5-1-85

Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

APR 3 0 1985

Ms. Denise D. Fort, Director
New Mexico Environmental Improvement Division
P. O. Box 968
Santa Fe, New Mexico 87594-0968

RECEIVED

MAY 0 1 1985

HAZARDOUS WASTE SECTION

Dear Ms. Fort:

Reference: Resource Conservation and Recovery Act (RCRA) Part B Hazardous Waste Permit Application

In response to the letter of April 23, 1984, signed by Mr. Pache, of the Environment Improvement Division (EID), enclosed are one original and two copies of RCRA Part B permit application for the Los Alamos National Laboratory submitted by the Los Alamos Area Office of the Department of Energy. Since EID has been granted final authority for RCRA, the two extra copies are being provided to facilitate your review of the Part B. The Part B consists of Volume I (Chemical Waste), Volume IA (Mixed Chemical and Radioactive Waste), and Volume II (Appendices). Volume I and Volume IA are independent and each can stand alone with Volume II.

Since the rules governing the preparation and submittals of Part B permit applications for our Mixed Chemical/Radioactive Wastes are still in the process of being promulgated by EPA and DOE, our preparation of the materials in Volume IA was based on our "best professional judgement" as to what may ultimately be governed and/or required thereby. Because of the inherent uncertainties in such rule making processes, however, we find that we are unable at this time to formally sign the Volume IA permit application. You will note that the certification as to the completeness and accuracy of the furnished information has been signed, notwithstanding our inability to execute the actual application. Please do not allow our temporary inability to execute the mixed-waste portion of the Part B application to be viewed as an indication of any reluctance on our part to fully comply with both the spirit and the letter of RCRA with respect to such wastes. I want to assure you that it is not so intended. We have definitely attempted in this submittal to furnish the State and EPA with all necessary information that is pertinent to our mixed waste activities at LANL, and to your review and consideration thereof under RCRA. As soon as the necessary new rules have been promulgated, or even sooner if the requirements thereof can be anticipated with some degree of certainty in advance of their actual finalization, we will readily amend or supplement the Volume IA application in whatever manner may be necessary to fully comply with those requirements.

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We request that the incinerator portion of the Part B application be reviewed, the trial burn be scheduled, and approval to operate the incinerator be granted without delay. The Laboratory incinerator does not have INTERIM STATUS and cannot be used without final approval. As was recognized in the recent RCRA reauthorization, incineration is more desirable because it will destroy hazardous waste and thus reduce the need for landfilling hazardous wastes.

The DOE and Laboratory will cooperate with you to assure issuance of the final Part B permit without delay. As questions are formulated, we request a telephone call to help resolve any issues. If you have any questions, please call Avedon (Don) Gallegos of my staff at 667-5288. We look forward to working with your staff.

Sincerely,

Harold E. Valencia
Area Manager

Enclosures

cc:
Christopher S. Adams, Jr., ADTS, MS-A120, LANL
Jesse Aragon, HSE-DO, MS-P228, LANL
Melvin McCorkle, HSE-8, MS-E518, LANL
Allyn Davis, Director, Air and Waste Maangement Division, EPA, Dallas, TX

Project No. 846510
May, 1985

COPY

IT CORPORATION

Volume I - Text, Tables & Figures

RCRA PART B PERMIT APPLICATION

Los Alamos National Laboratory
Los Alamos, New Mexico

Prepared for:
Los Alamos National Laboratory
Waste Management Group HSE-7
Los Alamos, New Mexico 87545

Volume I - Text, Tables & Figures

RCRA PART B PERMIT APPLICATION

Any use of product trade names in this permit application is not to be construed as an endorsement of the product, either by the IT Corporation or Los Alamos National Laboratory.

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D	EPA Request for Los Alamos Part B Addressing Radioactive/ Chemical Mixed Waste
E	Department of the Army, Corps of Engineers, Floodplain Documentation
F	Physical Characteristics of the Bandelier Tuff
G	Representative Waste Inventory and Analyses
H	Sample Waste Disposal Records
I	Detailed Specifications and Plans for TA-50 Batch Treatment System
J	Incinerator Trial Burn Plan
K	Los Alamos Procedure for Operating Drum Pumps
L	Los Alamos Procedure for Identification and Segregation of Hazardous Waste
M	Bulging Drum Procedure
N	Groundwater Monitoring Waiver Request
O	Vadose Zone Monitoring Program
P	Portions of the Los Alamos Health and Safety Manual Pertaining to Waste Management Activities
Q	Manual of Fire Protection Policies and Procedures
R	Operational Safety Requirements for the Controlled-Air Incineration Process
S	Controlled-Air Incinerator Process Operating Manual
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U	Job Descriptions
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1.0 INTRODUCTION AND PART A APPLICATION

1.1 INTRODUCTION

This application was prepared for submittal to the Environmental Protection Agency (EPA) and the New Mexico Environmental Improvement Division (NMEID) in order to meet the requirements of the Resource Conservation and Recovery Act (RCRA) for a Part B Permit Application. The EPA authorization for Los Alamos to operate under interim status is included as Appendix A. The EPA formally requested the Part B permit application in a February 22, 1984 letter to the Los Alamos Laboratory Director. Subsequently, the New Mexico Environmental Improvement Division transmitted a joint call-in of the permit application to the Laboratory dated April 23, 1984. These two letters are given in Appendices B and C, respectively. More recently, in a letter of August 7, 1984, the EPA requested a Part B Permit Application from Los Alamos addressing radioactive/chemical mixed waste (Appendix D). This permit application addresses chemical waste only. As necessary, a separate permit application will be submitted to address radioactive/chemical mixed waste.

The format of the Part B application follows an outline provided in "A Guide for Preparing RCRA Permit Applications for Existing Storage Facilities", U.S. EPA, 1982. An outline of the permit application with citations of the regulations covered by each section is shown in Table 1-1. A cross reference of the EPA completeness checklist to sections of the Part B permit application is included as Table 1-2.

Los Alamos National Laboratory (Los Alamos) is a multidisciplinary laboratory (RCRA No. NM0890010515). The principal mission of the Laboratory is the design and development of weapons for the nation's nuclear arsenal; however, considerable research and development (R&D) is directed toward the development of the peaceful uses of nuclear energy including research on controlled thermonuclear reactions, fission reactors, nuclear safeguards, laser fusion, and medium energy physics.

Extensive basic research programs in physics, chemistry, metallurgy, mathematics and computers, earth sciences, and electronics support these efforts. Biomedical and environmental research includes programs in molecular biology, radiobiology, cancer therapy, radiology, and industrial hygiene. Expansion into nonnuclear areas is represented by applied technology development of solar and geothermal energy and superconducting power transmission lines.

Los Alamos is managed by the University of California for the U.S. Department of Energy (DOE) with substantial work performed for the Department of Defense and the Nuclear Regulatory Commission. The University is responsible to DOE's Los Alamos Area Office (LAAO) which reports to the DOE Albuquerque Operations Office (ALO). Although not a primary function, some hazardous waste management and storage occurs at Los Alamos. Los Alamos falls under Standard Industrial Classification (SIC) Code Number 9711, national defense organizations.

Univ. of Calif. DOE.

Much of this application was prepared from existing documentation at the Laboratory. In addition, new information was developed for this permit application.

1.2 REVISED PART A APPLICATION

The complete RCRA Part A Application Revision is included in the following pages. The original Part A Application was submitted to the EPA in November 1980.

A complete application is required

TABLE 1-1. FORMAT OUTLINE AND REGULATION REFERENCES

REPORT SECTION	RCRA REGULATION REFERENCE[1]	NMHWMR REFERENCE
1.0 INTRODUCTION AND REVISED PART A APPLICATION		
1.1 INTRODUCTION		
1.2 REVISED PART A APPLICATION	270.13	302.A.4.a
2.0 FACILITY DESCRIPTION		
2.1 GENERAL DESCRIPTION	270.14(b)(1)	302.A.4.b(1)
2.2 LOCATION INFORMATION	270.14(b)(11), 270.14(b)(19), 264.18(a),(b)	302.A.4.b(1), 206.B.8.a & b
2.3 TRAFFIC PATTERNS	270.14(b)(10)	302.A.4.b(1)
3.0 WASTE CHARACTERISTICS AND ANALYSIS PLAN		
3.1 CHEMICAL AND PHYSICAL ANALYSES	270.14(b)(2), 264.13, 264.73(b)(3)	302.A.4.b(1), 206.B.3, 203.C.2.c
3.2 WASTE ANALYSIS PLAN	270.14(b)(3), 264.13, 261 App. I	302.A.4.b(1), 206.B.3
3.3 WASTE SEGREGATION	264.13	206.B.3
4.0 WASTE MANAGEMENT PRACTICES AND FACILITIES		
4.1 TA-50 BATCH TREATMENT SYSTEM AND CONTAINER STORAGE AREA	270.15, 264.171-173, 264.175, 264.191-192	302.A.4.b(2)(a), 206.D.4.b-d, 206.D.4.f, 206.D.5.b & c
4.2 TA-55 CHEMICAL WASTE INCINERATOR	270.19, 264.340-345	302.A.4.b(2)(e), 206.D.8.a-f
4.3 TA-54, AREA L WASTE TRANSFER AND PACKAGING BUILDING	270.15, 264.171-173, 264.175	302.A.4.b(2)(a), 206.D.4.b-d, 206.D.4.f
4.4 TA-54, AREA L CONTAINER STORAGE AREA	270.15, 264.171-173, 264.175	302.A.4.b(2)(a), 206.D.4.b-d, 206.D.4.f
4.5 TA-54, AREA L LAND DISPOSAL SHAFTS	270.21, 264.301, 264.309, 264.315-316	302.A.4.b(2)(g), 206.D.10.b, 206.D.10.e, 206.D.10.i & k
5.0 GROUNDWATER MONITORING	264.90(b)(4)	206.D.1.a(2)
6.0 PROCEDURES TO PREVENT HAZARDS		
6.1 SECURITY	270.14(b)(9), 264.14	302.A.4.b(1), 206.B.6
6.2 WARNING SIGNS	264.14(c)	206.B.4.b(3)
6.3 INSPECTION SCHEDULES AND REQUIREMENTS	270.14(b)(5), 264.15, 264.33, 264.174, 264.194, 264.303, 264.347	302.A.4.b(1), 206.B.5, 206.B.9.d, 206.B.4.e, 206.D.5.d, 206.D.10.d, 206.D.8.g
6.4 PREPAREDNESS AND PREVENTION REQUIREMENTS	264.30-35	206.B.5.a-g
6.5 PREVENTIVE PROCEDURES, STRUCTURES AND EQUIPMENT	270.14(b)(8)	302.A.4.b(1)
6.6 PREVENTION OF ACCIDENTAL IGNITION OR REACTION OF IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE	270.14(b)(8), 270.15(d), 264.17, 264.176, 264.198, 264.312	302.A.4.b(1), 302.A.4.b(2)(a), 206.B.7, 206.B.4.g, 206.D.5.f, 206.D.10.c
7.0 HAZARDOUS WASTE FACILITIES CONTINGENCY PLAN		
7.1 INTRODUCTION		
7.2 HAZARDOUS WASTE EMERGENCY RESPONSE RESOURCES	264.32, 264.52(a), 264.52(e)	206.B.9.a, 206.B.10.b, 206.B.10.i
7.3 NON-SUDDEN RELEASES		
7.4 SUDDEN RELEASES	264.51, 264.52(a)	206.B.10.b-d
7.5 SPECIFIC EMERGENCY RESPONSE PROCEDURES FOR HAZARDOUS WASTE FACILITIES	270.14(b)(7), 264.56	302.A.4.b(1), 206.B.10.m
7.6 EVACUATION	264.52(f)	206.B.10.i
7.7 SALVAGE AND CLEANUP	270.14(b)(7), 264.56	302.A.4.b(1), 206.B.10.m
7.8 POST-EMERGENCY ASSESSMENT		
7.9 EMERGENCY RECORDS		
7.10 EMERGENCY REPORTS	270.14(b)(7), 264.56	302.A.4.b(1), 206.B.10.m
7.11 CONTINGENCY PLAN AMENDMENT	264.54	206.B.10.k
8.0 PERSONNEL TRAINING		
8.1 OUTLINE OF TRAINING PROGRAM	264.16(d)(2)	206.B.6.d
8.2 TRAINING CONTENT, FREQUENCY, AND TECHNIQUES	270.14(b)(12), 264.16	302.A.4.b(1), 206.B.6
8.3 EMERGENCY RESPONSE TRAINING	264.16(a)(3)	206.B.6.a
8.4 IMPLEMENTATION OF TRAINING PROGRAM	264.16(b), (c), & (e)	206.B.6.b, c & e
9.0 CLOSURE AND POST-CLOSURE PLAN	270.14(b)(13), 264.112	302.A.4.b(1), 206.D.2.c
9.1 GENERAL CLOSURE/POST-CLOSURE INFORMATION		
9.2 CLOSURE PLAN FOR THERMAL TREATMENT FACILITIES		
9.3 CLOSURE PLAN FOR TA-50 STORAGE, BATCH TREATMENT, AND INCINERATION FACILITIES		
9.4 CLOSURE AND POST-CLOSURE PLANS FOR TA-54 AREA L FACILITIES	270.14(b)(13), 270.21(e), 264.112, 264.[illegible] & [illegible]	302.A.4.b(1), 206.D.2.h, 206.D.2.[illegible], 302.A.4.b(2)(g)
10.0 OTHER FEDERAL LAWS	270.3, 270.14(b)(20)	302.A.4.b(1)
11.0 CERTIFICATION	270.11	302.B

(1) From Code of Federal Regulations 40.

TABLE 1-2.

COMPLETENESS CHECKLIST CROSS REFERENCES

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14		302.A.4.b	Part B General Information Requirements	
270.14(b)(1)		302.A.4.b(1)	• General description of the facility	2.1
270.14(b)(2)	264.13(a)	302.A.4.b(1), 206.B.3.a	• Chemical and physical analysis of hazardous wastes to be handled	3.1
270.14(b)(3)		302.A.4.b(1)	• Waste analysis plan	3.2
	264.13(b) (1)-(5)	206.B.3.b	- Analysis parameters with rationale	3.2
			- Test methods for analyzing parameters	3.2
			- Procedure for collecting representative samples	3.2
			- Frequency of analyses	3.2
			- List and description of waste analyses to be generator supplied	N/A
	264.13(b)(6) & 264.17(c)	206.B.3.b, 206.B.7	- Waste analysis procedures for ignitable, reactive, incompatible wastes	3.3
	264.13(c)	206.B.3.c	. Procedures to determine identity of each waste movement	N/A
			. Procedures for collecting representative samples	N/A
270.14(b)(4)		302.A.4.b(1)	• Security description for active portion of facility	6.1
	264.14(a)	206.B.4.a	- Security procedures waiver justification	N/A
			. Unknowing/unauthorized contact with waste not harmful	N/A
			. Unknowing/unauthorized disturbance of waste or equipment cannot cause violation of Part 264	N/A
270.14(b)(4)	264.14(b)	302.A.4.b(1), 206.B.4.b(1)-(2)	- Description of 24-hour surveillance system	6.1
			- Description of artificial or natural barriers	6.1
			- Description of controlled entry/egress procedures	6.1
	264.14(c)	206.B.4.b(3)	- Description of warning signs	6.2
			. List of languages on signs	6.2
			. Statement of 25-foot legibility	6.2
			. Description of sign locations and numbers of signs	6.2
270.14(b)(5)		302.A.4.b(1)	• General Inspection Schedule and Procedures Description	6.3
	264.15(b)(1)	206.B.5.b&c	- Written schedule	6.3
	264.15(b)(2) & 265.15(d)	206.B.5.b&c, 206.B.5.e	- Statement as to where, at facility, inspection schedule and inspection records will be kept	6.3
	264.15(b)(1)	206.B.5.b&c	- Identification of equipment/processes to be inspected	6.3
	264.15(b)(3)	206.B.5.b&c	- Identification of types of problems each equipment/process to be checked for	6.3
	264.15(b)(4)	206.B.5.b&c	- Frequency of inspections by equipment/process	6.3
	264.15(c)	206.B.5.d	- Schedule of remedial action	6.3

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(5) & 270.17(d)	264.15(a) & 264.226	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(c), 206.D.6.d	• Specific Inspection Requirements for Surface Impoundments	N/A
			- Description of procedures for	N/A
			. Inspection of liners/covers during and immediately after installation	N/A
270.14(b)(5) & 270.17(d)	264.15(a) & 264.226	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(c), 206.D.6.d	. Inspections weekly and after storms for	N/A
			- Operation of overtopping controls	N/A
			- Sudden drop in impoundment liquid level	N/A
			- Presence of liquid in leak detection system	N/A
			- Integrity of dikes/containment devices	N/A
			- Statement from qualified engineer that structural integrity of dikes will be certified upon construction completion	N/A
			- Qualified engineer's certification of dike integrity for	N/A
			. Stress	N/A
			. Piping/scouring	N/A
270.14(b)(5) & 270.18(e)	264.15(a) & 264.254	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(d), 206.D.7.e	• Specific Inspection Requirements for Waste Piles	N/A
			- Description of procedures for	N/A
			. Inspection of liners/covers during and immediately after installation	N/A
			. Inspections weekly and after storms for	
			- Operation of run-on/run-off controls	N/A
			- Liquids in leak detection system	N/A
			- Proper functioning of wind dispersal controls	N/A
			- Leachate in and proper operation of leachate collection/removal system	N/A
270.14(b)(5), 270.20(c)(5)	264.15(a) & 264.273(g)	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(f), 206.D.9.d(7)	• Specific Inspection Requirements for Land Treatment Units	N/A
			- Description of procedures for units inspected weekly and after storms for	N/A
			. Operation of run-on/run-off controls	N/A
			. Function of wind dispersal controls	N/A
270.14(b)(5) & 270.21(d)	264.15(a) & 264.303	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(g), 206.D.10.d	• Specific Inspection Requirements for Landfills	6.3.3
			- Description of procedures for	
			. Inspection of liners/covers during and immediately after installation	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			. Inspections weekly and after storms for	
			- Operation of run-on and run-off controls	6.3.3
			- Liquids in leak detection system	N/A
			- Proper functioning of wind dispersal controls	6.3.3
			- Leachate in and proper operation of leachate collection/removal system	N/A
270.14(b)(6)	Part 264 Subpart C	302.A.4.b(1), 206.B.9	• Preparedness and Prevention Documentation	6.4
			- Waiver(s) request and justification	N/A
	264.32(a)	206.B.9.c(1)	- Description of internal communications/ alarm system(s)	6.4.1
	264.34(a)	206.B.9.e	- Documentation of personnel access to internal communication/alarm system(s)	6.4.1
	264.32(b)	206.B.9.c(2)	- Description of external communications/ alarm system(s)	6.4.1
	264.34(b)	206.B.9.f	- Documentation of personnel access to external communicatons/alarm system(s)	6.4.1
270.14(b)(6)	264.32(c)	302.A.4.b(1), 206.B.9.c(3)	- Description of fire control/extinguishing, spill control, and decontamination equipment	6.4.1
	264.32(d)	206.B.9.c(4)	- Documentation of adequate water volume and pressure for above equipment	6.4.1
	264.33	206.B.9.d	- Documentation of equipment testing/ maintenance schedule and procedures	6.3
	264.35	206.B.9.g	- Documentation of adequate aisle space	6.4.2
	264.37 & 264.52(c)	206.B.9.h, 206.B.10.f	- Documentation and descriptions of arrangements or attempts at arrangements with:	
			. Police department(s)	7.2
			. Fire department(s)	7.2
			. Hospitals	7.2
			. Local emergency response teams	7.2
			. State emergency response teams	7.2
			. Emergency response contractors	7.2
			. Equipment suppliers	7.2
	264.37(a)(2)	206.B.9.h(1)-(4)	- Documentation of agreements designating primary emergency authority	App. T
270.14(b)(7)	Part 264 Subpart D	302.A.4.b(1), 206.B.10	• Contingency Plan Documentation	App. T
	264.51 & 264.52(a)	206.B.10(b)-(d)	- Criteria for implementation of contingency plan	7.4
	264.52(d)	206.B.10(g)	- Emergency Coordinators Identification	Table 7-6
			. Names	Table 7-6
			. Addresses	Table 7-6
			. Home/work phones	Table 7-6
270.14(b)(7)	264.55	302.A.4.b(1), 206.B.10(1)	. Documentation of qualifications	7.2
			. Documentation of authority	7.2
			. Description of notification procedure	7.4

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.52(e)	206.B.10.h	- Emergency equipment list	Table 7-4
			. Documentation of equipment location	7.2
			. Physical description of equipment	7.2
			. Statement of equipment capabilities	7.2
	264.52(f)	206.B.10.i	- Evacuation Plan	7.6 Table 7-7
			. Criteria for implementation	7.6
			. Description of signal(s) to implement	7.6
			. Description of primary and alternate routes	7.6
	264.53	206.B.10.j	- Contingency Plan Copy Location	7.2
			. Description of location of facility's copy of plan	7.2
			. Number of duplicate copies distributed and their location	7.2
	264.54	206.B.10.k	- Contingency Plan Amendment	7.11
			. Identification of person responsible and authorized to change/amend plan	7.11
			. Description of procedure to change/amend facility copy of plan	7.11
			. Description of procedure to insure update of all copies of plan	7.11
270.14(b)(7)	264.56	302.A.4.b(1), 206.B.10.m	- Detailed Emergency Procedures	7.5
			. Procedure for facility personnel notification	7.4
			. Procedure for state/local agency notification	7.10
			. Procedure for identification of character, source, amount, and areal extent of released materials	7.4
			. Procedure for assessment of environment/human health hazards	7.4
			. Identification of on-scene coordinator for geographic area	7.4
			. Description of specific responses and control procedures for	7.5
			- Fire	7.5
			- Explosion	7.5
			- Spill	7.5
			. Description of process shutdown and monitoring procedures	7.6
			. Description of cleanup procedures and associated material treating, storing, disposal procedures	7.7
			. Description of emergency equipment cleaning and refitting procedures	7.7
			. Description of procedures to insure incompatible waste segregation during cleanup	7.7
270.14(b)(7) & 270.17(f)	264.227	302.A.4.b(1), 206.D.6.e, 302.A.4.b(2)(c)	• Specific Contingency Plan Requirements for Surface Impoundments	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Procedure for stopping waste addition to impoundment	N/A
	264.227	206.D.6.e	- Procedure for containing leakage	N/A
			- Procedure to prevent catastrophic failure	N/A
			- Procedure for emptying impoundment	N/A
			- Procedure for recertifying and reactivating impoundment	N/A
			- Procedure for closing impoundment	N/A
[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(l) The applicant should be prepared to respond to inquiries by the permit application reviewers regarding these requirements].				
270.14(b)(8)		302.A.4.b(1)	• Preventive Procedures, Structures, and Equipment Documentation, including description of equipment/procedures to	
			- Prevent hazards during unloading operations	6.5
			- Prevent run-off and flooding	6.5
			- Prevent water supply contamination	6.5
			- Mitigate equipment failure and power outages	6.5
			- Prevent undue personnel exposure to wastes	6.5
270.14(b)(9)	264.17	302.A.4.b(1), 206.B.7	• Prevention of Accidental Ignition or Reaction Documentation	6.6
			- Description of separation and protection of ignitable, reactive, incompatible wastes	3.3, 6.6
			- Description of ignitable, reactive, incompatible wastes handling procedure	6.6
270.14(b)(9)	264.17	302.A.4.b(1), 206.B.7	- Description of number, location, and type of warning/prohibition signs	6.2
			- Documentation that procedures are adequate to prevent accidental ignitions or reactions	6.6
270.14(b)(9) 270.17(h), & 270.17(i)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(c)	• Specific Ignitable/Reactive Waste Requirements for Surface Impoundments	N/A
	264.229	206.D.6.g	- Procedures that render waste nonreactive or nonignitable	N/A
			- Procedures for preventing reactions	N/A
			- Procedures for protecting wastes	N/A
			- "Emergency use only" documentation	N/A
	264.230	206.D.6.h	- Incompatible waste segregation or protective procedures	N/A
270.14(b)(9) 270.18(g), & 270.18(h)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(d)	• Specific Ignitable/Reactive Waste Requirements for Waste Piles	N/A
	264.256	206.D.7.f	- Procedures that render waste nonreactive or nonignitable	N/A
			- Procedures for preventing reactions	N/A
			- Procedures for protecting wastes	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.257	206.D.7.g	- Incompatible waste segregation or protection procedures	N/A
270.14(b)(9) 270.20(g), & 270.20(h)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(f)	• Specific Ignitable/Reactive Waste Requirements for Land Treatment Facilities	N/A
	264.281	206.D.9.i	- Documentation that application to soil renders waste nonreactive/nonignitable and prevents reactions	N/A
			- Procedures for protecting wastes	N/A
	264.282	206.D.9.j	- Procedures which insure that incompatible wastes are not applied to same treatment zone	N/A
270.14(b)(9) 270.21(f), & 270.21(g)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(g)	• Specific Ignitable/Reactive Waste Requirements for Landfills	
	264.312	206.D.10.g	- Procedures that render wastes nonreactive and nonignitable	4.3.1
			- Procedures for preventing reactions	4.3.3
			- Procedures for protecting wastes	4.3.1
	264.313	206.D.10.h	- Procedures for insuring that incompatible wastes will not be disposed of in same landfill cell	6.6.3
	264.316 (c)-(e)	206.D.10.k (3)-(5)	- Procedures for identifying contents and insuring proper landfilling of incoming labpacks	4.3.3
270.14(b)(10)		302.A.4.b(1)	• Traffic Documentation*	2.3
			- Identification of:	
			. Waste movement routes	2.3
			. Number of movements by type vehicle	2.3
			. Quantity of waste moved per movement per vehicle	2.3
			. Traffic control sign personnel	2.3
			. Route surface composition and load bearing capacity	2.3
270.14(b)(11)		302.A.4.b(1)	• Facility Location Documentation	2.1
270.14(b)(11) (i) and (ii)		302.A.4.b(1)	- Political jurisdiction identified (new facilities only)	2.1
			- Comparison to Appendix VI of Part 264	2.2.1
			- Demonstration that faults with displacement in Holocene time are more than 3000 feet from facility	2.2.1
	264.18(a)	206.B.8.a	- Demonstration that no faults pass within 200 feet of sites where T/S/D to be conducted	2.2.1
270.14(b)(11) (iii)-(iv)	264.18(b)	302.A.4.b(1), 206.B.8.b	- Documentation of facility location relative to 100-year floodplain level or wave action flooding	2.2.2
			- Documentation that facility can withstand the 100-year flood without washout of hazardous waste by:	N/A
			- Analysis of hydrodynamic/hydrostatic forces resulting at site from 100-year flood, and	N/A

*There are no standards in Part 264 for traffic movement. The information that must be submitted with the Part B permit application, as required by §270.14(b)(10), will be used by the Agency to evaluate safety at the facility.

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Presentation of operating units and flood protection devices design and how they will prevent washout, or	N/A
			- Plan for removal of waste before washout including,	N/A
			. Timing of removal relative to flood levels	N/A
			. Estimated time to remove all waste	N/A
			. Location to which waste will be moved and proof of compliance with Parts 122 and 264 through 267 of this Chapter	N/A
			. Detailed description of personnel, equipment, and procedures for waste removal sufficient to insure availability in time for use	N/A
			. Analysis of potential for discharge during waste movement	N/A
270.14(b)(11)(v)		302.A.4.b(1)	. A plan documenting how and on what time schedule the facility will comply with §264.18(b) if not in compliance (existing facilities only)	N/A
270.14(b)(12)	264.16	302.A.4.b(1), 206.B.6	• Personnel Training Program Documentation	8.0
			- Outline of introductory and continuing personnel training programs*	8.2 & 8.4
			- Identification and qualifications of program instructor	8.2.4
			- Brief description of how training program meets actual job tasks*	8.2.3
			- Description of procedures to insure all appropriate personnel receive appropriate training and receive annual training review	8.4
			- Description of records to be kept, their location, and procedures to insure they are retained for proper length of time	8.2
270.14(b)(13)	264.112	302.A.4.b(1), 206.D.2.c	• Closure Plan Documentation	9.0
			- Description of partial and final closure procedures	9.1
			- Description of maximum unclosed portion during facility life	9.1.3
			- Estimate of maximum waste inventory in storage/treatment during facility life	9.1, 9.2, 9.3, 9.4
	264.114	206.D.2.e	- Equipment decontamination procedure	9.4
			- Estimated year of closure	9.1.2
	264.113	206.D.2.d	- Description of closure schedule including	
			. Total time to close	9.2.1.2, 9.2.2.2, 9.3.1.2, 9.3.2.2, 9.4.1.2, 9.4.2.2, 9.4.3.1

*This documentation on Personnel Training must be included in the application. The remaining three items may be included at the applicant's discretion.

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(13)	264.113	302.A.4.b(1), 206.D.2.d	. Trackable intervening closure activities	9.2.1.2, 9.2.2.2, 9.3.1.2, 9.3.2.2, 9.4.1.2, 9.4.2.2, 9.4.3.1
			- Location(s) and number of copies of closure plan	9.1.7
			- Identification of person responsible for storage and updating of facility copy of closure plan	9.1.7
			- Procedure for updating all other copies of closure plan	9.1.7
270.14(b)(13) & 270.17(g)	264.112 & 264.338(a)	302.A.4.b(1), 206.D.2.c 302.A.b(2)(c)	• Specific Closure Plan Requirements for Surface Impoundments	N/A
			- Procedures for removal and/or decontamination of all wastes and materials/equipment associated with the impoundment, or	N/A
			- Detailed plans and engineering reports describing:	N/A
			. Elimination of free liquids	N/A
			. Stabilization of remaining wastes	N/A
			. Design of final cover demonstrating:	N/A
			- Liquid migration minimization	N/A
			- Function with minimum maintenance	N/A
			- Drainage promotion	N/A
			- Erosion/abrasion minimization	N/A
			- Settling/subsidence accommodation	N/A
			- Permeability less than liner or subsoils	N/A
270.14(b)(13) & 270.18(i)	264.112	302.A.4.b(1), 206.D.2.c, 302.A.4.b(2)(d)	• Specific Closure Plan Requirements for Waste Piles	N/A
	264.258(a)	206.D.7.h(1)	- Procedure for removal and/or decontamination of all wastes and materials/equipment associated with the waste pile	N/A
	264.258(b)	206.D.7.h(2)	- Procedure for closing in conformance with landfill closing requirements	N/A
270.14(b)(13) & 270.20(f)	264.112	302.A.4.b(1), 206.D.2.c, 302.A.4.b(2)(f)	• Specific Closure Plan Requirements for Land Treatment Facilities	N/A
	264.280(a)	206.D.9.h(1)	- Procedures to maximize degradation of waste in treatment zone	N/A
			- Procedures to minimize run-off	N/A
			- Run-off system maintenance procedures	N/A
			- Wind dispersal control procedures	N/A
			- Procedures for compliance with food-chain crop growth	N/A
			- Procedures for unsaturated zone monitoring	N/A
			- Description of vegetative cover	N/A
			- Procedures for establishing vegetative cover	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(13) & 270.21(e)	264.112 & 264.310(a)	302.A.4.b(1), 206.D.2.c, 302.A.4.b(2)(g), 206.D.10.f(1)	• Specific Closure Plan Requirements for Landfills	9.4
			- Detailed plans and an engineering report which details the final cover components in detail	9.4
			- Documentation that the final cover will:	9.4
			. Provide long-term minimization of migration of liquids through closed landfill	9.4
			. Function with minimum maintenance	9.4
			. Promote drainage and minimize erosion/abrasion	9.4
			. Settle/subside without losing integrity	9.4
			. Be less permeable than bottom liners or subsoils	9.4
270.14(b)(13)	264.117 & 264.118	302.A.4.b(1), 206.D.2.g, 206.D.2.h	• Post-Closure Plan Documentation	9.4
			- Description of groundwater monitoring activities and frequencies	9.4
			- Description of maintenance activities and frequencies for:	9.4
			. Final containment structures	9.4
			. Facility monitoring equipment	9.4
			- Location(s) and number of copies of post-closure plan	9.1.12
			- Identification and location (address and phone number) of person responsible for storage and updating of facility copy of post-closure plan prior to closure	9.1, 9.1.12
			- Identification and location (address and phone number) of person responsible for storage and updating of facility copy of post-closure plan during post-closure period)	9.1.7
			- Procedure for updating all other copies of post-closure plan	9.1.7
270.14(b)(13) 270.17(g)	264.118 & 264.228(b)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2)(c), 206.D.6.f(2)	• Specific Post-Closure Plan Requirements for Surface Impoundments	N/A
			- Procedures for maintenance and repair of final cover	N/A
			- Procedures for maintenance and monitoring of leak detection system	N/A
			- Procedures for maintenance and monitoring of groundwater monitoring system	N/A
			- Procedures for compliance with Subpart F	N/A
			- Procedures for preventing run-on/ run-off final cover damage	N/A
270.14(b)(13) 270.18(i)	264.118 & 264.258(b)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2), 206.D.7.h	• Specific Post-Closure Plan Requirements for Waste Piles	N/A
			- Procedures for post-closure care that meet the requirements for landfills	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(13) 270.20(f)	264.118 & 264.280(c)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2)(f), 206.D.9.h	• Specific Post-Closure Plan Requirements for Land Treatment Facilities	N/A
			- Procedures to enhance degradation of wastes in treatment zone	N/A
			- Procedure for maintaining vegetative cover	N/A
			- Procedure for maintaining run-on controls	N/A
			- Procedure for maintaining run-off controls	N/A
			- Procedures for wind dispersal control	N/A
			- Procedures to insure compliance with food-chain crop prohibitions	N/A
			- Procedures for unsaturated zone monitoring	N/A
270.14(b)(13) 270.21(e)	264.118 & 264.310(b)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2)(g), 206.D.10.f(2)	• Specific Post-Closure Plan Requirements for Landfills	
			- Procedures for maintenance and repair of final cover	9.4
			- Monitoring and maintenance procedures for leak detection system	N/A
			- Procedure for leachate collection/ removal system operation	N/A
			- Procedures to maintain and monitor groundwater monitoring system	9.4
			- Procedures for compliance with Subpart F	9.4
			- Procedures for preventing final cap erosion due to run-on and run-off	9.4
			- Procedures for protection and maintenance of benchmarks	9.4
	264.310(c)	206.D.10.f(3)	- Procedures to be undertaken if liquid is found in leak detection system	N/A
270.14(b)(14)	264.120	302.A.4.b(1), 206.D.2.j	• Documentation of Notice on Deed (existing facilities only)	9.1.9
			- Statement that land used to manage wastes	9.1.9
			- Statement of restricted use per §264.117(c)	9.1.9
	264.119	206.D.2.i	- Documentation of type, location, and quantity of wastes filed with local authority and EPA Regional Administrator	9.1.9
270.14(b)(15)	264.142	302.A.4.b(1), 206.D.3.c	• Closure Cost Estimate	9.1.3
	264.143 & 264.146	206.D.3.d, 206.D.3.g	• Documentation of a financial assurance mechanism for closure that is:	N/A
	264.151(a)	206.D.3.j(1), (a)&(b)	- Closure trust fund	N/A
	264.151(b)	206.D.3.j(2)	- Surety bond guaranteeing payment	N/A
	264.151(c)	206.D.3.j(3)	- Surety bond guaranteeing performance	N/A
	264.151(d)	206.D.3.j(4)	- Closure letter of credit	N/A
	264.151(e)	206.D.3.j(5)	- Closure insurance	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.151(f) & (h)	206.D.3.j (6)&(8)	- Financial test and corporate guarantee	N/A
			- Multiple financial mechanism for one facility	N/A
			- Single financial mechanism for multiple facilities	N/A
270.14(b)(16)	264.144	302.A.4.b(1), 206.D.3.e	• Post-Closure Cost Estimate	9.1.3
	264.145 & 264.146	206.D.3.f&g	• Documentation of a financial assurance mechanism for post-closure that is:	9.1.3
	264.151(a)	206.D.3.j(1) (a)&(b)	- Closure trust fund	N/A
	264.151(b)	206.D.3.j(2)	- Surety bond guaranteeing payment	N/A
	264.151(c)	206.D.3.j(3)	- Surety bond guaranteeing performance	N/A
	264.151(d)	206.D.3.j(4)	- Post-closure letter of credit	N/A
	264.151(e)	206.D.3.j(5)	- Post-closure insurance	N/A
	264.151(f) & (h)	206.D.3.j (6)&(8)	- Financial test and corporate guarantee	N/A
			- Multiple financial mechanism for one facility	N/A
			- Single financial mechanism for multiple facilities	N/A
270.14(b)(17)	264.147	302.A.4.b(1)	• Documentation of Insurance	N/A
			- Request for variance from insurance	N/A
	264.151(i) & (j)	206 D.3.j (9)&(10)	- Insurance for sudden/accidental occurrences	N/A
			- Insurance for nonsudden/accidental occurrences	N/A
	264.151(g)	206.D.3.j(7)	- Financial test for liability coverage	N/A
270.14(b)(18)	264.149	302.A.4.b(1)	• Documentation of a State Required Financial Mechanism for Closure, Post-Closure, or Liability including	9.1.3
			- EPA I.D. number	N/A
			- Facility name	N/A
			- Facility address	N/A
			- Amounts of liability coverage or funds assured	N/A
	264.150	None	• Documentation of State Assumed Responsibility for Closure, Post-Closure or Liability including	9.1.3
			- Letter from State describing State's responsibilities	N/A
			- Facility EPA I.D. number	N/A
			- Facility name	N/A
			- Facility address	N/A
			- Amounts of liability coverage or funds assured	N/A
270.14(b)(19)		302.A.4.b(1)	• Topographic map showing a distance of 1000 feet around facility at a scale of not more than 1 inch equals 200 feet that clearly shows:	
			- Contours	2.1.7
			- Proper contour intervals	2.1.7
			- Map scale and date	2.1.7

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- 100-year flood plain area	2.2.2
			- Surface waters & intermittent streams	2.1.7
			- Surrounding land uses	2.1.7 & 2.1.10
270.14(b)(19)		302.A.4.b(1)	- Wind rose	2.1.9
			- North orientation	2.1.7
			- Legal boundaries of facility site	2.1
			- Access control	2.1.7
			- Injection and withdrawal wells onsite and offsite	2.1.8
			- Buildings and recreation areas	2.1.7
			- Runoff control systems	
			- Access and internal roads	2.1.7
			- Storm, sanitary, and process sewerage systems	
			- Loading and unloading areas	
			- Fire control facilities	Fig. 7-2
			- Barriers for drainage or flood control	
			- Location of past or present operational units and equipment cleanup areas	2.1
270.17		302.A.4.b(2)(c)	• Specific Part B Information Requirements for Surface Impoundments	N/A
270.17(a)		302.A.4.b(2)(c)	- List of hazardous wastes placed or to be placed in impoundment	N/A
270.17(b)	264.221	302.A.4.b(2)(c), 206.D.6.b	- Detailed plans and an engineering report describing:	N/A
270.17(b)(i)	264.221(a)	302.A.4.b(2)(c), 206.D.6.b(1)	. Liner system construction (new only)	N/A
	264.221(a)(1)	206.D.6.b(1)	- Material of construction	N/A
			- Chemical properties	N/A
270.17(b)(1)		302.A.4.b(2)(c)	- Physical strength	N/A
			- Thickness	N/A
	264.221(a)(2)	206.D.6.b(1)	- Foundation design/integrity	N/A
	264.221(a)(3)	206.D.6.b(1)	- Area covered	N/A
	264.221(a)(1)	206.D.6.b(1)	. Liner system integrity against (new only)	N/A
			- Internal and external pressure gradients	N/A
			- Contact with waste/leachate	N/A
			- Climatic conditions	N/A
			- Installation stresses	N/A
			- Daily operational stresses	N/A
	264.221(b)	206.D.6.b(2)	. Liner system exemption including	N/A
			- Nature and quantity of wastes	N/A
			- Alternative design and operation	N/A
			- Impoundment location description	N/A
			. Hydrogeologic setting	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			• Attenuative capacity of materials between impoundment and groundwater and surface water	N/A
			- Documentation of no migration to ground/surface waters at any future time	N/A
270.17(b)(2)	264.221(c)	302.A.4.b(2)(c), 206.D.6.b(3)	• Procedures/equipment to prevent overtopping from:	N/A
			- Normal operation	N/A
			- Abnormal operation	N/A
			- Overfilling	N/A
			- Wind/wave action	N/A
			- Rainfall	N/A
			- Run-on	N/A
			- Equipment malfunctions	N/A
			- Human error	N/A
270.17(b)(3)	264.221(d)	302.A.4.b(2)(c), 206.D.6.b(4)	• Structural integrity of dikes	N/A
270.17(c)	264.222(a)	302.A.4.b(2)(c), 206.D.6.c(1)	- Documentation for Part 264, Subpart F exemption including,	N/A
			• Impoundment and liner location above seasonal highwater table	N/A
			• Two liners meeting 264.221(a) requirements	N/A
			• Leak detection system between liners	N/A
270.18		302.A.4.b(2)(d)	• Specific Part B Information Requirements for Waste Piles	N/A
270.18(a)		302.A.4.b(2)(d)	- List of hazardous wastes placed or to be placed in each waste pile	N/A
270.18(b)	264.250(c)	302.A.4.b(2)(d), 206.D.7.a(3)	- Documentation of general exemption from §264.251 and Part 264, Subpart F, including,	N/A
			• Waste pile protection from precipitation	N/A
			• Procedures for insuring liquids are not placed in pile	N/A
			• Description of run-on controls	N/A
			• Description of wind dispersal controls other than wetting	N/A
			• Decomposition/reactions do not cause leachate generation	N/A
270.18(c)	264.251(a)	302.A.4.b(2)(d), 206.D.7.b(1)	- Detailed plans and an engineering report describing,	N/A
270.18(c)(1)	264.251(a)(1)	302.A.4.b(2)(d), 206.D.7.b(1)	• Liner system construction (new only)	N/A
	264.221(a)	206.D.6.b(1)	- Material of construction	N/A
			- Chemical properties	N/A
			- Physical strength	N/A
			- Thickness	N/A
			- Foundation design/integrity	N/A
			- Area covered	N/A
			• Liner system integrity against (new only)	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Internal and external pressure gradients	N/A
			- Contact with waste/leachate	N/A
			- Climatic conditions	N/A
			- Installation stresses	N/A
			- Daily operational stresses	N/A
	264.251(a)(2)	206.D.7.b(1)	. Leachate collection and removal system to maintain less than one foot of leachate on liner including,	N/A
			- Materials of construction	N/A
270.18(c)(1)		302.A.4.b(2)(d)	- Chemical resistance to waste/leachate	N/A
			- Strength sufficient to prevent collapse	N/A
			- Provisions to prevent clogging	N/A
	264.251(b)	206.D.7.b(2)	. Liner system/leachate system exemption including,	N/A
			- Nature and quantity of wastes	N/A
			- Alternative design and operation	N/A
			- Pile location description	N/A
			. Hydrogeologic setting	N/A
			. Attenuative capacity of materials between pile, ground and surface waters	N/A
			- Documentation of no migration to ground/surface waters at any future time	N/A
270.18(c)(2)	264.251(c)	302.A.4.b(2)(d), 206.D.7.b(3)	. System for control of run-on from peak discharge of a 25-year storm	N/A
270.18(c)(3)	264.251(d)	302.A.4.b(2)(d), 206.D.7.b(4)	. System for control of run-off water volume of a 24-hour, 25-year storm	N/A
270.18(c)(4)	264.251(e)	302.A.4.b(2)(d), 206.D.7.b(5)	. Procedures to manage collection and holding facilities associated with run-on and run-off control systems	N/A
270.18(d)	264.251(f)	302.A.4.b(2)(d), 206.D.7.b(6)	. Wind dispersal control procedures	N/A
270.18(d)	264.252(a)	302.A.4.b(2)(d), 206.D.7.c(1)	- Documentation for Part 264, Subpart F exemption including,	N/A
			. Pile and liners above seasonal high water table	N/A
270.18(d)		302.A.4.b(2)(d)	. Two liners meeting requirements of §264.251(a)(1)	N/A
			. Leak detection system between liners	N/A
			. Leachate system meeting §264.251(a)(2) requirements	N/A
	264.253(b)	206.D.7.d(2)	- Documentation for Part 264, Subpart F exemption including,	N/A
			. Pile and liners above seasonal high water table	N/A
			. Liner meets §264.251(a)(1) requirements	N/A
			. Soil characteristics/depths	N/A
			. Leachate system meets §264.251(a)(2) requirements	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			. Schedule/procedures for liner inspection by waste removal	N/A
			. Sufficient liner strength/thickness to allow periodic removal/replacement of wastes	N/A
270.18(f)		302.A.4.b(2)(d)	- Description of treatment carried out in or on the pile including,	N/A
			. Details of treatment process	N/A
			. Equipment used	N/A
			. Nature and quality of residuals	N/A
270.20		302.A.4.b(2)(f)	• Specific Part B Information Requirements for Land Treatment Facilities	N/A
270.20(a)		302.A.4.b(2)(f)	- Description of treatment demonstration plans by	N/A
	264.272(b)	206.D.9.c(2)	. Field test	N/A
270.20(a)		302.A.4.b(2)(f)	. Laboratory analysis	N/A
			. Available data	N/A
			. Operating data (existing units only)	N/A
			- Submittal for laboratory analyses or field test demonstration permit including,	N/A
	264.272(c)	206.D.9.c(3)	. Documentation of accurate simulation	N/A
	264.272(c)	206.D.9.c(3)	- Wastes and hazardous constituents descriptions (Part 261, Appendix VIII)	N/A
			- Climatologic information	N/A
			- Topographical data	N/A
			- Operating practices	N/A
			- Type of test to be conducted	N/A
			- Test materials and methods	N/A
			- Expected completion time	N/A
			. Statement on appropriateness of demonstration	N/A
			. Statement on human health and environment protection considering,	N/A
			- Characteristics of wastes to be tested	N/A
			- Operating and monitoring during tests	N/A
			- Duration of test	N/A
			- Volume of waste used in test	N/A
			- Potential for hazardous waste migration to ground/surface waters (field tests only)	N/A
270.20(b)	264.271(a)	302.A.4.b(2)(f), 206.D.9.b(1)	- Description of land treatment program	N/A
			. Wastes to be land treated	N/A
			. Design measures to maximize treatment including,	N/A
270.20(b)(2)(i)	264.273(a)	302.A.4(2)(f), 206.D.9.d(1)	- Rate and method of waste application	N/A
			- Soil pH control measures	N/A
			- Microbial/chemical reaction enhancements	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Treatment zone moisture control measures	N/A
270.20(b)(3)	264.278(a)-(f)	302.A.4.b(2)(f), 206.D.9.f(1)-(6)	. Unsaturated zone monitoring procedures including,	N/A
			- List of and rationale for selecting compounds to be monitored	N/A
			- Monitoring equipment, procedures, frequency	N/A
			- Procedures for selecting sampling locations	N/A
			- Samples collection procedures	N/A
			- Sample preservation/shipment procedures	N/A
			- Sample chain of custody control	N/A
			- Sample analysis procedures	N/A
			- Background value determination procedures	N/A
			- Statistical methods description	N/A
270.20(b)(4)		302.A.4.b(2)(f)	. List of hazardous constituents expected to be in, or derived from, wastes to be land treated	N/A
270.20(b)(5)	264.271(c)	302.A.4.b(2)(f), 206.D.9.b(3)	. The proposed vertical and horizontal dimensions of the treatment zone with maximum depth of	N/A
			- No more than 5 feet from the initial soil surface	N/A
			- More than 3 feet above the seasonal high water table	N/A
270.20(c)	264.273(b)-(f)	302.A.4.b(2)(f), 206.D.9.d(2)-(6)	- Description of land treatment unit design	N/A
			. Procedures/equipment to prevent run-on from peak discharge of 25-year storm	N/A
			. Procedures/equipment to collect and control the run-off water volume from a 24-hour, 25-year storm	N/A
			. Procedures/equipment to minimize run-off from treatment zone during active life	N/A
			. Run-on and run-off collection and control systems management plan	N/A
			. Procedures/equipment for wind dispersal control	N/A
270.20(d)	264.276(a)	302.A.4.b(2)(f), 206.D.9.e(1)	- Documentation of request for growth of food-chain crops on treatment zone not receiving cadmium in wastes	N/A
270.20(d)	264.276(a)	302.A.4.b(2)(f), 206.D.9.c(1)	- Statement that demonstration of no risk to human health will be conducted by,	N/A
			. Field tests	N/A
			. Greenhouse studies	N/A
			. Available data	N/A
			. Operating data (existing only)	N/A
			- Demonstration program description, including,	N/A
			. Soil pH	N/A
			. Cation exchange capacity of soil	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			. Specific wastes to be applied	N/A
			. Waste application rates	N/A
			. Waste application methods	N/A
			. Identification of demonstration crops	N/A
			- Planting and growth procedures	N/A
			- Characteristics of crop	N/A
			- Sample selection criteria	N/A
			- Sample collection procedure	N/A
			- Sample size	N/A
			- Analyses methods	N/A
			- Statistical data evaluation procedures	N/A
			. Identification of comparison crops	N/A
			- Characteristics of crop	N/A
270.20(d)	264.276(a)	302.A.4.b(2)(f), 206.D.9.e(1)	- Planting and growth procedures	N/A
			- Conditions of growth	N/A
			- Sample selection criteria	N/A
			- Sample collection procedures	N/A
			- Sample size	N/A
			- Analyses methods	N/A
			- Statistical data evaluation procedures	N/A
			. Request for a permit to conduct demonstration program	N/A
270.20(e)	264.276(b)	302.A.4.b(2)(f), 206.D.9.e(2)	- Documentation of request for growth of food-chain crops on treatment zone if wastes contain cadmium	N/A
			. Cadmium concentration in waste	N/A
			. Soil pH	N/A
			. Annual application of cadmium in kilograms per hectare	N/A
			. Soil cation exchange capacity	N/A
			. Identification of animal feeds to be grown	N/A
			. Plan to prevent animal feed ingestion by humans	N/A
			. Documentation of notice on deed	N/A
270.21		302.A.4.b(2)(g)	• Specific Part B Information Requirements for Landfills	
270.21(a)		302.A.4.b(2)(g)	- List of hazardous wastes to be placed in each landfill cell	2.1.5.3 & 2.1.6
270.21(b)	264.301(a)	302.A.4.b(2)(g), 206.D.10.b(1)	- Detailed plans and an engineering report describing	N/A
270.21(b)(1)	264.301(a)(1)	302.A.4.b(2)(g), 206.D.10.b(1)(a)	. Liner system construction (new only)	N/A
			- Material of construction	N/A
			- Chemical properties	N/A
			- Physical strength	N/A
			- Thickness	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Foundation design/integrity	N/A
			- Area covered	N/A
			. Liner system integrity against (new only)	N/A
			- Internal and external pressure gradients	N/A
			- Contact with waste/leachate	N/A
			- Climatic conditions	N/A
			- Installation stresses	N/A
			- Daily operational stresses	N/A
	264.301(a)(2)	206.D.10.b(1)(b)	. Leachate collection and removal system to maintain less than one foot of leachate on liner including,	N/A
			- Materials of construction	N/A
			- Chemical resistance to waste/leachate	N/A
			- Sufficient strength to prevent collapse	N/A
270.21(b)(1)		302.A.4.b(2)(g), 206.D.10.b(2)	- Provisions to prevent clogging	N/A
	264.301(b)		. Liner system/leachate system exemption including,	N/A
			- Nature and quantity of wastes	N/A
			- Alternative design and operation	N/A
			- Landfill location description	N/A
			. Hydrogeologic setting	N/A
			. Attenuative capacity of materials between landfill and ground and surface waters	N/A
			- Documentation of no migration to ground/surface waters at any future time	N/A
270.21(b)(2)	264.301(c)	302.A.4.b(2)(g), 206.D.10.b(3)	. System for control of run-on from peak discharge of a 25-year storm	6.5.3
270.21(b)(3)	264.301(d)	302.A.4.b(2)(g), 206.D.10.b(4)	. System control of run-off water volume from a 24-hour, 25-year storm	6.5.3
270.21(b)(4)	264.301(e)	302.A.4.b(2)(g), 206.D.10.b(5)	. Procedures to manage collection and holding facilities associated with run-on and run-off control systems	6.5.3
270.21(b)(5)	264.301(f)	302.A.4.b(2)(g), 206.D.10.b(6)	. Wind dispersal control procedures	6.5.3
270.21(c)	264.302(a)	302.A.4.b(2)(g), 206.D.10.c(1)	- Documentation for Part 264, Subpart F exemption including,	N/A
			. Landfill and liners above seasonal high water table	N/A
			. Two liners meeting requirements of §264.301(a)(1)	N/A
			. Leak detection system between liners	N/A
			. Leachate system meeting §264.301(a)(2)	N/A
270.21(h)	264.314	302.A.4.b(2)(g), 206.D.10.i	- Documentation of procedures/equipment for landfilling liquid wastes	N/A
270.21(i)	264.315	302.A.4.b(2)(g), 206.D.10.j	- Documentation of procedures/equipment for landfilling containers	4.3.1

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(c)	Part 264 Subpart F	302.A.4.b(3), 206.D.1.a-k,	Part B Protection of Ground Water Information Requirements for Surface Impoundments, Waste Piles, Land Treatment Units, and Landfills	N/A*
270.14(c)(1)		302.A.4.b(3)	• Interim status period groundwater monitoring data summary	N/A*
270.14(c)(2)		302.A.4.b(3)	• Identification of uppermost and hydraulically interconnected aquifers under facility including,	N/A*
			- Water flow rate and direction	N/A*
			- Bases for identification	N/A*
270.14(c)(3), 270.14(b)(19)		302.A.4.b(3), 302.A.4.b(1)	• Topographic map	N/A*
			- Delineation of property boundary	N/A*
	264.95(b)	206.D.1.f(2)	- Delineation of waste management area	N/A*
	264.95(a)	206.D.1.f(1)	- Delineation of proposed point of compliance	N/A*
			- Groundwater monitoring well locations	N/A*
			- Location of aquifers	N/A*
270.14(c)(4)		302.A.4.b(3)	• Descriptions of existing contamination	N/A*
			- Delineation of plume extent	N/A*
			- Appendix VIII constituents concentrations	N/A*
			. Concentrations throughout plume	N/A*
			. Maximum concentrations in plume	N/A*
270.14(c)(5)	264.97	302.A.4.b(3), 206.D.1.h	• Detailed plans and an engineering report of Groundwater Monitoring Program	N/A*
	264.97(a)	206.D.1.h(1)	- Description of wells	N/A*
			. Number of wells	N/A*
			. Locations	N/A*
			. Depths	N/A*
			. Assurance of unaffected background water measurement	N/A*
			. Assurance of compliance point ground water measurement	N/A*
	264.97(c)	206.D.1.h(3)	. Casing description	N/A*
	264.97(d)	206.D.1.h(4)	- Description of sampling/analysis procedures	N/A*
			. Sample collection methods	N/A*
			. Sample preservation/shipment	N/A*
			. Analytical procedures	N/A*
			. Chain of custody control	N/A*
	264.97(e)	206.D.1.h(5)	- Documentation of proper/adequate analytical procedures	N/A*
	264.97(f)	206.D.1.h(6)	- Procedure for determination of groundwater elevation with each sample	N/A*
270.14(c)(6)	264.91(a)(4) and 264.98	302.A.4.b(3), 206.D.1.b(1) 206.D.1.i	• Description of Detection Monitoring Program including,	N/A*
270.14(c)(6)(i)	264.93 and 264.98(a)	302.A.4.b(3), 206.D.1.d, 206.D.1.i(1)	- List of indicator parameters, waste constituents, reaction products to be monitored for, including	N/A*

*Waiver requested (see Appendix N)

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			• Type, quantities, concentrations expected in wastes	N/A*
			• Mobility, stability, persistence in unsaturated zone	N/A*
			• Detectability in groundwater	N/A*
270.14(c)(6) (iii)	264.98(a)(4), 264.98(c)(1)	302.A.4.b(3), 206.D.1.i(1), 206.D.1.i(3)	• Background groundwater concentration values and coefficients of variation established by	N/A*
	264.98(c)(3)	206.D.1.i(3)	- Use of an appropriate groundwater monitoring system, and	N/A*
	264.97(g)(1)	206.D.1.h(7)	- Quarterly sampling of upgradient wells for one year, or	N/A*
	264.97(g)(3)	206.D.1.h(7)	- Quarterly sampling of other wells for one year, and	N/A*
	264.97(g)(4)	206.D.1.h(7)	- Data from a minimum of one sample/ well and minimum of four samples per quarter, or	N/A*
			- Presentation of procedures to calculate such values	N/A*
270.14(c)(6)	264.98(b)	302.A.4.b(3), 206.D.1.i(2)	• Description of an appropriate groundwater monitoring system to be installed at the compliance point	N/A*
270.14(c)(6) (iv)	264.98(d)	302.A.4.b(3), 206.D.1.i(4)	• Procedures for collecting semi-annual groundwater samples at the compliance point during	N/A*
			- Active life	N/A*
			- Closure period	N/A*
			- Post-closure period	N/A*
	264.98(e)	206.D.1.i(5)	• Procedure for annual determination of uppermost aquifer flow rate and direction	N/A*
	264.98(f) & 264.97(d)&(e)	206.D.1.i(6), 206.D.1.i(4)-(5)	• Documentation of sample collection and analysis procedures	N/A*
	264.98(g)	206.D.1.i(7)	• Procedure for determining a statistcally significant increase for any monitored parameter or constituent by	N/A*
			- Comparing compliance point data to background value data using the procedures in §264.97(h)(1) or (2), and	N/A*
			- Providing an estimate of the time period after sampling completion necessary to obtain results	N/A*
270.14(c)(6)	264.98(h)	302.A.4.b(3), 206.D.1.i(8)	• Procedure to be implemented if a statistically significant increase in any constituent or parameter is identified at any compliance point monitoring well, including	N/A*
	264.98(h)(1)	206.D.1.i(8)	- Written notification to Regional Administrator	N/A*
	264.98(h)(2)	206.D.1.i(8)	- Sample collection and analysis methods for all Appendix VIII constituents at all monitoring wells	N/A*
	264.98(h)(3)	206.D.1.i(8)	- Method for establishing Appendix VIII constituent background values	N/A*
	264.98(h)(4)	206.D.1.i(8)	- Preparation of an application for permit modification to establish compliance monitoring	N/A*

*Waiver requested (see Appendix N)

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(c)(7)	264.91(a)(1) and 264.99	302.A.4.b(3), 206.D.1.b(1), 206.D.1.j	• Description of Compliance Monitoring Program, including	N/A*
			- List of wastes previously handled at facility	N/A*
			- Characterization of contaminated groundwater	N/A*
			. Hazardous constituents identified	N/A*
			. Hazardous constituents concentrations	N/A*
	264.99(b)	206.D.1.j(2)	- Description of compliance monitoring system at the compliance point	N/A*
			- List of hazardous constituents to be compliance monitored	N/A*
	264.96	206.D.1.g	- Proposed compliance period	N/A*
	264.99(d)	206.D.1.j(4)	- Procedure for collecting quarterly samples at compliance point during compliance period	N/A*
	264.99(c)(3)	206.D.1.j(3)	- Procedures for establishing background concentration values for constituents that are based on	N/A*
			. Use of an appropriate groundwater monitoring system, and	N/A*
	264.97(g)	206.D.1.h(7)	. Data that is available prior to permit issuance	N/A*
			. Data that accounts for measurement errors in sampling and analysis	N/A*
			. Data that accounts for seasonal groundwater quality fluctuations	N/A*
			. Data from a minimum of one sample per well and a minimum of four samples from monitoring system, each time system is sampled	N/A*
270.14(c)(7)(iv)	264.92 and 264.99(c)(1),(2)	302.A.4.b(3), 206.D.1.c, 206.D.1.j(3)	- Proposed concentration limits for constituents with justification based on	N/A*
			. §264.94(a)(1) and §264.97(g)	N/A*
			. §264.94(a)(2)	N/A*
			. §264.94(b) and §264.99(c)(1)	N/A*
	264.99(e)	206.D.1.j(5)	- Procedure for annual determination of uppermost aquifer flow rate & direction	N/A*
	264.99(f)	206.D.1.j(6)	- Procedures for annual testing of all compliance point wells for Appendix VIII constituents	N/A*
	264.99(g)	206.D.1.j(7)	- Documentation of all sampling and analysis procedures	N/A*
	264.99(h)	206.D.1.j(8)	- Procedures for determining a statistically significant increase for any monitored constituent by	N/A*
			. Comparing compliance point data to the concentration limit using the procedure in §264.97(h)(2)	N/A*
			. Providing an estimate of the time period after sampling completion necessary to obtain results	N/A*
	264.99(i)	206.D.1.j(9)	- Procedures to be implemented if the groundwater protection standard is exceeded at any compliance point monitoring well, including	N/A*

*Waiver requested (see Appendix N)

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.99(i)(1)	206.D.1.j(9)	. Written notification to Regional Administrator	N/A*
	264.99(i)(2)	206.D.1.j(9)	. Preparation of an application for permit modification to establish a corrective action program, including	N/A*
			- Details of program to comply with groundwater protection standard	N/A*
270.14(c)(7)(v)	264.99(i)(2)(ii)	302.A.4.b(3), 206.D.1.j(9)	- Details of groundwater monitoring to demonstrate effectiveness of program	N/A*
270.14(c)(8)	264.91(a) and 264.100	302.A.4.b(3), 206.D.1.b(1), 206.D.1.k	• Description of Corrective Action Program, including	N/A*
270.14(c)(8)(i)		302.A.4.b(3)	- Characterization of contaminated groundwater	N/A*
	264.100(a)(1)	206.D.1.k(1)	. Identified hazardous constituents	N/A*
			. Concentrations of hazardous constituents	N/A*
270.14(c)(8)(ii)	264.100(a)(2)	302.A.4.b(3), 206.D.1.k(1)	- Concentration limit for each hazardous constituent	N/A*
270.14(c)(8)(iii)	264.100(b)	302.A.4.b(3), 206.D.1.k(2)	- Detailed plan and an engineering report describing the corrective actions to be taken at the compliance points	N/A*
	264.100(c)	206.D.1.k(3)	- Time period necessary to implement corrective action program	N/A*
270.14(c)(8)(iv)	264.100(d)	302.A.4.b(3), 206.D.1.k(4)	- Description of groundwater monitoring program that will be sufficient to assess the adequacy of corrective action	N/A*
	264.91(a)(3), 264.100(e)	206.D.1.b(1), 206.D.1.k(5)	- Description of the corrective action to be taken for constituents in groundwater between compliance point and downgradient facility boundary	N/A*
	264.100(g)	206.D.1.k(7)	- Procedure and content for semi-annually submitting written reports to the Regional Administrator on program effectiveness	N/A*
			Part B Certification and Signatories	
270.11(d)		302.B.4	• Certification paragraph	11.0
270.11(a)		302.B.1	• Appropriate signatory	11.0

*Waiver requested (see Appendix N)

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

S														T/A	C
F	N	M	0	8	9	0	0	1	0	5	1	5			1

1 2 - 12 14 15

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS
23	24 - 29	

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)* 71

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

YR.	MO.	DAY
73 74	75 76	77 78

☐ 2. NEW FACILITY *(Complete item below.)* 71

FOR NEW FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

YR.	MO.	DAY
73 74	75 76	77 78

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

☒ 1. FACILITY HAS INTERIM STATUS 72

☐ 2. FACILITY HAS A RCRA PERMIT 72

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. PROCESS CODE – Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

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

1. AMOUNT – Enter the amount.
2. UNIT OF MEASURE – For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING ITEM III *(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.

DUP T/A C 1

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)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G	
X-2	T 0 3	20	E	
1	S 0 1	18320	G	
2	D 8 0	100	B	
3	0 1	7680	U	
4	T 0 4	NA (SEC IIIC)		

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	B. PROCESS DESIGN CAPACITY 2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
5	T 0 3	0.15	D	
6				
7				
8				
9				
10				

CONTINUE ON REVERSE

III. PROCESSES *(continued)*

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

Discrete pieces of waste HE are collected, packaged, stored and burned at the TA-16 burning ground (see plan/topo sheets 2 and 5). This pad is designated 288 on the structure Location Plan of TA-16. Two pressure vessels (401 and 406) are used to burn HE contaminated sludge from various processing facilities located around the Laboratory. The sludge is placed on layers of sand in the vessels, the water allowed to drain from the bottom of a NPDES discharge point. After the sludge is completely dried, the residue is burned. Small quantities of reactive chemicals may be detonated with Scrap HE. Design capacities are not applicable as the treatment process is performed on as-need basis.

Page 1, line 2 - two 155 gal tanks at incineration facility.

Page 1, line 6 - incineration of hazardous waste is requested - the Los Alamos controlled air incinerator has been on-line as a research facility since 1980 for the volume reduction of radioactively contaminated waste. The incinerator is permitted by EPA to burn PCB.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER — Enter the four—digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four—digit number*(s)* from 40 CFR, 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 III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non—listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process codes contained in Item III to indicate **all** the processes that will be used to store, treat, and/or dispose of all the non—listed hazardous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, 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.

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 other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(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 NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K054	900	P	T03 D80	
X-2	002	400	P	T03 D80	
X-3	D001	100	P	T03 D80	
X-4	D002				included with above

CONTINUE ON PAGE 3

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A C: 1	W DUP — T/A C: 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D001	50000	P	S01 T03 D80	
2	D002	150000	P	S01 T01 D80	
3	D003	5000	P	S01 T04 D80	
4	D003	5000	P	S01 T03 T01 D80	Lithium Hydride only
5	D004	1000	P	S01 D80	
6	D005	150	Y	D80	Sand from clean out of explosives burn pads.
7	D005	250*	P	S01 D80	
8	D006	250*	P	S01 T01 D80	
9	D007	1000	P	S01 T01 D80	
10	D008	2000	P	S01 D80	
11	D009	1500	P	S01 T01 D80	
12	D010	250*	P	S01 D80	
13	D011	250*	P	S01 T01 D80	
14	D012	250*	P	S01 T03 D80	
15	D016	250*	P	S01 T03 D80	
16		END OF D DESIGNATOR			
17					
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25					
26					

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F001	1000	P	S01 T03 D80	
2	F002	1000	P	S01 T03 D80	
3	F003	250*	P	S01 T03 D80	
4	F004	250*	P	S01 T03 D80	
5	F005	250*	P	S01 T03 D80	
6	F006	250*	P	S01 T01 D80	
7	F007	12500	P	S01 T01 D80	
8	F008	1000	P	S01 T01 D80	
9	F009	6000	P	S01 T01 D80	
10	F027	700	P	S01 D80 T03	
11	F028	700	P	D80	
		END OF F DESIGNATOR			
13					
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CONTINUE ON REVERSE

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 9 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	K044	50000	P	S01		T04	D80	
2	K047	250*	P	S01		T04	D80	
3		END OF K DESIGNATOR						
4								
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Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A C: 1	W DUP — T/A C: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P001	250*	P	S01 T03 D80	
2	P002	250*	P	S01 T03 D80	
3	P003	250*	P	S01 T03 D80	
4	P004	250*	P	S01 T03 D80	
5	P005	250*	P	S01 T03 D80	
6	P006	250*	P	S01 T04 D80	
7	P007	250*	P	S01 T03 D80	
8	P008	250*	P	S01 T03 D80	
9	P009	250*	P	S01 T04 D80	
10	P010	250*	P	S01 D80	
11	P011	250*	P	S01 D80	
	P012	250*	P	S01 D80	
13	P013	250*	P	S01 T01 D80	
14	P014	250*	P	S01 T03 D80	
15	P015	6000	P	S01 D80	
16	P016	250*	P	S01 T03 D80	
17	P017	250*	P	S01 T03 D80	
18	P018	250*	P	S01 T03 D80	
19	P020	250*	P	S01 T03 D80	
20	P021	250*	P	S01 T01 D80	
21	P022	250*	P	S01 T04 D80	
22	P023	250*	P	S01 T03 D80	
23	P024	250*	P	S01 T03 D80	
	P026	250*	P	S01 T03 D80	
25	P027	250*	P	S01 T03 D80	
26	P028	250*	P	S01 T03 D80	

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER *(enter from page 1)*	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

LINE NO.	A. EPA HAZARD. WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	P029	250*	P	S01 T01 D80	
2	P030	250*	P	S01 T01 D80	
3	P031	250*	P	S01 T04 D80	
4	P033	250*	P	S01 T04 D80	
5	P034	250*	P	S01 T03 D80	
6	P036	250*	P	S01 T03 D80	
7	P037	250*	P	S01 T03 D80	
8	P038	250*	P	S01 T03 D80	
9	P039	250*	P	S01 T03 D80	
10	P040	250*	P	S01 T03 D80	
11	P041	250*	P	S01 T03 D80	
12	P042	250*	P	S01 T03 D80	
13	P043	250*	P	S01 T03 D80	
14	P044	250*	P	S01 T03 D80	
15	P045	250*	P	S01 T03 D80	
16	P046	250*	P	S01 T03 D80	
17	P047	250*	P	S01 T03 D80	
18	P048	250*	P	S01 T03 T04 D80	
19	P049	250*	P	S01 T03 D80	
20	P050	250*	P	S01 T03 D80	
21	P051	250*	P	S01 T03 D80	
22	P054	250*	P	S01 T03 T04 D80	
23	P056	250*	P	S01 T01 T04 D80	
24	P057	250*	P	S01 T03 D80	
25	P058	250*	P	S01 T03 D80	
26	P059	250*	P	S01 T03 D80	

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1): W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1

FOR OFFICIAL USE ONLY: W DUP — T/A: 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. 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	P060	250*	P	S01	T03	D80		
2	P062	250*	P	S01	T03	D80		
3	P063	250*	P	S01	T04	D80		
4	P064	250*	P	S01	T04	D80		
5	P065	250*	P	S01	T04	D80		
6	P066	250*	P	S01	T03	D80		
7	P067	250*	P	S01	T03	D80		
8	P068	250*	P	S01	T03	D80		
9	P069	250*	P	S01	T03	T04	D80	
10	P070	250*	P	S01	T03	D80		
11	P071	250*	P	S01	T03	T04	D80	
[illegible]	P072	250*	P	S01	T03	D80		
13	P073	250*	P	S01	T01	T04	D80	
14	P074	250*	P	S01		T01	D80	
15	P075	250*	P	S01	T03	D80		
16	P076	250*	P	S01	T01	T04	D80	
17	P077	250*	P	S01	T03	T04	D80	
18	P078	250*	P	S01	T01	D80		
19	P081	250*	P	S01	T04	D80		
20	P082	250*	P	S01	T03	D80		
21	P084	250*	P	S01	T03	D80		
22	P085	250*	P	S01	T03	D80		
23	P087	250*	P	S01	D80			
[illegible]	P088	250*	P	S01	T03	D80		
25	P089	250*	P	S01	T03	D80		
26	P092	250*	P	S01	T03	D80		

CONTINUE ON REVERSE

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P093	250*	P	S01	T03	D80		
2	P094	250*	P	S01	T03	D80		
3	P095	250*	P	S01	T03	D80		
4	P096	250*	P	S01	T04	D80		
5	P097	250*	P	S01	T03	D80		
6	P098	250*	P	S01	T01	D80		
7	P099	250*	P	S01	T01	D80		
8	P101	250*	P	S01	T03	D80		
9	P102	250*	P	S01	T03	D80		
10	P103	250*	P	S01	T03	D80		
11	P104	250*	P	S01	T01	D80		
-	P105	250*	P	S01	D80			
13	P106	250*	P	S01	T01	D80		
14	P107	250*	P	S01	T04	D80		
15	P108	250*	P	S01	T03	D80		
16	P109	250*	P	S01	T03	D80		
17	P110	250*	P	S01	T03	D80		
18	P111	250*	P	S01	T03	D80		
19	P112	250*	P	S01	T03	T04	D80	
20	P113	250*	P	S01	D80			
21	P114	250*	P	S01	D80			
22	P115	250*	P	S01	D80			
23	P116	250*	P	S01	D80			
	P118	250*	P	S01	T03	D80		
25	P119	250*	P	S01	D80			
26	P120	250*	P	S01	D80			

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

V. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P121	250*	P	S01 T01 D80	
2	P122	250*	P	S01 T04 D80	
3	P123	250*	P	S01 T03 D80	
4		END OF P DESIGNATOR			
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NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U001	250*	P	S01	T03	D80		
2	U002	1000	P	S01	T03	D80		
3	U003	250*	P	S01	T03	D80		
4	U004	250*	P	S01	T03	D80		
5	U005	250*	P	S01	D80			
6	U006	250*	P	S01	T04	D80		
7	U007	250*	P	S01	T03	D80		
8	U008	250*	P	S01	T03	T04	D80	
9	U009	250*	P	S01	T03	D80		
10	U010	250*	P	S01	T03	D80		
11	U011	250*	P	S01	T03	D80		
-	U012	250*	P	S01	T03	D80		
13	U014	250*	P	S01	T03	D80		
14	U015	250*	P	S01	T03	D80		
15	U016	250*	P	S01	T03	D80		
16	U017	250*	P	S01	T03	D80		
17	U018	250*	P	S01	T03	D80		
18	U019	250*	P	S01	D80			
19	U020	250*	P	S01	T03	T04	D80	
20	U021	250*	P	S01	T03	D80		
21	U022	250*	P	S01	T03	D80		
22	U023	250*	P	S01	T03	T04	D80	
23	U024	250*	P	S01	T03	D80		
	U025	250*	P	S01	T03	D80		
25	U026	250*	P	S01	T03	D80		
26	U027	250*	P	S01	T03	D80		

CONTINUE ON REVERSE

Continued from page 2.
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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. 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	U028	250*	P	S01	T03	D80		
2	U029	250*	P	S01	T03	D80		
3	U030	250*	P	S01	T03	D80		
4	U031	250*	P	S01	T03	D80		
5	U032	250*	P	S01	T01	D80		
6	U033	250*	P	S01	T04	D80		
7	U034	250*	P	S01	T03	D80		
8	U035	250*	P	S01	T03	D80		
9	U036	250*	P	S01	T03	D80		
10	U037	250*	P	S01	T03	D80		
11	U038	250*	P	S01	T03	D80		
12	U039	250*	P	S01	T03	D80		
13	U041	250*	P	S01	T03	D80		
14	U042	250*	P	S01	T03	T04	D80	
15	U043	250*	P	S01	T04	D80		
16	U044	1000	P	S01	T03	D80		
17	U045	250*	P	S01	T04	D80		
18	U046	250*	P	S01	T03	D80		
19	U047	250*	P	S01	T03	D80		
20	U048	250*	P	S01	T03	D80		
21	U049	250*	P	S01	T03	D80		
22	U050	250*	P	S01	T03	D80		
23	U051	250*	P	S01	T03	D80		
24	U052	250*	P	S01	T03	D80		
25	U053	250*	P	S01	T03	D80		
26	U055	250*	P	S01	T03	D80		

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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1 — C: 1	W DUP — T/A: — C: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U056	250*	P	S01 T03 D80	
2	U057	250*	P	S01 T03 D80	
3	U058	250*	P	S01 T03 D80	
4	U059	250*	P	S01 T03 D80	
5	U060	250*	P	S01 T03 D80	
6	U061	250*	P	S01 T03 D80	
7	U062	250*	P	S01 T03 D80	
8	U063	250*	P	S01 T03 D80	
9	U064	250*	P	S01 T03 D80	
10	U066	250*	P	S01 T03 D80	
11	U067	250*	P	S01 T03 D80	
[illegible]	U068	250*	P	S01 T03 D80	
13	U069	250*	P	S01 T03 D80	
14	U070	250*	P	S01 T03 D80	
15	U071	250*	P	S01 T03 D80	
16	U072	250*	P	S01 T03 D80	
17	U073	250*	P	S01 T03 D80	
18	U074	250*	P	S01 T03 D80	
19	U075	250*	P	S01 T04 D80	
20	U076	250*	P	S01 T03 D80	
21	U077	250*	P	S01 T03 D80	
22	U078	250*	P	S01 T03 D80	
23	U079	250*	P	S01 T03 D80	
24	U080	3000	P	S01 T03 D80	
[illegible]	U081	250*	P	S01 T03 D80	
26	U082	250*	P	S01 T03 D80	

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U083	250*	P	S01 T03 D80	
2	U084	250*	P	S01 T03 D80	
3	U085	250*	P	S01 T03 D80	
4	U086	250*	P	S01 T03 D80	
5	U087	250*	P	S01 T03 D80	
6	U088	250*	P	S01 T03 D80	
7	U089	250*	P	S01 T03 D80	
8	U090	250*	P	S01 T03 D80	
9	U091	250*	P	S01 T03 D80	
10	U092	250*	P	S01 T04 D80	
11	U093	250*	P	S01 T03 D80	
12	U094	250*	P	S01 T03 D80	
13	U095	250*	P	S01 T03 D80	
14	U096	250*	P	S01 T03 T04 D80	
15	U097	250*	P	S01 T03 D80	
16	U098	250*	P	S01 T03 D80	
17	U099	250*	P	S01 T03 D80	
18	U101	250*	P	S01 T03 D80	
19	U102	250*	P	S01 T03 D80	
20	U103	250*	P	S01 T03 D80	
21	U105	250*	P	S01 T03 D80	
22	U106	250*	P	S01 T03 D80	
23	U107	250*	P	S01 T03 D80	
24	U108	250*	P	S01 T03 T04 D80	
25	U109	250*	P	S01 T03 D80	
26	U110	250*	P	S01 T03 D80	

CONTINUE ON REVERSE

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U 1 1 1	250*	P	S 0 1 T 0 3 D 8 0	
2	U 1 1 2	250*	P	S 0 1 T 0 3 T 0 4 D 8 0	
3	U 1 1 3	250*	P	S 0 1 T 0 3 T 0 4 D 8 0	
4	U 1 1 4	250*	P	S 0 1 T 0 3 D 8 0	
5	U 1 1 5	250*	P	S 0 1 T 0 3 T 0 4 D 8 0	
6	U 1 1 6	250*	P	S 0 1 T 0 3 D 8 0	
7	U 1 1 7	250*	P	S 0 1 T 0 3 T 0 4 D 8 0	
8	U 1 1 8	250*	P	S 0 1 T 0 3 T 0 4 D 8 0	
9	U 1 1 9	250*	P	S 0 1 T 0 3 D 8 0	
10	U 1 2 0	250*	P	S 0 1 T 0 3 D 8 0	
11	U 1 2 1	250*	P	S 0 1 D 8 0	
12	U 1 2 2	250*	P	S 0 1 T 0 3 D 8 0	
13	U 1 2 3	250*	P	S 0 1 D 8 0	
14	U 1 2 4	250*	P	S 0 1 T 0 3 D 8 0	
15	U 1 2 5	250*	P	S 0 1 T 0 3 D 8 0	
16	U 1 2 6	250*	P	S 0 1 T 0 3 D 8 0	
17	U 1 2 7	250*	P	S 0 1 T 0 3 D 8 0	
18	U 1 2 8	250*	P	S 0 1 T 0 3 D 8 0	
19	U 1 2 9	250*	P	S 0 1 T 0 3 D 8 0	
20	U 1 3 0	250*	P	S 0 1 T 0 3 D 8 0	
21	U 1 3 1	250*	P	S 0 1 T 0 3 D 8 0	
22	U 1 3 2	250*	P	S 0 1 T 0 3 D 8 0	
23	U 1 3 3	250*	P	S 0 1 T 0 3 T 0 4 D 8 0	
24	U 1 3 4	250*	P	S 0 1 T 0 1 T 0 4 D 8 0	
25	U 1 3 5	250*	P	S 0 1 T 0 4 D 8 0	
26	U 1 3 6	250*	P	S 0 1 D 8 0	

CONTINUE ON REVERSE

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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
N M 0 8 9 0 0 1 0 5 1 5 — T/A C: 1	S: W — DUP — T/A C: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

	A. EPA HAZARD. 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	U137	250*	P	S01	T03	D80		
2	U138	250*	P	S01	T03	D80		
3	U139	250*	P	S01	T03	D80		
4	U140	250*	P	S01	T03	D80		
5	U141	250*	P	S01	T03	D80		
6	U142	250*	P	S01	T03	D80		
7	U143	250*	P	S01	T03	D80		
8	U144	250*	P	S01	D80			
9	U145	250*	P	S01	D80			
10	U146	250*	P	S01	D80			
11	U147	250*	P	S01	T03	D80		
12	U148	250*	P	S01	T03	D80		
13	U149	250*	P	S01	T03	D80		
14	U150	250*	P	S01	T03	D80		
15	U151	250*	P	S01	D80			
16	U152	250*	P	S01	T03	D80		
17	U153	250*	P	S01	T03	D80		
18	U154	250*	P	S01	T03	D80		
19	U155	250*	P	S01	T03	D80		
20	U156	250*	P	S01	T03	D80		
21	U157	1000	P	S01	T03	D80		
22	U158	250*	P	S01	T03	D80		
23	U159	1000	P	S01	T03	D80		
24	U160	250*	P	S01	T04	D80	T03	
25	U161	250*	P	S01	T03	D80		
26	U162	250*	P	S01	T03	D80		

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CONTINUE ON REVERSE

Continued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U163	250*	P	S01 T03 D80	
2	U164	250*	P	S01 T03 D80	
3	U165	250*	P	S01 T03 D80	
4	U166	250*	P	S01 T03 D80	
5	U167	250*	P	S01 T03 D80	
6	U168	250*	P	S01 T03 D80	
7	U169	250*	P	S01 T03 D80	
8	U170	250*	P	S01 T03 D80	
9	U171	250*	P	S01 T03 T04 D80	
10	U172	250*	P	S01 T03 D80	
11	U173	250*	P	S01 T03 D80	
12	U174	250*	P	S01 T03 D80	
13	U176	250*	P	S01 T03 D80	
14	U177	250*	P	S01 T03 D80	
15	U178	250*	P	S01 T03 D80	
16	U179	250*	P	S01 T03 D80	
17	U180	250*	P	S01 T03 D80	
18	U181	250*	P	S01 T03 D80	
19	U182	250*	P	S01 T03 D80	
20	U183	250*	P	S01 T03 D80	
21	U184	250*	P	S01 T03 D80	
22	U185	250*	P	S01 T03 D80	
23	U186	250*	P	S01 T03 D80	
24	U187	250*	P	S01 T03 D80	
25	U188	250*	P	S01 T03 D80	
26	U189	250*	P	S01 T03 T04 D80	

CONTINUE ON REVERSE

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W — DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

Z O J Z	A. EPA HAZARD. 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	U190	250*	P	S01	T03	D80		
2	U191	250*	P	S01	T03	D80		
3	U192	250*	P	S01	T03	D80		
4	U193	250*	P	S01	T03	D80		
5	U194	250*	P	S01	T03	D80		
6	U196	250*	P	S01	T03	D80		
7	U197	250*	P	S01	T03	D80		
8	U200	250*	P	S01	T03	D80		
9	U201	250*	P	S01	T03	D80		
10	U202	250*	P	S01	T03	D80		
11	U203	250*	P	S01	T03	D80		
[illegible]	U204	250*	P	S01	D80			
13	U205	250*	P	S01	T04	D80		
14	U206	250*	P	S01	T03	D80		
15	U207	250*	P	S01	T03	D80		
16	U208	250*	P	S01	T03	D80		
17	U209	250*	P	S01	T03	D80		
18	U210	250*	P	S01	T03	D80		
19	U211	250*	P	S01	T03	D80		
20	U212	250*	P	S01	T03	D80		
21	U213	250*	P	S01	T03	T04	D80	
22	U214	250*	P	S01	T03	D80		
23	U215	250*	P	S01	D80			
[illegible]	U216	250*	P	S01		D80		
25	U217	250*	P	S01	T04	D80		
26	U218	250*	P	S01	T03	D80		

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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U219	250*	P	S01	D80			
2	U220	1000	P	S01	T03	D80		
3	U221	250*	P	S01	T03	D80		
4	U222	250*	P	S01	T03	D80		
5	U223	1000	P	S01	T03	D80		
6	U225	250*	P	S01	T03	D80		
7	U226	1500	P	S01	T03	D80		
8	U227	250*	P	S01	T03	D80		
9	U228	2000	P	S01	T03	D80		
10	U230	250*	P	S01	T03	D80		
11	U231	250*	P	S01	T03	D80		
12	U232	250*	P	S01	T03	D80		
13	U233	250*	P	S01	T03	D80		
14	U234	250*	P	S01	T04	D80		
15	U235	250*	P	S01	T03	D80		
16	U236	250*	P	S01	T03	D80		
17	U237	250*	P	S01	T03	D80		
18	U238	250*	P	S01	T03	D80		
19	U239	1000	P	S01	T03	D80		
20	U240	250*	P	S01	T03	D80		
21	U242	250*	P	S01	T03	D80		
22	U243	250*	P	S01	T03	D80		
23	U244	250*	P	S01	T03	D80		
24	U246	250*	P	S01	D80			
25	U247	250*	P	S01	T03	D80		
26		END OF U DESIGNATOR						

CONTINUE ON REVERSE

..RIPTION OF HAZARDOUS WASTES *(continued)*

..SE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

All entries with an asterick in column IVB on page 3A are generated in labpack quantities only. If a new process/experiment will generate more than the stated qualtity, a revised ·t A will be submitted.

EPA I.D. NO. *(enter from page 1)*	T/A	C
N M 0 8 9 0 0 1 0 5 1 5		6

V. FACILITY DRAWING

A. ..isting facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail).*

..OTOGRAPHS

..sting 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).*

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
3 5 4 9 0 5 1	1 0 6 1 4 0 1 5

VIII. FACILITY OWNER

☐ A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
United States Department of Energy	5 0 5 - 6 6 7 - 5 2 8 8

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
Los Alamos Area Office	G Los Alamos	N M	8 7 5 4 5

IX. OWNER CERTIFICATION

..rtify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached ..ments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the ..ted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, ..ng the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Harold Valencia Los Alamos Area Office	Harold Valencia	4-1-85

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, in..ding the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Christopher S. Adams, Jr. Assoc. Director, Technical Serv.		3-29-85

 CONTINUE ON PAGE 5

Continued from page 4.

V. FACILITY DRAWING (see page 4)

The following drawings are attached to the revised Part A dated 10/31/84.

ENG-R 5277 Sheets 2 & 5 - "S" Site showing location of burn pits area - also relationship of "S" Site to rest of Lab. TA-40 & TA-14 locations where HE waste may be destroyed.

TA-16 - Structure Location Plan - Structural designation of pressure vessels (401, 406) and burn pads (387, 388, 399).

ENG-C-27630 - Pressure Vessel (406)

ENG-C-25937 - Pressure Vessel (401)

ENG-C-5849 - Burn Pads (387, 388, 399).

LA-RV-1-13.1 and LA-RV-P-9 - Batch Waste Treatment System at TA-50-1.

Area L Chemical Storage Facility, TA-54.

Area L Chemical Storage Facility, shed.

ENG-R-5277 Shed 10 - TA-15 and TA-36 - firing points where HE waste may be destroyed.

ENG-R-5277 Sheet 11 - TA-39 firing points where HE waste may be destroyed.

ENG-R-5277 Sheet 5 - TA-14 and TA-40 firing points where HE waste may be destroyed.

I. The following drawings are attached to the revised Part A dated 7/26/84:

Figure 1 - Technical Area Location Plan

Figure 4 - TA-50 Structure Location Plan showing location of the Batch Waste Treatment Facility in Building 1 and the controlled air incinerator in Building 37.

Figure 5 - TA-54 Structure Location Plan showing Area L.

II. The following drawings are new submittals:

TDF	(Fig. 4-3 of Part B)
TDF	(Fig. 4-4 of Part B)
TA-54	Area L Storage area

2.0 FACILITY DESCRIPTION

2.1 GENERAL DESCRIPTION

Los Alamos National Laboratory (Los Alamos) is located in Los Alamos County in north central New Mexico (Figure 2-1). The laboratory is approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe. The laboratory, which occupies an area of 43 square miles, and the associated residential areas of Los Alamos and White Rock are situated on Pajarito Plateau. The Plateau consists of a series of finger-like mesas separated by deep east-west trending canyons. The mesa tops range in elevation from approximately 7800 feet at the flank of Jemez Mountain (located to the west of Los Alamos) to about 6200 feet at their eastern extent where they terminate above the Rio Grande Valley. Intermittent streams lie at the bottoms of the east-west trending canyons.

Los Alamos is divided into 32 active Technical Areas (TA's) (Figure 2-2). Hazardous chemical wastes can be generated in virtually all of these areas. Hazardous waste management facilities addressed in this permit application are located in Technical Areas 14, 15, 16, 36, 39, 50 and 54. Hazardous waste management activities occupy only a small portion of the Laboratory. The following waste management facilities located as noted are addressed in this permit application:

- Technical Areas 14, 15, 16, 36, and 39
  - thermal treatment facilities, used to burn or detonate waste high explosives, high explosives-contaminated material and reactives
- Technical Area 50
  - batch treatment system and associated waste container storage area
  - chemical waste incinerator
- Technical Area 54, Area L
  - waste transfer, packaging and storage facilities, used for accumulation, packaging and storage of chemical wastes
  - treatment tanks, used for the neutralization, oxidation and evaporation of various wastes.

- land disposal facility, Los Alamos' primary chemical waste landfill operation where wastes are buried within shafts

may be circumvented

All of the above facilities have interim authority status, with the exception of the TA-50 waste incinerator. These facilities are described in the following sections.

??

2.1.1 Thermal Treatment Facilities

Facilities used for both the open burning and the detonation of waste high explosives (HE) are located at the Laboratory. Although these facilities are included in the Part A submission, they are not included in the Part B Permit Application because 40 CFR regulations for facilities of this nature have not been promulgated. This Part B Application will be amended when such regulations are in place. These facilities are described in the following sections.

2.1.1.1 Technical Area 16 (TA-16) Thermal Treatment Facilities

The thermal treatment facilities located at TA-16 include three general types. One type consists of a sand pad which is surrounded on at least two sides by a berm or a natural hillside. Waste explosives or explosives-contaminated equipment are placed on these pads and remotely burned using an "electric match" firing device. There are three facilities of this type at TA-16. A second type of thermal treatment facility present at TA-16 consists of a sand-filled metal pan on which five smaller shallow pans lined with fire brick are located. Waste HE fluids are poured into these pans and the HE is remotely ignited, with an "electric match". There is one facility of this type at the Laboratory. About 55 gallons of waste are burned approximately once a month. The third type of facility present at TA-16 is used to burn sludges containing waste HE. These facilities consist of steel cone-shaped vessels having a diameter of about five feet, buried with only the upper three to four feet of the vessel above ground. The steel vessels are filled with sand and gravel and ~~an open fluids drain is~~ located at the bottom of the cone. Sludge HE is gravity fed into the

? may not be subject to open-burning

May want to address in cover letter. Is this thermal treatment in a FONSI

top of the cone, onto the sand and gravel bed. A heavy steel cap is then placed over the top of the cone and hot air is forced into the cone through air ducts. The hot air dries the waste sludge and liquids from the sludge migrate downward through the sand and gravel bed and through the fluids drain. Effluent from these drains is regulated by NPDES permit (NM 0028355). When the remaining explosive material is relatively free of moisture, the steel cap is removed from the cone and the explosive is ignited remotely with an "electric match". There are two facilities of this type at Los Alamos; both of these are located in Technical Area 16. Explosives are burned at these two facilities at a rate of about one burn per week. Each burn consists of about 750 pounds of waste explosive sludge.

In some cases the burn pad sand or surface is contaminated by barium (D005), which is a constituent of some HE, prior to flashing or burning. Since the burn pad sand contains EP Toxic barium (see Section 3.0), it is drummed, stored and disposed of as a hazardous waste.

2.1.1.2 Technical Areas 14, 15, 36, and 39 Thermal Treatment Facilities

Waste HE detonation sites are located at Los Alamos in Technical Areas 14, 15, 36, and 39. These sites are used routinely to detonate scrap HE, failed experimental detonations, unneeded classified explosives shapes, other HE determined to be excess, and ~~small quantities of reactive chemicals.~~ These sites consist of firing pads often located within a small canyon. Associated facilities at these sites include bunkers which are occupied by technical personnel during detonations. Prior to all firings, nearby roads are checked and kept clear.

2.1.2 Technical Area 50 (TA-50) Facilities

2.1.2.1 Batch Treatment System and Container Storage Area

The Batch Treatment System is located in Building 1 at Technical Area 50 (Figure 2-3). The system consists of a totally enclosed, vented, 500-gallon pressure vessel equipped with a filtering system, condenser, and vacuum transfer lines. Total system washdown between batches allows for

the treatment of incompatible wastes in the facility. Wastes treated in the Batch Treatment System include cyanide, chromate plating solutions, and solutions of acids, bases and heavy metals.

Three waste streams comprise the bulk of the waste treated in the Batch Treatment System, although the system is flexible enough to allow treatment of other wastes that may be generated through new Laboratory projects. These streams are an acid/base waste which contains copper, chromate plating waste, and waste cyanide plating solutions. Los Alamos wishes to obtain a permit to treat hazardous wastes in the batch treatment system.

A chemical waste storage area is located in the same room housing the Batch Treatment System. Storage space consists of a bermed area encompassing 16 square feet. The area is designed to accommodate four 55-gallon waste drums. Wastes are stored in this area prior to treatment in the Batch Treatment System. Only compatible wastes are stored in this area at one time. Although waste residence time in this area is generally only thirty to sixty days, Los Alamos may store waste in this area in excess of 90 days to provide for operational flexibility.

A waste transfer and packaging area is also housed in the room in which the Batch Treatment System is located. This area consists of a small area which is covered with a ventilation hood. Small quantities of wastes are repackaged within this area, when necessary.

2.1.2.2 Chemical Waste Incinerator

The waste incinerator is located in Building 37 at Technical Area 50 (Figure 2-3). The highly modified, controlled air incinerator is rated at a nominal 45 kilograms per hour waste feed throughput. The incinerator was developed as part of a continuing incinerator study and demonstration program being conducted by Los Alamos and is currently permitted to burn PCB-contaminated liquid materials. Modifications to the incinerator include additions of liquid and solid waste feed preparation

lines, a continuous ash removal system, a high-efficiency off-gas cleanup system, and backup utility systems. Standard combustion equipment has been modified to permit effective incineration of waste in solid, liquid, slurry, or gaseous form. Particular attention has been given to engineering for proper waste containment, resulting in a system that is safe for evaluating the incineration of hazardous chemicals and certain radioactive waste forms. Los Alamos wishes to obtain a permit to burn RCRA-regulated wastes in this incinerator. Once Los Alamos receives approval to operate the incinerator for the destruction of RCRA wastes, many wastes that are currently landfilled will be incinerated.

2.1.3 Technical Area 54 (TA-54), Area L Facilities

2.1.3.1 Waste Transfer, Packaging and Storage Facilities

A single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1595 square feet are located in Area L of Technical Area 54. These facilities are used for the accumulation, packaging and storage of waste containers generated from throughout the Laboratory (Figure 2-4). Area L of Technical Area 54 is an area of about three acres surrounded by an eight-feet-high chain-link and barbed-wire fence (Figure 2-5). Currently active waste management facilities located within this area include four waste treatment tanks and four waste disposal shafts as well as the transfer, packaging and storage facilities. The metal building has a concrete floor having a design standard load-bearing capacity of 250 pounds per square foot. Three shallow sumps covered by fiberglass grates are located within the floor of the building (Figure 2-6). The storage pad has a concrete floor having a design standard load-bearing capacity of 700 pounds per square foot (Figure 2-7).

Hazardous waste containers generated at the various Los Alamos laboratories are delivered to the waste transfer, packaging and storage facilities on a routine basis. Wastes are segregated into compatible types and placed upon the three fiberglass grates located in the metal building or within one of the six storage cells on the roofed concrete

pad. Wastes packaged in small containers are placed into lab packs (Figure 2-8). Also, vermiculite is added to 55-gallon drums containing liquids in these facilities. Wastes suitable for recycling are consolidated into drums and any damaged or leaking drums are repackaged into larger drums in these facilities. Los Alamos wishes to obtain a permit to operate the waste transfer, packaging and storage facilities.

2.1.3.2 Treatment Tanks

Four 1665-gallon ten-gauge carbon steel tanks are located at Area L of Technical Area 54. The tanks are lined with plastic. These tanks are used to neutralize, oxidize and evaporate wastes. The tanks are located on a bermed concrete pad as shown in Figure 2-9. The waste most commonly oxidized in these tanks is lithium hydride. Ammonium bifluoride (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks. Los Alamos wishes to obtain a permit to treat hazardous wastes in these tanks.

2.1.3.3 Land Disposal Facilities

As of March 1985, land disposal facilities located in Area L include 34 shafts which range in diameter from three to eight feet. Thirty of the shafts have been capped. All of these shafts are about 60 feet deep. When in use, the shafts are covered with a heavy steel cap. When filled, the shafts are capped with a three-feet-thick concrete plug. Each shaft is used for the disposal of a single category of chemical wastes to assure that incompatible chemicals will not mix and react. Los Alamos wishes to obtain a permit to operate the open disposal shafts and future shafts expected to be needed. The approximate number and locations of these future shafts are shown on Figure 2-5.

