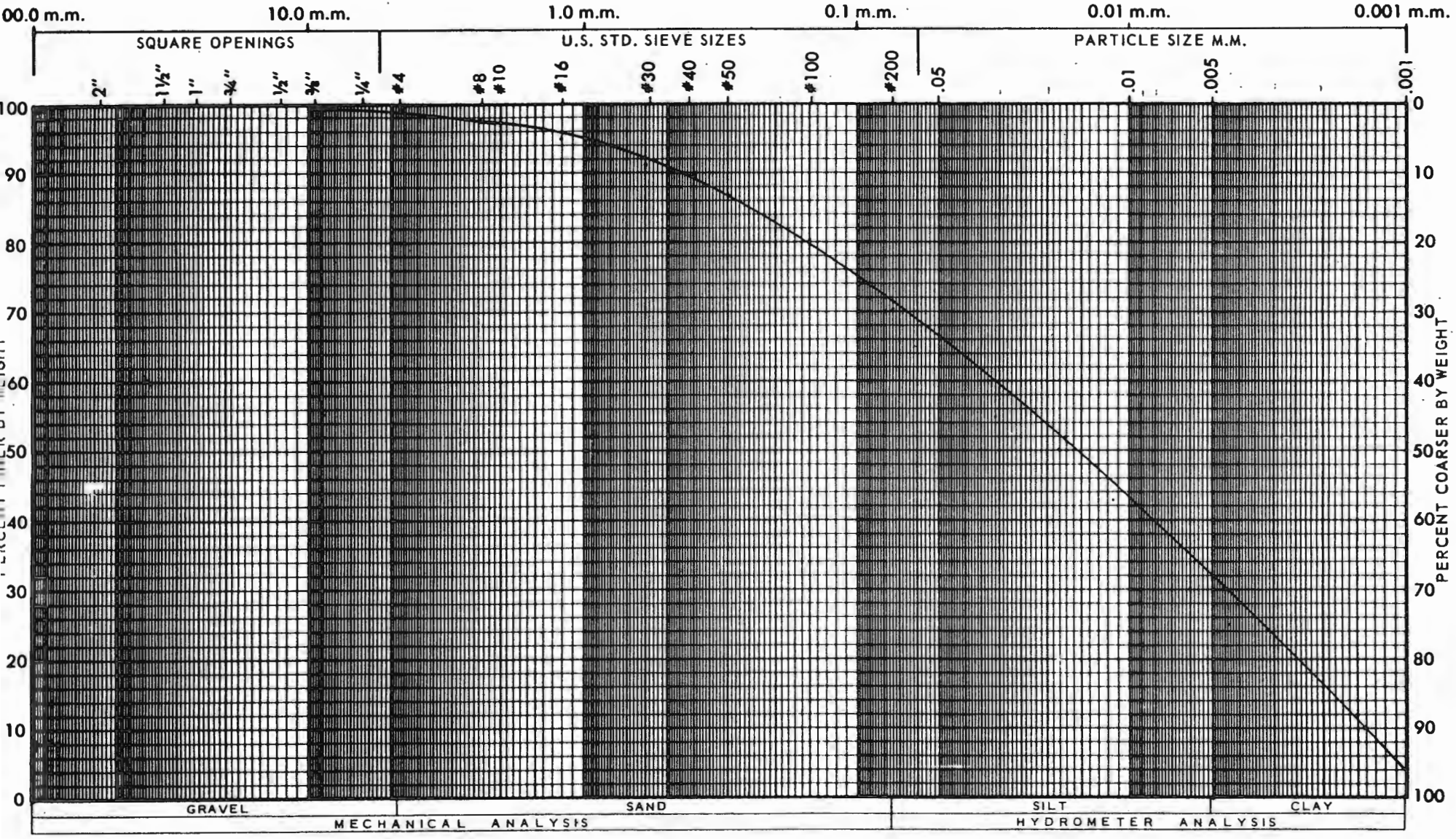
JOB NO. C. . 5

PARTICLE SIZE [illegible]RIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-15	32	9		CL	7932-15

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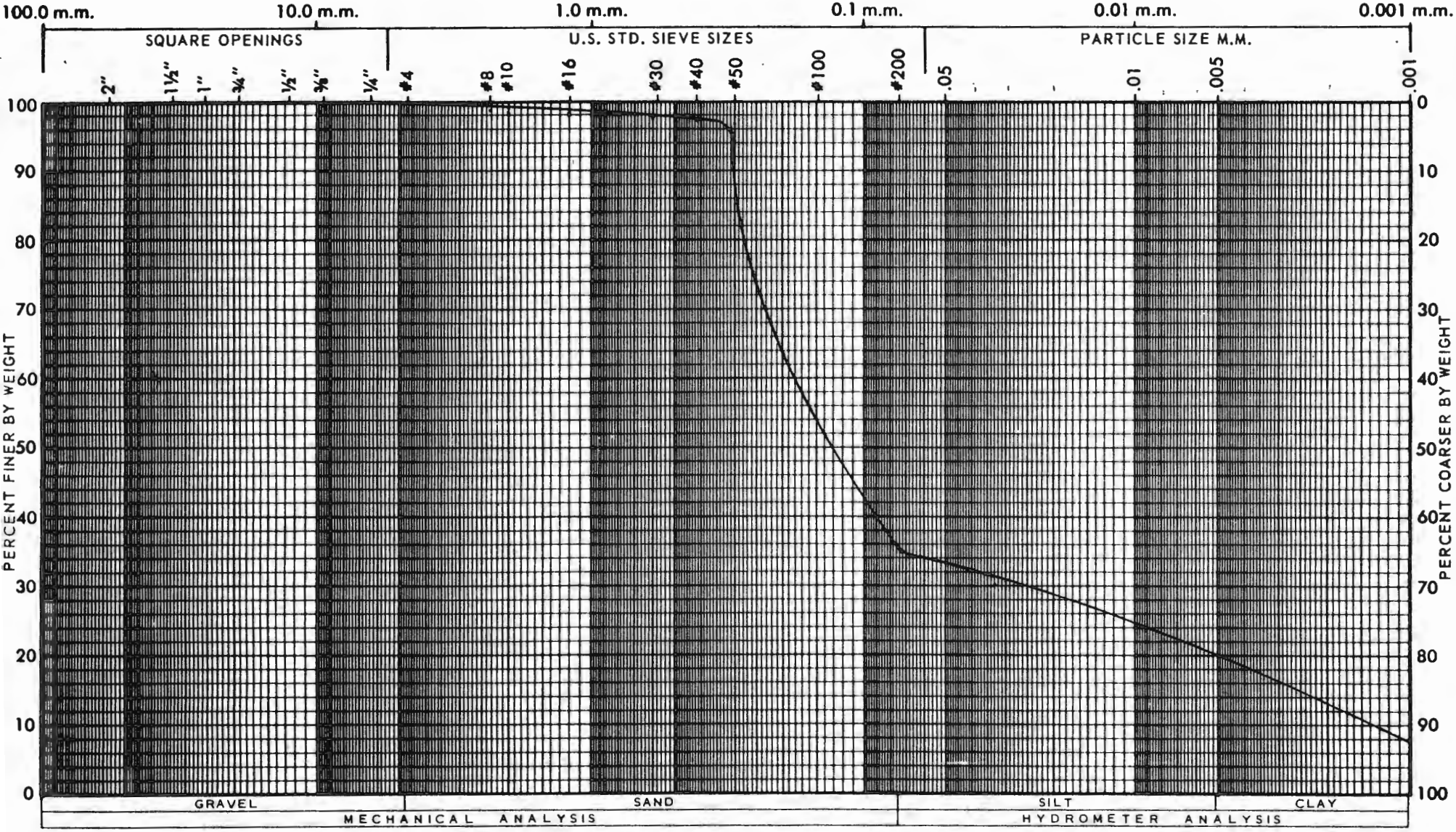
JOB NO. C94-

PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-14	NV	NP		SM	7932-14

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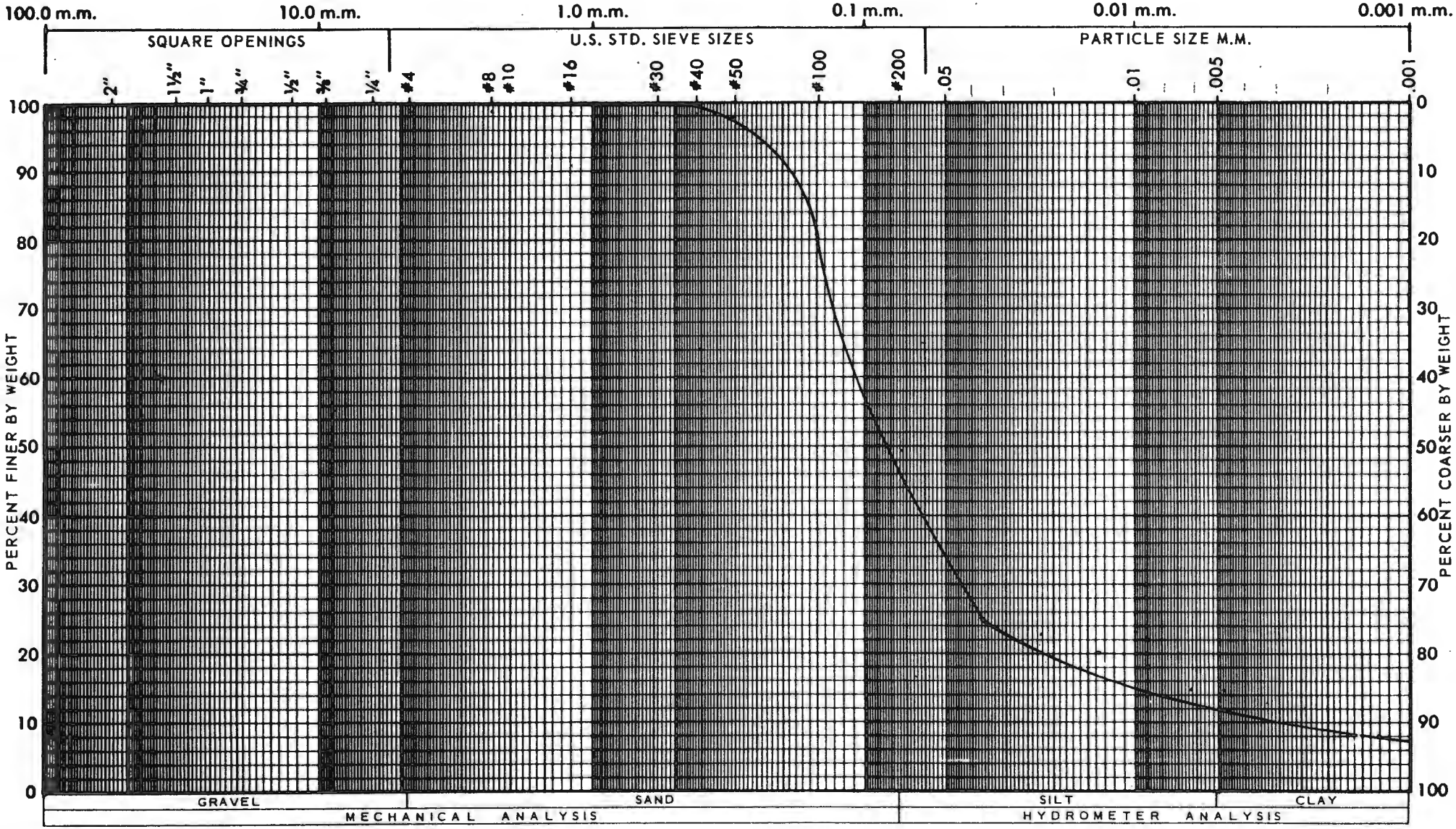
JOB NO. [illegible]

PARTICLE SIZE [illegible]RIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-13	NV	NP		SM	7932-13