2.1.4 Topographic Maps

Topographic maps, as required by 40 CFR §270.14(b)(19) (NMHWMR 302.A.4.b.[1]), are presented in Figure 2-3 for the TA-50 facilities and Figure 2-4 for the TA-54 facilities. In accordance with the note located at the end of 40 CFR §270.14(b)(19) (NMHWMR 302.A.4.b.[1]), maps

at a scale of 1" = 400' are provided. Los Alamos requests that EPA accept maps at this scale due to the large size of the various hazardous waste management facilities. Contour lines on these maps are at intervals of ten feet, reflecting the mountainous terrain present at Los Alamos. A second map of Area L at TA-54 at a scale of 1" = 20' and contour interval of two feet is provided (Figure 2-10). Surface waters are described in Section 2.2.2. There are no storm sewers in the vicinity of the hazardous waste management facilities; storm water runoff is diverted by ditches and culverts. Sanitary sewage lines in the vicinity of the incinerator are shown in Figure 2-11. No sanitary sewage is generated at Area L.

2.1.5 Wells

The municipal and industrial water supply for the Laboratory and community is from 17 deep wells in three well fields and one gallery. The wells are located on Pajarito Plateau and in canyons east of the Laboratory. Water is pumped from the main aquifer, which lies 350 m (1150 ft) to 260 m (850 ft) below the surface of the plateau. The gallery collects spring discharge from a perched water zone in the volcanics on the flanks of the mountains located west of Los Alamos.

There are no injection wells in the vicinity of Los Alamos. The location of supply wells and the gallery, as well as the locations of test wells, springs, observation holes and surface water sampling stations are shown on Figure 2-12. Surface, well, and spring waters are routinely sampled and analyzed for radionuclides as well as heavy metals, flourides, nitrates, carbonates, biocarbonates, silica, sodium, magnesium and conductivity. Analytical results are published annually by the Los Alamos Environmental Surveillance Group (HSE-8) and copies are submitted annually to the EPA Regional Administrator and the Director of the NMEID.

2.1.6 Wind Rose

An annual wind rose (1983 data) for Technical Area 59, which is located less than one mile northwest of Technical Area 50, is shown in Figure 2-13. The major wind component is from the west-northwest.

The mountainous terrain at Los Alamos produces a distinct daily wind pattern. At night, winds tend to flow downward from the Jemez Mountains generally out of the west-northwest and northwest. During the day, the pattern reverses and light upslope winds come generally from the southeast and south-southeast. Los Alamos is a generally light wind site with an annual average wind speed of 2.8 meters per second. Only twelve percent of wind speeds in 1983 were greater than five meters per second and 38 percent were less than 2.5 meters per second (Los Alamos National Laboratory, 1983).

2.1.7 Land Use

The communities located closest to the Laboratory facilities are Los Alamos, which is located just north of the Laboratory, and White Rock, which is located a few miles to the east-southeast of the Laboratory (Figure 2-1). The total population of Los Alamos County is 19,000 to 20,000. Most of Los Alamos County, as well as adjoining portions of neighboring Sandoval, Rio Arriba, and Santa Fe Counties, is undeveloped. The only significant development in Los Alamos County are the Laboratory facilities and the associated residential communities. Large tracts of land in the Jemez Mountains which lie to the north, west, and south of Los Alamos are held by the U.S. Forest Service and the National Park Service. This land is largely occupied by pine, fir, and aspen forests. Agriculture in the vicinity of the Laboratory is limited to home gardens and some cattle grazing. In the river valleys to the east, agriculture is limited to the cultivation of relatively small, irrigated plots. Primary crops are corn, chili, tree fruits, and alfalfa.

2.2 LOCATION INFORMATION

2.2.1 Seismic Standard

Consistent with the definition presented in 40 CFR 270.2 (NMHWMR 102.A.29) and the criteria provided in §270.14(b)(11)(i) (NMHWMR 302.A.4.b.[1]) and §264.18 (NMHWMR 206.B.8.a), the Area L chemical waste land disposal facility, TA-50 batch treatment and container storage area, and the TA-50 incinerator are existing facilities and thus seismic design standards are not applicable.

The Area L waste transfer, packaging, and storage facilities and the treatment tanks are not existing hazardous waste facilities according to the definitions given in 40 CFR §270.2 (NMHWMR 102.A.29). Additionally, these facilities are located in Los Alamos County, New Mexico, which is listed in Appendix VI of 40 CFR §264 (NMHWMR 206.B.8). Figure 2-14 shows the location of Los Alamos facilities and the locations of nearby fault traces. This information and that presented in Section 2.2.3.2 is provided to demonstrate compliance with §264.18(a) (NMHWMR 206.B.8.a). As can be noted from Figure 2-14, no faults or fault traces with Holocene (or other) displacements have been located within 3000 feet of the locations of the pertinent waste management facilities.

2.2.2 Floodplain Standard

A floodplain map of Los Alamos National Laboratory is unavailable. However, personnel from the U.S. Department of the Army, Albuquerque District Corps of Engineers, Engineering and Planning Division, have evaluated the potential for flooding and have concluded that Los Alamos waste management facilities do not lie within the 100-year floodplain (see Appendix E).

2.2.3 Soils

An intensive soil survey of Los Alamos County, New Mexico has been prepared by the USDA, Soil Conservation Service, and Forest Service (1978). This soil survey was published in June 1978 under DOE Contract W-7405-ENG.36. It classifies the soils according to the soil series, soil type, and soil phase.

The principal parent materials of about 95 percent of the Los Alamos soils are Bandelier Tuff, volcanic rocks of the Tschicoma and Puye Formations, the balsaltic rocks of Chino Mesa, and the remnants of the El Cajete pumice. The remaining five percent of the soils were formed from colluvium, alluvium, andesitic rocks of the Paliza Canyon Formation, Cerro Rubio Quartz Latites, and tuffs associated with sediments of Cerro Toledo Rhyolite. Textures of these soils range from very fine sandy loams and clay loams to gravelly, sandy loams and stony, silty clay loams.

The soils in Area L (landfill area, Technical Area 54) are classified as Hackroy sandy loam. These soils consist of shallow, well-drained soils that have formed in material weathered from volcanic tuff on mesa tops (see Figure 2-).

The Bandelier Tuff is formed by a series of ash flows and ash falls which are described as nonwelded, moderately welded, and welded tuff. The nonwelded, moderately welded and welded tuff grade one into the other, both vertically and horizontally (see Appendix F, "Physical Characteristics of the Bandelier Tuff"; Purtymun, no date).

The following description of the Hackroy soil series is taken from the published soil survey report for Los Alamos County:

> The surface layer of the Hackroy soils is a brown sandy loam, about 10 cm thick. The subsoil is a reddish brown clay, gravelly clay, or clay loam, about 20 cm thick. The depth to tuff bedrock and the effective rooting depth are 20 to 50 cm. Both the Hackroy and the Hackroy-Rock outcrop mapping units exhibit slow permeability and low available water capacities. The Hackroy mapping unit has medium runoff and only moderate water erosion hazard, whereas the Hackroy-Rock outcrop unit has a moderate to severe water erosion hazard and medium to high runoff.

A typical profile of Hackroy sandy loam (one to five percent slope) is described as follows:

A1 0-8 cm, brown sandy loam, brown moist; weak fine subangular blocky structure; hard and friable moist; many fine roots; common fine tubular pores; milkily alkaline; abrupt smooth boundary.

B2 8-25 cm, dark reddish brown clay, dark reddish brown moist; moderate fine prismatic structure; hard and firm moist, sticky and plastic wet; many fine roots; few very fine tubular pores; 3% gravel; continuous clay films on peds; mildly alkaline; abrupt smooth boundary.

B3 25-30 cm, yellowish red gravelly clay, yellowish red moist; moderate fine subangular blocky structure; slightly hard and firm moist, sticky and plastic wet; many fine roots; 25% gravel, slightly calcareous; neutral.

R 30+ cm, tuff bedrock.

The soils are classified in the Unified Soil Classification System as SM, SM-SC, ML, and CL-ML. The Hackroy soils range from a sandy loam (SM) in the top eight centimeters of depth to a clay loam (CL) in depths of from eight to 30 centimeters. Permeability rates range from five to 15 centimeters per hour in the top layers down to 0.5-0.15 centimeters per hour or less in the lower layers. The shrink-swell potential is low. The available water holding capacity is 0.11 to 0.21 centimeters per centimeter and the soil pH is 6.6 to 7.8.

2.2.4 Geology

2.2.4.1 Regional Geology

Los Alamos National Laboratory is located on the east-central edge of the Jemez Mountains. The Jemez Mountains are formed by a complex pile of volcanic rocks along the northwest margin of the Rio Grande rift in north-central New Mexico (Figure 2-16). The immense volume of Pliocene and Quaternary extrusive rocks that represents the Jemez volcanic field covers an area of over 30 miles east-to-west and 50 miles north-to-south and is over 4000 feet in thickness near the center.

The Jemez volcanic field uncomformably overlies the eastern part of the Nacimiento uplift and the southern Chama basin. The Chama basin, the San Juan Basin and the Gallina-Archuleta arch are part of the Colorado Plateau, whereas the Brazos and Nacimiento uplifts (Figure 2-16) are generally included with the Southern Rocky Mountains (Woodward, 1974). These features attained their present structural outlines during the Laramide orogeny of Late Cretaceous and early Tertiary time. Superimposed on these Laramide structures is the Rio Grande rift that began to form during the Miocene. Volcanism in the Jemez area began in Pliocene time after initial development of the rift with extrusive rocks accumulating along the western margin of the rift contemporaneously with late stages of rifting (Woodward, 1974). Initial eruptions were dominantly mafic to intermediate flows, which probably formed low, coalescing shields. Eruptive activity culminated in the early Pleistocene with explosive, caldera-forming eruptions of ash-flow tuffs, which covered most of the shields and formed two calderas, the largest and youngest of which is the Valles caldera located seven to ten miles west of Los Alamos, New Mexico (Kudo, 1974). Extensive studies of the Jemez volcanism have been performed by Ross et al. (1961), Bailey et al. (1969), Smith and Bailey (1966, 1968) and Smith et al. (1970).

Major tectonic features here are dominated by vertical movements. Minor horizontal shift and compressional features, however, occur in parts of the Colorado Plateau and Southern Rocky Mountain structures. The stratigraphy, structure and tectonics of the Jemez Mountains and surrounding area have been the topics of a large number of reconnaissance and detailed studies (c.f., Dane, 1948; Kelley, 1954, 1955; Griggs, 1964; Woodward et al., 1972, 1973, 1974).

2.2.4.2 Site-Specific Geology

The Los Alamos facilities are located on the western part of the Pajarito Plateau (Figure 2-17), which forms an apron of volcanic and sedimentary rocks around the eastern flanks of the Jemez Mountains. The

plateau is aligned approximately north-south and is about 20 to 25 miles in length and five to ten miles wide. It is bounded on the east by White Rock Canyon (which contains the Rio Grande), on the north and northeast by the Puye Escarpment and on the west by Sierra de los Valles. The Pajarito Plateau slopes gently eastward from an elevation of about 7500 feet near the mountains toward the Rio Grande where it terminates at an elevation of about 5400 feet in steep slopes and cliffs formed by down cutting of the river. The plateau has been dissected into a number of narrow mesas by southeastward-trending intermittent streams. The stratigraphy and structural features of the Pajarito Plateau are described in the following sections.

Stratigraphy

The Pajarito Plateau is formed by a series of sediments and volcanic extrusive rocks and is typical of a terrain produced by concurrent sedimentation and volcanism (Figure 2-18). The base of the plateau is represented by the Miocene Santa Fe Group, which in this area consists of friable to moderately well cemented siltstone and sandstones that contains lenses of conglomerate and clay (Purtymun and Johansen, 1974). Some basalt flows are interbedded with the sediments in the unit. The lower part of the Santa Fe is comprised of fine arkosic sand and the upper part is composed of very coarse arkosic sand, latitic gravels and volcanic detritus.

Overlying the Santa Fe Group are the volcanic extrusives of the Tschicoma Formation, which consist of latite, quartz-latite flows and pyroclastic rocks. The Tschicoma has been extruded through the Santa Fe west of Los Alamos, forming the lower part of the Jemez Volcanic Pile. The thickness of the Tschicoma is unknown as the base of the unit is not exposed in the Pajarito Plateau area.

Interfingering with the Tschicoma and overlying the Santa Fe Group are the conglomeratic and fanglomeratic rocks of the Puye Formation. The Puye contains a thin basal conglomerate composed of pebble through small

boulder size clasts of quartzite, quartz, granite and volcanic debris in a matrix of coarse sand (Griggs, 1964). Overlying the conglomerate is a thicker fanglomerate comprised of debris that was washed eastward from the volcanic rocks of the Tschicoma Formation. The fanglomerate consists of a series of conglomerates and siltstones with up-to-boulder size clasts in a matrix of silt and sand. Beds of volcanic ash that were water-lain or possibly represent air fall materials are also present within the Puye Formation. The overall thickness of the Puye ranges from about 725 feet in the north-central part of the Pajarito Plateau to 220 to 270 feet along the east edge of the Puye Escarpment to 60 to 80 feet at the north end of White Rock Canyon (Griggs, 1964).

Overlying and interfingering with the conglomerates of the Puye Formation are the basaltic rocks of Chino Mesa. The basalt, which is over 1300 feet thick near the volcanic vents near Chino Mesa from which it originated (Figure 2-18), thickens southward along the river and thins westward (Griggs, 1964).

The Pajarito Plateau is capped for the most part by the Bandelier Tuff, which ranges in thickness from about 1050 feet along the western edge of the plateau to about 260 feet just west of White Rock, New Mexico. The Bandelier is composed of a basal unit of pebble-size pumice, overlain by a poorly sorted rhyolite tuff breccia and capped by a cliff-forming welded rhyolite tuff.

Structure

The description of the geologic structure presented here was taken primarily from Griggs (1964). The geologic structure of surface rocks in the Los Alamos area is simple, although the structure of underlying rocks may be complex. The regional dip of surface rocks of the Pajarito Plateau is one to two degrees east. Beds of the Santa Fe Group in the easternmost part of the area dip gently to the west.

The rocks of the Pajarito Plateau are broken by several northward-trending normal faults (Figure 2-14). The Pajarito fault zone lies near the western edge of the plateau in the southern part of the area. The Bandelier Tuff at the southern edge of the area and on the east side of the Pajarito fault is downthrown about 300 feet in relation to the tuff on the west side of the fault. The fault farther north splits into two smaller subparallel faults, both downthrown to the east. Displacement decreases northward until both faults die out. The fault planes dip steeply to the east.

Two other normal faults, en echelon to the Pajarito zone, are located to the northeast. These faults are downthrown to the west and the fault planes dip to the west also. The westernmost of the faults extends southward for a short distance subparallel to the northern extension of the Pajarito zone. The Bandelier Tuff is displaced about 50 feet across the en echelon faults. The older Tschicoma Formation, however, may be displaced as much as 500 feet along the easternmost fault. This difference in displacement tends to indicate recurring movement along a pre-Bandelier fault.

2.2.5 Groundwater[1]

The only aquifer of the Pajarito Plateau capable of providing municipal and industrial water supply is in rocks of the Santa Fe Group and Puye Formation. The upper surface of this aquifer rises westward from the Rio Grande through the Santa Fe and into the lower part of the Puye beneath the central and western parts of the plateau (Figure 2-15). The water in the aquifer moves from the major recharge area of the intermountain basins of the Valles Caldera eastward toward the Rio Grande where a part is discharged into the river through seeps and springs (Figure 2-17). The intermountain basins are filled with deposits of clay, sand and gravels which are underlain by volcanic debris resulting

[1] The discussion of groundwater conditions in the Los Alamos area was extracted primarily from Purtymun and Johansen (1978) and Griggs (1964).

from the collapse of the caldera. The sediments and volcanics in the basins are highly permeable and saturated and recharge the main aquifer in the Santa Fe Group.

Minor amounts of recharge may occur in the deep canyons containing perennial streams on the flanks of the mountains. The intermittent streams in canyons which are cut into the plateau add little if any recharge to the main aquifer. Water balance calculations for the area of the Los Alamos facilities indicate that the annual evapotranspiration rate exceeds the annual precipitation rate. Additionally, field investigations have shown that infiltration of precipitation into the Bandelier Tuff is essentially zero. Further, the moisture content of the tuff at the Los Alamos facilities is quite low, varying from about 0.2 to two percent by weight. Typically, moisture contents greater than four percent are required to permit migration of moisture in the Bandelier Tuff.

Figure 2-19 shows the locations of a number of wells completed in the Santa Fe and Puye Formations. Also shown are the contours drawn to depict the elevation of the top of the main aquifer and the depths at which water was encountered in the main aquifer at each well location. The gradient on the surface of the aquifer averages about 60 feet per mile beneath the plateau in the Puye Formation with the depth to water decreasing along with the gentle slope of the surface of the plateau from about 1200 feet to the west to about 600 feet to the east. The depth to the water table under the Los Alamos facilities ranges from about 900 to 1200 feet except in the deeper canyons. The gradient of the aquifer steepens to about 100 feet per mile along the eastern edge of plateau because of the lesser permeability of the Santa Fe Group sediments. The aquifer is under water table conditions in the western margin of the plateau and is artesian along the eastern edge and along the Rio Grande.

As expected, wells completed into the high permeability sediments and volcanics of the Santa Fe Group and Puye Formation are very productive. Wells located in the eastern well field, which penetrate about 1600 feet of the fine grained sediments of the Santa Fe Group, yield an average of 500 gallons per minute with a specific capacity of eight gallons per minute per foot of drawdown. Wells in the central part of the plateau, which are completed in the Puye Formation and coarser sediments of the Santa Fe Group, are higher yielding and average 1000 gallons per minute with a specific capacity of about 35 gallons per minute per foot of drawdown.

The chemical quality of water varies among wells due to local conditions within the aquifer. In general, the quality of water is good; total dissolved solids (TDS) range from about 200 milligrams per liter to less than 500 milligrams per liter.

The Tschicoma Formation and the Bandelier Tuff, west of the Pajarito Plateau on the flank of the mountains, contain localized, small bodies of perched water. The Bandelier Tuff contains no perched water beneath the Pajarito Plateau.

2.3 TRAFFIC PATTERNS

The rugged topography of alternating mesas and canyons present at Los Alamos limits traffic circulation to only a few major arterial roads. This road system is shown in Figure 2-2. A total of 132 miles of paved roads are present at Los Alamos.

The main access route to Los Alamos is State Road 4. The majority of traffic to Los Alamos approaches on State Road 4 from the east, although an alternate access route, State Road 4 through the Jemez Mountains, is available.

The pattern of east-west trending canyons at Los Alamos prohibits north-south automobile travel in nearly all portions of the laboratory with

the exception of Diamond Drive. Los Alamos Canyon is spanned at Diamond Drive by an 820-feet-long steel arch bridge which was completed in 1951 (Los Alamos National Laboratory, 1984). This bridge provides the main access between the Los Alamos facilities located on either side of Los Alamos Canyon.

Roads at Los Alamos carrying the greatest traffic volumes include Diamond Drive, Pajarito Road, and East and West Jemez Drive. These roads were constructed with a ten-inch-thick base course overlain with a five-inch-thick asphaltic concrete surface. These roads were designed and built in conformance with American Association of State Highway Transportation Officials (AASHTO) specification HS-20. This specification is intended to accommodate truck loading capacities of 32,000 pounds per axle.

Are these the roads [illegible] TA 50 TA 54

Currently, over 9000 people are employed at Los Alamos (including Los Alamos personnel and contractors). Roughly 3500 people commute to the laboratory daily from communities other than Los Alamos and White Rock (Los Alamos National Laboratory, 1982). Traffic flow at the Laboratory is controlled by traffic lights, stop signs, and yield signs. Access to the high-security technical areas is controlled by security guards and is restricted to vehicles having specific identification. Only personnel having appropriate security clearance and identification, or escorted visitors are allowed access to the secured technical areas. Vehicles and personnel entering these technical areas are subject to periodic search by security personnel. Traffic signals and signs located in the vicinity of hazardous waste management facilities are shown on Figures 2-3 and 2-4.

Chemical wastes can be generated at all of the 32 active Los Alamos technical areas. Wastes are transported from the generating laboratories and shops to the various waste management facilities on an as-needed basis. The chemical wastes are generally received in small bottles (i.e., a gallon or less) or containers. These are packed in

— How are [illegible] — are what [illegible]

cardboard boxes or drums for transport. The volume of waste received in each instance varies considerably. Because wastes are generated at facilities dispersed throughout the laboratory, waste transport occurs (at least occasionally) on nearly all of the roads located within the Laboratory. A schematic diagram of Los Alamos waste management activities is shown in Figure 2-20.

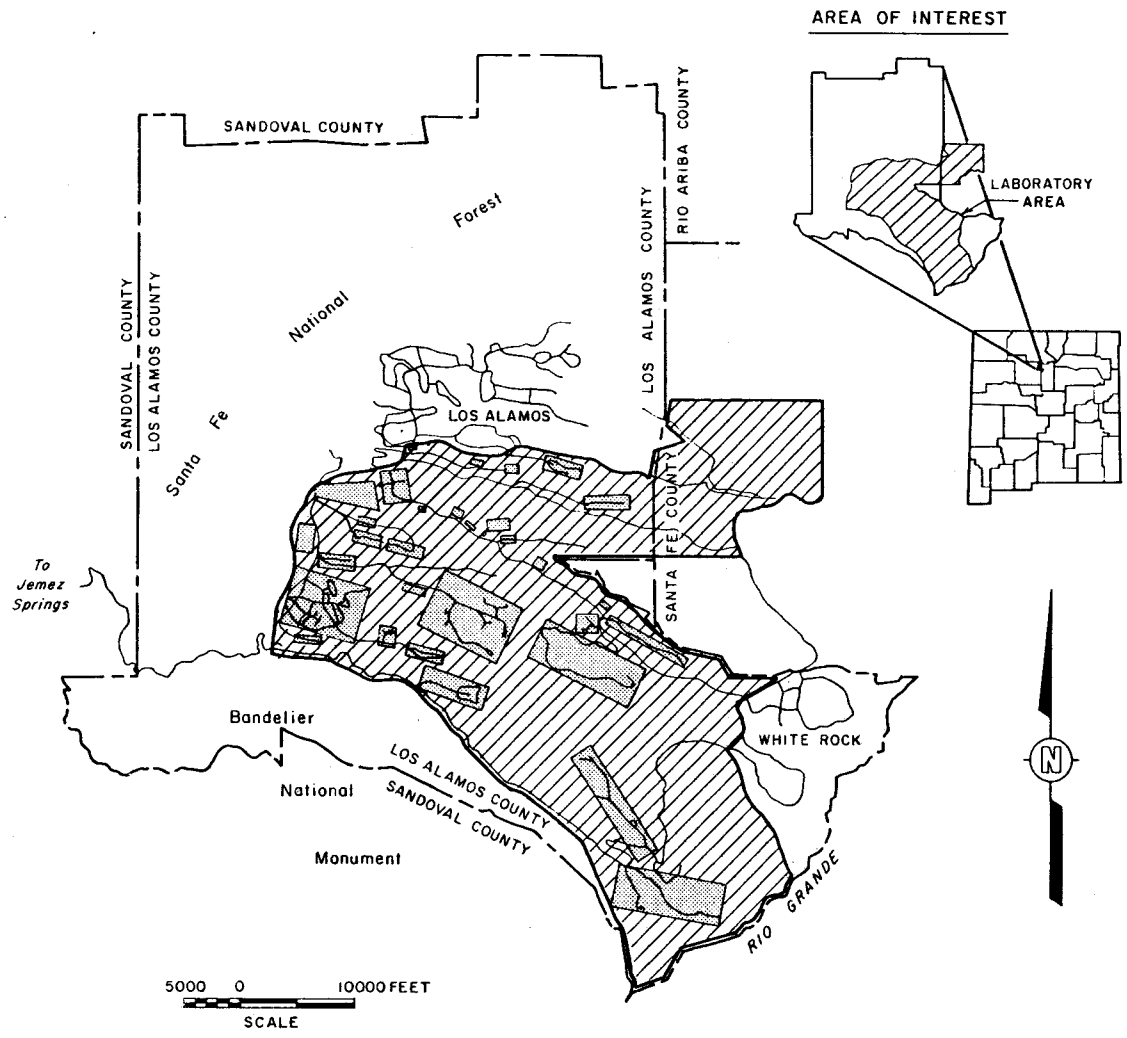

FIGURE 2-1

LOCATION MAP

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IT CORPORATION

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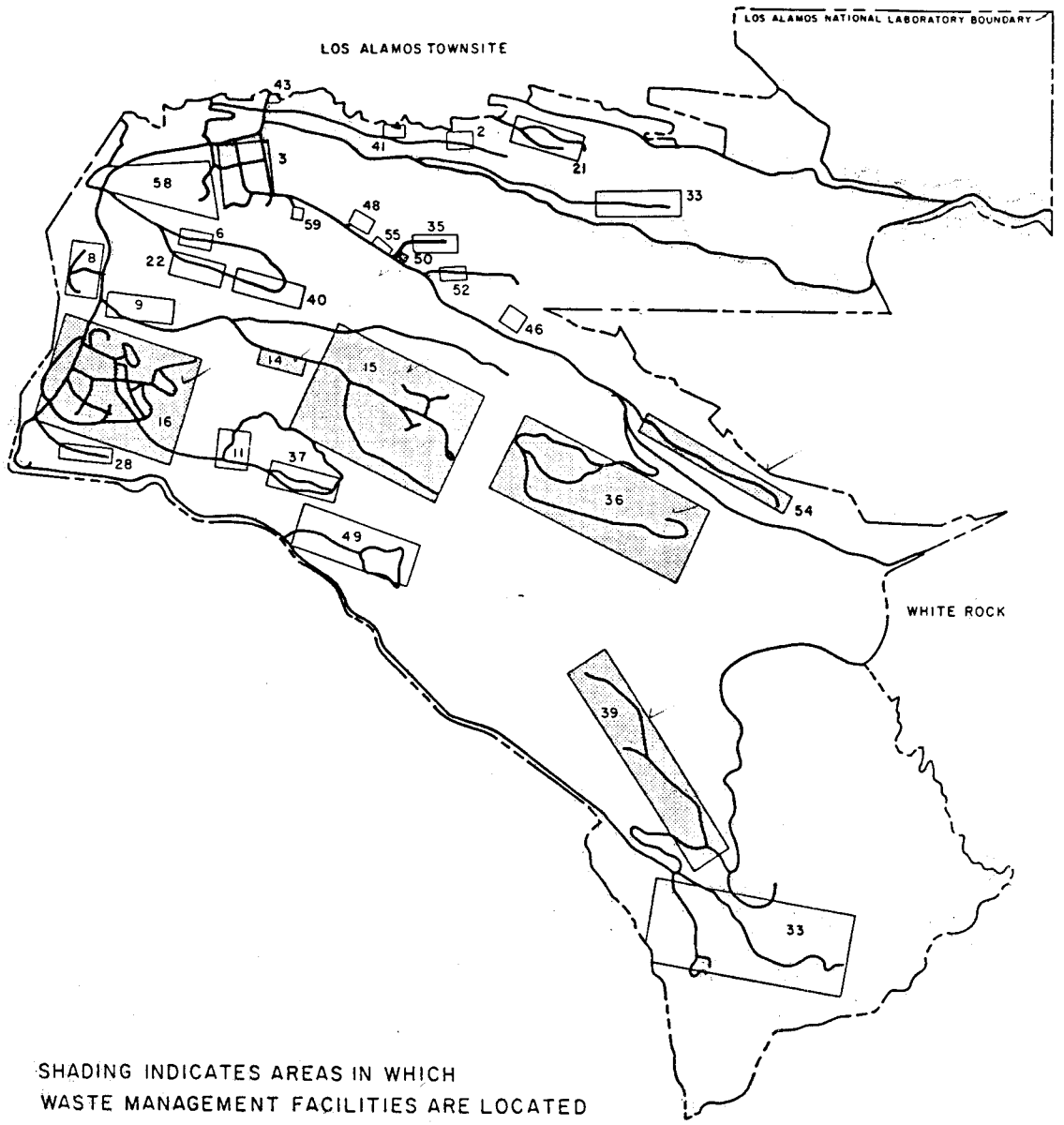
	9/24/84	APPROVED BY			

19 1253 HERCULENE. A&B SMITH CO. PGH., PA



SHADING INDICATES AREAS IN WHICH WASTE MANAGEMENT FACILITIES ARE LOCATED

N

4000 0 4000

SCALE

FIGURE 2-2

LOS ALAMOS
TECHNICAL AREAS

PREPARED FOR
LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

IT CORPORATION

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DRAWN BY

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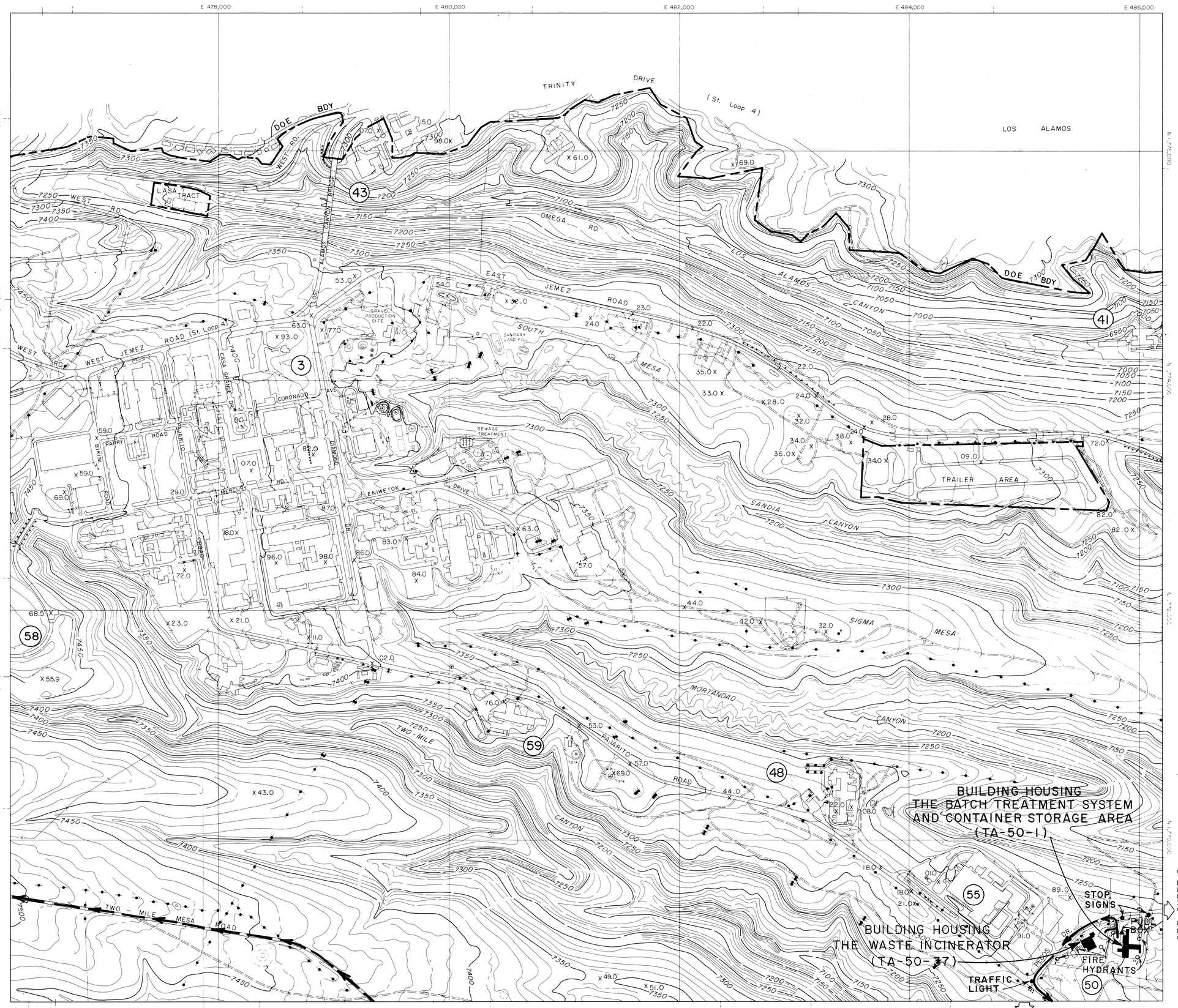
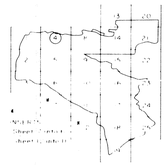


LEGEND

x 93.0	SPOT ELEVATION	N 768,000	NMSP GRID
6900	INDEX CONTOUR	3,989,000 N	UTM GRID
	INTERMEDIATE CONTOUR 10ft.	N 240+00	LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
	COUNTY LINES – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES.		
	DOE BOUNDARY – X & Y COORDINATE DATA PROVIDED BY LASL.		
	DOE BOUNDARY – SURVEY DESCRIPTIONS OR RECORD PLATS PROVIDED BY LASL.		
	DOE BOUNDARY – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES BASED ON PROJECTED COUNTY LINES.		

35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD	Tank	TANK
	JEEP TRAIL		POND
	CULVERT	RW	RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL	Earth Work	EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT



NORTH

GRID NMSP NORTH

MAPPING COMPLETED BY PHOTOGRAMMETRIC METHODS, UTILIZING 1:30,000, 1:12,000 & 1:13,200 PHOTOGRAPHY, OBTAINED IN NOV. 1976 & JUNE 1980 WITH ZEISS RMK A 15/23 CAMERAS OF 153.42 & 152.43mm C.F.L. RESPECTIVELY, MAPPING BASED ON CONTROL SURVEYS TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE). MAPPING COMPLETED IN ACCORDANCE WITH NATIONAL MAP ACCURACY SPECIFICATIONS.

GRAPHIC SCALE: 1 in.=400 ft.

CONTOUR INTERVAL 10 ft.

TECHNICAL AREAS

3 SM–SITE	41 W–SITE	50 WM–SITE
43 HRL–SITE	48 RC–SITE	
58 TWO MILE NORTH–SITE	55 PLUTONIUM FACILITY SITE	
59 OH–SITE		

LOS ALAMOS SCIENTIFIC LABORATORY

BECHTEL ENGINEERS, INC. LANDSCAPE AERIAL MAPPING DIVISION

FIGURE 2-3

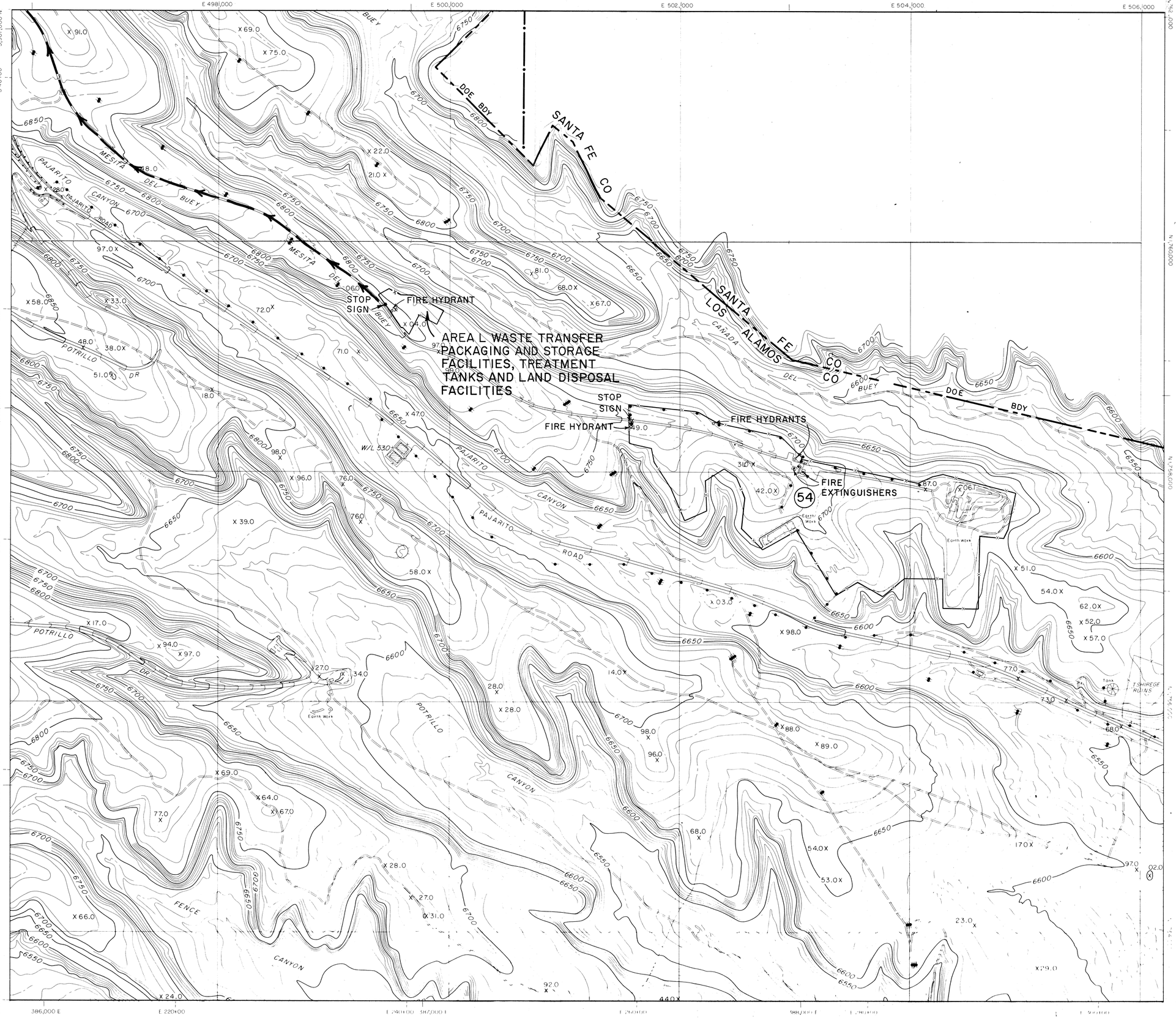
CONTOUR MAP SHOWING THE LOCATIONS OF THE BATCH TREATMENT SYSTEM AND CONTAINER STORAGE AREA AND THE WASTE INCINERATOR

LAB JOB NO. 5682

1" =400' SCALE

PLAN / TOPO

SHEET 4 OF 25



LEGEND

X 93.0	SPOT ELEVATION	N 1,768,000	NMSP GRID
6900	INDEX CONTOUR	3,989,000 N	UTM GRID
	INTERMEDIATE CONTOUR 10ft.	N 240+00	LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
	COUNTY LINES – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES.		
	DOE BOUNDARY – X & Y COORDINATE DATA PROVIDED BY LASL.		
	DOE BOUNDARY – SURVEY DESCRIPTIONS OR RECORD PLATS PROVIDED BY LASL.		
	DOE BOUNDARY – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES BASED ON PROJECTED COUNTY LINES.		

35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD		TANK
	JEEP TRAIL		POND
	CULVERT	RW	RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL	Earth Work	EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT

NORTH

GRID NMSP NORTH

MAPPING COMPLETED BY PHOTOGRAMMETRIC METHODS, UTILIZING 1:30,000, 1:12,000 & 1:13,200 PHOTOGRAPHY, OBTAINED IN NOV. 1976 & JUNE 1980 WITH ZEISS RMK A 15/23 CAMERAS OF 153.42 & 152.43mm C.F.L. RESPECTIVELY, MAPPING BASED ON CONTROL SURVEYS TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE). MAPPING COMPLETED IN ACCORDANCE WITH NATIONAL MAP ACCURACY SPECIFICATIONS.

GRAPHIC SCALE 1 in = 400 ft

CONTOUR INTERVAL 10 ft

TECHNICAL AREAS

(-1) MD-SITE

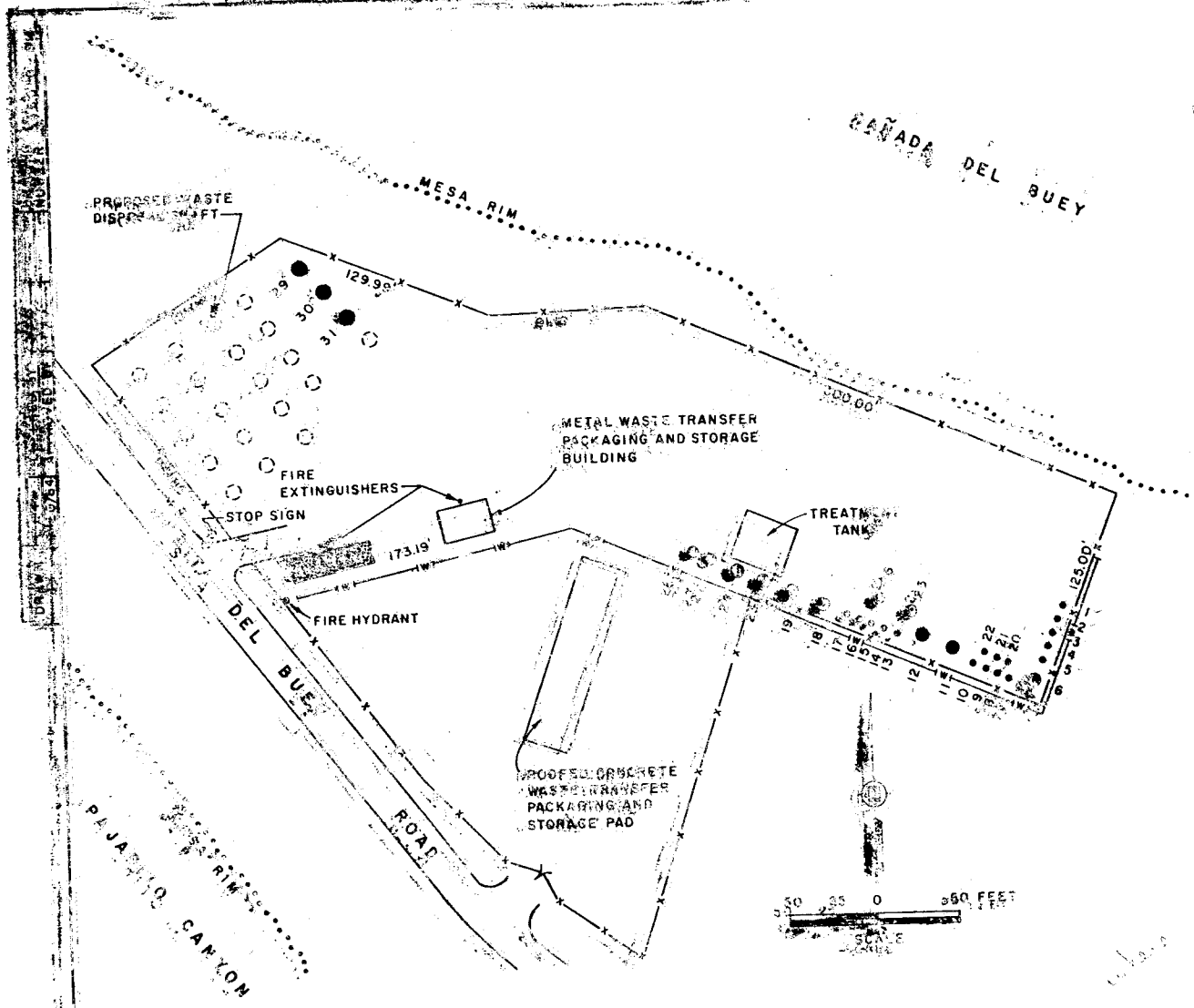
LOS ALAMOS SCIENTIFIC LABORATORY

FIGURE 2-4

CONTOUR MAP SHOWING THE LOCATION OF AREA L WASTE MANAGEMENT FACILITIES

LAB JOB NO 5682
1" = 400' SCALE
PLAN / TOPO
SHEET 16 OF 25

14844-J



SHAFT NO.	DIAMETER	DEPTH	DATE CAPPED	CONTENTS
1	3	[illegible]	[illegible]	[illegible]
2	3	2/75	[illegible]	[illegible]
3	3	2/75	[illegible]	[illegible]
4	3	[illegible]	[illegible]	[illegible]
5	3	2/75	[illegible]	OIL
6	4	[illegible]	[illegible]	[illegible]
7	3	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	6/75	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	OIL
11	[illegible]	[illegible]	[illegible]	SOLVENT
12	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]
21	3	[illegible]	OPEN	[illegible]
22	[illegible]	[illegible]	9/83	[illegible]
23(3)	4	[illegible]	[illegible]	[illegible]
24(4)	[illegible]	[illegible]	[illegible]	[illegible]
25	6	[illegible]	OPEN	[illegible]
26	6	[illegible]	[illegible]	[illegible]
27	4	[illegible]	[illegible]	[illegible]
28	4	[illegible]	OPEN	[illegible]
29	6	[illegible]	[illegible]	[illegible]
30	6	[illegible]	[illegible]	[illegible]
31	6	[illegible]	[illegible]	[illegible]
32	[illegible]	9/86	[illegible]	[illegible]
33	[illegible]	9/84	[illegible]	[illegible]
34	5	2/85	OPEN	[illegible]

NOTES:
(1) ALL SHAFTS ARE APPROXIMATELY 60 FEET DEEP.
(2) SHAFT ONE CONTAINS WASTES NOT IN DRUMS.
(3) PRIOR TO SHAFT 23, LIQUIDS WERE DISPOSED OF [illegible] WITHOUT [illegible] ABSORBENTS.
(4) MIDDLE SECTION OF THIS SHAFT NOT USED.
(5) USED FOR MISCELLANEOUS WASTE REQUIRING GREATER [illegible] ISOLATION.

FIGURE 2-5

AREA L
WASTE MANAGEMENT FACILITIES

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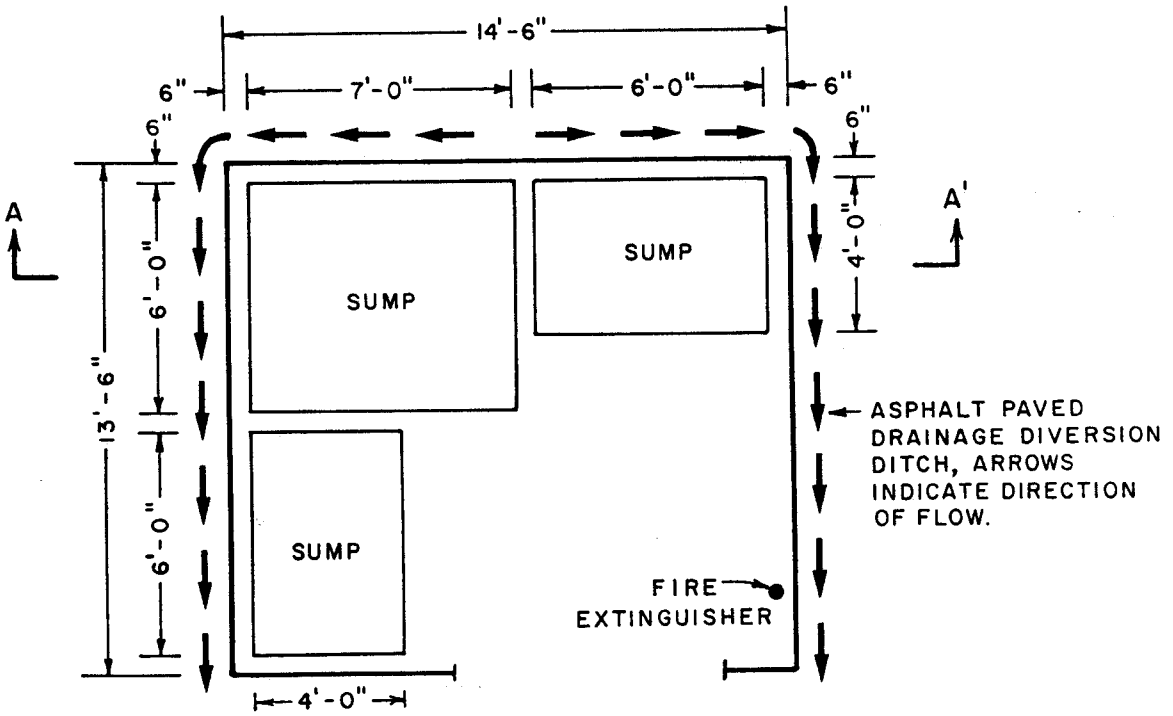
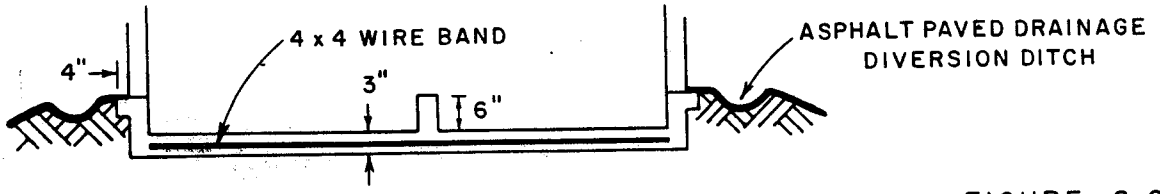
LOS ALAMOS, NEW MEXICO

CORPORATION



FLOOR PLAN



FOUNDATION AND SUMP

(Section A-A')

FIGURE 2-6

TA 54, AREA L WASTE TRANSFER, PACKAGING, AND STORAGE BUILDING

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY

LOS ALAMOS, NEW MEXICO

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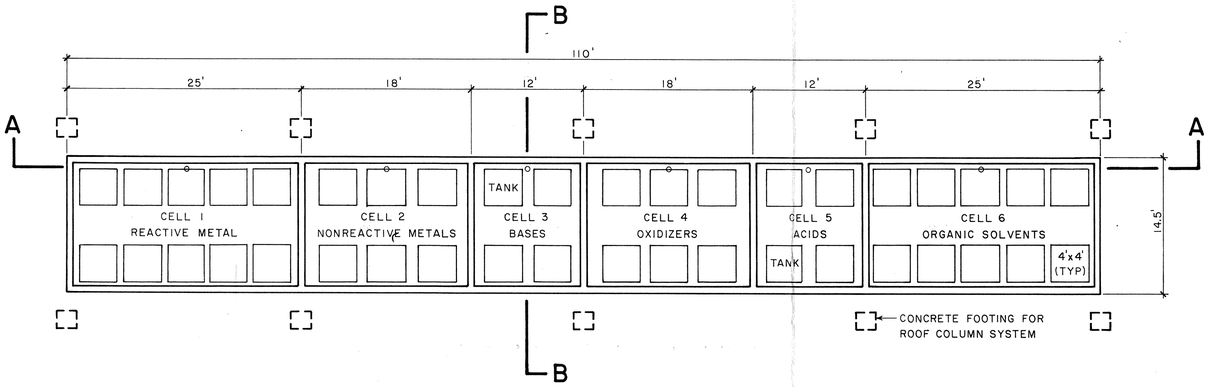
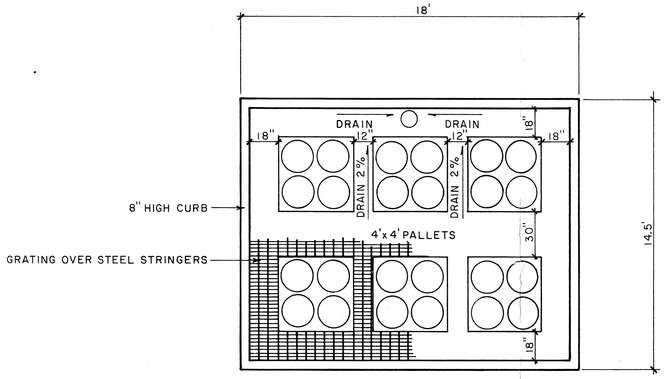


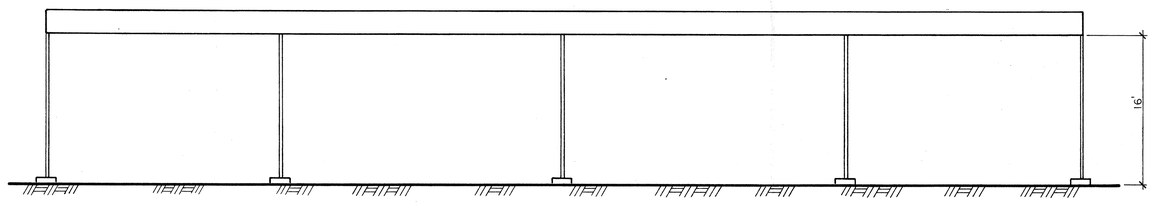
FLOOR PLAN OF CHEMICAL STORAGE AREA

SCALE: 1/8" = 1'



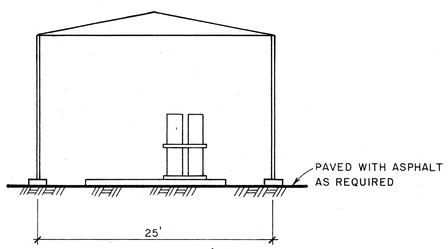
TYPICAL CELL AND SPACING OF PALLETS WITH 55 GALLON DRUMS

SCALE: 1/4" = 1'



ROOF SYSTEM OVER CHEMICAL STORAGE PAD

SCALE: 1/8" = 1'

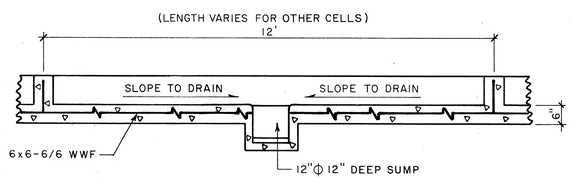


ROOF SYSTEM END VIEW

SCALE: 1/8" = 1'

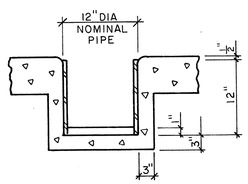
GENERAL NOTES

1. METAL ROOF SYSTEM ONLY WILL HAVE A 2:12 PITCH
2. SYSTEM IS 25' WIDE, 110' (120' OPTIONAL) LONG, 16' NOMINAL EAVE HEIGHT
3. 30 POUND ROOF LOAD
4. PURCHASE REQUEST TO FURNISH & ERECT ROOF SYSTEM
5. FOOTING TO BE CONSTRUCTED BY THE LABORATORY/ZIA
6. CONCRETE PAD TO BE CONSTRUCTED BY THE LABORATORY/ZIA
7. LAY ASPHALIC CONCRETE AROUND THE CONCRETE PAD AS REQUIRED - (2" THICKNESS)



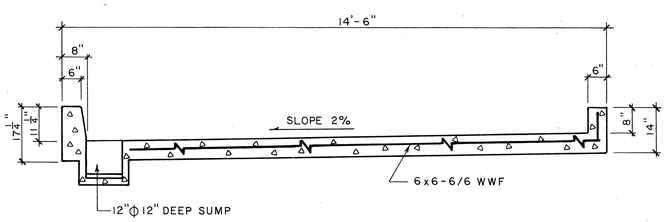
SECTION A-A OF CELL 3 (TYP)

SCALE: 1/2" = 1'



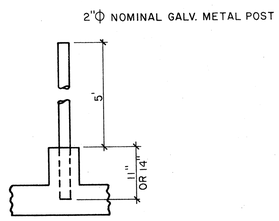
SUMP DETAIL

NO SCALE



SECTION B-B OF CELL 3 (TYP)

SCALE: 1/2" = 1'



POST INSTALLATION DETAIL

IF USED FOR BARRIER WALL CONSTRUCTION

NO SCALE

GENERAL NOTES

1. INSTALL 5' (MIN) HIGH BARRIER WALL BETWEEN CELLS
2. SLOPE FLOORS TO DRAIN TOWARD SUMP
3. METAL GRATING WILL BE USED TO STORE DRUMS 8" ABOVE FLOOR LEVEL
4. CONCRETE WILL HAVE A COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS
5. PAINT FLOOR WITH A PRIMER AND EPOXY PAINT
6. ACCESS FOR PALLET STACKING WILL BE FROM TWO SIDES
7. PALLETS HOLD FOUR 55 GALLON DRUMS AND WILL BE STACKED TWO HIGH

FIGURE 2-7

TA54, AREA L WASTE STORAGE PAD

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LOS ALAMOS, NEW MEXICO

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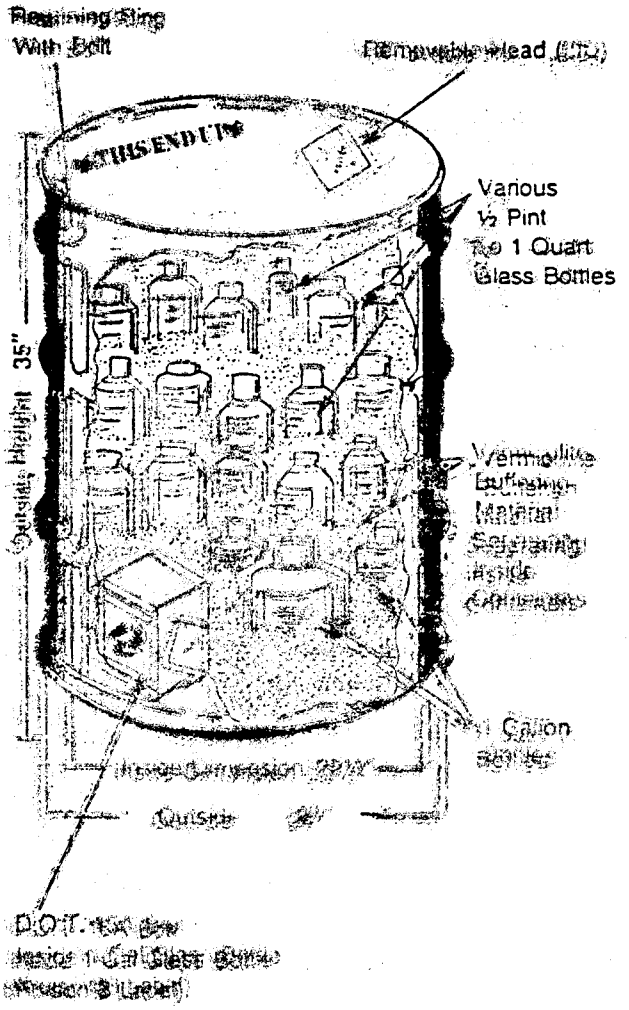

FIGURE 2-8
"LAB PACK" DRUM - TYPICAL
D.O.T. 17H STEEL WITH
REMOVABLE HEAD (LID)

PREPARED FOR
LOS ALAMOS
NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

DRAWN BY LLF 4/25/84 APPROVED BY

NUMBER 046184-A3

32803

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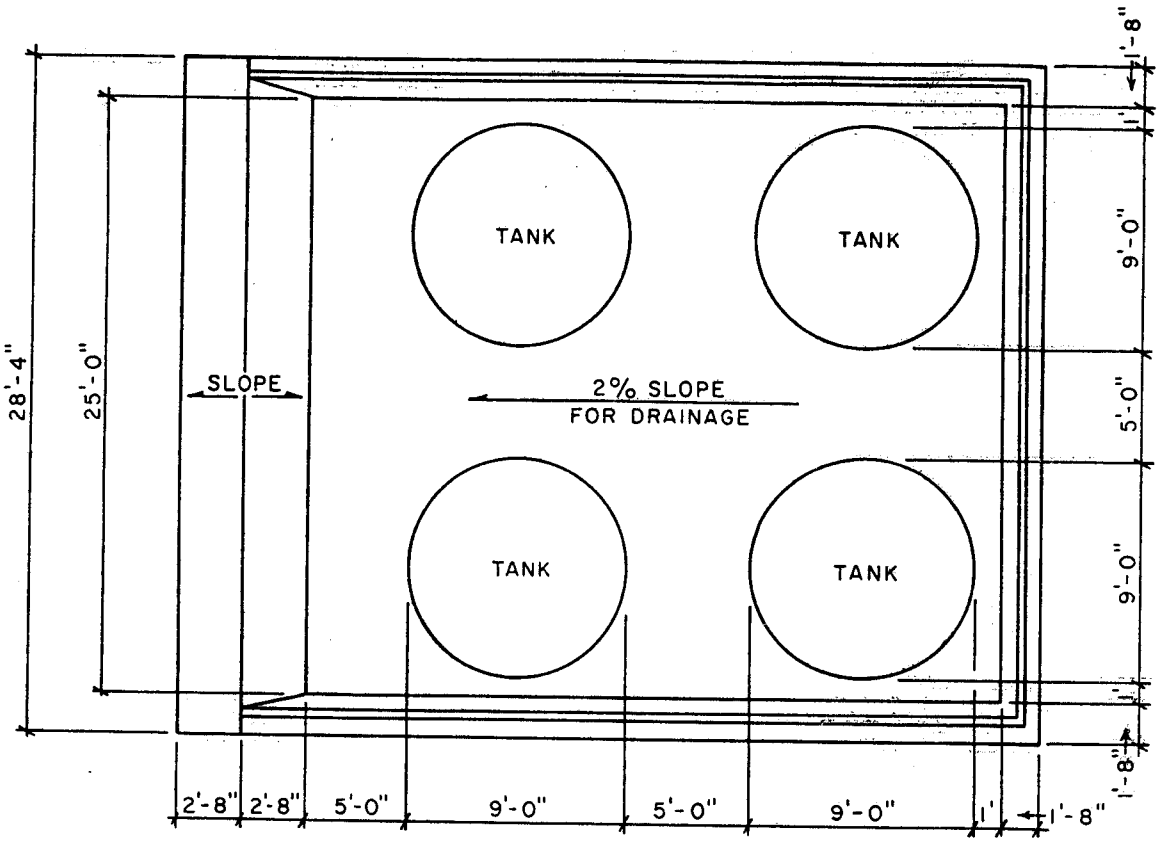
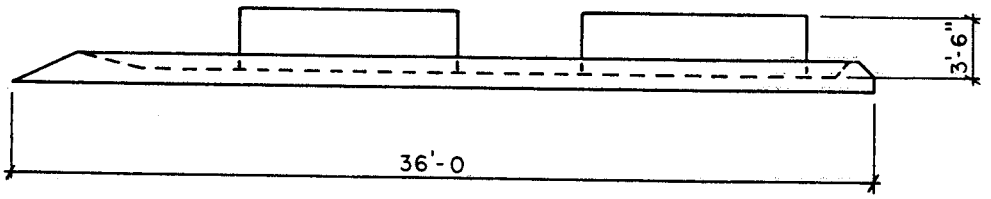
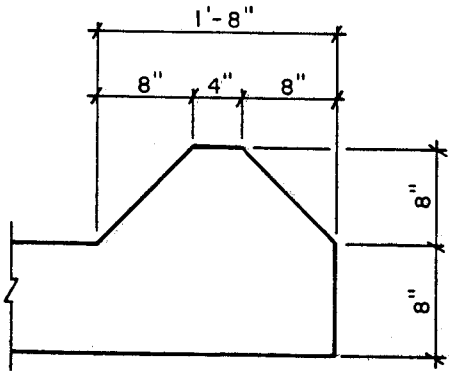
		APPROVED BY	KEP		



PLAN VIEW
SCALE: 1/8" = 1'-0



SIDE VIEW
SCALE: 1/8" = 1'-0



CURB DETAIL
SCALE: 3/4" = 1'-0

FIGURE 2-9

TA 54, AREA L
TREATMENT TANKS
PLAN

PREPARED FOR

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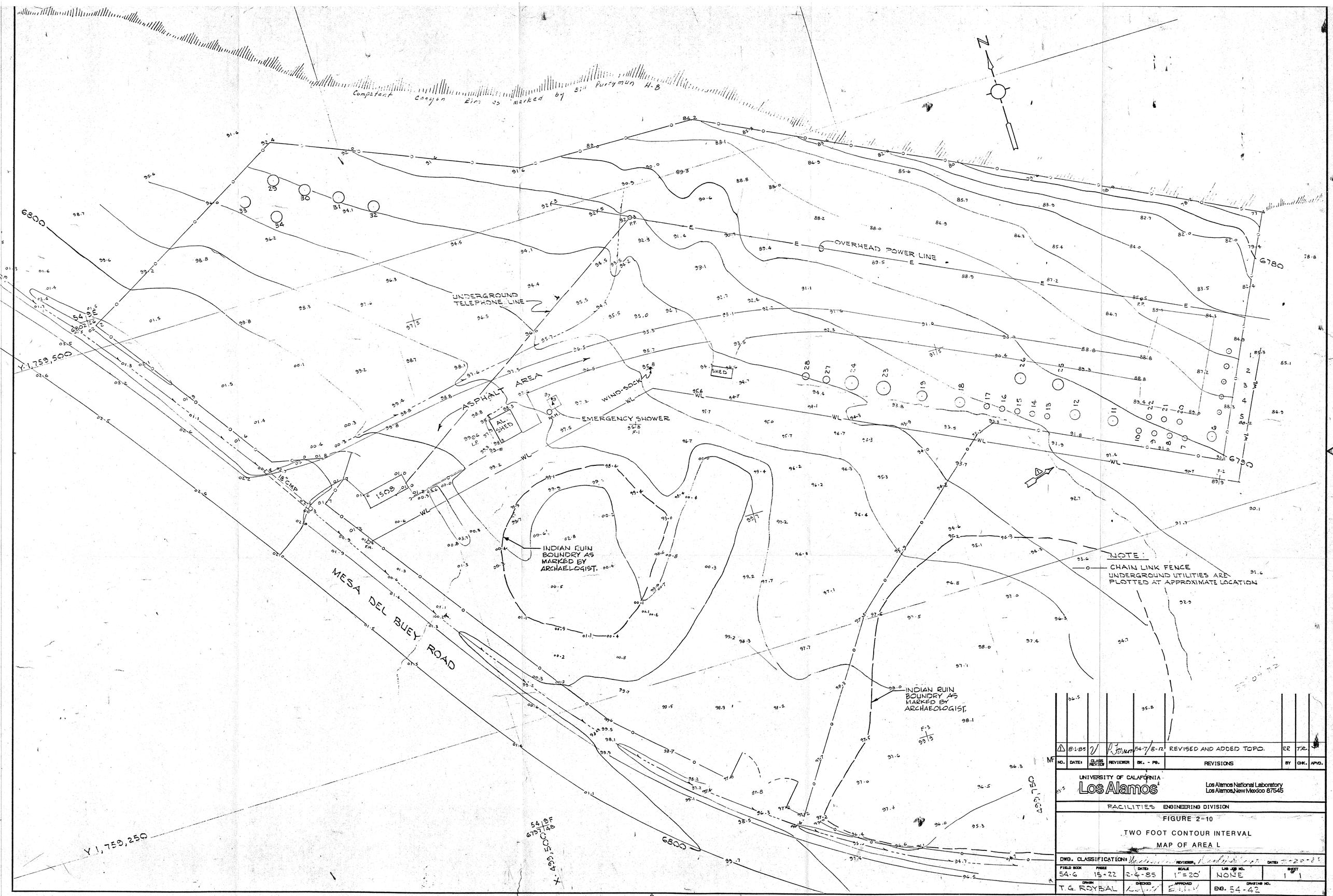

NO.	DATE	CLASS REVIEW	REVIEWER	BK. - PG.	REVISIONS	BY	CHK.	APVD.
1	8-1-85	V	H. Johnson	54-7/8-12	REVISED AND ADDED TOPO.	ER	TR	

UNIVERSITY OF CALAFORNIA
Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

FACILITIES ENGINEERING DIVISION

FIGURE 2-10

TWO FOOT CONTOUR INTERVAL

MAP OF AREA L

DWG. CLASSIFICATION: Unclassified REVIEWER: [illegible] DATE: 7-20-85

FIELD BOOK	PAGES	DATES	SCALE	LAB JOB NO.	SHEET
54-6	15-22	2-4-85	1" = 20'	NONE	1 of 1
DRAWN	CHECKED	APPROVED	DRAWING NO.		
T. G. ROYBAL	[illegible]	[illegible]	ENG. 54-42		

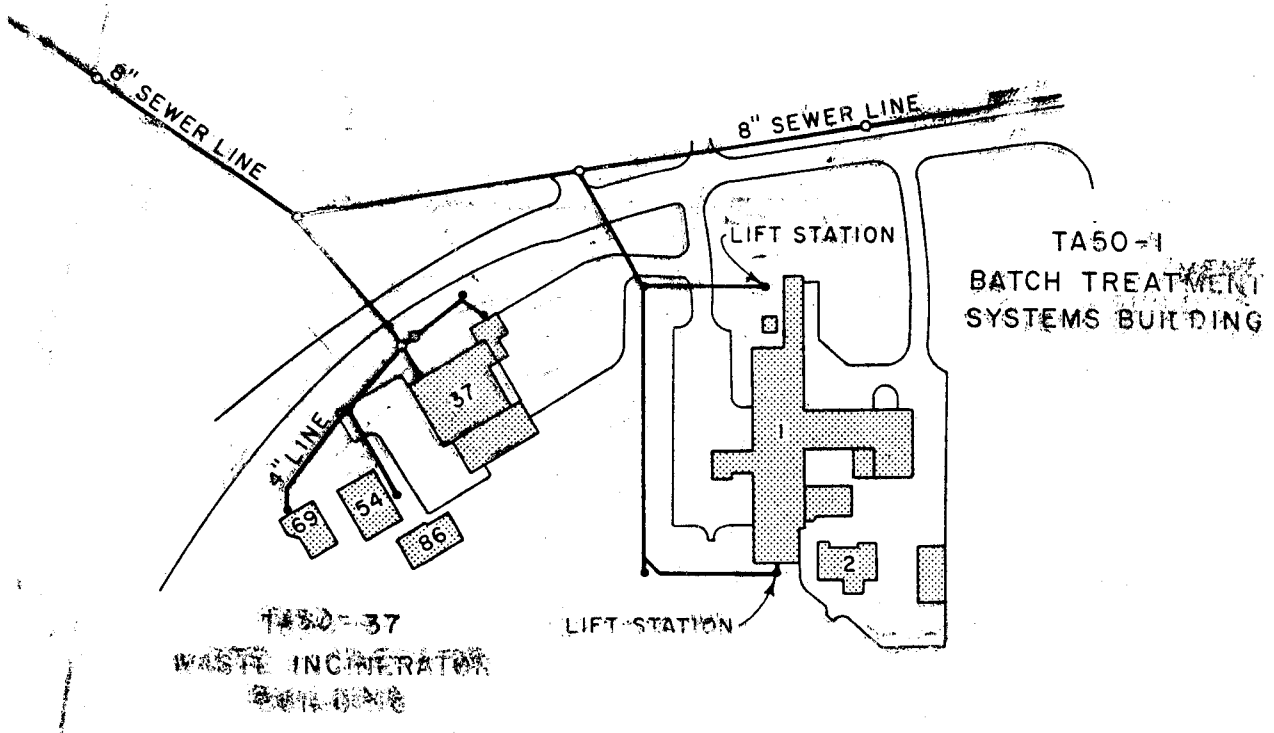

FIGURE 2-11
SANITARY SEWER LINES
AT TA-50
PREPARED FOR
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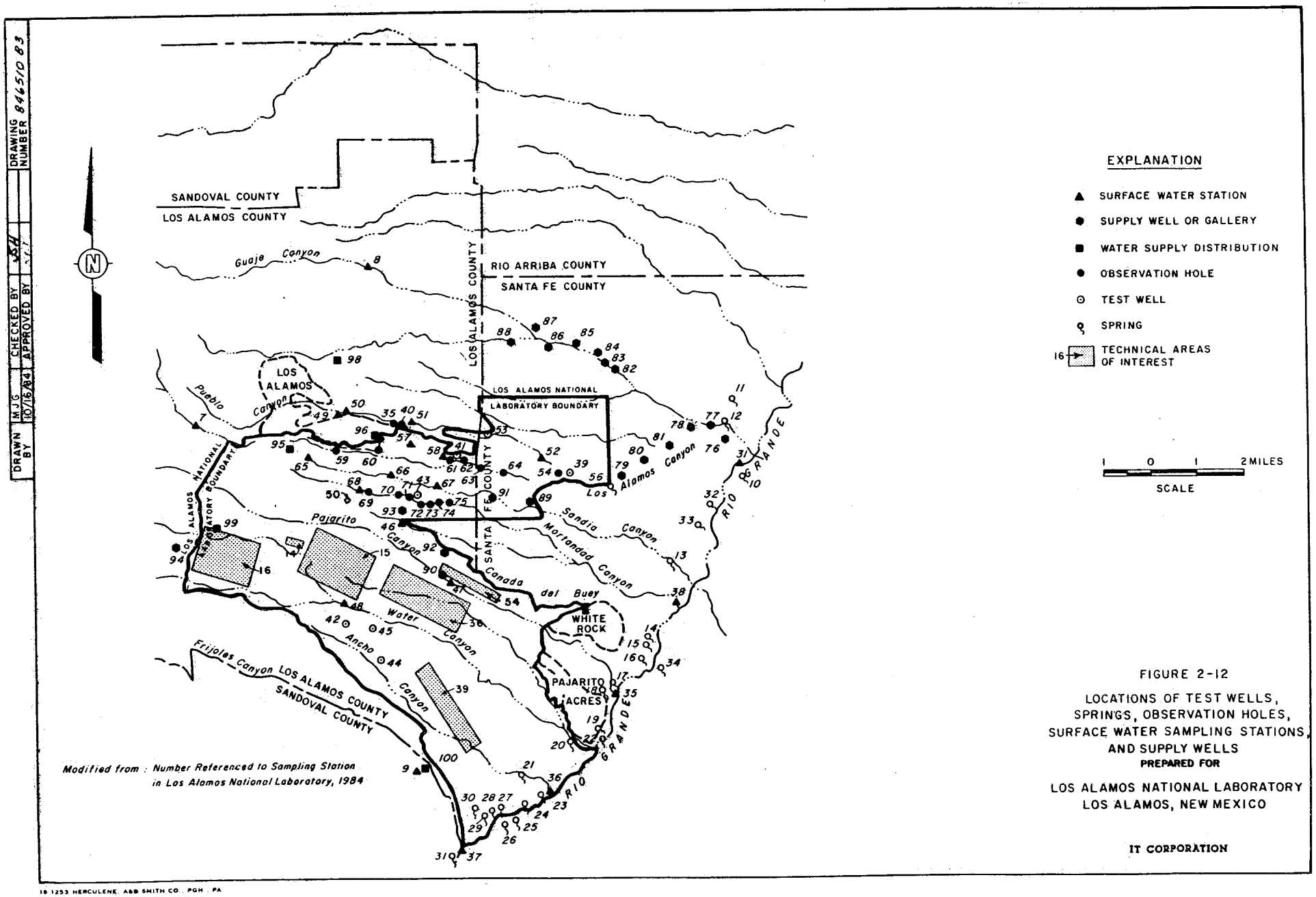

FIGURE 2-12

LOCATIONS OF TEST WELLS, SPRINGS, OBSERVATION HOLES, SURFACE WATER SAMPLING STATIONS, AND SUPPLY WELLS

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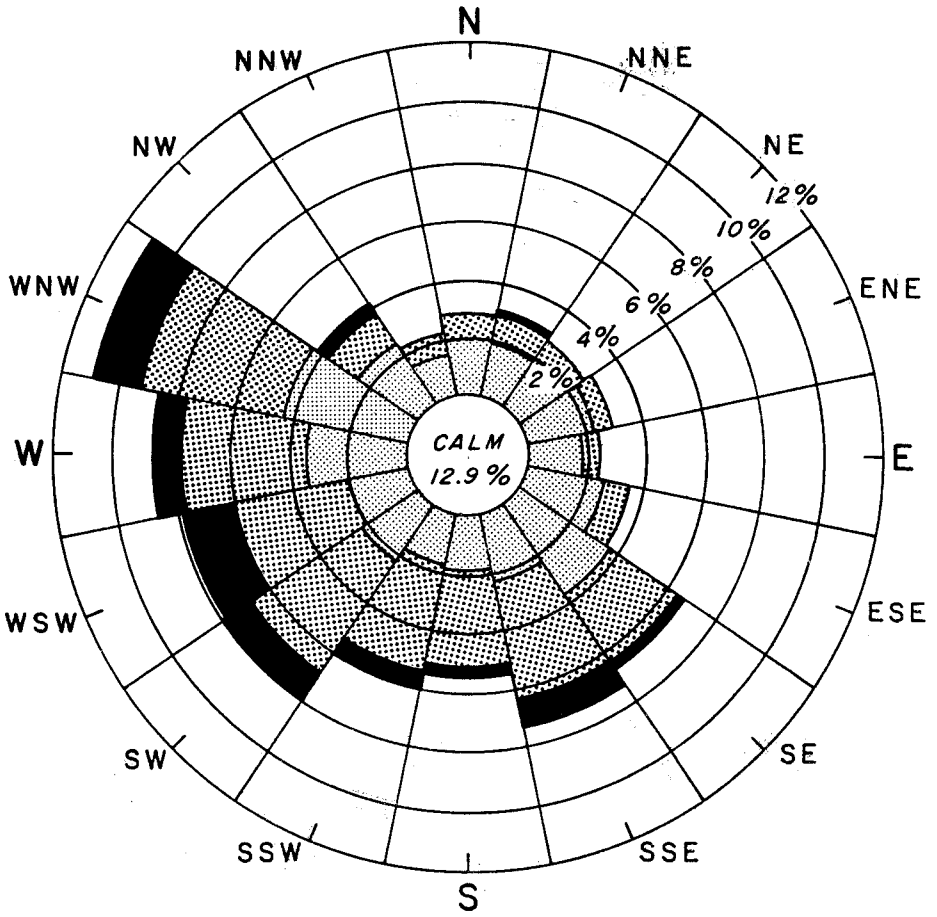

SPEED (m/sec)

1-2.5

2.5-5

5+

(AVG. SPEED = 2.8)

FIGURE 2-13
ANNUAL SURFACE WIND SPEED
AND DIRECTION, 1983,
TECHNICAL AREA 59
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Modified from: Los Alamos National Laboratory, 1984

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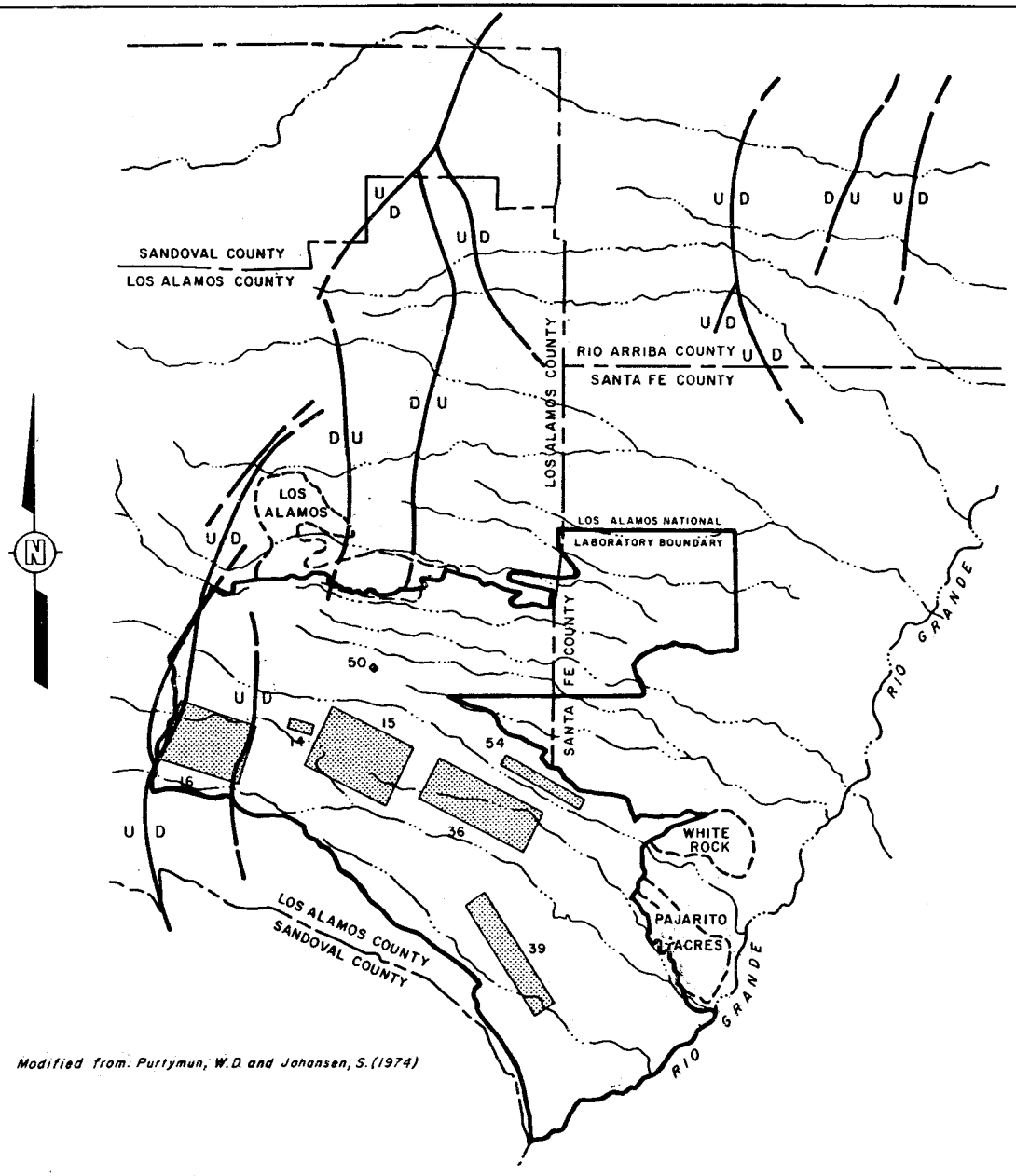

Modified from: Purtymun, W.D. and Johansen, S. (1974)

EXPLANATION

U/D MAJOR FAULTS, D INDICATES DOWNTHROWN SIDE, U INDICATES UPTHROWN SIDE

16 TECHNICAL AREAS OF INTEREST

1 0 1 2 MILES

SCALE

FIGURE 2-14

LOCATION OF LOS ALAMOS FACILITIES RELATIVE TO THE NEARBY FAULT TRACES

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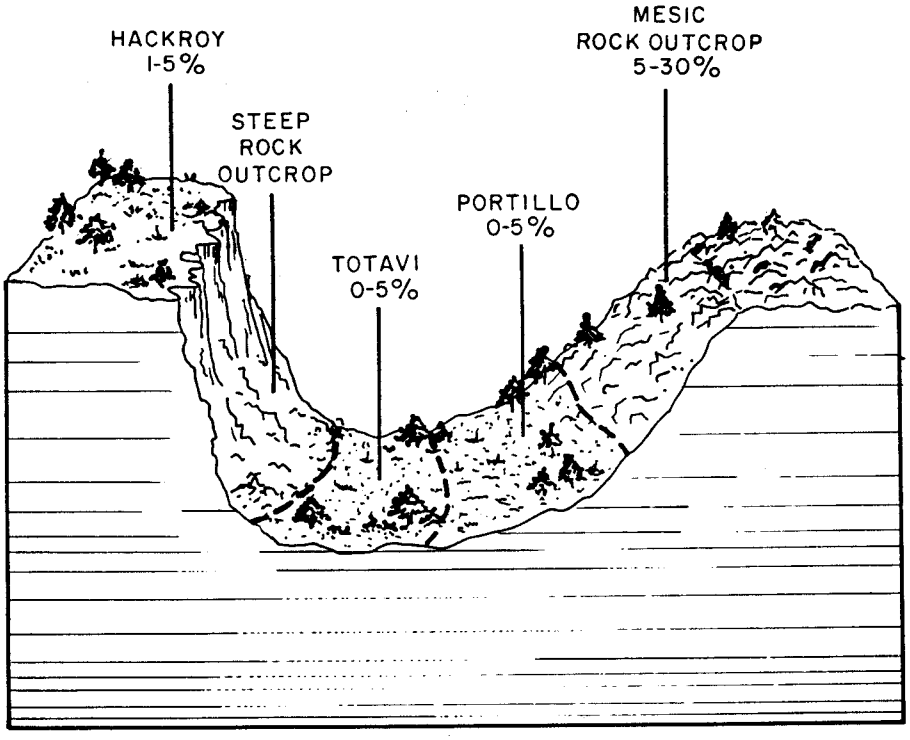

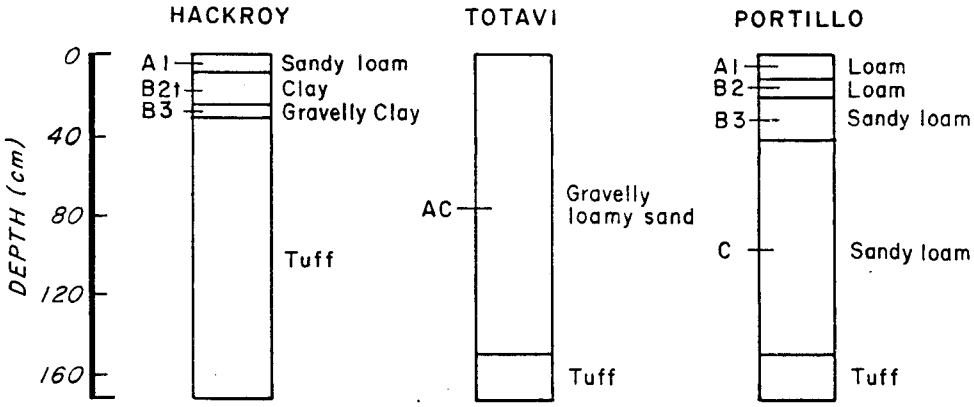

FIGURE 2-15

RELATIONSHIPS OF SLOPE, VEGETATION AND PARENT MATERIAL TO HACKROY, TOTAVI, AND PORTILLO SOILS

Reference; USDOE, 1978

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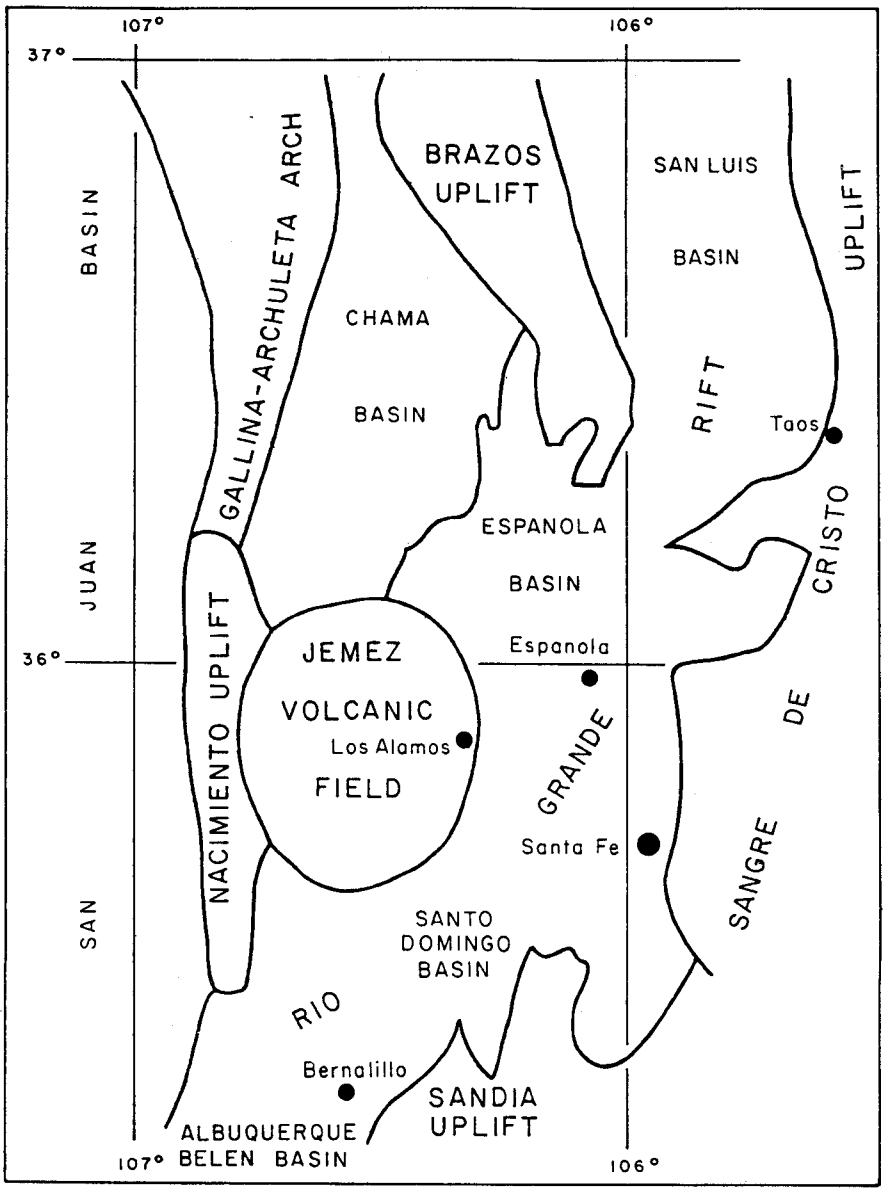

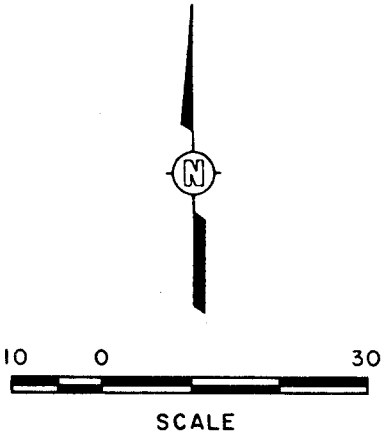

FIGURE 2-16
INDEX MAP SHOWING MAJOR TECTONIC ELEMENTS OF CENTRAL-NORTHERN NEW MEXICO
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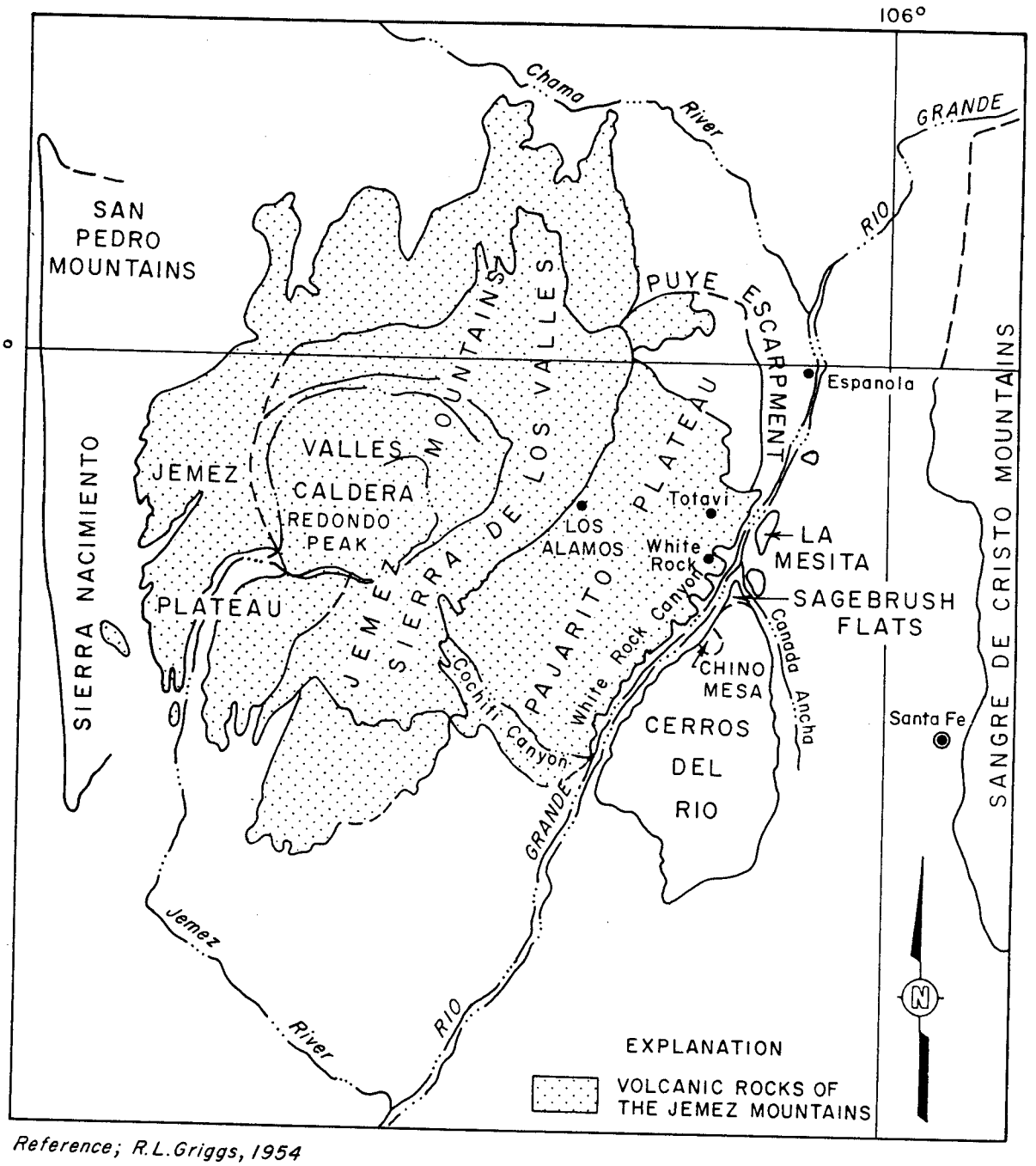

Reference; R.L.Griggs, 1954

5 0 5 10 MILES

SCALE

FIGURE 2-17

PHYSIOGRAPHIC FEATURES OF
THE JEMEZ MOUNTAINS

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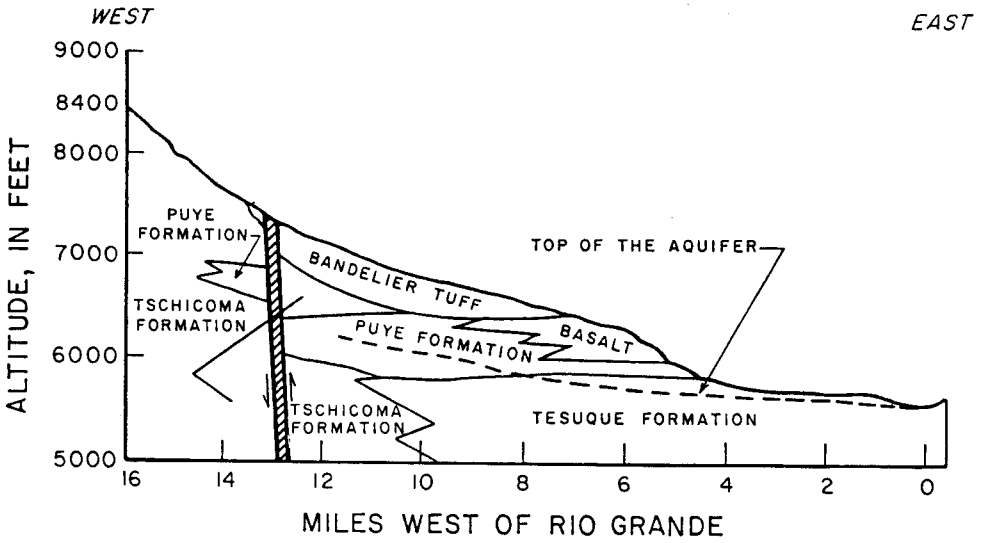

FIGURE 2-18

EAST-WEST GEOLOGIC SECTION
THROUGH THE PAJARITO PLATEAU
PREPARED FOR
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LOS ALAMOS, NEW MEXICO

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DRAWN BY LLF 8/16/84 APPROVED BY NUMBER 846510-A1

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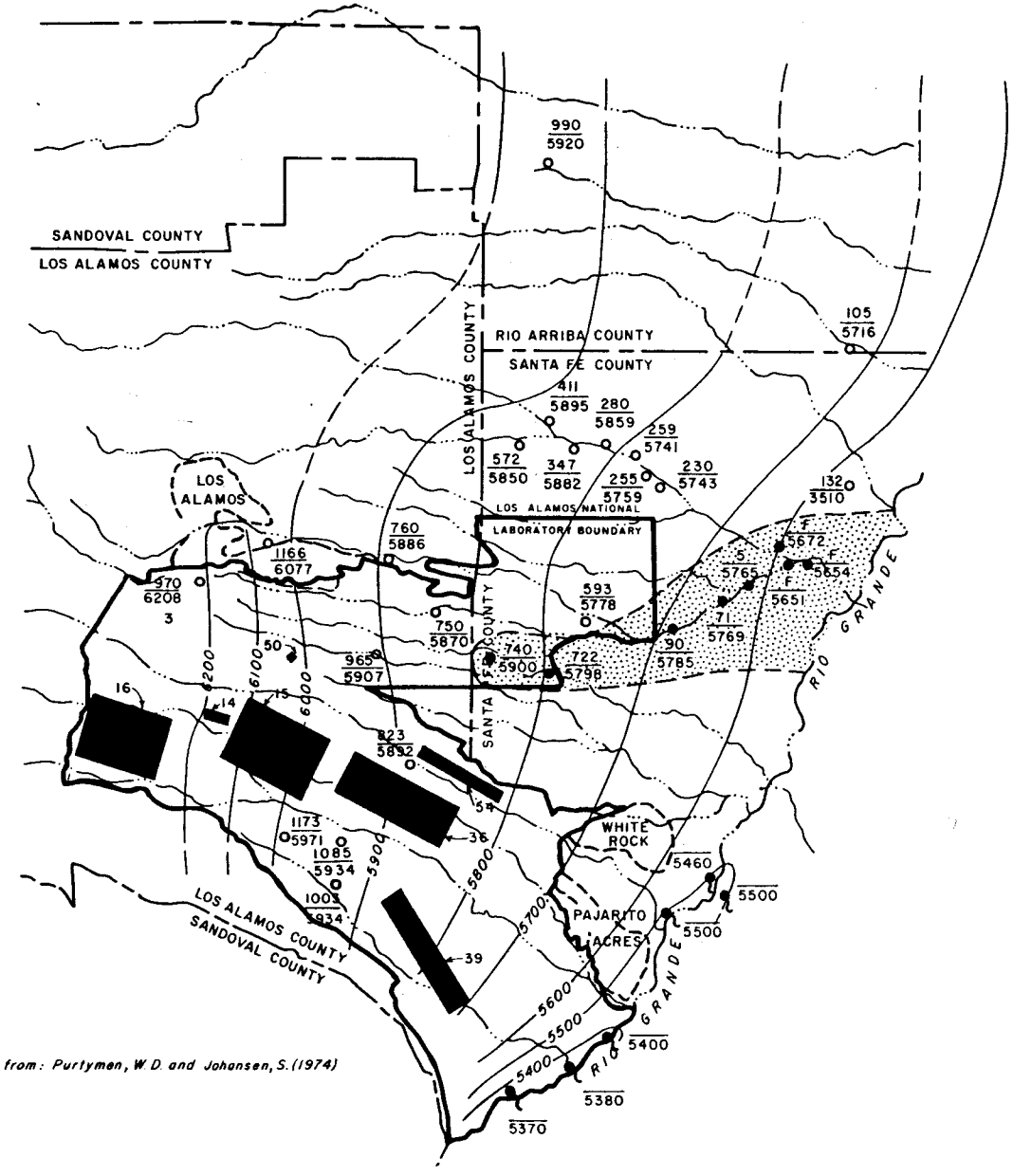

Modified from: Purtymun, W.D. and Johansen, S. (1974)

EXPLANATION

- WELL COMPLETED INTO AQUIFER UNDER WATER TABLE OR NEAR WATER TABLE CONDITIONS.
- WELL COMPLETED INTO AQUIFER UNDER ARTESIAN PRESSURE
- DEPTH TO WATER (FT.); F, FLOWING / ALTITUDE OF WATER SURFACE (FT.)
- SPRING / ALTITUDE OF WATER SURFACE
- 5900 — WATER-LEVEL CONTOUR ON AQUIFER UNDER WATER TABLE OR NEAR WATER TABLE CONDITIONS; IN FEET ABOVE MEAN SEA LEVEL; CONTOUR INTERVAL 100 FT.
- AREA OF DEEP WELLS COMPLETED INTO AQUIFER UNDER ARTESIAN PRESSURES
- 16 — TECHNICAL AREAS OF INTEREST

NOTE: DEPTH TO WATER AS REPORTED WHEN WELL DRILLED

N

1 0 1 2 MILES
SCALE

FIGURE 2-19

GENERALIZED CONTOURS ON TOP OF MAIN AQUIFER

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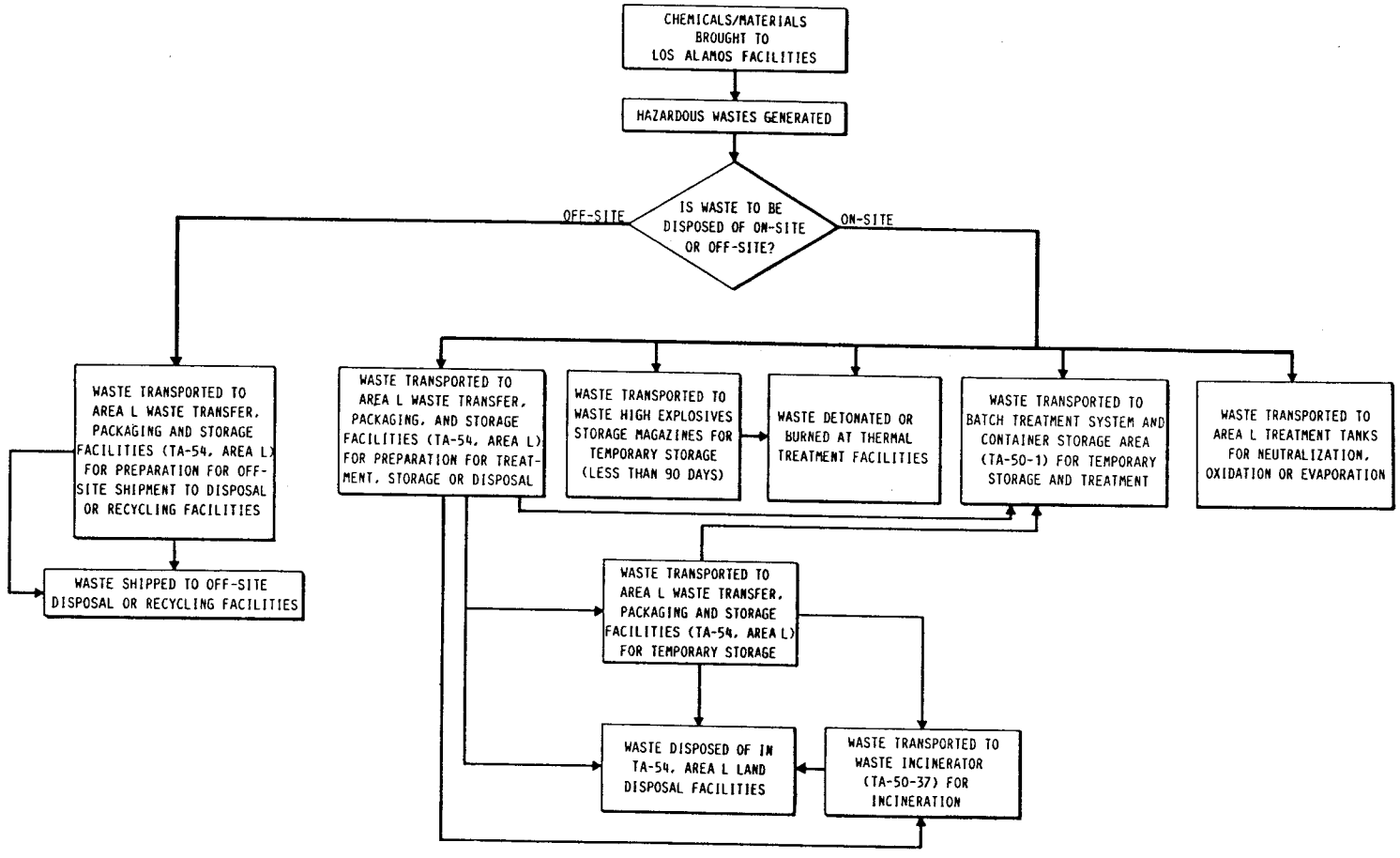

FIGURE 2-20

SCHEMATIC DIAGRAM OF LOS ALAMOS HAZARDOUS WASTE MANAGEMENT ACTIVITIES

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY

LOS ALAMOS, NEW MEXICO

DRAWING NUMBER 84610-86

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3.0 WASTE CHARACTERISTICS AND ANALYSIS PLAN

3.1 CHEMICAL AND PHYSICAL ANALYSES

This section describes the chemical and physical nature of the RCRA-regulated hazardous waste treated, stored and disposed at Los Alamos facilities. This information is provided in response to RCRA Part B Permit Application requirements, as specified in 40 CFR §270.14(b)(2) (NMHWMR 302.A.4.b.[1]) and regulatory requirements, as contained in 40 CFR §264.13 (NMHWMR 206.B.3). The Laboratory complied with RCRA Part A interim authorization as part of which all chemicals classified as hazardous and used at Los Alamos were listed. Chemicals not regulated by RCRA but considered by DOE to be of concern are not referenced herein.

Hazardous waste generated by Laboratory activities can be considered as three very general types: (1) wastes from processing operations, (2) wastes from research and development (R&D) activities, and (3) high explosive (HE) waste. Each of these general types has unique characteristics. Processing wastes typically are significant volumes of material that contain a very limited number of contaminants. R&D wastes, however, are typically lesser volumes of a vast number of different laboratory reagents, chemicals, solvents and other general laboratory waste. In addition, the composition and concentration of contaminants in a given process waste is generally uniform unless modifications to the process are made. Conversely, the waste species from R&D activities continually vary depending on the nature of the rapidly changing R&D efforts at the Laboratory. HE wastes consist of a narrow assemblage of chemicals, the concentrations of which may vary. The chemical assemblage, however, remains fairly constant. Los Alamos has developed procedures for the identification and segregation of hazardous wastes (see Section 3.3). Once a waste is identified as a hazardous waste, it is diverted to the appropriate treatment/disposal method (described in Section 4.0) based on its characteristics as determined by the Waste Analysis Plan (see Section 3.2).

Presented below is a brief description of the types of wastes generated, treated, stored and disposed at the Laboratory divided according to activities. Table 3-1 provides an abbreviated form of this information as well as representative estimates of waste volumes.

3.1.1 Wastes from Basic and Applied Chemistry R&D Programs

Primary Laboratory sites for basic and applied chemistry R&D include the Chemistry and Metallurgy Research Building (TA-3-29), Radiochemistry Laboratory (TA-48), Sigma Building (TA-3-66) and the Health Research Laboratory (TA-43). Typical nonradioactive chemical wastes consist primarily of large quantities of partly empty small containers of laboratory reagents, solvents, test samples and other laboratory wastes. Up to several hundred relatively small quantities of different acids, bases, organics, inorganics, reactive metals and other chemicals require disposal (see Appendix G for a list of these materials). These R&D wastes represent nearly all of the waste species included in the Los Alamos Part A Permit Application.

3.1.2 Electrochemistry Processing Wastes

The Electrochemistry Section of the MST-6 Materials Technology Group, located at TA-3-66, generates plating solutions containing chromates and cyanides. These are listed reactive and toxic wastes (F007, F009). The Print Circuit Board Shop of the E-2 Electronic Manufacturing and Technician Resources Group, located at TA-3-40, generates acid/base wastes heavily contaminated with copper. These are considered as hazardous wastes due to their corrosivity (D002).

3.1.3 Isotope Separation Wastes

The Isotope and Structural Chemistry Group, INC-4, generates highly concentrated nitric and sulfuric acid wastes. Both nitric and sulfuric acid wastes are hazardous due to their highly corrosive characteristics (D002). Nitric acid is also considered hazardous because it can be an oxidizer (D001) depending on its concentration. These wastes do not

contain hazardous contaminants based on knowledge of the waste-generating processes.

3.1.4 Shops Department Wastes

The Main Shops Department, Building TA-3-39, houses most of the highly versatile machine shop capabilities at the Laboratory. Parts can be machined from almost any metal, alloy or other materials. The machining operations generate waste lithium metal and lithium hydride, both of which are hazardous due to their reactivity (D003). The Main Shops Department also generates waste non-halogenated solvents (F003) and halogenated degreasers (F001) and solvents (F002).

3.1.5 Explosives Wastes

High explosives (HE) waste is generated by the Dynamics Testing (M) and Design Engineering (WX) Division groups in the course of processing and testing various HE materials. Processing includes pressing, machining and casting HE. Waste occurs as discrete pieces of HE, as well as chips, machine cuttings and powder. The chips, cuttings and powder are usually in the form of waterborne suspensions, collected in specially designed accumulating/settling sump tanks. Wastes also consist of materials contaminated with HE; these may include paper, oil, solvents, wood, machine tools, fixtures, etc. Chemically, the wastes consist of HMX, RDX (cyclonite), TNT (2,4,6 trinitrotoluene), PETN (pentoerythritol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine and various plastic binders. Nearly all the HE waste substances are ignitable (D001) or reactive (D003) and barium nitrate is EP toxic (D005). Residues from HE waste are generated by flashing or burning HE waste at TA-16. These residues are typically present in the uppermost layer of sand that covers the burn pad. The sand from the two pads used to burn pieces of explosives is considered hazardous due to its barium content (D005).

3.1.6 Chemically Contaminated Equipment

In addition to the wastes noted above, various laboratory items that contain chemical residues or are otherwise chemically contaminated may

Are they not

be considered hazardous waste. Empty drums, tanks and gas cylinders are typical contaminated items. Generation of this type of hazardous waste occurs throughout the Laboratory facilities and produces a wide variety of waste types.

3.2 WASTE ANALYSIS PLAN

To ensure that the characteristics of waste that require storage, treatment and disposal at Los Alamos are known well enough to permit proper waste-handling procedures to be applied, a waste analysis plan has been developed and implemented. The methods used to characterize the waste depend on the type of waste considered (e.g., laboratory waste versus processing waste). For all waste types, the Laboratory Waste Management Group utilizes the facts that the composition of most of the laboratory waste is known due to the nature of the basic and applied chemistry R&D programs and that the general compositions of the processing and HE wastes are known due to detailed knowledge of the processes or the materials. Knowledge of the compositions of laboratory and processing wastes ~~is supplemented as necessary~~ by analyses of individual containers or drums of waste. Table 3-2 lists the waste analysis parameters and the rationale for the selection of each for each general type of waste generated at Los Alamos. Table 3-3 presents the waste analysis parameters and the test methods used. Tables 3-4 and 3-5 list the methods used to sample hazardous wastes and the frequency of waste analysis including the rationale for that frequency, respectively. A brief description of the waste analysis plan developed in accordance with 40 CFR §264.13 (NMHWMR 206.B.3.b) is given below.

KOP & supplement w/ analysis

need to include a copy of the WASTE A Plan

When chemical substances are declared to be excess, the originating group completes a Chemical Waste Disposal Request (see Form H-1 in Appendix H) and sends the form to the Waste Management Group. The Request lists the specific chemicals the generating group needs to dispose of, the quantity and form of the chemicals and other pertinent information such as the condition of the containers. Most chemicals disposed of are residual substances in small reagent size containers

with the original detailed label intact. Thus, the completed Request form and the container label serve as the waste analysis record for the waste to be disposed of. Should the label become detached, the waste is handled as an unknown material, as discussed later. After the Waste Management Group collects the chemical wastes, individual reagent containers are sorted to insure compatibility (as described in Section 3.3) and are packaged with vermiculite into metal drums for disposal. The composition of waste in each drum is derived from recording the known compositions of waste that is placed in the container on a form developed for this purpose (Forms H-2 and H-3 in Appendix H).

For the processing waste streams (e.g., wastes generated by the electrochemistry processing activities), periodic analyses of the waste composition are performed. Thorough knowledge of the waste-generating process allows analyses of specific processing waste streams to be tailored to provide necessary characterization information in an efficient manner. In addition, the frequency of analysis is based on the possible temporal variation in the waste composition. The waste analysis program developed with these considerations in mind provides the information required to properly treat and dispose of Laboratory processing wastes (see Appendix H for analyses forms of processing wastes).

Occasionally, chemicals of an unknown nature require disposal. These wastes are handled on a case-by-case basis. Often the individual waste can be characterized by knowledge of the operations and activities that were performed in the specific area in which the waste was generated. For small volumes (less than one gallon) of unknown wastes originating from areas such as these, the waste is analyzed to determine its reactivity, pH, or ignitability. If based on the activities performed in the specific area in which the waste was generated, the waste is determined to be a dangerously reactive material, analysis is not attempted and the waste is detonated. Very rarely, larger volumes of a single unknown waste require treatment or disposal. These wastes are characterized in sufficient detail to permit assignment of the proper

EPA Hazardous Waste Number to the waste. Analyses to characterize unknown wastes are performed in accordance with the procedures given in the most recent EPA test methods manual (currently SW-846, Second Edition) or approved equivalent methods, as noted in Table 3-2.

Waste materials treated by incineration will be analyzed for properties and composition that are specific for safe handling and proper operation of the incineration system.

The general chemical composition and chemical and physical properties of HE waste are known through detailed knowledge of the material and proper waste treatment and disposal methods for HE waste can be selected on this basis. Thus, analysis of HE waste to determine its exact chemical composition is unnecessary and would be extremely dangerous.

3.3 WASTE SEGREGATION

To prevent adverse interactions of incompatible chemical wastes and to facilitate recycling or treatment of wastes, chemical wastes will generally be segregated, as discussed in Section 4.0 and Appendix L, into the following basic categories:

- Organics, including solvent wastes such as acetone, benzene, toluene, etc.
- Corrosive acidic wastes, including organic and mineral acids but excluding oxidizers such as nitric or perchloric acid
- Corrosive alkalic and caustic wastes
- Oxidizers, such as perchloric or chromic acid and non-acidic oxidizers such as permanganates and chlorates
- Reactive metals and compounds, such as sodium, lithium hydride, phosphorous trichloride, etc.
- Non-reactive metals, salts and neutral compounds, such as lead, barium salts, etc. and cyanide or sulfide compound containing wastes (in lab pack quantities only)

Additional waste segregation practices are also followed to aid in treating and processing chemical wastes at the Laboratory. These include segregation of all process wastes (as identified in Section 3.1) prior to processing and segregation of all high explosive wastes from other compounds.

As opportunities for recycling are discovered, potentially recyclable wastes will be separated from the remainder of the chemical wastes. For instance, large quantities of metallic mercury are currently recycled. Additionally, depending on the results of the trial burn for the Laboratory incinerator, further segregation of wastes may become desirable to facilitate incineration procedures.

TABLE 3-1.
WASTE HANDLED, TREATED, STORED AND DISPOSED AT LOS ALAMOS

Chemical	Approx. Annual Volume (m^3)	Hazard	Basis for Hazard Designation
Basic and Applied Chemistry R&D Programs			
Chemistry and Metallurgy Research Building			
Radiochemistry Laboratory			
Health Research Laboratory			
- Numerous chemical wastes	33	Varies[1]	R&D wastes are comprised of numerous listed wastes[1]
Electrochemistry Processing			
Materials Technology Group			
- Chromate and cyanide plating solutions	1	Toxic, Reactive	Listed waste - F007, F009 - toxic and reactive, could contain 10,000-20,000 ppm cyanide
Print Circuit Board Shop			
- Acid/base copper etching/ plating solutions	19	Corrosive	D002 - pH can vary from less than 2 to about 11
Isotope Separation			
Isotope and Structural Chemistry Group			
- Concentrated nitric and sulfuric acid	38	Corrosive	D002 - pH is generally less than 2, concentrated nitric acid is also ignitable (D001) per 261.21(a)(4) (NMHWMR 201.B.2.a[4]) as an oxidizer
Shops Department			
Main Shops Department			
- Lithium hydride, lithium metal	3	Reactive	D003 - per 261.23(a)(2),(3), (NMHWMR 201.B.4.a[2],[3]) gas and heat upon rapid reaction with water
- Halogenated solvents	<1	Toxic	Listed waste - F001, F002 - toxic
- Non-halogenated solvents	<1	Ignitable	Listed waste - F003 - ignitable
Explosives			
Dynamics Testing and Design Engineering			
- High Explosives	90	Ignitable, Reactive	Listed waste - K044 - also D001, D003, may also contain D005 waste
- Contaminated burn pad sand	NA[2]	Toxic	D005 - sand contaminated and tests EP Toxic for barium per 261.24(a) (NMHWMR 201.B.5.a)
Chemically Contaminated Equipment			
Many LANL Facilities	26		Same characteristics as hazardous material contaminants

(1) See Appendix F for a representative list of wastes and hazard designations.

(2) Not available.

TABLE 3-2.
WASTE ANALYSIS PARAMETERS AND RATIONALE FOR THEIR SELECTION

Hazardous Waste	Parameter(s)	Rationale
Basic and Applied Chemistry R&D Programs		
Laboratory waste (liquids)	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	Analyses for selected parameters will be performed, if necessary, for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Content	These wastes are intended for incineration, if possible, and thus will be analyzed for these incinerator parameters as part of the hazardous waste incinerator permit
Laboratory waste (solids)	Ignitability, Reactivity, EP Toxicity, Chemical Analysis	Analyses for selected parameters will be performed, if necessary, for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Content	These wastes are intended for incineration, if possible, and thus will be analyzed for these incinerator parameters as part of the hazardous waste incinerator permit
Electrochemistry Processing		
Materials Technology Group		
- Cyanide and chromate solutions	Cyanide, Chromate	This is a listed reactive, toxic waste (F007, F009), due to its cyanide, chromate content.
Print Circuit Board Shop		
- Acid/base copper etching/ plating solutions	pH	This waste is corrosive (D002) due to its pH
Isotope Separation		
Isotope and Structural Chemistry Group		
- Nitric and sulfuric acid	pH	This waste is hazardous (corrosive, D002) due to its pH.

TABLE 3-2.
WASTE ANALYSIS PARAMETERS AND RATIONALE FOR THEIR SELECTION (Continued)

Hazardous Waste	Parameter(s)	Rationale
Shops Department		
Main Shops Department		
- Lithium hydride, lithium metal	None	Material properties well known and process knowledge allows identification of material without analysis.
- Solvents, halogenated and non-halogenated	None	Material properties of solvents are well known and process knowledge allows identification of material without analysis.
Explosives		
Dynamics Testing and Design Engin. Groups		
- High explosives	Explosive Content	This is a listed hazardous waste (K044) due to its reactivity and ignitability; this material will not be analyzed due to safety considerations; however, process knowledge allows identification of the material.
- Contaminated burn pad sand	EP Toxicity for Metals	Sand has been found to contain EP Toxic barium; other high explosive chemicals are decomposed.
Chemically Contaminated Equipment		
Many LANL facilities		
- Empty drums, tanks, gas cylinders, etc.	None	Contaminants known and contaminated equipment treated with the same precautions as if it were were the actual material.

TABLE 3-3.
WASTE ANALYSIS PARAMETERS AND TEST METHODS

Parameter	Test Method	Reference[1]
Ignitability	Pensky-Martens Closed-Cup Method	(L) SW1010 (L) ASTM D93-80
Reactivity	Numerous methods and tests	(L,S) SW Section 2.1.3
pH	Electrometric	(L) SW9040
EP Toxicity	EP Toxicity Extraction[2] and Graphite Furnace Atomic Absorption Spectrophotometry	(L,S) SW1310
Arsenic		(L) SW7060
Barium		(L) SW7081
Beryllium		(L) SW7091
Cadmium		(L) SW7131
Chromium		(L) SW7191
Lead		(L) SW7421
Selenium		(L) SW7740
Silver		(L) SW7761
	EP Toxicity Extraction[2] and Manual Cold Vapor Technique	(L,S) SW1310
Mercury		(L) SW7470

(1) "A" refers to Sampling and Analysis Methods for Hazardous Waste Combustion, EPA-600/8-84-002, February 1984.

"ASTM" refers to American Society for Testing Material Standards.

"SW" refers to Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition, EPA, July 1982.

"L" refers to liquid waste.

"S" refers to solid waste.

(2) If EP Toxicity (and other analyses) do not permit identification of an unknown chemical waste, digested metal samples (per SW3020) will be analyzed for the metals noted.

TABLE 3-3.
WASTE ANALYSIS PARAMETERS AND TEST METHODS
(continued)

Parameter	Test Method	Reference[1]
EP Toxicity	EP Toxicity Extration and Gas Chromatography	(L,S) SW1310
Organochlorine Pesticides		(L) SW8080
Chlorinated Herbicides		(L) SW8150
Heat Value	Bomb calorimeter	(L) A006, ASTM D240 (S) A006, ASTM D2015
Organic Chlorine	Halide titration of combustion residue	(L,S) A004, ASTM D2361
Ash Content	Residue after combustion in muffle furnace	(L) A001, ASTM D482 (S) A001, ASTM D3174
Cyanide	Distillation and titration	(L) SW9010
Chrome	Colorimetric method for hexavalent chromium	(L) SW7196

TABLE 3-4.
SAMPLING METHODS FOR HAZARDOUS WASTES TO BE ANALYZED

Hazardous Waste	Sampling Method[1]	Description of Sampling
Basic and Applied Chemistry R&D Program		
Laboratory Waste (liquids)	Coliwasa; glass bottle	Samples of unknown wastes in larger containers (e.g., five-gallon can) taken with coliwasa; smaller containers may be sampled by pouring a small quantity of fluid into a glass bottle
Laboratory Waste (solids)	Thief, trier	Thief or trier used for unknown wastes based on waste physical consistency; in some cases (e.g., contaminated equipment) obtaining a representative sample may be impracticable
Electrochemistry Processing		
Materials Technology Group - Cyanide and chromate solutions	Coliwasa	Samples taken from drums before solutions transferred to batch treatment system; samples can also be taken from treatment system tank
Print Circuit Board Shop - Acid/base copper etching/ plating solutions	Coliwasa	See above description
Isotope Separation		
Isotope and Structural Chemistry Group - Nitric and sulfuric acid	Coliwasa	See description for cyanide and chromatic solution sampling
Explosives		
Dynamic Testing and Design Engin. Groups - Contaminated burn pad sand	Thief	Samples taken from approximate center of recent explosives burn

(1) Sampling methods are adopted from: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition, EPA, July 1982.

TABLE 3-5.
FREQUENCY OF ANALYSES AND RATIONALE

Hazardous Waste	Analysis	Frequency	Rationale
Basic and Applied Chemistry			
R&D Programs			
Laboratory waste (liquids)	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	As required	Analyses for selected parameters will be performed for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Production	One incinerator feed tank per month	Analyses will be required by incinerator permit
Laboratory waste (solids)	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	As required	Analyses for selected parameters will be performed for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine[1]	One incinerator feed tank per month	Analyses will be required by incinerator permit
Electrochemistry Processing			
Materials Technology Group - Cyanide and chromate solutions	Cyanide, Chrome	Per batch	Toxic contaminants concentrations can vary widely and proper treatment of waste is assured by frequent analyses.
Print Circuit Board Shop - Acid/base copper etching/ plating solutions	pH	Per batch	Same as cyanide, chromate analysis above
Isotope Separation			
Isotope and Structural Chemistry Group - Nitric and sulfuric acid	pH	Annually	The compositions of these wastes do not change significantly; test is performed to confirm composition; additional analyses will be performed if a process change should affect the waste characteristics; any such analyses may be conducted at the discretion of the Group Manager or regulatory agencies.

[1] The nature of the waste (e.g., contaminated rags, tissues, etc.) may preclude analysis and process knowledge will have to provide necessary information.

TABLE 3-5.
FREQUENCY OF ANALYSES AND RATIONALE (Continued)

Hazardous Waste	Analysis	Frequency	Rationale
Shops Department			
Main Shops Department			
- Lithium hydride, lithium metal	None	None	Process knowledge allows identification of material without analysis
- Halogenated solvents	None	None	Process knowledge allows identification of material without analysis
- Non-halogenated solvents	None	None	Process knowledge allows identification of material without analysis
Explosives			
Dynamics Testing and Design Engineering Group			
- High explosives	None	None	Process knowledge allows identification of material without performing highly dangerous analysis of high explosives
- Contaminated burn pad sand	EP Toxicity for Metals	Annually	Sand is assumed to be contaminated with EP Toxic barium
Chemically Contaminated Equipment			
Many LANL facilities			
- Empty drums, tanks, gas cylinders, etc.	None	None	Contaminants known and contaminated equipment treated with the same precautions as if it were the actual material

4.0 WASTE MANAGEMENT PRACTICES AND FACILITIES

The waste management facilities at Los Alamos to be permitted consist of the following, as noted in Section 2.0:

- TA-50 Batch Treatment System, Container Storage Area, and Chemical Waste Incinerator
- TA-54 Waste Transfer, Packaging and Storage Facilities, Treatment Tanks and Land Disposal Facilities

These Laboratory facilities and related hazardous waste processing activities (treatment, storage and disposal) are described in the following sections.

4.1 TA-50 BATCH TREATMENT SYSTEM AND CONTAINER STORAGE AREA

The lower level of Building 1 at TA-50 houses hazardous waste storage and treatment facilities for treating radioactive liquid wastes and non-radioactive RCRA-regulated wastes. The hazardous waste storage and treatment facilities are located in a room with approximately 425 square feet of floor area (Figure 4-1). The storage area consists of a four-foot square, cement pad with eight-inch high curbing capable of holding four drums of waste awaiting treatment. The area can easily be inspected. The treatment facility includes a versatile batch, wet chemical processing system (Figure 4-2), designed to neutralize or treat acids and bases, cyanides and heavy metal-containing solutions.

The batch treatment system consists of a totally enclosed, vented 500-gallon pressure vessel which is lined with a nominal 60-mil (0.060-inch) thick Kynar (polyvinylidene fluoride) carbon-mat-reinforced lining. The pressure vessel is equipped with a sparging loop for treatment gas introduction and an agitator for proper homogenization of tank contents. The vessel is also connected to various plumbing to allow the addition of treatment chemicals under enclosed conditions. The pressure vessel is jacketed and the jacket is designed to be connected to steam,

hot water and cold water lines to permit heating or cooling of the vessel. A vented, 370-gallon blowdown tank is incorporated into the system. This tank ensures that possible overpressuring of the pressure vessel during waste treatment or filling does not result in leaks of hazardous wastes or damage to the treatment system. A vent gas condenser system for pressure vessel venting and a basket/cartridge filter also complement the system. Vacuum transfer lines for pressure vessel loading from drums or from tank trucks complete the mechanical portions of the batch treatment system. All plumbing and hardware that would be subject to corrosion from untreated liquid waste are Kynar lined.

The batch treatment system has a full package of instrumentation to permit continuous or periodic measurement of appropriate treatment parameters. The system and its contents are monitored for pH, oxidation-reduction potential, temperature, pressure and flow volume at appropriate locations in the system. The detailed engineering drawings showing the batch treatment system mechanical components and instrumentation are in Appendix I. Appendix I also contains the detailed specifications and the pressure vessel lining inspection report.

The treatment facility also includes a fume hood area that can accommodate two 55-gallon drums for transfer of liquids from one drum to another under ventilated conditions.

4.1.1 Current Management Practices

Building 1 at TA-50 is fenced and the access gates and building doors are locked and the building patrolled by Los Alamos security personnel during unattended hours. The batch waste treatment system is used primarily to treat the Electrochemistry Processing chromate and cyanide plating solutions and acid/base copper etching/plating solutions. The treatment system is highly flexible, however, and other wastes, particularly heavy metal solutions, may occasionally be treated. Typically, the chromate and cyanide plating solutions are treated in batches of up to 220 gallons several times a year and the copper

etching/plating solutions are treated in 400-gallon batches approximately every two months.

Hazardous wastes are currently received in drums; however, connections and necessary equipment are in place for off and on loading trucks by vacuum. Drums are kept closed and stored in the curbed storage area until their contents are transferred to the treatment system. Only compatible waste are handled or stored at any one time in this area; however, the treatment system is used to treat incompatible wastes with thorough washdown between waste batches. Analyses of wastes are performed both before and after treatment unless process knowledge permits omission of pre-treatment analysis.

waste analysis on non-hazardous?

After rendering wastes non-hazardous by treatment (see Section 4.1.2), the resulting liquid is typically discharged to the industrial (radioactive) waste treatment system. These discharges are included in the NPDES permit. Sludges recovered from metals precipitation and other batch treatments are mixed in drums with cement for disposal at TA-54, Area L facilities.

The fume hood area of the batch treatment room is used for transfer of liquids from one drum to another and for absorption of liquids into vermiculite as required for disposal. This area is typically used when a waste generator within the Laboratory cannot transfer liquids without receiving vapor exposures to chemicals such as xylene or toluene.

4.1.2 Secondary Containment Areas

The eight-inch curb which encloses about 150 square feet of floor space beneath the batch treatment system and including the container storage area provides containment for approximately 850 gallons of liquid. This containment volume is greater than the 500-gallon capacity of the batch treatment system and the 220-gallon capacity of the drum storage area, combined (i.e., 720 gallons). Raised floor drains that empty into the industrial (radioactive) sewer system are located within the curbed area. The level of these drains is about one-half inch below the top of

the curb, which ensures that the liquid level will not exceed the height of the curb.

4.1.3 Batch Treatment System Description and Processes

4.1.3.1 Cyanide Waste Treatment

Batches of up to 220 gallons of waste cyanide solution are treated at one time in the treatment system. Cyanide solutions are received at the facility in 55-gallon drums. After analysis, the solutions are transferred from the drums into the treatment system tank by transfer pump. Based on the volume of the solution and its cyanide concentration, measured amounts of sodium hypochlorite or a combination of chlorine gas and sodium hydroxide are added to the tank through pipelines and valves. The subsequent series of reactions of these chemicals with the cyanide in solution results in the essentially complete destruction of the cyanide. The end-products of this process are sodium chloride, carbon dioxide and nitrogen, which can be safely released to the environment.

how are these end products evaluated?

4.1.3.2 Chromate Waste Treatment

Chromate plating solutions are also treated in batches of up to 150 gallons. These wastes are received in 55-gallon drums and transferred to the waste treatment system tank in a manner similar to that used for cyanide wastes. Sulfur dioxide gas is introduced into the tank and the pH maintained below 2 by addition of sulfuric acid. Resulting reactions reduce the chromium in the plating solutions from the plus six to the plus three valence state. After reduction of the chromium, sodium hydroxide is added to the tank, raising the pH to about eight and precipitating the chromium as the metal hydroxide. This precipitant is filtered from the tank solution, mixed in a drum with cement and disposed of in TA-54, Area L. The waste liquid is suitable for discharge to the sanitary or industrial waste treatment systems.

waste analysis

4.1.3.3 Acid/Base Heavy Metal Waste Treatment

Acid/base wastes resulting from processes such as copper etching and plating are treated in approximately 400-gallon batches. These wastes

are transferred to the treatment tank in the same manner as other wastes and are neutralized. Sodium hydroxide is used to neutralize waste acids, and hydrochloric or sulfuric acid are the neutralizing agents for alkaline solutions. In addition to neutralization, the solutions are treated to remove metals such as copper, arsenic, lead, silver, etc. by appropriate chemical methods. The neutralized liquid waste is discharged to the sanitary or industrial waste treatment system and any metals sludge is mixed in drums with cement and disposed of in TA-54, Area L.

waste analysis?

4.2 TA-50 CHEMICAL WASTE INCINERATOR

The chemical waste incinerator, located in Building 37 at TA-50, is a highly modified, controlled air incinerator rated at a nominal waste feed throughput of 45 kilograms per hour. It is currently permitted to burn radioactive and PCB-contaminated materials. The incinerator has not burned RCRA hazardous wastes to date; however, the Laboratory is proposing to permit the incinerator under RCRA to provide for future operating flexibility and minimization of land disposal. The incinerator and required support activities are located within Building 37, as shown in Figure 4-3. The incinerator and flue gas treatment systems are capable of safely combusting a variety of hazardous wastes including low-level radioactive wastes and transuranic contaminated wastes. Since the incinerator is designed to combust materials contaminated with radioactivity, the incinerator is fitted with glove boxes that permit operation and maintenance of components that have the potential of becoming radioactively contaminated. Personnel access to the incinerator equipment can be achieved with proper protective clothing and respiratory equipment (see Section 6.5.2).

The incinerator process is depicted in Figure 4-4. The incinerator, a controlled air, dual chamber design, is natural gas fired to provide waste ignition and to supply supplemental heat. A detailed description of the incinerator and incinerator process is provided in the trial burn plan (Appendix J); a summary of this information is provided below.

Solid wastes are loaded into the incinerator in batches by a ram feeder. Liquids are loaded by a pump and gaseous wastes fed by gas container pressure or assisted with a vacuum pump. All wastes are charged to the primary combustion chamber operated at a nominal temperature of 760 to 980°C with air controlled to maintain nearly stoichiometric conditions. Unburned volatile components and entrained particles exit the primary chamber to the secondary chamber where excess air and supplemental heat are introduced to promote complete combustion. The secondary chamber is maintained at a nominal temperature of 870 to 1200°C and provides the needed residence time to assure complete combustion.

The flue gas treatment system consists of a quench column, a venturi scrubber, a packed-column scrubber, a condenser, a mist eliminator, a reheater, HEPA filters, an activated carbon adsorber, additional HEPA filters, and an induced draft blower. The purpose of the flue gas treatment system is to remove particulate matter, condense volatile metals and capture acid gases, such as sulfur dioxide, chlorine and fluorine. After purification by the flue gas treatment system, the gas exiting the filters is discharged to the atmosphere through a stack by an induced draft blower.

4.2.1 Secondary Containment Areas

Two 155-gallon KYNAR-lined steel waste storage tanks are located in the incinerator facility. These tanks and associated pumps are located within a curbed area having dimensions of 0.42 feet x 9.5 feet x 20.83 feet. Curbing around a door reduces the containment volume by about 8 ft^3. The curbed area can contain approximately 562 gallons of liquid, an amount in excess of the total volume of waste that may be stored in the waste tanks.

4.2.2 Current Management Practices

Building 37 in TA-50 is fenced with access gates locked during unattended hours. Additionally, the building doors are locked when unattended and the area is patrolled by Los Alamos security personnel.

It is intended that the waste incinerator be used to reduce significantly the volume of hazardous waste requiring land disposal at the Laboratory. Incineration, coupled with batch treatment and recycling when feasible, should eventually reduce the volume of landfilled wastes to a minimal level. Some wastes may not be suitable for incineration. These wastes will be identified by actual waste analysis or process knowledge (see Section 3.2) and will be segregated from incinerator-suitable materials (see Section 3.3).

Solid wastes are received at the incinerator facility in sealed containers which may be opened or sorted as necessary. Prior to incineration, the solid wastes are restricted to an area that has been engineered for proper storage of the material. Liquid wastes are also received in sealed containers. Prior to incineration, the liquid wastes are either retained in the sealed container (if the container is within a shipping cask designed for spill control) or may be transferred by dip tube/pump into holding/blending tanks. Transfer to the holding/blending tanks is made in an enclosure by personnel wearing protective clothing.

The pH of the circulating flue-gas scrub solution is continuously monitored and adjusted when desired by addition of sodium hydroxide. The specific gravity of the scrub solution is monitored and maintained at or below a value representing the saturation concentration for dissolved solids by removing fluid for treatment at the TA-50 Batch Treatment System and adding fresh water.

Ash is removed with a vacuum system connected to a gravity ash-dropout and cooling mechanism. Ash cleanup from the cooled incinerator is accomplished using vacuum wands operated through glove ports. The vacuum system is equipped with a high efficiency cyclone, sintered metal filters and a HEPA filter to trap the ash. Ash removed by the cyclone and metal filters is stored prior to packaging/solidification in a dropout hopper. The ash storage is limited to less than 90 days, in

accordance with 40 CFR 262.34(a) (NMHWMR 204.B.1) so a RCRA permit is not required for the ash hopper. Since the incinerator is used for volume reduction of transuranic and low-level radioactive wastes, the ash, scrub solution and scrub filter cartridges are handled as suspect radioactive wastes. Thus, the ash is solidified by mixing with cement and the scrub solution is transferred to the TA-50 industrial (radioactive) waste treatment system for treatment. Since the incinerator is used for volume reduction of radioactive waste as described above, the ash is considered a hazardous waste (40 CFR 261.3 [c][2]) (NMHWMR 201.A.2.c[2]) and is checked for ~~radioactive contamination~~ and handled appropriately.

4.2.3 Waste Incinerator Trial Burn Plan

Pursuant to RCRA Part B permit application requirements noted in 40 CFR 270.62 (NMHWMR 302.E.2), a trial burn plan (including a quality assurance plan) has been developed for the Controlled Air Incinerator (CAI) system at Los Alamos. The trial burn and quality assurance plans are in Appendix J and the trial burn plan is summarized below. Startup/shakedown procedures are not applicable because the Laboratory incinerator is an existing facility.

The principal organic hazardous constituent (POHC) for which the destruction and removal efficiency is to be determined is carbon tetrachloride. Four runs, each consisting of triplicate test periods, will be conducted. Two runs will be with liquid waste feeds containing carbon tetrachloride and two will be with carbon-tetrachloride-containing solid wastes.

The trial burn test is to obtain process data that will permit calculation of POHC destruction and removal efficiency and hydrogen chloride removal efficiency. Additionally, the fate of POHC's treated by the system will be determined, that is, destroyed by thermal oxidation, removed by the air pollution control system or emitted in the stack gases. The trial burn test will also document the test process feed and

operating conditions that will be used in establishing operating permit conditions and allow calculation of heat and material balances needed to confirm or assess recorded process conditions. Thus, sampling and analysis procedures are included in the trial burn plan to determine the physical-chemical characteristics of the incinerator feed materials, particularly the POHC concentrations, material feed rates, the composition and flow rates of the stack gases, the amounts of POHC discharged in the stack gases and in the quench-scrubber purge water removed by filters in the air pollution control system and the quench-scrubber water recirculation system. The monitoring procedures are selected to measure concentrations of oxygen in the combustion gases and carbon monoxide in the stack gases. Details and locations of monitoring are in the trial burn plan.

Temperatures are continuously monitored and recorded in over twenty locations throughout the CAI process. All temperatures are continuously recorded on strip charts in the control room. The temperature in the primary chamber is automatically modulated by adjustment of the natural gas supply to the chamber to maintain the desired temperature.

Feed rates of waste liquid are measured using mass flowmeters and direct measurement of the liquid level in the feed tank. The destruction efficiency calculations will be based on the waste feed volumes determined from these measurements.

An operating log will be completed once each hour for all operations. These logs are a record of operating conditions and provide evidence that the operator has checked and is aware of the actual operating status of the system. The time at which entries are made will be shown, as will the actual instrument reading for each variable. If automatic shutdown occurs, the log will state the nature of the shutdown, the time it occurred and the suspected cause. Additionally, unusual conditions or situations such as spills or leaks will be noted on the log. Further, once each shift the shift supervisor will inspect the facility for

malfunctions, deterioration, operator error and discharges that could lead to discharge of hazardous waste constituents to the environment or to a threat to human health. If it is determined that a spill potential exists, corrective action will be taken immediately.

? be due until full permit issued

The interim period between completion of the trial burn and receipt of final approval for full operating authority could be several months. During this time, Los Alamos intends to continue operating the incineration system on a full-time basis under all of the guidelines of the federal requirements (40 CFR 265) (NMHWMR 206.C.10).

4.3 TA-54, AREA L WASTE TRANSFER, PACKAGING AND STORAGE FACILITIES

The waste transfer, packaging and storage facilities are used to store and to package or solidify hazardous chemical wastes. When ready, wastes are transported from the facilities either to on-site disposal or treatment facilities or off-site for recycling at a licensed facility. Two structures comprise the Area L waste transfer, packaging and storage facilities. These include a metal building and a roofed concrete pad. A plan view of the metal building is shown in Figure 2-6. The roofed concrete pad plan is shown in Figure 2-7.

floor plan only - no tech info 6" concr. sump

These facilities are used to store lab packs in 55-gallon drums. Prior to the containerization of the lab packs into the 55-gallon drums, an identification and appropriate segregation of the hazardous wastes is performed. This may involve the placement of waste in small containers into drums, pouring of liquid waste into drums containing vermiculite, and transfer of waste from one drum to another. All drums and containers are kept closed during storage and are opened only when chemicals are transferred from one container to another or when lab packs are prepared.

may not be allowed under 84 Amend

A representative handling/storage load for the metal building consists of the following:

- Four 55-gallon drums as lab packs

- 25 gallons of miscellaneous wastes in assorted small (five-gallon or less) containers

A maximum of eight 55-gallon drums can be stored in the metal building. The volume of liquid waste stored in the building will not exceed 440 gallons (as described in the Part A Application) due to the mix of lab packs and stabilized and free liquids.

A total of 304 55-gallon drums can be stored at the roofed concrete pad. Two 220-gallon storage tanks are also located on the pad.

Waste handling equipment used at these facilities include the following:

- Hand trucks
- Drum pumps
- Fork lift

The Los Alamos procedure for operating drum pumps is included as Appendix K.

4.3.1 Lab Packs

Lab packs are used at Los Alamos to containerize the laboratory wastes, particularly the laboratory R&D wastes. A typical lab pack (Figure 2-8) consists of a number of containers of compatible wastes (see Section 3.3) and vermiculite enclosed in a 55-gallon drum. Vermiculite was chosen as a stabilizing material for lab packs because of its good absorbing properties, its resistance to attack by most chemicals, and the cushioning it provides for inside containers during handling and transportation of lab packs. Table 4-1 provides data on the absorption capabilities for a few chemicals. None of the chemicals packaged into lab packs deteriorate vermiculite.

Los Alamos laboratory wastes are typically received for disposal in the containers in which the chemical manufacturer originally packaged the material. Thus, inside container/waste compatibility is usually not an

issue. Wastes not received in their original containers are placed into empty containers that once contained compatible chemicals or in other suitable containers based on 49 CFR 173, 178, 179. Inside containers are visually checked for signs of leakage and the container lid or top tightened as the containers are placed into lab packs. If simple lid tightening is not thought to be sufficient to correct the leak, the material is transferred to a non-leaking container before it is loaded into the lab pack.

A volume of vermiculite sufficient to absorb the entire aggregate liquid contents of the inside containers is added to the drum initially and as the drum is filled. Addition of the vermiculite in this manner eliminates unfilled voids between containers. After placing the final container in the drum, the remaining drum volume is filled with vermiculite. The required ratio of the volume of liquid waste to that of vermiculite in the lab pack depends on the type of waste to be placed in the drum. However, minimizing vermiculite usage by adding only the required volume of the absorbent to each lab pack would introduce unnecessary complexity to lab pack packaging procedures. Thus, a ratio of about five volumes of vermiculite to one volume of liquid will be maintained in all lab packs. This worst case ratio will ensure that sufficient absorbent volume is present in all lab packs (see Table 4-1 for absorbing capacities of vermiculite). The drums are DOT-approved 17C or 17H drums. Typically, the drums are unlined. When necessary, 83-gallon drums and vermiculite are used to overpack damaged 55-gallon lab pack drums.

4.3.2 Secondary Containment Areas

Three shallow sumps covered by fiberglass grates are located in the concrete floor of the metal building. These sumps are provided to contain any chemical spills that may occur within the building. The approximate dimensions of these sumps are shown in Figure 2-6 and will together contain a liquid volume of about 335 gallons. This secondary containment volume is significantly greater than that required based on

the maximum liquid waste storage in the area. The floor slopes generally towards the sumps. The handling of any spilled wastes that collect in the sumps is discussed in Section 6.0. An asphalt-lined run-on control ditch is located outside the building to divert surface drainage away from the building.

The concrete storage pad is divided into six bermed cells. Steel grating lies above the floor of each cell so that waste drums and tanks are elevated several inches above the floor. The floor of each cell slopes toward a sump. The six cells have a combined secondary containment capacity of 8570 gallons. This secondary containment volume is significantly greater than that required based on the maximum liquid waste storage in the area. The containment volume and the maximum liquid waste storage of each cell on the pad is listed below:

Cell[1]	Secondary Containment Volume (gallons)	Maximum Liquid Waste Storage in Cell (gallons)[2]
1	1951	4400
2	1406	2640
3	928	1570
4	1406	2640
5	928	1570
6	1951	4400

[1] Numbered left to right as shown in Figure 2-7.

[2] The actual maximum liquid volume will be below these amounts because some of the drums in each cell will be lab packs.

4.3.3 Current Container Management Practices

When a chemical waste is ready for disposal, personnel at the generating laboratory contact Group HSE-7. HSE-7 personnel then visit the generating site to package the waste for transport to the waste transfer, packaging and storage facilities at Area L. The wastes are packaged and labeled in compliance with DOT and EPA requirements. The wastes are transported on a three-ton flat-bed truck.

When the HSE-7 personnel pick up the wastes from the generator, a Chemical Waste Disposal Request form (H-1 in Appendix H) is completed. The form lists the chemicals being transported and is carried in the truck during transport. Once the lab wastes are received in the waste transfer, packaging and storage facilities, they are segregated into compatible chemical groups (e.g., oxidizers, organics, etc.). They are then packed with vermiculite (heavier containers at the bottom) in 55-gallon drums as described in Section 4.5.1, and in accordance with Los Alamos' procedure for identification and segregation of hazardous wastes (Appendix L).

no discussion in packaging

A second form called "Los Alamos Hazardous Chemical Waste Disposal Record" (H-2 in Appendix H) is also completed for each lab pack. This form is used to record information such as:

- Origin, description and quantity of each waste received
- Method of treatment, storage or disposal
- Location of disposal
- List of chemicals in lab packs

The segregation capabilities of the waste transfer, packaging and storage facilities permit storage of up to nine waste types at any one time (six on the concrete pad and three in the metal building).

4.3.3.1 Drum Numbering and Recording System

Each repackaging drum, whether for recyclable or nonrecyclable materials, is stenciled with both the drum type number and a record number the first time any materials are placed inside the drum. The drum type is stenciled as "Los Alamos National Laboratory HW type ___" and the record number is stenciled as "Los Alamos National Laboratory drum number ___". Record numbers are obtained from the drum number log book and the appropriate information is entered in the log book when a number is

? maintained where

utilized. In addition, each drum is labeled with a completed EPA hazardous waste label. An example of these labels is shown in Figure 4-5.

Each open drum of nonrecyclable materials has a storage and shipment form that is completed with the requested information on all of the materials which are placed into the drum. The drum record number is also recorded on the form. The form is submitted to the records manager after the drum has been sealed.

4.3.3.2 Hazardous Waste Categories for Repackaging Purposes

The first step in the waste categorization process is to determine if the hazardous waste is suitable for recycling. Depending on the quantity generated at any one time, various chemicals at Los Alamos are candidates for recycling. In the past, para-xylene, tantalum pentachloride and metallic mercury have been handled as recyclable materials. Other relatively clean hydrocarbon solvents received in excess of 40 gallons at one time may also be handled as recyclable material.

Nonrecyclable materials along with vermiculite are packaged into the appropriate lab pack, as described in Section 4.3.1. Waste types are segregated in accordance with Laboratory segregation practices noted in Section 3.3. Materials in each of the storage categories are kept segregated from each other at all times. Even after wastes have been repackaged, drums from different storage categories are kept segregated.

When appropriate, recyclable materials are poured from their original containers (except for 55-gallon drums) into a new 55-gallon drum constructed of a similar material. Pouring is performed in a well ventilated area. Personnel are equipped with appropriate personal protection devices.

Any bulging drums are handled in accordance with accepted practice and Laboratory procedures (Appendix M).

Other management practices currently followed at Los Alamos as they apply to these facilities include the following:

- Only compatible wastes are handled at any one time.
- Drums are inspected on a weekly basis and prior to their use.
- A maximum of eight 55-gallon drums are handled at any one time in the metal building.
- Appropriate spacing of drums is provided.

4.4 TA-54, AREA L TREATMENT TANKS

Four 1665-gallon ten-gauge carbon steel tanks are also located at TA-54, Area L. These tanks are used to neutralize, oxidize and evaporate RCRA-regulated and non-RCRA-regulated wastes.

4.4.1 Secondary Containment Areas

The four treatment tanks are located on a bermed concrete pad. The containment capacity of the bermed area is approximately 2340 gallons, an amount adequate to contain the maximum contents of one of the treatment tanks.

4.4.2 Current Management Practices

The treatment tanks are double-lined with eight-mil polyethylene except when the tanks are being used to treat reactive materials. The plastic overlaps the tank top and is tied in place. Liners are replaced at least yearly when tanks are in use. Tanks are unlined when reactives are treated to minimize the potential for combustion.

The tanks are maintained so that fluid levels are no higher than six inches below the top of the tanks. If rainfall should elevate fluid levels above this level, portable pumps are used to draw down the tanks. During periods of precipitation, the tanks are covered. Tank covers are constructed of styrofoam having rigid metal support members

and covered with heavy vinyl. Tank covers are secured with boards and clamps.

Grab samples are taken from tanks prior to and after treatment of wastes (at a minimum). This confirms completeness of treatment prior to removal of liquids. Prior to the placement of a new waste into a tank, the old tank liner is removed if the new and old wastes are not compatible.

4.5 TA-54, AREA L LAND DISPOSAL SHAFTS

Area L in TA-54 is the land disposal area for hazardous waste at Los Alamos. Stabilized, drummed liquid waste and lab packs are disposed of in 60-foot deep shafts that range in diameter from three to eight feet. No bulk or non-containerized liquid or reactive waste is placed in the shafts. Thirty shafts have been closed and four are currently open for waste disposal (Figure 2-5). Each of the four shafts is used for the disposal of a single category of drummed waste to ensure that incompatible wastes do not mix.

4.5.1 Current Management Practices

Open shafts at Area L are covered with a heavy steel cap. When a sufficient quantity of waste has accumulated at the Area L Container Storage Area, a small crane equipped with drum hooks is moved to the edge of the shaft. The drummed wastes are then lowered from a truck through the open steel cap into the shaft. After wastes are emplaced, a layer of crushed tuff or soil is placed on the waste drums to help minimize the potential for ignition of ignitable wastes, to avoid air spaces, and to ensure complete filling between drums. When a shaft is filled, the steel cap is removed and the shaft is capped with a three-feet-thick concrete cap. Shafts are generally open for a period of one to two years. Additional shafts of similar dimensions will be sunk as needed to meet future land disposal needs at Los Alamos.

TABLE 4-1.

ABSORPTION CAPABILITIES OF VERMICULITE

Chemical	Absorption Per 100 Pints of Vermiculite (pints)
Perchloroethylene	2.3
Sulfuric acid, 98%	2.1
Sodium hydroxide, 50%	4.7

Data from Diamond Shamrock Corporation, 1984.

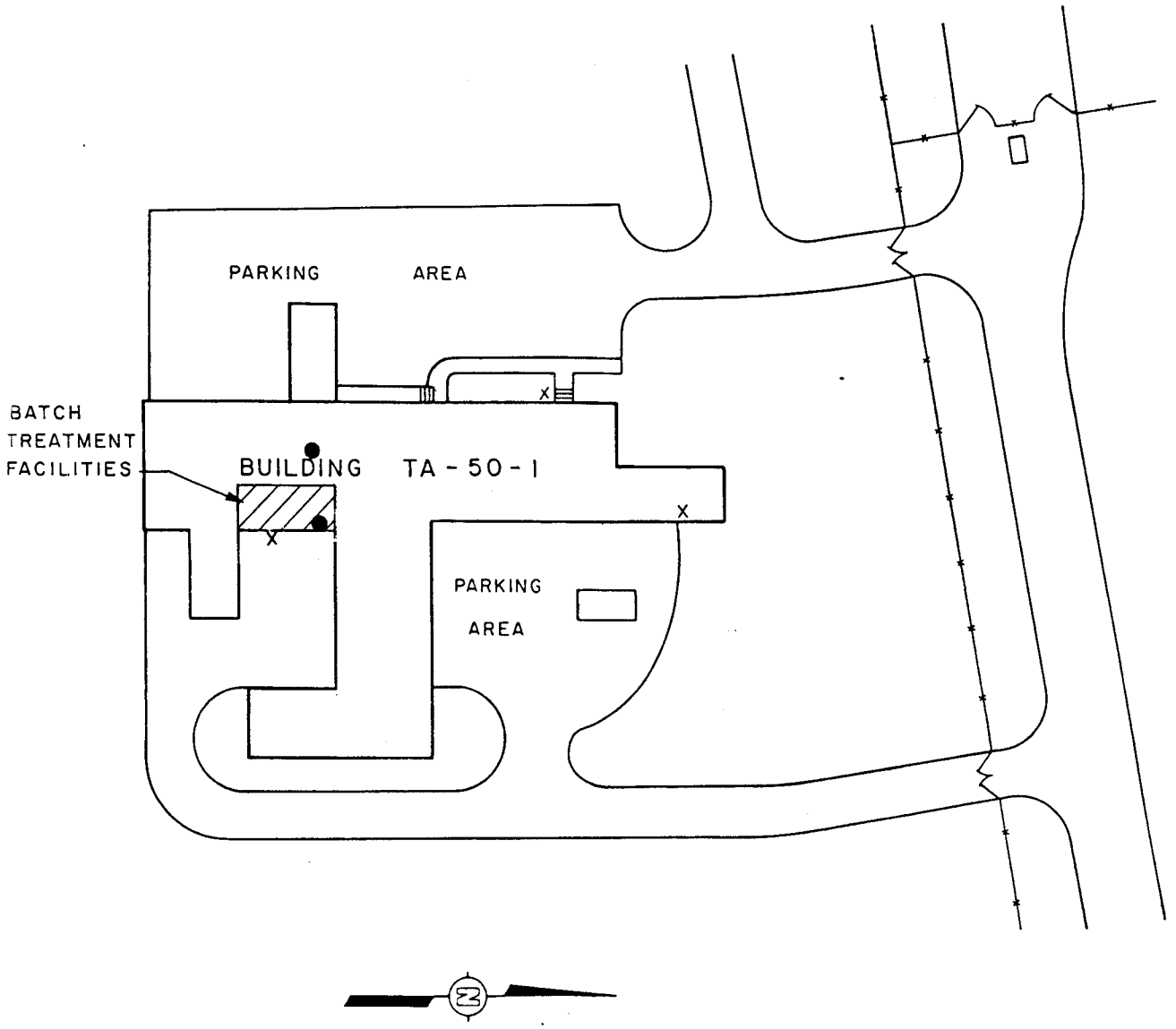


FIGURE 4-1
LOCATION OF
BATCH TREATMENT FACILITIES
IN BUILDING I IN TA-50

PREPARED FOR
LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

X ALARM PULL BOXES
● FIRE EXTINGUISHERS

IT CORPORATION

510-A10

32803

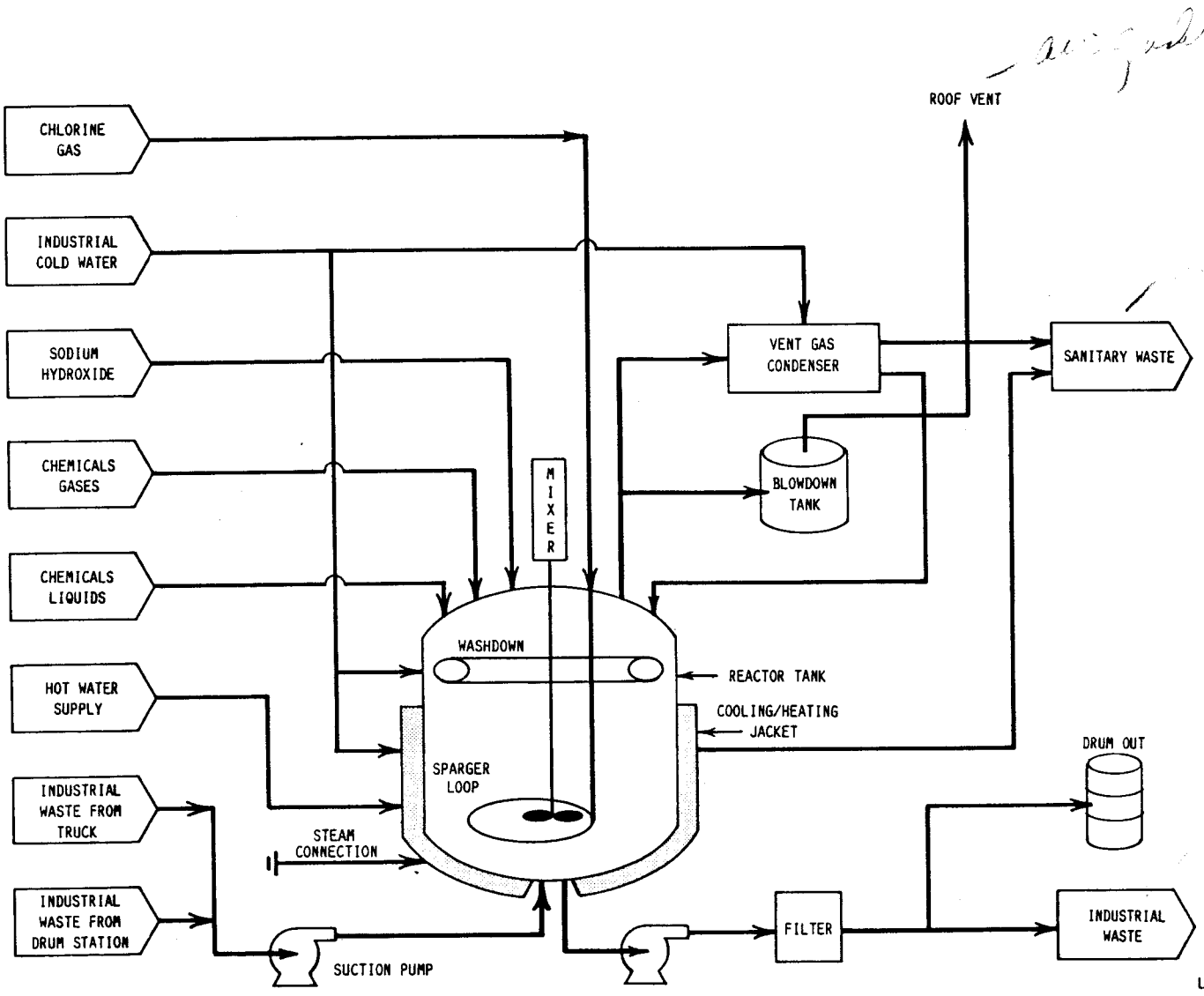


FIGURE 4-2

FLOW DIAGRAM OF BATCH TREATMENT SYSTEM

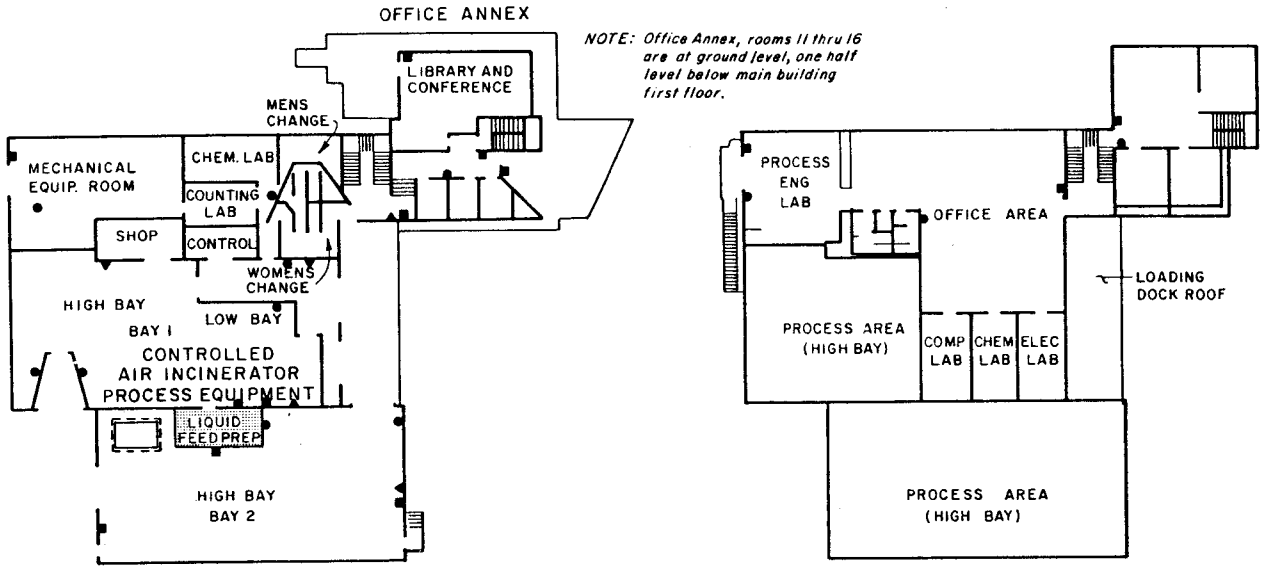
PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

IT CORPORATION

DRAWN BY	CHECKED BY	DRAWING NUMBER
mjh 4/85	APPROVED BY	846510-87

19 1253 HERCULENE. A&B SMITH CO., PGH., PA



NOTE: *Office Annex, rooms 11 thru 16 are at ground level, one half level below main building first floor.*

FIRST FLOOR

SECOND FLOOR

TREATMENT DEVELOPMENT FACILITY
TA-50, BUILDING 37

NOTE: *All rooms are covered by automatic sprinkler heads. Fire water flow activates automatic alarm pull.*

▲ EVACUATION ALARM
■ ALARM PULL (FIRE)
● FIRE EXTINGUISHER
HALON SYSTEM

FIGURE 4-3

TREATMENT DEVELOPMENT FACILITY SHOWING LOCATIONS OF CHEMICAL WASTE INCINERATOR AND SUPPORT FACILITIES

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

IT CORPORATION

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18 1253 HERCULENE, A&B SMITH CO., PGH., PA

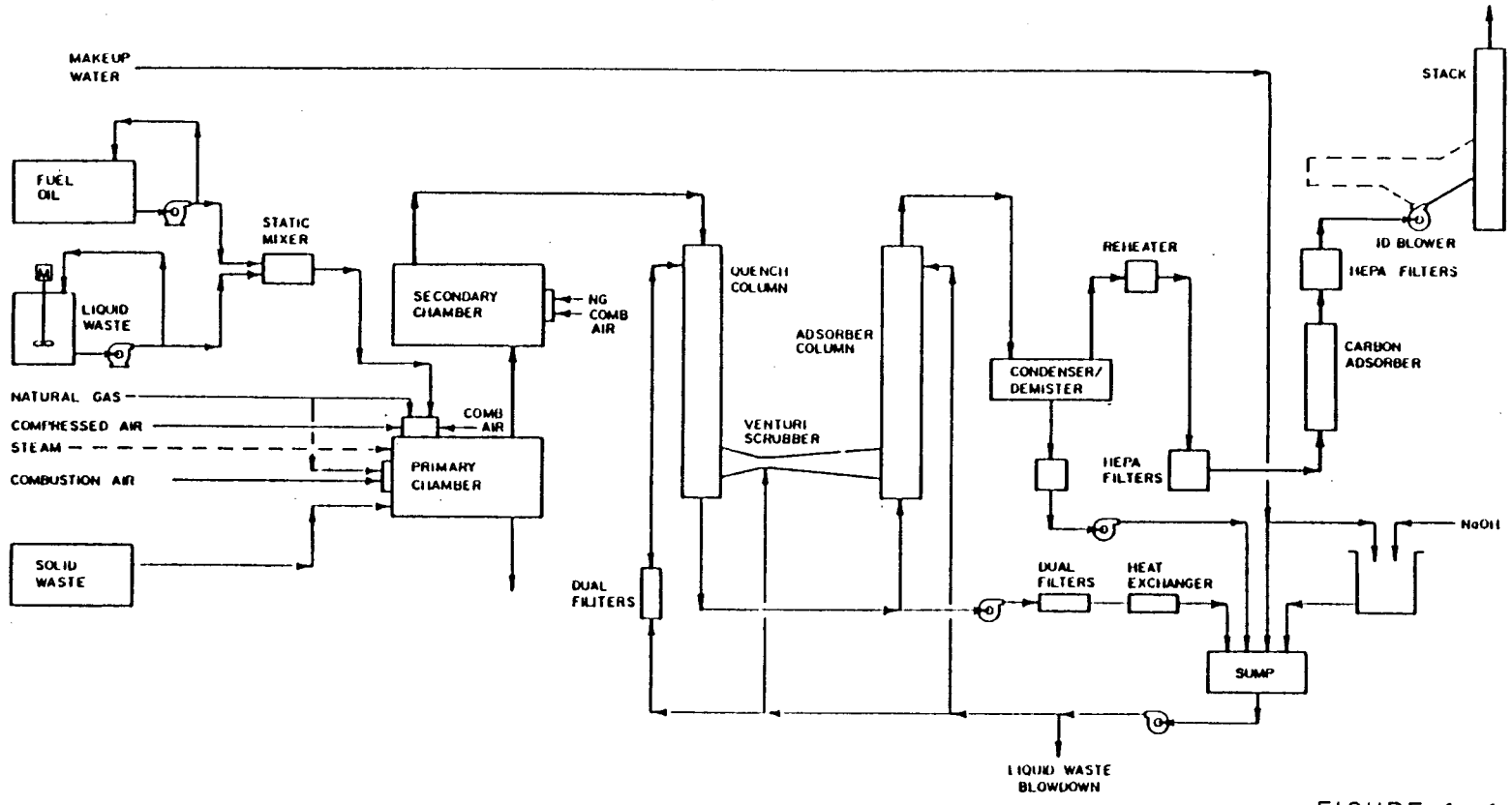

FIGURE 4-4

INCINERATOR
PROCESS DIAGRAM

PREPARED FOR

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HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE, OR
PUBLIC SAFETY AUTHORITY, OR THE
U.S. ENVIRONMENTAL PROTECTION AGENCY

PROPER D.O.T.
SHIPPING NAME_____UN OR NA#_____

GENERATOR INFORMATION:

NAME_____

ADDRESS_____

CITY_____STATE_____ZIP_____

EPA
ID NO._____

EPA
WASTE NO._____

ACCUMULATION
START DATE_____

MANIFEST
DOCUMENT NO._____

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTES

STYLE WM-6

© LABELMASTER, CHICAGO, IL 60646

FIGURE 4-5

TYPICAL DRUM LABEL

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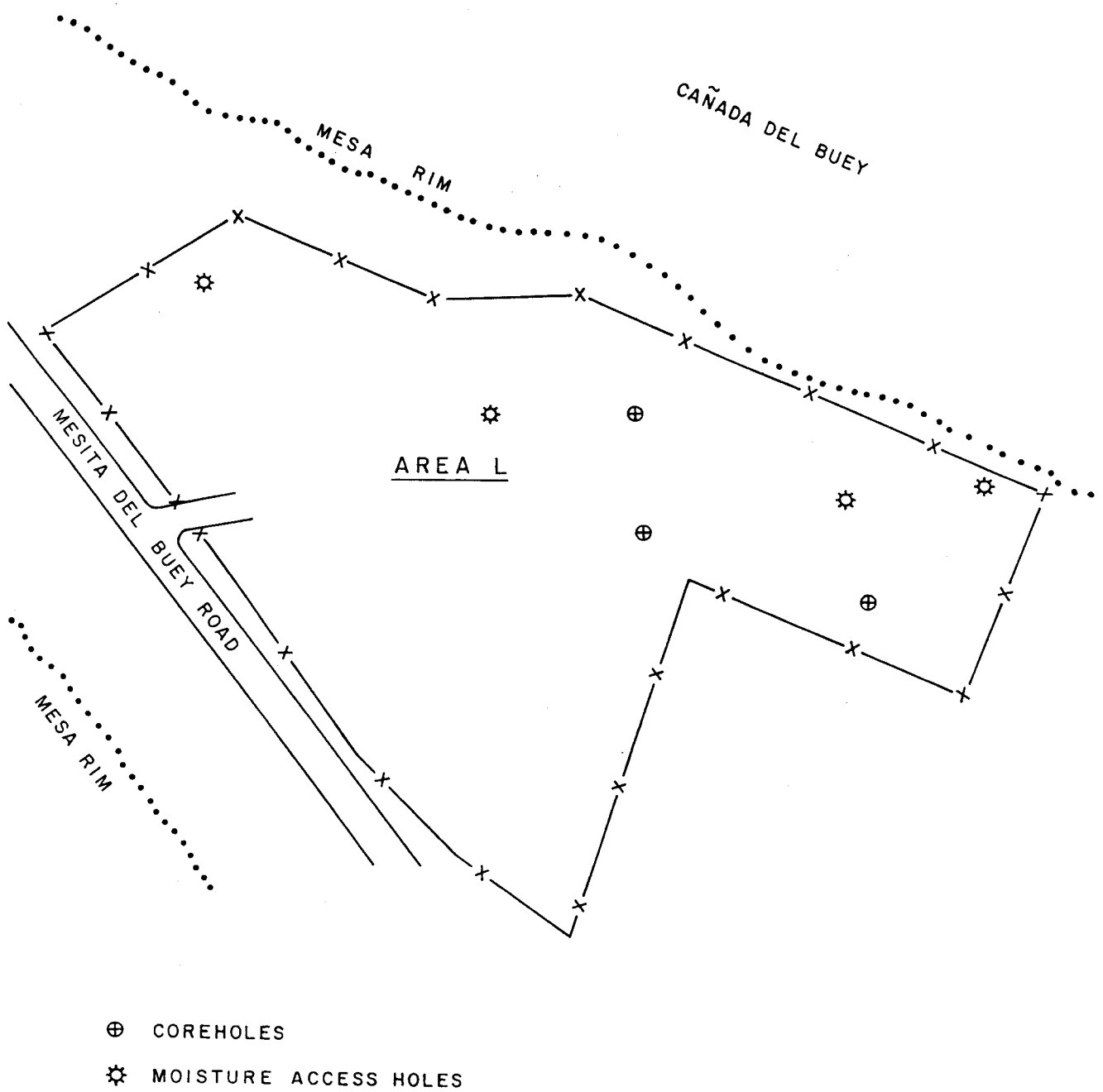
5.0 GROUNDWATER MONITORING

The regulations found in 40 CFR §265, Subpart F (NMHWMR 206.C.1) require the owner or operator of a landfill to implement a groundwater monitoring program to monitor the impact of the facility on the quality of water in the uppermost underlying aquifer. However, 40 CFR §264.90 (b)(4) and New Mexico Hazardous Waste Regulation 206.C.1.A(3) allow the waiver of all or part of the groundwater monitoring requirement if the owner or operator can demonstrate that there is no potential for migration of hazardous waste or hazardous waste constituents from the facility via the uppermost aquifer to water supply wells (domestic, industrial, or agricultural) or to surface water.

Los Alamos National Laboratory has evaluated the potential for migration of hazardous waste constituents from its land disposal facilities (Appendix N). The results of this work indicate that there is essentially no infiltration at the Los Alamos land disposal sites and that there is no recharge to underlying aquifers through the mesa tops in the vicinity of the Laboratory waste management areas (Cushman, 1965). The top of the uppermost aquifer underlying the TA-54 land disposal facilities is 950 feet below the surface at Area L and 850 feet below the surface at Area G. Soil and rock present at these sites, including tuff, volcanics, and sediments, are not saturated above the underlying aquifer so there is no driving force to facilitate infiltration or leaching of wastes from the disposal facilities. The lack of a hydraulic gradient at these sites and the depth to the aquifer indicate that wastes will not reach the aquifer.

This conclusion is supported by analyses of soil samples taken from holes bored horizontally under TA-54 disposal facilities from the wall of one of the adjoining canyons (Purtymun and Rogers, 1980). No indication of movement of contaminants out of disposal pits was found.

In light of these findings, Los Alamos has requested from the New Mexico Environmental Improvement Division (EID) a waiver of the 40 CFR §264 Subpart F (NMHWMR 206.C.1) groundwater monitoring requirements (Appendix M). In place of a new groundwater monitoring program directed specifically at TA-54 land disposal facilities, the Laboratory proposes to continue ongoing chemical and radiochemical monitoring of the underlying aquifer at two nearby supply wells and at springs in White Rock Canyon near the Rio Grande. The quality of surface water flow is also monitored when it occurs in canyons adjacent to Area L. Current sampling locations are shown in Figure 2-12. To augment data obtained from these monitoring activities, the Laboratory plans to sink additional borings in the tuff to permit vadose zone monitoring (Figure 5-1). Changes in moisture content in the tuff exposed in the borehole will be detected by using a neutron moisture probe to log the holes on a regular basis. Appendix O provides a detailed description of the planned vadose zone monitoring program.



50 0 100 FEET
SCALE

FIGURE 5-1

LOCATION OF PROPOSED
VADOSE ZONE MONITORING
AND CORE HOLES AT AREA L

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65360

6.0 PROCEDURES TO PREVENT HAZARDS

The information provided in this section is submitted in accordance with the requirements of 40 CFR §270.14 (NMHWMR 302.A.4.b). The following subject areas are addressed in this section: general security provisions, inspection schedules and requirements; preparedness and prevention requirements; and prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes. Guidelines for personnel working in potentially hazardous situations can be found in the Los Alamos National Laboratory Health and Safety Manual (Appendix P).

6.1 SECURITY

All Laboratory hazardous waste facilities are located within fenced areas which are locked during non-working hours. The Protective-Force maintains Laboratory security by manning check stations, patrolling facilities, and locking access gates. This security system will prevent unknowing entry and will minimize the possibility for unauthorized entry of persons or livestock into any of the hazardous waste facilities. In most cases, the Protective-Force is limited to external surveillance of buildings and disposal areas so that potential contact with Laboratory hazards is avoided.

The TA-50 batch treatment system, container storage area, and waste incinerator are located in fenced areas. The buildings and gates are locked during non-working hours, and externally patrolled by Protective Force guards. All visitors must check in with the reception desk during working hours.

Area L within TA-54 is enclosed by a cyclone security fence with a single 45 degree barbed wire outrigging. The entrance gates are open during weekday working hours only and manned so that access is limited to authorized personnel. The entrance gates are locked by the users (HSE-7) and externally patrolled by the Protective Force once every four hours, from 5 p.m. to 8 a.m. on weekdays, and all day on weekends and holidays.

6.2 WARNING SIGNS

Warning signs are posted at all entrances to hazardous waste facilities and at other appropriate areas. The letters and colors of the signs are chosen to insure 25 foot legibility.

Warning signs are posted in English at the TA-50 batch treatment system and container storage area. The signs read, "No Smoking," "Caustic Lines," and "Acid Lines."

Warning signs in English are posted on the doors at the TA-50 waste incinerator and read, "Hazard: PCB's." There are no signs posted outside the waste incinerator building since all external doors are locked and access is only with keys and administrative controls. The two doors to the change rooms have electric strike plates for administrative control of access.

Warning signs in Area L read, "Hazardous Chemical Wastes Disposal Area." Signs are in English on all approachable fences and in Spanish on the front gate.

Los Alamos is not in a county which borders Mexico, however, in the interest of safety, Spanish language warning signs are posted in Area L.

6.3 INSPECTION SCHEDULES AND REQUIREMENTS

Fire hydrants, alarms, extinguishers and sprinkler systems at all locations are inspected and maintained according to guidelines in the "Manual of Fire Protection Policies and Procedures" (Appendix Q). The DOE Fire Department and the Zia Company, a captive contractor to the Laboratory, are responsible for inspecting the fire fighting equipment. All other equipment is inspected and maintained by the operating group. Equipment is inspected according to Equipment Inspection Schedules (Tables 6-1 to 6-5). The frequency of inspections is based upon the rate of possible deterioration of the equipment and the

probability of an environmental or human health incident if the deterioration, malfunction, or any operator error goes undetected between inspections. Inspection schedules and records are kept at the HSE-7 office.

6.3.1 TA-50 Batch Treatment System and Container Storage Area

Potential Problems

The batch treatment system and container storage area are routinely inspected for potential problems with safety and emergency equipment, security devices, containers, and container storage facilities. Potential problems are listed on a daily inspection checklist. Potential problems include containment failure, fire, explosion, exposure, deterioration of the batch treatment system, construction materials, and system leakage.

Frequency and Content of Inspection

The batch treatment system and container storage area are inspected according to the schedule in Table 6-1. The batch system is inspected before each use and monitored during operation by the operator. This procedure is adequate to detect any cracks, leaks, corrosion, erosion, or wall thinning. In addition, the batch treatment tank will be periodically emptied and the interior walls and seams inspected for signs of deterioration.

Remedial Action

If any defects, deterioration, damage or hazards are discovered during inspection, appropriate remedial actions including repairs, maintenance and replacement will be completed as soon as practical to preclude further damage and reduce the need for emergency repairs. If a hazard is found imminent or if a hazardous situation already exists, remedial action will be initiated immediately. Any remedial action taken due to an inspection will be noted on the operating log.

The extent of damage from containment failure is assessed first by the supervisor's observations of the affected area. Upon this visual observation, he will indicate appropriate emergency response procedures, including the call-out list, evacuation, and cleanup. If necessary, the supervisor will also use Laboratory records to determine the chemicals involved.

The extent of the release may be further assessed by analyzing soil and water samples down-gradient from the release. Sampling locations are chosen by observations of the released material, if possible. If the release is not observable, sampling locations will be chosen randomly. Guidance in identifying hazardous chemicals is provided by the Safety Group (HSE-3), the Industrial Hygiene Group (HSE-5), the Waste Management Group (HSE-7), and the Environmental Surveillance Group (HSE-8). If sampling indicates that human health and the environment may be adversely affected, the Contingency Plan will be implemented immediately. Table 7-4 contains a list of equipment available for remediation.

If containment failure occurs, wastes will collect in the bermed areas. In the case of a small spill, vermiculite is poured over the spilled liquid. Once the liquid is absorbed, the waste is swept or shovelled and put back into a drum. For a larger spill, the liquid is pumped back into the drums. In either case, once free liquids are removed, the surface is cleaned using cleaners appropriate to the chemicals.

Leaks from the batch treatment system will collect in the eight-inch curb which surrounds the system. The liquid will be collected and handled as though it were the system contents. Cleanup measures will be initiated depending upon the type and extent of the leak.

In the case of exposure, remedial actions include treating the exposed personnel at the HSE-2 Medical Facility (see Section 7.5.4) and determining the cause of exposure by observation, Laboratory records, and/or sampling.

Similar to hazardous waste releases, the extent of damage from fire and explosion is assessed by visual observations, Laboratory records, and if necessary, sampling. Equipment damaged or contaminated by fire, explosion, or spills is identified by visual inspections and sampling, if necessary.

Daily inspections by batch operators will detect malfunctions and deteriorations of the system. Depending upon the degree of damage, the system can be shut down (see Section 7.6.2). The extent of damage is assessed by visual observation by the system operator, who determines whether process shutdown should be initiated.

Inspection Logs

Inspections of the TA-50 batch treatment system and container storage area are conducted by the operating group according to the checklist in the inspection log (Tables 6-1 and 6-5). Results of the inspection, the inspector's name and title, date and time of inspection, and any remedial action taken are recorded on the inspection log sheet. A copy is sent for records to HSE-7 and kept for at least three years. An inspection log is kept near the system at all times. In addition, an operating log will be completed by the process operator. This log is a record of operating conditions and provides evidence that the operator has checked and is aware of the operating status of the system. The time at which entries are made and the actual instrument reading for each variable will be entered into the log. When shutdown occurs, the log will state the nature of the shutdown, the time it occurred, and the suspected cause. Once each shift, the shift supervisor will inspect the facility for malfunctions, deterioration, operator error, and discharges.

6.3.2 TA-50 Waste Incinerator

Potential Problems

The waste incinerator system building is routinely inspected for potential problems with safety and emergency equipment, security devices, containers, container storage facilities, and loading and unloading facilities. Inspections of specific equipment and systems are conducted with a frequency appropriate to current operations, as well as appropriate to the equipment and systems. Potential problems include containment failure, fire, explosion, exposure, equipment deterioration or malfunction, and leaks from the incinerator. Appendix R contains conditions under which the waste incinerator will be operated.

Frequency and Content of Inspection

The waste incinerator, building, and emergency equipment are inspected according to the schedule in Table 6-2. Standard operating procedures require that process operators "walk through" their operating areas each hour to visually observe, monitor, and record the condition of equipment.

Remedial Action

If any defects, deterioration, damage or hazards are discovered during inspection, appropriate remedial actions including repairs, maintenance and replacement will be completed as soon as practical to preclude further damage and reduce the need for emergency repairs. If a hazard is found imminent or if a hazardous situation already exists, remedial action will be initiated immediately. Any remedial action taken due to an inspection will be noted on the operating log.

Remedial actions in the case of containment failure, fire, explosion, or exposure are identical to the measures at the TA-50 batch treatment system and container storage area. Should any of these problems occur, the waste incinerator can be shut down at the discretion of the oper-

ator. Failure of the HEPA filtration system or wet scrubbers, equipment deterioration or malfunction, or leaks from the waste incinerator will be remedied during and following process shutdown (see Section 7.6.2). The process operator will assess the situation and decide upon which shutdown method will be most efficient. He will supervise the operating area during the shutdown process.

Inspection Logs

General inspections are conducted by the operating group according to checklists associated with the operating log. Results of the inspection, the inspector's name and title, and date and time of inspection are recorded on the inspection log sheet. A copy is sent for records to HSE-7 and kept for at least three years. In addition, process operators will fill out general inspection checklists associated with the operating log at least once every four hours. These checklists are a record of operating conditions and provide evidence that the operator has checked and is aware of the operating status of the system. The time at which entries are made and the actual instrument reading for each variable will be entered into each checklist. When shutdown occurs, the log will state the nature of the shutdown, the time it occurred, and the suspected cause. Once each shift, the shift supervisor will inspect the facility for malfunctions, deterioration, operator error, and discharges. Prestarting inspection procedures, general inspection checklists and the operating log will be kept with the incinerator system during operations.

6.3.3 TA-54, Area L Waste Transfer, Packaging and Storage Facilities, Treatment Tanks, and Land Disposal Facilities

Potential Problems

Area L is routinely inspected for potential problems with safety and emergency equipment, security devices, containers, container storage facilities, treatment tanks, and loading and unloading facilities. Potential problems are listed on a weekly inspection checklist. While the landfill is in operation, it will be inspected weekly and after

storms to detect any evidence of deterioration, malfunctions or improper operation of run-on and run-off control systems. The treatment tanks will be inspected weekly and after storms to detect any leakage, damage, overflow, or cracks. Potential problems at Area L include containment failure, fire, explosion, and exposure.

Frequency and Content of Inspection

Area L is inspected according to the schedule in Table 6-3.

Remedial Action

If any defects, deterioration, damage or hazards are discovered during inspection, appropriate remedial actions including repairs, maintenance and replacement will be completed as soon as practical to preclude further damage and reduce the need for emergency repairs. If a hazard is found imminent or if a hazardous situation already exists, remedial action will be initiated immediately. Any remedial action taken due to an inspection will be noted on the operating log.

In the case of failure of run-on and run-off control measures (diversion ditches), the HSE-7 Group Leader or his qualified designee will assess the damage by visual observations and sampling and monitoring to determine the type and extent of contamination. Mitigation procedures and repairs, such as sandbagging and building berms, will be instituted immediately.

Remedial action in the case of containment failure, fire, explosion, or exposure is handled as described for the TA-50 batch treatment system and container storage area. At the transfer, packaging and storage facilities in Area L, releases from containment failure collect in sumps as well as berms.

If leakage, corrosion, overflow or any other damage is detected in the treatment tanks, the contents will be pumped into a drum or another treatment tank.

Inspection Logs

Each inspection is conducted by the operating groups according to the checklist in the inspection log. Results of the inspection, the inspector's name and title, and date and time of inspection are recorded on the inspection log sheet. A copy is sent for records to HSE-7 and kept for at least three years.

6.4 PREPAREDNESS AND PREVENTION REQUIREMENTS

6.4.1 Equipment Requirements

Internal Communication/Alarm Equipment

The following internal communication/alarm equipment is available at Los Alamos to provide emergency instruction for rapid evacuation and to initiate emergency response:

- Centrex telephone system
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Telephone/radio paging
- Two-way hand held radios
- Emergency central alarm system
- Mechanical central alarm system

Since this equipment is laboratory-wide, it allows all personnel to get in contact with emergency coordinators in all areas of the laboratory. All hazardous waste handling personnel have immediate access to internal alarms or emergency communication devices.

The TA-50 batch treatment system and container storage area is equipped with telephones, one pull alarm, one automatic thermal alarm, and one automatic smoke alarm. There is an intercom system at each telephone. In the case of an emergency, the nearest source of communication for personnel handling wastes is the intercom/paging systems on each telephone.

The TA-50 waste incinerator is equipped with telephones throughout the facility. A radio with microphones at remote locations is available. Other communication/alarm equipment available at this facility includes:

- one portable radio
- one radio-equipped vehicle
- telephone paging system
- internal telephone communication line
- two-channel work station intercoms for direct communication from process area to offices and labs.
- eleven pull alarms
- two automatic thermal alarms

The trailer at Area L is equipped with a telephone. A radio-equipped vehicle is available for use at Area L. These are the nearest communication sources for use in the case of an emergency.

External Communication/Alarm Equipment

The Laboratory has established external communication capabilities with the Los Alamos Police Department and the Los Alamos County Hospital (Section 7.2). The following external communication/alarm equipment is available at Los Alamos:

- Centrex telephone system
- Private telephone lines (if Centrex fails)
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Two National Warning System Stations (NAWAS)
- Direct line from Emergency Operations Centers to KRSN (local radio station)

Emergency Equipment

A list of emergency equipment available at Los Alamos, including types of equipment, locations, and contact phone numbers is shown in Table 7-4.

Emergency vehicles include 18 fire trucks, five ambulances, one rescue vehicle, and evacuation vehicles. Vehicles are inspected quarterly, according to the schedule in Table 6-4. Medical supplies include self-contained breathing apparati, wheel chairs, manual resuscitation, portable oxygen units, blankets, blood supplies, and medical kits.

Heavy equipment includes bulldozers, road graders, tractors, loaders, snowplows, semitrailers, and a portable power generator. Power tools include power saws and fire tools. The Zia Company inspection schedule for heavy equipment is shown in Table 6-5.

Transportation vehicles include trucks, buses, and vans.

Fire protection equipment includes fire alarms, sprinklers, hydrants, fire extinguishers, and halon extinguishing systems. The locations of fire alarms, hydrants, extinguishers, and halon systems are shown in Figures 2-3, 2-4, 2-5, 4-3, 7-12, and 7-13.

Water for Fire Control

The Department of Energy (DOE) is responsible for overall water production, transmission, and storage for the Laboratory and Los Alamos County. DOE has 5,541.3 acre-feet of groundwater rights, plus 1,200 acre-feet of San Juan-Chama Diversion Rights, for a total of 6,741.3 acre-feet. This is considered adequate for projected needs (Long Range Utilities Development Plan, Los Alamos National Laboratory, 1984). Current consumption is approximately 4,603 acre-feet/year. The present water supply comes from seventeen active wells in three well fields (Figure 2-12). The Los Alamos water distribution system is shown on Figure 6-1. Annual pumping is managed to avoid excessive drawdown in any of the well fields. The Pajarito field offers the best opportunities for further water system development. Storage capacity is adequate to provide water for fire-fighting purposes.

The types of fire protection equipment at Los Alamos hazardous waste facilities are shown in Table 6-6. Appendix Q describes inspection procedures for sprinkler systems, alarms, and extinguishers.

Hydrant flow tests and block valve inspections are performed annually. Pressure regulating valves are inspected and adjusted every 60 days. Appendix Q describes inspection procedures for fire hydrants. Flow rates for hydrants are specified by ENG-4, an experienced fire protection engineering staff, and are dependent upon site needs, including size of building and presence of sprinkler systems. The contact for fire extinguishers is Al Martinez at ENG-4, phone 667-2146, pager 110-0369. For other fire protection systems, the contact is Howard Richardson at ENG-4, phone 667-7702, pager 117-332.

6.4.2 Aisle Space Requirements

Aisle space between waste containers at the container storage areas is adequate to provide access for inspection purposes, and movement of personnel, containers, and equipment.

There are no ramps provided for fork lifts or drum handling equipment at the TA-50 batch treatment and container storage area since they are not required for the existing usage. There are no barriers which cause material handling problems at this site.

Aisles between rows of drums at the Area L transfer, packaging and storage facilities are maintained at a minimum width of two feet to permit access for inspection and handling. Much of the bermed or curbed areas are ramped to facilitate access of forklifts and drum handling equipment.

6.5 PREVENTATIVE PROCEDURES, STRUCTURES, AND EQUIPMENT

Each facility has minimum requirements for safety clothing and apparatus to be used for routine operations which are specified in the facilities' Standard Operating Procedures (SOPs). When non-standard operations or

working conditions exist, a special work permit specifying protective equipment and clothing must be obtained from HSE-5, Industrial Hygiene, and HSE-3, Safety, who inspect the site prior to issuing the permit.

6.5.1 TA-50 Batch Treatment System and Container Storage Area

Unloading Operations

Sealed and labeled waste drums are handled with a forklift equipped with a drum handling attachment or with drum carts. In addition, the room is equipped with a hoist mounted on a rail. Waste containers are secured on the truck during transport. Small containers are manually loaded and unloaded.

Run-off/Run-on Control

The storage and treatment area is located inside the building. Adequate storm sewers and gutters are provided to prevent sheet flooding of the building.

Water Supply Contamination

The storage area and treatment process areas are both on a curbed cement floor capable of containing spills. The remainder of the building has drained floors and the water collected by the floor drains is collected in a sump and recycled to the industrial (radioactive) waste treatment systems. Areas for loading and unloading waste containers are paved and spills are immediately cleaned up. Water supply lines are under pressure. Depth to the main aquifer at TA-50 is approximately 1,300 feet.

Equipment and/or Power Failure

In general, failure of utilities or equipment does not result in a loss of containment. Leaks from equipment are contained in the curbed floor area or in drip pans.

The batch nature of the operation results in shutdown of the treatment process during utility failure.

The reactor mixer, level indicator and temperature indicator as well as the process analytical instruments are electrically operated. During a power failure, the reactor level can be observed through a 6 inch site port and the reactor temperature can be read from a backup dial thermometer. The analytical equipment is not needed during a power failure as treatment is discontinued until power is restored. If mixing is required during power failure, the reactor can be sparged with inert gas.

Cooling water is used to remove heat from the reactor during neutralization processes and to condense vapor during solvent recovery. The cooling water is discharged to the sanitary sewer system. The treatment process would be discontinued and the source of heat removed should cooling water be lost.

Wind Dispersal Control

Only containerized wastes are handled at the TA-50 batch treatment system and container storage area. The mixing of absorbents with liquid wastes is performed inside the building under a ventilation hood. Liquids are transferred from drums with a tube pump. No wind dispersion occurs under normal operating procedures.

Personnel Protective Equipment

At a minimum, personnel operating the batch treatment process must wear rubber gloves, safety glasses and coveralls. During liquid transfer to and from drums, the operator must wear a face shield. The use of respirators is specified by HSE-5.

6.5.2 TA-50 Waste Incinerator

Unloading Operations

Sealed and labeled drums and large containers are handled with a drum cart or a forklift equipped with a drum handling attachment. Shipping

casks are handled with a forklift or a five-ton crane. Small sealed containers are manually loaded and unloaded. Waste containers are secured on the truck during transport.

Run-off/Run-on Control

The treatment area is located inside the building. Adequate storm sewers and gutters are provided to prevent sheet flooding of the building.

Water Supply Contamination

The waste loading and unloading area is paved. The building has concrete floors. Spills are immediately cleaned up. Liquid wastes are either retained in the sealed container (if the container is within a shipping cask designed for spill control) or may be transferred into holding/blending tanks in the hazardous waste feed preparation enclosure. The enclosure has a cement curb with a designed holding capacity greater than the enclosed liquid storage tanks. Water supply lines are under pressure. Depth to the main aquifer is approximately 1,300 feet.

The process area is equipped with drains that collect to a process sump. Any fluid collected in the sump is then pumped to the Laboratory's industrial (radioactive) waste treatment plant.

Equipment and/or Power Failure

Detailed procedures for handling equipment and power failures can be found in the Controlled-Air Incinerator Process Operating Manual (Appendix S) which includes standard operating procedures for rapid shutdown of the system while maintaining containment. Back-up systems have been built into the process.

A battery-based uninterruptable power supply provides continuous 120 VAC power to controls associated with the incineration process. Instrument air is backed up by plant air and then bottled nitrogen. A skid-mounted diesel-engine generator, which is kept on idle during operation, pro-

vides back-up power source for the incinerator process equipment. The generator connects through an automatic transfer switch which activates if there is a commercial power failure and automatically disconnects when power is restored. In the event of water failure, a pressurized auxiliary water system automatically supplies water to the off gas quench system to remove heat from the incinerator off-gas to allow shut down of the incinerator. Process steam is provided as a snuffing medium to the incinerator fire box should circumstances require immediate shut-down of the incinerator.

Wind Dispersal Control

Only containerized wastes are transferred to and from the building. The transfer of liquid wastes from containers by dip tube/pump is performed in the hazardous waste feed preparation enclosure inside the building. The enclosure is ventilated, the exhaust gases pass through HEPA filters and an activated carbon bed prior to exhausting the atmosphere. Solid wastes are stored in an enclosed area that is maintained at a negative pressure and ventilated through HEPA filters. Solid wastes may be unpacked and sorted. Wind dispersion is not a problem at the TA-50 waste incinerator.

Personnel Protective Equipment

Personnel working in the process area are required to wear, as a minimum, Anti-C (Anti Contamination) clothing. Personnel are required to wear Anti-C booties, caps, coveralls, undershirts, undershorts, and full face masks whenever they are working on any interior components of the incinerator. Surgeons gloves must be worn while working at gloveboxes. The gloveboxes are fitted with PVC gloves. Viton gloves, goggles, Tyvek coveralls, and boots or overshoes must be worn while transferring liquid wastes. Respirators or breathing apparatuses will be assigned if required by the nature of the wastes.

6.5.3 TA-54, Area L Waste Transfer, Packaging and Storage Facilities, Treatment Tanks, and Land Disposal Facilities

At Area L, small bottles and containers of laboratory chemicals are manually loaded and unloaded. Drums are unloaded using a forklift with a drum handling attachment. Drums are lowered into the shaft using drum hooks.

Run-off/Run-on Control

Area L is located on a long narrow mesa. At Area L, the mesa top trends downward along its length at a slope of 4:100. In addition, the mesa top slopes from its approximate centerline to the mesa walls at a slope of 8:100. Immediately up gradient from Area L, the mesa top is only 200 feet wide, so the drainage area affecting Area L is therefore very small. Annual precipitation at the site is estimated at 14 to 16 inches per year. The 100 year 24 hour precipitation event is four inches. Run-on is handled with earth diversion ditches which divert the water into the adjacent canyon.