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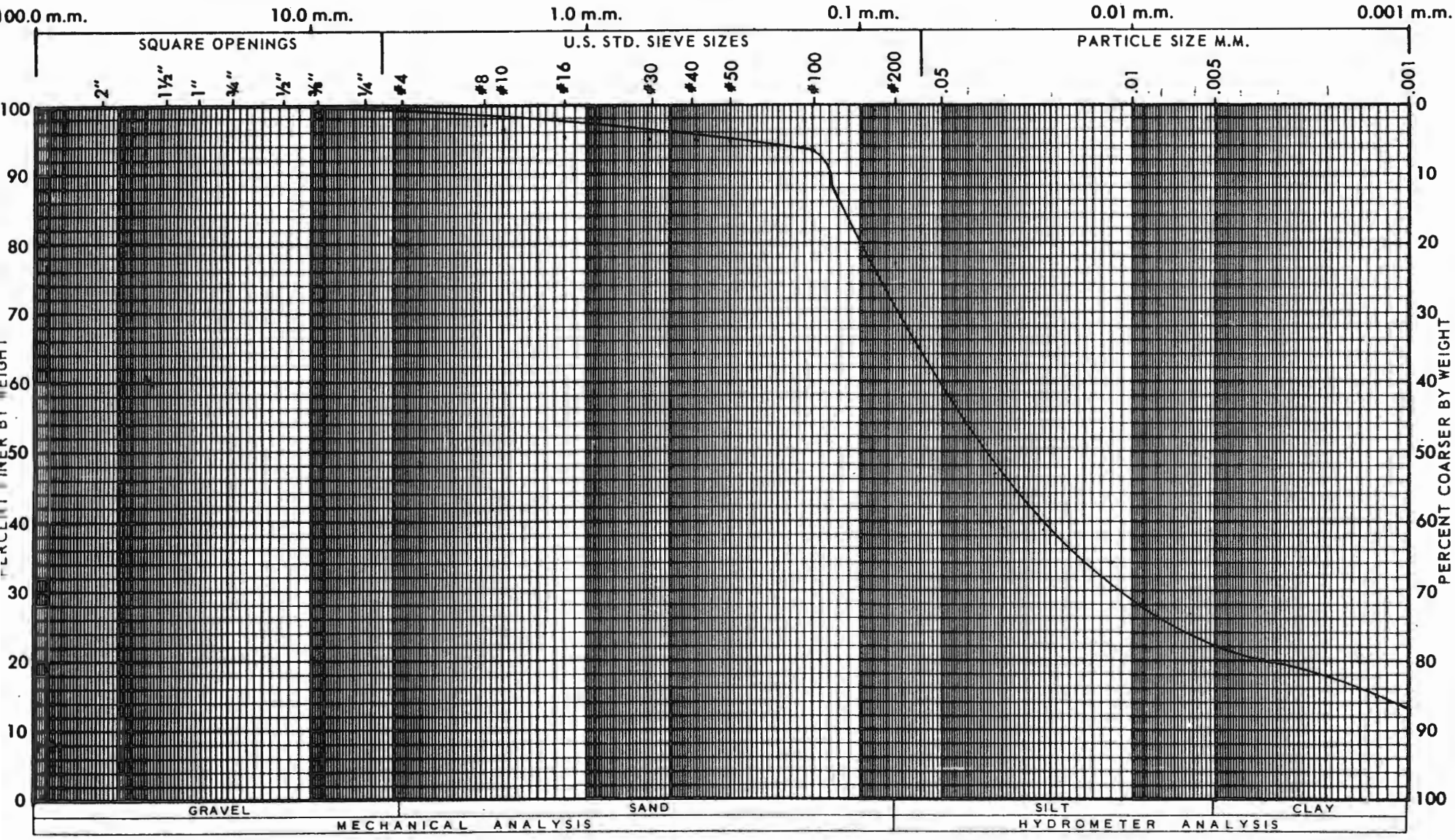
PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-11	32	12		CL	7932-11

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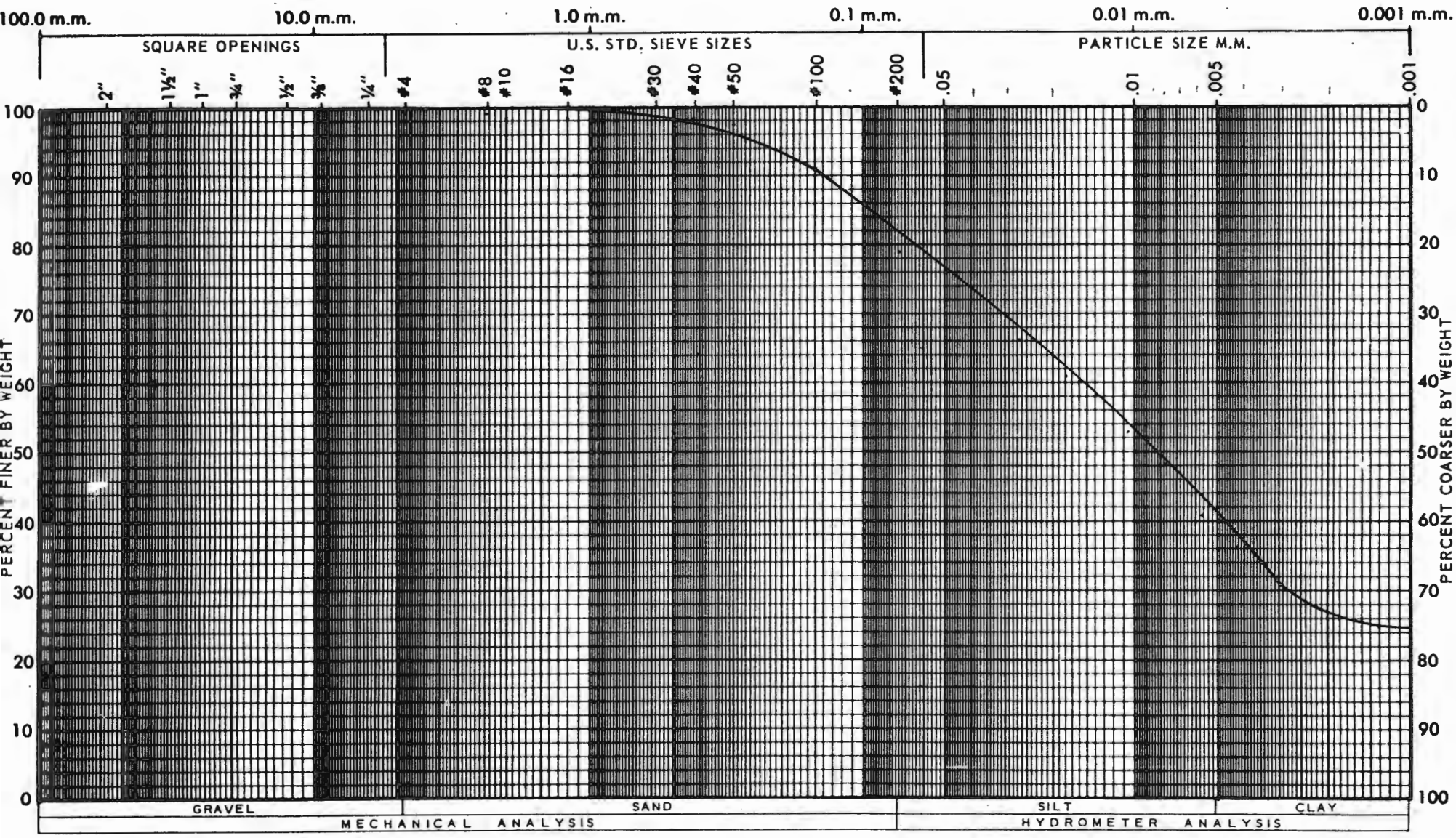
PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-10	30	13		CL	7932-10

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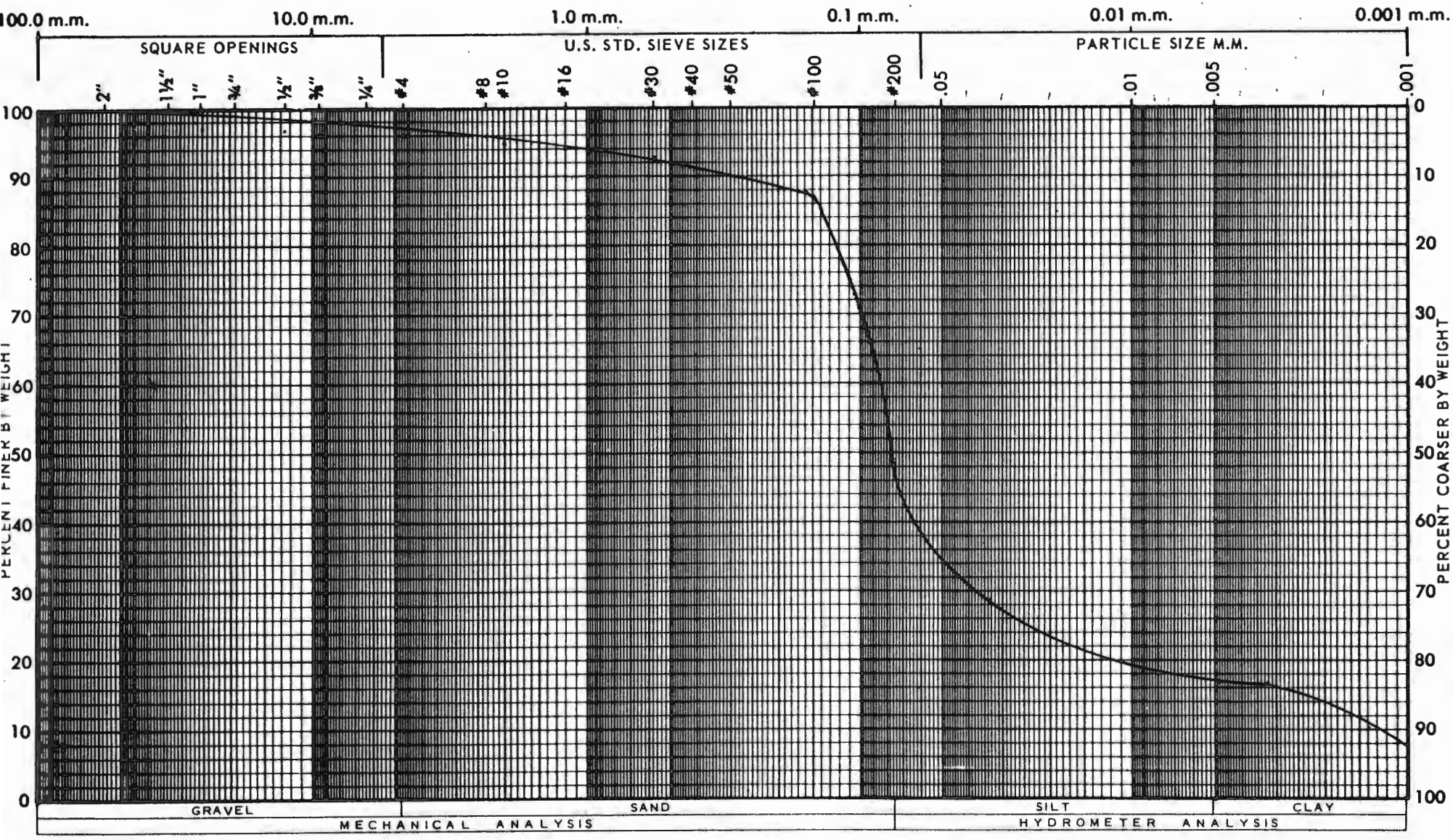
JOB NO. [illegible]

PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-9	NV	NP		SM	7932-9

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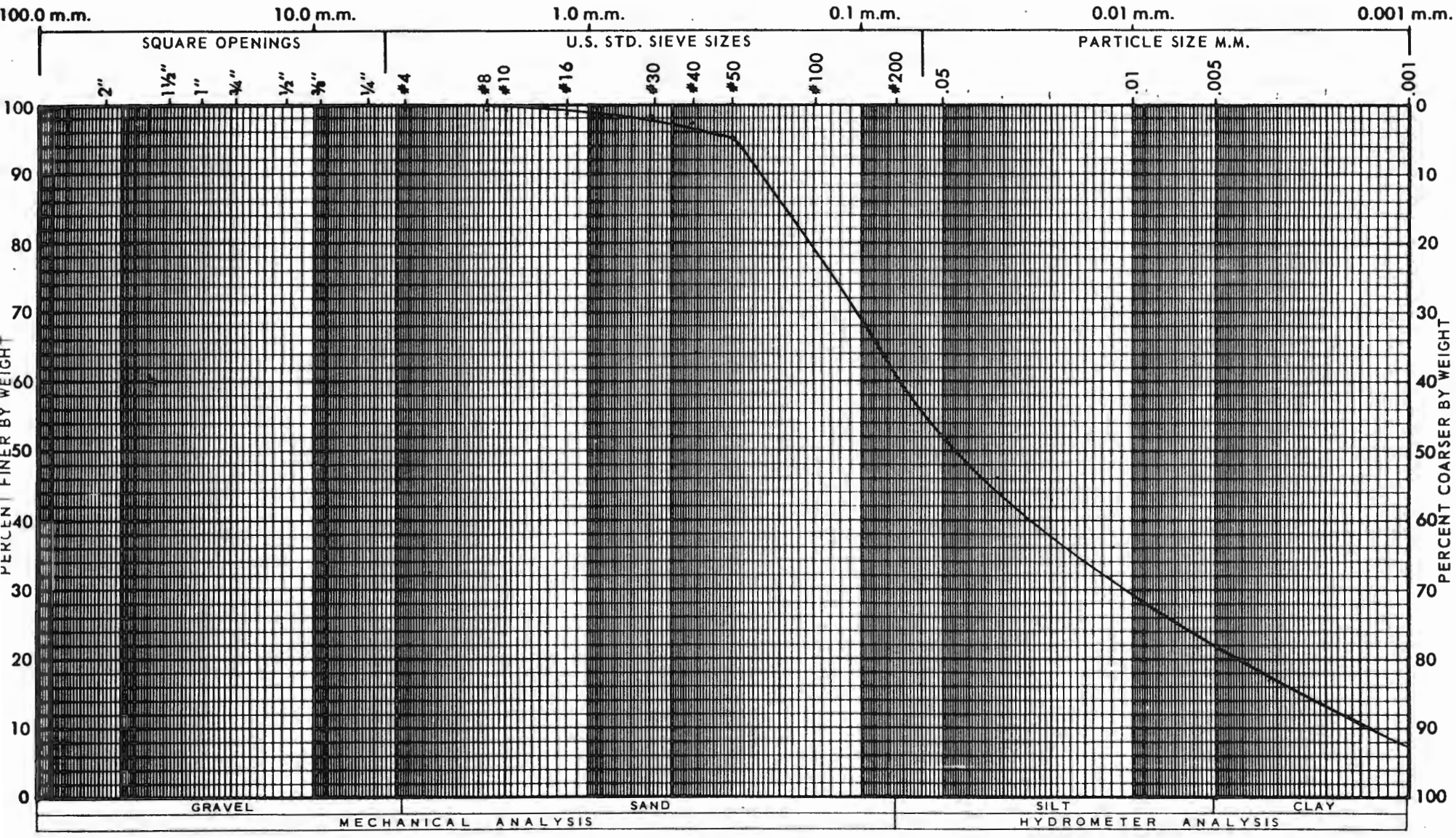
JOB NO. 694-[illegible]