Run-off from shafts does not occur because shafts are covered with a steel cap when waste is not being emplaced. When filled, they are covered with a concrete cap. Wastes are kept in closed containers. Any spills at the surface are immediately cleaned up. Thus, the possibility of run-off being contaminated is remote.

Water Supply Contamination

Water contamination at Area L is discussed in detail in the Groundwater Monitoring Waiver Application (Appendix N). Water supply lines at Area L are under pressure.

Evapotranspiration potential exceeds precipitation, so there is no water migration for leachate formation. The depth to groundwater is 950 feet at Area L. The stratigraphy includes layers of volcanic tuff and ash which are unsaturated and have moisture contents of 0.2 to 2.0 percent by weight, which is insufficient for moisture movement through the Bandelier Tuff (see Section 2.2.5).

In general, containerized wastes are stored on curbed concrete pads at Area L. Free liquids are not placed in the shafts, but are stabilized with vermiculite in 55-gallon drums.

Equipment and/or Power Failure

Power failures do not significantly affect operations and containment at Area L. Loading, unloading and shaft and pit filling are discontinued until equipment failures are corrected. Wastes are kept in sealed containers so equipment failure would not threaten containment.

Wind Dispersal Control

Only containerized or packaged wastes are handled at Area L. A metal cap is placed on shafts at Area L when shifts are completed. Wind dispersion is not a problem because shaft disposal does not lend itself to wind dispersal.

Personnel Protective Equipment

Personnel who handle containers at Area L are required, at a minimum, to wear safety glasses and gloves. Additional clothing and equipment are assigned where personnel are handling open containers. Protective equipment is specified by HSE-3 and HSE-5 by a special work permit.

6.6 PREVENTION OF ACCIDENTAL IGNITION OR REACTION OF IGNITABLE REACTIVE OR INCOMPATIBLE WASTE

6.6.1 TA-50 Batch Treatment System and Container Storage Area

Only compatible wastes are stored at one time at the TA-50 batch treatment system and container storage area. Each waste volume to be treated in the batch plant is carefully characterized to assure proper treatment. Standard operating procedures (SOP) are prepared for wastes that are routinely received and do not significantly change in character. Operating procedures for unique wastes are prepared after the waste is categorized.

The batch treatment system is designed for complete internal wash down to remove residuals which might be incompatible with future wastes treated.

6.6.2 TA-50 Waste Incinerator

Only compatible wastes are handled in the same holding/blending tank and associated transfer system at one time. Liquid wastes can be fed directly into the incinerator or pumped to waste holding tanks. Residuals are flushed with a compatible solvent which is burned at the completion of each liquids burn. The tanks and transfer system are left empty.

6.6.3 TA-54, Area L Waste Transfer, Packaging and Storage Facilities, Treatment Tanks, and Land Disposal Facilities

Incompatible chemicals are segregated for storage and shaft disposal to prevent interreaction of wastes in the case of a leak.

Containerized wastes are stored in the open air, inhibiting vapor accumulation. Smoking is not allowed and there is normally no ignition source in the area. The stored volatile and flammable wastes are inspected for leakage prior to loading.

Reactive wastes will be placed in the tanks for treatment only. They will not be stored in the tanks. Prior to adding new waste to a tank, the records will be checked to verify that the two waste streams are compatible. If they are not compatible, the second stream will not be placed in that tank until all contents have been removed and the liner has been replaced.

TABLE 6-1.

DAILY INSPECTION LOG FOR
TA-50 BATCH TREATMENT SYSTEM
(When in Use)

Inspected by:_____ Date:_____

Item	Inspected For	Condition	Remedial Action Date
Piping/Valves	Leaks, damage, poor seals		
Gauges	Calibrated		
Curbed Area	Spills, damage		
Telephone	Functioning		
Eyewash/Safety Shower	Functioning		

MONTHLY INSPECTION LOG FOR
TA-50 BATCH TREATMENT SYSTEM

Respirators	Clean, condition
Floors	Cracks, spalling
Warning Signs	Missing, good condition

ANNUAL INSPECTION LOG FOR
TA-50 BATCH TREATMENT SYSTEM

Thorough internal and external batch treatment system inspection	Corrosion, seam damage, valve damage

TABLE 6-2.

WEEKLY INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

(When in use)

Inspected By:_____ Date:_____

ITEM	INSPECTED FOR	CONDITION	ACTION
Process Gloves	tears		
	degradation		
Warning Signs	missing		
	damage		

Notes:_____

_____

_____

TABLE 6-2.
(continued)

MONTHLY INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR
(When in use)

Inspected By:_____ Date:_____

ITEM	INSPECTED FOR	CONDITION	ACTION
SCBA Gear	deterioration		
	furction		
Process Floor	cracks		
	spalling		
	coating		
Doors and Locks	damage		
Aisle Space	clear		

Notes:_____

TABLE 6-2.
(continued)

QUARTERLY INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By:_____ Date:_____

ITEM	INSPECTED FOR	CONDITION	ACTION
Communication Equipment (Radio)	function		
Protective Clothing	cleanliness		
	completeness		
	deterioration		
Medical Supplies (First Aid)	completeness		
	deterioration		
Emergency Equipment (Vehicle)	see reverse side		

Notes:_____

_____

_____

TABLE 6-2.
(continued)

ANNUAL INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By:_____ Date:_____

ITEM	INSPECTED FOR	CONDITION	ACTION
Spill Control Provisions (Berms)	cleanliness		
	damage		
	completeness		
Ramps	damage		
Respirators	deterioration		
	function		

Notes:_____

_____

_____

TABLE 6-2.
(continued)

PRE-RUN INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By:_____ Date:_____

ITEM	INSPECTED FOR	CONDITION	ACTION
Decontamination Equipment	cleanliness		
	completeness		
	damage		
Absorbent	20 or more bags		

Notes:_____

_____

_____

TABLE 6-2.
(continued)

OPERATING-SHIFT INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By: _____ Date: _____

Time: _____

ITEM	INSPECTED FOR	CONDITION	ACTION
Incinerator Equipment	deterioration		
	malfunction		
	leaks		

Notes: _____

_____

_____

TABLE 6-3.
WEEKLY SAFETY INSPECTION
OR
INSPECTION AFTER SIGNIFICANT RAIN/SNOWFALL
TA-54, AREA L

Item	Inspected For	Condition	Remedial Action/Date
Storage Drums	Open drums, leaks, corrosion, ID's, dates, aisle space, stack heights		
Safety Shower	leaks, functioning		
Safety Eyewash	leaks, functioning		
Hose Bib	leaks, functioning		
Evaporation Pits	drainage control		
Shaft Covers	damage		
Shaft Railing	damage		
Drainage - General	adequate, erosion		
Drainage - Berms	adequate, erosion damage		
Metal Shed	damage, cracks		
Blacktop	cracks		
Fence	integrity, damage		
Gate Lock	integrity, damage		
Windsock	damage, functioning		
Warning Signs	out-of-date, damage, legibility		
Pallets	intergrity, damage		
Plating Waste SM-40	leaks, liquid in berm container damage		
Nitric Acid Tank TA-46	leaks, container damage		
(Meson Physics)	leaks, corrosion of containers		
Treatment Tanks	leaks, damage, overflow, cracks, rainwater accumulation/removal		
Treatment Tanks Curbs/Pads	damage		

TABLE 6-3.
(Continued)
MONTHLY SAFETY INSPECTION
TA-54, AREA L

Item	Inspected For	Condition	Remedial Action/Date
Scott Air Pack	good condition, cylinders full		
Electrical Generator	functioning		
Protective Clothing	complete, clean, good condition		
Floors in Storage Building	cracks, spalling		
Spill Equipment (absorbent, shovels, oversize drums)	complete, good condition		
Portable Pumps	clogging, corrosion, frayed wires		

TABLE 6-3. (continued)
QUARTERLY/YEARLY SAFETY INSPECTION
TA-54, AREA L

Item	Inspected For	Condition	Remedial Action/Date
Fire Extinguisher-Trailer (quarterly)	expiration date		
Empty Drum Stack (quarterly)	order, corrosion, leaks		
Shaft and Pit Markers (quarterly)	missing, damage		
Weeds (quarterly)	cutting		
Wooden Storage Shed (quarterly)	integrity, damage		
Trailer (yearly)	integrity, damage		
Overhead Power Line and Poles (yearly)	sagging, pole damage		
Light and Pole (yearly)	functioning, damage		
Dumpster (yearly)	damage		
Treatment Tanks (yearly)	thin spots, excessive corrosion		

TABLE 6-4.
QUARTERLY VEHICLE INSPECTION FORM

INSPECTED BY: _____ DATE: _____

ITEMS TO INSPECT	VEHICLE NUMBER
1. Brakes, foot	
2. Brakes, parking	
3. Wipers	
4. Washer	
5. Mirrors	
6. Seatbelts	
7. Sun Visors	
8. Door Locks	
9. Horn	
10. Tires	
11. High Beam	
12. Low Beam	
13. Running Lights	
14. Park Lights	
15. Turn Signals	
16. Tail Lights	
17. Brake Lights	
18. Back-up Lights	
19. License Lights	
20. Windshield	
21. Housekeeping	
22. Engine	

TABLE 6-4. (continued)
QUARTERLY VEHICLE INSPECTION FORM

INSPECTED BY: _____ DATE: _____

ITEMS TO INSPECT	VEHICLE NUMBER
Additional Requirements for Explosives Modified Truck	
23. Tie-down Straps	
24. Wheel Chocks	
25. Fire Extinguishers	
26. Spark Arresters	
Additional Requirements for Vacuum Pump Truck	
27. Hose, Visual Inspection	
28. Tank, Visual Inspection	

Comments:

TABLE 6-5.

ZIA EQUIPMENT INSPECTION SCHEDULE FOR HEAVY EQUIPMENT

Date _____

EQUIPMENT DESCRIPTION: _____

CHECK:	OK	NO	METER HOURS
MOTOR OIL	____	____	START _____
COOLANT	____	____	FINISH _____
FUEL	____	____	
TIRES	____	____	
LIGHTS	____	____	
TURN SIGNALS	____	____	
BACK-UP ALARM	____	____	
CUTTING EDGE, TEETH	____	____	
INTERIOR CLEAN	____	____	

OTHER: _____

_____

_____

EQUIPMENT PERFORMANCE: OK ____ TROUBLES ____

IF TROUBLES WITH EQUIPMENT, EXPLAIN (IN YOUR OPINION WHAT IS WRONG):

_____

_____

_____

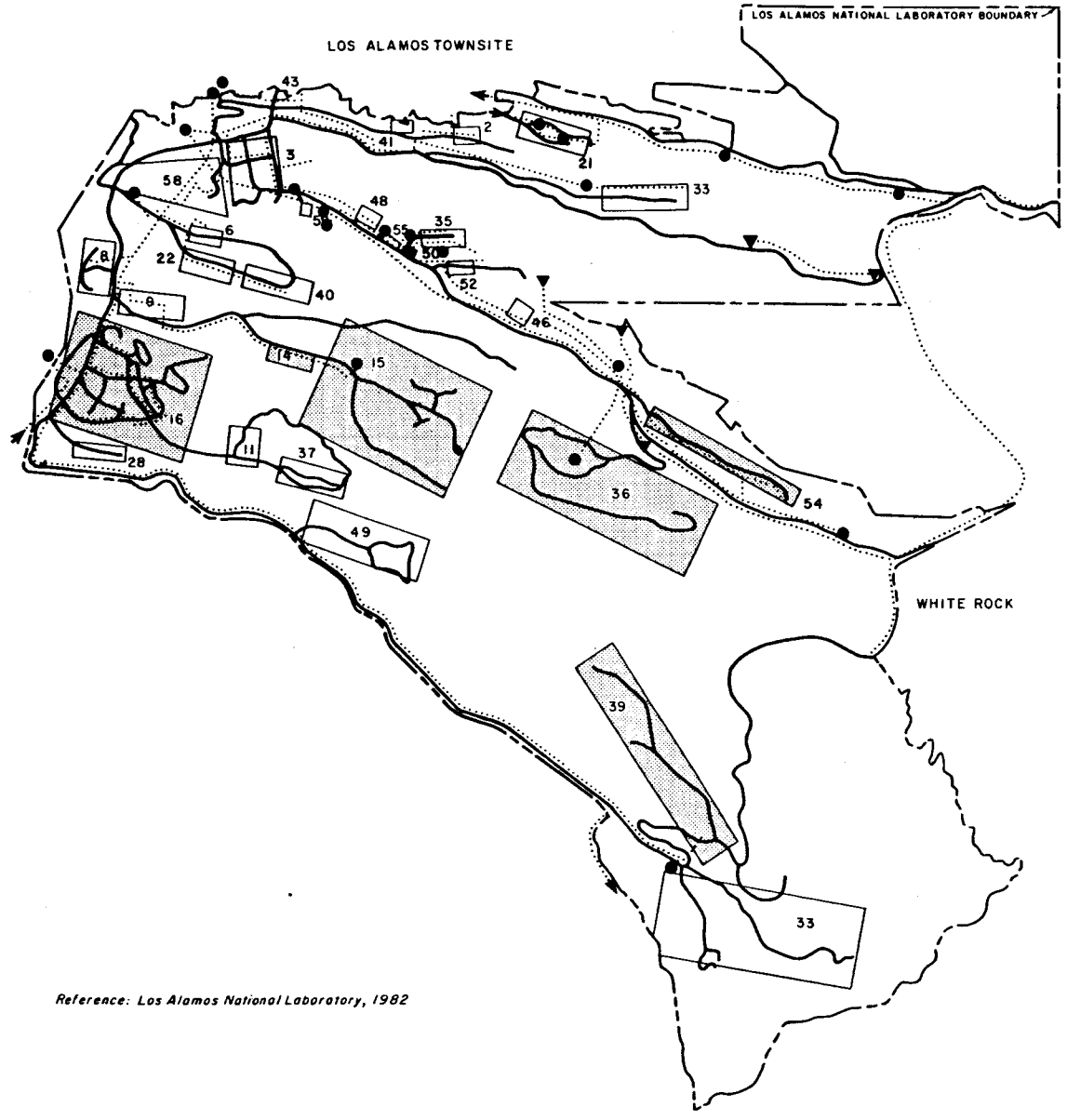
_____

TURN THIS FORM IN TO YOUR FOREMAN AT THE END OF YOUR SHIFT.

TABLE 6-6.

FIRE PROTECTION EQUIPMENT AT LOS ALAMOS HAZARDOUS WASTE FACILITIES

	Alarms						
	Pull Box	Automatic Thermal	Automatic Smoke	Automatic Thermal Sprinkler System	Halon Exting. System	Fire Hydrants	Fire Exting.
TA-50 Batch Treatment System	X	X	X	X		X	X
TA-50 Waste Incinerator	X	X		X	X	X	X
TA-54, Area L						X	X



Reference: Los Alamos National Laboratory, 1982

EXPLANATION

- SUPPLY LINES
- STORAGE TANK
- WELL SITE
- 36 TECHNICAL AREAS
- SHADING INDICATES AREAS IN WHICH WASTE MANAGEMENT FACILITIES ARE LOCATED

N

1 0 1 MILE
SCALE

FIGURE 6-1

LOS ALAMOS
WATER SUPPLY SYSTEM

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

IT CORPORATION

DRAWN BY	LLF 10/17/84	CHECKED BY	APPROVED BY	DRAWING NUMBER 846510-B

18 1253 HERCULENE, A&B SMITH CO., PGH., PA

7.0 HAZARDOUS WASTE FACILITIES CONTINGENCY PLAN

This section presents the Los Alamos National Laboratory's Hazardous Waste Facilities (HWF) Contingency Plan as required by 40 CFR §270.14(b)(7) (NMHWMR 302.A.4.b[1]) and specific requirements as stated in 40 CFR §264.51 through §264.56 (NMHWMR 206.B.10) as applicable. A copy of the Contingency Plan Authorization is located in Appendix T.

7.1 INTRODUCTION

The Los Alamos National Laboratory and the resident communities of Los Alamos and White Rock are located in north central New Mexico on the Pajarito Plateau, situated west of the Rio Grande on the eastern slopes of the Jemez Mountains. The Laboratory site covers about 111 km (27,500 acres) in and adjacent to Los Alamos County and includes 32 active Technical Areas (TAs) (Figure 7-1).

The principal mission of the Laboratory is the design and development of weapons for the nation's nuclear arsenal; however, considerable research and development (R&D) is directed toward the development of advanced technology. In executing its research mission, the Laboratory produces hazardous wastes in small quantities, the nature of which varies with changes in the research projects conducted. The potential exists for hazardous waste generation to occur at virtually all of the technical areas.

Overall responsibility for Hazardous Waste Management is with the HSE-7 Waste Management Group in the Health, Safety and Environment (HSE) Division (Figure 7-2). Generators of hazardous wastes are responsible for proper identification, segregation, and documentation of their wastes. Except for HE wastes, packaging, transportation, and final disposition of hazardous wastes are the responsibility of HSE-7 Solid Wastes Operations. Processing operation wastes handled in dumpster tanks are an exception, these being transported by Zia Company under the direction of HSE-7 Solid Wastes Operations.

HE wastes are handled by Dynamic Testing (M) and Design Engineering (WX) Division groups whose central purpose is the design and testing of explosives.

Activities within HSE-7 include liquid waste treatment, hazardous chemical waste packaging, transport, treatment, and disposal.

The Laboratory maintains its own response forces to handle emergencies. Emergency resources available to the Laboratory include the DOE Fire Department, the contracted services of the Mason-Hanger Protective Force (security), Zia Co. (maintenance), Los Alamos Medical Center, internal laboratory services including medical facilities, and minor external assistance from the Los Alamos County Police.

7.1.1 HAZARDOUS WASTES

The hazardous wastes generated by the Laboratory activities can be considered as three general types:

- Wastes from research and development,
- Wastes from process operations, and
- High explosive wastes (HE).

In addition to the wastes noted above, various laboratory items that contain chemical residues or are otherwise chemically contaminated are considered hazardous waste.

Table 7-1 lists the hazardous wastes currently generated at the Laboratory, the approximate annual generation rate, and the basis for hazardous waste designation. These wastes are further discussed in the following text.

7.1.1.1 Wastes from Basic and Applied Chemistry R&D Programs

Primary Laboratory sites for basic and applied chemistry R&D include the Chemistry and Metallurgy Research Building (TA-3-29), Radiochemistry

Laboratory (TA-48), Sigma Building (TA-3-66) and the Health Research Laboratory (TA-43). Typical hazardous chemical wastes consist of partly empty small containers of laboratory reagents, solvents, test samples and other laboratory wastes. Up to several hundred relatively small quantities of different acids, bases, organics, inorganics, reactive metals and other chemicals require disposal. The variability of research work prohibits limitation on the variety that can occur in this grouping. Conversely, quantities of individual chemical constituents are small.

7.1.1.2 Wastes from Processing Operations

Processing wastes typically are significant volumes of material that contain a very limited number of contaminants. The wastes are recurring resulting from ongoing experiments or materials production. The composition and concentration of contaminants in a given process waste are generally uniform unless modifications to the process are made.

- Electrochemistry Processing Wastes
  The Electrochemistry Section of the MST-6 Materials Technology Group, located at TA-3-66, generates plating solutions containing chromates and cyanides. These are reactive and toxic wastes. The Print Circuit Board Shop of the E-2 Electronic Manufacturing and Technician Resources Group, located at TA-3-40, generates acid/base wastes heavily contaminated with copper. These are considered as hazardous wastes due to their corrosivity.

- Isotope Separation Wastes
  The Isotope and Structural Chemistry Group, INC-4, generates highly concentrated nitric and sulfuric acid wastes. Both nitric and sulfuric acid wastes are hazardous due to their highly corrosive characteristics. Nitric acid is also considered hazardous because it can be an oxidizer depending on its concentration.

- Shops Department Wastes
  The Main Shops Department, Building TA-3-39, houses most of the highly versatile machine shop capabilities at the Laboratory. Parts can be machined from almost any metal, alloy or other

materials. The machining operations generate hazardous wastes including lithium metal and lithium hydride, both of which are reactive.

7.1.1.3 Explosives Wastes

High explosives (HE) waste is generated by the Dynamics Testing (M) and Design Engineering (WX) Division groups in the course of processing and testing various HE materials. Processing includes pressing, machining and casting HE. Waste occurs as discrete pieces of HE, as well as chips, machine cuttings and powder. The chips, cuttings and powder are usually in the form of waterborne suspensions, collected in specially designed accumulating/settling sump tanks. Wastes also consist of materials contaminated with HE; these may include paper, oil, solvents, wood, etc. Chemically, the wastes consist of HMX, RDX (cyclonite), TNT (2,4,6 trinitrotoluene), PETN (pentaerythritol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine and various plastic binders. Nearly all the HE waste substances are ignitable or reactive and barium nitrate is EP toxic. Residues from HE waste are generated by flashing, burning, or detonating HE waste at TA-14, 15, 16, 36, and 39. These residues are typically present in the uppermost layer of sand that covers the burn pad. The sand from two burn pads is considered hazardous due to its high barium content when barium nitrate is burned on these pads.

7.1.1.4 Chemically Contaminated Equipment

Empty drums, tanks and gas cylinders are typical contaminated items. Generation of this type of hazardous waste occurs throughout the Laboratory facilities and produces a wide variety of waste types. The hazards are the same as those associated with contaminating constituents.

7.1.2 Hazardous Waste Facilities

The safe handling, treatment, and/or storage of hazardous wastes is the responsibility of HSE-7. Daily operations involving hazardous wastes are performed by Solid Waste Operations. HE wastes are an exception,

their treatment being the responsibility of M and WX Divisions. HSE-7 is only responsible for residuals from HE treatment when these residuals are determined to be hazardous wastes.

Hazardous Waste Facilities (HWF) currently in operation are summarized in Table 7-2. The locations of the HWF are shown as the shaded areas on Figure 7-1. The flow plan for hazardous wastes within the Laboratory is shown in Figure 7-3.

7.1.2.1 Technical Area 16 (TA-16) Thermal Treatment Facilities

The thermal treatment facilities located at TA-16 include three general types. One type consists of a sand pad which is surrounded on at least two sides by a berm or a natural hillside. Waste explosives are placed on these pads and remotely burned using an "electric match" firing device. There are two facilities of this type at TA-16. A similar pad is used to flash contaminated equipment.

A second type of thermal treatment facility present at TA-16 consists of a large metal pan on a sand pad in which there are five secondary metal pans lined with fire brick. Waste HE fluids are poured into the secondary pans and the HE is remotely ignited, with an "electric match." There is one facility of this type at the Laboratory. About 55 gallons of waste are burned once a month. The third type of facility present at TA-16 is used to burn sludges containing waste HE. These facilities consist of steel cone-shaped vessels having a diameter of about five feet, buried with only the upper three to four feet of the vessel above ground. The steel vessels are filled with sand and gravel and an open fluids drain is located at the bottom of the cone. Sludge HE is pumped into the top of the cone, onto the sand and gravel bed. A heavy steel cap is then placed over the top of the cone and hot air is forced into the cone through air ducts. The hot air dries the waste sludge and liquids from the sludge migrate downward through the sand and gravel bed and through the fluids drain. Effluent from these drains is regulated by NPDES permit (NM 0028355). When the remaining explosive material is

relatively free of moisture, the steel cap is removed from the cone and the explosive is ignited remotely with an "electric match." There are two facilities of this type at Los Alamos; both of these are located in Technical Area 16. Explosives are burned at these two facilities at a rate of about one burn per week. Each burn consists of about 750 pounds of waste explosive sludge.

In some cases the burn pad sand or surface is contaminated by barium, which is a constituent of HE, prior to burning. Since the upper layer of the burn pad sand contains EP Toxic barium, it is drummed, stored and disposed of as a hazardous waste.

7.1.2.2 TA-14, 15, 36, and 39 Thermal Treatment Facilities

Waste HE detonation sites are located at Los Alamos in Technical Areas 14, 15, 36, and 39. These sites are used routinely to detonate scrap HE, failed experimental detonations, unneeded classified explosives shapes, other HE determined to be excess, and reactive wastes. These sites consist of firing pads often located within a small canyon. Associated facilities at these sites include bunkers which are occupied by technical personnel during detonations. Prior to all firings, nearby roads are checked and kept clear.

7.1.2.3 TA-50-01 Batch Treatment System and Container Storage Area

The Batch Treatment System is located in Building 1 at Technical Area 50 (Figure 7-4). The system consists of a totally enclosed, vented, 500-gallon pressure vessel equipped with a filtering system, condenser, and vacuum transfer lines (Figure 7-5). Wastes treated in the Batch Treatment System include cyanide, chromate plating solutions, and solutions of acids, bases and heavy metals.

A chemical waste storage area is located in the same room housing the Batch Treatment System. Storage space consists of a bermed area encompassing 16 square feet. The area is designed to accommodate four 55-gallon waste drums. Wastes are stored in this area prior to

treatment in the Batch Treatment System. Only compatible wastes are stored in this area at one time. A ventilated hood is provided for transferring wastes between drums.

7.1.2.4 TA-50-37 Chemical Waste Incinerator

The waste incinerator is located in Building 37 at Technical Area 50 (Figure 7-6). The highly modified, controlled air incinerator is rated at a nominal 45 kilograms per hour waste feed throughput. The incinerator was developed as part of a continuing incinerator study and demonstration program being conducted by Los Alamos and is currently permitted by the EPA to burn PCB-contaminated materials. Modifications to the incinerator include additions of liquid and solid waste feed preparation lines, a continuous ash removal system, a high-efficiency off-gas cleanup system, and backup utility systems (Figure 7-7). Standard combustion equipment has been modified to permit effective incineration of waste in solid, liquid, slurry, or gaseous form. Particular attention has been given to engineering for proper waste containment, resulting in a system that is safe for evaluating the incineration of hazardous chemicals and certain radioactive waste forms.

7.1.2.5 Technical Area 54 (TA-54), Area L Facilities

Waste Transfer, Packaging and Storage Facilities

A single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1595 square feet are located in Area L of Technical Area 54. These facilities are used for the accumulation, packaging and storage of waste containers generated from throughout the Laboratory (Figure 7-8). Area L of TA-54 is an area of about two acres surrounded by an eight-feet-high chain-link and barbed-wire fence (Figure 7-8). Currently active waste management facilities located within this area include four waste treatment tanks and six waste disposal shafts as well as the transfer, packaging and storage facilities. The metal building has a concrete floor having a design standard load-bearing capacity of 250 pounds per square foot. Three shallow

sumps covered by fiberglass grates are located within the floor of the building. The storage pad has a concrete floor having a design standard load-bearing capacity of 700 pounds per square foot.

Hazardous waste containers generated at the various Los Alamos laboratories are delivered to these facilities on a routine basis. Wastes are segregated into compatible types and placed upon the three fiberglass grates located in the metal building or within one of the six storage cells on the roofed concrete pad. Wastes, packaged in small containers, are placed into lab packs. Also, vermiculite is added to 55-gallon drums containing liquids in these facilities. Wastes suitable for recycling are consolidated into drums and any damaged or leaking drums are repackaged into larger drums in these facilities. Los Alamos wishes to obtain a permit to operate the waste transfer, packaging and storage facilities.

Treatment Tanks

Four 1665-gallon ten-gauge steel tanks are located at Area L of TA-54. The tanks are lined with plastic. These tanks are used to neutralize, oxidize and evaporate wastes. The waste most commonly oxidized in these tanks is lithium hydride. Ammonium bifluoride (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks.

Land Disposal Facilities

Land disposal facilities located in Area L include 34 shafts which range in diameter from three to eight feet. Thirty of the shafts have been capped. All of these shafts are about 60 feet deep. When in use, the shafts are covered with a heavy steel cap. When filled, the shafts are capped with a three-feet-thick concrete plug. Each shaft is used for the disposal of a single category of chemical wastes to assure that incompatible chemicals will not mix and react.

7.2 HAZARDOUS WASTE EMERGENCY RESPONSE RESOURCES

The Laboratory maintains its own response resources to handle emergencies. Interaction with outside agencies is limited for security

reasons and because it is impractical to train these agencies to cope with the technical diversity of the Laboratory's operations such that they could safely contribute in an emergency. Response resources include personnel, emergency equipment, and communication systems.

7.2.1 Response Groups

The emergency response groups available to the Laboratory include the DOE Fire Department, the contracted services of the Mason Hanger Protective Force (security), Zia Co. (maintenance), Los Alamos Medical Center internal laboratory services including medical facilities, and minor external assistance from the Los Alamos County Police. The services offered by these response groups are itemized on Table 7-3 and discussed briefly in the following. Each of the emergency response groups retains a current copy of the HWF Contingency Plan.

7.2.1.1 Medical Facilities

The Laboratory maintains its own medical facility, HSE-2 Occupational Medicine, to handle job-related injuries and to monitor employee health. Medical facilities include a staff of six physicians, two physician assistants, ten nurses, six x-ray technicians, and two laboratory technicians.

HSE-2 is supported by HSE-5, Industrial Hygiene. HSE-5 can provide exposure and treatment information via telephone access to Chemtrec and the National Library of Medicine, and via computer access to TOXLINE, CHEMLINE, and the Toxicity Data Bank.

Those cases which cannot be handled at HSE-2 would be forwarded to the Los Alamos County Hospital, where the Laboratory maintains a fully equipped decontamination room. The HSE-2 staff meets with the hospital's emergency staff monthly to go over procedures. In the event that a case is sent to the hospital, staff from HSE-2 provide assistance at the hospital.

7.2.1.2 HSE-3 Safety

HSE-3 reviews and approves fire protection procedures. They may assist in process shutdown and evacuation.

7.2.1.3 HSE-5 Industrial Hygiene

In addition to medical support, HSE-5 provides site field testing to determine the nature (nonradiological) and extent of contamination, provide information on correct handling of chemicals, and specify protective clothing and equipment.

7.2.1.4 HSE-7 Waste Management

Provides cleanup operations and proper disposal of hazardous materials and supervises emergency response operations. Since HSE-7 normally handles hazardous waste, the group is highly trained and equipped. This group represents the nucleus of the hazardous waste emergency response.

7.2.1.5 HSE-8 Environmental Surveillance

Provides field surveys of soils, water, air and biota to determine environmental effects of exposure. The group includes expertise in geohydrology.

7.2.1.6 DOE Fire Department

The DOE Fire Department provides fire protection for the Laboratory as well as the communities of Los Alamos and White Rock. The department includes 98 personnel.

The Fire Department is under direct control of the DOE and fire fighting personnel are DOE employees. In the case of an emergency within the Laboratory, the DOE Fire Department puts itself under the direction of the Laboratory response team.

The Fire Department personnel make regular tours of the Laboratory facilities to detect and discuss hazards associated with individual facilities and are instructed in hazardous material handling and emer-

gency procedures. They are aware of the hazardous waste practices at the Laboratory, and are well equipped to handle any credible emergency situation.

7.2.1.7 Mason & Hanger Protective Force (Pro-Force)

The Pro-Force consists of more than 200 personnel who are responsible for Laboratory security. The security force is provided by Mason & Hanger, Silas Mason, under contract to the Laboratory.

During an emergency, the Pro-Force activities include maintenance of security, direction of traffic within the Laboratory, and control of access to the emergency site. The Pro-Force maintains the necessary equipment to perform these functions such as crowd control equipment, patrol cars, etc.

7.2.1.8 Zia Company

The Zia Company provides a maintenance support force on contract to the Laboratory. This support force is under the Laboratory's direction in an emergency. Also included are 14 eight-man firefighting teams. The Zia Company conducts inspections of Laboratory equipment, maintains equipment, and participates in emergency cleanup.

7.2.1.9 Los Alamos County Police

In keeping with the principle of handling emergencies internally, the Los Alamos County Police have only a minimal interaction with the Laboratory in an emergency. That interaction is limited to traffic control on DOE roads with public access. The limits of interaction are included in a signed agreement, a copy of which is included in the Appendix to this document (Appendix T). There are no agreements with other agencies.

7.2.2 Emergency Equipment

A list of emergency equipment for use at the Laboratory and the location of this equipment can be found in Table 7-4. The equipment immediately

available for use is located at TA-54, Area L, the TA-50 batch treatment system and container storage area, and the TA-50 waste incinerator.

In addition, Zia Company, the DOE Fire Department, and HSE-2 maintain emergency equipment. Major emergency facilities are shown in Figure 7-9.

7.2.3 Communications

Effective emergency response at Los Alamos National Laboratory requires an efficient communication system which will integrate all personnel into the emergency response procedure.

There are two central alarm systems (CAS) at the Laboratory; an emergency CAS and a mechanical CAS. The emergency CAS is activated by:

- Telephone communication (9-911)
- Automatic fire alarms
- Manual pull alarms
- Computer interface (to warn of critical events or loss of confinement at selected facilities)
- Break-in security
- Radio communications

The emergency CAS is located in the central control room in Building 4409 at TA-3. The control room is manned 24 hours a day and is equipped with telephones, medium and short range radios, direct line telephones, a National Warning System (NAWAS) station, and an emergency power system. The fire alarm board at the control room gives the location of automatic and pull fire alarms.

The maintenance CAS board, located in Building 223 at TA-3, is manned by Zia personnel 24 hours a day. The maintenance CAS board interfaces with computers which monitor critical equipment throughout the Laboratory.

Activation of an alarm triggers a call-out procedure to provide maintenance personnel and management supervision to correct the malfunction. The maintenance CAS does not directly trigger an emergency response.

Internal communication systems at the Laboratory include:

- Centrex telephone system
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Telephone/radio paging
- Two-way hand held radios

Off-site communications with Federal, state, county and other agencies are maintained by the following:

- Centrex telephone system
- Private telephone lines (if Centrex fails)
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Two National Warning System Stations (NAWAS)
- Direct line to KRSN (local radio station)

All alarm systems and internal and external communication systems are available for use by all employees.

Activation of the emergency CAS automatically alerts the DOE Fire Department, the Mason Hanger Pro-Force, and the CAS dispatcher. For hazardous waste emergencies, the CAS dispatcher notifies the HSE-7 Hazardous Waste Emergency Coordinator (HWEC) and notifies upper management of the problem.

HSE-7 has access to all communications systems including a short wave radio base station located at TA-50-1. During normal working hours, communications to support response groups can be handled by HSE-7. During off hours, the HWEC uses the CAS Dispatcher to contact support groups.

7.3 NONSUDDEN RELEASES

Nonsudden releases include those incidences which, if uncontrolled, impact the environment over a long period of time. Such incidences include minor leaks of containers, loss of integrity of secondary containment, incomplete treatment, and leachate migration from disposal areas.

7.3.1 Responsibility

Correction of nonsudden release shall be the responsibility of the HSE-7 Solid Wastes Operations Associate Group Leader and can be handled with normal maintenance and management procedures. Correction methods for nonsudden releases that have resulted in environmental contamination shall be coordinated with, and approved by, the New Mexico Environmental Improvement Division (NMEID).

7.3.2 Credible Nonsudden Releases

Credible nonsudden releases, their detection and correction are given in Table 7-5. Not all failures can be predicted. In general, the response to nonsudden release will (1) contain the release, (2) correct the cause of the release, and (3) clean up any release to a level that protects health and the environment.

7.3.3 Nonsudden Release Surveillance

In addition to routine inspection and site-specific sampling and testing, the Laboratory maintains an area-wide environmental monitoring network maintained by HSE-8. Routine monitoring for radiation, radioactive materials, and chemical substances on the Laboratory site helps to fulfill the Laboratory's policy to protect the general public, employees, and the environment.

Monitoring and sampling locations for various types of measurements are organized into three main groups. Regional monitoring stations are located within the five counties surrounding Los Alamos County. They are placed up to 80 kilometers (50 miles) from the Laboratory, and serve

to determine background conditions. Perimeter stations are located within approximately four kilometers (2.5 miles) of the Laboratory boundary, and document conditions in residential areas surrounding the Laboratory. On-site stations are within the Laboratory boundary, and most are accessible only to employees during work hours.

The types of routine surveillance conducted at these stations includes radiation measurements and collection of air particulates, waters, soils, sediments, and foodstuffs for subsequent analysis.

Additional samples are collected to gain information about particular events such as major runoff events and nonroutine releases. Data are used for comparison with standards, background radiation levels, and dose calculations.

7.4 SUDDEN RELEASES

This section deals with incidents involving sudden release such as spills, fires, or explosions which pose a significant threat to human health or the environment.

7.4.1 Hazardous Waste Emergency Coordinator (HWEC)

The HWEC is responsible for coordinating all emergency response measures involving sudden releases of hazardous wastes with the exception of the thermal treatment facilities at TA-14, 15, 16, 36, and 39. HE waste handling is the responsibility of M and WX divisions, who have developed Standard Operating Procedures (SOPs) based on safe handling practices designed to eliminate the risk of fire and explosions. Unplanned detonation or combustion of HE renders the HE waste nontoxic. In some cases, residuals contain barium. Cleanup of barium contaminated areas due to unplanned detonations shall be coordinated with the HWEC.

The HSE-7 Group Leader or his designee is the primary HWEC. The primary HWEC is scheduled on call to provide coverage 24 hours a day, 365 days per year.

A list of qualified HWECs and their telephone numbers is on Table 7-6.

The HWEC can be reached during working hours by contacting the HSE-7 office (7-4301) or the CAS Dispatcher during off hours.

The HWEC shall respond to all incidents involving the release of hazardous wastes including spills, fires, or explosions; assess the possible hazards to human health or the environment; and use whatever response group or emergency equipment needed to control and contain the wastes.

7.4.2 HWF Emergency Contingency Plan

This section defines the guideline used to initiate the HWF Emergency Contingency Plan and the resulting actions taken.

7.4.2.1 Guidelines for Implementation

The decision to implement the HWF Emergency Contingency Plan depends upon whether or not an imminent or actual incident could threaten human health or the environment. The following guidelines shall be used by the HWEC in making the decision whether or not to institute the HWF Emergency Contingency Plan.

The HWF Emergency Contingency Plan could be implemented in the following situations involving hazardous wastes:

Spills

- A hazardous waste spill cannot be contained with secondary containment or application of absorbents,
- Precipitation threatens to move spilled material off site,
- A hazardous waste spill causes the release of flammable material, creating a fire or explosion hazard,

- A hazardous waste spill results in toxic fumes which threaten human health, or

- An earthquake or other natural disaster threatens containment integrity.

Explosions

- An unplanned explosion involving hazardous wastes occurred (except at TA-14, 15, 16, 36, and 39), or

- An imminent danger exists that an explosion involving hazardous wastes could occur.

Fires

- Any fire involving hazardous wastes (except planned burning of HE waste), or

- Any building, grass, forest, nonhazardous waste fire that threatens to ignite hazardous wastes.

7.4.2.2 Emergency Notification

Immediately upon discovery of an imminent or actual incident involving hazardous wastes, the HWEC will be notified first. In the case of fire involving hazardous wastes, this is superceded by the Laboratory fire alarm system. A fire is reported by dialing 9-911, activation of automatic alarms, or activation of a fire pull box. All fire alarms simultaneously alert the CAS Dispatcher, the DOE Fire Department, and the Mason and Hanger Pro-Force. For fire involving hazardous wastes or hazardous waste facilities, the CAS Dispatcher shall contact the HWEC (Figure 7-10).

During off hours, all incidents involving hazardous wastes shall be reported to the CAS Dispatcher, who will contact the on-call HWEC.

The HWEC shall proceed to the incident and assess the nature of the problem. On an as-needed basis, the HWEC shall contact response groups directly or instruct the CAS Dispatcher to contact them.

Each response group maintains an on-call person and/or a call-down procedure to answer emergencies.

7.4.2.3 HWEC Actions

Upon notification of an incident, the HWEC shall:

1. Proceed directly to the site;

2. Assess the nature of the incident, and quantities and types of hazardous wastes involved; and

3. Based on the guidelines in Section 7.4.2.1 of the Contingency Plan, determine if implementation of the HWF Emergency Contingency Plan is warranted.

Upon the decision to implement the HWF Emergency Contingency Plan, the HWEC shall perform, in this order, the following actions:

1. Assess the hazards to human health and the environment including both direct and indirect effects such as generation of toxic, irritating, or asphyxiating gases, hazards of runoff of fire water or treatment chemicals;

2. Determine if evacuation of the local area is advisable, and if so, immediately notify appropriate response groups and/or the Los Alamos County Police;

3. Notify required response personnel by phone, radio, or through the CAS Dispatcher in the case of a spill or incident other than fire. In the case of fire, since the fire fighters have already responded, he shall confirm that the Fire Department Officer-in-Charge is aware of the hazardous waste involvement and the special hazards associated with the wastes;

4. Warn the remaining personnel of imminent or actual hazards using the radio and/or the PA system;

5. Notify the New Mexico Environmental Improvement Division (505) 827-9329, and the National Response Center (800) 424-8802, reporting

- Name and telephone number of the reporter;
- Name and address of the facility;
- Time and type of incident;
- Name and quantity of materials involved, to the extent known;
- The extent of injuries, if any, and
- The possible hazards to human health or the environment outside the facility.

6. Advise the response groups as needed to minimize personnel exposure and expedite control; and

7. For the Batch Treatment Plant and Controlled Air Incinerator, where the emergency stops operations, the HWEC must monitor for leaks, pressure buildup, gas generation or equipment ruptures.

Once control of the emergency is established, the HWEC shall:

1. Arrange for site cleanup;

2. Provide for treating, storing, or disposing of recovered wastes, contaminated soil or contaminated surface waters;

3. Provide for decontamination of equipment as needed;

4. Replace and/or repair equipment as needed;

5. Conduct testing as needed to verify successful cleanup; and

6. Within 15 days of the incident, submit to the Regional Administrator and Environmental Improvement Division the report described in Section 7.10.

7.5 SPECIFIC EMERGENCY RESPONSE PROCEDURES FOR HAZARDOUS WASTE FACILITIES

The following section summarizes the guidelines for handling emergencies.

7.5.1 Chemical Spills

Hazardous wastes are handled and stored in small containers, lab packs, 55-gal. drums, and dumpster tanks. The individual volumes handled are small.

The general steps in handling hazardous wastes are:

- Containment including spreading of absorbents or forming of temporary dikes,
- Waste pickup and packaging in sound containers, and
- Decontamination followed by testing to assure adequate clean-up.

The emergency preparedness procedures related to flammable organic solvent spills call for stabilization of the spilled material with the organic solvent spill kit. Other chemical spills are to be stabilized using the acid and caustic spill kits or by the addition of absorbents such as vermiculite. Personnel protective equipment will be worn during spill control and cleanup. The stabilized material will be treated as hazardous waste. Runoff which might occur from spills outside containment areas during precipitation must be contained and handled as a hazardous waste unless analyzed and found to be nonhazardous. Temporary dikes can be constructed to contain runoff.

7.5.2 Fire

Depending on the size of the fire and fuel source, portable ABC fire extinguishers may be used to put out fires. However, the Laboratory is discouraging the use of portable fire extinguishers by employees and encouraging the immediate evacuation and notification of the DOE Fire Department. The person fighting the fire must wear appropriate protective equipment. If the fire spreads or increases in intensity, all personnel should evacuate to an upwind point at least 100 yards away from the fire. For any fire involving hazardous waste, the HWEC must be contacted immediately, and he will alert all necessary emergency pre-

paredness personnel. The DOE Fire Department is automatically alerted when the CAS is activated. The HWEC should remain near the disposal site, but at a safe distance, so he can advise the personnel responding to the fire of the known hazards. Upon arrival at a fire, the Fire Department Officer-in-Charge will be in command of fire fighting. He will accept and evaluate the advice of Los Alamos personnel and emergency preparedness organization members, but he will retain the responsibility to select the fire fighting methods and tactics. The HWEC will be in overall control of the Laboratory's emergency response efforts until the emergency is terminated.

7.5.3 Explosion

In the case of explosions, all personnel will immediately evacuate the area. Any injured personnel will be immediately transported to the Medical Department for treatment. The HWEC must be contacted immediately upon activation of the CAS, and then he must alert all necessary emergency response personnel. The DOE Fire Department is notified automatically upon CAS activation. The HWEC will remain near the disposal site, but at a safe distance, so he can advise the personnel responding to the explosion of the known hazards.

Upon arrival at the disposal site, the Fire Department Officer-in-Charge will be in command of fire fighting. He will accept and evaluate the advice of Los Alamos personnel and emergency preparedness organization members, but he retains the responsibility to select the fire fighting methods and tactics. The HWEC will be in overall control of the Laboratory's emergency response efforts until the emergency is terminated.

7.5.4 Exposure

Chemical material in the eye or on the skin will be washed either with the entire contents of the portable eye wash station or for at least 15 minutes. The eyelids will be held open during washing. The injured person will then be quickly transported to the Medical Department for

evaluation. If possible, the chemical material involved in the injury will be ascertained and the information given to the Medical Department.

Other potential chemical exposures will necessitate evacuation if anyone notices any of the following conditions:

- Irritation of the eyes, breathing passages or skin,
- Difficulty in breathing, or
- Nausea, light-headedness, vertigo, or blurred vision.

The affected person will be transferred to the Medical Department and the HSE-5 Group representative will attempt to ascertain what, if any, chemical exposure occurred and what corrective measure is appropriate.

7.5.5 Flood

The U.S. Army Corps of Engineers has documented that Los Alamos National Laboratory's waste management facilities are not located within the 100-year floodplain. The appendix to the HWF Contingency Plan (Appendix T) contains this documentation.

7.6 EVACUATION

A facility will be evacuated upon the voice command of "evacuate the area," or upon the sounding of the evacuation alarm, or upon the fire alarm.

7.6.1 Evacuation Plan

Emergency situations may warrant the shutdown and evacuation of an area(s) or building(s) in order to protect personnel and property, to anticipate the emergency condition, or to enhance the appropriate response. Table 7-7 shows the criteria for evacuation, persons responsible for initiating evacuations, and reentry conditions. The TA-54, Area L evacuation route is shown in Figure 7-11. Building evacuation routes for the TA-50 batch treatment system and TA-50 incinerator

building are shown in Figures 7-12 and 7-13. The evacuation route for TA-50 is shown in Figure 7-14.

To initiate building evacuation, the evacuation alarm is sounded and/or the public address system is used. The evacuation alarm, which is more suitable for evacuation of the whole facility, is a steady, continuous, audible signal. This alarm cannot be silenced and reset by site personnel. The Fire Alarm Maintenance Section at 667-4027 and the Fire Department Platoon Chief at 667-7026 can silence and reset the alarm.

To evacuate a portion of the building, the public address system is more appropriate. The PA system will notify the occupants of the area to be evacuated, and additionally, will advise personnel in the rest of the facility of the existence of a problem in that specific area.

Upon initiation of an evacuation, either via the PA or evacuation alarm, all personnel are to leave the specified area and go to the muster area, turning off all equipment that could contribute to the hazard if left unattended.

In the event of an evacuation of only a portion of the building, one of the out buildings, or outlying work areas, the Group Leader will designate a control point at the closest and/or the most convenient location. This area will be outside the affected area and will serve as a muster point and provide control of the affected area to prevent further spread of the hazard.

Sweep Team personnel will remain in the area for a visual inspection of all the affected work areas, laboratories, and offices. At least two persons will do the sweep to insure that if an injured person is found or if a single person is fighting a small fire, turning off equipment or activating fire suppression systems, one sweep team member can give assistance while the other reports to the muster area or control point to obtain additional aid.

If the building is evacuated during normal working hours, the secretary will remove the personnel attendance roster that is posted near the secretary's desk, take it to the muster area, call roll, and report the personnel accounting to the Group Leader. During second or third shift operations, the lead engineer will be responsible for evacuation and roll call. The evacuation procedure follows:

- Group Leader determines cause and probable extent of hazard.
- Group Leader will sound the evacuation alarm or make an announcement on the PA system.
- Group Leader will designate an assembly area if other than muster area.
- Group Leader will notify the on-call HWEC.
- Personnel will shut down equipment that might contribute to the hazard.
- Personnel will activate fire suppression systems.
- Personnel will not remain in affected area except to assist injured personnel.
- Personnel will report to the muster area or designated control point.
- Roll call (general evacuation) or personnel accounting (partial evacuation).
- Building or Area sweep by assigned personnel.

For a small scale evacuation, the Group Leader takes control. For a large-scale evacuation, the CAS will be activated, the HWEC will be notified and will be responsible for the evacuation.

7.6.2 Process Shutdown

Personnel are instructed to shut down equipment prior to evacuating a building unless an immediate building evacuation is announced. To ensure efficient shutdown, training and exercises in process shutdown

are required. In the case of an immediate evacuation, a selected team may shutdown designated equipment in an evacuated area. The team will be equipped with the proper equipment, clothing and breathing apparatus. If present, HSE-1, HSE-3, and HSE-5 will provide advice and assistance. Process shutdown procedures only apply to the TA-50 batch treatment system and waste incinerator. Process shutdown procedures are as follows.

7.6.2.1 TA-50 Batch Treatment System

If a fire or evacuation alarm sounds during the operation of the Batch Treatment System, the operating crew will initiate a process shutdown in accordance with the current Standard Operating Procedures. Because the process is a batch treatment, cessation of treatment is adequate to bring the process to a safe condition. In general, the process shut should include the following:

- Shutdown of the waste pump discontinuing waste transfer or circulation,
- Shutdown of treatment chemical feeds,
- Shutdown of steam to the reactor jacket, if any,
- Shutdown cooling water only if there is a risk of contamination of the water with waste (continued cooling removes residual heat from the system), and
- Allow the reactor mixer to operate unless its operation poses a unique hazard (operation helps remove heat and prevents stratification).

7.6.2.2 TA-50 Waste Incinerator

If a fire or evacuation alarm sounds during the operation of the controlled air incineration process, the operating crew will initiate a process shutdown in accordance with the current Standard Operating Procedures. Three logic sequences are provided to shut down the process in a safe and orderly manner.

- The SCRAM - initiated in any situation that could lead to an immediate loss of containment. A SCRAM can be initiated manually at any time at the discretion of an operator. The upper and lower chamber burners are shut down, all combustion air and induced draft blowers are shut down and the valves and dampers are positioned so as to minimize flow into the system while maintaining a negative pressure. Snuffing steam is introduced into the lower chamber.

- Fast Shutdown Sequence - initiated for any condition that could likely result in damage to major process components. The chain of events are identical to the SCRAM sequence except it is delayed for a 2-minute period following the last waste feeding operation. This delay allows for the ignition of any pyrolytic gases formed from the waste charge prior to burner shutdown.

Both of the above modes are potentially destructive to the incinerator refractory and are initiated only when the consequences of not shutting down are greater than the consequences to the incinerator during the SCRAM or Fast Shutdown.

- Controlled Shutdown - initiated when there is potential for significant damage to minor process components. This is also the normal shutdown mode at the completion of an experiment. When controlled shutdown is initiated, programmable set point generator is activated that directs remote set point input to the temperature controllers, causing a gradual decrease in chamber temperatures. Switches internal to the set point generator cause an orderly shutdown of the process components.

It is the responsibility of the operations personnel and the process lead engineer to assess any situation and initiate the proper process shutdown sequence.

7.7 SALVAGE AND CLEANUP

The affected area will be surveyed by appropriate representatives from HSE Groups before salvage, cleanup and return to normal operations.

After determination of any existing hazards from toxic or hazardous gases or fumes, electrical hazards, or other unsafe conditions, personnel or selected teams, equipped with proper breathing apparatus and protective clothing, will reenter the area to perform designated tasks to affect decontamination, repairs, and salvage to allow the return to normal operations. After an emergency, the HWEC will:

- Provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion. Contaminated material will be treated as a hazardous waste and disposed of according to Laboratory procedures.
- Remain at the site to ensure that no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed.
- Ensure that emergency equipment is cleaned and fit for its intended use before operations are resumed. Equipment will be visually inspected and sampled if necessary to determine the type and degree of contamination and appropriate cleanup measures will be used.

Prior to resuming operations, appropriate local authorities will be notified that cleanup procedures are completed and emergency equipment is cleaned and fit for its intended use.

Damage assessment and recovery shall be performed within the reporting and investigative requirements of DOE Order 5484.1. The HWEC has general responsibility for coordinating post-emergency actions, particularly during the time period immediately after the emergency. Such actions include cleanup operations, repair of vital equipment, or interim hazard-removing operations (such as demolition of unstable walls). The services of the affected operational organizations, HSE Division, the Zia Company, and other on-site talent will also be utilized to estimate cleanup costs and operational impact. The HWEC declares the end of the emergency; an Incident Report is filled out, and the HSE-7 Group Leader and his staff review emergency actions.

7.8 POST-EMERGENCY ASSESSMENT

When the emergency is over, the causes of the emergency and the effectiveness of the response are investigated, in order that future emergencies may either be prevented, or that the response to them may be more effective. Following each event requiring the implementation of the HWF Contingency Plan, the HWEC shall meet with representatives of all response functions to determine the adequacy of the response.

7.9 EMERGENCY RECORDS

The details of any incident that requires implementation of the HWF Emergency Contingency Plan must be noted in that facility's log book. This record must include the time, date, and full description of the incident.

7.10 EMERGENCY REPORTS

Any emergency that requires implementation of the HWF Emergency Contingency Plan will be reported in writing within 15 days to the EPA Regional Administrator and to the New Mexico Environmental Improvement Division (EID).

The report shall include the following data:

- Name, address, and phone number of owner or operator;
- Name, address and phone number of the facility;
- Date, time, and type of incident (e.g. fire, explosion, spill);
- Name of material involved;
- Quantity of material involved;
- Extent of injuries (if any);
- Assessment of actual or potential hazards to human health or the environment; and

- Estimated quantity and disposition of material recovered from the incident.

7.11 CONTINGENCY PLAN AMENDMENT

The Contingency Plan shall be reviewed by the HSE-7 Group Leader and immediately amended if determined to be inadequate to handle nonsudden and sudden releases, and whenever:

- The HWF permit is revised;
- There is significant change in the design or operation of the HWF (i.e., waste quantities handled, handling techniques, or final disposition);
- The list of emergency coordinators changes;
- The list of emergency equipment significantly changes;
- Operating experience, drills, or technical review demonstrates the plan is inappropriate; or
- Actual implementation of the plan demonstrates inadequacies.

The Contingency Plan shall have a cover sheet (Appendix T) noting the date of the last amendment. Each amendment date shall be initiated by the HSE-7 Group Leader authorizing the changes. Amendments shall be issued to all HWF Contingency Plan holders and shall include a cover letter that describes the plan changes and rationale for those changes.

TABLE 7-1.
WASTE HANDLED, TREATED, STORED AND DISPOSED AT LOS ALAMOS

Chemical	Approx. Annual Volume (m^3)	Hazard	Basis for Hazard Designation
Basic and Applied Chemistry R&D Programs			
Chemistry and Metallurgy Research Building Radiochemistry Laboratory Health Research Laboratory - Numerous chemical wastes	33	Varies	R&D wastes are comprised of numerous listed wastes
Electrochemistry Processing			
Materials Technology Group - Chromate and cyanide plating solutions	1	Toxic, Reactive	Listed waste - F007, F009 - toxic and reactive, could contain 10,000-20,000 ppm cyanide
Print Circuit Board Shop - Acid/base copper etching/ plating solutions	19	Corrosive	D002 - pH can vary from less than 2 to about 11
Isotope Separation			
Isotope and Structural Chemistry Group - Concentrated nitric and sulfuric acid	38	Corrosive	D002 - pH is generally less than 2, concentrated nitric acid is also ignitable (D001) per 261.21(a)(4) (NMHWMR 201.B.2.a[4]) as an oxidizer
Shops Department			
Main Shops Department - Lithium hydride, lithium metal	3	Reactive	D003 - per 261.23(a)(2),(3), (NMHWMR 201.B.4.a[2],[3]) gas and heat upon rapid reaction with water
- Halogenated solvents	<1	Toxic	Listed waste - F001, F002 - toxic
- Non-halogenated solvents	<1	Ignitable	Listed waste - F003 - ignitable
Explosives			
Dynamics Testing and Design Engineering - High Explosives	90	Ignitable, Reactive	Listed waste - K044 - also D001, D003, may also contain D005 waste
- Contaminated burn pad sand	5	Toxic	D005 - sand contaminated and tests EP Toxic for barium per 261.24(a) (NMHWMR 201.B.5.a)
Chemically Contaminated Equipment			
Many LANL Facilities	26		Same characteristics as hazardous material contaminants

TABLE 7-2.

SUMMARY OF HAZARDOUS WASTE FACILITIES
LOS ALAMOS NATIONAL LABORATORIES

Technical Area and Building or Area Designation	Wastes Handled	Activity Description
TA-14, 15, 16, 36, and 39	HE	Thermal treatment facilities used to burn waste high explosives and high explosives contaminated material
TA-50-01	Electrochemistry wastes Isotope separation wastes	Chemical batch treatment by neutralization, metal precipitation, and cyanide destruction. Includes associated waste container storage area
TA-50-37	Combustible liquids and solids, including chlorinated and fluorinated hydrocarbons, and carcinogenic materials	Waste incineration with flue gas treatment
TA-54 Area L	Shops department wastes Wastes from Basic and Applied Chemistry R&D programs	Wastes are segregated and stored prior to treatment, incineration, recycle, shipment offsite, or disposed at Area L

TABLE 7-3.

HAZARDOUS WASTE EMERGENCY RESPONSE GROUPS

Laboratory Controlled Response Group	Emergency Telephone	Assistance Available
HSE-2 Occupational Medicine	667-7878 (8 am - 5 pm) 988-0539 off-duty hours	Emergency medical treatment
HSE-3 Safety		Reviews and approves fire protection procedures. May assist in process shutdown and evacuation
HSE-5 Industrial Hygiene		Site evaluation - field testing to determine the nature and extent of contamination (nonradiological)
		Specify protective clothing and equipment
		Information services regarding hazards of wastes and treatment for exposure
HSE-7 Waste Management		Hazardous waste cleanup, handling, treatment, and disposal
HSE-8 Environmental Surveillance		Field surveys to determine spread of contamination and adequacy of clean up
		Meterological information
		Geohydrologic support
HSE-9 Health and Environmental Chemistry		Chemical analytical services
DOE Fire Department	9-911	Firefighting personnel and equipment
		Ambulance and parametic service

TABLE 7-3. (cont)

Laboratory Controlled Response Group	Emergency Telephone	Assistance Available
Mason & Hanger Protective Force (Pro Force)	667-4437	Traffic Control Security
Zia Company	667-6196	Maintenance personnel and equipment
Non-Laboratory Controlled		
Los Alamos County Police	662-4176	Traffic control on DOE roads with public access
Los Alamos Medical Center*	662-4201	Medical Services

*Medical services related to hazardous wastes injuries provided under the direction of HSE-2.

TABLE 7-4.

EMERGENCY EQUIPMENT

EMERGENCY EQUIPMENT AT THE TA-50 BATCH WASTE TREATMENT FACILITY (BWTR)

Fire Control Equipment:

2 fire extinguishers (B,C)
East wall of Batch Waste Treatment Room (BWTR)
West wall of adjoining room (Rm. 24) to west of BWTR
Fire alarm pull box
Located on east wall immediately outside BWTR
1 automatic thermal alarm
Sprinkler system
2 sprinkler heads in ceiling of BWTR, set off at 212F

Communication Equipment:

Telephones
Located in Room 24 and at the BWTR
Telephones equipped with building-wide paging system
Evacuation alarm, single tone horn

Spill Control Equipment:

Eight-inch curb around reactor, receiving tanks, and storage area
Absorbent kept onsite

Decontamination Equipment

Safety shower located next to reactor tank outside curbed area
Eye wash
Located on south wall next to hood

TABLE 7-4. (cont)

EMERGENCY EQUIPMENT AT THE TA-50 WASTE INCINERATOR

Fire Control Equipment:

13 fire extinguishers (9C-CO; 4 A-water)
- 1 Mechanical Equipment Room 111
- 2 High Bay Room 112
- 2 High Bay Room 114
- 1 South of Library and Conference Room
- 1 Chemistry Laboratory Room 107
- 1 Process Engineering Laboratory Room 209
- 1 Office Area Room 202
- 1 Room 21

11 Fire Alarm Pull Boxes connected to the CAS
- 1 Mechanical Equipment Room 111
- 1 High Bay Room 112
- 2 South of Library and Conference Room
- 2 High Bay Room 114
- 1 East of women's changing room
- 1 Process Engineering Laboratory
- 1 Office Area Room 202
- 2 Room 21

Automatic thermal alarm on inlet and exhaust of ventilation system
Automatic thermal sprinkler system throughout offices
4 Fire Hydrants
- 1 Northwest corner of Building 84
- 1 West of Building 69
- 1 Northeast of Building 37

Halon Extinguishing System, manual and ultraviolet inRoom 115

Communication Equipment:

Telephones throughout building with building-wide paging system
Radio located in Room 202

Spill Control Equipment:

Absorbent kept onsite
PCB room is bermed to handle all liquids stored
Have Spill Prevention and Containment Plan

Decontamination Equipment:

Showers
Emergency eyewash

TABLE 7-4. (cont)

EMERGENCY EQUIPMENT - HSE-7 CONTROLLED

Spill Control Equipment: Located at TA-54--Area G

Heavy equipment available for emergencies which may include
- 2 scrapers
- 1 bulldozer
- 1 tractor (front end loader)

Shovels
Absorbents (vermiculite) in combustibles storage shed

Decontamination Equipment:

Small decontamination pit for heavy equipment
Showers (MD-11)

Other:

Change room with protective clothing (MD-11)
2-3 dozen respirators (particulates) (MD-11)
2 self-contained, portable air masks (MD-11)
2 emergency generators, portable
3 vehicles are available for evacuation of personnel:
- 2 sanfu
- 1 Jeep (with emergency equipment, e.g., coveralls, booties, tape, rope)

TABLE 7-4. (cont)

EMERGENCY EQUIPMENT AT TA-54, AREA L

Fire Control Equipment:

1 fire hydrant located 30 feet south of site entrance to site
1 CO fire extinguisher located inside trailer at west end of site (B,C)
1 CO fire extinguisher located inside storage shed (B,C)
1 freeze-proof faucet located immediately east of shed

Spill Control Equipment:

Shovels
Oversized drums
Absorbent inside storage shed
Heavy equipment from Area G available for any emergencies at Area L
Bermed storage area

Communications Equipment:

2-way radios are available to all personnel when in area
2-way radios are in all vehicles used for moving hazardous waste
Telephone located inside trailer

Decontamination Equipment:

1 emergency shower and eye wash located immediately east of shed

Other:

2 self-contained, portable air masks located inside trailer

TABLE 7-4. (cont)

SUPPLEMENTARY EMERGENCY EQUIPMENT

ZIA COMPANY (667-6196)

Equipment	Number
A. Transportation	
1. Pickups, 1/2 through 3/4 ton	183
2. Trucks 1 through 3 ton	25
3. Powerwagon (E-20781 with welder (PN-30256) mounted on vehicle, CC-135	1
4. Buses (11-passenger)	2
5. Stationwagens	11
6. Vans, panels, and carryalls	24
B. Special Equipment	
1. Road grader, Champion, self-propelled blade, with radio	1
2. Grader, John Deere, self-propelled, with radio	1
3. Loaders, bucket, Melroe, Bobcat, 1/3 cubic yards	3
4. Loader, bucket, Michigan, 2-3/4 cubic yards	1
5. Loader, Fiat-Ellis, 3 cubic yards	1
6. Loader, bucket, Michigan, 2-1/2 cubic yards	1
7. Loader, bucket, Michigan, 3-1/4 cubic yards	1
8. Loader, bucket, Yale, 3 cubic yards, with radio	1
9. Loader, bucket, backhoe, International, 1-1/2 cubic yards	1
10. Loaders, bucket, backhoe, Case, 7/8 cubic yards	2
11. Loader, backhoe, Ford, 1 cubic yard	1
12. Snowplows, Bombardier, with blade	2
13. Bulldozer, D-8, Crawler	1
14. Bulldozers, TD-25, International	2
15. Scraper, Terex, self-propelled	1
16. Scraper, Fiat-Ellis, self-propelled	1
17. Bulldozer, 280, rubber-tired, with radio	1
18. Semitrailers	5
19. Lights, camp (electrical, plant, portable, 1000 to 5000 watts)	4
20. Power saws	14 (approx)
21. Flusher, street, 3000-gallon Truck, tanker, 500-gallon, International	1
22. Mobile transceivers (2-way, KOB-753)	64

TABLE 7-4. (cont)

ZIA COMPANY (667-6196)

Equipment	Number
B. Special Equipment (cont)	
23. Mobile transceivers (2-way, fire network)	7
24. Handsets (2-way)	8
25. Pageboys (1-way)	235
26. Welders, mounted on trailers and trucks	32
27. Fire tools (hand)	150 (approx)
C. Supplies	
1. Food	
Box lunches	150
D. Other Supplies	
1. Bedding	
Blankets	60
Bedrolls (disposable)	50
(from U.S. Forest Service in Santa Fe)	
2. Butane gas (25-gallon tanks)	4
3. Fuel and lubricants	
4. Miscellaneous supplies	
Manpower	
A. Fire Bosses	
1. Crew bosses	3
2. Straw bosses	12
B. Service Bosses	
1. Transportation boss	1
C. Specialists	
1. Cat bosses	2
2. Bulldozer operators	14
3. Clerks	10
4. Dispatchers	3
5. Mechanics	17
6. Power saw operators	8
7. Radio and telephone operators	10
8. Truck drivers	13
9. Tool sharpener	4

TABLE 7-4. (cont)

ZIA COMPANY (667-6196)

Manpower (cont)	Number
7. Radio and telephone operators	10
8. Truck drivers	13
9. Tool sharpener	4
D. Firefighters	
1. Organized crews (approximately 8 men per crew)	14 crews

TABLE 7-4. (cont)

EMERGENCY EQUIPMENT AT THE DOE FIRE DEPARTMENT
(9-911)

8 1000-gallons-per-minute pumper trucks
5 Minipumper trucks
5 1500-gallon tank trucks
4 Modular ambulances
1 Rescue vehicle
69 Self-contained breathing apparati
Various firefighting equipment
Emergency Medical Technician (EMT) medical equipment
98 Personnel with 81 hours MTA training
1 75-foot elevated platform

TABLE 7-4. (cont)

EMERGENCY RESOURCES AT THE MEDICAL FACILITY (HSE-2)
(667-7878) 8 am - 5 pm
(988-0539) off-duty hours

Manpower

6 (2 casual) physicians
2 physician's assistants
10 (1 part-time) nurses
3 (2 casuals) x-ray technicians
2 laboratory technicians

Special Equipment - Portable

1 Radio base station (HSE-Div. net, being installed)
3 Walkie talkies (HSE-Div. net)
1 Portable cardiac monitor and defibrillator
1 Crash cart - emergency equipment
1 Portable physicians bag - drugs
1 Portable suction unit
5 Portable stretchers
1 Ambulance stretcher with straps
6 Wheel chairs
1 Manual resuscitator
6 Portable oxygen units
Several intravenous holders and solutions
6 Otoscope/opthalmoscope sets
1 Portable sphygmomanometer
10 Stethoscopes
Many contamination apparel
1 Eye irrigation system
Many inflatable limb traction splints
3 Industrial first aid kits
Many extrication and cervical collars
Many crutches and canes
Many suture sets

Supplies

Bedding and pillows
Rescue blankets
Burn blankets
Thermal/icing pouches
Multitrauma dressing and bandages

TABLE 7-4. (cont)

EMERGENCY RESOURCES AT THE MEDICAL FACILITY (HSE-2)
(667-7878) 8 am - 5 pm
(988-0539) off-duty hours

Special Facilities - Nonportable

Completely equipped medical clinic with emergency lighting system, x-ray machine, and ambulance entrance. Contamination showers, protective clothing, and wound counters. Suction unit, electrocardiograph (12 lead), pulse rate monitor/recorder, primary response trauma kits are included.

Transportation

1970 Plymouth Sedan

TABLE 7-5.

CREDIBLE NONSUDDEN RELEASES

Location	Credible Releases	Detection	Correction
TA-14, 15, 16, 36, 39	Toxic material leaching	Sand and soil samples	Removal and proper treatment or disposal of contaminated sand and soil
	Wind dispersion (prevented by procedures)	Visual	Operating procedures prohibit treatment under adverse weather conditions
TA-50-1	Incomplete treatment	Analysis	Continue or modify treatment
	Failure of containment	Inspection for leaking containers and tanks, inspect secondary containment for integrity	Maintenance or replacement of containment
Transport	Leaking containers	Inspection prior to transfer	Repackage in sound container
TA-50-37	Incomplete treatment	Analysis and stack monitoring	Modify treatment procedure prior to continuing
	Failure of containment	Inspection for leaking containers and tanks, inspect secondary containment for integrity	Maintenance or replacement of containment
TA-54 Area L	Failure of containment	Inspection for leaks, inspect secondary containment for integrity	Maintenance or replacement of containment
	Toxic material migration from disposal shafts	Vadose zone monitoring	Develop in agreement with the NM EID a detection monitoring program and corrective action program in compliance with 40 CFR 264.99 and 264.100

TABLE 7-6.

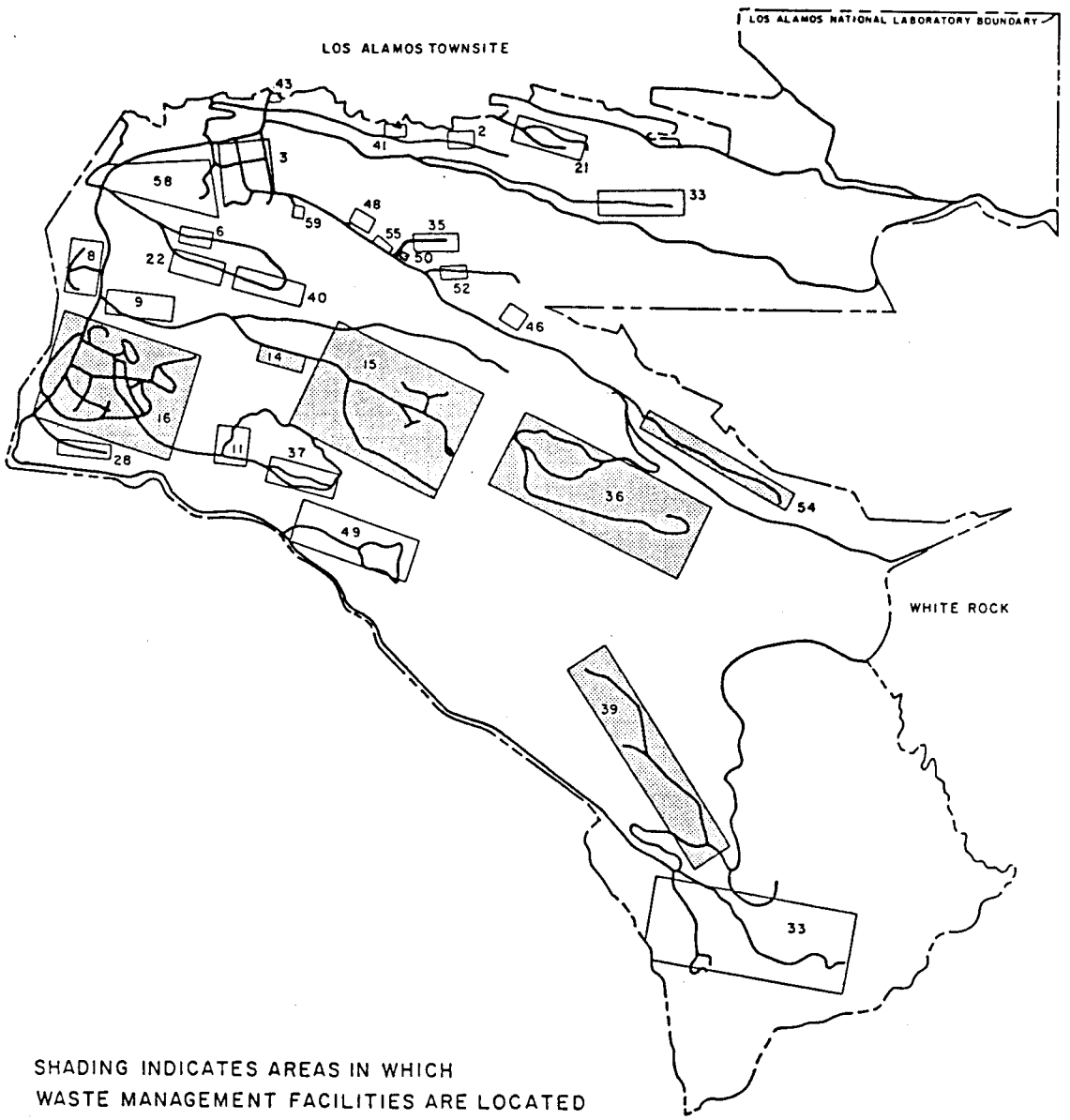
HAZARDOUS WASTE EMERGENCY COORDINATOR

Primary Coordinators	Laboratory Telephone	Telephone	Home Address
Ray Garde, HSE-7 Group Leader	7-7920/4301	753-7737	2560 Aeby Lane, Espanola, NM
Lud Emelity, HSE-7 Deputy Group Leader	7-5839/4301	662-7993	388 El Conejo, Los Alamos, NM
J. L. Warren, HSE-7 Associate Group Leader	7-5398	662-9639	1082 Big Rock Loop, Los Alamos, NM
Jerry Buchholz Associate Group Leader	7-4301	672-3647	316 Potrillo Drive, White Rock, NM
Lee Borduin Associate Group Leader	7-7391	455-2882	Rt. 1, Box 92G, Santa Fe, NM
Karen Balo Section Leader	7-6095	983-5169	1933 San Idelfonso, Santa Fe, NM

TABLE 7-7.

EVACUATION DETERMINATION AND REENTRY

Reason for Evacuation	Determination Made By	Reentry Conditions
Fire	Fire or Evacuation Alarm; Group Leader; Alternate; Lead Engineer, Senior Staff Member present, or HWEC	Following survey by the Chief Fire Officer, HSE-1 and/or HSE-5, and R&D Supervision
Explosion	Same as above	Same as above plus HSE-3
Loss of Ventilation	Group Leader, Alternate, Senior Staff Member, Lead Engineer, or Senior Technician	Following survey by HSE-1 and/or HSE-5, and R&D Supervision
Loss of Electric Power	Same as above	Same as above
Extensive Contamination	Same as above or HSE-1 Representative	Same as above
Airborne Contamination	Same as above or Rad Monitor	Same as above
Escape or Release of Toxic or Hazardous Gas or Fumes	Group Leader, Alternate, Senior Staff Member, Lead Engineer, Senior Technician, or HWEC	Same as above plus HSE-5
Bomb Threat	HSE-3 or Protective Representative, R&D Section Leader, Alternative, Senior Staff Member or Lead Engineer	Following determination by HSE-3 or Protective Force Representative and R&D Supervision



SHADING INDICATES AREAS IN WHICH WASTE MANAGEMENT FACILITIES ARE LOCATED

N

4000 0 4000

SCALE

FIGURE 7-1

LOS ALAMOS
TECHNICAL AREAS

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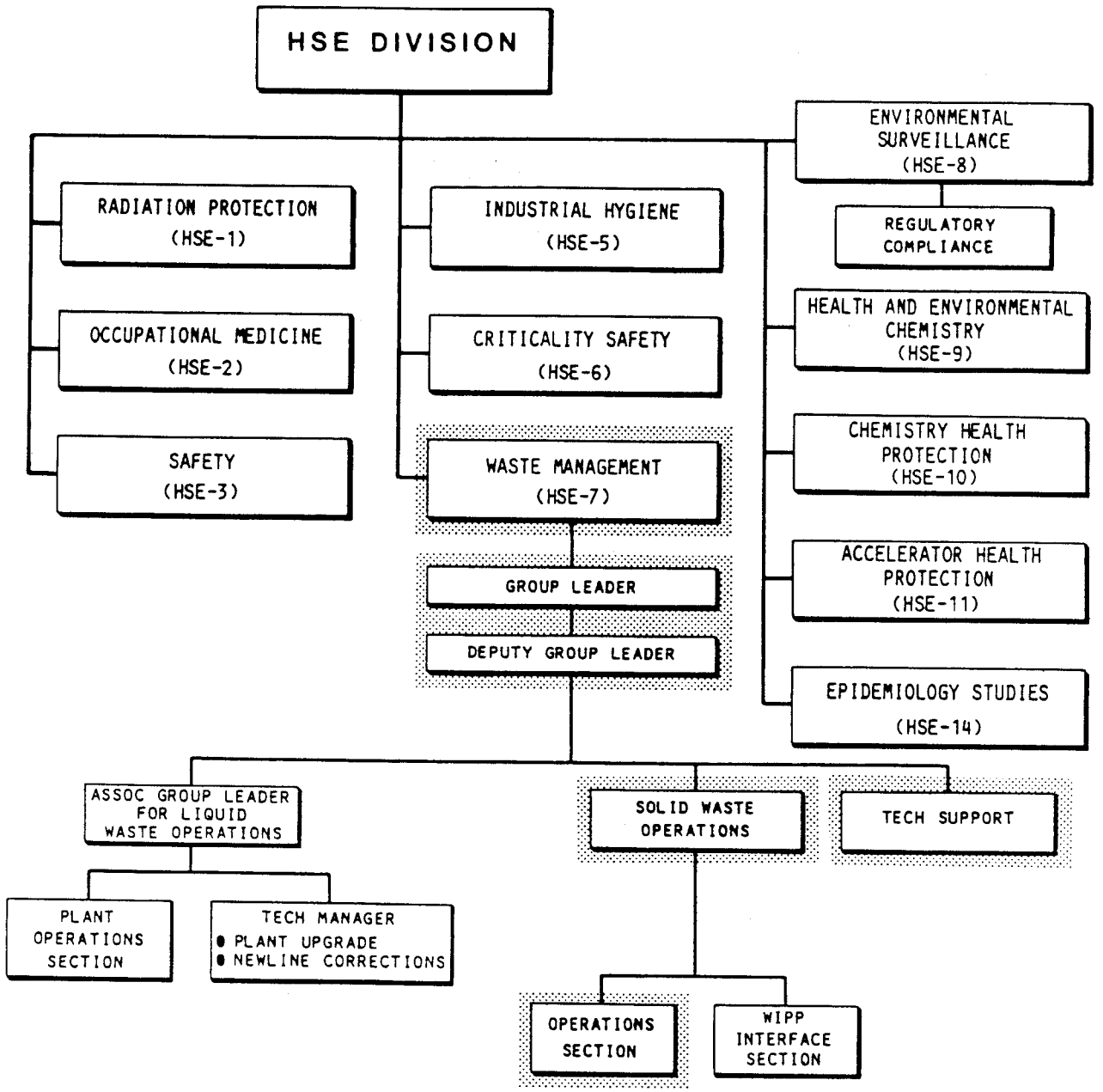

NOTE: SCREENED BOXES INDICATE PRIMARY RESPONSIBILITY FOR CHEMICAL WASTE MANAGEMENT

FIGURE 7-2

HEALTH, SAFETY AND ENVIRONMENT DIVISION MANAGEMENT CHART

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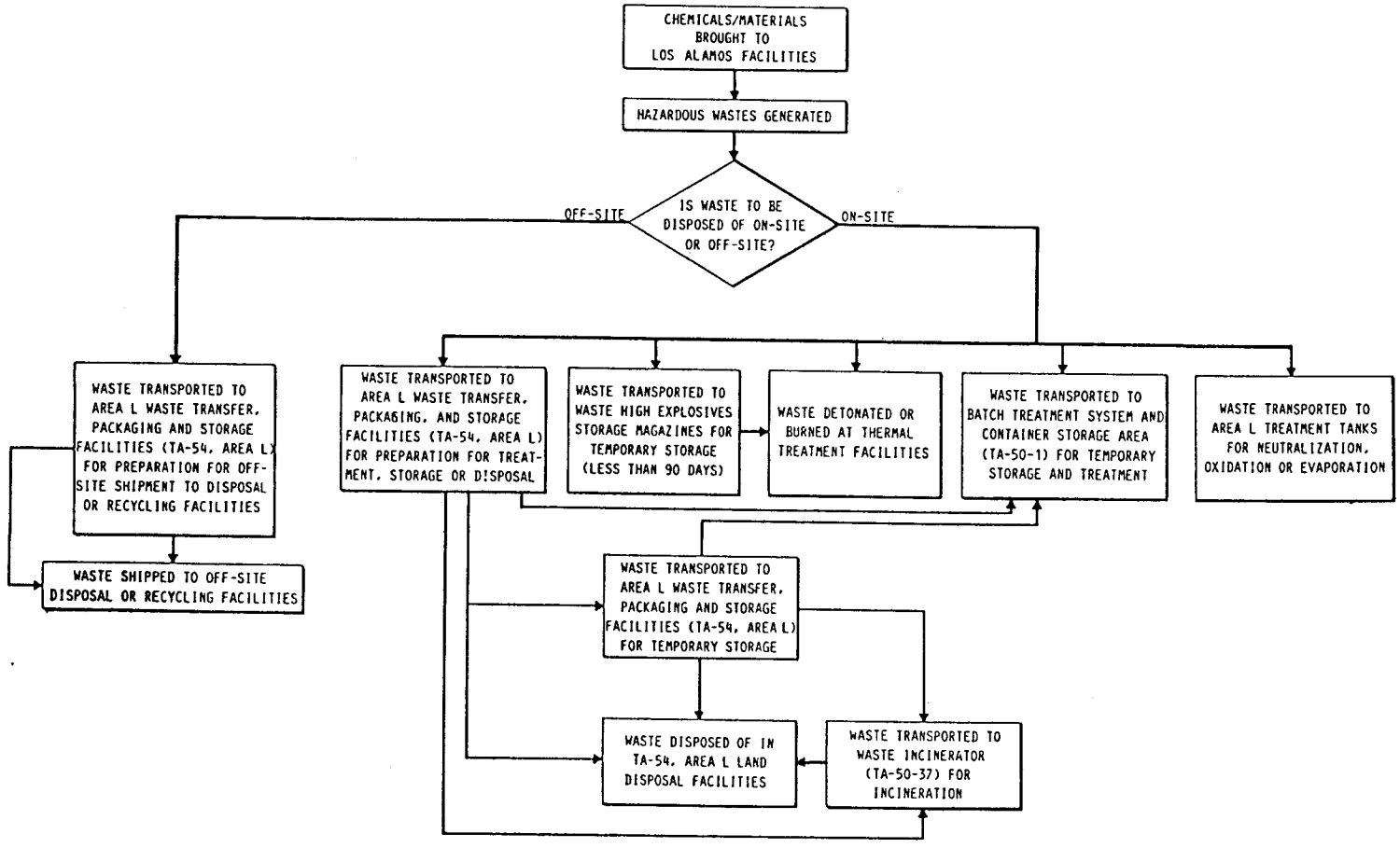

FIGURE 7-3

SCHEMATIC DIAGRAM OF LOS ALAMOS HAZARDOUS WASTE MANAGEMENT ACTIVITIES

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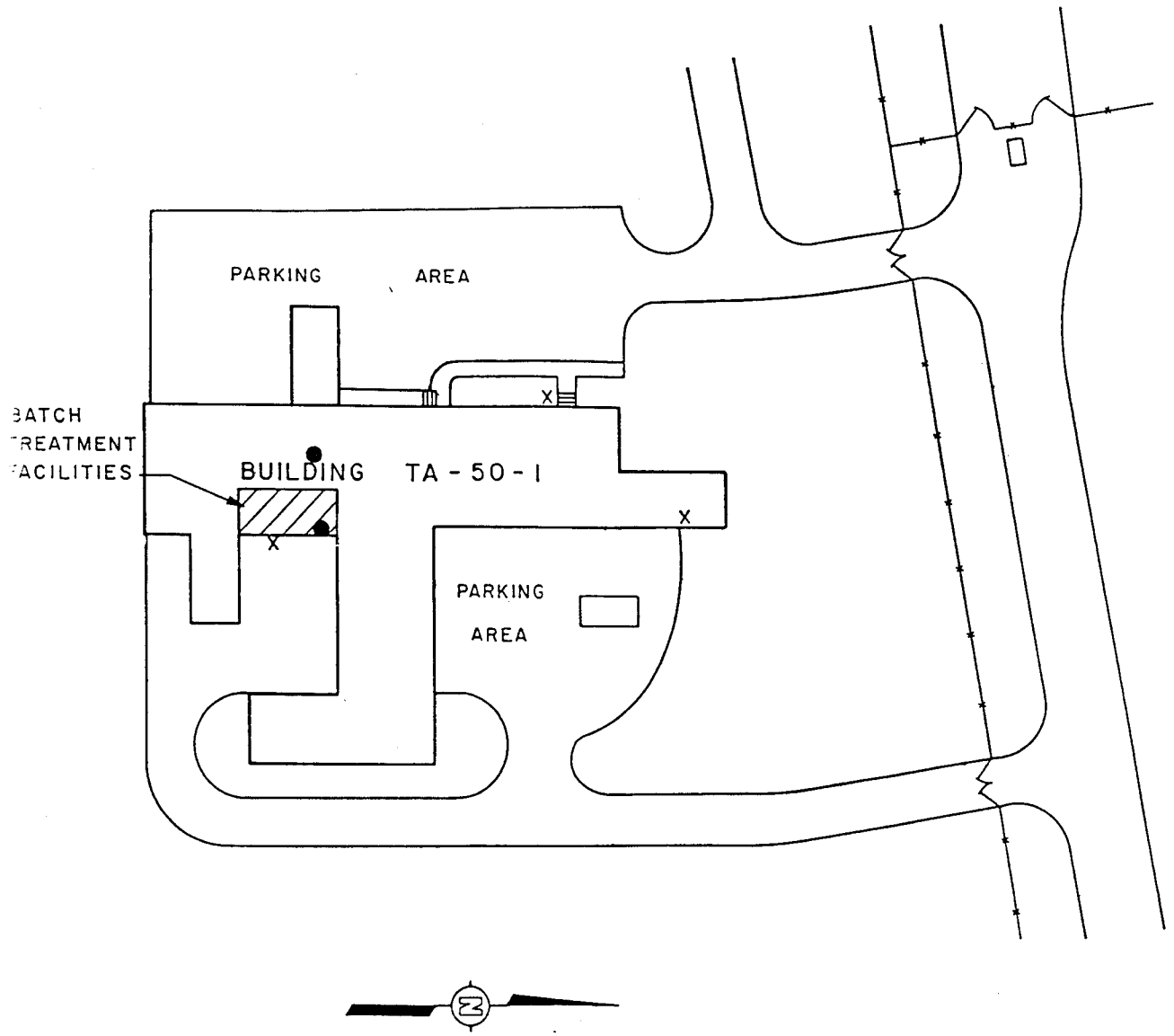

FIGURE 7-4

LOCATION OF
BATCH TREATMENT FACILITIES
IN BUILDING I IN TA-50

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X ALARM PULL BOXES
● FIRE EXTINGUISHERS

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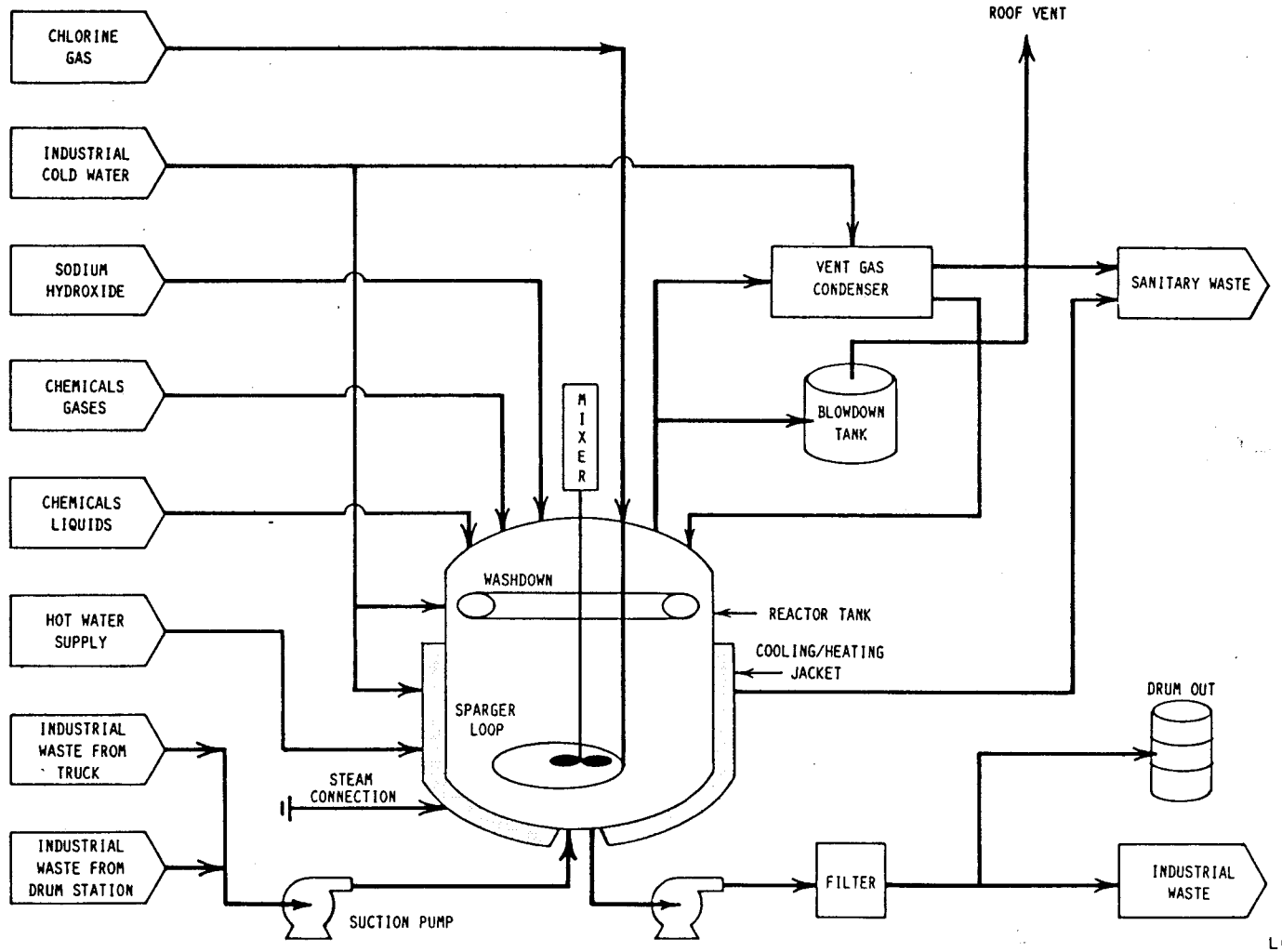

FIGURE 7-5

FLOW DIAGRAM OF BATCH TREATMENT SYSTEM

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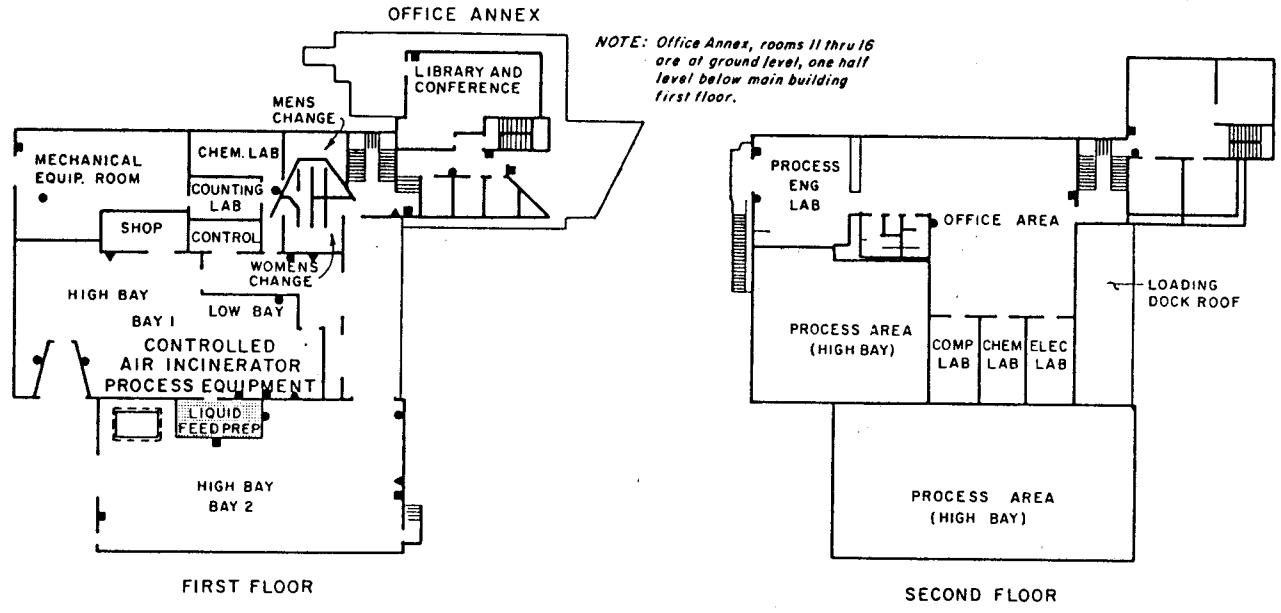

NOTE: Office Annex, rooms 11 thru 16 are at ground level, one half level below main building first floor.

TREATMENT DEVELOPMENT FACILITY
TA-50, BUILDING 37

NOTE: All rooms are covered by automatic sprinkler heads. Fire water flow activates automatic alarm pull.