PARTICLE SIZE [illegible]RIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-8	28	9		SC	7932-8

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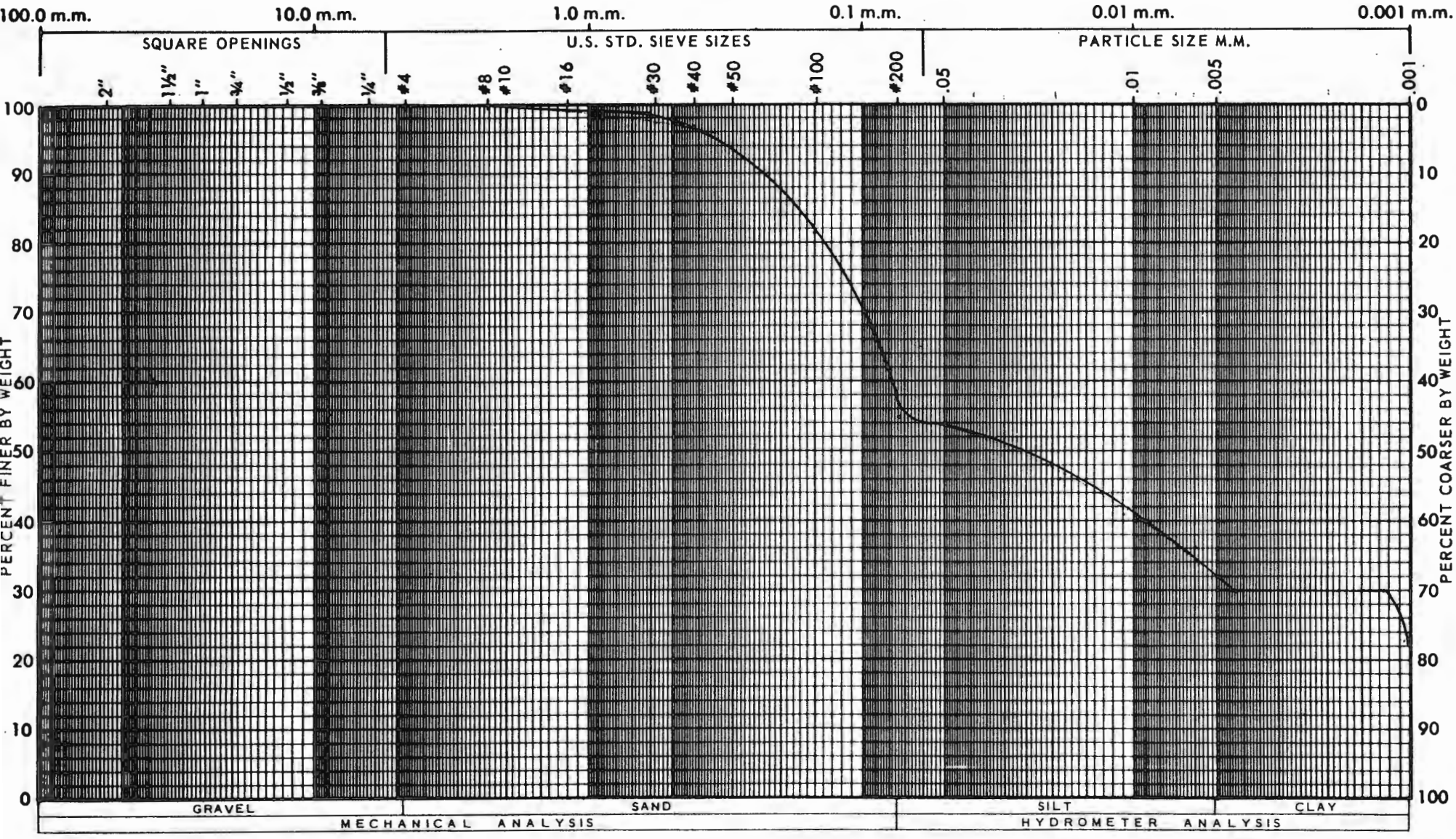
PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-7	28	6		CL-ML	7932-7

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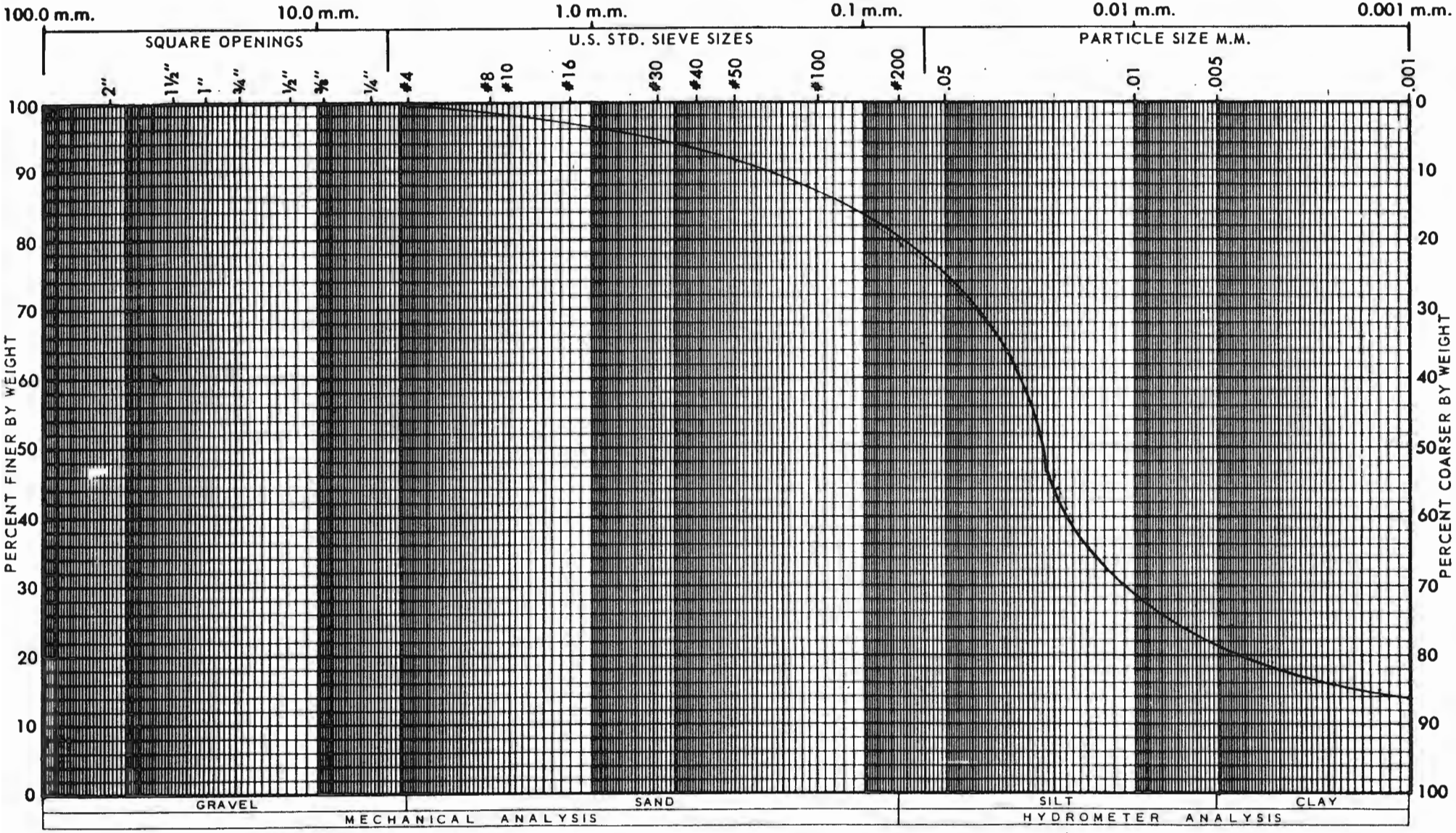
PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-6	24	6		CL-ML	7932-6

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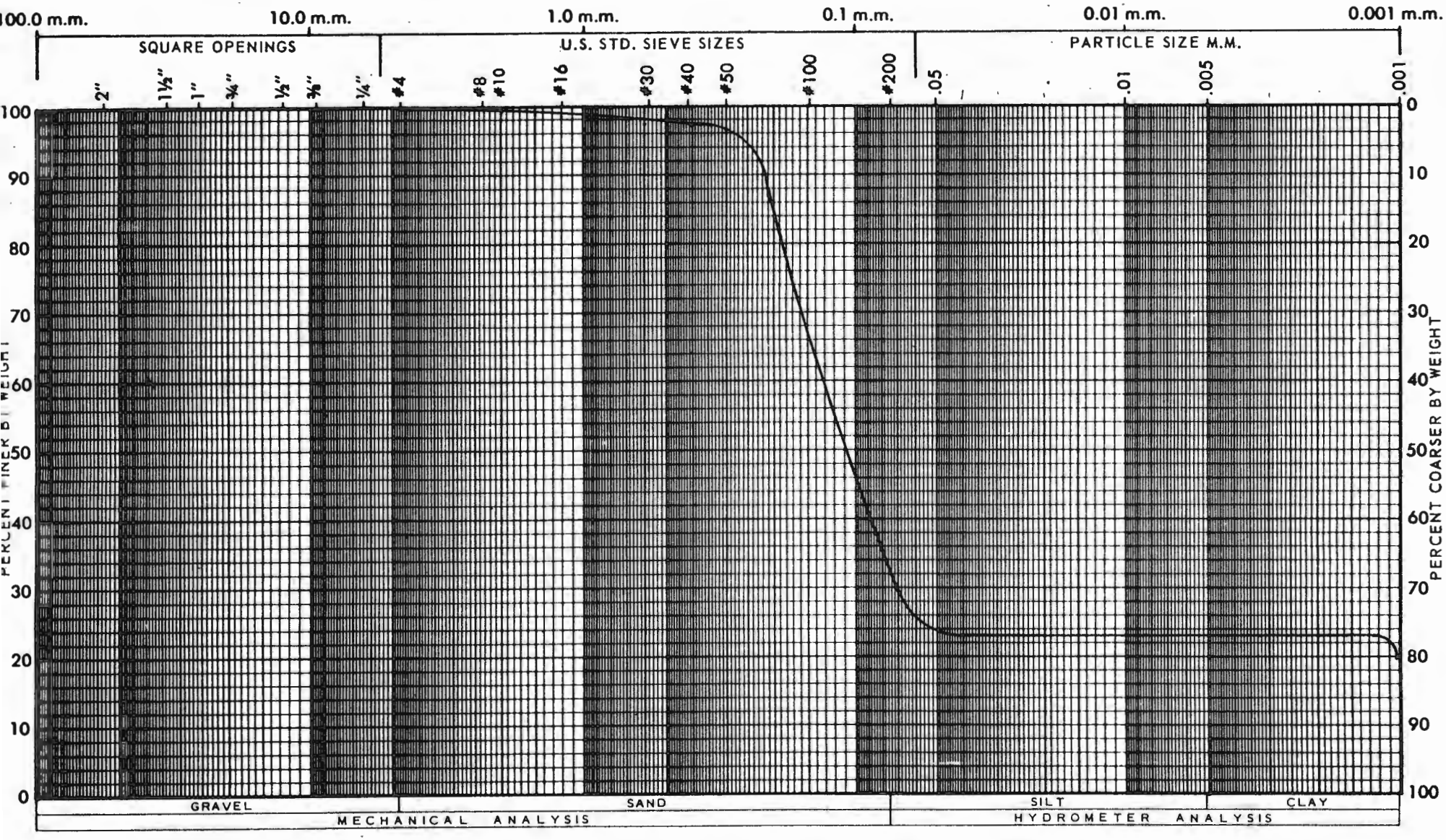
JOB NO. C 53

PARTICLE SIZE DISTRIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-4	NV	NP		SM	7932-4