▲ EVACUATION ALARM
■ ALARM PULL (FIRE)
● FIRE EXTINGUISHER
HALON SYSTEM

FIGURE 7-6

TREATMENT DEVELOPMENT FACILITY SHOWING LOCATIONS OF CHEMICAL WASTE INCINERATOR AND SUPPORT FACILITIES

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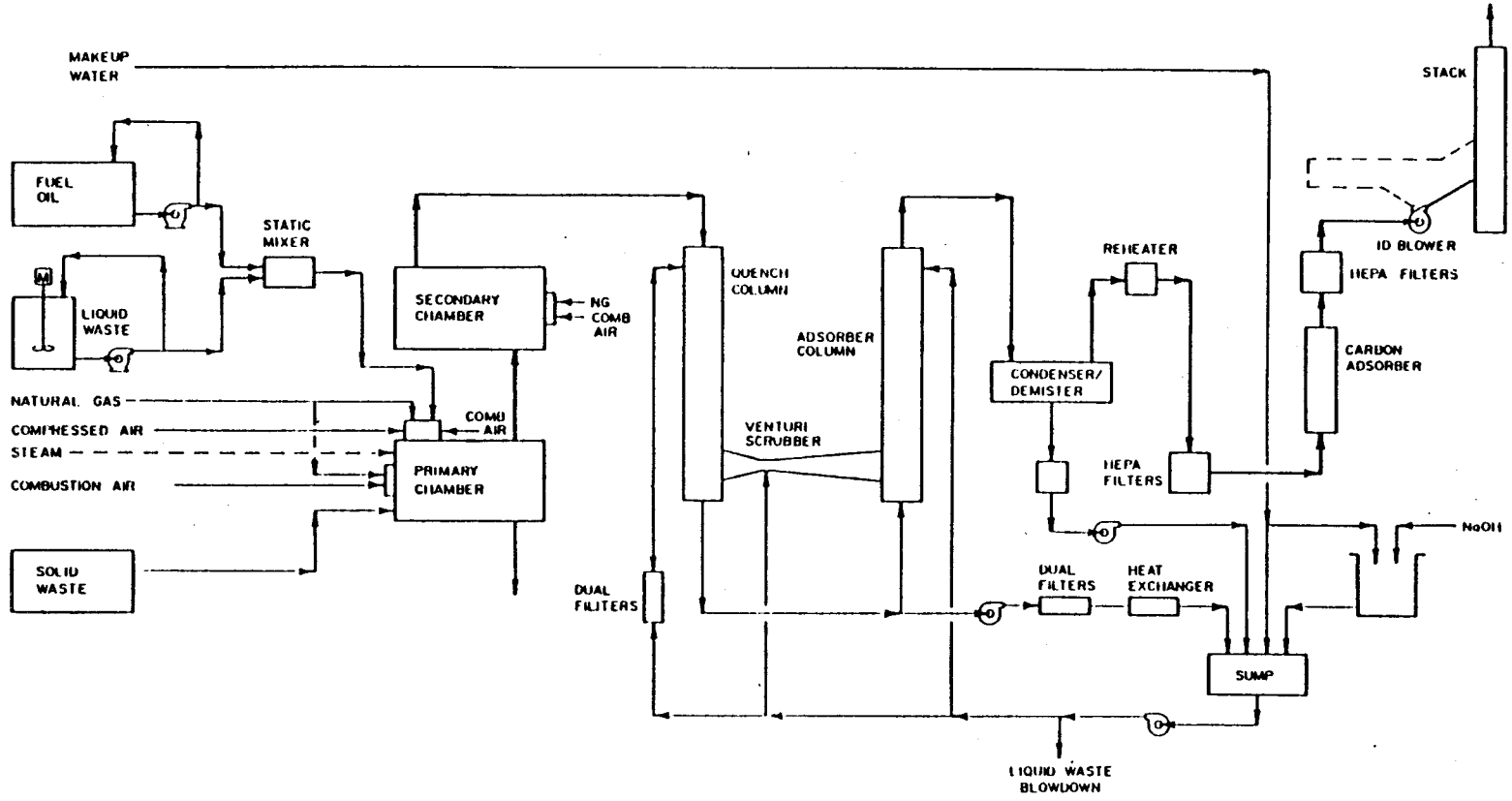

FIGURE 7-7
INCINERATOR
PROCESS DIAGRAM

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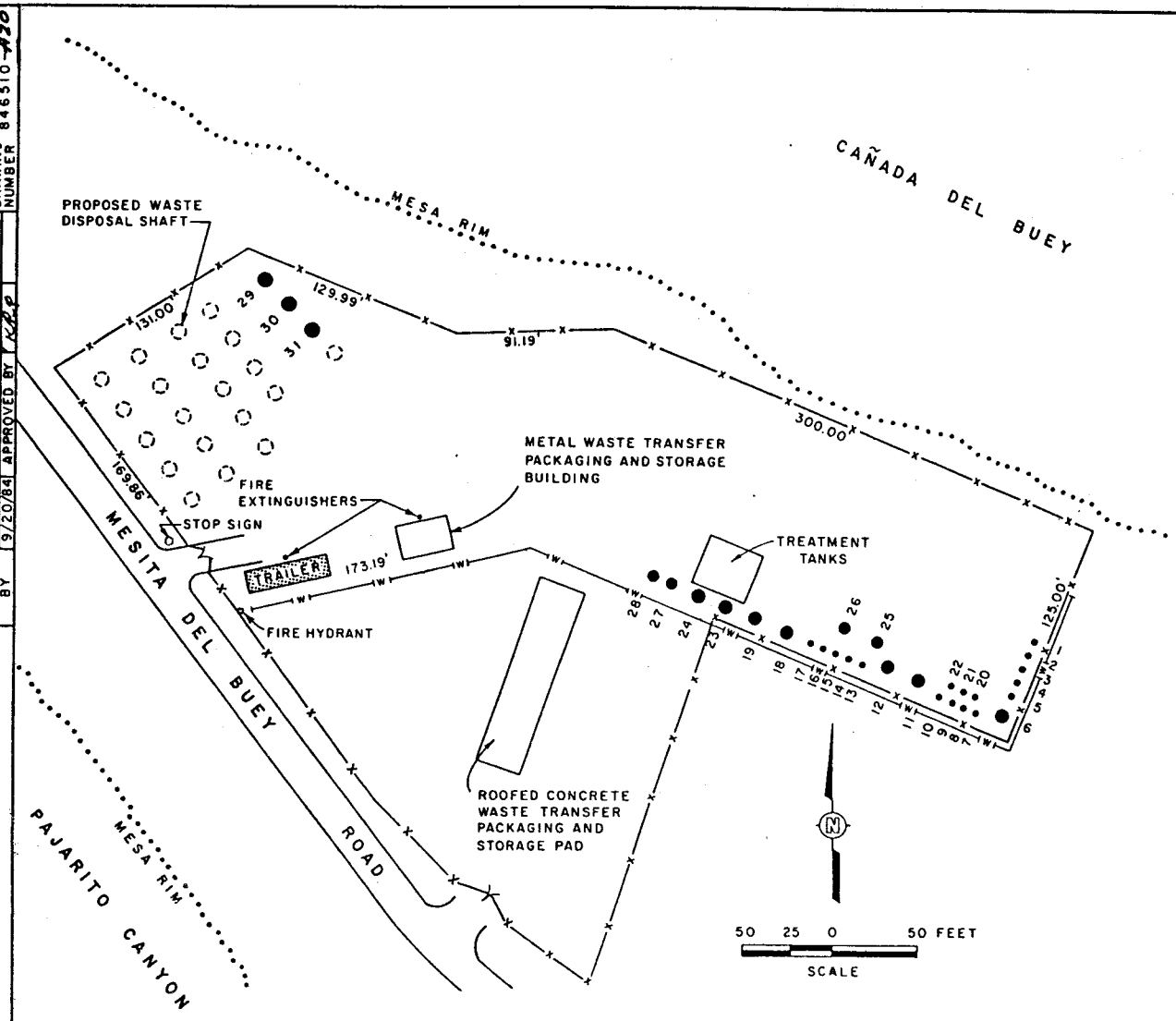

AREA L SHAFTS[1]
(INFORMATION CURRENT MARCH 1985)

SHAFT NO.	SHAFT DIAMETER (FEET)	DATE DRILLED	DATE CAPPED	CONTENTS
1	3	4/80	9/83	ORGANICS[2]
2	3	2/75	7/79	ACIDS & BASES
3	3	2/75	11/78	INORGANIC
4	3	2/75	5/80	ORGANIC
5	3	2/75	6/77	WASTE OIL
6	4	6/75	6/79	REACTIVE
7	3	6/75	6/79	REACTIVE
8	3	6/75	6/79	REACTIVE
9	3	6/75	6/79	GAS CYLINDERS
10	3	6/77	6/79	WASTE OIL
11	8	1/78	7/79	WASTE OIL/SOLVENT
12	4	1/78	7/79	WASTE OIL/SOLVENT
13	3	6/79	5/82	INORGANIC
14	3	6/79	5/82	REACTIVE
15	3	6/79	5/82	REACTIVE
16	3	6/79	5/82	GAS CYLINDERS
17	3	6/79	5/82	ORGANIC
18	8	6/79	6/80	WASTE OIL
19	8	4/80	5/82	WASTE OIL
20	3	4/80	9/83	INORGANIC
21	3	4/80	OPEN	GAS CYLINDERS
22	3	4/80	9/83	ORGANIC
23[3]	8	4/82	3/84	WASTE OIL
24[4]	8	4/82	4/84	ORGANIC & WASTE OIL
25	6	9/82	OPEN	INORGANIC
26	6	9/82	3/84	ORGANIC
27	4	1/83	2/85	SPECIAL[5]
28	4	1/82	OPEN	SPECIAL
29	6	12/83	8/84	ORGANIC
30	6	12/83	8/84	ORGANIC
31	6	12/83	9/84	ORGANIC
32	4	9/84	9/84	ORGANIC
33	6	9/84	2/85	ORGANIC
34	6	2/85	OPEN	ORGANIC

NOTES:
(1) ALL SHAFTS ARE APPROXIMATELY 60 FEET DEEP.
(2) SHAFT ONE CONTAINS WASTES NOT IN DRUMS.
(3) PRIOR TO SHAFT 23, LIQUIDS WERE DISPOSED OF IN DRUMS WITHOUT ADDING ABSORBENTS.
(4) MIDDLE SECTION OF THIS SHAFT NOT USED.
(5) USED FOR MISCELLANEOUS WASTE REQUIRING GREATER ISOLATION.

FIGURE 7-8

TA-54 AREA L
WASTE MANAGEMENT FACILITIES

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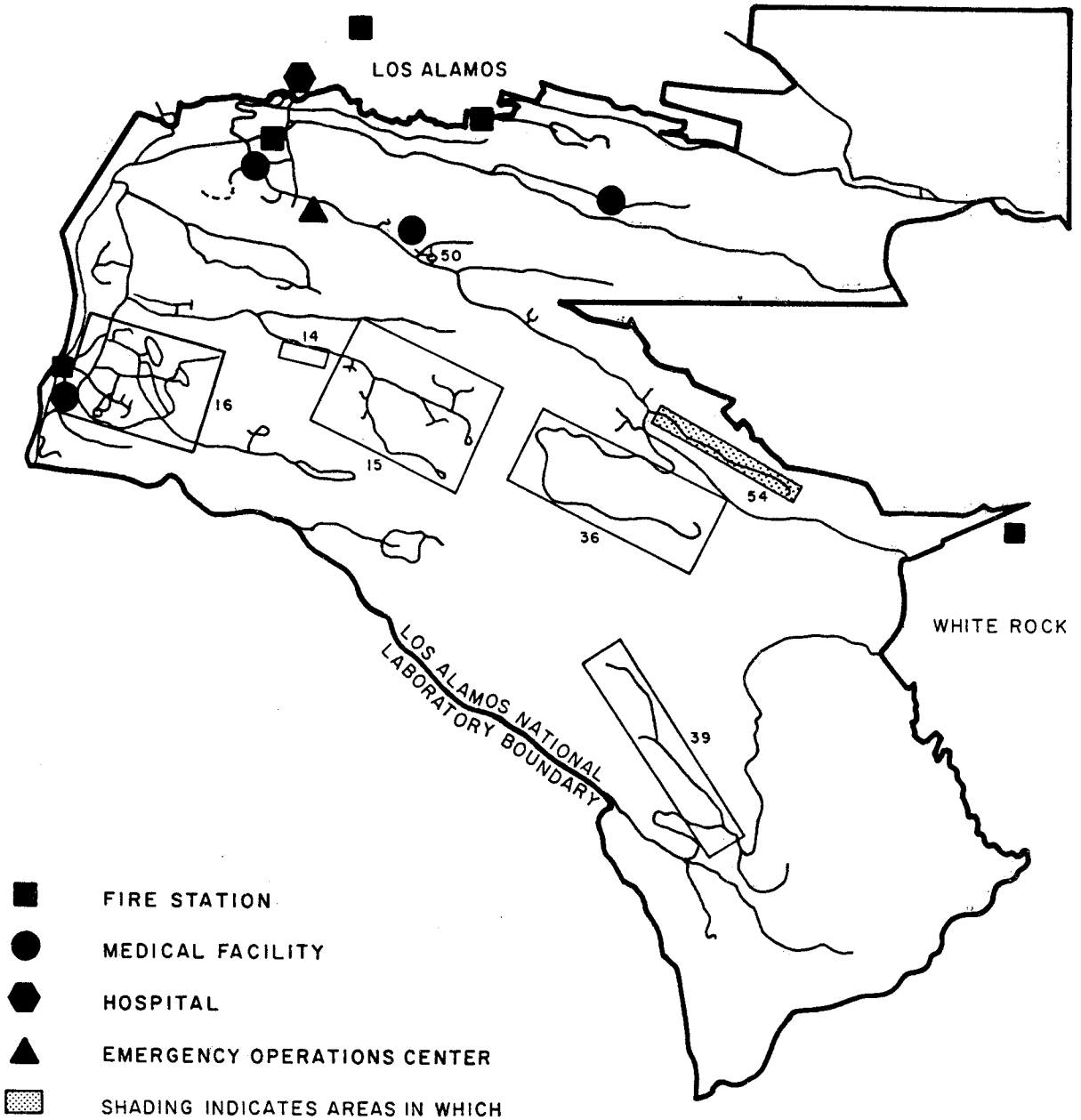

FIGURE 7-9

EMERGENCY FACILITIES

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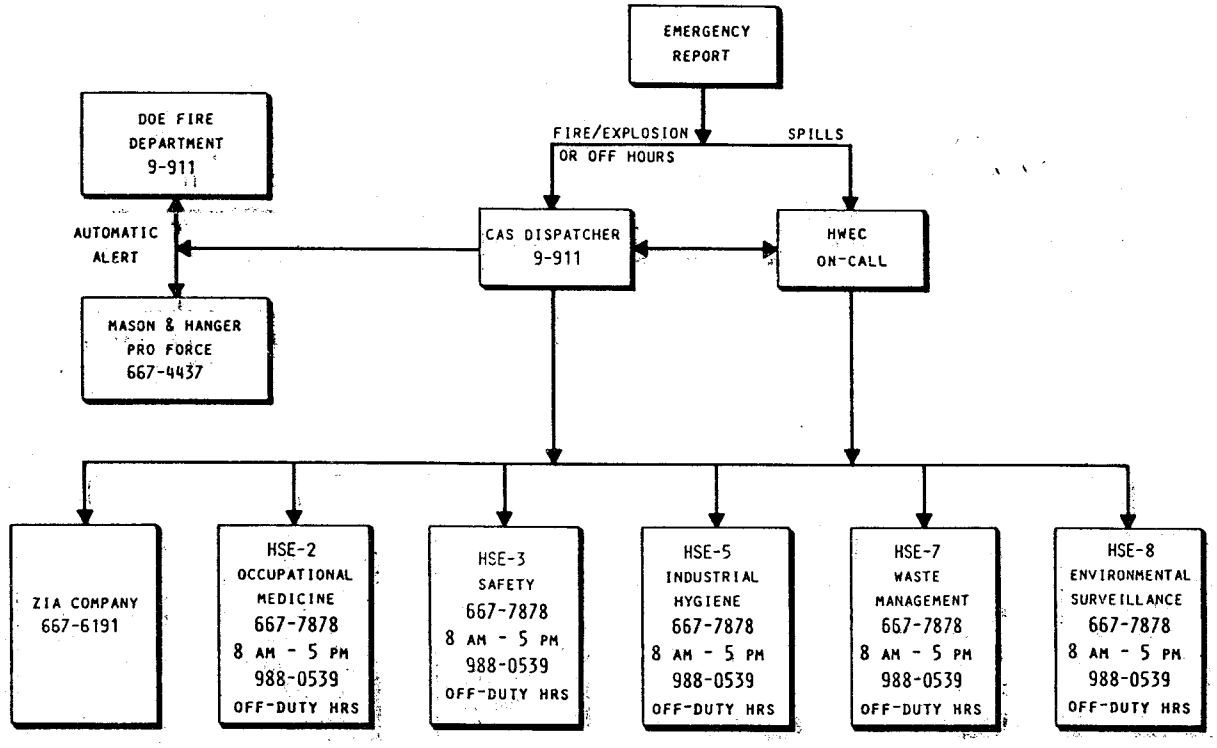

FIGURE 7-10

HAZARDOUS WASTE
EMERGENCY
NOTIFICATION STRUCTURE

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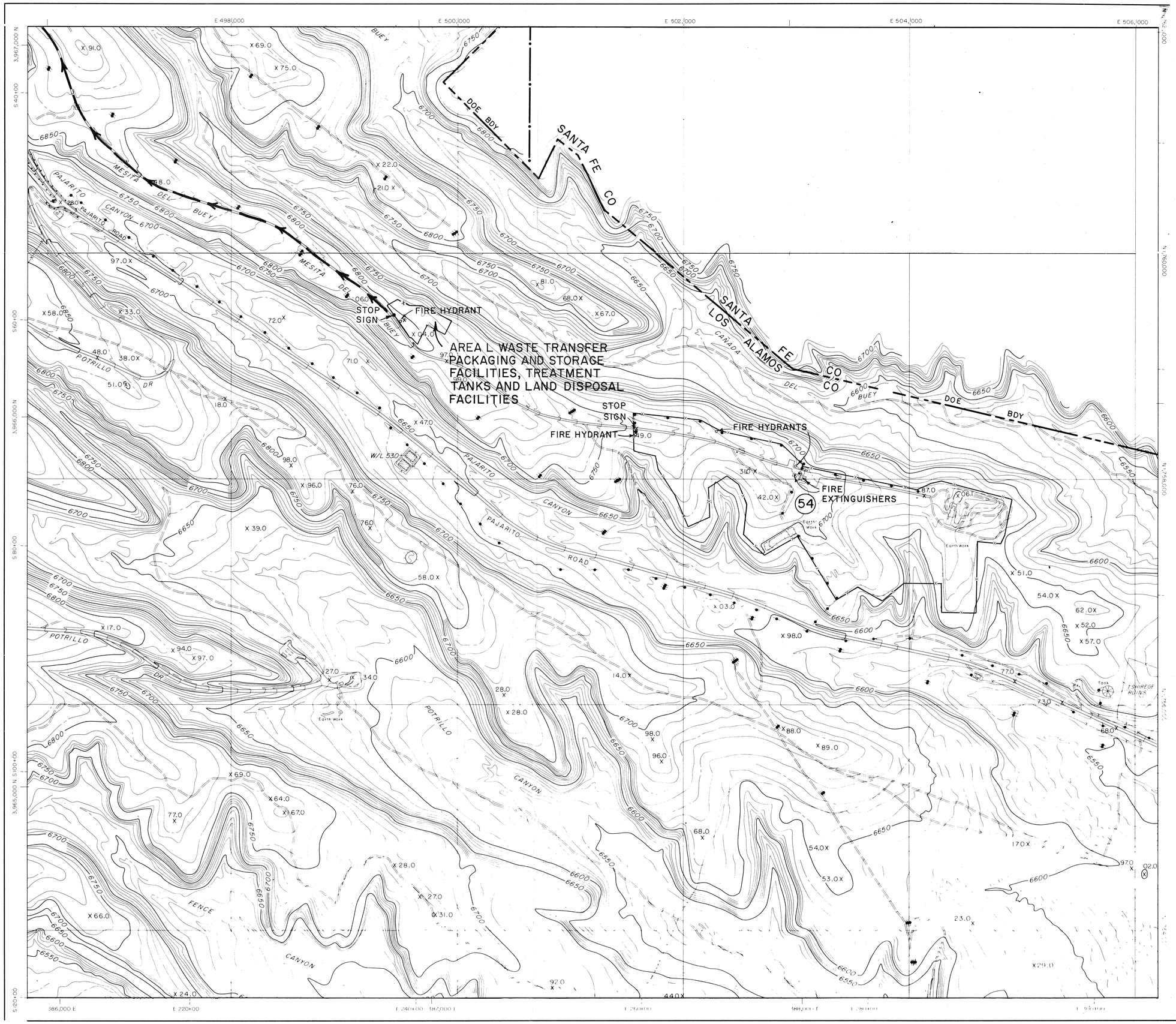

LEGEND

x 93.0	SPOT ELEVATION		NMSP GRID
6900	INDEX CONTOUR		UTM GRID
	INTERMEDIATE CONTOUR 10ft.		LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
	COUNTY LINES – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES.		
	DOE BOUNDARY – X & Y COORDINATE DATA PROVIDED BY LASL.		
	DOE BOUNDARY – SURVEY DESCRIPTIONS OR RECORD PLATS PROVIDED BY LASL.		
	DOE BOUNDARY – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES BASED ON PROJECTED COUNTY LINES.		
35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD	Tank	TANK
	JEEP TRAIL		POND
	CULVERT	RW	RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL	Earth Work	EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT

NORTH

GRID NMSP NORTH

MAPPING COMPLETED BY PHOTOGRAMMETRIC METHODS, UTILIZING 1:30,000, 1:12,000 & 1:13,200 PHOTOGRAPHY, OBTAINED IN NOV. 1976 & JUNE 1980 WITH ZEISS RMK A 15/23 CAMERAS OF 153.42 & 152.43mm C.F.L. RESPECTIVELY, MAPPING BASED ON CONTROL SURVEYS TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE). MAPPING COMPLETED IN ACCORDANCE WITH NATIONAL MAP ACCURACY SPECIFICATIONS.

GRAPHIC SCALE 1 in = 400 ft

CONTOUR INTERVAL 10 ft

TECHNICAL AREAS

(35) MD–SITE

LOS ALAMOS SCIENTIFIC LABORATORY

FIGURE 7-11

CONTOUR MAP SHOWING THE LOCATION OF AREA L WASTE MANAGEMENT FACILITIES

LAB JOB NO. 5682
1"=400' SCALE
PLAN / TOPO
SHEET 16 OF 25

14844-P

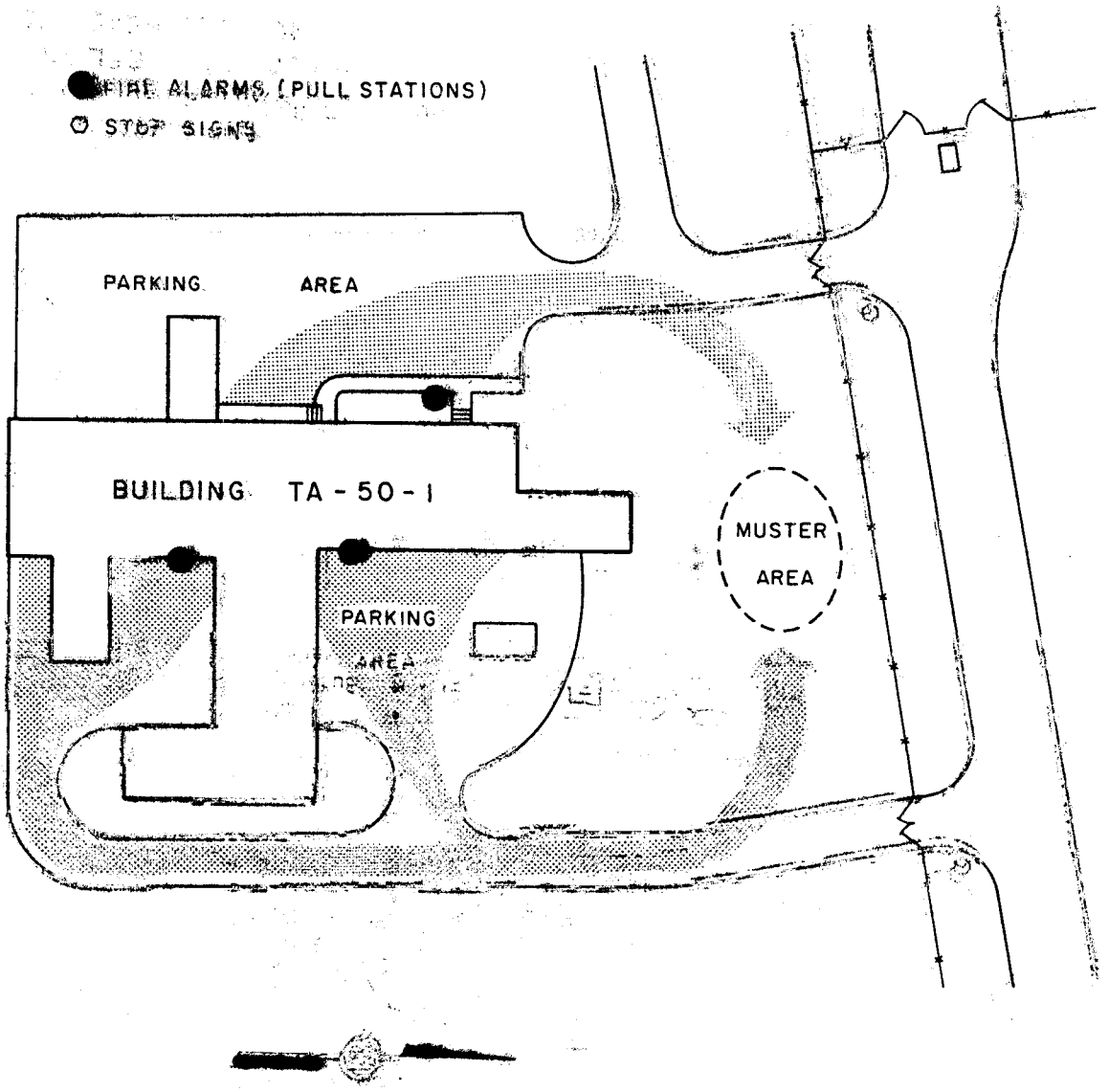

FIGURE T-12

TA-50,
BATCH TREATMENT PLANT
EVACUATION ROUTE

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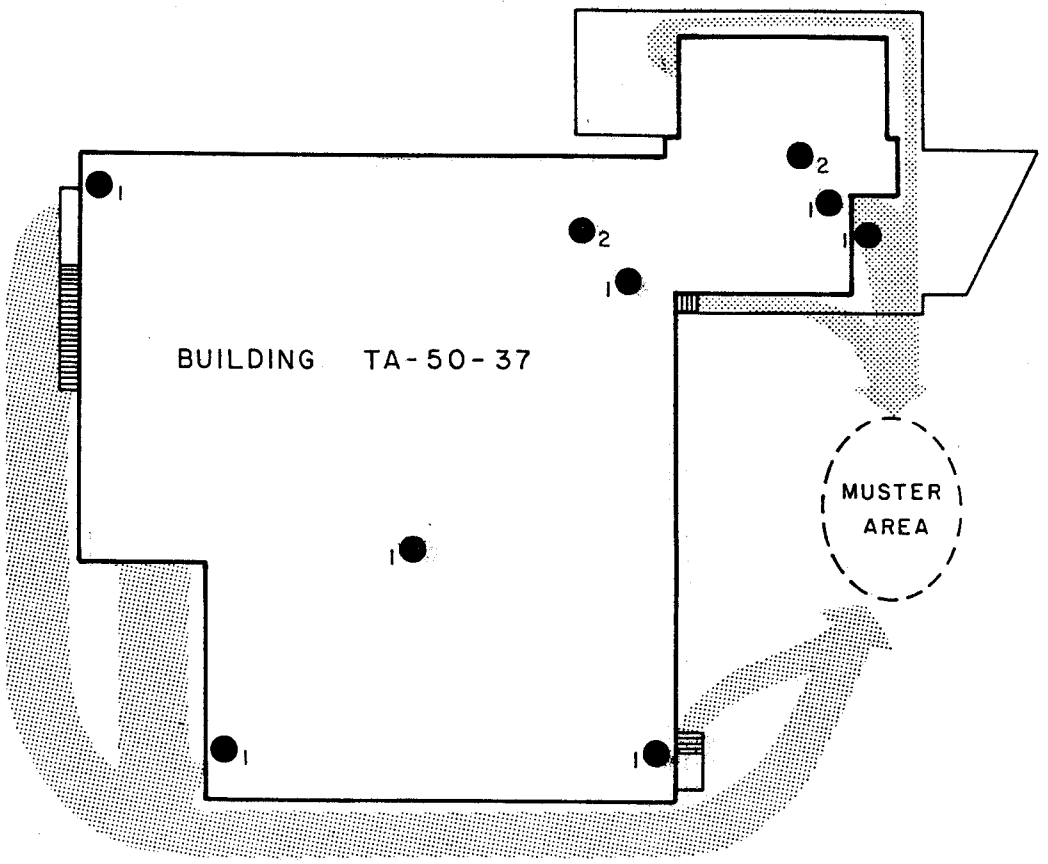

FIGURE 7-13

TA-50
WASTE INCINERATOR BUILDING
EVACUATION ROUTE

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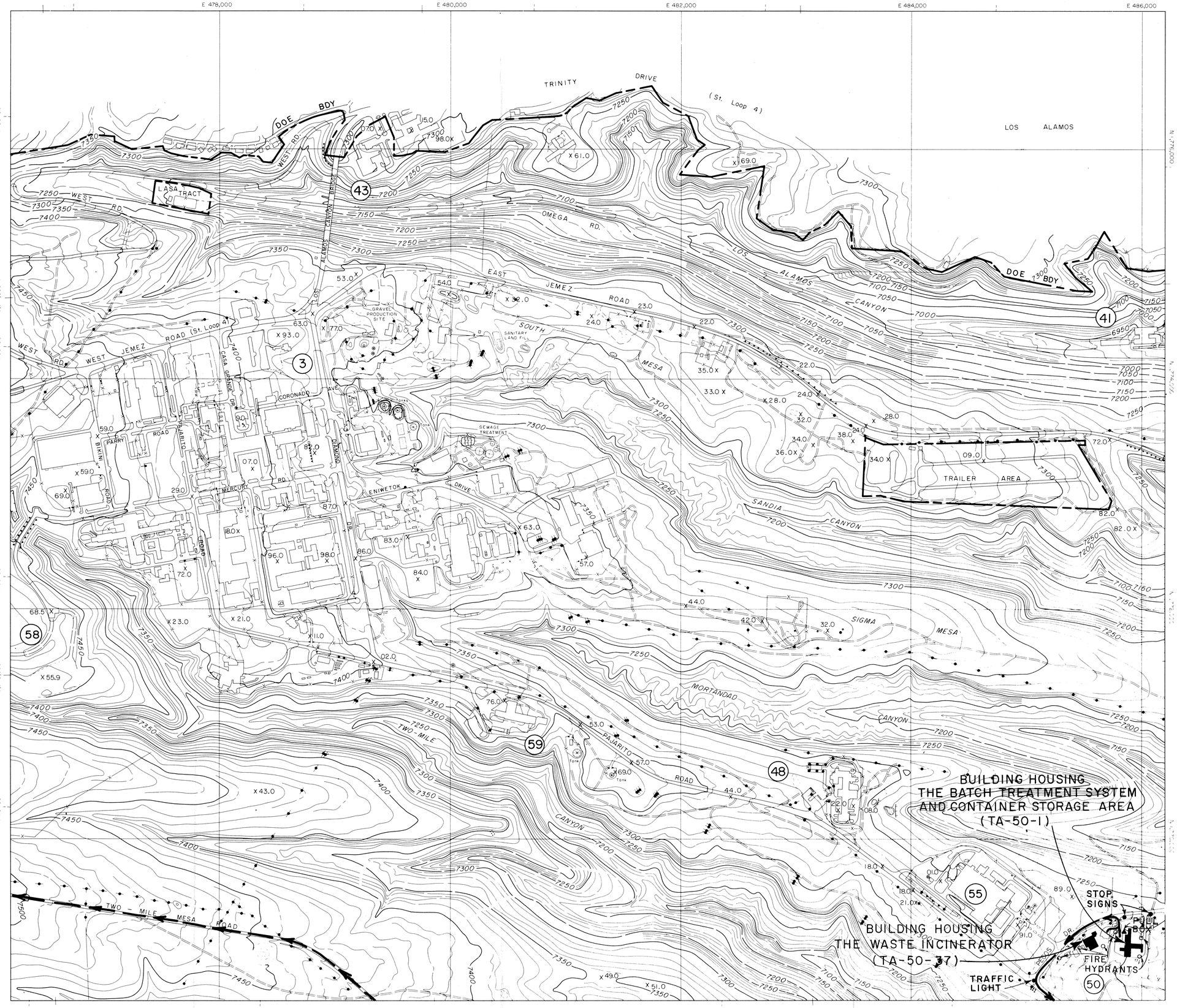
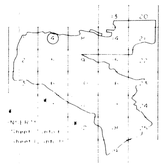


LEGEND

x 93.0	SPOT ELEVATION	N 1768,000	NMSP GRID
—6900—	INDEX CONTOUR	3,989,000 N	UTM GRID
	INTERMEDIATE CONTOUR 10ft.	N 240+00	LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
	COUNTY LINES – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES.		
	DOE BOUNDARY – X & Y COORDINATE DATA PROVIDED BY LASL.		
	DOE BOUNDARY – SURVEY DESCRIPTIONS OR RECORD PLATS PROVIDED BY LASL		
	DOE BOUNDARY – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES BASED ON PROJECTED COUNTY LINES.		
35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD		TANK
	JEEP TRAIL		POND
	CULVERT		RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL		EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT



NORTH

GRID NMSP NORTH

MAPPING COMPLETED BY PHOTOGRAMMETRIC METHODS, UTILIZING 1:30,000, 1:12,000 & 1:13,200 PHOTOGRAPHY, OBTAINED IN NOV. 1976 & JUNE 1980 WITH ZEISS RMK A 15/23 CAMERAS OF 153.42 & 152.43mm C.F.L. RESPECTIVELY, MAPPING BASED ON CONTROL SURVEYS TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE). MAPPING COMPLETED IN ACCORDANCE WITH NATIONAL MAP ACCURACY SPECIFICATIONS.

GRAPHIC SCALE: 1 in.=400 ft.

CONTOUR INTERVAL 10 ft.

TECHNICAL AREAS

- (1) SM–SITE
- (41) W–SITE
- (50) WM–SITE
- (43) HRL–SITE
- (48) RC–SITE
- (59) TWO MILE NORTH–SITE
- (55) PLUTONIUM FACILITY SITE
- (50) OH–SITE

LOS ALAMOS SCIENTIFIC LABORATORY

FIGURE 7-14

CONTOUR MAP SHOWING THE LOCATIONS OF THE BATCH TREATMENT SYSTEM AND CONTAINER STORAGE AREA AND THE WASTE INCINERATOR

LAB JOB NO. 5682

1" = 400' SCALE

PLAN / TOPO

SHEET 4 OF 25

8.0 PERSONNEL TRAINING

This section describes the personnel training program for Los Alamos National Laboratory's facilities in accordance with the regulatory requirements of §264.16 (NMHWMR 206.B.6). These requirements are submitted with the Part B Application, as specified in §270.14(b) (12) (NMHWMR 302.A.4.b.[1]).

The information presented outlines the personnel training programs at the Laboratory. The primary objective of the program is to prepare persons to safely operate and maintain those areas containing hazardous wastes.

8.1 OUTLINE OF TRAINING PROGRAM

8.1.1 Responsibilities

Figure 8-1 presents the organization of Health, Safety, and Environment Division. HSE Division handles all waste management activities except for high explosives treatment, which is handled by the WX and M Divisions. Individuals who are directly involved with waste management are in Health, Safety, and Environment Group 7 (HSE-7). The Environmental Surveillance Group is responsible for RCRA compliance. Personnel in the Occupational Medicine (HSE-2), Safety Group (HSE-3), Industrial Hygiene Group (HSE-5), and Environmental Surveillance Group (HSE-8) are trained in their specialties to provide emergency response support. Job descriptions for the Laboratory's hazardous waste management personnel are included in Appendix U.

8.2 TRAINING CONTENT, FREQUENCY, AND TECHNIQUES

Past training was conducted by a training contractor, J. T. Baker Chemical Company.

A new training program is being instituted at the Laboratory. It will include a combination of internal training courses, on-the-job training, and courses taught by outside contractors.

Records of each individual's formal training are maintained in the HSE Division office. Training records of current employees are kept until closure of the facility. Records of former employees are kept for at least three years from the date the employee last worked at the facility.

The training outline is on file in the HSE Division Office and is available for review by all hazardous waste management and handling personnel, emergency response personnel, and all regulatory agencies. Training records and procedures are reviewed by the DOE and the EPA and during internal audits/inspections. Provisions are made for updating and reviewing courses, as necessary, to ensure RCRA Part B compliance.

The training coordinator will work with the group leaders of HSE-2, 3, 5, 7, and 8, WX, and M Divisions to ensure that all employees receive the proper level of training. All new employees will receive training within six months of their date of hire or transfer. Personnel will not work in unsupervised positions until they successfully complete the training course.

8.2.1 Internal Training

The personnel training courses developed at the Laboratory emphasize the safe handling of hazardous wastes. Program instructors are trained in hazardous waste management procedures and RCRA provisions. The Laboratory's internal training program is designed to provide training commensurate with the employee's responsibilities. Three versions of a course are offered (intensive, limited, overview) so that the program can be molded to fit each employee's needs.

An outline of the Los Alamos National Laboratory Training Program can be found in Appendix V. Table 8-1 shows the employees who will participate in each of these courses and the level of the course they will be required to take.

8.2.2 On-the-Job Training

Appropriate personnel will participate in on-the-job training programs. These programs are designed to give field demonstrations of Laboratory procedures for hazardous waste handling, inspections, and hazardous waste transportation requirements. An outline of on-the-job training programs can be found in Appendix V.

8.2.3 External Training

In addition to internal training, appropriate personnel will participate in contractor-taught courses. Those personnel who will participate in the external training program are shown in Table 8-1. These contractor-taught courses will serve to supplement the internal training program.

8.2.4 Training Coordinator

The personnel training program is directed by Dr. Wayne Hansen. As Associate Division Leader for the Health, Safety, and Environment Division at Los Alamos National Laboratory, Dr. Hansen is knowledgeable about hazardous waste management facilities and practices and emergency procedures. Dr. Hansen's resume can be found in Appendix V.

8.2.5 Relevance of Training to Job Position

Dr. Wayne Hansen, the training coordinator, is responsible for coordinating the internal and external training courses and for assuring that all waste management and handling personnel receive the required training. The training program provides employees with training relevant to their positions within the organization. Supervisors and staff receive training appropriate to their degree of handling hazardous waste (e.g., reporting and other procedures required for compliance). For example, management responsibilities for compliance with RCRA are assigned to the HSE-7 Group Leader, who receives training in RCRA provisions. Material handlers are trained to maintain proper and safe operating procedures and to respond effectively to spills and other emergencies. Table 8-1 shows how training is applicable to job position.

8.3 EMERGENCY RESPONSE TRAINING

The outside professionals (Zia Company and the Protective Force) assist the Laboratory Emergency Coordinator as soon as they arrive on the scene of the emergency. These people are trained in their specialties (i.e., heavy equipment operations, traffic control). Personnel from these agencies do not require special training from the Laboratory, and are under the direct supervision of trained Laboratory personnel.

In order to ensure maximum protection of life and property and to mitigate the consequences of an emergency situation, it is imperative that all HSE personnel, WX and M personnel involved in waste handling and emergency response be knowledgeable about appropriate building and operating area emergency procedures. These groups will participate in the Laboratory's formal training program.

In addition to the Laboratory's formal program (Table 8-1), division and group leaders and immediate supervisors are responsible for providing education and training in emergency response procedures. Periodic unannounced emergency drills and exercises are used to familiarize employees with emergency procedures. Training is also provided through prominent instruction displays and through presentations and discussions in safety meetings.

Each new or transferred employee is indoctrinated by his immediate supervisor regarding the general emergency procedures and those specific procedures related to his/her work area. Each employee is advised of changes to any emergency procedures and is given an annual review of procedures affecting his/her work area. The review may be given separately in writing or included in an overall indoctrination.

Specialized training is given to those employees assigned special functions or specific emergency duties (see Table 8-1). Emergency response personnel (HSE-2, 3, 5, and 8, the DOE Fire Department, Laboratory Emergency Coordinators, and Area Spill Coordinators) participate in the

formal Laboratory training program and are required to attend courses on spill response, the RCRA contingency plan and RCRA provisions. All waste handling personnel (HSE-7, WX, and M) also participate in the formal training program in which they are instructed in emergency procedures pertinent to their work area. The emergency procedures instruction in which hazardous waste management and handling personnel and emergency response personnel are required to participate will ensure a coordinated response to hazardous waste emergencies.

8.4 IMPLEMENTATION OF TRAINING PROGRAM

The Los Alamos National Laboratory introductory training program (Table 8-1) is offered at six-month intervals, when needed, to ensure that all employees receive training within six months of their date of hire or transfer. Employees will not work in unsupervised positions until they have been trained.

All hazardous waste management and handling personnel must attend annual refresher courses. These courses are intended to update personnel on Laboratory procedures and provide them with an overview of their introductory training.

In addition, a complete Respirator/SCBA course is taught annually, where appropriate, and must be successfully completed by hazardous waste handling personnel.

Group leaders, along with the training coordinator, will ensure that all personnel participate in the introductory and annual training programs.

TABLE 8-1. LOS ALAMOS NATIONAL LABORATORY TRAINING

Course Content	High Explosives Handling Technicians	High Explosives Handling Staff	Incineration Technicians	Incineration Staff	Chemical Waste Technicians	Chemical Waste Staff	Associate Group Leaders	HSE-7 Group Leader	Training Coordinator	Occupational Medicine, Safety Group, Industrial Hygiene Group, Environmental Surveillance Group, DOE Fire Department, Hazardous Waste Emergency Coordinators, Area Spill Coordinators	Course Type
RCRA Provisions	L	I	L	I	L	I	L	L	L	L	IC, EC
Personal Safety	I	I	I	I	I	I	L				IC, EC
Respirator/SCBA*			I	I	I	I					IC
Hazardous Waste Handling and Operations											
a) Batch Treatment					I	I	O				OJT
b) Incineration			I	I	O	O	O				OJT
c) Detonation/Burning HE	I	I				O	O				OJT
d) Landfill Disposal					I	I	O				OJT
e) Reactives					I	I	O				EC, OJT
f) Acids/Bases					I	I	O				EC, OJT
g) Organics - General			I	I	I	I	O				EC, OJT
h) Inorganics - General					I	I	O				EC, OJT
Spill Response*			I	I	I	I	I	I		I	IC
RCRA Contingency Plan*	L	I	L	I	L	I	I	I		O	IC
Recordkeeping/Inspections	I	I	I	I	I	I	O				IC, EC, OJT
On-Site/Off-Site Transportation	L	L			I	I	L				OJT

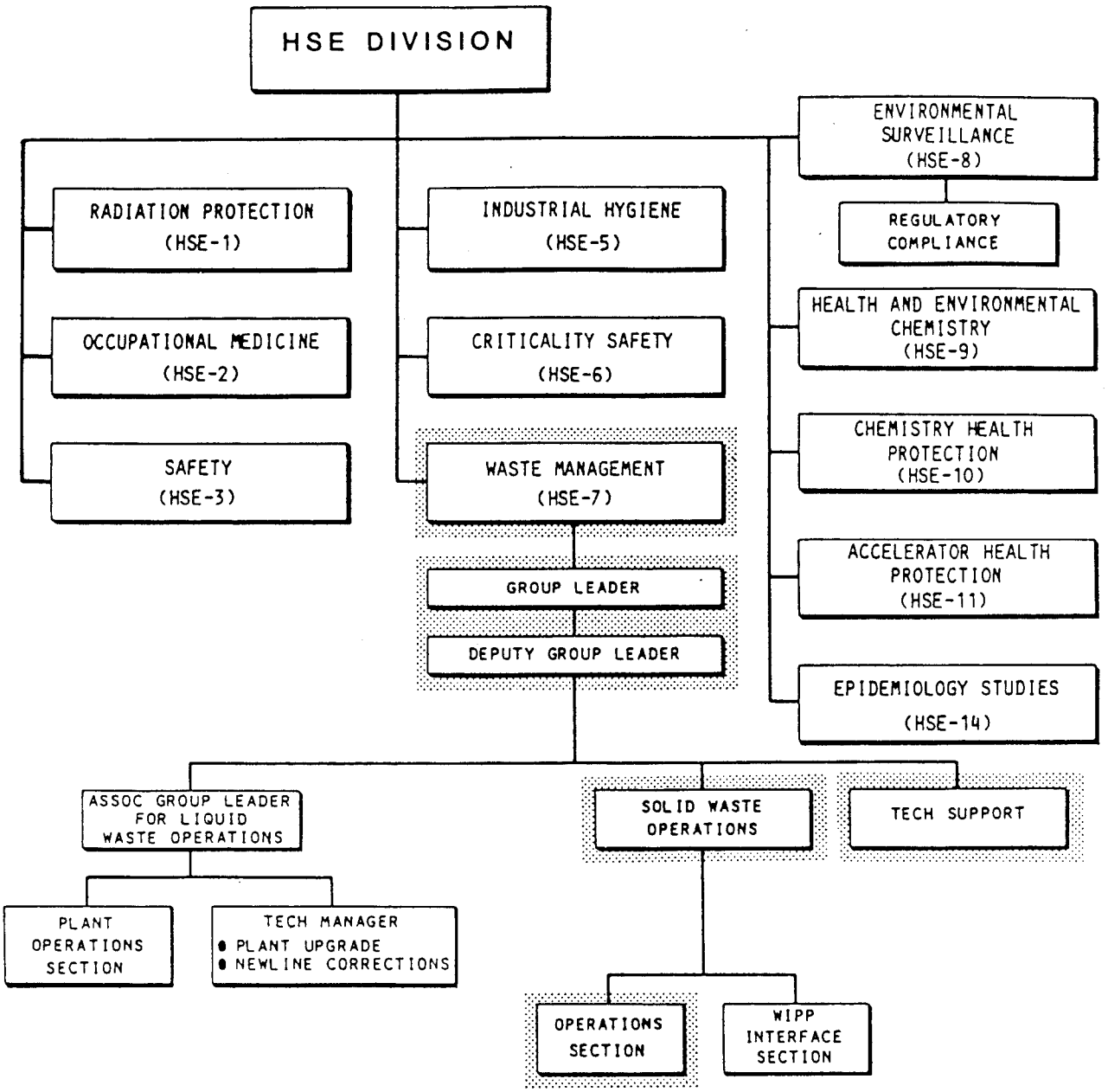
*Class taught internally only; others may be taught by any combination of internal/external classes.

I = Intensive L = Limited O = Overview

IC = Internal Classroom Instruction

EC = External Classroom Instruction (contractor taught)

OJT = On-the-Job Training



NOTE: SCREENED BOXES INDICATE PRIMARY RESPONSIBILITY FOR CHEMICAL WASTE MANAGEMENT

FIGURE 8-1

HEALTH, SAFETY AND ENVIRONMENT DIVISION MANAGEMENT CHART

PREPARED FOR

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LOS ALAMOS, NEW MEXICO

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9.0 CLOSURE AND POST-CLOSURE PLAN

9.1 GENERAL CLOSURE/POST-CLOSURE INFORMATION

Introduction

This section is submitted in accordance with the requirements of 40 CFR 264.110 through 120 (NMHWMR 206.D.2.a[1] through 206.D.2.j[2]), 264.178 (NMHWMR 206.D.4.i) and 270.14(b)(13) (NMHWMR 302.A.4.b[1]). This plan identifies all steps that will be necessary to close the facility at the end of its operating life or to partially close the facility at any point during its intended operating life.

Hazardous waste treatment, storage, and disposal facilities at the Los Alamos National Laboratory consist of container storage, chemical treatment, controlled air incineration, thermal treatment, and landfill disposal. The functions of the individual hazardous waste facilities are outlined in Table 9-1.

9.1.1 Closure Performance Standard

The closure plans have been designed to meet the following performance standards:

- Protect human health and the environment
- Prevent the escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or atmosphere
- Minimize future maintenance

9.1.2 Partial and Final Closure

The Laboratory's hazardous waste facilities are to be closed in the year 2100. All hazardous wastes will be recycled, treated, and/or disposed of prior to closure.

Partial closure of treatment facilities may occur to accommodate upgrading of facilities to handle new wastes or to use new technology. No such partial closures are now anticipated.

Closure of individual landfill shafts or pit cells located at TA-54, Area L is ongoing and performed as these pits are filled.

9.1.3 Closure and Post-Closure Cost Estimates

Federal facilities are exempt under 40 CFR 264.140(c) (NMHWMR 206.D.3.a[3]) from the requirements for closure and post-closure cost estimates and financial assurance. These data are therefore not included.

9.1.4 Groundwater Monitoring

Los Alamos National Laboratory has applied for a ground water monitoring waiver in accordance with the provisions of 40 CFR 264.90 (b)(4) (NMHWMR 206.D.1.a[2]). Groundwater monitoring is only applicable to the landfill operations at Area L. The waiver request is based on the determination that average annual precipitation is equaled or exceeded by runoff and evapotranspiration resulting in negative percolation rates. Past free liquids disposed of at this site are of inadequate volume to threaten the first aquifer 290 meters (950 feet) below Area L. Therefore, ground water monitoring at the disposal sites is only as described in Appendix N. Vadose zone monitoring at Area L is to be performed as described in Appendix O.

9.1.5 Personal Protection

Good industrial hygiene practices shall be followed during all phases of closure and post-closure to protect employees from exposure to hazardous waste constituents. Normal Los Alamos National Laboratory operating procedures require that the Laboratory's Industrial Hygiene Group (HSE-5) survey a site prior to personnel entry and specify protective clothing and respiratory protection equipment. Contaminated protective clothing and protection equipment shall be treated as hazardous and either decontaminated or disposed of in compliance with appropriate regulations.

9.1.6 Certification of Closure

When final closure of a facility has been performed, a certificate, attested to by a registered professional engineer and signed by the appropriate Department of Energy official in accordance with 40 CFR 264.115 (NMHWMR 206.D.2.f) shall be submitted to the Regional Administrator or the Director of the New Mexico Environmental Improvement Division, as appropriate stating that the facility has been closed in accordance with an approved closure plan.

9.1.7 Post-Closure Care Office

The following is the office to which contact may be made concerning the facility during the post-closure care period.

Area Manager
Los Alamos Area Office
U.S. Department of Energy
Los Alamos, New Mexico 87544
(505) 667-5105

A copy of the closure plan will be maintained at this office until the time of closure. The facility copy of the closure plan will be updated by the Area Manager or his designee. This office will also assure that other copies of the closure plan are updated as needed by maintaining a list of holders of the plan and by issuing plan modifications to all holders of the plan.

9.1.8 Security

Low-level radioactive wastes have been handled and buried at TA-54. TA-54 will therefore be under the permanent care of the Department of Energy (DOE) or other authorized federal agency. Fences and site security will be maintained in perpetuity to prohibit public access and to meet DOE requirements for radiation protection.

9.1.9 Notation of Deed

Notice to local land authority as per 40 CFR §264.119 (NMHWMR 206.D.2.i) and notation of deed as per §264.120 (NMHWMR 206.D.2.j[1]) shall be performed. Land plats for Los Alamos facilities will be provided to the local land authority indicating that the lands have been used for hazardous waste management activities. However, the past use of the site precludes any circumstances under which the deed for disposal areas will be transferred to the public domain. The land will remain federally owned in the care of the DOE or other authorized federal agency. The notice of hazardous waste management activities in the land record can be found in Appendix W.

9.1.10 Individual Closure and Post-Closure Plans

Details of the closure and post-closure plans for individual Los Alamos hazardous wastes facilities are included in the following sections.

9.2 CLOSURE PLAN FOR THERMAL TREATMENT FACILITIES

9.2.1 Technical Areas 14, 15, 36, and 39 Thermal Treatment Facilities

Waste high explosives (HE) detonation sites are located at Los Alamos in Technical Areas 14, 15, 36, and 39. These sites are used routinely to detonate scrap high explosives (HE), failed experimental detonations, unneeded classified explosives shapes, other HE and reactive wastes determined to be excess. These sites consist of firing pads often located within a small canyon. Associated facilities at these sites include bunkers which are occupied by technical personnel during detonations.

9.2.1.1 Estimate of Maximum Wastes in Treatment

The maximum inventory of hazardous wastes at each of the thermal treatment facilities located in Technical Areas 14, 15, 36, and 39 is ~1 cubic meter (35 cubic feet).

9.2.1.2 Closure Plan for Technical Areas 14, 15, 36, and 39 Thermal Treatment Facilities

Closure would require up to 30 days to collect, schedule, and thermally treat the last load of HE or reactive waste. Following the final

operation, the soil from the pads shall be sampled and analyzed to assure that there is no residual waste. The soil shall also be analyzed for EP toxicity. Should the soil from any of the pads be deemed toxic based on EP toxicity, the soil shall be removed, placed in containers, and disposed of at TA-54, Area L. Protective clothing shall be worn during soil removal and packaging. Soil sampling and analysis is expected to take 30 days. Disposal of contaminated soils is expected to take 60 days.

9.2.1.3 Post-Closure Care

Post-closure care plans are not required for thermal treatment facilities.

9.2.2 Technical Area 16 (TA-16) Thermal Treatment Facilities

The thermal treatment facilities located at TA-16 include three general types. One type consists of a sand pad which is surrounded on at least two sides by a berm or a natural hillside. Waste explosives or explosives-contaminated equipment are placed on these pads and remotely burned using an "electric match" firing device. There are three facilities of this type at TA-16. A second type of thermal treatment facility present at TA-16 consists of a sand-filled metal pan on which five smaller shallow pans lined with fire brick are located. Waste HE-contaminated fluids are poured into these pans and the HE is remotely ignited, with and "electric match". There is one facility of this type at the Laboratory. About 55 gallons of waste are burned approximately once a month. The third type of facility present at TA-16 is used to burn sludges containing waste HE. These facilities consist of steel cone-shaped vessels having a diameter of about five feet, buried with only the upper three to four feet of the vessel above ground. The steel vessels are filled with sand and gravel and an open fluids drain is located at the bottom of the cone. Sludge HE is gravity fed into the top of the cone, onto the sand and gravel bed. A heavy steel cap is then placed over the top of the cone and hot air is forced into the cone through air ducts. The hot air dries the waste sludge and liquids from the sludge migrate downward through the sand and gravel bed and through

the fluids drain. Effluent from these drains is regulated by NPDES permit (NM 0028355). When the remaining explosive material is relatively free of moisture, the steel cap is removed from the cone and the explosive is ignited remotely with an "electric match". There are two facilities of this type at Los Alamos; both of these are located in Technical Area 16. Explosives are burned at these two facilities at a rate of about one burn per week. Each burn consists of about 750 pounds of waste explosive sludge.

In some cases the burn pad sand or surface is contaminated by barium (D005), which is a constituent of HE, prior to flashing or burning. Since the burn pad sand contains EP Toxic barium (see Section 3.0), it is drummed, stored and disposed of as a hazardous waste.

9.2.2.1 Estimate of Maximum Waste in Treatment

The maximum inventory of wastes at the TA-16 Thermal Treatment Facilities is 1 cubic meter (35 cubic feet).

9.2.2.2 Closure Plan for Technical Area 16 (TA-16) Thermal Treatment Facilities

Hazardous wastes generated at TA-16 consist of solid high explosives (HE), water-HE slurry and HE-contaminated oil and solvents. The slurry is collected and pumped over sand beds to filter the HE out of the water. When filtration is complete, the sand bed is flashed (burned) to destroy the HE. Small quantities of solid HE are also burned on the sand beds.

Closure would require up to 30 days to collect, schedule, and thermally treat the last load of HE waste. Because the only hazardous waste treated at the sand pit is HE and flammable materials, the flashing operation decontaminates the equipment.

Following the final operation, the sand from the sand pit shall be sampled and analyzed to assure that there is no residual HE. Repeated

flashing shall be used to clear the sand of HE, if necessary. The sand shall also be analyzed for EP toxicity.

Should the sand be deemed toxic based on EP toxicity, the sand shall be removed, placed in containers, and disposed of at TA-54, Area L. The flash pit equipment shall be disassembled, decontaminated, and disposed of appropriately. Protective clothing shall be worn during sand removal and equipment disassembly.

Should the sand not be toxic, the sand and equipment shall be disposed of using landfill techniques used for nonhazardous wastes.

Sand sampling and analysis is estimated to take 30 days. Disassembly and disposal is estimated to take 60 days.

9.2.2.3 Post-Closure

Post-closure plans are not required for thermal treatment facilities.

9.3 CLOSURE PLAN FOR TA-50 STORAGE, BATCH TREATMENT, AND INCINERATION FACILITIES

9.3.1 Batch Treatment System and Container Storage Area

The Batch Treatment System is located in Building 1 at Technical Area 50 (Figure 4-1). The system consists of a totally enclosed, vented, 500-gallon pressure vessel equipped with a filtering system, condenser, and vacuum transfer lines. Total system washdown between batches allows for the treatment of incompatible wastes in the facility. Wastes treated in the Batch Treatment System include cyanide, chromate plating solutions, and solutions of acids, bases and heavy metals.

Three waste streams comprise the bulk of the waste treated in the Batch Treatment System, although the system is flexible enough to allow treatment of other wastes that may be generated through new Laboratory projects. These streams are in acid/base waste which contains copper, chromate plating waste, and waste cyanide plating solutions. Los Alamos

wishes to obtain a permit to treat hazardous wastes in the batch treatment system.

A chemical waste storage area is located in the same room housing the Batch Treatment System. Storage space consists of a bermed area encompassing 16 square feet. The area is designed to accommodate four 55-gallon waste drums. Wastes are stored in this area prior to treatment in the Batch Treatment System. Only compatible wastes are stored in this area at one time. Although waste residence time in this area is generally only thirty to sixty days, Los Alamos may store waste in this area in excess of 90 days to provide for operational flexibility.

A waste transfer and packaging area is also housed in the room in which the Batch Treatment System is located. This area consists of a small area which is covered with a ventilation hood. Small quantities of wastes are repackaged within this area, when necessary.

9.3.1.1 Estimate of Maximum Waste in Storage and Treatment

The maximum inventory of hazardous wastes at the TA-50 storage and batch treatment facilities is estimated at three cubic meters (106 cubic feet).

9.3.1.2 Closure Plan

Within the chemical treatment room in TA-50 is a curbed area for storage. The area is designed to accommodate drums of liquid waste requiring treatment prior to disposal. The treatment facility in TA-50 consists of versatile wet chemical processing equipment capable of neutralizing acids and bases, oxidizing cyanides, and precipitating heavy metals.

Closure would require 30 days to characterize the final shipment of wastes, then up to 60 days to schedule, process, and remove the treated waste from the final shipment.

To close, the equipment shall be internally flushed with water, detergent, and/or solvents as required by the nature of past chemicals handled. The equipment shall be externally washed with water, detergent, and/or solvents. The fluids from both operations shall be analyzed and disposed of as hazardous wastes if they are determined to be hazardous. The equipment may be disassembled, removed from the building, decontaminated further (as necessary), and will be disposed of as non-hazardous waste. Residues found in the equipment during disassembly shall be removed and disposed of as a hazardous waste. Personnel involved in disassembly and handling of equipment shall wear protective equipment to include as minimum protection: acid/solvent resistant coveralls, head protection, neoprene-coated gloves, and boots. Wrists and ankles are to be taped to protect against upward and inward splash. As a minimum protection, face shields shall be worn. Full face respirators shall be used if specified by the Laboratory's Industrial Hygiene Group following a field inspection. Spills occurring during equipment disassembly shall be picked up with absorbents and the area decontaminated to prevent tracking of wastes. The equipment shall be packaged to contain residues during transport to the disposal site.

No decontamination of container handling equipment is anticipated during closure because the wastes are inside containers and no contact is expected between wastes and handling equipment.

The area used for storage will be visually inspected for evidence of leaks such as floor discolorations, and the presence of residues. All such areas shall be considered contaminated and shall be decontaminated by removing the residue using methods appropriate to the waste such as absorbing, sweeping, scraping, washing, or steam cleaning. Residues and fluids created by decontamination activities shall be handled as a hazardous waste and disposed of in accordance with the regulations. Successful decontamination shall be verified by analysis of a swipe test sample. Contaminated floor areas that cannot be adequately cleaned shall be removed and disposed of as hazardous wastes. The entire floor

area shall be swept and/or washed, the residue from these activities analyzed for hazardous waste components, and disposed of appropriately.

The chemical process room shall be decontaminated in the same manner as the storage area.

Following removal of all equipment, the area outside of the storage and chemical process containment area shall be inspected for signs of contamination such as discolored areas. Samples shall be taken from the areas where leakage appears to have occurred and analyzed for waste constituents by methods described in "Test Methods of Evaluating Solid Wastes, Physical/Chemical Methods," EPA Publication SW-846 (including current revisions). The results from the analysis will be compared to upgradient and downgradient (based on topography) control samples. If hazardous wastes constituents are found in the samples in excess of those in the control sample, the area containing the constituents shall be excavated to a depth sufficient to ensure removal of the contaminated material or decontaminated using appropriate procedures. Removal shall be verified by obtaining samples that do not contain hazardous waste constituents in excess of levels found in the controls. Excavated areas shall be backfilled to grade. Decontamination, disassembly and disposal, or shipment of equipment is expected to take 90 days form the time wastes have been removed from the area.

9.3.1.3 Post-Closure

Post-closure plans are not required for container storage facilities or treatment facilities.

9.3.2 Chemical Waste Incinerator

The waste incinerator is located in Building 37 at Technical Area 50. The highly modified, controlled air incinerator is rated at a nominal 45 kilograms per hour waste feed throughout. The incinerator was developed as part of a continuing incinerator study and demonstration program being conducted by Los Alamos and is currently permitted to burn PCB-

contaminated liquid materials. Modifications to the incinerator include additions of liquid and solid waste feed preparation lines, a continuous ash removal system, a high-efficiency off-gas cleanup system, and backup utility systems. Standard combustion equipment has been modified to permit effective incineration of waste in solid, liquid, slurry, or gaseous form. Particular attention has been given to engineering for proper waste containment, resulting in a system that is safe for evaluating the incineration of hazardous chemicals and certain radioactive waste forms.

9.3.2.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes at the TA-50 waste incinerator is estimated at ten cubic meters (353 cubic feet).

9.3.2.2 Closure Plan

All remaining wastes will be incinerated before shutting down the incinerator. If for some reason it is not possible to incinerate all the waste on site, it will be sent to a designated treatment and disposal facility. Once all the waste inventory has been properly disposed of, the facility will be decontaminated as follows: First, the entire incineration system (incinerator, all relevant lines and pumps, and the air pollution control system) will be cleaned. The two incinerator chambers, including all attached refractory and residual solid residue, will then be sealed and sent to a designated treatment and disposal facility. Next, the remaining components of the system will be steamed for a minimum of 24 hours, after which they will be visually inspected, may be dismantled, and will be disposed of in an appropriate manner. All radioactive components will be decontaminated and disposed of according to appropriate regulations.

A detailed description of decontamination procedures upon closure is not possible at this time since the equipment may be contaminated with transuranic (TRU) and low-level radioactive wastes. Decommissioning will follow Laboratory guidelines and procedures for handling radio-

active contaminated equipment. Exact procedures are a function of the degree of contamination at the time of closure.

Upon the decision to close the facility, the equipment and building will be surveyed to determine the nature and levels of both radioactive and hazardous chemical contamination. Using the Laboratory guidelines and procedures, a decommissioning document will be prepared describing in detail the methods and procedures for decontamination, demolition, packaging, and disposal. All materials generated from decontamination and demolition will be treated as radioactive wastes and disposed of in accordance with DOE radioactive waste management guidelines.

Characterization of the final delivery of hazardous waste may require up to 30 days. An estimated 60 days will be required to schedule and process the final wastes received.

The survey to determine the nature and level of contamination and to prepare the decommissioning document is estimated to take one year. Decommissioning and final disposal are estimated to take up to two years.

9.3.2.3 Post-Closure

Post-closure plans are not required for incineration facilities.

9.4 CLOSURE AND POST-CLOSURE FOR TA-54, AREA L FACILITIES

9.4.1 Waste Transfer, Packaging and Storage Facilities

A single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1595 square feet are located in Area L of TA-54. These facilities are used for the accumulation, packaging and storage of waste containers generated from throughout the Laboratory.

Hazardous waste containers generated at the various Los Alamos laboratories are delivered to the Waste Transfer, Packaging and Storage Facilities on a routine basis. Wastes are segregated into compatible

types and placed upon the three fiberglass grates located in the metal building or within one of the six storage cells on the roofed concrete pad. Wastes packaged in small containers are placed into lab packs. Also, vermiculite is added to 55-gallon drums containing liquids in these facilities. Wastes suitable for recycling are consolidated into drums and any damaged or leaking drums are repackaged into larger drums in these facilities.

9.4.1.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes in storage at the TA-54, Area L waste transfer, packaging and storage facilities is 67 cubic meters (2360 cubic feet).

9.4.1.2 Closure Plan

The waste transfer, packaging and storage facilities at TA-54, Area L will be visually inspected for evidence of leaks such as floor discoloration and the presence of residues. The facilities will be considered contaminated and will be decontaminated by removing residues using appropriate methods such as sweeping, scraping, washing, or steam cleaning. Residues and fluids created by these decontamination activities will be handled as hazardous materials and disposed of in accordance with the regulations. Successful decontamination will be verified by analysis of wipe/swab test samples.

The metal building and the roofed concrete storage pad will be disassembled and disposed of in an appropriate manner. The floor areas will be cleaned by washing, scraping, or steam cleaning. Contaminated floor and sump areas that cannot be adequately cleaned will be removed and disposed of as hazardous waste. The residues from these cleaning activities will be analyzed for hazardous components and disposed of appropriately.

Closure is expected to require 30 days to characterize and package the last wastes held in the facilities. Up to 60 days may be required to

schedule and remove the last waste shipment. Decontamination, disassembly and disposal or shipment of equipment is expected to take 90 days from the time wastes have been removed from the facilities.

9.4.1.3 Post-Closure

Post-closure plans are not required for transfer, packaging and storage facilities.

9.4.2 Treatment Tanks

Four 1665-gallon ten-gauge steel tanks are located in Area L of TA-54. The tanks are lined with plastic. These tanks are used to neutralize, oxidize and evaporate wastes. The tanks are located on a bermed concrete pad as shown in Figure 2-7. The waste most commonly oxidized in these tanks is lithium hydride. Ammonium bifluoride (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks. Los Alamos wishes to obtain a permit to treat hazardous wastes in these tanks.

9.4.2.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes at the TA-54, Area L treatment tanks is 25 cubic meters (890 cubic feet).

9.4.2.2 Closure Plan

The treatment tanks and the bermed concrete pad will be inspected for evidence of leaks or spills such as discoloration and the presence of residues. The equipment will be externally washed with water, detergent and/or solvents. The fluids from both operations will be analyzed for hazardous waste components and then disposed of as hazardous waste as appropriate. The equipment may be disassembled and removed from the site, and will be disposed of in an appropriate manner. Residues found on the equipment or the site will be removed and disposed of as hazardous waste.

Personnel involved in disassembly and handling of equipment will wear protective equipment to include the following items as minimum protec-

tion: acid/solvent-resistant coveralls, head protection, neoprene-coated gloves, and boots. Wrists and ankles will be taped to protect against upward and inward splash. As a minimum protection, face shields will be worn. Full-face respirators will be used if specified by the Laboratory's Industrial Hygiene Group.

Spills occurring during equipment disassembly will be contained with absorbents, and the area will be decontaminated to prevent tracking of wastes. The equipment will be packaged in order to contain any residues that may be present during transport to the disposal site.

No decontamination of the container handling equipment is anticipated during closure since the wastes are to be removed from the tanks prior to closure and no contact is expected between the wastes and the handling equipment.

Closure is expected to require 30 days to characterize, collect and package any waste residues. Decontamination, disassembly and disposal or shipment of equipment is expected to take 90 days from the time wastes have been removed from the treatment tanks.

9.4.2.3 Post-Closure

Post-closure plans are not required for treatment tanks.

9.4.3 Land Disposal Shafts

Four land disposal shafts are currently open at TA-54, Area L and Los Alamos plans to excavate additional shafts as needed.

9.4.3.1 Closure

Disposal shafts are closed as they are filled. Shafts open at the initiation of closure shall be closed using the standard shaft closure procedure. Only wastes in solid or solidified form are accepted for shaft burial. Shafts shall be filled with wastes to a level no higher than three feet below the "spill point" (lowest point of shaft rim).

Wastes are to be covered with a minimum of 0.5-foot layer of compacted crushed tuff. Partially filled shafts shall be backfilled with compacted tuff to three feet of the spill point. The final cover of a shaft shall be noncontaminated cement, a minimum of three feet thick, slightly rounded, and extending about 0.5 feet above the land surface. Identifying engineering markers shall be placed in the final pour of seal cement in the shafts. The marker is a brass cap. Information on the cap shall include the wording "Buried Hazardous Wastes" along with the shaft number, category of wastes stored, and dates of use.

No decontamination of equipment is anticipated during closure because hazardous wastes are containerized and no contact is expected between the wastes and equipment.

The area shall be graded and bermed to control run-on and run-off of surface water and minimize erosion. Disturbed areas shall be planted with turf-forming grasses and bunch grasses to prevent wind and sheet wash erosion.

9.4.3.2 Post-Closure

Post-closure activities would include the following items:

1. Within 90 days after closure is complete, the EPA, NMEID, DOE, and the County of Los Alamos shall be furnished a survey plat indicating the location and dimensions of the closed pits and shafts. The plat shall be prepared and certified by a professional land surveyor. The plat filed with Los Alamos County shall include a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the site in accordance with 40 CFR 264.117(c) (NMHWMR 206.D.2.g[3]). In addition, the EPA, NMEID, DOE, and County of Los Alamos shall be provided the records of type, location, and quantities of wastes stored. Information for wastes stored prior to the promulgation of hazardous waste regulations shall be estimated based on available records.

2. The property deed shall be noted or documented to comply with the requirements of 40 CFR 264.120 (NMHWMR 206.D.2.j).

3. The site shall be inspected semiannually or more frequently as determined necessary checking

(a) the cover system for integrity, settlement, and erosion,

(b) the site drainage system for any blockages or evidence of poor function,

(c) the integrity of the fence, gate and lock, and

(d) the condition of surveyed benchmarks.

4. Repairs shall be made to any of the items mentioned in activity No. 3 should the inspection reveal conditions requiring further attention for the proper function of the closure system.

5. Environmental sampling and monitoring programs at Area L will be consistent with key contaminants relative to environmental surveillance of the Laboratory waste management activities (see Appendices N and O for details of present and proposed monitoring).

6. Post-closure care activities shall be performed for 30 years as required by 40 CFR 264.117(a)(1) (NMHWMR 206.D.2.g[1][a]).

7. Records shall be kept of inspections, repairs, sampling, and analytical results for the duration of post-closure care activities.

The design of the closure and post-closure plans is based in large part on data developed for Los Alamos National Laboratory's Ground Water Monitoring Waiver Request. The conclusions of these data are that the site has a low infiltration rate, under worst case conditions and that past storage of free liquids are of insufficient volume to have a potential impact on the main aquifer 950 feet below the site.

TABLE 9-1. SUMMARY OF HAZARDOUS WASTE FACILITIES AT LOS ALAMOS NATIONAL LABORATORY

Facility	Treatment	Storage	Disposal
TA-14	Thermal	none	none
TA-15	Thermal	none	none
TA-16	Thermal	none	none
TA-36	Thermal	none	none
TA-39	Thermal	none	none
TA-50	Batch Chemical Incineration	container	none
TA-54	Solidification Neutralization Oxidation Evaporation	container	landfill

10.0 OTHER FEDERAL LAWS

The Los Alamos National Laboratory, Los Alamos, New Mexico (LANL) has reviewed and is in compliance with the following federal laws:

1. The Fish and Wildlife Coordination Act of 1934 (PL 121 and amendments). An act to promote the conservation of wildlife, fish and game, and for other purposes.

   (PL 85-624) An act to amend the Act of March 10, 1934, to provide for more effective integration of a fish and wildlife conservation program with Federal water-resource developments, and for other purposes.

   (PL 89-72) An act to provide uniform policies with respect to recreation and fish and wildlife benefits and costs of Federal multiple-purpose water resource projects, and for other purposes.

2. The National Historic Preservation Act of 1966 (PL 89-665 and subsequent amendments). An act to establish a program for the preservation of additional historic properties throughout the Nation, and for other purposes.

3. The Wild and Scenic Rivers Act of 1968 (Public Law 90-542 and subsequent amendments). An act to provide for a National Wild and Scenic Rivers System, and for other purposes.

4. The Coastal Zone Management Act of 1972 (PL 92-583 and subsequent amendments). An act to establish national policy and develop a national program for the management, beneficial use, protection, and development of the land and water resources of the Nation's coastal zones, and for other purposes.

5. The Endangered Species Act of 1973 (PL 93-205 and subsequent amendments). An act to provide for the conservation of endangered and threatened species of fish, wildlife, and plants, and for other purposes.

Further information will be provided at the request of the EPA Region VI or the New Mexico Environmental Improvement Division.

Los Alamos is also in full compliance with the Federal Water Pollution Control Act of 1977 and the Clean Air Act and its subsequent amendments. Los Alamos has on-going programs in support of the National Historic Preservation Act and the Endangered Species Act.

11.0 CERTIFICATION

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

_____ _____

Christopher S. Adams, Jr.
Associate Director
Los Alamos National Laboratory
Operator

Date Signed

_____ _____

Harold E. Valencia
Area Manager, Los Alamos Area Office
U.S. Department of Energy
Albuquerque Operations
Owner

Date Signed

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Project No. 846510
May, 1985

COPY

IT CORPORATION

Volume IA- Text, Tables & Figures

RCRA PART B PERMIT APPLICATION

Addressing Mixed Chemical and Radioactive Wastes

Los Alamos National Laboratory
Los Alamos, New Mexico

Prepared for:
Los Alamos National Laboratory
Waste Management Group HSE-7
Los Alamos, New Mexico 87545

Volume IA- Text, Tables & Figures

RCRA PART B PERMIT APPLICATION

Addressing Mixed Chemical and Radioactive Wastes

Any use of product trade names in this permit application is not to be construed as an endorsement of the product, either by the IT Corporation or Los Alamos National Laboratory.

OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Volume IA, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Harold E. Valencia
Area Manager, Los Alamos Area Office
U.S. Department of Energy
Albuquerque Operations

Date Signed

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I certify under penalty of law that I have personally examined and am familiar with the information submitted in this Volume IA, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitted false information, including the possibility of fine and imprisonment.

Christopher S. Adams, Jr.
Associate Director
Los Alamos National Laboratory

Date Signed

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D	EPA Request for Los Alamos Part B Addressing Radioactive/ Chemical Mixed Waste
E	Department of the Army, Corps of Engineers, Floodplain Documentation
F	Physical Characteristics of the Bandelier Tuff
G	Representative Waste Inventory and Analyses
H	Sample Waste Disposal Records
J	Incinerator Trial Burn Plan
K	Los Alamos Procedure for Operating Drum Pumps
L	Los Alamos Procedure for Identification and Segregation of Hazardous Waste
M	Bulging Drum Procedure
N	Groundwater Monitoring Waiver Request
O	Vadose Zone Monitoring Program
P	Portions of the Los Alamos Health and Safety Manual Pertaining to Waste Management Activities
Q	Manual of Fire Protection Policies and Procedures
R	Operational Safety Requirements for the Controlled-Air Incineration Process
S	Controlled-Air Incinerator Process Operating Manual
T	RCRA Contingency Plan Documentation
U	Job Descriptions
V	Personnel Training Information
W	Notice of Hazardous Waste Management Activities

1.0 INTRODUCTION AND PART A APPLICATION

1.1 INTRODUCTION

This application was prepared for submittal to the Environmental Protection Agency (EPA) and the New Mexico Environmental Improvement Division (NMEID) in order to meet the requirements of the Resource Conservation and Recovery Act (RCRA) for a Part B Permit Application. The EPA authorization for Los Alamos to operate under interim status is included as Appendix A. The EPA formally requested the Part B permit application addressing radioactive/chemical mixed waste (Appendix D) in an August 7, 1984 letter to the Los Alamos Laboratory Director

The format of the Part B application follows an outline provided in "A Guide for Preparing RCRA Permit Applications for Existing Storage Facilities", U.S. EPA, 1982. An outline of the permit application with citations of the regulations covered by each section is shown in Table 1-1. A cross reference of the EPA completeness checklist to sections of the Part B permit application is included as Table 1-2.

Los Alamos National Laboratory (Los Alamos) is a multidisciplinary laboratory (RCRA No. NM0890010515). The principal mission of the Laboratory is the design and development of weapons for the nation's nuclear arsenal; however, considerable research and development (R&D) is directed toward the development of the peaceful uses of nuclear energy including research on controlled thermonuclear reactions, fission reactors, nuclear safeguards, laser fusion, and medium energy physics. Extensive basic research programs in physics, chemistry, metallurgy, mathematics and computers, earth sciences, and electronics support these efforts. Biomedical and environmental research includes programs in molecular biology, radiobiology, cancer therapy, radiology, and industrial hygiene. Expansion into nonnuclear areas is represented by applied technology development of solar and geothermal energy and superconducting power transmission lines.

Los Alamos is managed by the University of California for the U.S. Department of Energy (DOE) with substantial work performed for the Department of Defense and the Nuclear Regulatory Commission. The University is responsible to DOE's Los Alamos Area Office (LAAO) which reports to the DOE Albuquerque Operations Office (ALO). Although not a primary function, some hazardous waste management and storage occurs at Los Alamos. Los Alamos falls under Standard Industrial Classification (SIC) Code Number 9711, national defense organizations.

Much of this application was prepared from existing documentation at the Laboratory. In addition, new information was developed for this permit application.

1.2 REVISED PART A APPLICATION

The complete mixed waste RCRA Part A Application Revision is included in the following pages.

TABLE 1-1. FORMAT OUTLINE AND REGULATION REFERENCES

REPORT SECTION	RCRA REGULATION REFERENCE[1]	NMHWMR REFERENCE
1.0 INTRODUCTION AND PART A APPLICATION		
1.1 INTRODUCTION		
1.2 REVISED PART A APPLICATION	270.13	302.A.4.a
2.0 FACILITY DESCRIPTION		
2.1 GENERAL DESCRIPTION	270.14(b)(1)	302.A.4.b(1)
2.2 LOCATION INFORMATION	270.14(b)(11), 270.14(c)(1-5), 264.18(a), (b)	302.A.4.b(1), 206.B.8.a & b
2.3 TRAFFIC PATTERNS	270.14(b)(10)	302.A.4.b(1)
3.0 WASTE CHARACTERISTICS AND ANALYSIS PLAN		
3.1 CHEMICAL AND PHYSICAL ANALYSIS	270.14(b)(2), 264.13, 264.73(b)(3)	302.A.4.b(1), 206.B.3, 203.C.2.c
3.2 WASTE ANALYSIS PLAN	270.14(b)(3), 264.13, 261 App. I	302.A.4.b(1), 206.B.3
3.3 WASTE SEGREGATION	264.13	206.B.3
4.0 WASTE MANAGEMENT PRACTICES AND FACILITIES		
4.1 TA-50 CHEMICAL WASTE INCINERATOR	270.19, 264.340-345	302.A.4.b(2)(a), 206.D.8.a-f
4.2 TA-54, AREA L WASTE TRANSFER, PACKAGING AND STORAGE FACILITIES	270.15, 264.171-173, 264.175	302.A.4.b(2)(a), 206.D.4.b-d, 206.D.4.f
4.3 TA-54, AREA L TREATMENT TANKS	270.15, 264.191 & 192	302.A.4.b(2)(a), 206.D.5.b & c
4.4 TA-54, AREA L LAND DISPOSAL SHAFTS	270.21, 264.301, 264.309, 264.315-316	302.A.4.b(2)(g), 206.D.10.b, 206.D.10.e, 206.D.10.j & k
5.0 GROUNDWATER MONITORING	264.90(b)(4)	206.D.1.a(2)
6.0 PROCEDURES TO PREVENT HAZARDS		
6.1 SECURITY	270.14(b)(9), 264.14	302.A.4.b(1), 206.B.4
6.2 WARNING SIGNS	264.14(c)	206.B.4.b(3)
6.3 INSPECTION SCHEDULES AND REQUIREMENTS	270.14(b)(5), 264.15, 264.33, 264.174, 264.194, 264.303, 264.347	302.A.4.b(1), 206.B.5, 206.B.9.d, 206.D.4.e, 206.D.5.d, 206.D.10.d, 206.D.8.g
6.4 PREPAREDNESS AND PREVENTION REQUIREMENTS	264.34-35	206.B.9.e-g
6.5 PREVENTATIVE PROCEDURES, STRUCTURES AND EQUIPMENT	270.14(b)(8)	302.A.4.b(1)
6.6 PREVENTION OF ACCIDENTAL IGNITION OR REACTION OF IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE	270.14(b)(9), 270.15(d), 264.17, 264.176, 264.198, 264.312	302.A.4.b(1), 302.A.4.b(2)(a), 206. 206.D.4.g, 206.D.5.f, 206.D.10.g
7.0 HAZARDOUS WASTE FACILITIES CONTINGENCY PLAN		
7.1 INTRODUCTION		
7.2 HAZARDOUS WASTE EMERGENCY RESPONSE RESOURCES	264.37, 264.52(c), 264.52(e)	206.B.9.h, 206.B.10.h, 206.B.10.f
7.3 HAZARDOUS RELEASES		
7.4 SPILLS RELEASES	264.51, 264.52(a)	206.B.10.b-d
7.5 SPECIFIC EMERGENCY RESPONSE PROCEDURES FOR HAZARDOUS WASTE FACILITIES	270.14(b)(7), 264.56	302.A.4.b(1), 206.B.10.m
7.6 EVACUATION	264.52(f)	206.B.10.i
7.7 SPILLS AND CLEANUP	270.14(b)(7), 264.56	302.A.4.b(1), 206.B.10.m
7.8 POST-EMERGENCY ASSESSMENT		
7.9 EMERGENCY RECORDS		
7.10 EMERGENCY REPORTS	270.14(b)(7), 264.56	302.A.4.b(1), 206.B.10.m
7.11 CONTINGENCY PLAN AMENDMENT	264.54	206.B.10.k
8.0 PERSONNEL TRAINING		
8.1 OUTLINE OF TRAINING PROGRAM	264.16(d)(2)	206.B.6.d
8.2 TRAINING CONTENT, FREQUENCY, AND TECHNIQUE	270.14(b)(12), 264.16	302.A.4.b(1), 206.B.6
8.3 EMERGENCY RESPONSE TRAINING	264.16(a)(3)	206.B.6.a
8.4 IMPLEMENTATION OF TRAINING PROGRAM	264.16(b), (c), & (e)	206.B.6.b, c & e
9.0 CLOSURE AND POST-CLOSURE PLAN	270.14(b)(13), 264.112	302.A.4.b(1), 206.D.2.c
9.1 GENERAL CLOSURE/POST-CLOSURE INFORMATION		
9.2 CLOSURE PLAN FOR TA-50 INCINERATOR		
9.3 CLOSURE AND POST-CLOSURE FOR TA-54, AREA L FACILITIES	270.14(b)(13), 270.21(e), 264.112, 264.310(a) & (b), 264.117 & 118, 264.197	302.A.4.b(1), 206.D.2.c & g, 206.D.7.h, 302.A.4.b(2)(a), 206.D.10.f(1), 206.D.5.e
10.0 OTHER FEDERAL LAWS	270.3, 270.14(b)(20)	302.A.4.b(1)
11.0 CERTIFICATION	270.11	302.B

[1] From Code of Federal Regulations 40.

TABLE 1-2.

COMPLETENESS CHECKLIST CROSS REFERENCES

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14		302.A.4.b	Part B General Information Requirements	
270.14(b)(1)		302.A.4.b(1)	• General description of the facility	2.1
270.14(b)(2)	264.13(a)	302.A.4.b(1), 206.B.3.a	• Chemical and physical analysis of hazardous wastes to be handled	3.1
270.14(b)(3)		302.A.4.b(1)	• Waste analysis plan	3.2
	264.13(b) (1)-(5)	206.B.3.b	- Analysis parameters with rationale	3.2
			- Test methods for analyzing parameters	3.2
			- Procedure for collecting representative samples	3.2
			- Frequency of analyses	3.2
			- List and description of waste analyses to be generator supplied	N/A
	264.13(b)(6) & 264.17(c)	206.B.3.b, 206.B.7	- Waste analysis procedures for ignitable, reactive, incompatible wastes	3.3
	264.13(c)	206.B.3.c	. Procedures to determine identity of each waste movement	N/A
			. Procedures for collecting representative samples	N/A
270.14(b)(4)		302.A.4.b(1)	• Security description for active portion of facility	6.1
	264.14(a)	206.B.4.a	- Security procedures waiver justification	N/A
			. Unknowing/unauthorized contact with waste not harmful	N/A
			. Unknowing/unauthorized disturbance of waste or equipment cannot cause violation of Part 264	N/A
270.14(b)(4)	264.14(b)	302.A.4.b(1), 206.B.4.b(1)-(2)	- Description of 24-hour surveillance system	6.1
			- Description of artificial or natural barriers	6.1
			- Description of controlled entry/egress procedures	6.1
	264.14(c)	206.B.4.b(3)	- Description of warning signs	6.2
			. List of languages on signs	6.2
			. Statement of 25-foot legibility	6.2
			. Description of sign locations and numbers of signs	6.2
270.14(b)(5)		302.A.4.b(1)	• General Inspection Schedule and Procedures Description	6.3
	264.15(b)(1)	206.B.5.b&c	- Written schedule	6.3
	264.15(b)(2) & 265.15(d)	206.B.5.b&c, 206.B.5.e	- Statement as to where, at facility, inspection schedule and inspection records will be kept	6.3
	264.15(b)(1)	206.B.5.b&c	- Identification of equipment/processes to be inspected	6.3
	264.15(b)(3)	206.B.5.b&c	- Identification of types of problems each equipment/process to be checked for	6.3
	264.15(b)(4)	206.B.5.b&c	- Frequency of inspections by equipment/process	6.3
	264.15(c)	206.B.5.d	- Schedule of remedial action	6.3

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(5) & 270.17(d)	264.15(a) & 264.226	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(c), 206.D.6.d	• Specific Inspection Requirements for Surface Impoundments	N/A
			- Description of procedures for	N/A
			. Inspection of liners/covers during and immediately after installation	N/A
270.14(b)(5) & 270.17(d)	264.15(a) & 264.226	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(c), 206.D.6.d	. Inspections weekly and after storms for	N/A
			- Operation of overtopping controls	N/A
			- Sudden drop in impoundment liquid level	N/A
			- Presence of liquid in leak detection system	N/A
			- Integrity of dikes/containment devices	N/A
			- Statement from qualified engineer that structural integrity of dikes will be certified upon construction completion	N/A
			- Qualified engineer's certification of dike integrity for	N/A
			. Stress	N/A
			. Piping/scouring	N/A
270.14(b)(5) & 270.18(e)	264.15(a) & 264.254	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(d), 206.D.7.e	• Specific Inspection Requirements for Waste Piles	N/A
			- Description of procedures for	N/A
			. Inspection of liners/covers during and immediately after installation	N/A
			. Inspections weekly and after storms for	
			- Operation of run-on/run-off controls	N/A
			- Liquids in leak detection system	N/A
			- Proper functioning of wind dispersal controls	N/A
			- Leachate in and proper operation of leachate collection/removal system	N/A
270.14(b)(5), 270.20(c)(5)	264.15(a) & 264.273(g)	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(f), 206.D.9.d(7)	• Specific Inspection Requirements for Land Treatment Units	N/A
			- Description of procedures for units inspected weekly and after storms for	N/A
			. Operation of run-on/run-off controls	N/A
			. Function of wind dispersal controls	N/A
270.14(b)(5) & 270.21(d)	264.15(a) & 264.303	302.A.4.b(1), 206.B.5.a, 302.A.4.b(2)(g), 206.D.10.d	• Specific Inspection Requirements for Landfills	6.3.2
			- Description of procedures for	
			. Inspection of liners/covers during and immediately after installation	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			. Inspections weekly and after storms for	
			- Operation of run-on and run-off controls	6.3.2
			- Liquids in leak detection system	N/A
			- Proper functioning of wind dispersal controls	6.3.2
			- Leachate in and proper operation of leachate collection/removal system	N/A
270.14(b)(6)	Part 264 Subpart C	302.A.4.b(1), 206.B.9	• Preparedness and Prevention Documentation	6.4
			- Waiver(s) request and justification	N/A
	264.32(a)	206.B.9.c(1)	- Description of internal communications/alarm system(s)	6.4.1
	264.34(a)	206.B.9.e	- Documentation of personnel access to internal communication/alarm system(s)	6.4.1
	264.32(b)	206.B.9.c(2)	- Description of external communications/alarm system(s)	6.4.1
	264.34(b)	206.B.9.f	- Documentation of personnel access to external communicatons/alarm system(s)	6.4.1
270.14(b)(6)	264.32(c)	302.A.4.b(1), 206.B.9.c(3)	- Description of fire control/extinguishing, spill control, and decontamination equipment	6.4.1
	264.32(d)	206.B.9.c(4)	- Documentation of adequate water volume and pressure for above equipment	6.4.1
	264.33	206.B.9.d	- Documentation of equipment testing/maintenance schedule and procedures	6.3
	264.35	206.B.9.g	- Documentation of adequate aisle space	6.4.2
	264.37 & 264.52(c)	206.B.9.h, 206.B.10.f	- Documentation and descriptions of arrangements or attempts at arrangements with:	
			. Police department(s)	7.2
			. Fire department(s)	7.2
			. Hospitals	7.2
			. Local emergency response teams	7.2
			. State emergency response teams	7.2
			. Emergency response contractors	7.2
			. Equipment suppliers	7.2
	264.37(a)(2)	206.B.9.h(1)-(4)	- Documentation of agreements designating primary emergency authority	App. T
270.14(b)(7)	Part 264 Subpart D	302.A.4.b(1), 206.B.10	• Contingency Plan Documentation	App. T
	264.51 & 264.52(a)	206.B.10(b)-(d)	- Criteria for implementation of contingency plan	7.4
	264.52(d)	206.B.10(g)	- Emergency Coordinators Identification	Table 7-6
			. Names	Table 7-6
			. Addresses	Table 7-6
			. Home/work phones	Table 7-6
270.14(b)(7)	264.55	302.A.4.b(1), 206.B.10(1)	. Documentation of qualifications	7.4
			. Documentation of authority	7.4
			. Description of notification procedure	7.4

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.52(e)	206.B.10.h	- Emergency equipment list	Table 7-4
			• Documentation of equipment location	7.2
			• Physical description of equipment	Table 7-4
			• Statement of equipment capabilities	Table 7-4
	264.52(f)	206.B.10.i	- Evacuation Plan	7.6 Table 7-7
			• Criteria for implementation	7.6
			• Description of signal(s) to implement	7.6
			• Description of primary and alternate routes	7.6
	264.53	206.B.10.j	- Contingency Plan Copy Location	7.2
			• Description of location of facility's copy of plan	7.2
			• Number of duplicate copies distributed and their location	7.2
	264.54	206.B.10.k	- Contingency Plan Amendment	7.11
			• Identification of person responsible and authorized to change/amend plan	7.11
			• Description of procedure to change/amend facility copy of plan	7.11
			• Description of procedure to insure update of all copies of plan	7.11
270.14(b)(7)	264.56	302.A.4.b(1), 206.B.10.m	- Detailed Emergency Procedures	7.5
			• Procedure for facility personnel notification	7.4
			• Procedure for state/local agency notification	7.10
			• Procedure for identification of character, source, amount, and areal extent of released materials	7.4
			• Procedure for assessment of environment/human health hazards	7.4
			• Identification of on-scene coordinator for geographic area	7.4
			• Description of specific responses and control procedures for	7.5
			- Fire	7.5
			- Explosion	7.5
			- Spill	7.5
			• Description of process shutdown and monitoring procedures	7.6
			• Description of cleanup procedures and associated material treating, storing, disposal procedures	7.7
			• Description of emergency equipment cleaning and refitting procedures	7.7
			• Description of procedures to insure incompatible waste segregation during cleanup	7.7
270.14(b)(7) & 270.17(f)	264.227	302.A.4.b(1), 206.D.6.e, 302.A.4.b(2)(c)	• Specific Contingency Plan Requirements for Surface Impoundments	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Procedure for stopping waste addition to impoundment	N/A
	264.227	206.D.6.e	- Procedure for containing leakage	N/A
			- Procedure to prevent catastrophic failure	N/A
			- Procedure for emptying impoundment	N/A
			- Procedure for recertifying and reactivating impoundment	N/A
			- Procedure for closing impoundment	N/A
[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(l) The applicant should be prepared to respond to inquiries by the permit application reviewers regarding these requirements].				
270.14(b)(8)		302.A.4.b(1)	• Preventive Procedures, Structures, and Equipment Documentation, including description of equipment/procedures to	
			- Prevent hazards during unloading operations	6.5
			- Prevent run-off and flooding	6.5
			- Prevent water supply contamination	6.5
			- Mitigate equipment failure and power outages	6.5
			- Prevent undue personnel exposure to wastes	6.5
270.14(b)(9)	264.17	302.A.4.b(1), 206.B.7	• Prevention of Accidental Ignition or Reaction Documentation	6.6
			- Description of separation and protection of ignitable, reactive, incompatible wastes	3.3, 6.6
			- Description of ignitable, reactive, incompatible wastes handling procedure	6.6
270.14(b)(9)	264.17	302.A.4.b(1), 206.B.7	- Description of number, location, and type of warning/prohibition signs	6.2
			- Documentation that procedures are adequate to prevent accidental ignitions or reactions	6.6
270.14(b)(9) 270.17(h), & 270.17(i)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(c)	• Specific Ignitable/Reactive Waste Requirements for Surface Impoundments	N/A
	264.229	206.D.6.g	- Procedures that render waste nonreactive or nonignitable	N/A
			- Procedures for preventing reactions	N/A
			- Procedures for protecting wastes	N/A
			- "Emergency use only" documentation	N/A
	264.230	206.D.6.h	- Incompatible waste segregation or protective procedures	N/A
270.14(b)(9) 270.18(g), & 270.18(h)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(d)	• Specific Ignitable/Reactive Waste Requirements for Waste Piles	N/A
	264.256	206.D.7.f	- Procedures that render waste nonreactive or nonignitable	N/A
			- Procedures for preventing reactions	N/A
			- Procedures for protecting wastes	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.257	206.D.7.g	- Incompatible waste segregation or protection procedures	N/A
270.14(b)(9) 270.20(g), & 270.20(h)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(f)	• Specific Ignitable/Reactive Waste Requirements for Land Treatment Facilities	N/A
	264.281	206.D.9.i	- Documentation that application to soil renders waste nonreactive/nonignitable and prevents reactions	N/A
			- Procedures for protecting wastes	N/A
	264.282	206.D.9.j	- Procedures which insure that incompatible wastes are not applied to same treatment zone	N/A
270.14(b)(9) 270.21(f), & 270.21(g)	264.17(b)	302.A.4.b(1), 206.B.7, 302.A.4.b(2)(g)	• Specific Ignitable/Reactive Waste Requirements for Landfills	
	264.312	206.D.10.g	- Procedures that render wastes nonreactive and nonignitable	4.4
			- Procedures for preventing reactions	4.4
			- Procedures for protecting wastes	4.4
	264.313	206.D.10.h	- Procedures for insuring that incompatible wastes will not be disposed of in same landfill cell	6.6.2
	264.316 (c)-(e)	206.D.10.k (3)-(5)	- Procedures for identifying contents and insuring proper landfilling of incoming labpacks	3.2, 4.4
270.14(b)(10)		302.A.4.b(1)	• Traffic Documentation*	2.3
			- Identification of:	
			. Waste movement routes	2.3
			. Number of movements by type vehicle	2.3
			. Quantity of waste moved per movement per vehicle	2.3
			. Traffic control sign personnel	2.3
			. Route surface composition and load bearing capacity	2.3
270.14(b)(11)		302.A.4.b(1)	• Facility Location Documentation	2.1
270.14(b)(11) (i) and (ii)		302.A.4.b(1)	- Political jurisdiction identified (new facilities only)	2.1
			- Comparison to Appendix VI of Part 264	2.2.1
			- Demonstration that faults with displacement in Holocene time are more than 3000 feet from facility	2.2.1
	264.18(a)	206.B.8.a	- Demonstration that no faults pass within 200 feet of sites where T/S/D to be conducted	2.2.1
270.14(b)(11) (iii)-(iv)	264.18(b)	302.A.4.b(1), 206.B.8.b	- Documentation of facility location relative to 100-year floodplain level or wave action flooding	2.2.2
			- Documentation that facility can withstand the 100-year flood without washout of hazardous waste by:	N/A
			- Analysis of hydrodynamic/hydrostatic forces resulting at site from 100-year flood, and	N/A

*There are no standards in Part 264 for traffic movement. The information that must be submitted with the Part B permit application, as required by §270.14(b)(10), will be used by the Agency to evaluate safety at the facility.

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Presentation of operating units and flood protection devices design and how they will prevent washout, or	N/A
			- Plan for removal of waste before washout including,	N/A
			. Timing of removal relative to flood levels	N/A
			. Estimated time to remove all waste	N/A
			. Location to which waste will be moved and proof of compliance with Parts 122 and 264 through 267 of this Chapter	N/A
			. Detailed description of personnel, equipment, and procedures for waste removal sufficient to insure availability in time for use	N/A
			. Analysis of potential for discharge during waste movement	N/A
270.14(b)(11)(v)		302.A.4.b(1)	. A plan documenting how and on what time schedule the facility will comply with §264.18(b) if not in compliance (existing facilities only)	N/A
270.14(b)(12)	264.16	302.A.4.b(1), 206.B.6	• Personnel Training Program Documentation	8.0
			- Outline of introductory and continuing personnel training programs*	8.2
			- Identification and qualifications of program instructor	8.2.4
			- Brief description of how training program meets actual job tasks*	8.2.5
			- Description of procedures to insure all appropriate personnel receive appropriate training and receive annual training review	8.4
			- Description of records to be kept, their location, and procedures to insure they are retained for proper length of time	8.2
270.14(b)(13)	264.112	302.A.4.b(1), 206.D.2.c	• Closure Plan Documentation	9.0
			- Description of partial and final closure procedures	9.2, 9.3
			- Description of maximum unclosed portion during facility life	9.1.3
			- Estimate of maximum waste inventory in storage/treatment during facility life	9.2.1.1, 9.3.1.1, 9.3.2.1
	264.114	206.D.2.e	- Equipment decontamination procedure	9.1.5
			- Estimated year of closure	9.1.2
	264.113	206.D.2.d	- Description of closure schedule including	
			. Total time to close	9.2.1.2, 9.3.1.2, 9.3.2.2, 9.3.3.1

*This documentation on Personnel Training must be included in the application. The remaining three items may be included at the applicant's discretion.