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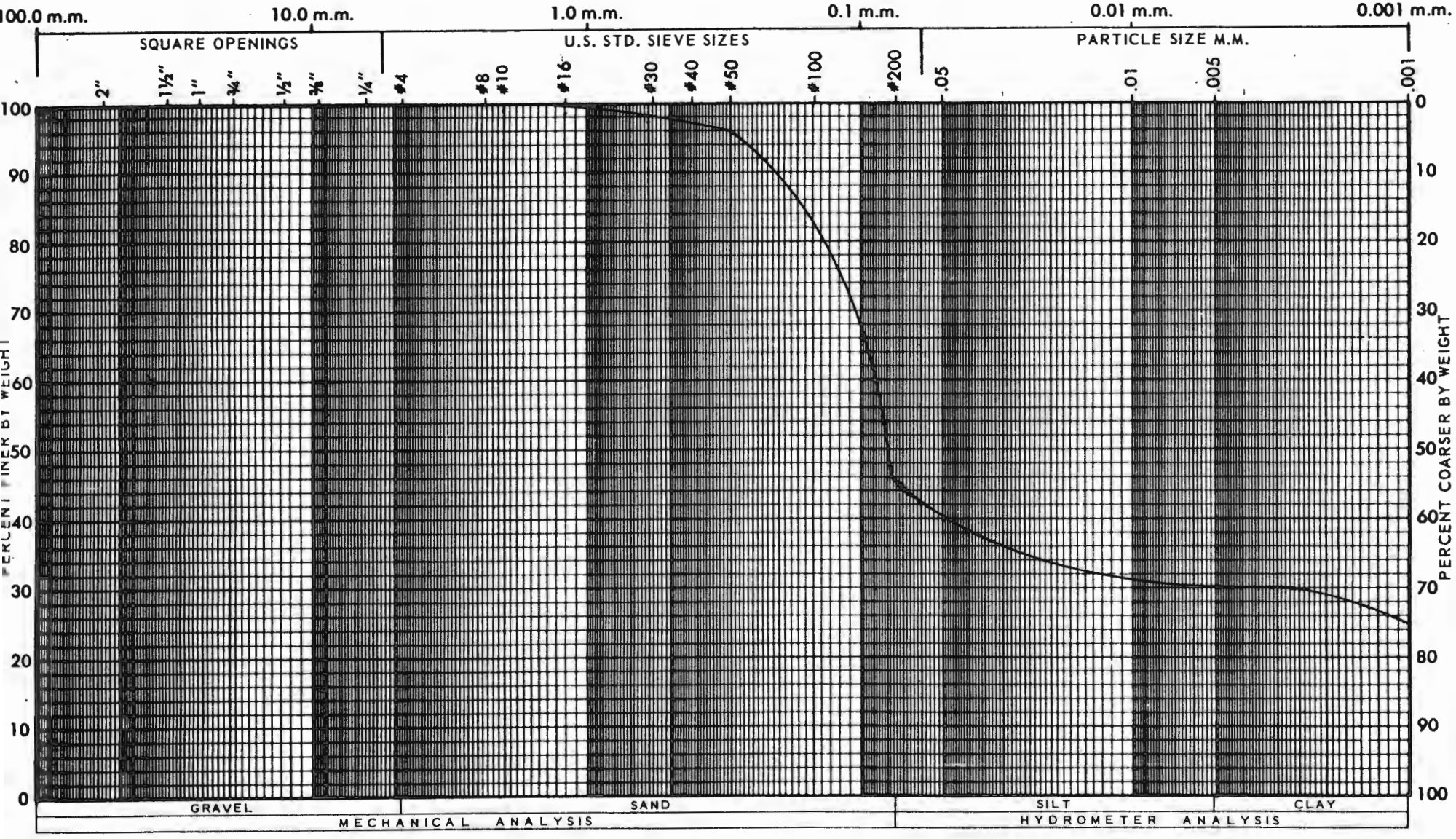
PARTICLE SIZE [illegible]RIBUTION CURVE

PROJECT GANDI PROJECT LOCATION ROSWELL, NEW MEXICO



CURVE	SAMPLE	LIQUID LIMIT	PLASTICITY INDEX	ACTIVITY	UNIFIED SOIL CLASSIFICATION	LAB NO.
	PB-2	36	31		SC	7932-2

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Appendix F
Grain Size Analysis

Grain-size Analysis Procedure

The following methodology is adapted from Jackson (1979). The samples were dry to the touch upon arrival; thus, no initial drying was performed.

1) Entire samples from the five foot core intervals were split until a 10 to 20 gram subsample was obtained.

2) Given that the material was not completely disaggregated, the subsample was crushed with a mortar and pestle to disaggregate coarse-grained clumps of rock.

3) The subsample was weighed on a Fisher-Scientific model 300-D balance. The accuracy of the balance is ± 0.02 gr for weights greater than 10 grams and ± 0.002 gr for weights less than 10 gr.

4) The subsample was split into two 50 ml centrifuge tubes, to which 30 ml of deionized water and 5 ml of 1% sodium-pyrophosphate solution (a de-flocculant) were added.

5) The centrifuge tubes were stopped and shaken vigorously for one minute. A sonic dismembrator was used to further disaggregate a few samples, but was found to have little effect.

6) The centrifuge tubes were placed in an IEC Centra-7 high-speed centrifuge for 6 minutes at 600 rpm to separate the silt and sand fraction from the clay.

7) Five ml of clay solution was extracted from each tube and placed in pre-weighed foil trays.

8) The trays were placed in an oven at 100°C for at least two hours (or until completely dry). The trays were weighed immediately after removal from the oven.

9) After subtracting the weight of the foil tray, the weight of the dried clay solution was multiplied by seven to obtain the weight of clay in the subsample.

10) The remaining material in the centrifuge tube is passed through a wet sieve in order to separate the sand and silt fractions.

11) The sand fraction was directed from the sieve into either a pre-weighed 100 ml beaker or petri dish.

12) The beakers or petri dishes were placed in an oven at 100°C for at least 2 hours (or until completely dry). The beakers or petri dishes were weighed after cooling to room temperature.

13) The weight of sand was obtained by subtracting the weight of the beaker or petri dish from the sand + glassware weight.

14) The weight percent of the sand and clay fractions were obtained by computing the ratio of size fraction weight to the total sample weight and multiplying by 100. The weight percent silt was obtained from the difference of the measured weight fractions and 100 percent.

Other:

- A blank was prepared to assess the contribution of sodium pyrophosphate to the clay weight.

- Replicates (both intentional and blind) were completed in order to assess the reproducibility of the results.

- The progress of the separation procedure was tracked in a lab notebook and written in indelible black ink.

Jackson, M.L., 1979, Soil Chemical Analysis--Advanced Course, 2nd edition, 11th printing. Published by the author, Madison, WI 53705.

Contract Samples for Jim Bonner, Stroller Corp.								
Borehole WW-2								
Sample #	Spl. wt.	tray wt.	cl. + tray	beaker wt.	sd + beak.	wt. % clay	wt. % silt	wt. % sand
48-55	10.99	1.51	1.69	45.27	49.56	11	50	39
55-60	12.41	1.52	1.65	47.09	50.60	8	64	28
60-65	10.40	1.55	1.74	36.58	38.04	13	73	14
65-70(av.)						15	55	30
70-75	12.43	1.64	1.85	27.47	28.67	12	79	10
75-80	21.32	1.54	2.03	46.17	48.05	16	75	9
80-85	9.95	1.56	1.76	49.96	50.64	14	79	7
85-90	11.42	1.57	1.80	36.10	38.33	14	66	20
90-95	17.71	1.51	2.04	34.16	38.33	21	55	24
95-100	18.22	1.50	1.95	45.24	46.57	17	75	7
105-110	9.61	1.52	1.74	43.80	45.16	16	70	14
110-115	14.94	1.60	1.89	48.54	52.24	14	61	25
115-120	13.14	1.49	1.71	50.16	52.92	12	67	21
120-125	12.66	1.53	1.77	50.18	51.19	13	79	8
125-130	14.99	1.57	1.80	40.82	41.99	11	82	8
130-135	10.99	1.60	1.78	35.02	36.40	11	76	13
135-140	13.99	1.55	1.83	50.53	51.58	14	78	8
140-145	10.81	1.52	1.76	27.51	29.78	16	63	21
145-150	16.22	1.58	1.88	46.92	49.10	13	74	13
150-155	29.35	1.53	2.22	44.70	49.60	17	67	17
155-160	14.42	1.55	1.84	49.84	51.70	14	73	13
160-165	6.45	1.56	1.64	44.78	45.01	9	88	4
165-170	28.54	1.58	2.19	50.11	55.06	15	68	17
170-175	13.11	1.61	1.86	38.47	40.89	13	68	18
175-180	12.06	1.58	1.85	38.46	41.49	16	59	25
180-185	14.30	1.56	1.85	36.29	40.42	14	57	29
185-190	8.42	1.54	1.66	50.76	51.80	10	78	12
190-195	15.84	1.60	1.93	47.12	50.72	15	63	23
195-200	11.70	1.51	1.71	40.35	42.42	12	71	18
200-205	8.55	1.53	1.72	47.98	49.93	16	61	23
205-210	8.01	1.58	1.74	40.85	42.71	14	63	23
210-215	8.13	1.51	1.73	44.72	46.26	19	62	19
215-220	6.86	1.51	1.67	35.31	36.83	16	62	22
220-225	9.24	1.53	1.65	47.46	48.75	9	76	14
225-230	5.85	1.55	1.68	45.80	47.41	16	57	28
230*								
235-240	13.28	1.50	1.76	45.55	48.75	14	62	24
240-245	14.14	1.54	1.82	34.18	38.39	14	56	30
245-250	15.21	1.57	1.97	40.96	45.24	19	53	28
250-255	10.61	1.60	1.82	36.60	38.01	14	73	13
255-260	10.19	1.59	1.69	45.48	47.86	7	69	23
260-265	16.46	1.54	1.87	46.22	52.28	14	49	37
265-270	19.97	1.54	2.00	27.50	32.47	16	59	25
270-275	14.45	1.58	1.85	47.10	52.16	13	52	35
275-280	6.04	1.57	1.67	47.45	48.52	11	71	18
280-285	12.18	1.51	1.70	38.45	41.43	11	64	24
285-290	17.22	1.54	1.84	50.47	54.93	12	62	26
290-295	15.47	1.56	1.83	50.19	54.08	12	63	25

295-300	12.08	1.53	1.74	50.11	52.09	12	71	16	
300-305	10.51	1.56	1.80	48.56	50.96	16	62	23	
305-310	22.28	1.55	2.11	36.10	42.03	18	56	27	
310-315	8.84	1.53	1.67	40.95	41.87	11	78	10	
315-320	10.05	1.57	1.81	37.02	37.81	17	75	8	
320-325	10.06	1.55	1.72	46.89	50.02	12	57	31	
325-330	14.45	1.53	1.78	44.73	49.16	12	58	31	
330-335	12.30	1.57	1.82	46.88	52.91	14	37	49	
335*									
340*									
345-350	7.47	1.53	1.62	49.79	51.12	8	74	18	
350-355	12.28	1.57	1.78	50.15	52.18	12	71	17	
355-360	11.06	1.51	1.70	44.80	47.31	12	66	23	
360-365	8.98	1.52	1.65	45.48	45.91	10	85	5	
365-370	13.63	1.59	1.84	45.28	48.86	13	61	26	
370-375	5.84	1.53	1.60	35.28	35.75	8	84	8	
375-380	11.58	1.52	1.76	50.12	52.04	15	69	17	
380-385	8.80	1.54	1.72	44.17	46.74	14	57	29	
385-390	21.13	1.54	2.06	45.79	52.11	17	53	30	
390-395	12.80	1.53	1.79	44.15	45.44	14	76	10	
395-400	8.60	1.57	1.71	45.78	46.37	11	82	7	
400-405 ave.						15	76	9	
405-410	8.43	1.52	1.64	50.17	51.07	10	80	11	
410-415	18.01	1.52	1.85	50.21	52.34	13	75	12	
415-420	13.57	1.56	1.83	49.93	51.88	14	72	14	
420-425	18.60	1.54	1.85	44.82	48.68	12	67	21	
425-430	16.81	1.59	1.85	40.41	43.25	11	72	17	
430-435	14.50	1.51	1.81	50.14	53.39	15	63	22	
435-440	16.00	1.53	1.92	50.06	51.76	17	72	11	
440-445	12.71	1.51	1.86	50.24	51.26	19	73	8	
445-450	27.89	1.56	2.35	50.18	54.56	20	64	16	
450-455	13.73	1.54	1.79	46.91	49.12	13	71	16	
455-460	17.21	1.64	1.98	36.13	37.11	14	81	6	
465-470	15.26	1.54	1.76	49.81	53.18	10	67	22	
470-475	23.75	1.62	1.98	50.00	54.64	11	70	20	
475-480	8.36	1.55	1.69	50.79	51.80	12	76	12	
480-485	10.60	1.53	1.70	50.44	53.61	11	59	30	
*485-490									
490-495	9.96	1.51	1.76	50.58	52.28	18	65	17	
495-500	17.81	1.53	1.99	48.56	50.07	18	73	8	
500-505	18.96	1.53	1.83	46.97	51.60	11	65	24	
505-510	19.79	1.57	1.88	50.16	54.62	11	66	23	
510-515	10.34	1.57	1.75	50.04	53.20	12	57	31	
515-520	7.85	1.60	1.77	45.82	46.45	15	77	8	
520-525	14.57	1.58	1.91	48.55	50.51	16	71	13	
525-530	27.57	1.56	2.11	35.30	45.75	14	48	38	
530-535	21.96	1.60	1.81	49.91	55.41	7	68	25	
535-540	13.51	1.61	1.86	40.38	45.30	13	50	36	
540-545	18.88	1.54	1.95	40.84	46.86	15	53	32	
545-550	11.38	1.51	1.67	50.54	54.23	10	58	32	
550-555	13.94	1.57	1.76	43.81	46.91	9	68	22	

555-560	6.92	1.56	1.69	27.52	28.12	13	78	9	
560-565	14.90	1.51	1.82	40.86	44.81	14	59	27	
565-570	8.78	1.57	1.75	35.32	37.33	14	63	23	
570-575	8.75	1.54	1.72	43.83	45.23	14	70	16	
575-580	14.67	1.55	1.76	34.21	37.71	10	66	24	
580-585	11.83	1.51	1.72	35.06	36.30	12	77	10	
585-590	13.46	1.56	1.84	44.74	47.49	14	65	20	
590-595	12.42	1.52	1.72	50.57	51.63	12	80	9	
* - missing samples									
Effect of sonication									
615-620A	13.18	1.54	1.77	36.31	37.30	12	81	8	sonication
615-620B	13.22	1.55	1.76	48.02	48.89	11	82	7	no sonic.
blank	0.00	1.52	1.52	50.14	50.10	0.04	0 D.L. gr.	0.00	gr.
Replicates									
65-70B	11.37	1.52	1.77	35.06	38.36	16	55	29	
65-70C	16.35	1.51	1.82	46.90	52.12	13	55	32	
65-70A	10.41	1.53	1.77	46.94	50.01	16	54	29	
					average	14.94	54.91	30.15	
					1 S.D.	1.65	0.49	1.56	
Blind Replicates									
400-405	16.05	1.48	1.89	45.29	47.59	18	68	14	
400-405	9.17	1.48	1.64	36.99	37.29	12	85	3	
					average	14.90	76.30	8.80	

Appendix G
Plates