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(13)	264.113	302.A.4.b(1), 206.D.2.d	• Trackable intervening closure activities	9.2.1.2, 9.3.1.2, 9.3.2.2, 9.3.3.1
			- Location(s) and number of copies of closure plan	9.1.7
			- Identification of person responsible for storage and updating of facility copy of closure plan	9.1.7
			- Procedure for updating all other copies of closure plan	9.1.7
270.14(b)(13) & 270.17(g)	264.112 & 264.338(a)	302.A.4.b(1), 206.D.2.c 302.A.b(2)(c)	• Specific Closure Plan Requirements for Surface Impoundments	N/A
			- Procedures for removal and/or decontamination of all wastes and materials/equipment associated with the impoundment, <u>or</u>	N/A
			- Detailed plans and engineering reports describing:	N/A
			• Elimination of free liquids	N/A
			• Stabilization of remaining wastes	N/A
			• Design of final cover demonstrating:	N/A
			- Liquid migration minimization	N/A
			- Function with minimum maintenance	N/A
			- Drainage promotion	N/A
			- Erosion/abrasion minimization	N/A
			- Settling/subsidence accommodation	N/A
			- Permeability less than liner or subsoils	N/A
270.14(b)(13) & 270.18(i)	264.112	302.A.4.b(1), 206.D.2.c, 302.A.4.b(2)(d)	• Specific Closure Plan Requirements for Waste Piles	N/A
	264.258(a)	206.D.7.h(1)	- Procedure for removal and/or decontamination of all wastes and materials/equipment associated with the waste pile	N/A
	264.258(b)	206.D.7.h(2)	- Procedure for closing in conformance with landfill closing requirements	N/A
270.14(b)(13) & 270.20(f)	264.112	302.A.4.b(1), 206.D.2.c, 302.A.4.b(2)(f)	• Specific Closure Plan Requirements for Land Treatment Facilities	N/A
	264.280(a)	206.D.9.h(1)	- Procedures to maximize degradation of waste in treatment zone	N/A
			- Procedures to minimize run-off	N/A
			- Run-off system maintenance procedures	N/A
			- Wind dispersal control procedures	N/A
			- Procedures for compliance with food-chain crop growth	N/A
			- Procedures for unsaturated zone monitoring	N/A
			- Description of vegetative cover	N/A
			- Procedures for establishing vegetative cover	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(13) & 270.21(e)	264.112 & 264.310(a)	302.A.4.b(1), 206.D.2.c, 302.A.4.b(2)(g), 206.D.10.f(1)	• Specific Closure Plan Requirements for Landfills	9.3.3
			- Detailed plans and an engineering report which details the final cover components in detail	9.3.3.1
			- Documentation that the final cover will:	9.3.3.2
			. Provide long-term minimization of migration of liquids through closed landfill	9.3.3.2
			. Function with minimum maintenance	9.3.3.2
			. Promote drainage and minimize erosion/abrasion	9.3.3.2
			. Settle/subside without losing integrity	9.3.3.2
			. Be less permeable than bottom liners or subsoils	9.3.3.2
270.14(b)(13)	264.117 & 264.118	302.A.4.b(1), 206.D.2.g, 206.D.2.h	• Post-Closure Plan Documentation	9.4
			- Description of groundwater monitoring activities and frequencies	9.1.4
			- Description of maintenance activities and frequencies for:	9.3
			. Final containment structures	9.3
			. Facility monitoring equipment	9.3
			- Location(s) and number of copies of post-closure plan	9.1.7
			- Identification and location (address and phone number) of person responsible for storage and updating of facility copy of post-closure plan prior to closure	9.1.7
			- Identification and location (address and phone number) of person responsible for storage and updating of facility copy of post-closure plan during post-closure period)	9.1.7
			- Procedure for updating all other copies of post-closure plan	9.1.7
270.14(b)(13) 270.17(g)	264.118 & 264.228(b)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2)(c), 206.D.6.f(2)	• Specific Post-Closure Plan Requirements for Surface Impoundments	N/A
			- Procedures for maintenance and repair of final cover	N/A
			- Procedures for maintenance and monitoring of leak detection system	N/A
			- Procedures for maintenance and monitoring of groundwater monitoring system	N/A
			- Procedures for compliance with Subpart F	N/A
			- Procedures for preventing run-on/ run-off final cover damage	N/A
270.14(b)(13) 270.18(i)	264.118 & 264.258(b)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2), 206.D.7.h	• Specific Post-Closure Plan Requirements for Waste Piles	N/A
			- Procedures for post-closure care that meet the requirements for landfills	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(b)(13) 270.20(f)	264.118 & 264.280(c)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2)(f), 206.D.9.h	• Specific Post-Closure Plan Requirements for Land Treatment Facilities	N/A
			- Procedures to enhance degradation of wastes in treatment zone	N/A
			- Procedure for maintaining vegetative cover	N/A
			- Procedure for maintaining run-on controls	N/A
			- Procedure for maintaining run-off controls	N/A
			- Procedures for wind dispersal control	N/A
			- Procedures to insure compliance with food-chain crop prohibitions	N/A
			- Procedures for unsaturated zone monitoring	N/A
270.14(b)(13) 270.21(e)	264.118 & 264.310(b)	302.A.4.b(1), 206.D.2.h, 302.A.4.b(2)(g), 206.D.10.f(2)	• Specific Post-Closure Plan Requirements for Landfills	
			- Procedures for maintenance and repair of final cover	9.3
			- Monitoring and maintenance procedures for leak detection system	N/A
			- Procedure for leachate collection/ removal system operation	N/A
			- Procedures to maintain and monitor groundwater monitoring system	9.1.4
			- Procedures for compliance with Subpart F	9.3
			- Procedures for preventing final cap erosion due to run-on and run-off	9.3
			- Procedures for protection and maintenance of benchmarks	9.3
	264.310(c)	206.D.10.f(3)	- Procedures to be undertaken if liquid is found in leak detection system	N/A
270.14(b)(14)	264.120	302.A.4.b(1), 206.D.2.j	• Documentation of Notice on Deed (existing facilities only)	9.1.9
			- Statement that land used to manage wastes	9.1.9
			- Statement of restricted use per §264.117(c)	9.1.9
	264.119	206.D.2.i	- Documentation of type, location, and quantity of wastes filed with local authority and EPA Regional Administrator	9.1.9
270.14(b)(15)	264.142	302.A.4.b(1), 206.D.3.c	• Closure Cost Estimate	9.1.3
	264.143 & 264.146	206.D.3.d, 206.D.3.g	• Documentation of a financial assurance mechanism for closure that is:	N/A
	264.151(a)	206.D.3.j(1), (a)&(b)	- Closure trust fund	N/A
	264.151(b)	206.D.3.j(2)	- Surety bond guaranteeing payment	N/A
	264.151(c)	206.D.3.j(3)	- Surety bond guaranteeing performance	N/A
	264.151(d)	206.D.3.j(4)	- Closure letter of credit	N/A
	264.151(e)	206.D.3.j(5)	- Closure insurance	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.151(f) & (h)	206.D.3.j (6)&(8)	- Financial test and corporate guarantee	N/A
			- Multiple financial mechanism for one facility	N/A
			- Single financial mechanism for multiple facilities	N/A
270.14(b)(16)	264.144	302.A.4.b(1), 206.D.3.e	• Post-Closure Cost Estimate	9.1.3
	264.145 & 264.146	206.D.3.f&g	• Documentation of a financial assurance mechanism for post-closure that is:	9.1.3
	264.151(a)	206.D.3.j(1) (a)&(b)	- Closure trust fund	N/A
	264.151(b)	206.D.3.j(2)	- Surety bond guaranteeing payment	N/A
	264.151(c)	206.D.3.j(3)	- Surety bond guaranteeing performance	N/A
	264.151(d)	206.D.3.j(4)	- Post-closure letter of credit	N/A
	264.151(e)	206.D.3.j(5)	- Post-closure insurance	N/A
	264.151(f) & (h)	206.D.3.j (6)&(8)	- Financial test and corporate guarantee	N/A
			- Multiple financial mechanism for one facility	N/A
			- Single financial mechanism for multiple facilities	N/A
270.14(b)(17)	264.147	302.A.4.b(1)	• Documentation of Insurance	N/A
			- Request for variance from insurance	N/A
	264.151(i) & (j)	206 D.3.j (9)&(10)	- Insurance for sudden/accidental occurrences	N/A
			- Insurance for nonsudden/accidental occurrences	N/A
	264.151(g)	206.D.3.j(7)	- Financial test for liability coverage	N/A
270.14(b)(18)	264.149	302.A.4.b(1)	• Documentation of a State Required Financial Mechanism for Closure, Post-Closure, or Liability including	9.1.3
			- EPA I.D. number	N/A
			- Facility name	N/A
			- Facility address	N/A
			- Amounts of liability coverage or funds assured	N/A
	264.150	None	• Documentation of State Assumed Responsibility for Closure, Post-Closure or Liability including	9.1.3
			- Letter from State describing State's responsibilities	N/A
			- Facility EPA I.D. number	N/A
			- Facility name	N/A
			- Facility address	N/A
			- Amounts of liability coverage or funds assured	N/A
270.14(b)(19)		302.A.4.b(1)	• Topographic map showing a distance of 1000 feet around facility at a scale of not more than 1 inch equals 200 feet that clearly shows:	
			- Contours	2.1.3
			- Proper contour intervals	2.1.3
			- Map scale and date	2.1.3

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- 100-year flood plain area	2.2.2
			- Surface waters & intermittent streams	2.1.3
			- Surrounding land uses	2.1.3, 2.1.6
270.14(b)(19)		302.A.4.b(1)	- Wind rose	2.1.5
			- North orientation	2.1.3
			- Legal boundaries of facility site	2.1
			- Access control	2.1.3
			- Injection and withdrawal wells onsite and offsite	2.1.4
			- Buildings and recreation areas	2.1.3
			- Runoff control systems	N/A
			- Access and internal roads	2.1.3
			- Storm, sanitary, and process sewerage systems	2.1.3
			- Loading and unloading areas	6.5.1, 6.5.2
			- Fire control facilities	Fig. 7-7
			- Barriers for drainage or flood control	
			- Location of past or present operational units and equipment cleanup areas	2.1
270.17		302.A.4.b(2)(c)	• Specific Part B Information Requirements for Surface Impoundments	N/A
270.17(a)		302.A.4.b(2)(c)	- List of hazardous wastes placed or to be placed in impoundment	N/A
270.17(b)	264.221	302.A.4.b(2)(c), 206.D.6.b	- Detailed plans and an engineering report describing:	N/A
270.17(b)(i)	264.221(a)	302.A.4.b(2)(c), 206.D.6.b(1)	. Liner system construction (new only)	N/A
	264.221(a)(i)	206.D.6.b(1)	- Material of construction	N/A
			- Chemical properties	N/A
270.17(b)(1)		302.A.4.b(2)(c)	- Physical strength	N/A
			- Thickness	N/A
	264.221(a)(2)	206.D.6.b(1)	- Foundation design/integrity	N/A
	264.221(a)(3)	206.D.6.b(1)	- Area covered	N/A
	264.221(a)(1)	206.D.6.b(1)	. Liner system integrity against (new only)	N/A
			- Internal and external pressure gradients	N/A
			- Contact with waste/leachate	N/A
			- Climatic conditions	N/A
			- Installation stresses	N/A
			- Daily operational stresses	N/A
	264.221(b)	206.D.6.b(2)	. Liner system exemption including	N/A
			- Nature and quantity of wastes	N/A
			- Alternative design and operation	N/A
			- Impoundment location description	N/A
			. Hydrogeologic setting	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			• Attenuative capacity of materials between impoundment and groundwater and surface water	N/A
			- Documentation of no migration to ground/surface waters at any future time	N/A
270.17(b)(2)	264.221(c)	302.A.4.b(2)(c), 206.D.6.b(3)	• Procedures/equipment to prevent overtopping from:	N/A
			- Normal operation	N/A
			- Abnormal operation	N/A
			- Overfilling	N/A
			- Wind/wave action	N/A
			- Rainfall	N/A
			- Run-on	N/A
			- Equipment malfunctions	N/A
			- Human error	N/A
270.17(b)(3)	264.221(d)	302.A.4.b(2)(c), 206.D.6.b(4)	• Structural integrity of dikes	N/A
270.17(c)	264.222(a)	302.A.4.b(2)(c), 206.D.6.c(1)	- Documentation for Part 264, Subpart F exemption including,	N/A
			• Impoundment and liner location above seasonal highwater table	N/A
			• Two liners meeting 264.221(a) requirements	N/A
			• Leak detection system between liners	N/A
270.18		302.A.4.b(2)(d)	• Specific Part B Information Requirements for Waste Piles	N/A
270.18(a)		302.A.4.b(2)(d)	- List of hazardous wastes placed or to be placed in each waste pile	N/A
270.18(b)	264.250(c)	302.A.4.b(2)(d), 206.D.7.a(3)	- Documentation of general exemption from §264.251 and Part 264, Subpart F, including,	N/A
			• Waste pile protection from precipitation	N/A
			• Procedures for insuring liquids are not placed in pile	N/A
			• Description of run-on controls	N/A
			• Description of wind dispersal controls other than wetting	N/A
			• Decomposition/reactions do not cause leachate generation	N/A
270.18(c)	264.251(a)	302.A.4.b(2)(d), 206.D.7.b(1)	- Detailed plans and an engineering report describing,	N/A
270.18(c)(1)	264.251(a)(1)	302.A.4.b(2)(d), 206.D.7.b(1)	• Liner system construction (new only)	N/A
	264.221(a)	206.D.6.b(1)	- Material of construction	N/A
			- Chemical properties	N/A
			- Physical strength	N/A
			- Thickness	N/A
			- Foundation design/integrity	N/A
			- Area covered	N/A
			• Liner system integrity against (new only)	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Internal and external pressure gradients	N/A
			- Contact with waste/leachate	N/A
			- Climatic conditions	N/A
			- Installation stresses	N/A
			- Daily operational stresses	N/A
	264.251(a)(2)	206.D.7.b(1)	. Leachate collection and removal system to maintain less than one foot of leachate on liner including,	N/A
			- Materials of construction	N/A
270.18(c)(1)		302.A.4.b(2)(d)	- Chemical resistance to waste/leachate	N/A
			- Strength sufficient to prevent collapse	N/A
			- Provisions to prevent clogging	N/A
	264.251(b)	206.D.7.b(2)	. Liner system/leachate system exemption including,	N/A
			- Nature and quantity of wastes	N/A
			- Alternative design and operation	N/A
			- Pile location description	N/A
			. Hydrogeologic setting	N/A
			. Attenuative capacity of materials between pile, ground and surface waters	N/A
			- Documentation of no migration to ground/surface waters at any future time	N/A
270.18(c)(2)	264.251(c)	302.A.4.b(2)(d), 206.D.7.b(3)	. System for control of run-on from peak discharge of a 25-year storm	N/A
270.18(c)(3)	264.251(d)	302.A.4.b(2)(d), 206.D.7.b(4)	. System for control of run-off water volume of a 24-hour, 25-year storm	N/A
270.18(c)(4)	264.251(e)	302.A.4.b(2)(d), 206.D.7.b(5)	. Procedures to manage collection and holding facilities associated with run-on and run-off control systems	N/A
270.18(d)	264.251(f)	302.A.4.b(2)(d), 206.D.7.b(6)	. Wind dispersal control procedures	N/A
270.18(d)	264.252(a)	302.A.4.b(2)(d), 206.D.7.c(1)	- Documentation for Part 264, Subpart F exemption including,	N/A
			. Pile and liners above seasonal high water table	N/A
270.18(d)		302.A.4.b(2)(d)	. Two liners meeting requirements of §264.251(a)(1)	N/A
			. Leak detection system between liners	N/A
			. Leachate system meeting §264.251(a)(2) requirements	N/A
	264.253(b)	206.D.7.d(2)	- Documentation for Part 264, Subpart F exemption including,	N/A
			. Pile and liners above seasonal high water table	N/A
			. Liner meets §264.251(a)(1) requirements	N/A
			. Soil characteristics/depths	N/A
			. Leachate system meets §264.251(a)(2) requirements	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			. Schedule/procedures for liner inspection by waste removal	N/A
			. Sufficient liner strength/thickness to allow periodic removal/replacement of wastes	N/A
270.18(f)		302.A.4.b(2)(d)	- Description of treatment carried out in or on the pile including,	N/A
			. Details of treatment process	N/A
			. Equipment used	N/A
			. Nature and quality of residuals	N/A
270.20		302.A.4.b(2)(f)	• Specific Part B Information Requirements for Land Treatment Facilities	N/A
270.20(a)		302.A.4.b(2)(f)	- Description of treatment demonstration plans by	N/A
	264.272(b)	206.D.9.c(2)	. Field test	N/A
270.20(a)		302.A.4.b(2)(f)	. Laboratory analysis	N/A
			. Available data	N/A
			. Operating data (existing units only)	N/A
			- Submittal for laboratory analyses or field test demonstration permit including,	N/A
	264.272(c)	206.D.9.c(3)	. Documentation of accurate simulation	N/A
	264.272(c)	206.D.9.c(3)	- Wastes and hazardous constituents descriptions (Part 261, Appendix VIII)	N/A
			- Climatologic information	N/A
			- Topographical data	N/A
			- Operating practices	N/A
			- Type of test to be conducted	N/A
			- Test materials and methods	N/A
			- Expected completion time	N/A
			. Statement on appropriateness of demonstration	N/A
			. Statement on human health and environment protection considering,	N/A
			- Characteristics of wastes to be tested	N/A
			- Operating and monitoring during tests	N/A
			- Duration of test	N/A
			- Volume of waste used in test	N/A
			- Potential for hazardous waste migration to ground/surface waters (field tests only)	N/A
270.20(b)	264.271(a)	302.A.4.b(2)(f), 206.D.9.b(1)	- Description of land treatment program	N/A
			. Wastes to be land treated	N/A
			. Design measures to maximize treatment including,	N/A
270.20(b)(2)(i)	264.273(a)	302.A.4(2)(f), 206.D.9.d(1)	- Rate and method of waste application	N/A
			- Soil pH control measures	N/A
			- Microbial/chemical reaction enhancements	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Treatment zone moisture control measures	N/A
270.20(b)(3)	264.278(a)-(f)	302.A.4.b(2)(f), 206.D.9.f(1)-(6)	. Unsaturated zone monitoring procedures including,	N/A
			- List of and rationale for selecting compounds to be monitored	N/A
			- Monitoring equipment, procedures, frequency	N/A
			- Procedures for selecting sampling locations	N/A
			- Samples collection procedures	N/A
			- Sample preservation/shipment procedures	N/A
			- Sample chain of custody control	N/A
			- Sample analysis procedures	N/A
			- Background value determination procedures	N/A
			- Statistical methods description	N/A
270.20(b)(4)		302.A.4.b(2)(f)	. List of hazardous constituents expected to be in, or derived from, wastes to be land treated	N/A
270.20(b)(5)	264.271(c)	302.A.4.b(2)(f), 206.D.9.b(3)	. The proposed vertical and horizontal dimensions of the treatment zone with maximum depth of	N/A
			- No more than 5 feet from the initial soil surface	N/A
			- More than 3 feet above the seasonal high water table	N/A
270.20(c)	264.273(b)-(f)	302.A.4.b(2)(f), 206.D.9.d(2)-(6)	- Description of land treatment unit design	N/A
			. Procedures/equipment to prevent run-on from peak discharge of 25-year storm	N/A
			. Procedures/equipment to collect and control the run-off water volume from a 24-hour, 25-year storm	N/A
			. Procedures/equipment to minimize run-off from treatment zone during active life	N/A
			. Run-on and run-off collection and control systems management plan	N/A
			. Procedures/equipment for wind dispersal control	N/A
270.20(d)	264.276(a)	302.A.4.b(2)(f), 206.D.9.e(1)	- Documentation of request for growth of food-chain crops on treatment zone not receiving cadmium in wastes	N/A
270.20(d)	264.276(a)	302.A.4.b(2)(f), 206.D.9.c(1)	- Statement that demonstration of no risk to human health will be conducted by,	N/A
			. Field tests	N/A
			. Greenhouse studies	N/A
			. Available data	N/A
			. Operating data (existing only)	N/A
			- Demonstration program description, including,	N/A
			. Soil pH	N/A
			. Cation exchange capacity of soil	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			• Specific wastes to be applied	N/A
			• Waste application rates	N/A
			• Waste application methods	N/A
			• Identification of demonstration crops	N/A
			- Planting and growth procedures	N/A
			- Characteristics of crop	N/A
			- Sample selection criteria	N/A
			- Sample collection procedure	N/A
			- Sample size	N/A
			- Analyses methods	N/A
			- Statistical data evaluation procedures	N/A
			• Identification of comparison crops	N/A
			- Characteristics of crop	N/A
270.20(d)	264.276(a)	302.A.4.b(2)(f), 206.D.9.e(1)	- Planting and growth procedures	N/A
			- Conditions of growth	N/A
			- Sample selection criteria	N/A
			- Sample collection procedures	N/A
			- Sample size	N/A
			- Analyses methods	N/A
			- Statistical data evaluation procedures	N/A
			• Request for a permit to conduct demonstration program	N/A
270.20(e)	264.276(b)	302.A.4.b(2)(f), 206.D.9.e(2)	- Documentation of request for growth of food-chain crops on treatment zone if wastes contain cadmium	N/A
			• Cadmium concentration in waste	N/A
			• Soil pH	N/A
			• Annual application of cadmium in kilograms per hectare	N/A
			• Soil cation exchange capacity	N/A
			• Identification of animal feeds to be grown	N/A
			• Plan to prevent animal feed ingestion by humans	N/A
			• Documentation of notice on deed	N/A
270.21		302.A.4.b(2)(g)	• Specific Part B Information Requirements for Landfills	
270.21(a)		302.A.4.b(2)(g)	- List of hazardous wastes to be placed in each landfill cell	2.1.2.3
270.21(b)	264.301(a)	302.A.4.b(2)(g), 206.D.10.b(1)	- Detailed plans and an engineering report describing	N/A
270.21(b)(1)	264.301(a)(1)	302.A.4.b(2)(g), 206.D.10.b(1)(a)	• Liner system construction (new only)	N/A
			- Material of construction	N/A
			- Chemical properties	N/A
			- Physical strength	N/A
			- Thickness	N/A

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			- Foundation design/integrity	N/A
			- Area covered	N/A
			. Liner system integrity against (new only)	N/A
			- Internal and external pressure gradients	N/A
			- Contact with waste/leachate	N/A
			- Climatic conditions	N/A
			- Installation stresses	N/A
			- Daily operational stresses	N/A
	264.301(a)(2)	206.D.10.b(1)(b)	. Leachate collection and removal system to maintain less than one foot of leachate on liner including,	N/A
			- Materials of construction	N/A
			- Chemical resistance to waste/leachate	N/A
			- Sufficient strength to prevent collapse	N/A
270.21(b)(1)		302.A.4.b(2)(g), 206.D.10.b(2)	- Provisions to prevent clogging	N/A
	264.301(b)		. Liner system/leachate system exemption including,	N/A
			- Nature and quantity of wastes	N/A
			- Alternative design and operation	N/A
			- Landfill location description	N/A
			. Hydrogeologic setting	N/A
			. Attenuative capacity of materials between landfill and ground and surface waters	N/A
			- Documentation of no migration to ground/surface waters at any future time	N/A
270.21(b)(2)	264.301(c)	302.A.4.b(2)(g), 206.D.10.b(3)	. System for control of run-on from peak discharge of a 25-year storm	6.5.1, 6.5.2
270.21(b)(3)	264.301(d)	302.A.4.b(2)(g), 206.D.10.b(4)	. System control of run-off water volume from a 24-hour, 25-year storm	6.5.1, 6.5.2
270.21(b)(4)	264.301(e)	302.A.4.b(2)(g), 206.D.10.b(5)	. Procedures to manage collection and holding facilities associated with run-on and run-off control systems	6.5.1, 6.5.2
270.21(b)(5)	264.301(f)	302.A.4.b(2)(g), 206.D.10.b(6)	. Wind dispersal control procedures	6.5.1, 6.5.2
270.21(c)	264.302(a)	302.A.4.b(2)(g), 206.D.10.c(1)	- Documentation for Part 264, Subpart F exemption including,	N/A
			. Landfill and liners above seasonal high water table	N/A
			. Two liners meeting requirements of §264.301(a)(1)	N/A
			. Leak detection system between liners	N/A
			. Leachate system meeting §264.301(a)(2)	N/A
270.21(h)	264.314	302.A.4.b(2)(g), 206.D.10.i	- Documentation of procedures/equipment for landfilling liquid wastes	N/A
270.21(i)	264.315	302.A.4.b(2)(g), 206.D.10.j	- Documentation of procedures/equipment for landfilling containers	4.4.1

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(c)	Part 264 Subpart F	302.A.4.b(3), 206.D.1.a-k	Part B Protection of Ground Water Information Requirements for Surface Impoundments, Waste Piles, Land Treatment Units, and Landfills	N/A*
270.14(c)(1)		302.A.4.b(3)	• Interim status period groundwater monitoring data summary	N/A*
270.14(c)(2)		302.A.4.b(3)	• Identification of uppermost and hydraulically interconnected aquifers under facility including,	N/A*
			- Water flow rate and direction	N/A*
			- Bases for identification	N/A*
270.14(c)(3), 270.14(b)(19)		302.A.4.b(3), 302.A.4.b(1)	• Topographic map	N/A*
			- Delineation of property boundary	N/A*
	264.95(b)	206.D.1.f(2)	- Delineation of waste management area	N/A*
	264.95(a)	206.D.1.f(1)	- Delineation of proposed point of compliance	N/A*
			- Groundwater monitoring well locations	N/A*
			- Location of aquifers	N/A*
270.14(c)(4)		302.A.4.b(3)	• Descriptions of existing contamination	N/A*
			- Delineation of plume extent	N/A*
			- Appendix VIII constituents concentrations	N/A*
			. Concentrations throughout plume	N/A*
			. Maximum concentrations in plume	N/A*
270.14(c)(5)	264.97	302.A.4.b(3), 206.D.1.h	• Detailed plans and an engineering report of Groundwater Monitoring Program	N/A*
	264.97(a)	206.D.1.h(1)	- Description of wells	N/A*
			. Number of wells	N/A*
			. Locations	N/A*
			. Depths	N/A*
			. Assurance of unaffected background water measurement	N/A*
			. Assurance of compliance point ground water measurement	N/A*
	264.97(c)	206.D.1.h(3)	. Casing description	N/A*
	264.97(d)	206.D.1.h(4)	- Description of sampling/analysis procedures	N/A*
			. Sample collection methods	N/A*
			. Sample preservation/shipment	N/A*
			. Analytical procedures	N/A*
			. Chain of custody control	N/A*
	264.97(e)	206.D.1.h(5)	- Documentation of proper/adequate analytical procedures	N/A*
	264.97(f)	206.D.1.h(6)	- Procedure for determination of groundwater elevation with each sample	N/A*
270.14(c)(6)	264.91(a)(4) and 264.98	302.A.4.b(3), 206.D.1.b(1) 206.D.1.i	• Description of Detection Monitoring Program including,	N/A*
270.14(c)(6)(i)	264.93 and 264.98(a)	302.A.4.b(3), 206.D.1.d, 206.D.1.i(1)	- List of indicator parameters, waste constituents, reaction products to be monitored for, including	N/A*

*Waiver requested (see Appendix N)

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
			• Type, quantities, concentrations expected in wastes	N/A*
			• Mobility, stability, persistence in unsaturated zone	N/A*
			• Detectability in groundwater	N/A*
270.14(c)(6) (iii)	264.98(a)(4), 264.98(c)(1)	302.A.4.b(3), 206.D.1.i(1), 206.D.1.i(3)	• Background groundwater concentration values and coefficients of variation established by	N/A*
	264.98(c)(3)	206.D.1.i(3)	- Use of an appropriate groundwater monitoring system, and	N/A*
	264.97(g)(1)	206.D.1.h(7)	- Quarterly sampling of upgradient wells for one year, or	N/A*
	264.97(g)(3)	206.D.1.h(7)	- Quarterly sampling of other wells for one year, and	N/A*
	264.97(g)(4)	206.D.1.h(7)	- Data from a minimum of one sample/ well and minimum of four samples per quarter, or	N/A*
			- Presentation of procedures to calculate such values	N/A*
270.14(c)(6)	264.98(b)	302.A.4.b(3), 206.D.1.i(2)	• Description of an appropriate groundwater monitoring system to be installed at the compliance point	N/A*
270.14(c)(6) (iv)	264.98(d)	302.A.4.b(3), 206.D.1.i(4)	• Procedures for collecting semi-annual groundwater samples at the compliance point during	N/A*
			- Active life	N/A*
			- Closure period	N/A*
			- Post-closure period	N/A*
	264.98(e)	206.D.1.i(5)	• Procedure for annual determination of uppermost aquifer flow rate and direction	N/A*
	264.98(f) & 264.97(d)&(e)	206.D.1.i(6), 206.D.1.i(4)-(5)	• Documentation of sample collection and analysis procedures	N/A*
	264.98(g)	206.D.1.i(7)	• Procedure for determining a statist-cally significant increase for any monitored parameter or constituent by	N/A*
			- Comparing compliance point data to background value data using the procedures in §264.97(h)(1) or (2), and	N/A*
			- Providing an estimate of the time period after sampling completion necessary to obtain results	N/A*
270.14(c)(6)	264.98(h)	302.A.4.b(3), 206.D.1.i(8)	• Procedure to be implemented if a statistically significant increase in any constituent or parameter is identified at any compliance point monitoring well, including	N/A*
	264.98(h)(1)	206.D.1.i(8)	- Written notification to Regional Administrator	N/A*
	264.98(h)(2)	206.D.1.i(8)	- Sample collection and analysis methods for all Appendix VIII constituents at all monitoring wells	N/A*
	264.98(h)(3)	206.D.1.i(8)	- Method for establishing Appendix VIII constituent background values	N/A*
	264.98(h)(4)	206.D.1.i(8)	- Preparation of an application for permit modification to establish compliance monitoring	N/A*

*Waiver requested (see Appendix N)

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
270.14(c)(7)	264.91(a)(1) and 264.99	302.A.4.b(3), 206.D.1.b(1), 206.D.1.j	• Description of Compliance Monitoring Program, including	N/A*
			- List of wastes previously handled at facility	N/A*
			- Characterization of contaminated groundwater	N/A*
			. Hazardous constituents identified	N/A*
			. Hazardous constituents concentrations	N/A*
	264.99(b)	206.D.1.j(2)	- Description of compliance monitoring system at the compliance point	N/A*
			- List of hazardous constituents to be compliance monitored	N/A*
	264.96	206.D.1.g	- Proposed compliance period	N/A*
	264.99(d)	206.D.1.j(4)	- Procedure for collecting quarterly samples at compliance point during compliance period	N/A*
	264.99(c)(3)	206.D.1.j(3)	- Procedures for establishing background concentration values for constituents that are based on	N/A*
			. Use of an appropriate groundwater monitoring system, and	N/A*
	264.97(g)	206.D.1.h(7)	. Data that is available prior to permit issuance	N/A*
			. Data that accounts for measurement errors in sampling and analysis	N/A*
			. Data that accounts for seasonal groundwater quality fluctuations	N/A*
			. Data from a minimum of one sample per well and a minimum of four samples from monitoring system, each time system is sampled	N/A*
270.14(c)(7)(iv)	264.92 and 264.99(c)(1),(2)	302.A.4.b(3), 206.D.1.c, 206.D.1.j(3)	- Proposed concentration limits for constituents with justification based on	N/A*
			. §264.94(a)(1) and §264.97(g)	N/A*
			. §264.94(a)(2)	N/A*
			. §264.94(b) and §264.99(c)(1)	N/A*
	264.99(e)	206.D.1.j(5)	- Procedure for annual determination of uppermost aquifer flow rate & direction	N/A*
	264.99(f)	206.D.1.j(6)	- Procedures for annual testing of all compliance point wells for Appendix VIII constituents	N/A*
	264.99(g)	206.D.1.j(7)	- Documentation of all sampling and analysis procedures	N/A*
	264.99(h)	206.D.1.j(8)	- Procedures for determining a statistically significant increase for any monitored constituent by	N/A*
			. Comparing compliance point data to the concentration limit using the procedure in §264.97(h)(2)	N/A*
			. Providing an estimate of the time period after sampling completion necessary to obtain results	N/A*
	264.99(i)	206.D.1.j(9)	- Procedures to be implemented if the groundwater protection standard is exceeded at any compliance point monitoring well, including	N/A*

*Waiver requested (see Appendix N)

TABLE 1-2.
COMPLETENESS CHECKLIST CROSS REFERENCES (Continued)

Part 270	Part 264	NMHWMR	Subject Requirement	Location
	264.99(i)(1)	206.D.1.j(9)	. Written notification to Regional Administrator	N/A*
	264.99(i)(2)	206.D.1.j(9)	. Preparation of an application for permit modification to establish a corrective action program, including	N/A*
			- Details of program to comply with groundwater protection standard	N/A*
270.14(c)(7)(v)	264.99(i)(2)(ii)	302.A.4.b(3), 206.D.1.j(9)	- Details of groundwater monitoring to demonstrate effectiveness of program	N/A*
270.14(c)(8)	264.91(a) and 264.100	302.A.4.b(3), 206.D.1.b(1), 206.D.1.k	• Description of Corrective Action Program, including	N/A*
270.14(c)(8)(i)		302.A.4.b(3)	- Characterization of contaminated groundwater	N/A*
	264.100(a)(1)	206.D.1.k(1)	. Identified hazardous constituents	N/A*
			. Concentrations of hazardous constituents	N/A*
270.14(c)(8)(ii)	264.100(a)(2)	302.A.4.b(3), 206.D.1.k(1)	- Concentration limit for each hazardous constituent	N/A*
270.14(c)(8)(iii)	264.100(b)	302.A.4.b(3), 206.D.1.k(2)	- Detailed plan and an engineering report describing the corrective actions to be taken at the compliance points	N/A*
	264.100(c)	206.D.1.k(3)	- Time period necessary to implement corrective action program	N/A*
270.14(c)(8)(iv)	264.100(d)	302.A.4.b(3), 206.D.1.k(4)	- Description of groundwater monitoring program that will be sufficient to assess the adequacy of corrective action	N/A*
	264.91(a)(3), 264.100(e)	206.D.1.b(1), 206.D.1.k(5)	- Description of the corrective action to be taken for constituents in groundwater between compliance point and downgradient facility boundary	N/A*
	264.100(g)	206.D.1.k(7)	- Procedure and content for semi-annually submitting written reports to the Regional Administrator on program effectiveness	N/A*
			Part B Certification and Signatories	
270.11(d)		302.B.4	• Certification paragraph	11.0
270.11(a)		302.B.1	• Appropriate signatory	11.0

*Waiver requested (see Appendix N)

(Fill–in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

S													T/A	C
F	N	M	0	8	9	0	0	1	0	5	1	5		1

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below *(mark one box only)* to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

FOR EXISTING FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

YR.	MO.	DAY

☐ 2. NEW FACILITY *(Complete item below.)*

FOR NEW FACILITIES, PROVIDE THE DATE *(yr., mo., & day)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

YR.	MO.	DAY

B. REVISED APPLICATION *(place an "X" below and complete Item I above)*

☒ 1. FACILITY HAS INTERIM STATUS

☐ 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code*(s)* in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the form *(Item III-C)*.

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER *(barrel, drum, etc.)*	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER *(Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)*	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G	LITERS PER DAY	V	ACRE-FEET	A
LITERS	L	TONS PER HOUR	D	HECTARE-METER	F
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	B
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	Q
GALLONS PER DAY	U	LITERS PER HOUR	H		

EXAMPLE FOR COMPLETING ITEM III *(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.

C DUP T/A C 1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S02	600	G		5	T03	0.15	D	
X-2	T03	20	E		6				
1	S01	18320	G		7				
2	80	100	B		8				
3	T01	7680	U		9				
4	T04	NA (SEC IIIC)			10				

CONTINUE ON REVERSE

PROCESSES (continued)

SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

Small quantities of radioactively contaminated reactive chemicals may be detonated with trap HE. Design capacity requirements are not applicable as this treatment process is performed on an as needed basis.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER — Enter the four—digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four—digit number(s) from 40 CFR, 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 III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non—listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed hazardous wastes that possess that characteristic or toxic contaminant.
   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, 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.

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 other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(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 NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K054	900	P	T03 D80	
X-2	002	400	P	T03 D80	
X-3	D001	100	P	T03 D80	
X-4	D002				included with above

CONTINUE ON PAGE 3

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1): W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1

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IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D001	50000	P	S01	T03	D80		Mixed Waste
2	D001	20000	P	S01	D80	T03		Radioactively cont. scint. fluids (benzene, Toluene, xylene)
3	D002	150000	P	S01		T01	D80	
4	D003	5000	P	S01	T04	D80		Mixed Waste
5	D003	5000	P	S01	D80	T01	T03	Lithium Hydride contaminated with radiation
6	D004	1000	P	S01	D80			
7	D005	250*	P	S01	D80			Mixed Waste
8	D006	250*	P	S01	T01	D80		Mixed Waste
9	D007	1000	P	S01	T01	D80		Mixed Waste
10	D008	2000	P	S01	D80			Mixed Waste
11	D009	1500	P	S01		T01	D80	Mixed Waste
12	D010	250*	P	S01	D80			Mixed Waste
13	D011	250*	P	S01	T01	D80		Mixed Waste
14	D012	250*	P	S01	T03	D80		Mixed Waste
15	D016	250*	P	S01	T03	D80		Mixed Waste
16		END OF D DESIGNATOR						
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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...E: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1)		FOR OFFICIAL USE ONLY	
W N M 0 8 9 0 0 1 0 5 1 5	T/A C 1	W DUP	T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F001	1000	P	S01	T03	D80		Mixed Waste
2	F002	1000	P	S01	T03	D80		Mixed Waste
3	F003	250*	P	S01	T03	D80		Mixed Waste
4	F004	250*	P	S01	T03	D80		Mixed Waste
5	F005	250*	P	S01	T03	D80		Mixed Waste
6	F006	250*	P	S01		T01	D80	Mixed Waste
7	F007	12500	P	S01		T01	D80	Mixed Waste
8	F008	1000	P	S01		T01	D80	Mixed Waste
9	F009	6000	P	S01		T01	D80	Mixed Waste
10	F027	700	P	S01	D80	T03		Mixed Waste
11	F028	700	P	D80				Mixed Waste
		END OF F DESIGNATOR						
13								
14								
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NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. 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	P001	250*	P	S01	T03	D80		Mixed Waste
2	P002	250*	P	S01	T03	D80		Mixed Waste
3	P003	250*	P	S01	T03	D80		Mixed Waste
4	P004	250*	P	S01	T03	D80		Mixed Waste
5	P005	250*	P	S01	T03	D80		Mixed Waste
6	P006	250*	P	S01	T04	D80		Mixed Waste
7	P007	250*	P	S01	T03	D80		Mixed Waste
8	P008	250*	P	S01	T03	D80		Mixed Waste
9	P009	250*	P	S01	T04	D80		Mixed Waste
10	P010	250*	P	S01	D80			Mixed Waste
11	P011	250*	P	S01	D80			Mixed Waste
	P012	250*	P	S01	D80			Mixed Waste
13	P013	250*	P	S01	T01	D80		Mixed Waste
14	P014	250*	P	S01	T03	D80		Mixed Waste
15	P015	6000	P	S01	D80			Mixed Waste
16	P016	250*	P	S01	T03	D80		Mixed Waste
17	P017	250*	P	S01	T03	D80		Mixed Waste
18	P018	250*	P	S01	T03	D80		Mixed Waste
19	P020	250*	P	S01	T03	D80		Mixed Waste
20	P021	250*	P	S01	T01	D80		Mixed Waste
21	P022	250*	P	S01	T04	D80		Mixed Waste
22	P023	250*	P	S01	T03	D80		Mixed Waste
23	P024	250*	P	S01	T03	D80		Mixed Waste
	P026	250*	P	S01	T03	D80		Mixed Waste
25	P027	250*	P	S01	T03	D80		Mixed Waste
26	P028	250*	P	S01	T03	D80		Mixed Waste

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A C: 1	W DUP — T/A C: 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P029	250*	P	S01		T01	D80	Mixed Waste
2	P030	250*	P	S01	T01	D80		Mixed Waste
3	P031	250*	P	S01	T04	D80		Mixed Waste
4	P033	250*	P	S01	T04	D80		Mixed Waste
5	P034	250*	P	S01	T03	D80		Mixed Waste
6	P036	250*	P	S01	T03	D80		Mixed Waste
7	P037	250*	P	S01	T03	D80		Mixed Waste
8	P038	250*	P	S01	T03	D80		Mixed Waste
9	P039	250*	P	S01	T03	D80		Mixed Waste
10	P040	250*	P	S01	T03	D80		Mixed Waste
11	P041	250*	P	S01	T03	D80		Mixed Waste
12	P042	250*	P	S01	T03	D80		Mixed Waste
13	P043	250*	P	S01	T03	D80		Mixed Waste
14	P044	250*	P	S01	T03	D80		Mixed Waste
15	P045	250*	P	S01	T03	D80		Mixed Waste
16	P046	250*	P	S01	T03	D80		Mixed Waste
17	P047	250*	P	S01	T03	D80		Mixed Waste
18	P048	250*	P	S01	T03	T04	D80	Mixed Waste
19	P049	250*	P	S01	T03	D80		Mixed Waste
20	P050	250*	P	S01	T03	D80		Mixed Waste
21	P051	250*	P	S01	T03	D80		Mixed Waste
22	P054	250*	P	S01	T03	T04	D80	Mixed Waste
23	P056	250*	P	S01	T01	T04	D80	Mixed Waste
24	P057	250*	P	S01	T03	D80		Mixed Waste
25	P058	250*	P	S01	T03	D80		Mixed Waste
26	P059	250*	P	S01	T03	D80		Mixed Waste

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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. 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	P060	250*	P	S01	T03	D80		Mixed Waste
2	P062	250*	P	S01	T03	D80		Mixed Waste
3	P063	250*	P	S01	T04	D80		Mixed Waste
4	P054	250*	P	S01	T04	D80		Mixed Waste
5	P065	250*	P	S01	T04	D80		Mixed Waste
6	P066	250*	P	S01	T03	D80		Mixed Waste
7	P067	250*	P	S01	T03	D80		Mixed Waste
8	P068	250*	P	S01	T03	D80		Mixed Waste
9	P069	250*	P	S01	T03	T04	D80	Mixed Waste
10	P070	250*	P	S01	T03	D80		Mixed Waste
11	P071	250*	P	S01	T03	T04	D80	Mixed Waste
	P072	250*	P	S01	T03	D80		Mixed Waste
13	P073	250*	P	S01	T01	T04	D80	Mixed Waste
14	P074	250*	P	S01		T01	D80	Mixed Waste
15	P075	250*	P	S01	T03	D80		Mixed Waste
16	P076	250*	P	S01	T01	T04	D80	Mixed Waste
17	P077	250*	P	S01	T03	T04	D80	Mixed Waste
18	P078	250*	P	S01	T01	D80		Mixed Waste
19	P081	250*	P	S01	T04	D80		Mixed Waste
20	P082	250*	P	S01	T03	D80		Mixed Waste
21	P084	250*	P	S01	T03	D80		Mixed Waste
22	P085	250*	P	S01	T03	D80		Mixed Waste
23	P087	250*	P	S01	D80			Mixed Waste
	P088	250*	P	S01	T03	D80		Mixed Waste
25	P089	250*	P	S01	T03	D80		Mixed Waste
26	P092	250*	P	S01	T03	D80		Mixed Waste

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CONTINUE ON REVERSE

...from page 2.
...Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P093	250*	P	S01	T03	D80		Mixed Waste
2	P094	250*	P	S01	T03	D80		Mixed Waste
3	P095	250*	P	S01	T03	D80		Mixed Waste
4	P096	250*	P	S01	T04	D80		Mixed Waste
5	P097	250*	P	S01	T03	D80		Mixed Waste
6	P098	250*	P	S01	T01	D80		Mixed Waste
7	P099	250*	P	S01	T01	D80		Mixed Waste
8	P101	250*	P	S01	T03	D80		Mixed Waste
9	P102	250*	P	S01	T03	D80		Mixed Waste
10	P103	250*	P	S01	T03	D80		Mixed Waste
11	P104	250*	P	S01	T01	D80		Mixed Waste
12	P105	250*	P	S01	D80			Mixed Waste
13	P106	250*	P	S01	T01	D80		Mixed Waste
14	P107	250*	P	S01	T04	D80		Mixed Waste
15	P108	250*	P	S01	T03	D80		Mixed Waste
16	P109	250*	P	S01	T03	D80		Mixed Waste
17	P110	250*	P	S01	T03	D80		Mixed Waste
18	P111	250*	P	S01	T03	D80		Mixed Waste
19	P112	250*	P	S01	T03	T04	D80	Mixed Waste
20	P113	250*	P	S01	D80			Mixed Waste
21	P114	250*	P	S01	D80			Mixed Waste
22	P115	250*	P	S01	D80			Mixed Waste
23	P116	250*	P	S01	D80			Mixed Waste
24	P118	250*	P	S01	T03	D80		Mixed Waste
25	P119	250*	P	S01	D80			Mixed Waste
26	P120	250*	P	S01	D80			Mixed Waste

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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A C: 1	W DUP — T/A C: 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P 1 2 1	250*	P	S 0 1 T 0 1 D 8 0	Mixed Waste
2	P 1 2 2	250*	P	S 0 1 T 0 4 D 8 0	Mixed Waste
3	P 1 2 3	250*	P	S 0 1 T 0 3 D 8 0	Mixed Waste
4		END OF P DESIGNATOR			
5					
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NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1	W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U001	250*	P	S01	T03	D80		Mixed Waste
2	U002	1000	P	S01	T03	D80		Mixed Waste
3	U003	250*	P	S01	T03	D80		Mixed Waste
4	U004	250*	P	S01	T03	D80		Mixed Waste
5	U005	250*	P	S01	D80			Mixed Waste
6	U006	250*	P	S01	T04	D80		Mixed Waste
7	U007	250*	P	S01	T03	D80		Mixed Waste
8	U008	250*	P	S01	T03	T04	D80	Mixed Waste
9	U009	250*	P	S01	T03	D80		Mixed Waste
10	U010	250*	P	S01	T03	D80		Mixed Waste
11	U011	250*	P	S01	T03	D80		Mixed Waste
[illegible]	U012	250*	P	S01	T03	D80		Mixed Waste
13	U014	250*	P	S01	T03	D80		Mixed Waste
14	U015	250*	P	S01	T03	D80		Mixed Waste
15	U016	250*	P	S01	T03	D80		Mixed Waste
16	U017	250*	P	S01	T03	D80		Mixed Waste
17	U018	250*	P	S01	T03	D80		Mixed Waste
18	U019	250*	P	S01	D80			Mixed Waste
19	U020	250*	P	S01	T03	T04	D80	Mixed Waste
20	U021	250*	P	S01	T03	D80		Mixed Waste
21	U022	250*	P	S01	T03	D80		Mixed Waste
22	U023	250*	P	S01	T03	T04	D80	Mixed Waste
23	U024	250*	P	S01	T03	D80		Mixed Waste
[illegible]	U025	250*	P	S01	T03	D80		Mixed Waste
25	U026	250*	P	S01	T03	D80		Mixed Waste
26	U027	250*	P	S01	T03	D80		Mixed Waste

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EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1 — C: 1	W DUP — T/A: — C: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. 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	U028	250*	P	S01	T03	D80		Mixed Waste
2	U029	250*	P	S01	T03	D80		Mixed Waste
3	U030	250*	P	S01	T03	D80		Mixed Waste
4	U031	250*	P	S01	T03	D80		Mixed Waste
5	U032	250*	P	S01	T01	D80		Mixed Waste
6	U033	250*	P	S01	T04	D80		Mixed Waste
7	U034	250*	P	S01	T03	D80		Mixed Waste
8	U035	250*	P	S01	T03	D80		Mixed Waste
9	U036	250*	P	S01	T03	D80		Mixed Waste
10	U037	250*	P	S01	T03	D80		Mixed Waste
11	U038	250*	P	S01	T03	D80		Mixed Waste
[illegible]	U039	250*	P	S01	T03	D80		Mixed Waste
13	U041	250*	P	S01	T03	D80		Mixed Waste
14	U042	250*	P	S01	T03	T04	D80	Mixed Waste
15	U043	250*	P	S01	T04	D80		Mixed Waste
16	U044	1000	P	S01	T03	D80		Mixed Waste
17	U045	250*	P	S01	T04	D80		Mixed Waste
18	U046	250*	P	S01	T03	D80		Mixed Waste
19	U047	250*	P	S01	T03	D80		Mixed Waste
20	U048	250*	P	S01	T03	D80		Mixed Waste
21	U049	250*	P	S01	T03	D80		Mixed Waste
22	U050	250*	P	S01	T03	D80		Mixed Waste
23	U051	250*	P	S01	T03	D80		Mixed Waste
24	U052	250*	P	S01	T03	D80		Mixed Waste
25	U053	250*	P	S01	T03	D80		Mixed Waste
26	U055	250*	P	S01	T03	D80		Mixed Waste

CONTINUE ON REVERSE

(enter "A", "B", "C", etc. behind the "D" to identify ...

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Form Approved OMB No. 158-S80004

I.D. NUMBER (enter from page 1): N M 0 8 9 0 0 1 0 5 1 5 — T/A: 1

FOR OFFICIAL USE ONLY: W DUP — T/A: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NUMBER	A. EPA HAZARD. STENO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U056	250*	P	S01 T03 D80	
2	U057	250*	P	S01 T03 D80	
3	U058	250*	P	S01 T03 D80	
4	U059	250*	P	S01 T03 D80	
5	U060	250*	P	S01 T03 D80	
6	U061	250*	P	S01 T03 D80	
7	U062	250*	P	S01 T03 D80	
8	U063	250*	P	S01 T03 D80	
9	U064	250*	P	S01 T03 D80	
10	U066	250*	P	S01 T03 D80	
11	U067	250*	P	S01 T03 D80	
12	U068	250*	P	S01 T03 D80	
13	U069	250*	P	S01 T03 D80	
14	U070	250*	P	S01 T03 D80	
15	U071	250*	P	S01 T03 D80	
16	U072	250*	P	S01 T03 D80	
17	U073	250*	P	S01 T03 D80	
18	U074	250*	P	S01 T03 D80	
19	U075	250*	P	S01 T04 D80	
20	U076	250*	P	S01 T03 D80	
21	U077	250*	P	S01 T03 D80	
22	U078	250*	P	S01 T03 D80	
23	U079	250*	P	S01 T03 D80	
24	U080	3000	P	S01 T03 D80	
25	U081	250*	P	S01 T03 D80	
26	U082	250*	P	S01 T03 D80	

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CONTINUE ON REVERSE

(enter "A", "B", "C", etc. behind the "3" to identify photocopied pages)

Continued from page 2.
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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
NM089001051 5 (T/A C: 1)	W DUP (T/A C: 2) DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U083	250*	P	S01 T03 D80	Mixed Waste
2	U084	250*	P	S01 T03 D80	Mixed Waste
3	U085	250*	P	S01 T03 D80	Mixed Waste
4	U086	250*	P	S01 T03 D80	Mixed Waste
5	U087	250*	P	S01 T03 D80	Mixed Waste
6	U088	250*	P	S01 T03 D80	Mixed Waste
7	U089	250*	P	S01 T03 D80	Mixed Waste
8	U090	250*	P	S01 T03 D80	Mixed Waste
9	U091	250*	P	S01 T03 D80	Mixed Waste
10	U092	250*	P	S01 T04 D80	Mixed Waste
11	U093	250*	P	S01 T03 D80	Mixed Waste
12	U094	250*	P	S01 T03 D80	Mixed Waste
13	U095	250*	P	S01 T03 D80	Mixed Waste
14	U096	250*	P	S01 T03 T04 D80	Mixed Waste
15	U097	250*	P	S01 T03 D80	Mixed Waste
16	U098	250*	P	S01 T03 D80	Mixed Waste
17	U099	250*	P	S01 T03 D80	Mixed Waste
18	U101	250*	P	S01 T03 D80	Mixed Waste
19	U102	250*	P	S01 T03 D80	Mixed Waste
20	U103	250*	P	S01 T03 D80	Mixed Waste
21	U105	250*	P	S01 T03 D80	Mixed Waste
22	U106	250*	P	S01 T03 D80	Mixed Waste
23	U107	250*	P	S01 T03 D80	Mixed Waste
24	U108	250*	P	S01 T03 T04 D80	Mixed Waste
25	U109	250*	P	S01 T03 D80	Mixed Waste
26	U110	250*	P	S01 T03 D80	Mixed Waste

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CONTINUE ON REVERSE

(enter "A", "B", "C", etc. behind the "S" to identify photocopied pages)

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NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A: ; C: 1	W DUP — T/A: ; C: 2 — DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U 1 1 1	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
2	U 1 1 2	250*	P	S 0 1	T 0 3	T 0 4	D 8 0	Mixed Waste
3	U 1 1 3	250*	P	S 0 1	T 0 3	T 0 4	D 8 0	Mixed Waste
4	U 1 1 4	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
5	U 1 1 5	250*	P	S 0 1	T 0 3	T 0 4	D 8 0	Mixed Waste
6	U 1 1 6	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
7	U 1 1 7	250*	P	S 0 1	T 0 3	T 0 4	D 8 0	Mixed Waste
8	U 1 1 8	250*	P	S 0 1	T 0 3	T 0 4	D 8 0	Mixed Waste
9	U 1 1 9	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
10	U 1 2 0	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
11	U 1 2 1	250*	P	S 0 1	D 8 0			Mixed Waste
	U 1 2 2	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
13	U 1 2 3	250*	P	S 0 1	D 8 0			Mixed Waste
14	U 1 2 4	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
15	U 1 2 5	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
16	U 1 2 6	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
17	U 1 2 7	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
18	U 1 2 8	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
19	U 1 2 9	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
20	U 1 3 0	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
21	U 1 3 1	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
22	U 1 3 2	250*	P	S 0 1	T 0 3	D 8 0		Mixed Waste
23	U 1 3 3	250*	P	S 0 1	T 0 3	T 0 4	D 8 0	Mixed Waste
	U 1 3 4	250*	P	S 0 1	T 0 1	T 0 4	D 8 0	Mixed Waste
25	U 1 3 5	250*	P	S 0 1	T 0 4	D 8 0		Mixed Waste
26	U 1 3 6	250*	P	S 0 1	D 8 0			Mixed Waste

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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1): W N M 0 8 9 0 0 1 0 5 1 5 — T/A C: 1

FOR OFFICIAL USE ONLY: W DUP — T/A C: 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. 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	U137	250*	P	S01	T03	D80		
2	U138	250*	P	S01	T03	D80		
3	U139	250*	P	S01	T03	D80		
4	U140	250*	P	S01	T03	D80		
5	U141	250*	P	S01	T03	D80		
6	U142	250*	P	S01	T03	D80		
7	U143	250*	P	S01	T03	D80		
8	U144	250*	P	S01	D80			
9	U145	250*	P	S01	D80			
10	U146	250*	P	S01	D80			
11	U147	250*	P	S01	T03	D80		
12	U148	250*	P	S01	T03	D80		
13	U149	250*	P	S01	T03	D80		
14	U150	250*	P	S01	T03	D80		
15	U151	250*	P	S01	D80			
16	U152	250*	P	S01	T03	D80		
17	U153	250*	P	S01	T03	D80		
18	U154	250*	P	S01	T03	D80		
19	U155	250*	P	S01	T03	D80		
20	U156	250*	P	S01	T03	D80		
21	U157	1000	P	S01	T03	D80		
22	U158	250*	P	S01	T03	D80		
23	U159	1000	P	S01	T03	D80		
24	U160	250*	P	S01	T04	D80	T03	
25	U161	250*	P	S01	T03	D80		
26	U162	250*	P	S01	T03	D80		

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Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U163	250*	P	S01	T03	D80		Mixed Waste
2	U164	250*	P	S01	T03	D80		Mixed Waste
3	U165	250*	P	S01	T03	D80		Mixed Waste
4	U166	250*	P	S01	T03	D80		Mixed Waste
5	U167	250*	P	S01	T03	D80		Mixed Waste
6	U168	250*	P	S01	T03	D80		Mixed Waste
7	U169	250*	P	S01	T03	D80		Mixed Waste
8	U170	250*	P	S01	T03	D80		Mixed Waste
9	U171	250*	P	S01	T03	T04	D80	Mixed Waste
10	U172	250*	P	S01	T03	D80		Mixed Waste
11	U173	250*	P	S01	T03	D80		Mixed Waste
12	U174	250*	P	S01	T03	D80		Mixed Waste
13	U176	250*	P	S01	T03	D80		Mixed Waste
14	U177	250*	P	S01	T03	D80		Mixed Waste
15	U178	250*	P	S01	T03	D80		Mixed Waste
16	U179	250*	P	S01	T03	D80		Mixed Waste
17	U180	250*	P	S01	T03	D80		Mixed Waste
18	U181	250*	P	S01	T03	D80		Mixed Waste
19	U182	250*	P	S01	T03	D80		Mixed Waste
20	U183	250*	P	S01	T03	D80		Mixed Waste
21	U184	250*	P	S01	T03	D80		Mixed Waste
22	U185	250*	P	S01	T03	D80		Mixed Waste
23	U186	250*	P	S01	T03	D80		Mixed Waste
24	U187	250*	P	S01	T03	D80		Mixed Waste
25	U188	250*	P	S01	T03	D80		Mixed Waste
26	U189	250*	P	S01	T03	T04	D80	Mixed Waste

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NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

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EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 — T/A C: 1	W DUP — T/A C: 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. 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	U190	250*	P	S01	T03	D80		Mixed Waste
2	U191	250*	P	S01	T03	D80		Mixed Waste
3	U192	250*	P	S01	T03	D80		Mixed Waste
4	U193	250*	P	S01	T03	D80		Mixed Waste
5	U194	250*	P	S01	T03	D80		Mixed Waste
6	U196	250*	P	S01	T03	D80		Mixed Waste
7	U197	250*	P	S01	T03	D80		Mixed Waste
8	U200	250*	P	S01	T03	D80		Mixed Waste
9	U201	250*	P	S01	T03	D80		Mixed Waste
10	U202	250*	P	S01	T03	D80		Mixed Waste
11	U203	250*	P	S01	T03	D80		Mixed Waste
12	U204	250*	P	S01	D80			Mixed Waste
13	U205	250*	P	S01	T04	D80		Mixed Waste
14	U206	250*	P	S01	T03	D80		Mixed Waste
15	U207	250*	P	S01	T03	D80		Mixed Waste
16	U208	250*	P	S01	T03	D80		Mixed Waste
17	U209	250*	P	S01	T03	D80		Mixed Waste
18	U210	250*	P	S01	T03	D80		Mixed Waste
19	U211	250*	P	S01	T03	D80		Mixed Waste
20	U212	250*	P	S01	T03	D80		Mixed Waste
21	U213	250*	P	S01	T03	T04	D80	Mixed Waste
22	U214	250*	P	S01	T03	D80		Mixed Waste
23	U215	250*	P	S01	D80			Mixed Waste
24	U216	250*	P	S01		D80		Mixed Waste
25	U217	250*	P	S01	T04	D80		Mixed Waste
26	U218	250*	P	S01	T03	D80		Mixed Waste

EPA Form 3510-3 (6-80)

CONTINUE ON REVERSE

(enter "A", "B", "C", etc. behind the "P" to identify photocopied ...

nued from page 2.

NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICE USE ONLY
W N M 0 8 9 0 0 1 0 5 1 5 T/A C 1	W DUP T/A C 2 DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U219	250*	P	S01	D80			Mixed Waste
2	U220	1000	P	S01	T03	D80		Mixed Waste
3	U221	250*	P	S01	T03	D80		Mixed Waste
4	U222	250*	P	S01	T03	D80		Mixed Waste
5	U223	1000	P	S01	T03	D80		Mixed Waste
6	U225	250*	P	S01	T03	D80		Mixed Waste
7	U226	1500	P	S01	T03	D80		Mixed Waste
8	U227	250*	P	S01	T03	D80		Mixed Waste
9	U228	2000	P	S01	T03	D80		Mixed Waste
10	U230	250*	P	S01	T03	D80		Mixed Waste
11	U231	250*	P	S01	T03	D80		Mixed Waste
	U232	250*	P	S01	T03	D80		Mixed Waste
13	U233	250*	P	S01	T03	D80		Mixed Waste
14	U234	250*	P	S01	T04	D80		Mixed Waste
15	U235	250*	P	S01	T03	D80		Mixed Waste
16	U236	250*	P	S01	T03	D80		Mixed Waste
17	U237	250*	P	S01	T03	D80		Mixed Waste
18	U238	250*	P	S01	T03	D80		Mixed Waste
19	U239	1000	P	S01	T03	D80		Mixed Waste
20	U240	250*	P	S01	T03	D80		Mixed Waste
21	U242	250*	P	S01	T03	D80		Mixed Waste
22	U243	250*	P	S01	T03	D80		Mixed Waste
23	U244	250*	P	S01	T03	D80		Mixed Waste
	U246	250*	P	S01	D80			Mixed Waste
25	U247	250*	P	S01	T03	D80		Mixed Waste
26		END OF U DESIGNATOR						

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IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

All entries with an asterick in column IVB on page 3A are generated in labpack quantities only. If a new process/experiment will generate more than the stated ntity, a revised Part A will be submitted.

With the exception of a few waste streams (e.g., D005 explosives pad sand, K044 and K047) all of the waste in Part IV have the potential of being contaminated with radioactive species. The estimated quantities in column B reflect the amount of mixed waste also. The total amount of these mixed wastes will not exceed 10,000 lbs/yr generation. As far as reports, the straight hazardous waste and mixed waste will be broken down into separate entities. Readily identifiable waste steams (D001, D003) are broken out in Part IV and are listed separately.

EPA I.D. NO. *(enter from page 1)*

S												T/A	C
F	N	M	0	8	9	0	0	1	0	5	1	5	6

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail).*

VI. 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).*

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
35 49 051	106 14 015

VIII. FACILITY OWNER

☐ A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
E United States Department of Energy	505-667-5288

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
F Los Alamos Area Office	G Los Alamos	NM	87545

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Harold Valencia Los Alamos Area Office		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the s ed information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, i g the possibility of fine and imprisonment.

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Christopher S. Adams, Jr. Associate Director		

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V. FACILITY DRAWING *(see page 4)*

The following drawings are attached to the revised Part A dated 10/31/84.

LA-RV-1-13.1 and LA-RV-P-9 - Batch Waste Treatment System at TA-50-1.

Area L Chemical Storage Facility, TA-54.

Area L Chemical Storage Facility, shed.

I. The following drawings are attached to the revised Part A dated 7/26/84:

Figure 1 - Technical Area Location Plan

Figure 4 - TA-50 Structure Location Plan showing location of the Batch Waste Treatment Facility in Building 1 and the controlled air incinerator in Building 37.

Figure 5 - TA-54 Structure Location Plan showing Area L.

II. The following drawings are new submittals:

TDF	(Fig. 4-3 of Part B)
TDF	(Fig. 4-4 of Part B)
TA-54	Area L storage area

2.0 FACILITY DESCRIPTION

2.1 GENERAL DESCRIPTION

Los Alamos National Laboratory (Los Alamos) is located in Los Alamos County in north central New Mexico (Figure 2-1). The laboratory is approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe. The laboratory, which occupies an area of 43 square miles, and the associated residential areas of Los Alamos and White Rock are situated on Pajarito Plateau. The Plateau consists of a series of finger-like mesas separated by deep east-west trending canyons. The mesa tops range in elevation from approximately 7800 feet at the flank of Jemez Mountain (located to the west of Los Alamos) to about 6200 feet at their eastern extent where they terminate above the Rio Grande Valley. Intermittent streams lie at the bottoms of the east-west trending canyons.

Los Alamos is divided into 32 active Technical Areas (TA's) (Figure 2-2). Hazardous chemical wastes can be generated in virtually all of these areas. Hazardous waste management facilities addressed in this permit application are located in Technical Areas 50 and 54. Hazardous waste management activities occupy only a small portion of the Laboratory. The following waste management facilities located as noted are addressed in this permit application:

- Technical Area 50
  - waste incinerator
- Technical Area 54, Area L
  - waste transfer, packaging and storage facilities, used for accumulation, packaging and storage of chemical wastes
  - treatment tanks, used for the neutralization, oxidation and evaporation of various wastes.
  - land disposal facility, Los Alamos' primary chemical waste landfill operation where wastes are buried within shafts

The above facilities have interim authority status, with the exception of the TA-50 waste incinerator. These facilities are described in the following sections.

2.1.1 Technical Area 50 (TA-50) Facility

2.1.1.1. Chemical Waste Incinerator

The waste incinerator is located in Building 37 at Technical Area 50 (Figure 2-3). The highly modified, controlled air incinerator is rated at a nominal 45 kilograms per hour waste feed throughput. The incinerator was developed as part of a continuing incinerator study and demonstration program being conducted by Los Alamos and is currently permitted to burn PCB-contaminated liquid materials. Modifications to the incinerator include additions of liquid and solid waste feed preparation lines, a continuous ash removal system, a high-efficiency off-gas cleanup system, and backup utility systems. Standard combustion equipment has been modified to permit effective incineration of waste in solid, liquid, slurry, or gaseous form. Particular attention has been given to engineering for proper waste containment, resulting in a system that is safe for evaluating the incineration of hazardous chemicals and certain radioactive waste forms. Los Alamos wishes to obtain a permit to burn RCRA-regulated wastes in this incinerator. Once Los Alamos receives approval to operate the incinerator for the destruction of RCRA wastes, many wastes that are currently landfilled will be incinerated.

2.1.2 Technical Area 54 (TA-54), Area L Facilities

2.1.2.1 Waste Transfer, Packaging and Storage Facilities

A single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1595 square feet are located in Area L of Technical Area 54 (Figure 2-4). These facilities are used for the accumulation, packaging and storage of waste containers generated from throughout the Laboratory. Area L of Technical Area 54 is an area about three acres surrounded by an eight-feet-high chain-link and barbed-wire fence (Figure 2-5). Currently active waste management facilities located within this area include four waste treatment tanks and four waste disposal shafts as well as the transfer, packaging and storage facilities. The metal building has a concrete floor having a design standard load-bearing capacity of 250 pounds per square foot. Three

shallow sumps covered by fiberglass grates are located within the floor of the building (Figure 2-6). The storage pad has a concrete floor having a design standard load-bearing capacity of 700 pounds per square foot (Figure 2-7).

Hazardous waste containers generated at the various Los Alamos laboratories are delivered to the waste transfer, packaging and storage facilities on a routine basis. Wastes are segregated into compatible types and placed upon the three fiberglass grates located in the metal building or within one of the six storage cells on the roofed concrete pad. Wastes packaged in small containers are placed into lab packs (Figure 2-8). Also, vermiculite is added to 55-gallon drums containing liquids in these facilities. Wastes suitable for recycling are consolidated into drums and any damaged or leaking drums are repackaged into larger drums in these facilities. Los Alamos wishes to obtain a permit to operate the waste transfer, packaging and storage facilities.

2.1.2.2 Treatment Tanks

Four 1665-gallon ten-gauge carbon steel tanks are located at Area L of Technical Area 54. The tanks are lined with plastic. These tanks are used to neutralize, oxidize and evaporate wastes. The tanks are located on a bermed concrete pad as shown in Figure 2-9. The waste most commonly oxidized in these tanks is lithium hydride. Ammonium bifluoride (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks. Los Alamos wishes to obtain a permit to treat hazardous wastes in these tanks.

2.1.2.3 Land Disposal Facilities

As of March 1985, land disposal facilities located in Area L include 34 shafts which range in diameter from three to eight feet. Thirty of the shafts have been capped. All of these shafts are about 60 feet deep. When in use, the shafts are covered with a heavy steel cap. When filled, the shafts are capped with a three-feet-thick concrete plug. Each shaft is used for the disposal of a single category of chemical

wastes to assure that incompatible chemicals will not mix and react. Los Alamos wishes to obtain a permit to operate the open disposal shafts and future shafts expected to be needed. The approximate number and locations of these future shafts are shown on Figure 2-5.

2.1.3 Topographic Maps

Topographic maps, as required by 40 CFR §270.14(b)(19) (NMHWMR 302.A.4.b.[1]), are presented in Figure 2-3 for the TA-50 facilities and Figure 2-6 for the TA-54 facility. In accordance with the note located at the end of 40 CFR §270.14(b)(19) (NMHWMR 302.A.4.b.[1]), maps at a scale of 1" = 400' are provided. Los Alamos requests that EPA accept maps at this scale due to the large size of the various hazardous waste management facilities. Contour lines on these maps are at intervals of ten feet, reflecting the mountainous terrain present at Los Alamos. A second map of Area L at TA-54 at a scale of 1" = 20' and contour interval of two feet is provided (Figure 2-10). Surface waters are described in Section 2.2.2. There are no storm sewers in the vicinity of mixed waste management facilities; storm water runoff is diverted by ditches and culverts. Sanitary sewage lines in the vicinity of the incinerator are shown in Figure 2-11. No sanitary sewage is generated at Area L.

2.1.4 Wells

The municipal and industrial water supply for the Laboratory and community is from 17 deep wells in three well fields and one gallery. The wells are located on Pajarito Plateau and in canyons east of the Laboratory. Water is pumped from the main aquifer, which lies 350 m (1150 ft) to 260 m (850 ft) below the surface of the plateau. The gallery collects spring discharge from a perched water zone in the volcanics on the flanks of the mountains located west of Los Alamos.

There are no injection wells in the vicinity of Los Alamos. The location of supply wells and the gallery, as well as the locations of test wells, springs, observation holes and surface water sampling stations

are shown on Figure 2-12. Surface, well, and spring waters are routinely sampled and analyzed for radionuclides as well as heavy metals, flourides, nitrates, carbonates, biocarbonates, silica, sodium, magnesium and conductivity. Analytical results are published annually by the Los Alamos Environmental Surveillance Group (HSE-8) and copies are submitted annually to the EPA Regional Administrator and the Director of the NMEID.

2.1.5 Wind Rose

An annual wind rose (1983 data) for Technical Area 59, which is located less than one mile northwest of Technical Area 50, is shown in Figure 2-13. The major wind component is from the west-northwest.

The mountainous terrain at Los Alamos produces a distinct daily wind pattern. At night, winds tend to flow downward from the Jemez Mountains generally out of the west-northwest and northwest. During the day, the pattern reverses and light upslope winds come generally from the southeast and south-southeast. Los Alamos is a generally light wind site with an annual average wind speed of 2.8 meters per second. Only twelve percent of wind speeds in 1983 were greater than five meters per second and 38 percent were less than 2.5 meters per second (Los Alamos National Laboratory, 1983).

2.1.6 Land Use

The communities located closest to the Laboratory facilities are Los Alamos, which is located just north of the Laboratory, and White Rock, which is located a few miles to the east-southeast of the Laboratory (Figure 2-1). The total population of Los Alamos County is 19,000 to 20,000. Most of Los Alamos County, as well as adjoining portions of neighboring Sandoval, Rio Arriba, and Santa Fe Counties, is undeveloped. The only significant development in Los Alamos County are the Laboratory facilities and the associated residential communities. Large tracts of land in the Jemez Mountains which lie to the north, west, and south of Los Alamos are held by the U.S. Forest Service and the National

Park Service. This land is largely occupied by pine, fir, and aspen forests. Agriculture in the vicinity of the Laboratory is limited to home gardens and some cattle grazing. In the river valleys to the east, agriculture is limited to the cultivation of relatively small, irrigated plots. Primary crops are corn, chili, tree fruits, and alfalfa.

2.2 LOCATION INFORMATION

2.2.1 Seismic Standard

Consistent with the definition presented in 40 CFR 270.2 (NMHWMR 102.A.29) and the criteria provided in §270.14(b)(11)(i) (NMHWMR 302.A.4.b.[1]) and §264.18 (NMHWMR 206.B.8.a), the Area L chemical waste land disposal facility, and the TA-50 incinerator are existing facilities and thus seismic design standards are not applicable.

The Area L waste transfer, packaging and storage facilities and the treatment tanks are not existing hazardous waste facilities according to the definitions given in 40 CFR §270.2 (NMHWMR 102.A.29). Additionally, these facilities are located in Los Alamos County, New Mexico, which is listed in Appendix VI of 40 CFR §264 (NMHWMR 206.B.8). Figure 2-14 shows the location of Los Alamos facilities and the locations of nearby fault traces. This information and that presented in Section 2.2.3.2 is provided to demonstrate compliance with §264.18(a) (NMHWMR 206.B.8.a). As can be noted from Figure 2-14 no faults or fault traces with Holocene (or other) displacements have been located within 3000 feet of the locations of the pertinent waste management facilities.

2.2.2 Floodplain Standard

A floodplain map of Los Alamos National Laboratory is unavailable. However, personnel from the U.S. Department of the Army, Albuquerque District Corps of Engineers, Engineering and Planning Division, have evaluated the potential for flooding and have concluded that Los Alamos waste management facilities do not lie within the 100-year floodplain (see Appendix E).

2.2.3 Soils

An intensive soil survey of Los Alamos County, New Mexico has been prepared by the USDA, Soil Conservation Service, and Forest Service (1978). This soil survey was published in June 1978 under DOE Contract W-7405-ENG.36. It classifies the soils according to the soil series, soil type, and soil phase.

The principal parent materials of about 95 percent of the Los Alamos soils are Bandelier Tuff, volcanic rocks of the Tschicoma and Puye Formations, the balsaltic rocks of Chino Mesa, and the remnants of the El Cajete pumice. The remaining five percent of the soils were formed from colluvium, alluvium, andesitic rocks of the Paliza Canyon Formation, Cerro Rubio Quartz Latites, and tuffs associated with sediments of Cerro Toledo Rhyolite. Textures of these soils range from very fine sandy loams and clay loams to gravelly, sandy loams and stony, silty clay loams.

The soils in Area L (landfill area, Technical Area 54) are classified as Hackroy sandy loam. These soils consist of shallow, well-drained soils that have formed in material weathered from volcanic tuff on mesa tops (see Figure 2-15).

The Bandelier Tuff is formed by a series of ash flows and ash falls which are described as nonwelded, moderately welded, and welded tuff. The nonwelded, moderately welded and welded tuff grade one into the other, both vertically and horizontally (see Appendix F, "Physical Characteristics of the Bandelier Tuff"; Purtymun, no date).

The following description of the Hackroy soil series is taken from the published soil survey report for Los Alamos County:

> The surface layer of the Hackroy soils is a brown sandy loam, about 10 cm thick. The subsoil is a reddish brown clay, gravelly clay, or clay loam, about 20 cm thick. The depth to tuff bedrock and the effective rooting depth are 20 to 50 cm. Both

the Hackroy and the Hackroy-Rock outcrop mapping units exhibit slow permeability and low available water capacities. The Hackroy mapping unit has medium runoff and only moderate water erosion hazard, whereas the Hackroy-Rock outcrop unit has a moderate to severe water erosion hazard and medium to high runoff.

A typical profile of Hackroy sandy loam (one to five percent slope) is described as follows:

A1 0-8 cm, brown sandy loam, brown moist; weak fine subangular blocky structure; hard and friable moist; many fine roots; common fine tubular pores; milkily alkaline; abrupt smooth boundary.

B2 8-25 cm, dark reddish brown clay, dark reddish brown moist; moderate fine prismatic structure; hard and firm moist, sticky and plastic wet; many fine roots; few very fine tubular pores; 3% gravel; continuous clay films on peds; mildly alkaline; abrupt smooth boundary.

B3 25-30 cm, yellowish red gravelly clay, yellowish red moist; moderate fine subangular blocky structure; slightly hard and firm moist, sticky and plastic wet; many fine roots; 25% gravel, slightly calcareous; neutral.

R 30+ cm, tuff bedrock.

The soils are classified in the Unified Soil Classification System as SM, SM-SC, ML, and CL-ML. The Hackroy soils range from a sandy loam (SM) in the top eight centimeters of depth to a clay loam (CL) in depths of from eight to 30 centimeters. Permeability rates range from five to 15 centimeters per hour in the top layers down to 0.5-0.15 centimeters per hour or less in the lower layers. The shrink-swell potential is low. The available water holding capacity is 0.11 to 0.21 centimeters per centimeter and the soil pH is 6.6 to 7.8.

2.2.4 Geology

2.2.4.1 Regional Geology

Los Alamos National Laboratory is located on the east-central edge of the Jemez Mountains. The Jemez Mountains are formed by a complex pile

of volcanic rocks along the northwest margin of the Rio Grande rift in north-central New Mexico (Figure 2-16). The immense volume of Pliocene and Quaternary extrusive rocks that represents the Jemez volcanic field covers an area of over 30 miles east-to-west and 50 miles north-to-south and is over 4000 feet in thickness near the center.

The Jemez volcanic field uncomformably overlies the eastern part of the Nacimiento uplift and the southern Chama basin. The Chama basin, the San Juan Basin and the Gallina-Archuleta arch are part of the Colorado Plateau, whereas the Brazos and Nacimiento uplifts (Figure 2-16) are generally included with the Southern Rocky Mountains (Woodward, 1974). These features attained their present structural outlines during the Laramide orogeny of Late Cretaceous and early Tertiary time. Superimposed on these Laramide structures is the Rio Grande rift that began to form during the Miocene. Volcanism in the Jemez area began in Pliocene time after initial development of the rift with extrusive rocks accumulating along the western margin of the rift contemporaneously with late stages of rifting (Woodward, 1974). Initial eruptions were dominantly mafic to intermediate flows, which probably formed low, coalescing shields. Eruptive activity culminated in the early Pleistocene with explosive, caldera-forming eruptions of ash-flow tuffs, which covered most of the shields and formed two calderas, the largest and youngest of which is the Valles caldera located seven to ten miles west of Los Alamos, New Mexico (Kudo, 1974). Extensive studies of the Jemez volcanism have been performed by Ross et al. (1961), Bailey et al. (1969), Smith and Bailey (1966, 1968) and Smith et al. (1970).

Major tectonic features here are dominated by vertical movements. Minor horizontal shift and compressional features, however, occur in parts of the Colorado Plateau and Southern Rocky Mountain structures. The stratigraphy, structure and tectonics of the Jemez Mountains and surrounding area have been the topics of a large number of reconnaissance and detailed studies (c.f., Dane, 1948; Kelley, 1954, 1955; Griggs, 1964; Woodward et al., 1972, 1973, 1974).

2.2.4.2 Site-Specific Geology

The Los Alamos facilities are located on the western part of the Pajarito Plateau (Figure 2-17), which forms an apron of volcanic and sedimentary rocks around the eastern flanks of the Jemez Mountains. The plateau is aligned approximately north-south and is about 20 to 25 miles in length and five to ten miles wide. It is bounded on the east by White Rock Canyon (which contains the Rio Grande), on the north and northeast by the Puye Escarpment and on the west by Sierra de los Valles. The Pajarito Plateau slopes gently eastward from an elevation of about 7500 feet near the mountains toward the Rio Grande where it terminates at an elevation of about 5400 feet in steep slopes and cliffs formed by down cutting of the river. The plateau has been dissected into a number of narrow mesas by southeastward-trending intermittent streams. The stratigraphy and structural features of the Pajarito Plateau are described in the following sections.

Stratigraphy

The Pajarito Plateau is formed by a series of sediments and volcanic extrusive rocks and is typical of a terrain produced by concurrent sedimentation and volcanism (Figure 2-18). The base of the plateau is represented by the Miocene Santa Fe Group, which in this area consists of friable to moderately well cemented siltstone and sandstones that contains lenses of conglomerate and clay (Purtymun and Johansen, 1974). Some basalt flows are interbedded with the sediments in the unit. The lower part of the Santa Fe is comprised of fine arkosic sand and the upper part is composed of very coarse arkosic sand, latitic gravels and volcanic detritus.

Overlying the Santa Fe Group are the volcanic extrusives of the Tschicoma Formation, which consist of latite, quartz-latite flows and pyroclastic rocks. The Tschicoma has been extruded through the Santa Fe west of Los Alamos, forming the lower part of the Jemez Volcanic Pile. The thickness of the Tschicoma is unknown as the base of the unit is not exposed in the Pajarito Plateau area.

Interfingering with the Tschicoma and overlying the Santa Fe Group are the conglomeratic and fanglomeratic rocks of the Puye Formation. The Puye contains a thin basal conglomerate composed of pebble through small boulder size clasts of quartzite, quartz, granite and volcanic debris in a matrix of coarse sand (Griggs, 1964). Overlying the conglomerate is a thicker fanglomerate comprised of debris that was washed eastward from the volcanic rocks of the Tschicoma Formation. The fanglomerate consists of a series of conglomerates and siltstones with up-to-boulder size clasts in a matrix of silt and sand. Beds of volcanic ash that were water-lain or possibly represent air fall materials are also present within the Puye Formation. The overall thickness of the Puye ranges from about 725 feet in the north-central part of the Pajarito Plateau to 220 to 270 feet along the east edge of the Puye Escarpment to 60 to 80 feet at the north end of White Rock Canyon (Griggs, 1964).

Overlying and interfingering with the conglomerates of the Puye Formation are the basaltic rocks of Chino Mesa. The basalt, which is over 1300 feet thick near the volcanic vents near Chino Mesa from which it originated (Figure 2-18), thickens southward along the river and thins westward (Griggs, 1964).

The Pajarito Plateau is capped for the most part by the Bandelier Tuff, which ranges in thickness from about 1050 feet along the western edge of the plateau to about 260 feet just west of White Rock, New Mexico. The Bandelier is composed of a basal unit of pebble-size pumice, overlain by a poorly sorted rhyolite tuff breccia and capped by a cliff-forming welded rhyolite tuff.

Structure

The description of the geologic structure presented here was taken primarily from Griggs (1964). The geologic structure of surface rocks in the Los Alamos area is simple, although the structure of underlying rocks may be complex. The regional dip of surface rocks of the Pajarito

Plateau is one to two degrees east. Beds of the Santa Fe Group in the easternmost part of the area dip gently to the west.

The rocks of the Pajarito Plateau are broken by several northward-trending normal faults (Figure 2-14). The Pajarito fault zone lies near the western edge of the plateau in the southern part of the area. The Bandelier Tuff at the southern edge of the area and on the east side of the Pajarito fault is downthrown about 300 feet in relation to the tuff on the west side of the fault. The fault farther north splits into two smaller subparallel faults, both downthrown to the east. Displacement decreases northward until both faults die out. The fault planes dip steeply to the east.

Two other normal faults, en echelon to the Pajarito zone, are located to the northeast. These faults are downthrown to the west and the fault planes dip to the west also. The westernmost of the faults extends southward for a short distance subparallel to the northern extension of the Pajarito zone. The Bandelier Tuff is displaced about 50 feet across the en echelon faults. The older Tschicoma Formation, however, may be displaced as much as 500 feet along the easternmost fault. This difference in displacement tends to indicate recurring movement along a pre-Bandelier fault.

2.2.5 Groundwater[1]

The only aquifer of the Pajarito Plateau capable of providing municipal and industrial water supply is in rocks of the Santa Fe Group and Puye Formation. The upper surface of this aquifer rises westward from the Rio Grande through the Santa Fe and into the lower part of the Puye beneath the central and western parts of the plateau (Figure 2-17). The water in the aquifer moves from the major recharge area of the intermountain basins of the Valles Caldera eastward toward the Rio Grande

[1] The discussion of groundwater conditions in the Los Alamos area was extracted primarily from Purtymun and Johansen (1978) and Griggs (1964).

where a part is discharged into the river through seeps and springs (Figure 2-17). The intermountain basins are filled with deposits of clay, sand and gravels which are underlain by volcanic debris resulting from the collapse of the caldera. The sediments and volcanics in the basins are highly permeable and saturated and recharge the main aquifer in the Santa Fe Group.

Minor amounts of recharge may occur in the deep canyons containing perennial streams on the flanks of the mountains. The intermittent streams in canyons which are cut into the plateau add little if any recharge to the main aquifer. Water balance calculations for the area of the Los Alamos facilities indicate that the annual evapotranspiration rate exceeds the annual precipitation rate. Additionally, field investigations have shown that infiltration of precipitation into the Bandelier Tuff is essentially zero. Further, the moisture content of the tuff at the Los Alamos facilities is quite low, varying from about 0.2 to two percent by weight. Typically, moisture contents greater than four percent are required to permit migration of moisture in the Bandelier Tuff.

Figure 2-19 shows the locations of a number of wells completed in the Santa Fe and Puye Formations. Also shown are the contours drawn to depict the elevation of the top of the main aquifer and the depths at which water was encountered in the main aquifer at each well location. The gradient on the surface of the aquifer averages about 60 feet per mile beneath the plateau in the Puye Formation with the depth to water decreasing along with the gentle slope of the surface of the plateau from about 1200 feet to the west to about 600 feet to the east. The depth to the water table under the Los Alamos facilities ranges from about 900 to 1200 feet except in the deeper canyons. The gradient of the aquifer steepens to about 100 feet per mile along the eastern edge of plateau because of the lesser permeability of the Santa Fe Group sediments. The aquifer is under water table conditions in the western margin of the plateau and is artesian along the eastern edge and along the Rio Grande.

As expected, wells completed into the high permeability sediments and volcanics of the Santa Fe Group and Puye Formation are very productive. Wells located in the eastern well field, which penetrate about 1600 feet of the fine grained sediments of the Santa Fe Group, yield an average of 500 gallons per minute with a specific capacity of eight gallons per minute per foot of drawdown. Wells in the central part of the plateau, which are completed in the Puye Formation and coarser sediments of the Santa Fe Group, are higher yielding and average 1000 gallons per minute with a specific capacity of about 35 gallons per minute per foot of drawdown.

The chemical quality of water varies among wells due to local conditions within the aquifer. In general, the quality of water is good; total dissolved solids (TDS) range from about 200 milligrams per liter to less than 500 milligrams per liter.

The Tschicoma Formation and the Bandelier Tuff, west of the Pajarito Plateau on the flank of the mountains, contain localized, small bodies of perched water. The Bandelier tuff contains no perched water beneath the Pajarito Plateau.

2.3 TRAFFIC PATTERNS

The rugged topography of alternating mesas and canyons present at Los Alamos limits traffic circulation to only a few major arterial roads. This road system is shown in Figure 2-2. A total of 132 miles of paved roads are present at Los Alamos.

The main access route to Los Alamos is State Road 4. The majority of traffic to Los Alamos approaches on State Road 4 from the east, although an alternate access route, State Road 4 through the Jemez Mountains, is available.

The pattern of east-west trending canyons at Los Alamos prohibits north-south automobile travel in nearly all portions of the laboratory with the exception of Diamond Drive. Los Alamos Canyon is spanned at Diamond Drive by an 820-feet-long steel arch bridge which was completed in 1951 (Los Alamos National Laboratory, 1984). This bridge provides the main access between the Los Alamos facilities located on either side of Los Alamos Canyon.

Roads at Los Alamos carrying the greatest traffic volumes include Diamond Drive, Pajarito Road, and East and West Jemez Drive. These roads were constructed with a ten-inch-thick base course overlain with a five-inch-thick asphaltic concrete surface. These roads were designed and built in conformance with American Association of State Highway Transportation Officials (AASHTO) specification HS-20. This specification is intended to accommodate truck loading capacities of 32,000 pounds per axle.

Currently, over 9000 people are employed at Los Alamos (including Los Alamos personnel and contractors). Roughly 3500 people commute to the laboratory daily from communities other than Los Alamos and White Rock (Los Alamos National Laboratory, 1982). Traffic flow at the Laboratory is controlled by traffic lights, stop signs, and yield signs. Access to the high-security technical areas is controlled by security guards and is restricted to vehicles having specific identification. Only personnel having appropriate security clearance and identification, or escorted visitors are allowed access to the secured technical areas. Vehicles and personnel entering these technical areas are subject to periodic search by security personnel. Traffic signals and signs located in the vicinity of hazardous waste management facilities are shown on Figures 2-3 and 2-4.

Mixed wastes can be generated at most of the 32 active Los Alamos technical areas. Wastes are transported from the generating laboratories and shops to the various waste management facilities on an as-needed

basis. The chemical wastes are generally received in small bottles (i.e., a gallon or less) or containers. These are packed in cardboard boxes or drums for transport. The volume of waste received in each instance varies considerably. Because wastes are generated at facilities dispersed throughout the laboratory, waste transport occurs (at least occasionally) on nearly all of the roads located within the Laboratory. A schematic diagram of Los Alamos waste management as is shown in Figure 2-20.

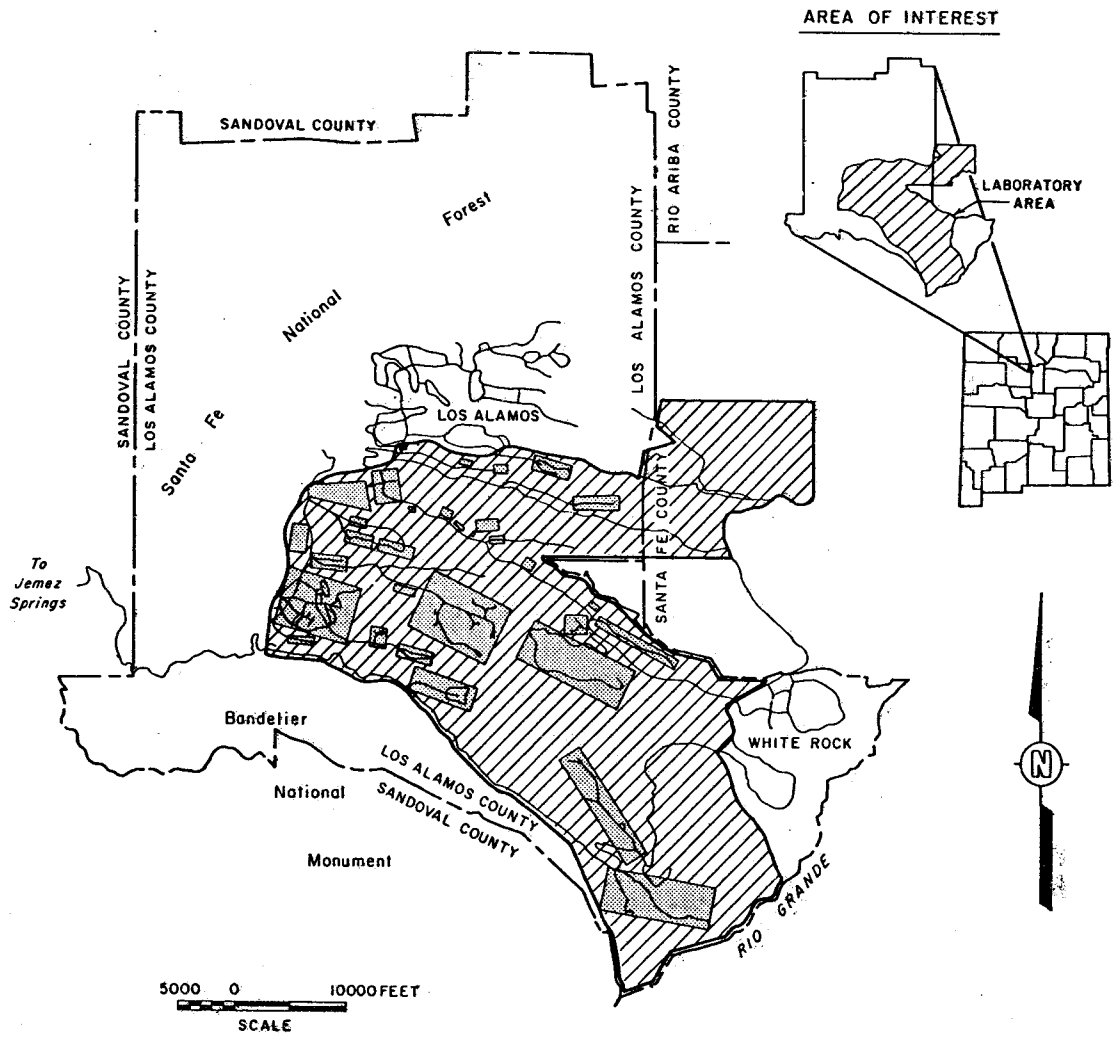

FIGURE 2-1

LOCATION MAP

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

IT CORPORATION

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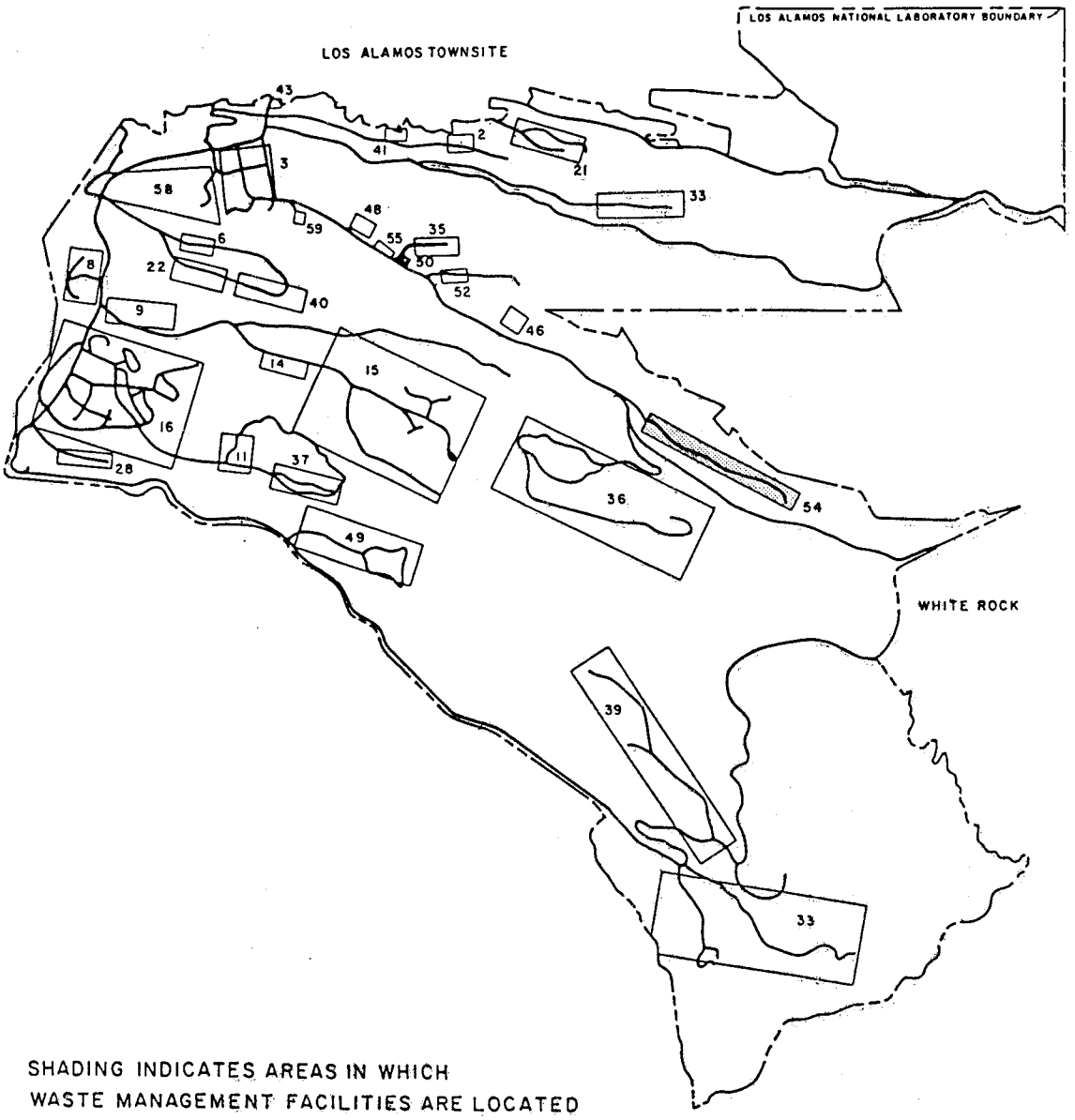


SHADING INDICATES AREAS IN WHICH WASTE MANAGEMENT FACILITIES ARE LOCATED

N

4000 0 4000

SCALE

FIGURE 2-2

LOS ALAMOS TECHNICAL AREAS

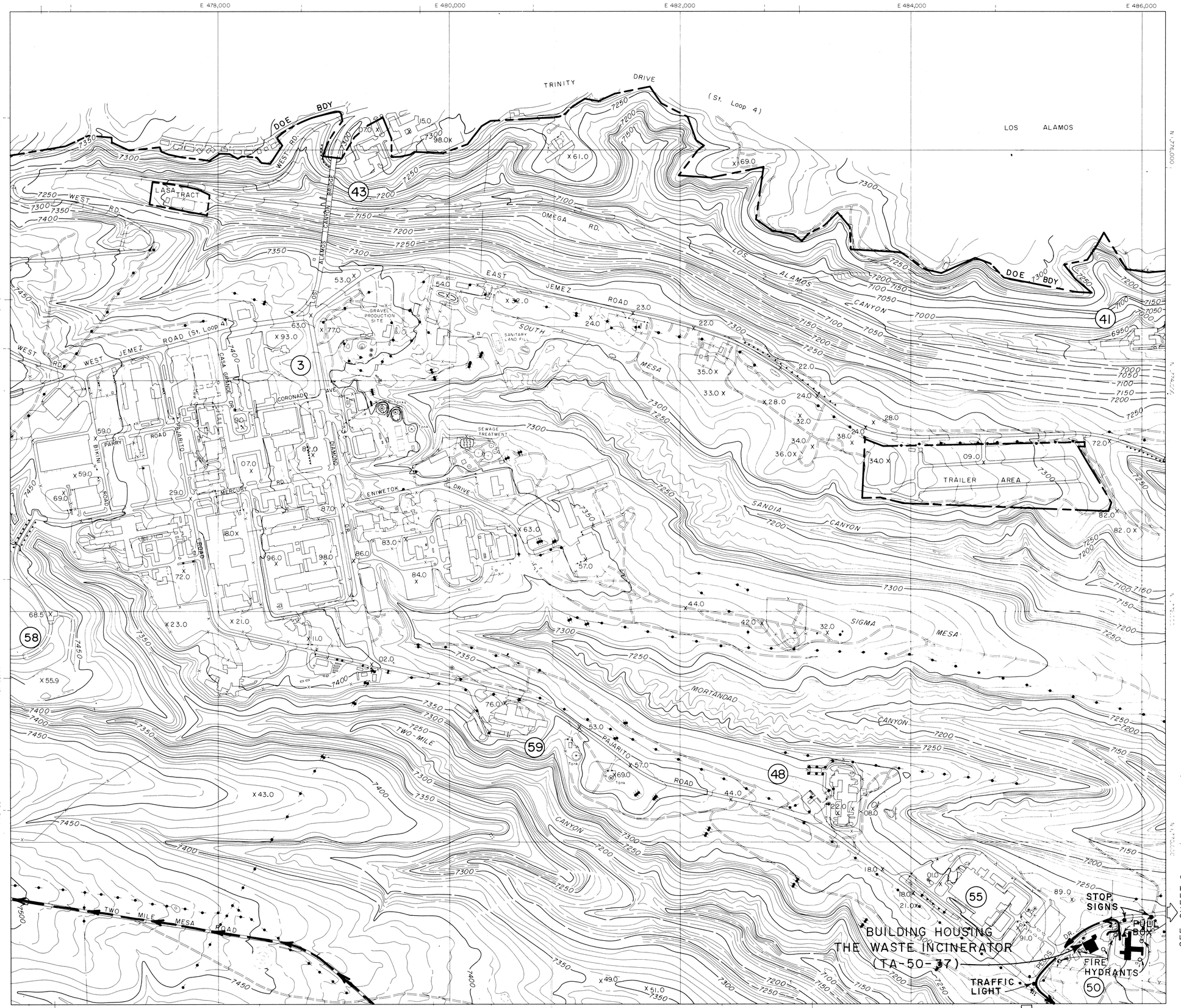
PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY

LOS ALAMOS, NEW MEXICO

IT CORPORATION

32803



LEGEND

x 93.0	SPOT ELEVATION	X 768,000	NMSP GRID
6900	INDEX CONTOUR	3,989,000 N	UTM GRID
	INTERMEDIATE CONTOUR 10ft.	N 240+00	LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
	COUNTY LINES – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES.		
	DOE BOUNDARY – X & Y COORDINATE DATA PROVIDED BY LASL.		
	DOE BOUNDARY – SURVEY DESCRIPTIONS OR RECORD PLATS PROVIDED BY LASL.		
	DOE BOUNDARY – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES BASED ON PROJECTED COUNTY LINES.		

35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD	Tank	TANK
	JEEP TRAIL		POND
	CULVERT	RW	RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL	Earth work	EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT

NORTH

GRID NMSP NORTH

MAPPING COMPLETED BY PHOTOGRAMMETRIC METHODS, UTILIZING 1:30,000, 1:12,000 & 1:13,200 PHOTOGRAPHY, OBTAINED IN NOV. 1976 & JUNE 1980 WITH ZEISS RMK A 15/23 CAMERAS OF 153.42 & 152.43mm C.F.L. RESPECTIVELY. MAPPING BASED ON CONTROL SURVEYS TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE). MAPPING COMPLETED IN ACCORDANCE WITH NATIONAL MAP ACCURACY SPECIFICATIONS.

GRAPHIC SCALE: 1 in.=400 ft.

CONTOUR INTERVAL 10 ft.

TECHNICAL AREAS

3 SM–SITE	41 W–SITE	59 WM–SITE
43 HRL–SITE	48 RC–SITE	
58 TWO MILE NORTH–SITE	55 PLUTONIUM FACILITY SITE	
59 OH–SITE		

LOS ALAMOS SCIENTIFIC LABORATORY

BLOUNT ENGINEERS, INC.

FIGURE 2-3

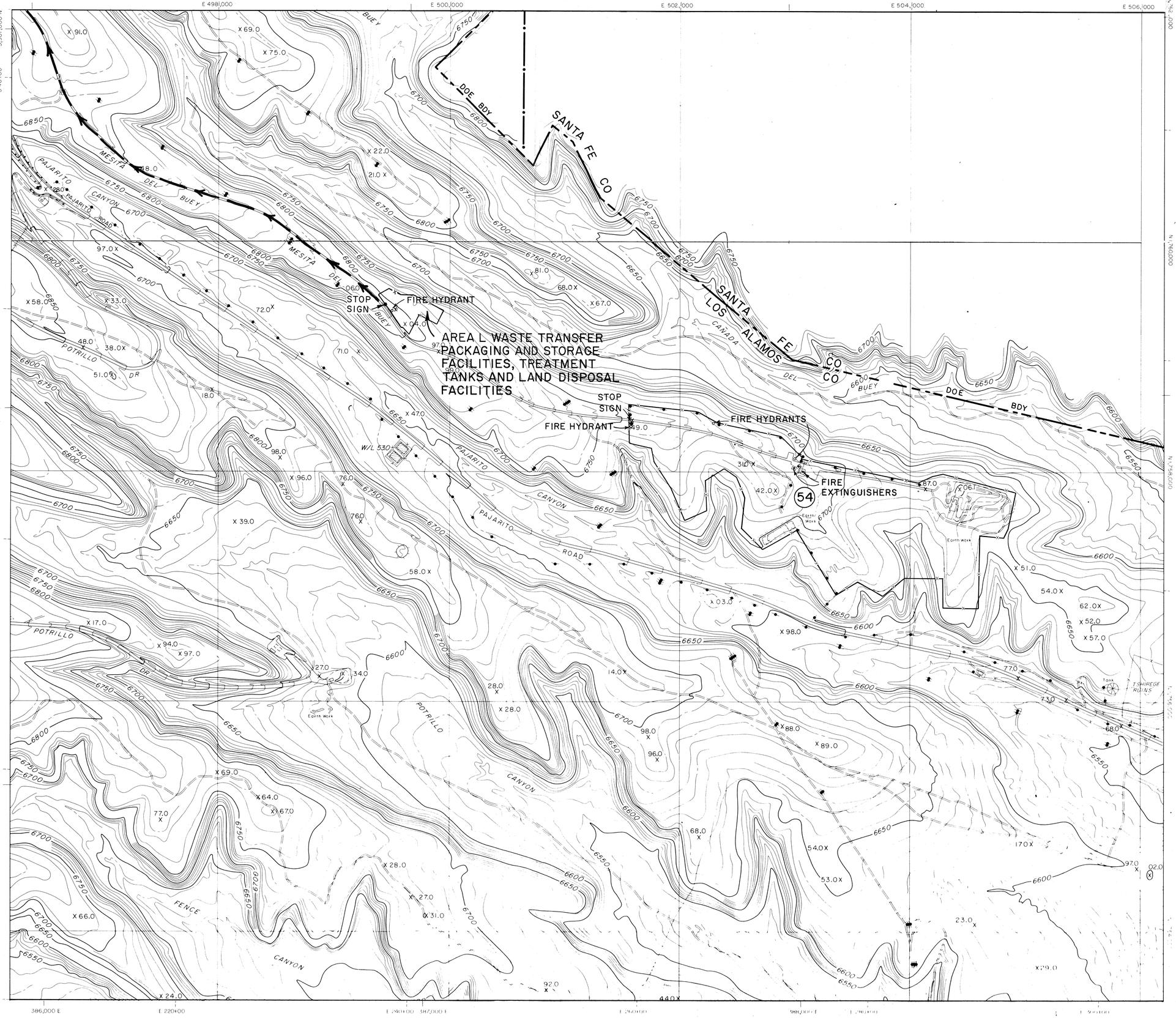
CONTOUR MAP SHOWING THE LOCATION OF THE TA-50 WASTE INCINERATOR

LAB JOB NO. 5682

1"=400' SCALE

PLAN / TOPO

SHEET 4 OF 25

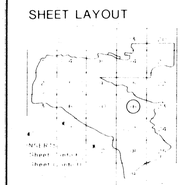


LEGEND

X 93.0	SPOT ELEVATION	N 768,000	NMSP GRID
6900	INDEX CONTOUR	3,989,000 N	UTM GRID
	INTERMEDIATE CONTOUR 10ft.	N 240+00	LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
	COUNTY LINES – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES.		
	DOE BOUNDARY – X & Y COORDINATE DATA PROVIDED BY LASL.		
	DOE BOUNDARY – SURVEY DESCRIPTIONS OR RECORD PLATS PROVIDED BY LASL.		
	DOE BOUNDARY – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES BASED ON PROJECTED COUNTY LINES.		

35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD		TANK
	JEEP TRAIL		POND
	CULVERT	RW	RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL	Earth Work	EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT



NORTH

GRID NMSP NORTH

MAPPING COMPLETED BY PHOTOGRAMMETRIC METHODS, UTILIZING 1:30,000, 1:12,000 & 1:13,200 PHOTOGRAPHY, OBTAINED IN NOV. 1976 & JUNE 1980 WITH ZEISS RMK A 15/23 CAMERAS OF 153.42 & 152.43mm C.F.L. RESPECTIVELY. MAPPING BASED ON CONTROL SURVEYS TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE). MAPPING COMPLETED IN ACCORDANCE WITH NATIONAL MAP ACCURACY SPECIFICATIONS.

GRAPHIC SCALE 1 in = 400 ft

CONTOUR INTERVAL 10 ft

TECHNICAL AREAS

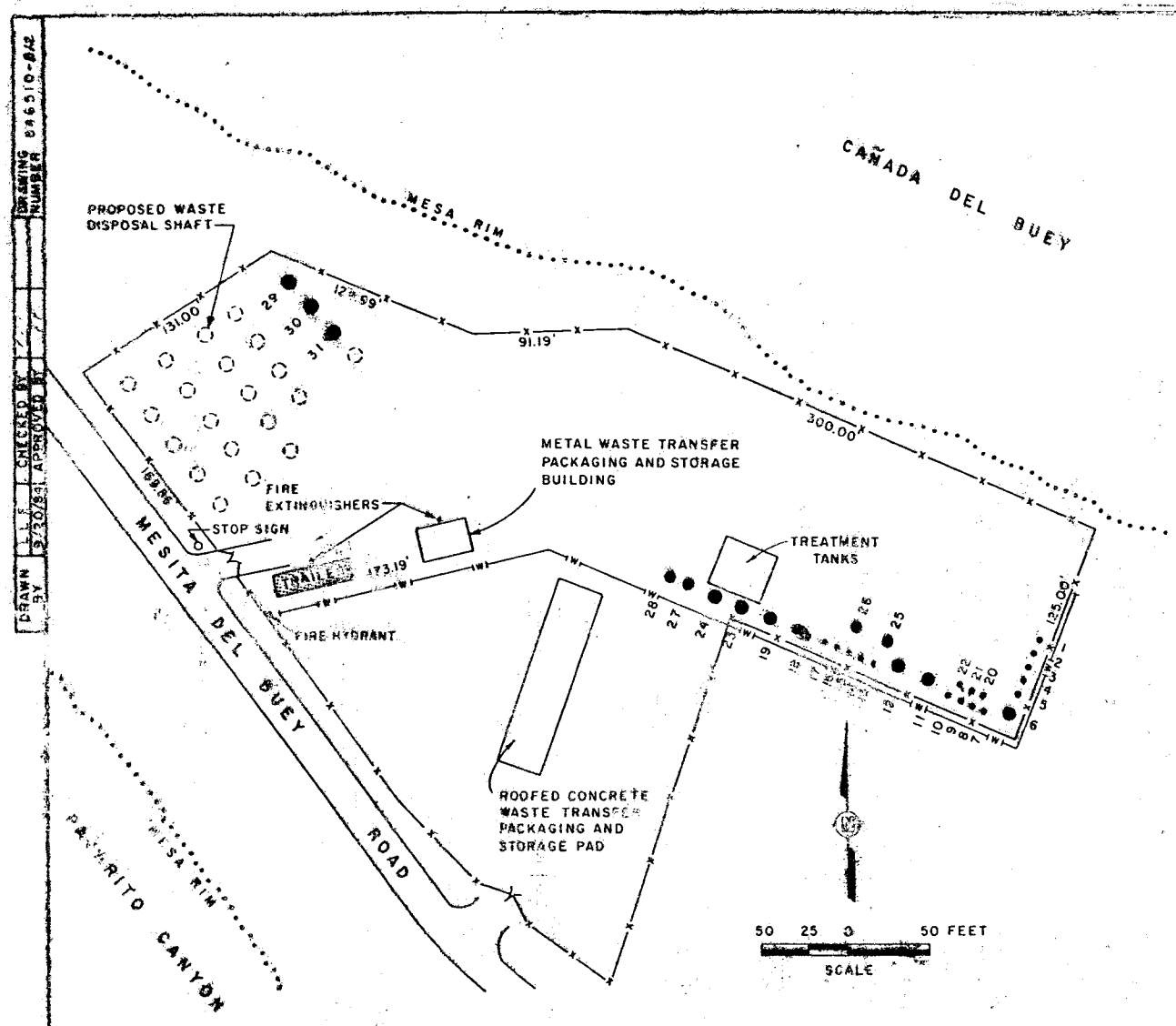
(-) MD-SITE

LOS ALAMOS SCIENTIFIC LABORATORY

FIGURE 2-4

CONTOUR MAP SHOWING THE LOCATION OF AREA L WASTE MANAGEMENT FACILITIES

LAB JOB NO. 5682
1" = 400' SCALE
PLAN / TOPO
SHEET 16 OF 25



AREA L SHAFTS
(INFORMATION EXPIRES FISCAL 1985)

SHAFT NO.	SHAFT DIAMETER (FEET)	DATE DRILLED	DATE CAPPED	CONTENTS
1	3	4/80	9/83	ORGANIC(2)
2	3	2/75	7/75	GASES & GASES
3	3	2/75	11/78	ORGANIC
4	3	2/75	5/80	ORGANIC
5	3	2/75	6/77	WASTE OIL
6	4	6/75	6/79	REACTIVE
7	3	6/75	6/79	REACTIVE
8	3	6/75	6/79	REACTIVE
9	3	6/75	6/79	GAS CYLINDERS
10	3	6/77	6/79	WASTE OIL
11	8	1/78	7/79	WASTE OIL/SOLVENT
12	4	1/78	7/79	WASTE OIL/SOLVENT
13	3	6/79	5/82	INORGANIC
14	3	6/79	5/82	REACTIVE
15	3	6/79	5/82	REACTIVE
16	3	6/79	5/82	GAS CYLINDERS
17	3	6/79	5/82	ORGANIC
18	8	6/79	6/80	WASTE OIL
19	8	4/80	5/82	WASTE OIL
20	3	4/80	9/83	INORGANIC
21	3	4/80	OPEN	GAS CYLINDERS
22	3	4/80	9/83	ORGANIC
23(3)	8	4/82	3/84	WASTE OIL
24(4)	8	4/82	4/84	ORGANIC & WASTE OIL
25	6	9/82	OPEN	INORGANIC
26	6	9/82	3/84	ORGANIC
27	4	1/83	2/85	SPECIAL(5)
28	4	1/82	OPEN	SPECIAL
29	6	12/83	9/84	ORGANIC
30	6	12/83	9/84	ORGANIC
31	6	12/83	9/84	ORGANIC
32	4	9/84	9/84	ORGANIC
33	6	9/84	2/85	ORGANIC
34	6	2/85	OPEN	ORGANIC

NOTES:
(1) ALL SHAFTS ARE APPROXIMATELY 60 FEET DEEP.
(2) SHAFT ONE CONTAINS WASTES NOT IN DRUMS.
(3) PRIOR TO SHAFT 23, LIQUIDS WERE DISPOSED OF IN DRUMS WITHOUT ADDING ABSORBENTS.
(4) MIDDLE SECTION OF THIS SHAFT NOT USED.
(5) USED FOR MISCELLANEOUS WASTE REQUIRING GREATER ISOLATION.

FIGURE 2-5

TA-54 AREA L
WASTE MANAGEMENT FACILITIES

PREPARED FOR

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LOS ALAMOS, NEW MEXICO

IT CORPORATION

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19 1233 HERCULENE, ABRAMITH CO., PGH., PA

DRAWING NUMBER 846510-A27

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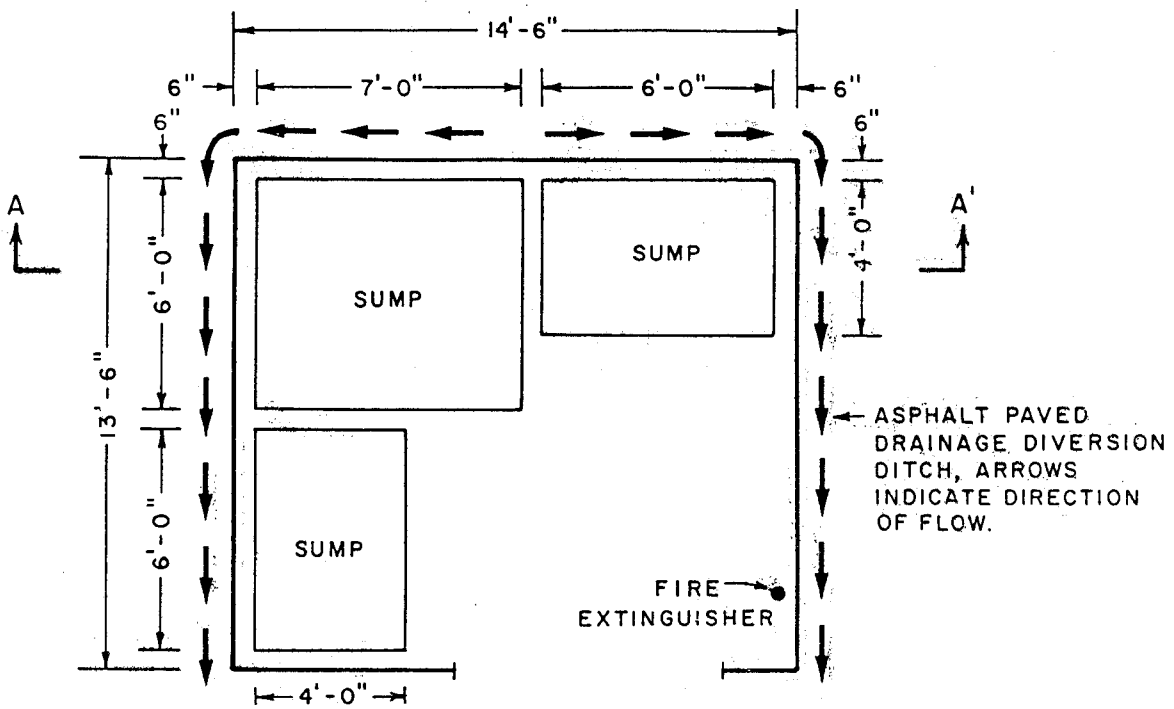
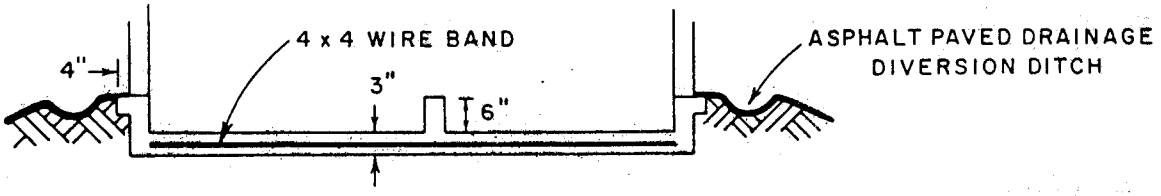
DRAWN BY 3/85



FLOOR PLAN



FOUNDATION AND SUMP

(Section A-A')

FIGURE 2-6

TA 54, AREA L WASTE TRANSFER, PACKAGING, AND STORAGE BUILDING

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY

LOS ALAMOS, NEW MEXICO

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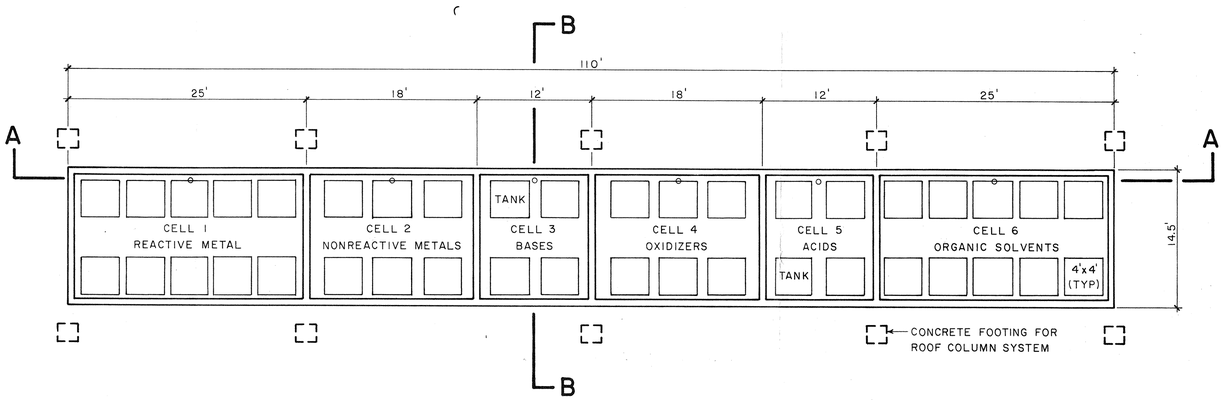
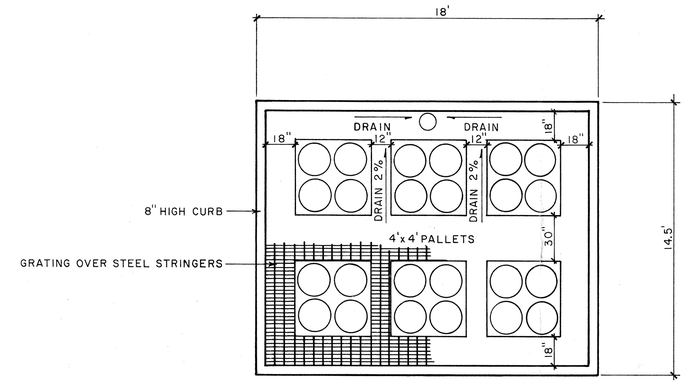


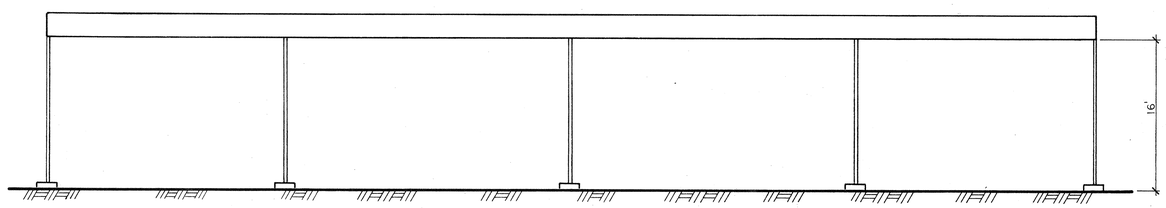
FLOOR PLAN OF CHEMICAL STORAGE AREA

SCALE: 1/8" = 1'



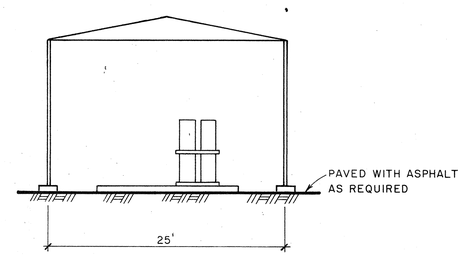
TYPICAL CELL AND SPACING OF PALLETS WITH 55 GALLON DRUMS

SCALE: 1/4" = 1'



ROOF SYSTEM OVER CHEMICAL STORAGE PAD

SCALE: 1/8" = 1'

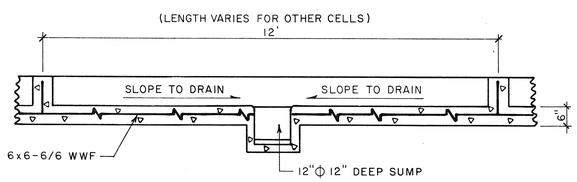


ROOF SYSTEM END VIEW

SCALE: 1/8" = 1'

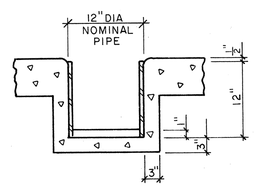
GENERAL NOTES

1. METAL ROOF SYSTEM ONLY WILL HAVE A 2:12 PITCH
2. SYSTEM IS 25' WIDE, 110' (120' OPTIONAL) LONG, 16' NOMINAL EAVE HEIGHT
3. 30 POUND ROOF LOAD
4. PURCHASE REQUEST TO FURNISH & ERECT ROOF SYSTEM
5. FOOTING TO BE CONSTRUCTED BY THE LABORATORY/ZIA
6. CONCRETE PAD TO BE CONSTRUCTED BY THE LABORATORY/ZIA
7. LAY ASPHALIC CONCRETE AROUND THE CONCRETE PAD AS REQUIRED - (2" THICKNESS)



SECTION A-A OF CELL 3 (TYP)

SCALE: 1/2" = 1'

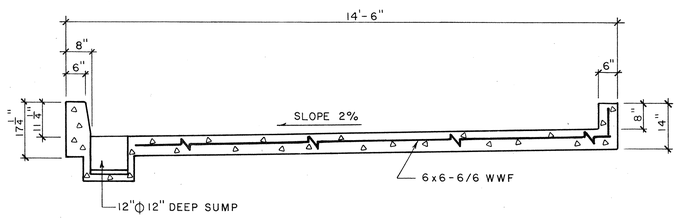


SUMP DETAIL

NO SCALE

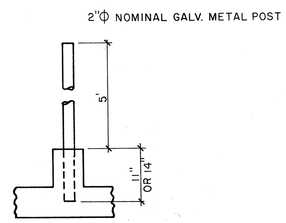
GENERAL NOTES

1. INSTALL 5' (MIN) HIGH BARRIER WALL BETWEEN CELLS
2. SLOPE FLOORS TO DRAIN TOWARD SUMP
3. METAL GRATING WILL BE USED TO STORE DRUMS 8" ABOVE FLOOR LEVEL
4. CONCRETE WILL HAVE A COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS
5. PAINT FLOOR WITH A PRIMER AND EPOXY PAINT
6. ACCESS FOR PALLET STACKING WILL BE FROM TWO SIDES
7. PALLETS HOLD FOUR 55 GALLON DRUMS AND WILL BE STACKED TWO HIGH



SECTION B-B OF CELL 3 (TYP)

SCALE: 1/2" = 1'



POST INSTALLATION DETAIL

IF USED FOR BARRIER WALL CONSTRUCTION

NO SCALE

FIGURE 2-7

TA54, AREA L WASTE STORAGE PAD

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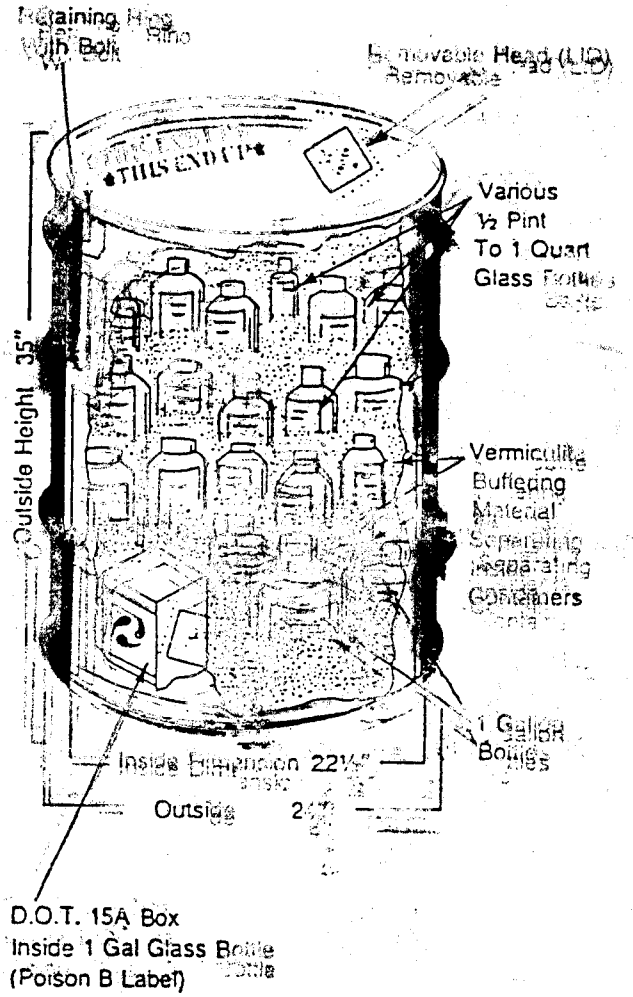

FIGURE 2-8
"LAB PACK" DRUM - TYPICAL
D.O.T. 15A 80M TYPE
REINFORCED STEEL WITH
REMOVABLE HEAD (LID)

PREPARED FOR
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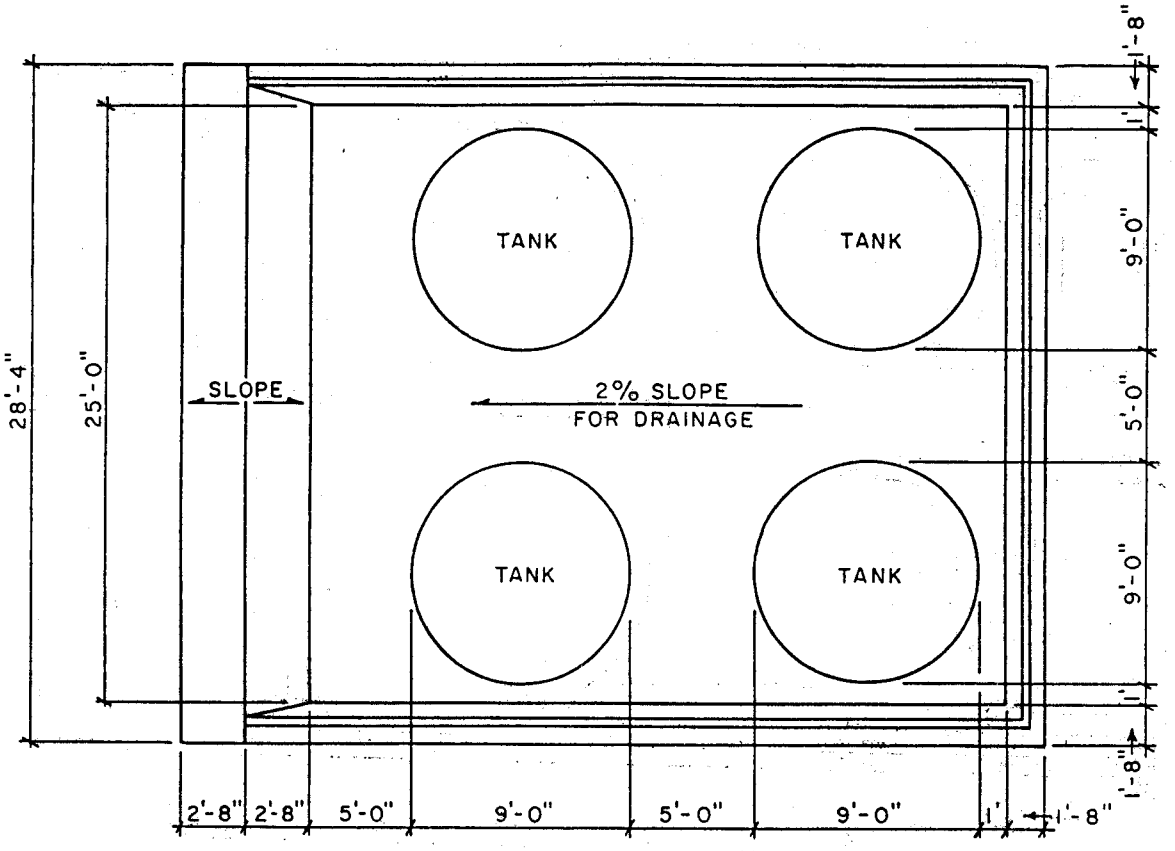
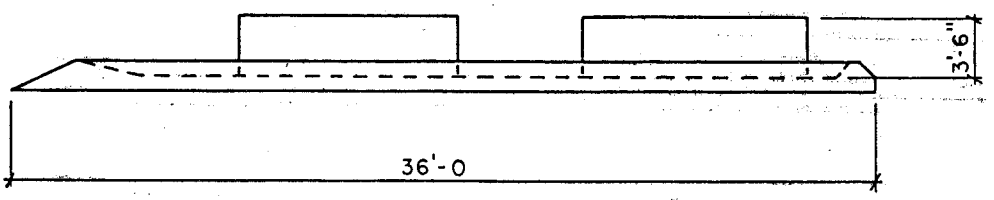
LOS ALAMOS, NEW MEXICO

DRAWN BY | 4/25/84 | APPROVED BY | NUMBER 07-05/0-R20

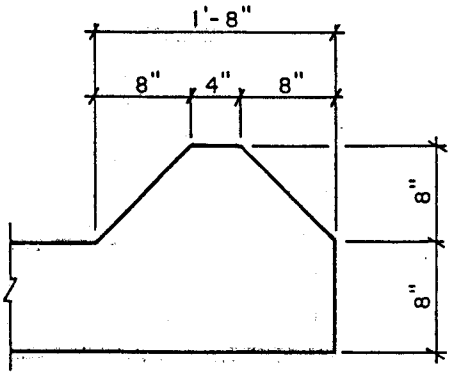
32803



PLAN VIEW
SCALE: 1/8" = 1'-0



SIDE VIEW
SCALE: 1/8" = 1'-0



CURB DETAIL
SCALE: 3/4" = 1'-0

FIGURE 2-9

TA 54, AREA L
TREATMENT TANKS
PLAN

PREPARED FOR

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LOS ALAMOS, NEW MEXICO

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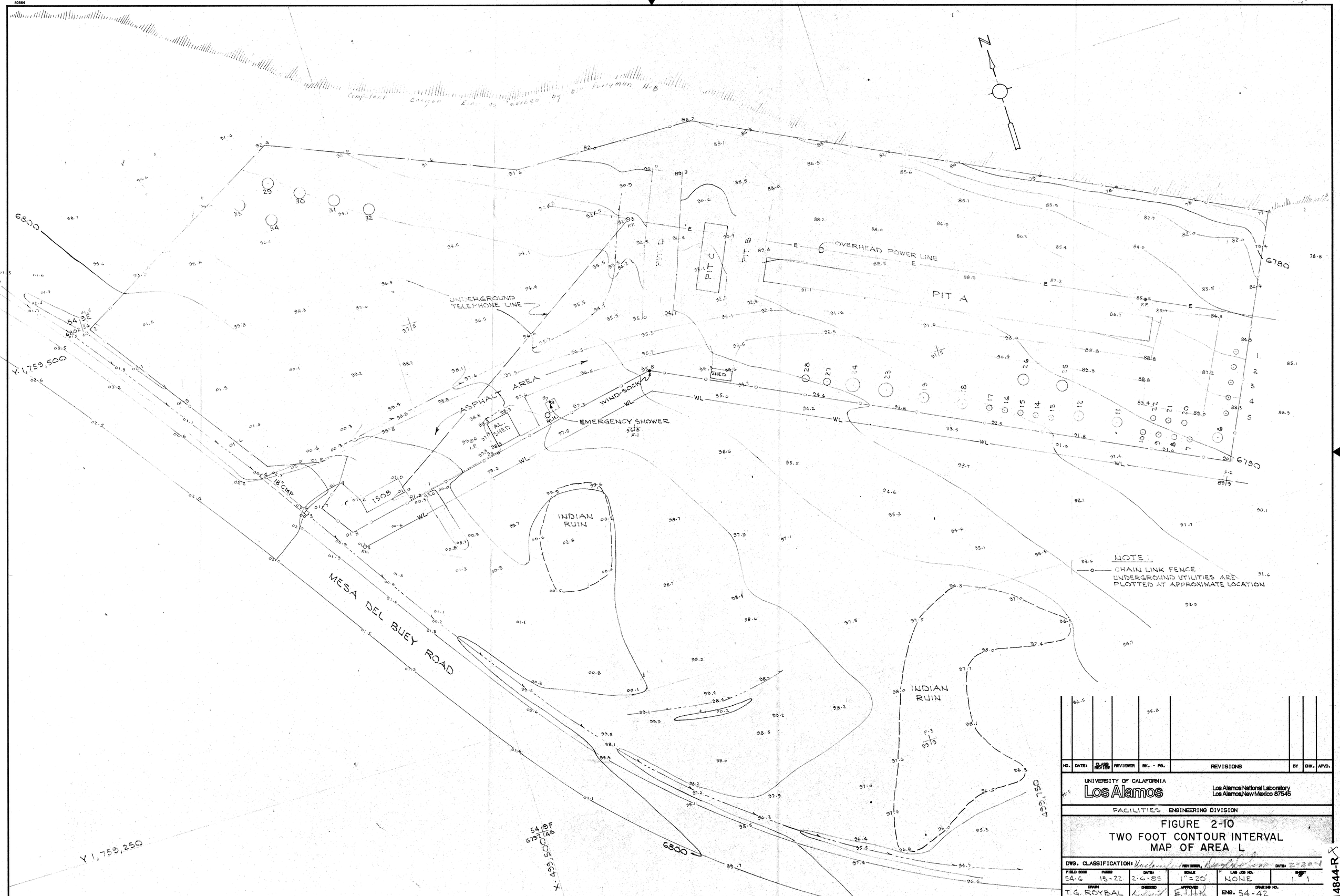

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Los Alamos National Laboratory
Los Alamos, New Mexico 87545

FACILITIES ENGINEERING DIVISION

FIGURE 2-10
TWO FOOT CONTOUR INTERVAL MAP OF AREA L

DWG. CLASSIFICATION: Unclassified REVIEWER: [illegible] DATE: 2-22-8[illegible]

FIELD BOOK	PAGES	DATE:	SCALE	LAB JOB NO.	SHEET
54-6	15-22	2-6-85	1" = 20'	NONE	1 of 1

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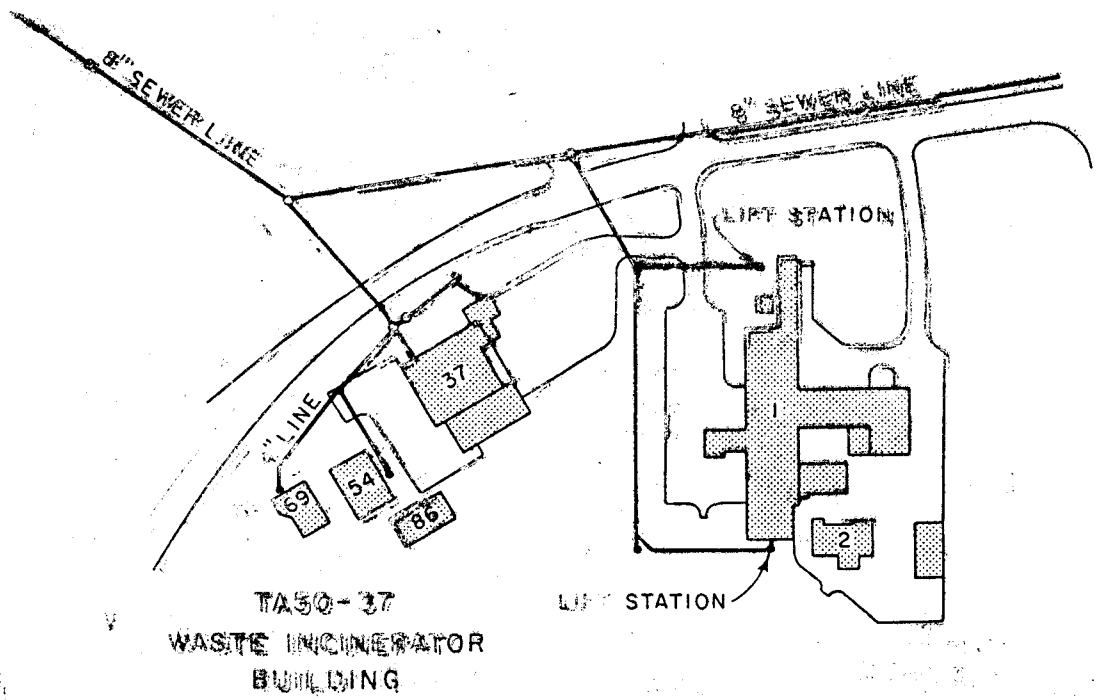

FIGURE 2-11

SANITARY SEWER LINES

AT TA-50

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LOS ALAMOS, NEW MEXICO

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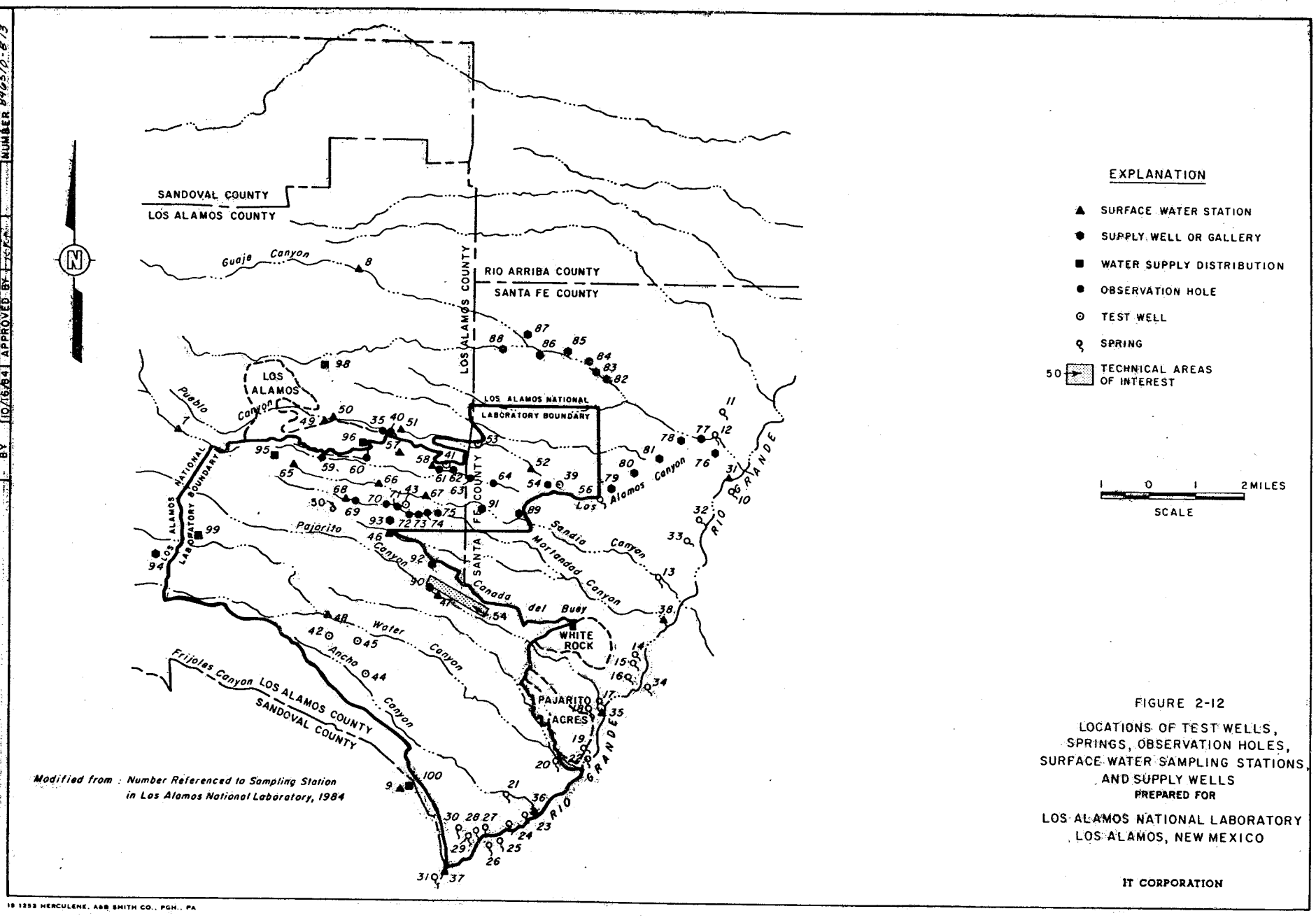

FIGURE 2-12

LOCATIONS OF TEST WELLS, SPRINGS, OBSERVATION HOLES, SURFACE WATER SAMPLING STATIONS, AND SUPPLY WELLS

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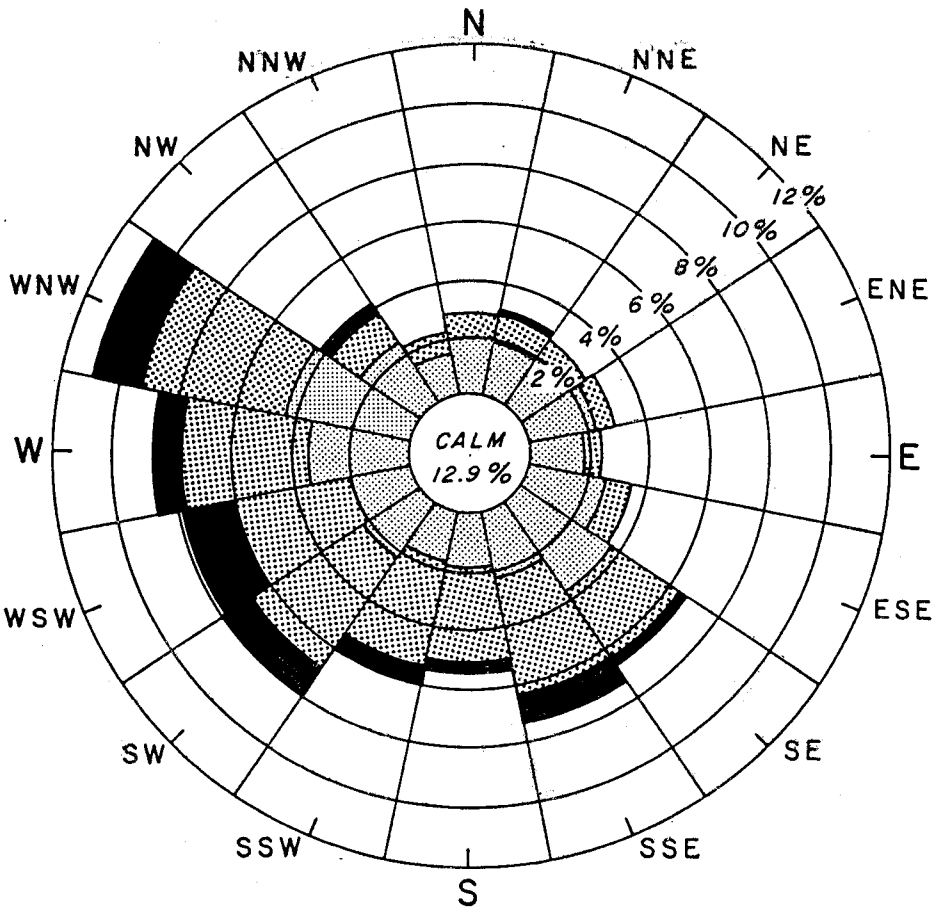

SPEED (m/sec)

1-2.5

2.5-5

5+

(AVG. SPEED = 2.8)

FIGURE 2-13
ANNUAL SURFACE WIND SPEED
AND DIRECTION, 1983,
TECHNICAL AREA 59
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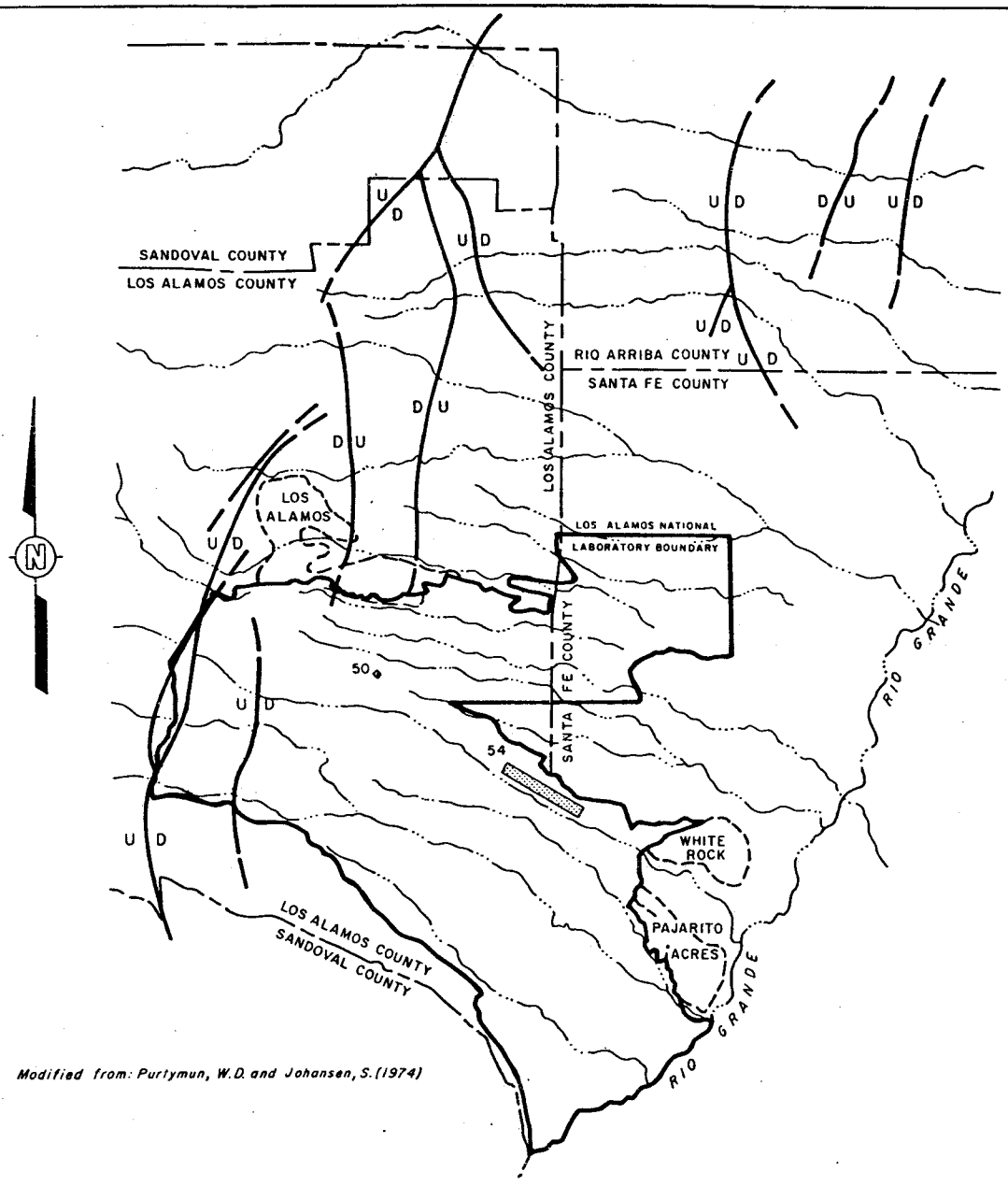

Modified from: Purtymun, W.D. and Johansen, S. (1974)

EXPLANATION

U/D MAJOR FAULTS, D INDICATES DOWNTHROWN SIDE, U INDICATES UPTHROWN SIDE

50 TECHNICAL AREAS OF INTEREST

1 0 1 2 MILES

SCALE

FIGURE 2-14

LOCATION OF LOS ALAMOS FACILITIES RELATIVE TO THE NEARBY FAULT TRACES

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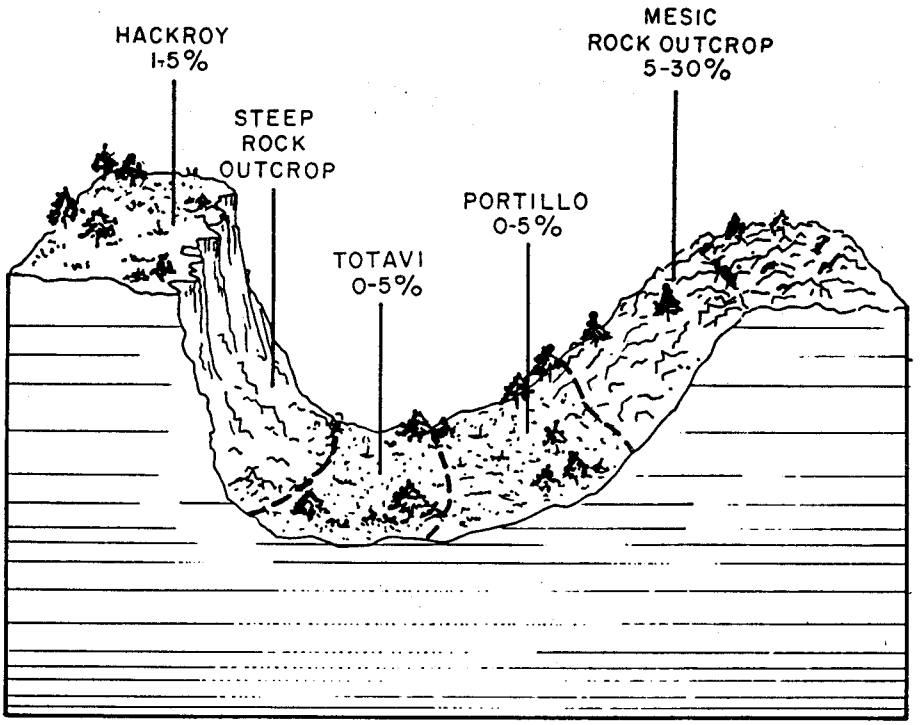

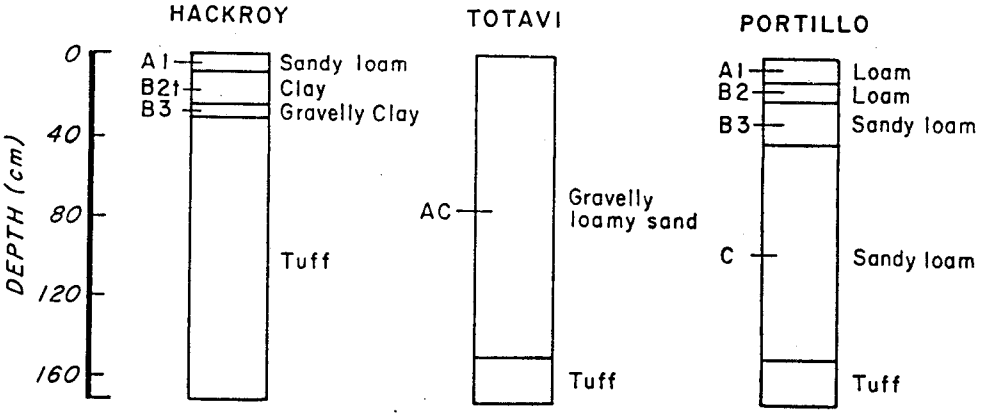

FIGURE 2-15

RELATIONSHIPS OF SLOPE, VEGETATION AND PARENT MATERIAL TO HACKROY, TOTAVI, AND PORTILLO SOILS

Reference; USDOE, 1978

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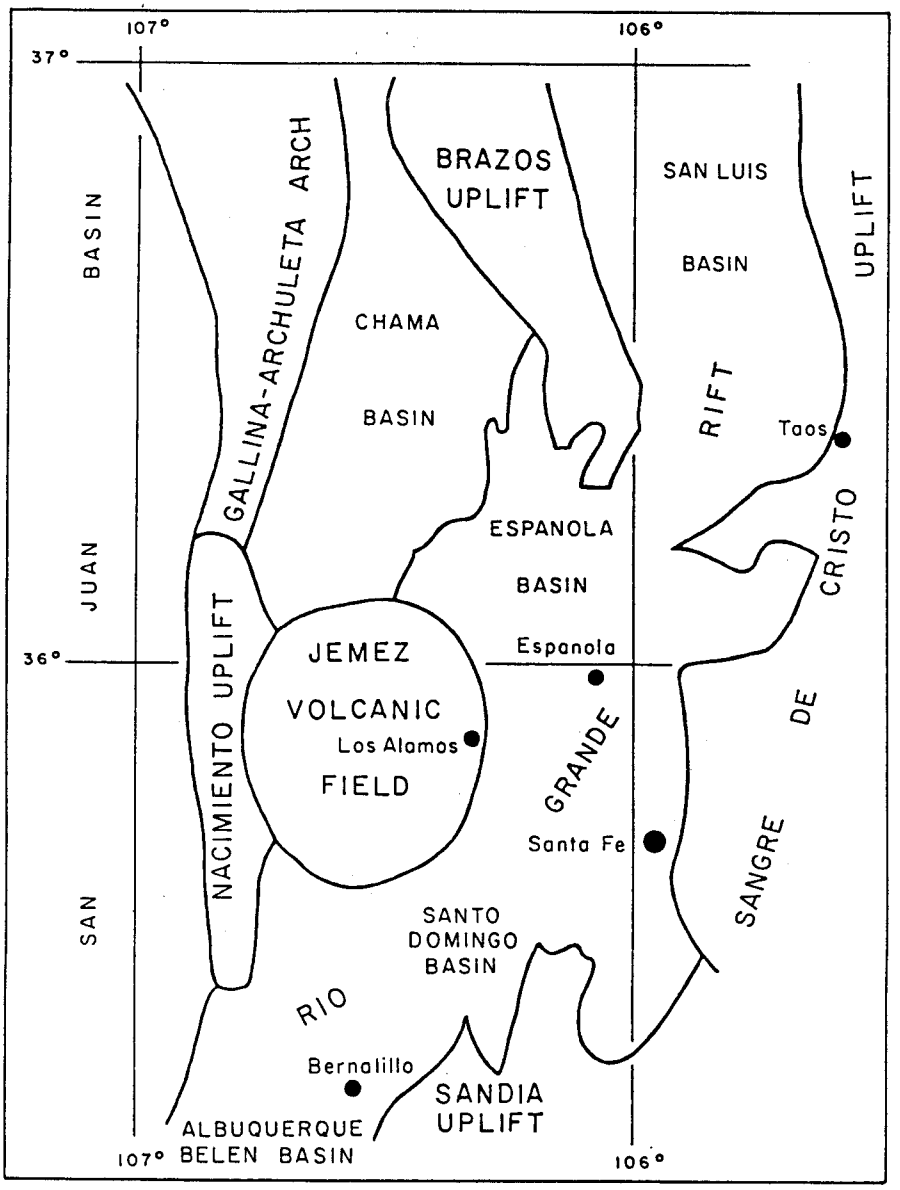

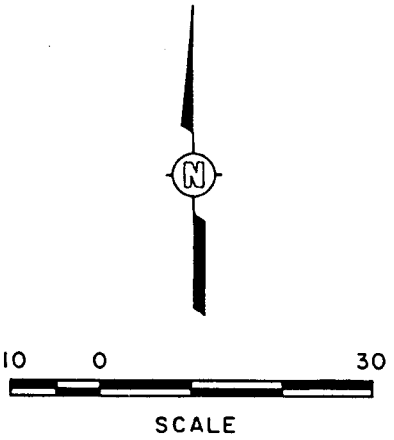

FIGURE 2-16
INDEX MAP SHOWING MAJOR
TECTONIC ELEMENTS OF
CENTRAL-NORTHERN NEW MEXICO
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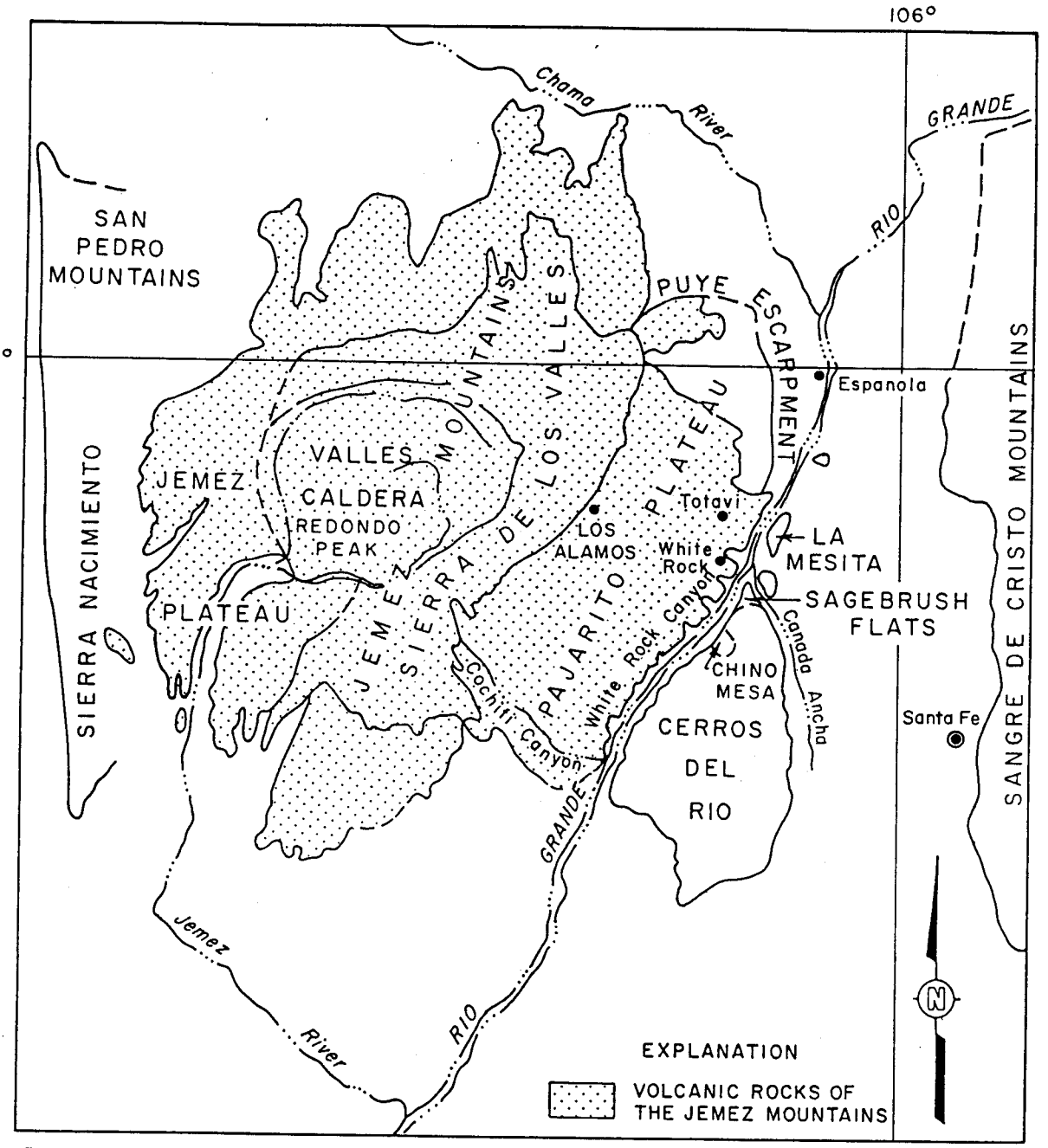

Reference; R.L.Griggs, 1954

5 0 5 10 MILES

SCALE

FIGURE 2-17

PHYSIOGRAPHIC FEATURES OF
THE JEMEZ MOUNTAINS

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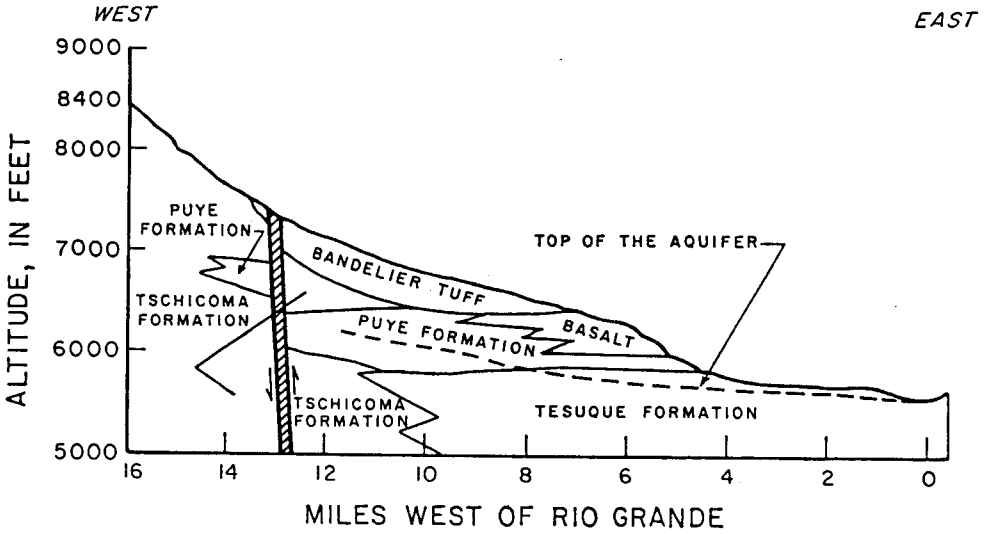

FIGURE 2-18

EAST-WEST GEOLOGIC SECTION
THROUGH THE PAJARITO PLATEAU
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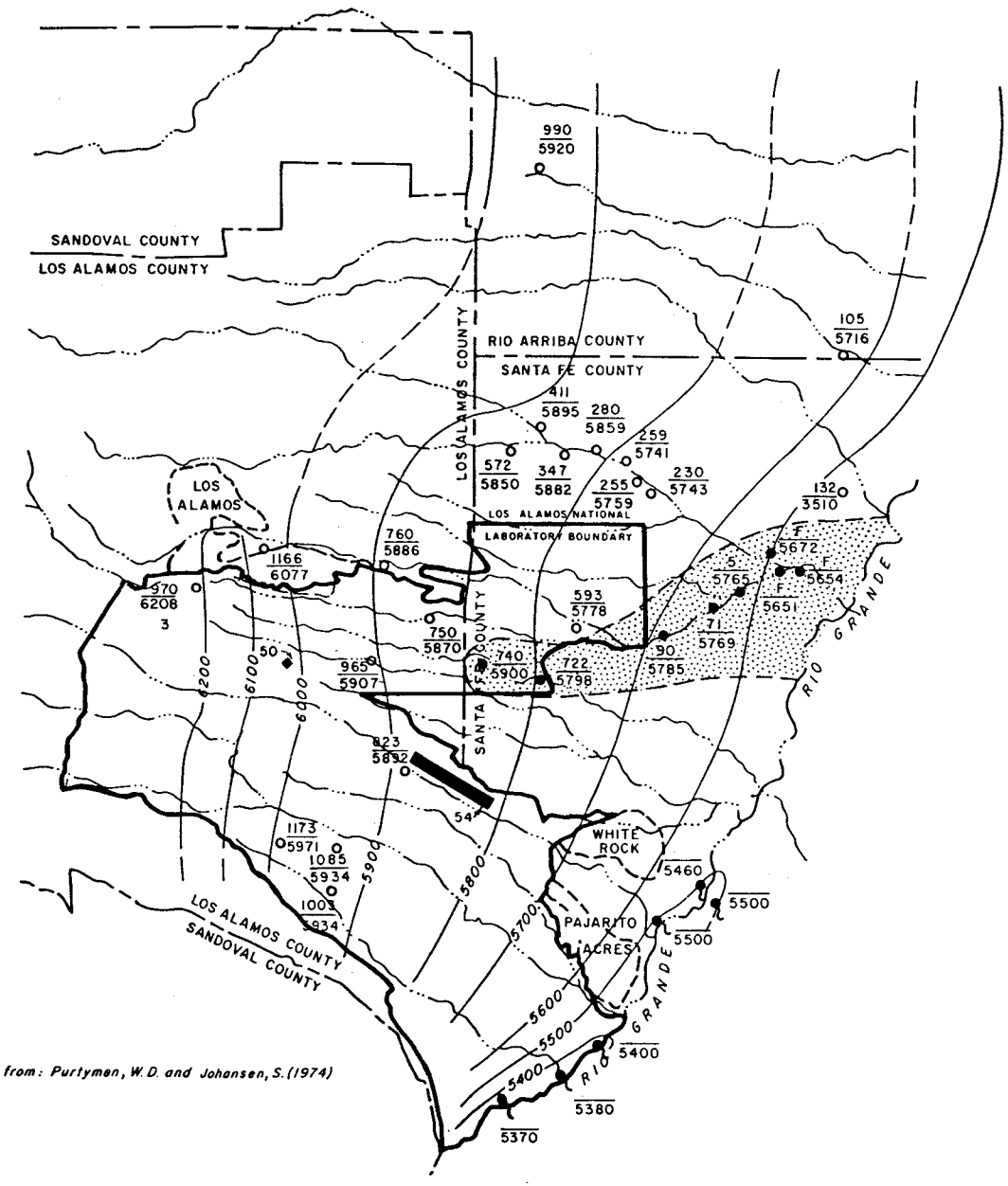

Modified from: Purtymen, W.D. and Johansen, S. (1974)

EXPLANATION

- WELL COMPLETED INTO AQUIFER UNDER WATER TABLE OR NEAR WATER TABLE CONDITIONS.
- WELL COMPLETED INTO AQUIFER UNDER ARTESIAN PRESSURE
- DEPTH TO WATER (FT.); F, FLOWING / ALTITUDE OF WATER SURFACE (FT.)
- SPRING / ALTITUDE OF WATER SURFACE
- 5900 — WATER-LEVEL CONTOUR ON AQUIFER UNDER WATER TABLE OR NEAR WATER TABLE CONDITIONS; IN FEET ABOVE MEAN SEA LEVEL; CONTOUR INTERVAL 100 FT.
- AREA OF DEEP WELLS COMPLETED INTO AQUIFER UNDER ARTESIAN PRESSURES
- 50 — TECHNICAL AREAS OF INTEREST

NOTE: DEPTH TO WATER AS REPORTED WHEN WELL DRILLED

1 0 1 2 MILES
SCALE

FIGURE 2-19

GENERALIZED CONTOURS ON TOP OF MAIN AQUIFER

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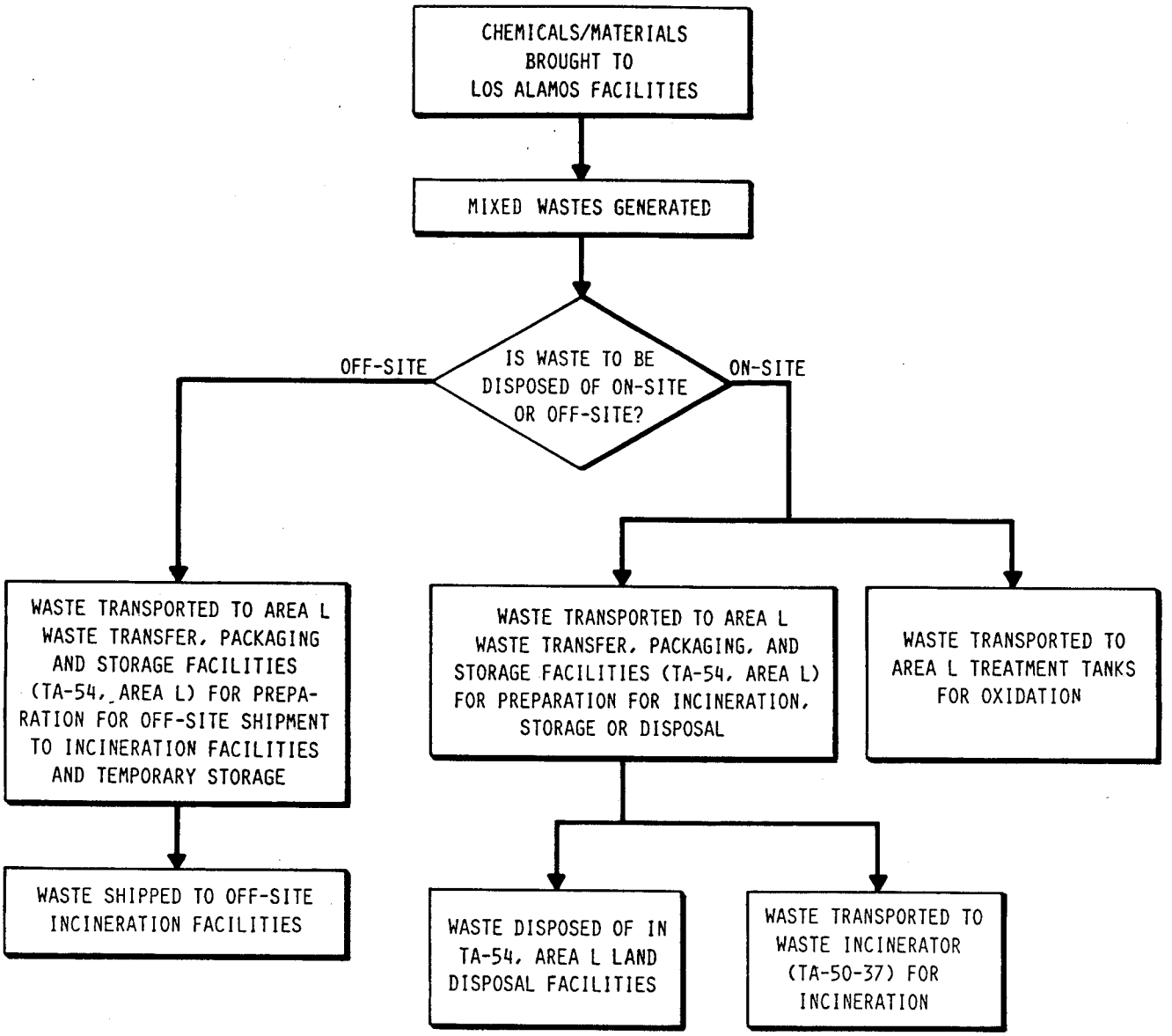

FIGURE 2-20

SCHEMATIC DIAGRAM OF LOS ALAMOS MIXED WASTE MANAGEMENT ACTIVITIES

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3.0 WASTE CHARACTERISTICS AND ANALYSIS PLAN

3.1 CHEMICAL AND PHYSICAL ANALYSES

This section describes the chemical and physical nature of the RCRA-regulated hazardous mixed waste treated, stored and disposed at Los Alamos facilities. This information is provided in response to RCRA Part B Permit Application requirements, as specified in 40 CFR §270.14(b)(2) (NMHWMR 302.A.4.b.[1]) and regulatory requirements, as contained in 40 CFR §264.13 (NMHWMR 206.B.3). The Laboratory complied with RCRA Part A interim authorization as part of which all chemicals classified as hazardous mixed wastes and used at Los Alamos were listed. Chemicals not regulated by RCRA but considered by DOE to be of concern are not referenced herein.

For the purposes of this permit application, mixed waste (or hazardous mixed waste) is defined as low-level radioactive waste which has a component that meets the definition of hazardous waste under 40 CFR 261 (NMHWMR 201.A). Specifically excluded are high-level radioactive waste, transuranic waste, and waste that is defined by DOE as by-product material; i.e., depleted uranium (definitions of categories of radioactive wastes are given in DOE Order 5820.2, dated February 6, 1984).

Hazardous mixed waste generated by Laboratory activities can be considered as three general types: (1) lithium hydride mixed wastes, (2) wastes generated in research and development (R&D) laboratories, and (3) scintillation cocktails. Los Alamos has developed procedures for the identification and segregation of hazardous mixed wastes (see Section 3.3). Once a waste is identified as a hazardous mixed waste, it is diverted to the appropriate treatment/disposal method (described in Section 4.0) based on its characteristics as determined by the Waste Analysis Plan (see Section 3.2).

Presented below is a brief description of the types of hazardous mixed wastes generated, treated, stored and disposed at the Laboratory. Table 3-1 provides an abbreviated form of this information as well as representative estimates of waste volumes.

3.1.1 Lithium Hydride Mixed Wastes

Los Alamos generates waste lithium hydride which has some surface contamination consisting of depleted uranium. The radionuclide-contaminated lithium hydride is typically one-inch to one-foot chunks with a very limited volume of finer-sized material. Lithium hydride wastes are hazardous due to their reactivity (D003).

3.1.2 Scintillation Cocktails Mixed Wastes

Various scintillation cocktails are used at the Laboratory for dissolution and/or dispersal of environmental and bioassay samples to permit accurate analyses of radionuclide concentrations. The most common scintillation liquids used at the laboratory are composed of benzene, xylene, toluene or combinations of these solvents. The specific radionuclides and their concentrations vary considerably in these waste solvents; however, tritium, carbon 14, phosphorus 32, and various plutonium isotopes are the most common radioactive components. Waste scintillation liquids are approximately one fluid ounce plastic or glass scintillation vials. Nearly all these potentially radioactive waste solvents are generated by the TA-43 Health Research Laboratory, the TA-59 Environmental and Bioassay Laboratories, and the TA-55 Plutonium Facility. All scintillation cocktails are treated as mixed wastes which are hazardous due to their ignitability (D001), even though they may not be contaminated by radionuclides.

3.1.3 Basic and Applied Chemistry R&D Programs Mixed Wastes

Typical mixed wastes generated by basic and applied chemistry R&D generally consist of small quantities of a very large variety of laboratory reagents, solvents, test samples and other wastes. Some chemical wastes become mixed wastes because through their use in R&D laboratory

areas they become radioactively contaminated. R&D mixed wastes are primarily generated by activities in the TA-3 Chemistry and Metallurgy Research Building, the TA-48 Radiochemistry Laboratory, and the TA-43 Health Research Laboratory, although mixed wastes may be generated throughout the Laboratory. The total volume of mixed wastes generated annually at Los Alamos is small; however, all chemical waste species listed in Appendix G may occasionally contain radionuclides.

3.1.4 Contaminated Equipment

In addition to the wastes noted above, various laboratory items that are chemically and radioactively contaminated may be considered hazardous mixed waste. Empty drums and tanks are typical contaminated items that are occasionally generated throughout the Laboratory.

3.2 WASTE ANALYSIS PLAN

A waste analysis plan has been developed and implemented to permit proper storage, treatment and disposal of mixed wastes at Los Alamos. The methods used to characterize the waste depend on the type of waste considered. For all wastes, the Laboratory Waste Management Group utilizes the fact that the composition of individual containers of the three types of mixed wastes are known due to detailed knowledge of the processes and the properties of the materials. For the rare instances in which the composition of a container of waste is unknown, analyses are performed to determine the characteristics and/or composition of the waste material. Table 3-2 lists the waste analysis parameters and the rationale for the selection of each for each general type of waste generated at Los Alamos. Table 3-3 presents the waste analysis parameters and the test methods used. Tables 3-4 and 3-5 list the methods used to sample hazardous mixed wastes and the frequency of waste analysis including the rationale for that frequency, respectively. A brief description of the waste analysis plan developed in accordance with 40 CFR §264.13 (NMHWMR 206.B.3.b) is given below.

When mixed wastes are generated, the originating group completes a Chemical Waste Disposal Request (see Form H-1 in Appendix H) and sends

the form to the Waste Management Group. The Request lists the specific chemicals the generating group needs to dispose of, the quantity and form of the mixed waste and other pertinent information such as the condition of the containers. Most chemicals disposed of are residual substances in small reagent size containers which are labeled with the composition of the waste. Thus, the completed Request form and the container label serve as the waste analysis record for the waste to be disposed of. Should the label become detached, the waste is handled as an unknown material, as discussed later. After the Waste Management Group collects the wastes, individual reagent containers are sorted to insure compatibility (as described in Section 3.3) and are packaged with vermiculite into metal drums for disposal. The composition of waste in each drum is derived from recording the known compositions of waste that is placed in the container on a form developed for this purpose (Forms H-2 and H-3 in Appendix H).

Occasionally, chemicals of an unknown nature require disposal. These wastes are handled on a case-by-case basis. Often the individual waste can be characterized by knowledge of the operations and activities that were performed in the specific area in which the waste was generated. For small volumes (less than one gallon) of unknown wastes originating from areas such as these, the waste is analyzed to determine its reactivity, pH, or ignitability. If based on the activities performed in the specific area in which the waste was generated, the waste is determined to be a dangerously reactive material, analysis is not attempted and the waste is handled accordingly. Very rarely, larger volumes of a single unknown waste require treatment or disposal. These wastes are characterized in sufficient detail to permit assignment of the proper EPA Hazardous Waste Number to the waste. Analyses to characterize unknown wastes are performed in accordance with the procedures given in the most recent EPA test methods manual (currently SW-846, Second Edition) or approved equivalent methods, as noted in Table 3-2.

Mixed waste materials treated by incineration will be analyzed for properties and composition that are specific for safe handling and proper operation of the incineration system.

3.3 WASTE SEGREGATION

To prevent adverse interactions of incompatible mixed wastes and to facilitate recycling or treatment of wastes, mixed wastes will generally be segregated, as discussed in Section 4.0 and Appendix L, into the following basic categories:

- Organics, including solvent wastes such as acetone, benzene, toluene, etc.
- Corrosive acidic wastes, including organic and mineral acids but excluding oxidizers such as nitric or perchloric acid
- Corrosive alkalic and caustic wastes
- Oxidizers, such as perchloric or chromic acid and non-acidic oxidizers such as permanganates and chlorates
- Reactive metals and compounds, such as sodium, lithium hydride, phosphorous trichloride, etc.
- Non-reactive metals, salts and neutral compounds, such as lead, barium salts, etc. and cyanide or sulfide compound containing wastes (in lab pack quantities only)

Additionally, depending on the results of the trial burn for the Laboratory incinerator, further segregation of wastes may become desirable to facilitate incineration procedures.

TABLE 3-1.
MIXED WASTE HANDLED, TREATED, STORED AND DISPOSED AT LOS ALAMOS[1]

Chemical	Hazard	Basis for Hazard Designation
Basic and Applied Chemistry R&D Programs		
Chemistry and Metallurgy Research Building Radiochemistry Laboratory Health Research Laboratory Plutonium Facility - Numerous chemical wastes contaminated with various radionuclides	Varies[2]	R&D wastes are comprised of numerous listed wastes[2]
Scintillation Cocktails		
Health Research Laboratory Environmental and Bioassay Laboratories Plutonium Facility - Solvents	Ignitable	Wastes are ignitable solvents (D001) - typically benzene, toluene, xylene
Machine Shops		
Main Shops Department - Lithium hydride, lithium metal contaminated with depleted uranium	Reactive	D003 - per 261.23(a)(2),(3), (NMHWMR 201.B.4.a[2],[3]), barium per 261.24(a) (NMHWMR 201.B.5.a)
Chemically and Radionuclide Contaminated Equipment		
Many LANL Facilities		Same characteristics as hazardous material contaminants

[1] See Part A application (Section 1.0) for estimated volumes.

[2] See Appendix G for a representative list of wastes and hazard designations.

TABLE 3-2.
MIXED WASTE ANALYSIS PARAMETERS AND RATIONALE FOR THEIR SELECTION

Hazardous Waste	Parameter(s)	Rationale
Basic and Applied Chemistry R&D Programs		
Laboratory mixed waste (liquids)	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	Analyses for selected parameters will be performed, if necessary, for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Content	These wastes are intended for incineration, if possible, and thus will be analyzed for these incinerator parameters as part of the hazardous waste incinerator permit
Laboratory mixed waste (solids)	Ignitability, Reactivity, EP Toxicity, Chemical Analysis	Analyses for selected parameters will be performed, if necessary, for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Content	These wastes are intended for incineration, if possible, and thus will be analyzed for these incinerator parameters as part of the hazardous waste incinerator permit
Scintillation Cocktails		
- Solvents	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	Analyses for selected parameters will be performed, if necessary, for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Content	These wastes are intended for incineration, if possible, and thus will be analyzed for these incinerator parameters as part of the hazardous waste incinerator permit
Shops Department		
Main Shops Department		
- Lithium hydride, lithium metal contaminated with depleted uranium	None	Material properties well known and process knowledge allows identification of material without analysis.
Chemical and Radionuclide Contaminated Equipment		
Many LANL facilities		
- Empty drums, tanks, gas cylinders, etc.	None	Contaminants known and contaminated equipment treated with the same precautions as if it were were the actual material.

TABLE 3-3.
MIXED WASTE ANALYSIS PARAMETERS AND TEST METHODS

Parameter	Test Method	Reference[1]
Ignitability	Pensky-Martens Closed-Cup Method	(L) SW1010 (L) ASTM D93-80
Reactivity	Numerous methods and tests	(L,S) SW Section 2.1.3
pH	Electrometric	(L) SW9040
EP Toxicity	EP Toxicity Extraction[2] and Graphite Furnace Atomic Absorption Spectrophotometry	(L,S) SW1310
Arsenic		(L) SW7060
Barium		(L) SW7081
Beryllium		(L) SW7091
Cadmium		(L) SW7131
Chromium		(L) SW7191
Lead		(L) SW7421
Selenium		(L) SW7740
Silver		(L) SW7761
	EP Toxicity Extraction[2] and Manual Cold Vapor Technique	(L,S) SW1310
Mercury		(L) SW7470

(1) "A" refers to Sampling and Analysis Methods for Hazardous Waste Combustion, EPA-600/8-84-002, February 1984.

"ASTM" refers to American Society for Testing Material Standards.

"SW" refers to Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition, EPA, July 1982.

"L" refers to liquid waste.

"S" refers to solid waste.

(2) If EP Toxicity (and other analyses) do not permit identification of an unknown chemical waste, digested metal samples (per SW3020) will be analyzed for the metals noted.

TABLE 3-3.
MIXED WASTE ANALYSIS PARAMETERS AND TEST METHODS
(continued)

Parameter	Test Method	Reference[1]
EP Toxicity	EP Toxicity Extration and Gas Chromatography	(L,S) SW1310
Organochlorine Pesticides		(L) SW8080
Chlorinated Herbicides		(L) SW8150
Heat Value	Bomb calorimeter	(L) A006, ASTM D240 (S) A006, ASTM D2015
Organic Chlorine	Halide titration of combustion residue	(L,S) A004, ASTM D2361
Ash Content	Residue after combustion in muffle furnace	(L) A001, ASTM D482 (S) A001, ASTM D3174
Cyanide	Distillation and titration	(L) SW9010
Chrome	Colorimetric method for hexavalent chromium	(L) SW7196

TABLE 3-4.
SAMPLING METHODS FOR HAZARDOUS MIXED WASTES TO BE ANALYZED

Hazardous Waste	Sampling Method[1]	Description of Sampling
Basic and Applied Chemistry R&D Program		
Laboratory Waste (liquids)	Coliwasa; glass bottle	Samples of unknown wastes in larger containers (e.g., five-gallon can) taken with coliwasa; smaller containers may be sampled by pouring a small quantity of fluid into a glass bottle
Laboratory Waste (solids)	Thief, trier	Thief or trier used for unknown wastes based on waste physical consistency; in some cases (e.g., contaminated equipment) obtaining a representative sample may be impracticable
Scintillation Cocktails		
Solvents	Entire vial will be analyzed	Scintillation vials have volumes of approximately one fluid ounce

(1) Sampling methods are adopted from: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 2nd Edition, EPA, July 1982.

TABLE 3-5.
FREQUENCY OF ANALYSES AND RATIONALE

Hazardous Mixed Waste	Analysis	Frequency	Rationale
Basic and Applied Chemistry			
R&D Programs			
Laboratory waste (liquids)	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	As required	Analyses for selected parameters will be performed for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Production	One incinerator feed tank per month	Analyses will be required by incinerator permit
Laboratory waste (solids)	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	As required	Analyses for selected parameters will be performed for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine[1]	One incinerator feed tank per month	Analyses will be required by incinerator permit
Scintillation Cocktails			
Solvents	Ignitability, Reactivity, pH, EP Toxicity, Chemical Analysis	As required	Analyses for selected parameters will be performed for wastes that are unknown from laboratory process knowledge
	Heat Value, Organic Chlorine, Ash Production	One incinerator feed tank per month	Analyses will be required by incinerator permit
Shops Department			
Main Shops Department			
- Lithium hydride, lithium metal contaminated with depleted uranium	None	None	Process knowledge allows identification of material without analysis
Chemical and Radionuclide Contaminated Equipment			
Many LANL facilities			
- Empty drums, tanks, gas cylinders, etc.	None	None	Contaminants known and contaminated equipment treated with the same precautions as if it were the actual material

[1] The nature of the waste (e.g., contaminated rags, tissues, etc.) may preclude analysis and process knowledge will have to provide necessary information.

4.0 WASTE MANAGEMENT PRACTICES AND FACILITIES

The waste management facilities at Los Alamos to be permitted consist of the following, as noted in Section 2.0:

- o TA-50 Chemical Waste Incinerator
- o TA-54 Waste Transfer, Packaging and Storage Facilities, Treatment Tanks and Land Disposal Facilities

These Laboratory facilities and related hazardous waste processing activities (treatment, storage and disposal) are described in the following sections.

4.1 TA-50 CHEMICAL WASTE INCINERATOR

The chemical waste incinerator, located in Building 37 at TA-50, is a highly modified, controlled air incinerator rated at a nominal waste feed throughput of 45 kilograms per hour. It is currently permitted to burn radioactive and PCB-contaminated materials. The incinerator has not burned RCRA hazardous wastes to date; however, the Laboratory is proposing to permit the incinerator under RCRA to provide for future operating flexibility and minimization of land disposal. The incinerator and required support activities are located within Building 37, as shown in Figure 4-1. The incinerator and flue gas treatment systems are capable of safely combusting a variety of hazardous wastes including low-level radioactive wastes and transuranic contaminated wastes. Since the incinerator is designed to combust materials contaminated with radioactivity, the incinerator is fitted with glove boxes that permit operation and maintenance of components that have the potential of becoming radioactively contaminated. Personnel access to the incinerator equipment can be achieved with proper protective clothing and respiratory equipment (see Section 6.5.2).

The incinerator process is depicted in Figure 4-2. The incinerator, a controlled air, dual chamber design, is natural gas fired to provide

waste ignition and to supply supplemental heat. A detailed description of the incinerator and incinerator process is provided in the trial burn plan (Appendix J); a summary of this information is provided below.

Solid wastes are loaded into the incinerator in batches by a ram feeder. Liquids are loaded by a pump and gaseous wastes fed by gas container pressure or assisted with a vacuum pump. All wastes are charged to the primary combustion chamber operated at a nominal temperature of 760 to 980°C with air controlled to maintain nearly stoichiometric conditions. Unburned volatile components and entrained particles exit the primary chamber to the secondary chamber where excess air and supplemental heat are introduced to promote complete combustion. The secondary chamber is maintained at a nominal temperature of 870 to 1200°C and provides the needed residence time to assure complete combustion.

The flue gas treatment system consists of a quench column, a venturi scrubber, a packed-column scrubber, a condenser, a mist eliminator, a reheater, HEPA filters, an activated carbon adsorber, additional HEPA filters, and an induced draft blower. The purpose of the flue gas treatment system is to remove particulate matter, condense volatile metals and capture acid gases, such as sulfur dioxide, chlorine and fluorine. After purification by the flue gas treatment system, the gas exiting the filters is discharged to the atmosphere through a stack by an induced draft blower.

4.1.1 Secondary Containment Areas

Two 155-gallon KYNAR-lined steel waste storage tanks are located in the incinerator facility. These tanks and associated pumps are located within a curbed area having dimensions of 0.42 feet x 9.5 feet x 20.83 feet. Curbing around a door reduces the containment volume by about eight cubic feet. The curbed area can contain approximately 562 gallons of liquid, an amount in excess of the total volume of waste that may be stored in the waste tanks.

4.1.2 Current Management Practices

Building 37 in TA-50 is fenced with access gates locked during unattended hours. Additionally, the building doors are locked when unattended and the area is patrolled by Los Alamos security personnel.

It is intended that the waste incinerator be used to reduce significantly the volume of hazardous waste requiring land disposal at the Laboratory. Incineration, coupled with batch treatment and recycling when feasible, should eventually reduce the volume of landfilled wastes to a minimal level. Some wastes may not be suitable for incineration. These wastes will be identified by actual waste analysis or process knowledge (see Section 3.2) and will be segregated from incinerator-suitable materials (see Section 3.3).

Solid wastes are received at the incinerator facility in sealed containers which may be opened or sorted as necessary. Prior to incineration, the solid wastes are restricted to an area that has been engineered for proper storage of the material. Liquid wastes are also received in sealed containers. Prior to incineration, the liquid wastes are either retained in the sealed container (if the container is within a shipping cask designed for spill control) or may be transferred by dip tube/pump into holding/blending tanks. Transfer to the holding/blending tanks is made in an enclosure by personnel wearing protective clothing.

The pH of the circulating flue-gas scrub solution is continuously monitored and adjusted when desired by addition of sodium hydroxide. The specific gravity of the scrub solution is monitored and maintained at or below a value representing the saturation concentration for dissolved solids by removing fluid for treatment at the TA-50 Batch Treatment System and adding fresh water.

Ash is removed with a vacuum system connected to a gravity ash-dropout and cooling mechanism. Ash cleanup from the cooled incinerator is

accomplished using vacuum wands operated through glove ports. The vacuum system is equipped with a high efficiency cyclone, sintered metal filters and a HEPA filter to trap the ash. Ash removed by the cyclone and metal filters is stored prior to packaging/solidification in a dropout hopper. The ash storage is limited to less than 90 days, in accordance with 40 CFR 262.34(a) (NMHWMR 204.B.1) so a RCRA permit is not required for the ash hopper. Since the incinerator is used for volume reduction of transuranic and low-level radioactive wastes, the ash, scrub solution and scrub filter cartridges are handled as suspect radioactive wastes. Thus, the ash is solidified by mixing with cement and the scrub solution is transferred to the TA-50 industrial waste treatment plant for treatment. The ash is considered a hazardous waste by definition (40 CFR 261.3[c][2]) (NMHWMR 201.A.2.c[2]) if it is generated from burning of listed hazardous wastes, so the ash is handled appropriately.

4.1.3 Waste Incinerator Trial Burn Plan

Pursuant to RCRA Part B permit application requirements noted in 40 CFR 270.62 (NMHWMR 302.E.2), a trial burn plan (including a quality assurance plan) has been developed for the Controlled Air Incinerator (CAI) system at Los Alamos. The trial burn and quality assurance plans are in Appendix J and the trial burn plan is summarized below. Startup/shakedown procedures are not applicable because the Laboratory incinerator is an existing facility.

The principal organic hazardous constituent (POHC) for which the destruction and removal efficiency is to be determined is carbon tetrachloride. Four runs, each consisting of triplicate test periods, will be conducted. Two runs will be with liquid waste feeds containing carbon tetrachloride and two will be with carbon-tetrachloride-containing solid wastes.

The trial burn test is to obtain process data that will permit calculation of POHC destruction and removal efficiency and hydrogen chloride

removal efficiency. Additionally, the fate of POHC's treated by the system will be determined, that is, destroyed by thermal oxidation, removed by the air pollution control system or emitted in the stack gases. The trial burn test will also document the test process feed and operating conditions that will be used in establishing operating permit conditions and allow calculation of heat and material balances needed to confirm or assess recorded process conditions. Thus, sampling and analysis procedures are included in the trial burn plan to determine the physical-chemical characteristics of the incinerator feed materials, particularly the POHC concentrations, material feed rates, the composition and flow rates of the stack gases, the amounts of POHC discharged in the stack gases and in the quench-scrubber purge water removed by filters in the air pollution control system and the quench-scrubber water recirculation system. The monitoring procedures are selected to measure concentrations of oxygen in the combustion gases and carbon monoxide in the stack gases. Details and locations of monitoring are in the trial burn plan.

Temperatures are continuously monitored and recorded in over twenty locations throughout the CAI process. All temperatures are continuously recorded on strip charts in the control room. The temperature in the primary chamber is automatically modulated by adjustment of the natural gas supply to the chamber to maintain the desired temperature.

Feed rates of waste liquid are measured using mass flowmeters and direct measurement of the liquid level in the feed tank. The destruction efficiency calculations will be based on the waste feed volumes determined from these measurements.

An operating log will be completed once each hour for all operations. These logs are a record of operating conditions and provide evidence that the operator has checked and is aware of the actual operating status of the system. The time at which entries are made will be shown, as will the actual instrument reading for each variable. If automatic

shutdown occurs, the log will state the nature of the shutdown, the time it occurred and the suspected cause. Additionally, unusual conditions or situations such as spills or leaks will be noted on the log. Further, once each shift the shift supervisor will inspect the facility for malfunctions, deterioration, operator error and discharges that could lead to discharge of hazardous waste constituents to the environment or to a threat to human health. If it is determined that a spill potential exists, corrective action will be taken immediately.

The interim period between completion of the trial burn and receipt of final approval for full operating authority could be several months. During this time, Los Alamos intends to continue operating the incineration system on a full-time basis under all of the guidelines of the federal requirements (40 CFR 265) (NMHWMR 206.C.10).

4.2 TA-54, AREA L WASTE TRANSFER, PACKAGING AND STORAGE FACILITIES

The waste transfer, packaging and storage facilities are used to store and to package or solidify hazardous mixed wastes. When ready, wastes are transported from the facilities either to on-site disposal or treatment facilities or off-site for incineration at a licensed facility. Two structures comprise the Area L waste transfer, packaging and storage facilities. These include a metal building and a roofed concrete pad. A plan view of the metal building is shown in Figure 2-6. The roofed concrete pad plan is shown in Figure 2-7.

These facilities are used to store lab packs in 55-gallon drums. Prior to the containerization of the lab packs into the 55-gallon drums, an identification and appropriate segregation of the hazardous wastes is performed. This may involve the placement of waste in small containers into drums, pouring of liquid waste into drums containing vermiculite, and transfer of waste from one drum to another. All drums and containers are kept closed during storage and are opened only when chemicals are transferred from one container to another or when lab packs are prepared.

A maximum of eight 55-gallon drums can be stored in the metal building. The volume of liquid waste stored in the building will not exceed 440 gallons due to the mix of lab packs and stabilized and free liquids.

A total of 304 55-gallon drums can be stored at the roofed concrete pad. Two 220-gallon storage tanks are also located on the pad.

Waste handling equipment used at these facilities include the following:

- Hand trucks
- Drum pumps
- Fork lift

The Los Alamos procedure for operating drum pumps is included as Appendix K.

4.2.1 Lab Packs

Lab packs are used at Los Alamos to containerize the laboratory wastes, particularly the laboratory R&D wastes. A typical lab pack (Figure 2-8) consists of a number of containers of compatible wastes (see Section 3.3) and vermiculite enclosed in a 55-gallon drum. Vermiculite was chosen as a stabilizing material for lab packs because of its good absorbing properties, its resistance to attack by most chemicals, and the cushioning it provides for inside containers during handling and transportation of lab packs. Table 4-1 provides data on the absorption capabilities for a few chemicals. None of the chemicals packaged into lab packs deteriorate vermiculite.

Los Alamos laboratory wastes are typically received for disposal in the containers in which the chemical manufacturer originally packaged the material. Thus, inside container/waste compatibility is usually not an issue. Wastes not received in their original containers are placed into empty containers that once contained compatible chemicals or in other suitable containers based on 49 CFR 173, 178, 179. Inside containers

are visually checked for signs of leakage and the container lid or top tightened as the containers are placed into lab packs. If simple lid tightening is not thought to be sufficient to correct the leak, the material is transferred to a non-leaking container before it is loaded into the lab pack.

A volume of vermiculite sufficient to absorb the entire aggregate liquid contents of the inside containers is added to the drum initially and as the drum is filled. Addition of the vermiculite in this manner eliminates unfilled voids between containers. After placing the final container in the drum, the remaining drum volume is filled with vermiculite. The required ratio of the volume of liquid waste to that of vermiculite in the lab pack depends on the type of waste to be placed in the drum. However, minimizing vermiculite usage by adding only the required volume of the absorbent to each lab pack would introduce unnecessary complexity to lab pack packaging procedures. Thus, a ratio of about five volumes of vermiculite to one volume of liquid will be maintained in all lab packs. This worst case ratio will ensure that sufficient absorbent volume is present in all lab packs (see Table 4-1 for absorbing capacities of vermiculite). The drums are DOT-approved 17C or 17H drums. Typically, the drums are unlined. When necessary, 83-gallon drums and vermiculite are used to overpack damaged 55-gallon lab pack drums.

4.2.2 Secondary Containment Areas

Three shallow sumps covered by fiberglass grates are located in the concrete floor of the metal building. These sumps are provided to contain any chemical spills that may occur within the building. The approximate dimensions of these sumps are shown in Figure 2-6 and will together contain a liquid volume of about 335 gallons. This secondary containment volume is significantly greater than that required based on the maximum liquid waste storage in the area. The floor slopes generally towards the sumps. The handling of any spilled wastes that collect in the sumps is discussed in Section 6.0. An asphalt-lined run-

on control ditch is located outside the building to divert surface drainage away from the building.

The concrete storage pad is divided into six bermed cells. Steel grating lies above the floor of each cell so that waste drums and tanks are elevated several inches above the floor. The floor of each cell slopes toward a sump. The six cells have a combined secondary containment capacity of 8570 gallons. This secondary containment volume is significantly greater than that required based on the maximum liquid waste storage in the area. The containment volume and the maximum liquid waste storage of each cell on the pad is listed below:

Cell[1]	Secondary Containment Volume (gallons)	Maximum Liquid Waste Storage in Cell (gallons)[2]
1	1951	4400
2	1406	2640
3	928	1570
4	1406	2640
5	928	1570
6	1951	4400

[1] Numbered left to right as shown in Figure 2-7.

[2] The actual maximum liquid volume will be below these amounts because some of the drums in each cell will be lab packs.

4.2.3 Current Container Management Practices

When a chemical waste is ready for disposal, personnel at the generating laboratory contact Group HSE-7. HSE-7 personnel then visit the generating site to package the waste for transport to the waste transfer, packaging and storage facilities at Area L. The wastes are packaged and labeled in compliance with DOT and EPA requirements. The wastes are transported on a three-ton flat-bed truck.

When the HSE-7 personnel pick up the wastes from the generator, a Chemical Waste Disposal Request form (H-1 in Appendix H) is completed. The

form lists the chemicals being transported and is carried in the truck during transport. Once the lab wastes are received in the waste transfer, packaging and storage facilities, they are segregated into compatible chemical groups (e.g., oxidizers, organics, etc.). They are then packed with vermiculite (heavier containers at the bottom) in 55-gallon drums as described in Section 4.5.1, and in accordance with Los Alamos' procedure for identification and segregation of hazardous wastes (Appendix L).

A second form called "Los Alamos Hazardous Chemical Waste Disposal Record" (H-2 in Appendix H) is also completed for each lab pack. This form is used to record information such as:

- Origin, description and quantity of each waste received
- Method of treatment, storage or disposal
- Location of disposal
- List of chemicals in lab packs

The segregation capabilities of the waste transfer, packaging and storage facilities permit storage of up to nine waste types at any one time (six on the concrete pad and three in the metal building).

4.2.3.1 Drum Numbering and Recording System

Each repackaging drum, whether for recyclable or nonrecyclable materials, is stenciled with both the drum type number and a record number the first time any materials are placed inside the drum. The drum type is stenciled as "Los Alamos National Laboratory HW type ___" and the record number is stenciled as "Los Alamos National Laboratory drum number ___". Record numbers are obtained from the drum number log book and the appropriate information is entered in the log book when a number is utilized. In addition, each drum is labeled with a completed EPA hazardous waste label. An example of these labels is shown in Figure 4-3.

Each open drum of nonrecyclable materials has a storage and shipment form that is completed with the requested information on all of the materials which are placed into the drum. The drum record number is also recorded on the form. The form is submitted to the records manager after the drum has been sealed.

4.2.3.2 Hazardous Waste Categories for Repackaging Purposes

Nonrecyclable materials along with vermiculite are packaged into the appropriate lab pack, as described in Section 4.2.1. Waste types are segregated in accordance with Laboratory segregation practices noted in Section 3.3. Materials in each of the storage categories are kept segregated from each other at all times. Even after wastes have been repackaged, drums from different storage categories are kept segregated.

Recyclable materials are poured from their original containers (except for 55-gallon drums) into a new 55-gallon drum constructed of a similar material when appropriate. Pouring is performed in a well ventilated area. Personnel are equipped with appropriate personal protection devices.

Any bulging drums are handled in accordance with accepted practice and Laboratory procedures (Appendix M).

Other management practices currently followed at Los Alamos as they apply to these facilities include the following:

- Only compatible wastes are handled at any one time.
- Drums are inspected on a weekly basis and prior to their use.
- A maximum of eight 55-gallon drums are handled at any one time in the metal building.
- Appropriate spacing of drums is provided.

4.3 TA-54, AREA L TREATMENT TANKS

Four 1665-gallon ten-gauge carbon steel tanks are also located at TA-54, Area L. These tanks are used to neutralize, oxidize and evaporate RCRA-regulated and non-RCRA regulated wastes.

4.3.1 Secondary Containment Areas

The four treatment tanks are located on a bermed concrete pad. The containment capacity of the bermed area is approximately 2340 gallons, an amount adequate to contain the maximum contents of one of the treatment tanks.

4.3.2 Current Management Practices

The treatment tanks are double-lined with eight-mil polyethylene except when the tanks are being used to treat reactive materials. The plastic overlaps the tank top and is tied in place. Liners are replaced at least yearly when tanks are in use. Tanks are unlined when reactives are treated to minimize the potential for combustion.

The tanks are maintained so that fluid levels are no higher than six inches below the top of the tanks. If rainfall should elevate fluid levels above this level, portable pumps are used to draw down the tanks. During periods of precipitation, the tanks are covered. Tank covers are constructed of styrofoam having rigid metal support members and covered with heavy vinyl. Tank covers are secured with boards and clamps.

Grab samples are taken from tanks prior to and after treatment of wastes (at a minimum). This confirms completeness of treatment prior to removal of liquids. Prior to the placement of a new waste into a tank, the old tank liner is removed if the new and old wastes are not compatible.

4.4 TA-54, AREA L LAND DISPOSAL SHAFTS

Area L in TA-54 is the land disposal area for hazardous waste at Los Alamos. Stabilized, drummed liquid waste and lab packs are disposed of

in 60-foot deep shafts that range in diameter from three to eight feet. No bulk or non-containerized liquid or reactive waste is placed in the shafts. Thirty shafts have been closed and four are currently open for waste disposal (Figure 2-5). Each of the four shafts is used for the disposal of a single category of drummed waste to ensure that incompatible wastes do not mix.

4.4.1 Current Management Practices

Open shafts at Area L are covered with a heavy steel cap. When a sufficient quantity of waste has accumulated at the Area L Container Storage Area, a small crane equipped with drum hooks is moved to the edge of the shaft. The drummed wastes are then lowered from a truck through the open steel cap into the shaft. After wastes are emplaced, a layer of crushed tuff or soil is placed on the waste drums to help minimize the potential for ignition of ignitable wastes, to avoid air spaces, and to ensure complete filling between drums. When a shaft is filled, the steel cap is removed and the shaft is capped with a three-feet-thick concrete cap. Shafts are generally open for a period of one to two years. Additional shafts of similar dimensions will be sunk as needed to meet future land disposal needs at Los Alamos.

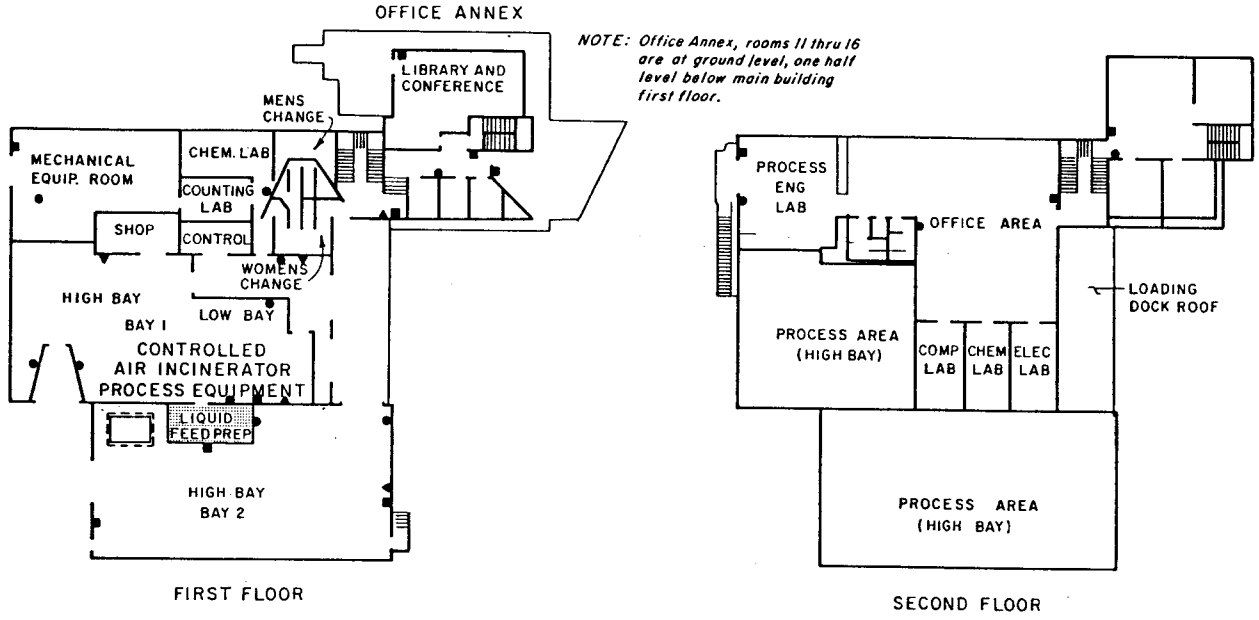
TABLE 4-1.

ABSORPTION CAPABILITIES OF VERMICULITE

Chemical	Absorption Per 100 Pints of Vermiculite (pints)
Perchloroethylene	2.3
Sulfuric acid, 98%	2.1
Sodium hydroxide, 50%	4.7

Data from Diamond Shamrock Corporation, 1984.

DRAWN BY	MJG	CHECKED BY		DRAWING NUMBER
	11/20/84	APPROVED BY		8465/0-816



NOTE: Office Annex, rooms 11 thru 16 are at ground level, one half level below main building first floor.

TREATMENT DEVELOPMENT FACILITY
TA-50, BUILDING 37

NOTE: All rooms are covered by automatic sprinkler heads. Fire water flow activates automatic alarm pull.

▲ EVACUATION ALARM
■ ALARM PULL (FIRE)
● FIRE EXTINGUISHER
▒ HALON SYSTEM

FIGURE 4-1

TREATMENT DEVELOPMENT FACILITY SHOWING LOCATIONS OF CHEMICAL WASTE INCINERATOR AND SUPPORT FACILITIES

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LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

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19 1253 HERCULENE. A&B SMITH CO., PGH., PA

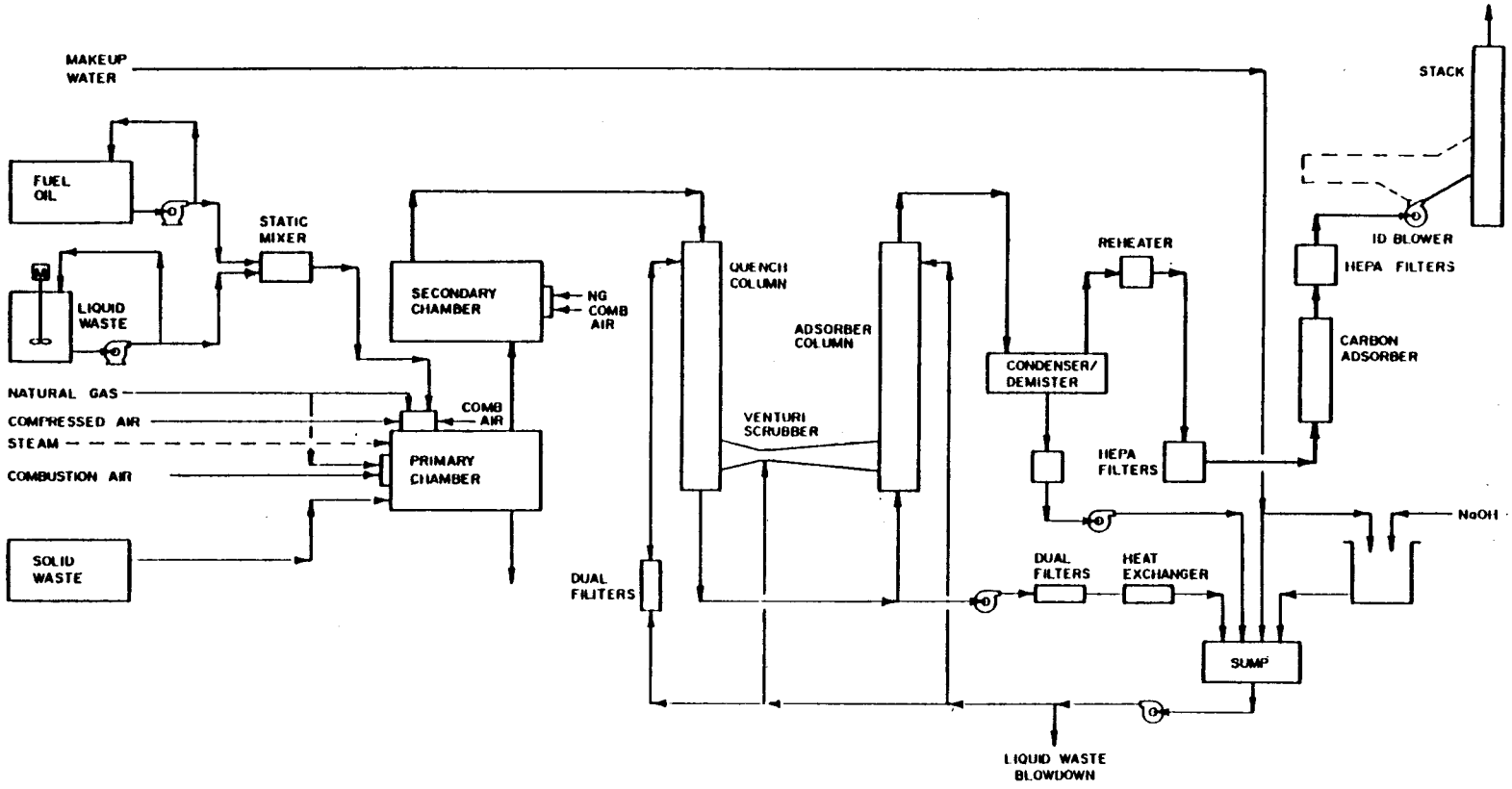

FIGURE 4-2
INCINERATOR
PROCESS DIAGRAM

PREPARED FOR
LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

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DRAWING NUMBER 846510 A36

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE, OR
PUBLIC SAFETY AUTHORITY, OR THE
U.S. ENVIRONMENTAL PROTECTION AGENCY

PROPER D.O.T.
SHIPPING NAME_____UN OR NA#_____

GENERATOR INFORMATION:

NAME_____

ADDRESS_____

CITY_____STATE_____ZIP_____

EPA
ID NO._____

EPA
WASTE NO._____

ACCUMULATION
START DATE_____

MANIFEST
DOCUMENT NO._____

HANDLE WITH CARE!

CONTAINS HAZARDOUS OR TOXIC WASTES

STYLE WM-6

© LABELMASTER, CHICAGO, IL 60646

FIGURE 4-3

TYPICAL DRUM LABEL

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LOS ALAMOS, NEW MEXICO

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32803

5.0 GROUNDWATER MONITORING

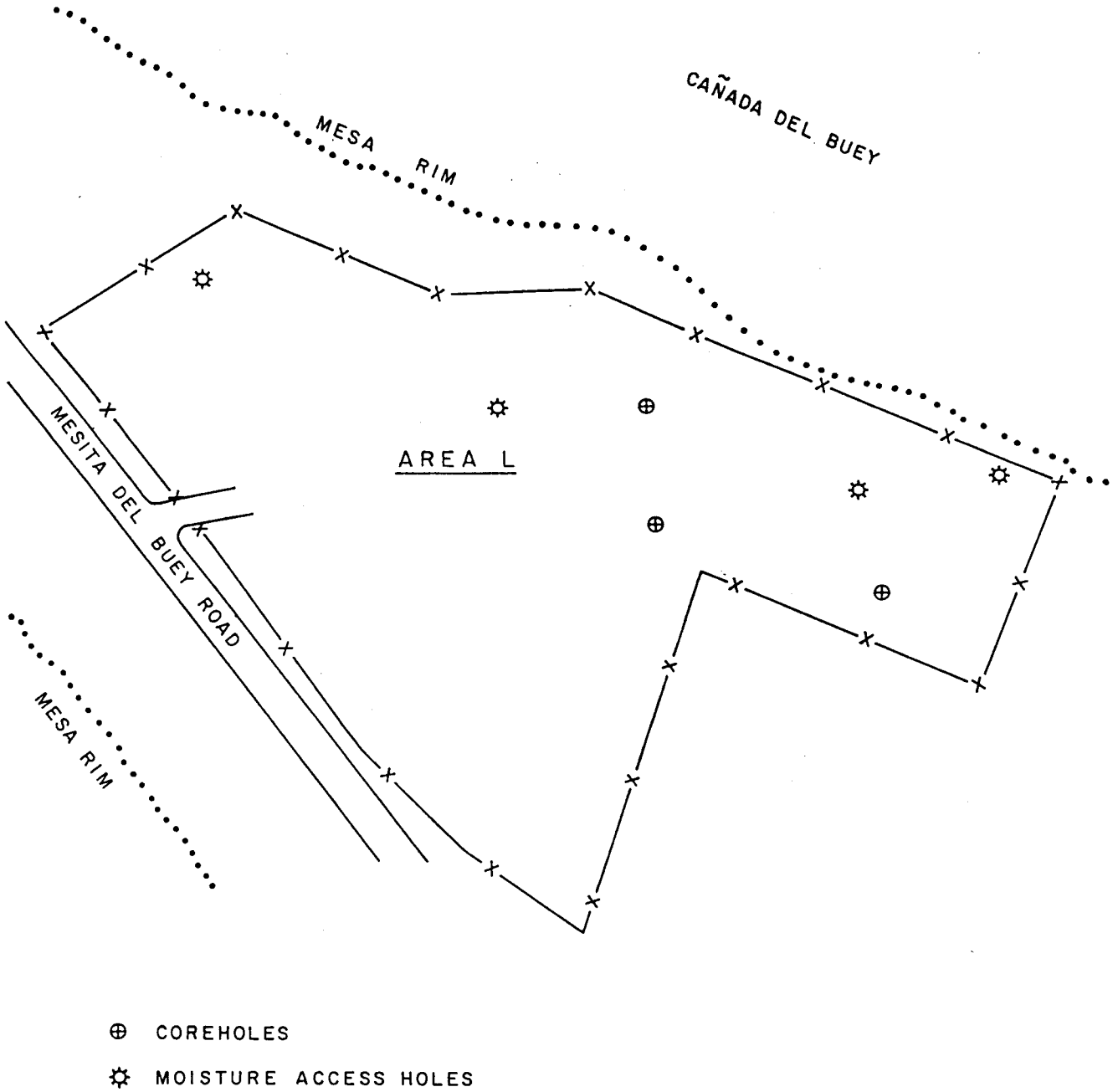
The regulations found in 40 CFR §265, Subpart F (NMHWMR 206.C.1) require the owner or operator of a landfill to implement a groundwater monitoring program to monitor the impact of the facility on the quality of water in the uppermost underlying aquifer. However, 40 CFR §264.90 (b)(4) and New Mexico Hazardous Waste Regulation 206.C.1.A(3) allow the waiver of all or part of the groundwater monitoring requirement if the owner or operator can demonstrate that there is no potential for migration of hazardous waste or hazardous waste constituents from the facility via the uppermost aquifer to water supply wells (domestic, industrial, or agricultural) or to surface water.

Los Alamos National Laboratory has evaluated the potential for migration of hazardous waste constituents from its land disposal facilities (Appendix N). The results of this work indicate that there is essentially no infiltration at the Los Alamos land disposal sites and that there is no recharge to underlying aquifers through the mesa tops in the vicinity of the Laboratory waste management areas (Cushman, 1965). The top of the uppermost aquifer underlying the TA-54 land disposal facilities is 950 feet below the surface. Soil and rock present at these sites, including tuff, volcanics, and sediments, are not saturated above the underlying aquifer so there is no driving force to facilitate infiltration or leaching of wastes from the disposal facilities. The lack of a hydraulic gradient at these sites and the depth to the aquifer indicate that wastes will not reach the aquifer.

This conclusion is supported by analyses of soil samples taken from holes bored horizontally under TA-54 disposal facilities from the wall of one of the adjoining canyons (Purtymun and Rogers, 1980). No indication of movement of contaminants out of disposal pits was found.

In light of these findings, Los Alamos has requested from the New Mexico Environmental Improvement Division (EID) a waiver of the 40 CFR §264 Subpart F (NMHWMR 206.C.1) groundwater monitoring requirements (Appendix

M). In place of a new groundwater monitoring program directed specifically at TA-54 land disposal facilities, the Laboratory proposes to continue ongoing chemical and radiochemical monitoring of the underlying aquifer at two nearby supply wells and at springs in White Rock Canyon near the Rio Grande. The quality of surface water flow is also monitored when it occurs in canyons adjacent to Area L. Current sampling locations are shown in Figure 2-12. To augment data obtained from these monitoring activities, the Laboratory plans to sink additional borings in the tuff to permit vadose zone monitoring (Figure 5-1). Changes in moisture content in the tuff exposed in the borehole will be detected by using a neutron moisture probe to log the holes on a regular basis. Appendix O provides a detailed description of the planned vadose zone monitoring program.



50 0 100 FEET
SCALE

FIGURE 5-1

LOCATION OF PROPOSED
VADOSE ZONE MONITORING
AND CORE HOLES AT AREA L

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

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6.0 PROCEDURES TO PREVENT HAZARDS

The information provided in this section is submitted in accordance with the requirements of 40 CFR §270.14 (NMHWMR 302.A.4.b). The following subject areas are addressed in this section: general security provisions, inspection schedules and requirements; preparedness and prevention requirements; and prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes. Guidelines for personnel working in potentially hazardous situations can be found in the Los Alamos National Laboratory Health and Safety Manual (Appendix P).

6.1 SECURITY

All Laboratory hazardous waste facilities are located within fenced areas which are locked during non-working hours. The Protective-Force maintains Laboratory security by manning check stations, patrolling facilities, and locking access gates. This security system will prevent unknowing entry and will minimize the possibility for unauthorized entry of persons or livestock into any of the hazardous waste facilities. In most cases, the Protective-Force is limited to external surveillance of buildings and disposal areas so that potential contact with Laboratory hazards is avoided.

The TA-50 waste incinerator is located within a fenced area. The building and gates are locked during non-working hours, and externally patrolled by Protective Force guards. All visitors must check in with the reception desk during working hours.

Area L within TA-54 is enclosed by a cyclone security fence with a single 45 degree barbed wire outrigging. The entrance gates are open during weekday working hours only and manned so that access is limited to authorized personnel. The entrance gates are locked by the users (HSE-7) and externally patrolled by the Protective Force once every four hours, from 5 p.m. to 8 a.m. on weekdays, and all day on weekends and holidays.

6.2 WARNING SIGNS

Warning signs are posted at all entrances to hazardous waste facilities and at other appropriate areas. The letters and colors of the signs are chosen to insure 25 foot legibility.

Warning signs are posted in English at the TA-50 batch treatment system and container storage area. The signs read, "No Smoking," "Caustic Lines," and "Acid Lines."

Warning signs in English are posted on the doors at the TA-50 waste incinerator and read, "Hazard: PCB's." There are no signs posted outside the waste incinerator building since all external doors are locked and access is only with keys and administrative controls. The two doors to the change rooms have electric strike plates for administrative control of access.

Warning signs in Area L read, "Hazardous Chemical Wastes Disposal Area." Signs are in English on all approachable fences and in Spanish on the front gate.

6.3 INSPECTION SCHEDULES AND REQUIREMENTS

Fire hydrants, alarms, extinguishers and sprinkler systems at all locations are inspected and maintained according to guidelines in the "Manual of Fire Protection Policies and Procedures" (Appendix Q). The DOE Fire Department and the Zia Company, a captive contractor to the Laboratory, are responsible for inspecting the fire fighting equipment. All other equipment is inspected and maintained by the operating group. Equipment is inspected according to Equipment Inspection Schedules (Tables 6-1 to 6-4). The frequency of inspections is based upon the rate of possible deterioration of the equipment and the probability of an environmental or human health incident if the deterioration, malfunction, or any operator error goes undetected between inspections. Inspection schedules and records are kept at the HSE-7 office.

6.3.1 TA-50 Waste Incinerator

Potential Problems

The waste incinerator system building is routinely inspected for potential problems with safety and emergency equipment, security devices, containers, container storage facilities, and loading and unloading facilities. Inspections of specific equipment and systems are conducted with a frequency appropriate to current operations, as well as appropriate to the equipment and systems. Potential problems include containment failure, fire, explosion, exposure, equipment deterioration or malfunction, and leaks from the incinerator. Appendix R contains conditions under which the waste incinerator will be operated.

Frequency and Content of Inspection

The waste incinerator, building, and emergency equipment are inspected according to the schedule in Table 6-1. Standard operating procedures require that process operators "walk through" their operating areas each hour to visually observe, monitor, and record the condition of equipment.

Remedial Action

If any defects, deterioration, damage or hazards are discovered during inspection, appropriate remedial actions including repairs, maintenance and replacement will be completed as soon as practical to preclude further damage and reduce the need for emergency repairs. If a hazard is found imminent or if a hazardous situation already exists, remedial action will be initiated immediately. Any remedial action taken due to an inspection will be noted on the operating log.

The extent of damage from containment failure is assessed first by the supervisor's observations of the affected area. Upon this visual observation, he will indicate appropriate emergency response procedures, including the call-out list, evacuation, and cleanup. If necessary, the

supervisor will also use Laboratory records to determine the chemicals involved.

The extent of the release may be further assessed by analyzing soil and water samples down-gradient from the release. Sampling locations are chosen by observations of the released material, if possible. If the release is not observable, sampling locations will be chosen randomly. Guidance in identifying hazardous chemicals is provided by the Safety Group (HSE-3), the Industrial Hygiene Group (HSE-5), the Waste Management Group (HSE-7), and the Environmental Surveillance Group (HSE-8). If sampling indicates that human health and the environment may be adversely affected, the Contingency Plan will be implemented immediately. Table 7-4 contains a list of equipment available for remediation.

If containment failure occurs, wastes will collect in the bermed areas. In the case of a small spill, vermiculite is poured over the spilled liquid. Once the liquid is absorbed, the waste is swept or shovelled and put back into a drum. For a larger spill, the liquid is pumped back into the drums. In either case, once free liquids are removed, the surface is cleaned using cleaners appropriate to the chemicals.

In the case of exposure, remedial actions include treating the exposed personnel at the HSE-2 Medical Facility (see Section 7.5.4) and determining the cause of exposure by observation, Laboratory records, and/or sampling.

Similar to hazardous waste releases, the extent of damage from fire and explosion is assessed by visual observations, Laboratory records, and if necessary, sampling. Equipment damaged or contaminated by fire, explosion, or spills is identified by visual inspections and sampling, if necessary.

Daily inspections by batch operators will detect malfunctions and deteriorations of the system. Depending upon the degree of damage, the system can be shut down (see Section 7.6.2). The extent of damage is assessed by visual observation by the system operator, who determines whether process shutdown should be initiated.

Should any of these problems occur, the waste incinerator can be shut down at the discretion of the operator. Failure of the HEPA filtration system or wet scrubbers, equipment deterioration or malfunction, or leaks from the waste incinerator will be remedied during and following process shutdown (see Section 7.6.2). The process operator will assess the situation and decide upon which shutdown method will be most efficient. He will supervise the operating area during the shutdown process.

Inspection Logs

General inspections are conducted by the operating group according to checklists associated with the operating log. Results of the inspection, the inspector's name and title, and date and time of inspection are recorded on the inspection log sheet. A copy is sent for records to HSE-7 and kept for at least three years. In addition, process operators will fill out general inspection checklists associated with the operating log at least once every four hours. These checklists are a record of operating conditions and provide evidence that the operator has checked and is aware of the operating status of the system. The time at which entries are made and the actual instrument reading for each variable will be entered into each checklist. When shutdown occurs, the log will state the nature of the shutdown, the time it occurred, and the suspected cause. Once each shift, the shift supervisor will inspect the facility for malfunctions, deterioration, operator error, and discharges. Prestarting inspection procedures, general inspection checklists, and the operating log will be kept with the incinerator system during operations.

6.3.2 TA-54, Area L Waste Transfer, Packaging and Storage Facilities, Treatment Tanks, and Land Disposal Facilities

Potential Problems

Area L is routinely inspected for potential problems with safety and emergency equipment, security devices, containers, container storage facilities, treatment tanks, and loading and unloading facilities. Potential problems are listed on a weekly inspection checklist. While the landfill is in operation, it will be inspected weekly and after storms to detect any evidence of deterioration, malfunctions or improper operation of run-on and run-off control systems. The treatment tanks will be inspected weekly and after storms to detect any leakage, damage, overflow, or cracks. Potential problems at Area L include containment failure, fire, explosion, and exposure.

Frequency and Content of Inspection

Area L is inspected according to the schedule in Table 6-2.

Remedial Action

If any defects, deterioration, damage or hazards are discovered during inspection, appropriate remedial actions including repairs, maintenance and replacement will be completed as soon as practical to preclude further damage and reduce the need for emergency repairs. If a hazard is found imminent or if a hazardous situation already exists, remedial action will be initiated immediately. Any remedial action taken due to an inspection will be noted on the operating log.

In the case of failure of run-on and run-off control measures (diversion ditches), the HSE-7 Group Leader or his qualified designee will assess the damage by visual observations and sampling and monitoring to determine the type and extent of contamination. Mitigation procedures and repairs, such as sandbagging and building berms, will be instituted immediately.

Remedial action in the case of containment failure, fire, explosion, or exposure is handled as described for the TA-50 incinerator. At the transfer, packaging and storage facilities in Area L, releases from containment failure collect in sumps as well as berms.

If leakage, corrosion, overflow or any other damage is detected in the treatment tanks, the contents will be pumped into a drum or another treatment tank.

Inspection Logs

Each inspection is conducted by the operating groups according to the checklist in the inspection log. Results of the inspection, the inspector's name and title, and date and time of inspection are recorded on the inspection log sheet. A copy is sent for records to HSE-7 and kept for at least three years.

6.4 PREPAREDNESS AND PREVENTION REQUIREMENTS

6.4.1 Equipment Requirements

Internal Communication/Alarm Equipment

The following internal communication/alarm equipment is available at Los Alamos to provide emergency instruction for rapid evacuation and to initiate emergency response:

- Centrex telephone system
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Telephone/radio paging
- Two-way hand held radios
- Emergency central alarm system
- Mechanical central alarm system

Since this equipment is laboratory-wide, it allows all personnel to get in contact with emergency coordinators in all areas of the laboratory. All hazardous waste handling personnel have immediate access to internal alarms or emergency communication devices.

The TA-50 waste incinerator is equipped with telephones throughout the facility. A radio with microphones at remote locations is available. Other communication/alarm equipment available at this facility includes:

- one portable radio
- one radio-equipped vehicle
- telephone paging system
- internal telephone communication line
- two-channel work station intercoms for direct communication from process area to offices and labs
- eleven pull alarms
- two automatic thermal alarms

The trailer at Area L is equipped with a telephone. A radio-equipped vehicle is available for use at Area L. These are the nearest communication sources for use in the case of an emergency.

External Communication/Alarm Equipment

The Laboratory has established external communication capabilities with the Los Alamos Police Department and the Los Alamos County Hospital (Section 7.2). The following external communication/alarm equipment is available at Los Alamos:

- Centrex telephone system
- Private telephone lines (if Centrex fails)
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Two National Warning System Stations (NAWAS)
- Direct line from Emergency Operations Centers to KRSN (local radio station)

Emergency Equipment

A list of emergency equipment available at Los Alamos, including types of equipment, locations, and contact phone numbers is shown in Table 7-4.

Emergency vehicles include 18 fire trucks, five ambulances, one rescue vehicle, and evacuation vehicles. Vehicles are inspected quarterly, according to the schedule in Table 6-3. Medical supplies include self-contained breathing apparati, wheel chairs, manual resuscitation, portable oxygen units, blankets, blood supplies, and medical kits.

Heavy equipment includes bulldozers, road graders, tractors, loaders, snowplows, semitrailers, and a portable power generator. Power tools include power saws and fire tools. The Zia Company inspection schedule for heavy equipment is shown in Table 6-4.

Transportation vehicles include trucks, buses, and vans.

Fire protection equipment includes fire alarms, sprinklers, hydrants, fire extinguishers, and halon extinguishing systems. The locations of fire alarms, hydrants, extinguishers, and halon systems are shown in Figures 2-3, 2-4 and 7-10.

Water for Fire Control

The Department of Energy (DOE) is responsible for overall water production, transmission, and storage for the Laboratory and Los Alamos County. DOE has 5,541.3 acre-feet of groundwater rights, plus 1,200 acre-feet of San Juan-Chama Diversion Rights, for a total of 6,741.3 acre-feet. This is considered adequate for projected needs (Long Range Utilities Development Plan, Los Alamos National Laboratory, 1984). Current consumption is approximately 4,603 acre-feet/year. The present water supply comes from seventeen active wells in three well fields (Figure 2-12). The Los Alamos water distribution system is shown on Figure 6-1. Annual pumping is managed to avoid excessive drawdown in any of the well fields. The Pajarito field offers the best opportuni-

ties for further water system development. Storage capacity is adequate to provide water for fire-fighting purposes.

The types of fire protection equipment at Los Alamos hazardous waste facilities are shown in Table 6-5. Appendix Q describes inspection procedures for sprinkler systems, alarms, and extinguishers.

Hydrant flow tests and block valve inspections are performed annually. Pressure regulating valves are inspected and adjusted every 60 days. Appendix Q describes inspection procedures for fire hydrants. Flow rates for hydrants are specified by ENG-4, an experienced fire protection engineering staff, and are dependent upon site needs, including size of building and presence of sprinkler systems. The contact for fire extinguishers is Al Martinez at ENG-4, phone 667-2146, pager 110-0369. For other fire protection systems, the contact is Howard Richardson at ENG-4, phone 667-7702, pager 117-332.

6.4.2 Aisle Space Requirements

Aisle space between waste containers at the container storage areas is adequate to provide access for inspection purposes, and movement of personnel, containers, and equipment.

Aisles between rows of drums at the Area L transfer, packaging and storage facilities are maintained at a minimum width of two feet to permit access for inspection and handling. Much of the bermed or curbed areas are ramped to facilitate access of forklifts and drum handling equipment.

6.5 PREVENTATIVE PROCEDURES, STRUCTURES, AND EQUIPMENT

Each facility has minimum requirements for safety clothing and apparatus to be used for routine operations which are specified in the facilities' Standard Operating Procedures (SOPs). When non-standard operations or working conditions exist, a special work permit specifying protective equipment and clothing must be obtained from HSE-5, Industrial Hygiene, and HSE-3, Safety, who inspect the site prior to issuing the permit.

6.5.1 TA-50 Waste Incinerator

Unloading Operations

Sealed and labeled drums and large containers are handled with a drum cart or a forklift equipped with a drum handling attachment. Shipping casks are handled with a forklift or a five-ton crane. Small sealed containers are manually loaded and unloaded. Waste containers are secured on the truck during transport.

Run-off/Run-on Control

The treatment area is located inside the building. Adequate storm sewers and gutters are provided to prevent sheet flooding of the building.

Water Supply Contamination

The waste loading and unloading area is paved. The building has concrete floors. Spills are immediately cleaned up. Liquid wastes are either retained in the sealed container (if the container is within a shipping cask designed for spill control) or may be transferred into holding/blending tanks in the hazardous waste feed preparation enclosure. The enclosure has a cement curb with a designed holding capacity greater than the enclosed liquid storage tanks. Water supply lines are under pressure. Depth to the main aquifer is approximately 1,300 feet.

The process area is equipped with drains that collect to a process sump. Any fluid collected in the sump is then pumped to the Laboratory's industrial (radioactive) waste treatment plant.

Equipment and/or Power Failure

Detailed procedures for handling equipment and power failures can be found in the Controlled-Air Incinerator Process Operating Manual (Appendix S) which includes standard operating procedures for rapid

shutdown of the system while maintaining containment. Back-up systems have been built into the process.

A battery-based uninterruptable power supply provides continuous 120 VAC power to controls associated with the incineration process. Instrument air is backed up by plant air and then bottled nitrogen. A skid-mounted diesel-engine generator, which is kept on idle during operation, provides back-up power source for the incinerator process equipment. The generator connects through an automatic transfer switch which activates if there is a commercial power failure and automatically disconnects when power is restored. In the event of water failure, a pressurized auxiliary water system automatically supplies water to the off gas quench system to remove heat from the incinerator off-gas to allow shut down of the incinerator. Process steam is provided as a snuffing medium to the incinerator fire box should circumstances require immediate shutdown of the incinerator.

Wind Dispersal Control

Only containerized wastes are transferred to and from the building. The transfer of liquid wastes from containers by dip tube/pump is performed in the hazardous waste feed preparation enclosure inside the building. The enclosure is ventilated, the exhaust gases pass through HEPA filters and an activated carbon bed prior to exhausting the atmosphere. Solid wastes are stored in an enclosed area that is maintained at a negative pressure and ventilated through HEPA filters. Solid wastes may be unpacked and sorted in a glovebox maintained at a negative pressure. The air from the glovebox is exhausted to the atmosphere after passing through HEPA filters. Wind dispersion is not a problem at the TA-50 waste incinerator.

Personnel Protective Equipment

Personnel working in the process area are required to wear, as a minimum, Anti-C (Anti Contamination) clothing. Personnel are required to wear Anti-C booties, caps, coveralls, undershirts, undershorts, and

full face masks whenever they are working on any interior components of the incinerator. Surgeons gloves must be worn while working at gloveboxes. The gloveboxes are fitted with PVC gloves. Viton gloves, goggles, Tyvek coveralls, and boots or overshoes must be worn while transferring liquid wastes. Respirators or breathing apparatuses will be assigned if required by the nature of the wastes.

6.5.2 TA-54, Area L Waste Transfer, Packaging and Storage Facilities, Treatment Tanks, and Land Disposal Facilities

At Area L, small bottles and containers of laboratory chemicals are manually loaded and unloaded. Drums are unloaded using a forklift with a drum handling attachment. Drums are lowered into the shaft using drum hooks.

Run-off/Run-on Control

Area L is located on a long narrow mesa. At Area L, the mesa top trends downward along its length at a slope of 4:100. In addition, the mesa top slopes from its approximate centerline to the mesa walls at a slope of 8:100. Immediately up gradient from Area L, the mesa top is only 200 feet wide, so the drainage area affecting Area L is therefore very small. Annual precipitation at the site is estimated at 14 to 16 inches per year. The 100 year 24 hour precipitation event is four inches. Run-on is handled with earth diversion ditches which divert the water into the adjacent canyon.

Run-off from shafts does not occur because shafts are covered with a steel cap when waste is not being emplaced. When filled, they are covered with a concrete cap. Wastes are kept in closed containers. Any spills at the surface are immediately cleaned up. Thus, the possibility of run-off being contaminated is remote.

Water Supply Contamination

Water contamination at Area L is discussed in detail in the Groundwater Monitoring Waiver Application (Appendix N). Water supply lines at Area L are under pressure.

Evapotranspiration potential exceeds precipitation, so there is no water migration for leachate formation. The depth to groundwater is 950 feet at Area L. The stratigraphy includes layers of volcanic tuff and ash which are unsaturated and have moisture contents of 0.2 to 2.0 percent by weight, which is insufficient for moisture movement through the Bandelier Tuff (see Section 2.2.5).

In general, containerized wastes are stored on curbed concrete pads at Area L. Free liquids are not placed in the shafts, but are stabilized with vermiculite in 55-gallon drums.

Equipment and/or Power Failure

Power failures do not significantly affect operations and containment at Area L. Loading, unloading and shaft and pit filling are discontinued until equipment failures are corrected. Wastes are kept in sealed containers so equipment failure would not threaten containment.

Wind Dispersal Control

Only containerized or packaged wastes are handled at Area L. A metal cap is placed on shafts at Area L when shifts are completed. Wind dispersion is not a problem because shaft disposal does not lend itself to wind dispersal. Wastes contained in the treatment tanks are maintained with adequate freeboard to prevent overtopping caused by wind erosion.

Personnel Protective Equipment

Personnel who handle containers at Area L are required, at a minimum, to wear safety glasses and gloves. Additional clothing and equipment are assigned where personnel are handling open containers. Protective equipment is specified by HSE-3 and HSE-5 by a special work permit.

6.6 PREVENTION OF ACCIDENTAL IGNITION OR REACTION OF IGNITABLE REACTIVE OR INCOMPATIBLE WASTE

6.6.1 TA-50 Waste Incinerator

Only compatible wastes are handled in the same holding/blending tank and associated transfer system at one time. Liquid wastes can be fed directly into the incinerator or pumped to waste holding tanks. Residuals are flushed with a compatible solvent which is burned at the completion of each liquids burn. The tanks and transfer system are left empty.

6.6.2 TA-54, Area L Waste Transfer, Packaging and Storage Facilities, Treatment Tanks, and Land Disposal Facilities

Incompatible chemicals are segregated for storage and shaft disposal to prevent interreaction of wastes in the case of a leak.

Containerized wastes are stored in the open air, inhibiting vapor accumulation. Smoking is not allowed and there is normally no ignition source in the area. The stored volatile and flammable wastes are inspected for leakage prior to loading.

Reactive wastes will be placed in the tanks for treatment only. They will not be stored in the tanks. Prior to adding new waste to a tank, the records will be checked to verify that the two waste streams are compatible. If they are not compatible, the second stream will not be placed in that tank until all contents have been removed and the liner has been replaced.

TABLE 6-1.

WEEKLY INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

(When in use)

Inspected By: _____ Date: _____

ITEM	INSPECTED FOR	CONDITION	ACTION
Process Gloves	tears		
	degradation		
Warning Signs	missing		
	damage		

Notes: _____

_____

_____

TABLE 6-1.
(Continued)

MONTHLY INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR
(When in use)

Inspected By: _____ Date: _____

ITEM	INSPECTED FOR	CONDITION	ACTION
SCBA Gear	deterioration		
	function		
Process Floor	cracks		
	spalling		
	coating		
Doors and Locks	damage		
Aisle Space	clear		

Notes: _____

TABLE 6-1.
(Continued)

QUARTERLY INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By: _____ Date: _____

ITEM	INSPECTED FOR	CONDITION	ACTION
Communication Equipment (Radio)	function		
Protective Clothing	cleanliness		
	completeness		
	deterioration		
Medical Supplies (First Aid)	completeness		
	deterioration		
Emergency Equipment (Vehicle)	see reverse side		

Notes: _____

TABLE 6-1.
(Continued)

ANNUAL INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By:_____ Date:_____

ITEM	INSPECTED FOR	CONDITION	ACTION
Spill Control Provisions (Berms)	cleanliness		
	damage		
	completeness		
Ramps	damage		
Respirators	deterioration		
	function		

Notes:_____

_____

_____

TABLE 6-1.
(Continued)

PRE-RUN INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By:_____ Date:_____

ITEM	INSPECTED FOR	CONDITION	ACTION
Decontamination Equipment	cleanliness		
	completeness		
	damage		
Absorbent	20 or more bags		

Notes:_____

_____

_____

TABLE 6-1.
(Continued)

OPERATING-SHIFT INSPECTION SCHEDULE

TA-50 WASTE INCINERATOR

Inspected By: _____ Date: _____

Time: _____

ITEM	INSPECTED FOR	CONDITION	ACTION
Incinerator Equipment	deterioration		
	malfunction		
	leaks		

Notes: _____

_____

_____

TABLE 6-2.
WEEKLY SAFETY INSPECTION
OR
INSPECTION AFTER SIGNIFICANT RAIN/SNOWFALL
TA-54, AREA L

Item	Inspected For	Condition	Remedial Action/Date
Storage Drums	Open drums, leaks, corrosion, ID's, dates, aisle space, stack heights		
Safety Shower	leaks, functioning		
Safety Eyewash	leaks, functioning		
Hose Bib	leaks, functioning		
Evaporation Pits	drainage control		
Shaft Covers	damage		
Shaft Railing	damage		
Drainage - General	adequate, erosion		
Drainage - Berms	adequate, erosion damage		
Metal Shed	damage, cracks		
Blacktop	cracks		
Fence	integrity, damage		
Gate Lock	integrity, damage		
Windsock	damage, functioning		
Warning Signs	out-of-date, damage, legibility		
Pallets	intergrity, damage		
Plating Waste SM-40	leaks, liquid in berm container damage		
Nitric Acid Tank TA-46	leaks, container damage		
(Meson Physics)	leaks, corrosion of containers		
Treatment Tanks	leaks, damage, overflow, cracks, rainwater accumulation/removal		
Treatment Tanks Curbs/Pads	damage		

TABLE 6-2.
(Continued)
MONTHLY SAFETY INSPECTION
TA-54, AREA L

Item	Inspected For	Condition	Remedial Action/Date
Scott Air Pack	good condition, cylinders full		
Electrical Generator	functioning		
Protective Clothing	complete, clean, good condition		
Floors in Storage Building	cracks, spalling		
Spill Equipment (absorbent, shovels, oversize drums)	complete, good condition		
Portable Pumps	clogging, corrosion, frayed wires		

TABLE 6-2. (continued)
QUARTERLY/YEARLY SAFETY INSPECTION
TA-54, AREA L

Item	Inspected For	Condition	Remedial Action/Date
Fire Extinguisher-Trailer (quarterly)	expiration date		
Empty Drum Stack (quarterly)	order, corrosion, leaks		
Shaft and Pit Markers (quarterly)	missing, damage		
Weeds (quarterly)	cutting		
Wooden Storage Shed (quarterly)	integrity, damage		
Trailer (yearly)	integrity, damage		
Overhead Power Line and Poles (yearly)	sagging, pole damage		
Light and Pole (yearly)	functioning, damage		
Dumpster (yearly)	damage		
Treatment Tanks (yearly)	thin spots, excessive corrosion		

TABLE 6-3.
QUARTERLY VEHICLE INSPECTION FORM

INSPECTED BY: _____ DATE: _____

ITEMS TO INSPECT	VEHICLE NUMBER
1. Brakes, foot	
2. Brakes, parking	
3. Wipers	
4. Washer	
5. Mirrors	
6. Seatbelts	
7. Sun Visors	
8. Door Locks	
9. Horn	
10. Tires	
11. High Beam	
12. Low Beam	
13. Running Lights	
14. Park Lights	
15. Turn Signals	
16. Tail Lights	
17. Brake Lights	
18. Back-up Lights	
19. License Lights	
20. Windshield	
21. Housekeeping	
22. Engine	

TABLE 6-3. (continued)
QUARTERLY VEHICLE INSPECTION FORM

INSPECTED BY: _____ DATE: _____

ITEMS TO INSPECT	VEHICLE NUMBER
Additional Requirements for Explosives Modified Truck	
23. Tie-down Straps	
24. Wheel Chocks	
25. Fire Extinguishers	
26. Spark Arresters	
Additional Requirements for Vacuum Pump Truck	
27. Hose, Visual Inspection	
28. Tank, Visual Inspection	

Comments:

TABLE 6-4.

ZIA EQUIPMENT INSPECTION SCHEDULE FOR HEAVY EQUIPMENT

Date _____

EQUIPMENT DESCRIPTION: _____

CHECK:	OK	NO	METER HOURS
MOTOR OIL	____	____	START _____
COOLANT	____	____	FINISH _____
FUEL	____	____	
TIRES	____	____	
LIGHTS	____	____	
TURN SIGNALS	____	____	
BACK-UP ALARM	____	____	
CUTTING EDGE, TEETH	____	____	
INTERIOR CLEAN	____	____	

OTHER: _____

_____

_____

EQUIPMENT PERFORMANCE: OK ____ TROUBLES ____

IF TROUBLES WITH EQUIPMENT, EXPLAIN (IN YOUR OPINION WHAT IS WRONG):

_____

_____

_____

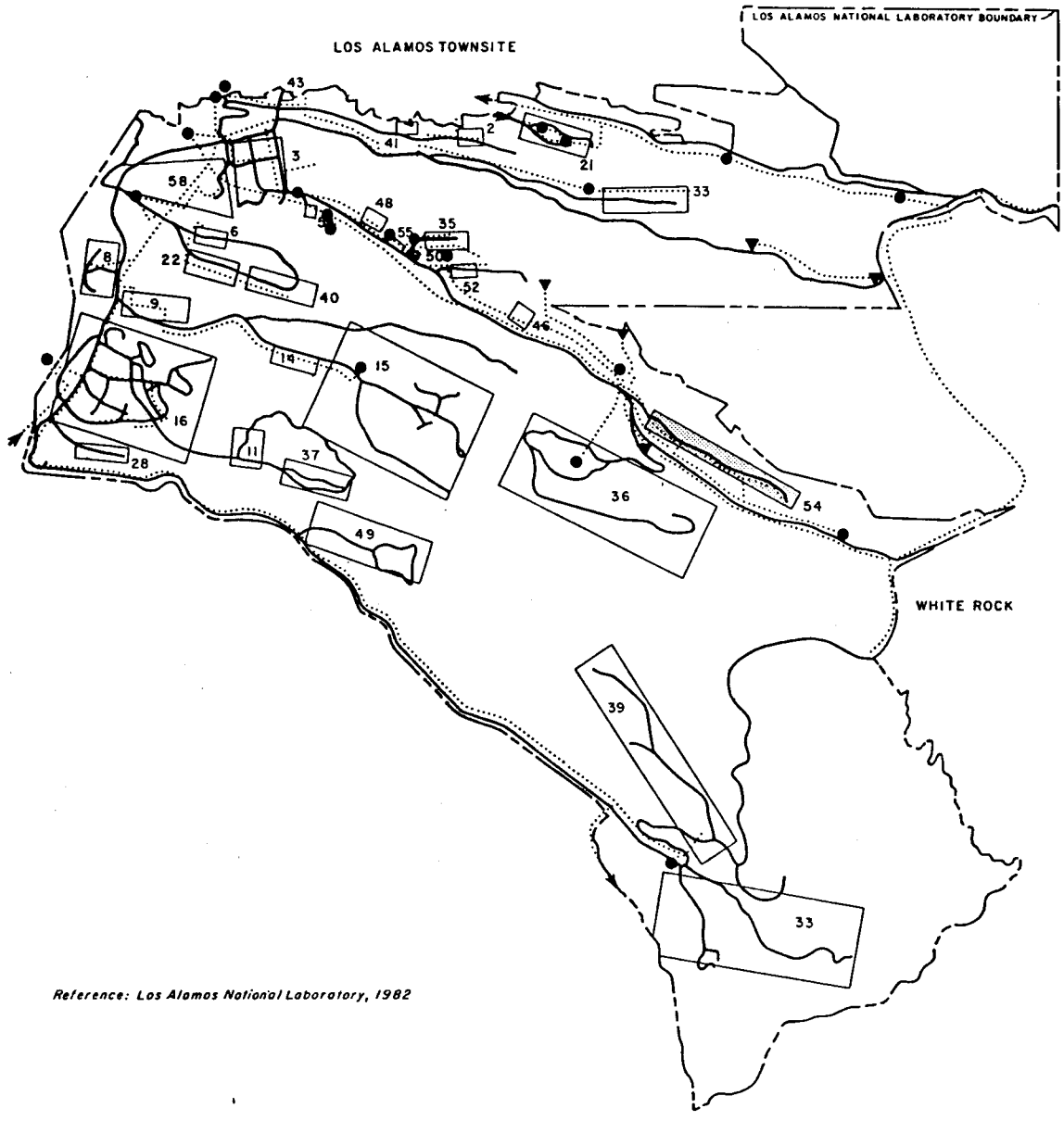
_____

TURN THIS FORM IN TO YOUR FOREMAN AT THE END OF YOUR SHIFT.

TABLE 6-5.

FIRE PROTECTION EQUIPMENT AT LOS ALAMOS
HAZARDOUS MIXED WASTE FACILITIES

	Alarms						
	Pull Box	Automatic Thermal	Automatic Smoke	Automatic Thermal Sprinkler System	Halon Exting. System	Fire Hydrants	Fire Exting.
TA-50 Waste Incinerator	X	X		X	X	X	X
TA-54, Area L						X	X



Reference: Los Alamos National Laboratory, 1982

EXPLANATION

- SUPPLY LINES
- STORAGE TANK
- WELL SITE
- 36 TECHNICAL AREAS
- SHADING INDICATES AREAS IN WHICH WASTE MANAGEMENT FACILITIES ARE LOCATED

N

1 0 1 MILE
SCALE

FIGURE 6-1

LOS ALAMOS
WATER SUPPLY SYSTEM

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

IT CORPORATION

DRAWN BY	L.L.F.	CHECKED BY		DRAWING NUMBER	846510-B/7
	10/17/84	APPROVED BY			

19 1253 HERCULENE, A&B SMITH CO., PGH., PA

7.0 HAZARDOUS WASTE FACILITIES CONTINGENCY PLAN

This section presents the Los Alamos National Laboratory's Hazardous Waste Facilities (HWF) Contingency Plan as required by 40 CFR §270.14(b)(7) (NMHWMR 302.A.4.b[1]) and specific requirements as stated in 40 CFR §264.51 through §264.56 (NMHWMR 206.B.10) as applicable. A copy of the Contingency Plan Authorization is located in Appendix T.

7.1 INTRODUCTION

The Los Alamos National Laboratory and the resident communities of Los Alamos and White Rock are located in north central New Mexico on the Pajarito Plateau, situated west of the Rio Grande on the eastern slopes of the Jemez Mountains. The Laboratory site covers about 111 km (27,500 acres) in and adjacent to Los Alamos County and includes 32 active Technical Areas (TAs) (Figure 7-1).

The principal mission of the Laboratory is the design and development of weapons for the nation's nuclear arsenal; however, considerable research and development (R&D) is directed toward the development of advanced technology. In executing its research mission, the Laboratory produces hazardous wastes in small quantities, the nature of which varies with changes in the research projects conducted. The potential exists for hazardous waste generation to occur at virtually all of the technical areas.

Overall responsibility for Hazardous Waste Management is with the HSE-7 Waste Management Group in the Health, Safety and Environment (HSE) Division (Figure 7-2). Generators of hazardous wastes are responsible for proper identification, segregation, and documentation of their wastes. Packaging, transportation, and final disposition of mixed wastes are the responsibility of HSE-7 Solid Wastes Operations.

Activities within HSE-7 include liquid waste treatment, hazardous chemical waste packaging, transport, treatment, and disposal.

The Laboratory maintains its own response forces to handle emergencies. Emergency resources available to the Laboratory include the DOE Fire Department, the contracted services of the Mason-Hanger Protective Force (security), Zia Co. (maintenance), Los Alamos Medical Center, internal laboratory services including medical facilities, and minor external assistance from the Los Alamos County Police.

7.1.1 Hazardous Wastes

The mixed hazardous wastes generated by the Laboratory activities can be considered as three general types:

- Lithium hydride
- Scintillation cocktails, and
- Basic and applied chemistry R&D programs mixed wastes.

Table 7-1 lists the mixed hazardous wastes currently generated at the Laboratory, the approximate annual generation rate, and the basis for hazardous waste designation. These wastes are further discussed in the following text.

7.1.1.1 Lithium Hydride

Los Alamos has a number of highly versatile machine shops that can machine parts from almost any metal, alloy or other material. Some of the machining operations generate waste lithium hydride which has some surface contamination consisting of depleted uranium 238. The radionuclide-contaminated lithium hydride is typically one-inch to one-foot chunks with a very limited volume of finer-sized material. Lithium hydride wastes are hazardous due to their reactivity (D003).

7.1.1.2 Scintillation Cocktails

Various scintillation cocktails are used at the Laboratory for dissolution and/or dispersal of environmental and bioassay samples to permit accurate analyses of radionuclide concentrations. The most common scintillation liquids used at the laboratory are composed of benzene,

xylene, toluene or combinations of these solvents. The specific radionuclides and their concentrations vary considerably in these waste solvents; however, tritium, carbon 14, phosphorus 32, and various plutonium isotopes are the most common radioactive components. Waste scintillation liquids are commonly in approximately one fluid ounce plastic or glass scintillation vials. Nearly all these potentially radioactive waste solvents are generated by the TA-43 Health Research Laboratory, the TA-59 Environmental and Bioassay Laboratories, and the TA-55 plutonium facility. All scintillation cocktails are treated as mixed wastes which are hazardous due to their ignitability (D001), even though they may not be contaminated by radionuclides.

7.1.1.3 Basic and Applied Chemistry R&D Programs Mixed Wastes

Typical mixed wastes generated by basic and applied chemistry R&D generally consist of small quantities of a very large variety of laboratory reagents, solvents, test samples and other wastes. Some chemical wastes are considered mixed wastes because they are stored or used in R&D laboratory areas that also contain radioactive materials. R&D mixed wastes are primarily generated by activities in the TA-3 Chemistry and Metallurgy Research Building, the TA-48 Radiochemistry Laboratory, and the TA-43 Health Research Laboratory, although mixed wastes may be generated throughout the Laboratory. The total volume of mixed wastes generated annually at Los Alamos is small; however, all chemical waste species listed in Appendix G may occasionally contain radionuclides.

7.1.2 Hazardous Waste Facilities

The safe handling, treatment, and/or storage of hazardous wastes is the responsibility of HSE-7. Daily operations involving hazardous wastes are performed by Solid Waste Operations.

Mixed Waste Facilities currently in operation are summarized in Table 7-2. The locations of the HWF are shown as the shaded areas on Figure

7-1. The flow plan for mixed wastes within the Laboratory is shown in Figure 7-3.

7.1.2.1 TA-50-37 Chemical Waste Incinerator

The waste incinerator is located in Building 37 at Technical Area 50 (Figure 7-4). The highly modified, controlled air incinerator is rated at a nominal 45 kilograms per hour waste feed throughput. The incinerator was developed as part of a continuing incinerator study and demonstration program being conducted by Los Alamos and is currently permitted by the EPA to burn PCB-contaminated materials. Modifications to the incinerator include additions of liquid and solid waste feed preparation lines, a continuous ash removal system, a high-efficiency off-gas cleanup system, and backup utility systems (Figure 7-5). Standard combustion equipment has been modified to permit effective incineration of waste in solid, liquid, slurry, or gaseous form. Particular attention has been given to engineering for proper waste containment, resulting in a system that is safe for evaluating the incineration of hazardous chemicals and certain radioactive waste forms.

7.1.2.2 Technical Area 54 (TA-54), Area L Facilities

Waste Transfer, Packaging and Storage Facilities

A single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1595 square feet are located in Area L of Technical Area 54. These facilities are used for the accumulation, packaging and storage of waste containers generated from throughout the Laboratory (Figure 7-6). Area L of TA-54 is an area of about three acres surrounded by an eight-feet-high chain-link and barbed-wire fence (Figure 7-6). Currently active waste management facilities located within this area include four waste treatment tanks and four waste disposal shafts as well as the transfer, packaging and storage facilities. The metal building has a concrete floor having a design standard load-bearing capacity of 250 pounds per square foot. Three shallow sumps covered by fiberglass grates are located within the floor of the

building. The storage pad has a concrete floor having a design standard load-bearing capacity of 700 pounds per square foot.

Hazardous waste containers generated at the various Los Alamos laboratories are delivered to these facilities on a routine basis. Wastes are segregated into compatible types and placed upon the three fiberglass grates located in the metal building or within one of the six storage cells on the roofed concrete pad. Wastes, packaged in small containers, are placed into lab packs. Also, vermiculite is added to 55-gallon drums containing liquids in these facilities. Wastes suitable for recycling are consolidated into drums and any damaged or leaking drums are repackaged into larger drums in these facilities. Los Alamos wishes to obtain a permit to operate the waste transfer, packaging and storage facilities.

Treatment Tanks

Four 1665-gallon ten-gauge steel tanks are located at Area L of TA-54. The tanks are lined with plastic. These tanks are used to neutralize, oxidize and evaporate wastes. The waste most commonly oxidized in these tanks is lithium hydride. Ammonium biflouride (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks.

Land Disposal Facilities

Land disposal facilities located in Area L include 34 shafts which range in diameter from three to eight feet. Thirty of the shafts have been capped. All of these shafts are about 60 feet deep. When in use, the shafts are covered with a heavy steel cap. When filled, the shafts are capped with a three-feet-thick concrete plug. Each shaft is used for the disposal of a single category of chemical wastes to assure that incompatible chemicals will not mix and react.

7.2 HAZARDOUS WASTE EMERGENCY RESPONSE RESOURCES

The Laboratory maintains its own response resources to handle emergencies. Interaction with outside agencies is limited for security

reasons and because it is impractical to train these agencies to cope with the technical diversity of the Laboratory's operations such that they could safely contribute in an emergency. Response resources include personnel, emergency equipment, and communication systems.

7.2.1 Response Groups

The emergency response groups available to the Laboratory include the DOE Fire Department, the contracted services of the Mason Hanger Protective Force (security), Zia Co. (maintenance), Los Alamos Medical Center internal laboratory services including medical facilities, and minor external assistance from the Los Alamos County Police. The services offered by these response groups are itemized on Table 7-3 and discussed briefly in the following. Each of the emergency response groups retains a current copy of the HWF Contingency Plan.

7.2.1.1 Medical Facilities

The Laboratory maintains its own medical facility, HSE-2 Occupational Medicine, to handle job-related injuries and to monitor employee health. Medical facilities include a staff of six physicians, two physician assistants, ten nurses, six x-ray technicians, and two laboratory technicians.

HSE-2 is supported by HSE-5, Industrial Hygiene. HSE-5 can provide exposure and treatment information via telephone access to Chemtrec and the National Library of Medicine, and via computer access to TOXLINE, CHEMLINE, and the Toxicity Data Bank. HSE-2 is also supported by HSE-1, 10 and 11, the Health Physics Groups, which provide data on the health impact of exposure.

Those cases which cannot be handled at HSE-2 would be forwarded to the Los Alamos County Hospital, where the Laboratory maintains a fully equipped decontamination room. The HSE-2 staff meets with the hospital's emergency staff monthly to go over procedures. In the event that a case is sent to the hospital, staff from HSE-2 provide assistance at the hospital.

7.2.1.2 HSE-1, -10, -11

HSE groups 1, 10 and 11 provide site field testing to determine the nature and extent of any radiological contamination. These groups also provide guidance on the correct handling of radioactive materials and they specify protective clothing and equipment for radiological hazards.

7.2.1.3 HSE-3 Safety

HSE-3 reviews and approves fire protection procedures. They may assist in process shutdown and evacuation.

7.2.1.4 HSE-5 Industrial Hygiene

In addition to medical support, HSE-5 provides site field testing to determine the nature (nonradiological) and extent of contamination, provide information on correct handling of chemicals, and specify protective clothing and equipment.

7.2.1.5 HSE-7 Waste Management

Provides cleanup operations and proper disposal of hazardous materials and supervises emergency response operations. Since HSE-7 normally handles hazardous waste, the group is highly trained and equipped. This group represents the nucleus of the hazardous waste emergency response.

7.2.1.6 HSE-8 Environmental Surveillance

Provides field surveys of soils, water, air and biota to determine environmental effects of exposure. The group includes expertise in geohydrology.

7.2.1.7 DOE Fire Department

The DOE Fire Department provides fire protection for the Laboratory as well as the communities of Los Alamos and White Rock. The department includes 98 personnel.

The Fire Department is under direct control of the DOE and fire fighting personnel are DOE employees. In the case of an emergency within the

Laboratory, the DOE Fire Department puts itself under the direction of the Laboratory response team.

The Fire Department personnel make regular tours of the Laboratory facilities to detect and discuss hazards associated with individual facilities and are instructed in hazardous material handling and emergency procedures. They are aware of the hazardous waste practices at the Laboratory, and are well equipped to handle any credible emergency situation.

7.2.1.8 Mason & Hanger Protective Force (Pro-Force)

The Pro-Force consists of more than 200 personnel who are responsible for Laboratory security. The security force is provided by Mason & Hanger, Silas Mason, under contract to the Laboratory.

During an emergency, the Pro-Force activities include maintenance of security, direction of traffic within the Laboratory, and control of access to the emergency site. The Pro-Force maintains the necessary equipment to perform these functions such as crowd control equipment, patrol cars, etc.

7.2.1.9 Zia Company

The Zia Company provides a maintenance support force on contract to the Laboratory. This support force is under the Laboratory's direction in an emergency. Also included are 14 eight-man firefighting teams. The Zia Company conducts inspections of Laboratory equipment, maintains equipment, and participates in emergency cleanup.

7.2.1.10 Los Alamos County Police

In keeping with the principle of handling emergencies internally, the Los Alamos County Police have only a minimal interaction with the Laboratory in an emergency. That interaction is limited to traffic control on DOE roads with public access. The limits of interaction are included in a signed agreement, a copy of which is included in the

Appendix to this document (Appendix T). There are no agreements with other agencies.

7.2.2 Emergency Equipment

A list of emergency equipment for use at the Laboratory and the location of this equipment can be found in Table 7-4. The equipment immediately available for use is located at TA-54, Area L, the TA-50 batch treatment system and container storage area, and the TA-50 waste incinerator.

In addition, Zia Company, the DOE Fire Department, and HSE-2 maintain emergency equipment. Major emergency facilities are shown in Figure 7-7.

7.2.3 Communications

Effective emergency response at Los Alamos National Laboratory requires an efficient communication system which will integrate all personnel into the emergency response procedure.

There are two central alarm systems (CAS) at the Laboratory; an emergency CAS and a mechanical CAS. The emergency CAS is activated by:

- Telephone communication (9-911)
- Automatic fire alarms
- Manual pull alarms
- Computer interface (to warn of critical events or loss of confinement at selected facilities)
- Break-in security
- Radio communications

The emergency CAS is located in the central control room in Building 4409 at TA-3. The control room is manned 24 hours a day and is equipped with telephones, medium and short range radios, direct line telephones, a National Warning System (NAWAS) station, and an emergency power

system. The fire alarm board at the control room gives the location of automatic and pull fire alarms.

The maintenance CAS board, located in Building 223 at TA-3, is manned by Zia personnel 24 hours a day. The maintenance CAS board interfaces with computers which monitor critical equipment throughout the Laboratory. Activation of an alarm triggers a call-out procedure to provide maintenance personnel and management supervision to correct the malfunction. The maintenance CAS does not directly trigger an emergency response.

Internal communication systems at the Laboratory include:

- Centrex telephone system
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Telephone/radio paging
- Two-way hand held radios

Off-site communications with Federal, state, county and other agencies are maintained by the following:

- Centrex telephone system
- Private telephone lines (if Centrex fails)
- Medium range radio nets (30-60 miles)
- Limited range radio nets (3-10 miles)
- Two National Warning System Stations (NAWAS)
- Direct line to KRSN (local radio station)

All alarm systems and internal and external communication systems are available for use by all employees.

Activation of the emergency CAS automatically alerts the DOE Fire Department, the Mason Hanger Pro-Force, and the CAS dispatcher. For hazardous waste emergencies, the CAS dispatcher notifies the HSE-7 Hazardous Waste Emergency Coordinator (HWEC) and notifies upper management of the problem.

HSE-7 has access to all communications systems including a short wave radio base station located at TA-50-1. During normal working hours, communications to support response groups can be handled by HSE-7.

During off hours, the HWEC uses the CAS Dispatcher to contact support groups.

7.3 NONSUDDEN RELEASES

Nonsudden releases include those incidences which, if uncontrolled, impact the environment over a long period of time. Such incidences include minor leaks of containers, loss of integrity of secondary containment, incomplete treatment, and leachate migration from disposal areas.

7.3.1 Responsibility

Correction of nonsudden release shall be the responsibility of the HSE-7 Solid Wastes Operations Associate Group Leader and can be handled with normal maintenance and management procedures. Correction methods for nonsudden releases that have resulted in environmental contamination shall be coordinated with, and approved by, the New Mexico Environmental Improvement Division (NMEID).

7.3.2 Credible Nonsudden Releases

Credible nonsudden releases, their detection and correction are given in Table 7-5. Not all failures can be predicted. In general, the response to nonsudden release will (1) contain the release, (2) correct the cause of the release, and (3) clean up any release to a level that protects health and the environment.

7.3.3 Nonsudden Release Surveillance

In addition to routine inspection and site-specific sampling and testing, the Laboratory maintains an area-wide environmental monitoring network maintained by HSE-8. Routine monitoring for radiation, radioactive materials, and chemical substances on the Laboratory site helps

to fulfill the Laboratory's policy to protect the general public, employees, and the environment.

Monitoring and sampling locations for various types of measurements are organized into three main groups. Regional monitoring stations are located within the five counties surrounding Los Alamos County. They are placed up to 80 kilometers (50 miles) from the Laboratory, and serve to determine background conditions. Perimeter stations are located within approximately four kilometers (2.5 miles) of the Laboratory boundary, and document conditions in residential areas surrounding the Laboratory. On-site stations are within the Laboratory boundary, and most are accessible only to employees during work hours.

The types of routine surveillance conducted at these stations includes radiation measurements and collection of air particulates, waters, soils, sediments, and foodstuffs for subsequent analysis.

Additional samples are collected to gain information about particular events such as major runoff events and nonroutine releases. Data are used for comparison with standards, background radiation levels, and dose calculations.

7.4 SUDDEN RELEASES

This section deals with incidents involving sudden release such as spills, fires, or explosions which pose a significant threat to human health or the environment.

7.4.1 Hazardous Waste Emergency Coordinator (HWEC)

The HWEC is responsible for coordinating all emergency response measures involving sudden releases of mixed wastes. The HSE-7 Group Leader or his designee is the primary HWEC. The primary HWEC is scheduled on call to provide coverage 24 hours a day, 365 days a year.

A list of qualified HWECs and their telephone numbers is on Table 7-6.

The HWEC can be reached during working hours by contacting the HSE-7 office (7-4301) or the CAS Dispatcher during off hours.

The HWEC shall respond to all incidents involving the release of hazardous wastes including spills, fires, or explosions; assess the possible hazards to human health or the environment; and use whatever response group or emergency equipment needed to control and contain the wastes.

7.4.2 HWF Emergency Contingency Plan

This section defines the guideline used to initiate the Emergency Contingency Plan and the resulting actions taken.

7.4.2.1 Guidelines for Implementation

The decision to implement the HWF Emergency Contingency Plan depends upon whether or not an imminent or actual incident could threaten human health or the environment. The following guidelines shall be used by the HWEC in making the decision whether or not to institute the Emergency Contingency Plan.

The Emergency Contingency Plan could be implemented in the following situations involving mixed wastes:

Spills

- A mixed waste spill cannot be contained with secondary containment or application of absorbents,
- Precipitation threatens to move spilled material off site,
- A mixed waste spill causes the release of flammable material, creating a fire or explosion hazard,
- A mixed waste spill results in toxic fumes which threaten human health, or

- An earthquake or other natural disaster threatens containment integrity.

Explosions

- An unplanned explosion involving mixed wastes occurred, or

- An imminent danger exists that an explosion involving mixed wastes could occur.

Fires

- Any fire involving mixed wastes, or

- Any building, grass, forest, or other nonhazardous waste fire that threatens to ignite hazardous wastes.

7.4.2.2 Emergency Notification

Immediately upon discovery of an imminent or actual incident involving hazardous wastes, the HWEC will be notified first. In the case of fire involving hazardous wastes, this is superceded by the Laboratory fire alarm system. A fire is reported by dialing 9-911, activation of automatic alarms, or activation of a fire pull box. All fire alarms simultaneously alert the CAS Dispatcher, the DOE Fire Department, and the Mason and Hanger Pro-Force. For fire involving hazardous wastes or hazardous waste facilities, the CAS Dispatcher shall contact the HWEC (Figure 7-8).

During off hours, all incidents involving hazardous wastes shall be reported to the CAS Dispatcher, who will contact the on-call HWEC.

The HWEC shall proceed to the incident and assess the nature of the problem. On an as-needed basis, the HWEC shall contact response groups directly or instruct the CAS Dispatcher to contact them.

Each response group maintains an on-call person and/or a call-down procedure to answer emergencies.

7.4.2.3 HWEC Actions

Upon notification of an incident, the HWEC shall:

1. Proceed directly to the site;

2. Assess the nature of the incident, and quantities and types of hazardous wastes involved; and

3. Based on the guidelines in Section 7.4.2.1 of the Contingency Plan, determine if implementation of the HWF Emergency Contingency Plan is warranted.

Upon the decision to implement the HWF Emergency Contingency Plan, the HWEC shall perform, in this order, the following actions:

1. Assess the hazards to human health and the environment including both direct and indirect effects such as generation of toxic, irritating, or asphyxiating gases, hazards of runoff of fire water or treatment chemicals;

2. Determine if evacuation of the local area is advisable, and if so, immediately notify appropriate response groups and/or the Los Alamos County Police;

3. Notify required response personnel by phone, radio, or through the CAS Dispatcher in the case of a spill or incident other than fire. In the case of fire, since the fire fighters have already responded, he shall confirm that the Fire Department Officer-in-Charge is aware of the hazardous waste involvement and the special hazards associated with the wastes;

4. Warn the remaining personnel of imminent or actual hazards using the radio and/or the PA system;

5. Notify the New Mexico Environmental Improvement Division (505) 827-9329, and the National Response Center (800) 424-8802, reporting

   - Name and telephone number of the reporter;
   - Name and address of the facility;
   - Time and type of incident;
   - Name and quantity of materials involved, to the extent known;
   - The extent of injuries, if any, and

- The possible hazards to human health or the environment outside the facility.

6. Advise the response groups as needed to minimize personnel exposure and expedite control; and

7. For the Batch Treatment Plant and Controlled Air Incinerator, where the emergency stops operations, the HWEC must monitor for leaks, pressure buildup, gas generation or equipment ruptures.

Once control of the emergency is established, the HWEC shall:

1. Arrange for site cleanup;

2. Provide for treating, storing, or disposing of recovered wastes, contaminated soil or contaminated surface waters;

3. Provide for decontamination of equipment as needed;

4. Replace and/or repair equipment as needed;

5. Conduct testing as needed to verify successful cleanup; and

6. Within 15 days of the incident, submit to the Regional Administrator and Environmental Improvement Division the report described in Section 7.10.

7.5 SPECIFIC EMERGENCY RESPONSE PROCEDURES FOR HAZARDOUS WASTE FACILITIES

The following section summarizes the guidelines for handling emergencies.

7.5.1 Chemical Spills

Hazardous wastes are handled and stored in small containers, lab packs, 55-gallon drums, and dumpster tanks. The individual volumes handled are small.

The general steps in handling hazardous wastes are:

- Containment including spreading of absorbents or forming of temporary dikes,
- Waste pickup and packaging in sound containers, and
- Decontamination followed by testing to assure adequate clean-up.

The emergency preparedness procedures related to flammable organic solvent spills call for stabilization of the spilled material with the organic solvent spill kit. Other chemical spills are to be stabilized using the acid and caustic spill kits or by the addition of absorbents such as vermiculite. Personnel protective equipment will be worn during spill control and cleanup. The stabilized material will be treated as hazardous waste. Runoff which might occur from spills outside containment areas during precipitation must be contained and handled as a hazardous waste unless analyzed and found to be nonhazardous. Temporary dikes can be constructed to contain runoff.

7.5.2 Fire

Depending on the size of the fire and fuel source, portable ABC fire extinguishers may be used to put out fires. However, the Laboratory is discouraging the use of portable fire extinguishers by employees and encouraging the immediate evacuation and notification of the DOE Fire Department. The person fighting the fire must wear appropriate protective equipment. If the fire spreads or increases in intensity, all personnel should evacuate to an upwind point at least 100 yards away from the fire. For any fire involving hazardous waste, the HWEC must be contacted immediately, and he will alert all necessary emergency preparedness personnel. The DOE Fire Department is automatically alerted when the CAS is activated. The HWEC should remain near the disposal site, but at a safe distance, so he can advise the personnel responding to the fire of the known hazards. Upon arrival at a fire, the Fire Department Officer-in-Charge will be in command of fire fighting. He

will accept and evaluate the advice of Los Alamos personnel and emergency preparedness organization members, but he will retain the responsibility to select the fire fighting methods and tactics. The HWEC will be in overall control of the Laboratory's emergency response efforts until the emergency is terminated.

7.5.3 Explosion

In the case of explosions, all personnel will immediately evacuate the area. Any injured personnel will be immediately transported to the Medical Department for treatment. The HWEC must be contacted immediately upon activation of the CAS, and then he must alert all necessary emergency response personnel. The DOE Fire Department is notified automatically upon CAS activation. The HWEC will remain near the disposal site, but at a safe distance, so he can advise the personnel responding to the explosion of the known hazards.

Upon arrival at the disposal site, the Fire Department Officer-in-Charge will be in command of fire fighting. He will accept and evaluate the advice of Los Alamos personnel and emergency preparedness organization members, but he retains the responsibility to select the fire fighting methods and tactics. The HWEC will be in overall control of the Laboratory's emergency response efforts until the emergency is terminated.

7.5.4 Exposure

Chemical material in the eye or on the skin will be washed either with the entire contents of the portable eye wash station or for at least 15 minutes. The eyelids will be held open during washing. The injured person will then be quickly transported to the Medical Department for evaluation. If possible, the chemical material involved in the injury will be ascertained and the information given to the Medical Department.

Other potential chemical exposures will necessitate evacuation if anyone notices any of the following conditions:

- Irritation of the eyes, breathing passages or skin,
- Difficulty in breathing, or
- Nausea, light-headedness, vertigo, or blurred vision.

The affected person will be transferred to the Medical Department and the HSE-5 Group representative will attempt to ascertain what, if any, chemical exposure occurred and what corrective measure is appropriate.

7.5.5 Flood

The U.S. Army Corps of Engineers has documented that Los Alamos National Laboratory's waste management facilities are not located within the 100-year floodplain. The appendix to the HWP Contingency Plan (Appendix T) contains this documentation.

7.6 EVACUATION

A facility will be evacuated upon the voice command of "evacuate the area," or upon the sounding of the evacuation alarm, or upon the fire alarm.

7.6.1 Evacuation Plan

Emergency situations may warrant the shutdown and evacuation of an area(s) or building(s) in order to protect personnel and property, to anticipate the emergency condition, or to enhance the appropriate response. Table 7-7 shows the criteria for evacuation, persons responsible for initiating evacuations, and reentry conditions. The TA-54, Area L evacuation route is shown in Figure 7-9. Building evacuation routes for the TA-50 incinerator building are shown in Figure 7-10. The evacuation route for TA-50 is shown in Figure 7-11.

To initiate building evacuation, the evacuation alarm is sounded and/or the public address system is used. The evacuation alarm, which is more

suitable for evacuation of the whole facility, is a steady, continuous, audible signal. This alarm cannot be silenced and reset by site personnel. The Fire Alarm Maintenance Section at 667-4027 and the Fire Department Platoon Chief at 667-7026 can silence and reset the alarm.

To evacuate a portion of the building, the public address system is more appropriate. The PA system will notify the occupants of the area to be evacuated, and additionally, will advise personnel in the rest of the facility of the existence of a problem in that specific area.

Upon initiation of an evacuation, either via the PA or evacuation alarm, all personnel are to leave the specified area and go to the muster area, turning off all equipment that could contribute to the hazard if left unattended.

In the event of an evacuation of only a portion of the building, one of the out buildings, or outlying work areas, the Group Leader will designate a control point at the closest and/or the most convenient location. This area will be outside the affected area and will serve as a muster point and provide control of the affected area to prevent further spread of the hazard.

Sweep Team personnel will remain in the area for a visual inspection of all the affected work areas, laboratories, and offices. At least two persons will do the sweep to insure that if an injured person is found or if a single person is fighting a small fire, turning off equipment or activating fire suppression systems, one sweep team member can give assistance while the other reports to the muster area or control point to obtain additional aid.

If the building is evacuated during normal working hours, the secretary will remove the personnel attendance roster that is posted near the secretary's desk, take it to the muster area, call roll, and report the personnel accounting to the Group Leader. During second or third shift

operations, the lead engineer will be responsible for evacuation and roll call. The evacuation procedure follows:

- Group Leader determines cause and probable extent of hazard.
- Group Leader will sound the evacuation alarm or make an announcement on the PA system.
- Group Leader will designate an assembly area if other than muster area.
- Group Leader will notify the on-call HWEC.
- Personnel will shut down equipment that might contribute to the hazard.
- Personnel will activate fire suppression systems.
- Personnel will not remain in affected area except to assist injured personnel.
- Personnel will report to the muster area or designated control point.
- Roll call (general evacuation) or personnel accounting (partial evacuation).
- Building or Area sweep by assigned personnel.

For a small scale evacuation, the Group Leader takes control. For a large-scale evacuation, the CAS will be activated, the HWEC will be notified and will be responsible for the evacuation.

7.6.2 Process Shutdown

Personnel are instructed to shut down equipment prior to evacuating a building unless an immediate building evacuation is announced. To ensure efficient shutdown, training and exercises in process shutdown are required. In the case of an immediate evacuation, a selected team may shutdown designated equipment in an evacuated area. The team will be equipped with the proper equipment, clothing and breathing apparatus. If present, HSE-1, HSE-3, and HSE-5 will provide advice and assistance. Process shutdown procedures only apply to the TA-50 waste incinerator. Process shutdown procedures are as follows.

7.6.2.1 TA-50 Waste Incinerator

If a fire or evacuation alarm sounds during the operation of the controlled air incineration process, the operating crew will initiate a process shutdown in accordance with the current Standard Operating Procedures. Three logic sequences are provided to shut down the process in a safe and orderly manner.

- The SCRAM - initiated in any situation that could lead to an immediate loss of containment. A SCRAM can be initiated manually at any time at the discretion of an operator. The upper and lower chamber burners are shut down, all combustion air and induced draft blowers are shut down and the valves and dampers are positioned so as to minimize flow into the system while maintaining a negative pressure. Snuffing steam is introduced into the lower chamber.

- Fast Shutdown Sequence - initiated for any condition that could likely result in damage to major process components. The chain of events are identical to the SCRAM sequence except it is delayed for a 2-minute period following the last waste feeding operation. This delay allows for the ignition of any pyrolytic gases formed from the waste charge prior to burner shutdown.

Both of the above modes are potentially destructive to the incinerator refractory and are initiated only when the consequences of not shutting down are greater than the consequences to the incinerator during the SCRAM or Fast Shutdown.

- Controlled Shutdown - initiated when there is potential for significant damage to minor process components. This is also the normal shutdown mode at the completion of an experiment. When controlled shutdown is initiated, programmable set point generator is activated that directs remote set point input to the temperature controllers, causing a gradual decrease in chamber temperatures. Switches internal to the set point generator cause an orderly shutdown of the process components.

It is the responsibility of the operations personnel and the process lead engineer to assess any situation and initiate the proper process shutdown sequence.

7.7 SALVAGE AND CLEANUP

The affected area will be surveyed by appropriate representatives from HSE Groups before salvage, cleanup and return to normal operations. After determination of any existing hazards from toxic or hazardous gases or fumes, electrical hazards, or other unsafe conditions, personnel or selected teams, equipped with proper breathing apparatus and protective clothing, will reenter the area to perform designated tasks to affect decontamination, repairs, and salvage to allow the return to normal operations. After an emergency, the HWEC will:

- Provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion. Contaminated material will be treated as a hazardous waste and disposed of according to Laboratory procedures.

- Remain at the site to ensure that no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed.

- Ensure that emergency equipment is cleaned and fit for its intended use before operations are resumed. Equipment will be visually inspected and sampled if necessary to determine the type and degree of contamination and appropriate cleanup measures will be used.

Prior to resuming operations, appropriate local authorities will be notified that cleanup procedures are completed and emergency equipment is cleaned and fit for its intended use.

Damage assessment and recovery shall be performed within the reporting and investigative requirements of DOE Order 5484.1. The HWEC has general responsibility for coordinating post-emergency actions,

particularly during the time period immediately after the emergency. Such actions include cleanup operations, repair of vital equipment, or interim hazard-removing operations (such as demolition of unstable walls). The services of the affected operational organizations, HSE Division, the Zia Company, and other on-site talent will also be utilized to estimate cleanup costs and operational impact. The HWEC declares the end of the emergency; an Incident Report is filled out, and the HSE-7 Group Leader and his staff review emergency actions.

7.8 POST-EMERGENCY ASSESSMENT

When the emergency is over, the causes of the emergency and the effectiveness of the response are investigated, in order that future emergencies may either be prevented, or that the response to them may be more effective. Following each event requiring the implementation of the HWF Contingency Plan, the HWEC shall meet with representatives of all response functions to determine the adequacy of the response.

7.9 EMERGENCY RECORDS

The details of any incident that requires implementation of the HWF Emergency Contingency Plan must be noted in that facility's log book. This record must include the time, date, and full description of the incident.

7.10 EMERGENCY REPORTS

Any emergency that requires implementation of the HWF Emergency Contingency Plan will be reported in writing within 15 days to the EPA Regional Administrator and to the New Mexico Environmental Improvement Division (EID).

The report shall include the following data:

- Name, address, and phone number of owner or operator;
- Name, address and phone number of the facility;

- Date, time, and type of incident (e.g. fire, explosion, spill);
- Name of material involved;
- Quantity of material involved;
- Extent of injuries (if any);
- Assessment of actual or potential hazards to human health or the environment; and
- Estimated quantity and disposition of material recovered from the incident.

7.11 CONTINGENCY PLAN AMENDMENT

The Contingency Plan shall be reviewed by the HSE-7 Group Leader and immediately amended if determined to be inadequate to handle nonsudden and sudden releases, and whenever:

- The HWF permit is revised;
- There is significant change in the design or operation of the HWF (i.e., waste quantities handled, handling techniques, or final disposition);
- The list of emergency coordinators changes;
- The list of emergency equipment significantly changes;
- Operating experience, drills, or technical review demonstrates the plan is inappropriate; or
- Actual implementation of the plan demonstrates inadequacies.

The Contingency Plan shall have a cover sheet (Appendix T) noting the date of the last amendment. Each amendment date shall be initiated by the HSE-7 Group Leader authorizing the changes. Amendments shall be issued to all HWF Contingency Plan holders and shall include a cover letter that describes the plan changes and rationale for those changes.

TABLE 7-1.
MIXED WASTE HANDLED, TREATED, STORED AND DISPOSED AT LOS ALAMOS[1]

Chemical	Hazard	Basis for Hazard Designation
Basic and Applied Chemistry R&D Programs		
Chemistry and Metallurgy Research Building		
Radiochemistry Laboratory		
Health Research Laboratory		
Plutonium Facility		
- Numerous chemical wastes contaminated with various radionuclides	Varies[2]	R&D wastes are comprised of numerous listed wastes[2]
Scintillation Cocktails		
Health Research Laboratory		
Environmental and Bioassay Laboratories		
Plutonium Facility		
- Solvents	Ignitable	Wastes are ignitable solvents (D001) - typically benzene, toluene, xylene
Machine Shops		
Main Shops Department		
- Lithium hydride, lithium metal contaminated with depleted uranium	Reactive	D003 - per 261.23(a)(2),(3), (NMHWMR 201.B.4.a[2],[3]), barium per 261.24(a) (NMHWMR 201.B.5.a)
Chemically and Radionuclide Contaminated Equipment		
Many LANL Facilities		Same characteristics as hazardous material contaminants

(1) See Part A application (Section 1.0) for estimated volumes.

(2) See Appendix G for a representative list of wastes and hazard designations.

TABLE 7-2.

SUMMARY OF MIXED WASTE FACILITIES
LOS ALAMOS NATIONAL LABORATORIES

Technical Area and Building or Area Designation	Wastes Handled	Activity Description
TA-50-37	Combustible liquids and solids, including chlorinated and fluorinated hydrocarbons, and carcinogenic materials	Waste incineration with flue gas treatment
TA-54 Area L	Shops department wastes Wastes from Basic and Applied Chemistry R&D programs	Wastes are segregated and stored prior to treatment, incineration, recycle, shipment offsite, or disposed at Area L

TABLE 7-3.

HAZARDOUS WASTE EMERGENCY RESPONSE GROUPS

Laboratory Controlled Response Group	Emergency Telephone	Assistance Available
HSE-1 Health Physics HSE-10 Chemistry Health Protection HSE-11 Accelerator Health Protection	667-7878 8 am - 5 pm	Assists HSE-2 by providing data on the health impact of exposure
HSE-2 Occupational Medicine	988-0539 off-duty hrs	Emergency medical treatment
HSE-3 Safety		Reviews and approves fire protection procedures. May assist in process shutdown and evacuation
HSE-5 Industrial Hygiene		Site evaluation - field testing to determine the nature and extent of contamination (nonradiological)
		Specify protective clothing and equipment
		Information services regarding hazards of wastes and treatment for exposure
HSE-7 Waste Management		Hazardous waste cleanup, handling, treatment, and disposal
HSE-8 Environmental Surveillance		Field surveys to determine spread of contamination and adequacy of clean up
		Meterological information
		Geohydrologic support
HSE-9 Health and Environmental Chemistry		Chemical analytical services
DOE Fire Department	9-911	Firefighting personnel and equipment
		Ambulance and parametic service

TABLE 7-3. (cont)

Laboratory Controlled Response Group	Emergency Telephone	Assistance Available
Mason & Hanger Protective Force (Pro Force)	667-4437	Traffic Control Security
Zia Company	667-6196	Maintenance personnel and equipment
Non-Laboratory Controlled		
Los Alamos County Police	662-4176	Traffic control on DOE roads with public access
Los Alamos Medical Center*	662-4201	Medical Services

*Medical services related to hazardous wastes injuries provided under the direction of HSE-2.

TABLE 7-4.
EMERGENCY EQUIPMENT

EMERGENCY EQUIPMENT AT THE TA-50 WASTE INCINERATOR

Fire Control Equipment:

13 fire extinguishers (9C-CO; 4 A-water)
- 1 Mechanical Equipment Room 111
- 2 High Bay Room 112
- 2 High Bay Room 114
- 1 South of Library and Conference Room
- 1 Chemistry Laboratory Room 107
- 1 Process Engineering Laboratory Room 209
- 1 Office Area Room 202
- 1 Room 21

11 Fire Alarm Pull Boxes connected to the CAS
- 1 Mechanical Equipment Room 111
- 1 High Bay Room 112
- 2 South of Library and Conference Room
- 2 High Bay Room 114
- 1 East of women's changing room
- 1 Process Engineering Laboratory
- 1 Office Area Room 202
- 2 Room 21

Automatic thermal alarm on inlet and exhaust of ventilation system
Automatic thermal sprinkler system throughout offices
4 Fire Hydrants
- 1 Northwest corner of Building 84
- 1 West of Building 69
- 1 Northeast of Building 37

Halon Extinguishing System, manual and ultraviolet inRoom 115

Communication Equipment:

Telephones throughout building with building-wide paging system
Radio located in Room 202

Spill Control Equipment:

Absorbent kept onsite
PCB room is bermed to handle all liquids stored
Have Spill Prevention and Containment Plan

Decontamination Equipment:

Showers
Emergency eyewash

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

EMERGENCY EQUIPMENT - HSE-7 CONTROLLED

Spill Control Equipment: Located at TA-54--Area G

Heavy equipment available for emergencies which may include
- 2 scrapers
- 1 bulldozer
- 1 tractor (front end loader)

Shovels
Absorbents (vermiculite) in combustibles storage shed

Decontamination Equipment:

Small decontamination pit for heavy equipment
Showers (MD-11)

Other:

Change room with protective clothing (MD-11)
2-3 dozen respirators (particulates) (MD-11)
2 self-contained, portable air masks (MD-11)
2 emergency generators, portable
3 vehicles are available for evacuation of personnel:
- 2 sanfu
- 1 Jeep (with emergency equipment, e.g., coveralls, booties, tape, rope)

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

EMERGENCY EQUIPMENT AT TA-54, AREA L

Fire Control Equipment:

1 fire hydrant located 30 feet south of site entrance to site
1 CO fire extinguisher located inside trailer at west end of site (B,C)
1 CO fire extinguisher located inside storage shed (B,C)
1 freeze-proof faucet located immediately east of shed

Spill Control Equipment:

Shovels
Oversized drums
Absorbent inside storage shed
Heavy equipment from Area G available for any emergencies at Area L
Bermed storage area

Communications Equipment:

2-way radios are available to all personnel when in area
2-way radios are in all vehicles used for moving hazardous waste
Telephone located inside trailer

Decontamination Equipment:

1 emergency shower and eye wash located immediately east of shed

Other:

2 self-contained, portable air masks located inside trailer

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

SUPPLEMENTARY EMERGENCY EQUIPMENT

ZIA COMPANY (667-6196)

Equipment	Number
A. Transportation	
1. Pickups, 1/2 through 3/4 ton	183
2. Trucks 1 through 3 ton	25
3. Powerwagon (E-20781 with welder (PN-30256) mounted on vehicle, CC-135	1
4. Buses (11-passenger)	2
5. Stationwagens	11
6. Vans, panels, and carryalls	24
B. Special Equipment	
1. Road grader, Champion, self-propelled blade, with radio	1
2. Grader, John Deere, self-propelled, with radio	1
3. Loaders, bucket, Melroe, Bobcat, 1/3 cubic yards	3
4. Loader, bucket, Michigan, 2-3/4 cubic yards	1
5. Loader, Fiat-Ellis, 3 cubic yards	1
6. Loader, bucket, Michigan, 2-1/2 cubic yards	1
7. Loader, bucket, Michigan, 3-1/4 cubic yards	1
8. Loader, bucket, Yale, 3 cubic yards, with radio	1
9. Loader, bucket, backhoe, International, 1-1/2 cubic yards	1
10. Loaders, bucket, backhoe, Case, 7/8 cubic yards	2
11. Loader, backhoe, Ford, 1 cubic yard	1
12. Snowplows, Bombardier, with blade	2
13. Bulldozer, D-8, Crawler	1
14. Bulldozers, TD-25, International	2
15. Scraper, Terex, self-propelled	1
16. Scraper, Fiat-Ellis, self-propelled	1
17. Bulldozer, 280, rubber-tired, with radio	1
18. Semitrailers	5
19. Lights, camp (electrical, plant, portable, 1000 to 5000 watts)	4
20. Power saws	14 (approx)
21. Flusher, street, 3000-gallon Truck, tanker, 500-gallon, International	1
22. Mobile transceivers (2-way, KOB-753)	64

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

ZIA COMPANY (667-6196)

Equipment	Number
B. Special Equipment (cont)	
23. Mobile transceivers (2-way, fire network)	7
24. Handsets (2-way)	8
25. Pageboys (1-way)	235
26. Welders, mounted on trailers and trucks	32
27. Fire tools (hand)	150 (approx)
C. Supplies	
1. Food	
Box lunches	150
D. Other Supplies	
1. Bedding	
Blankets	60
Bedrolls (disposable)	50
(from U.S. Forest Service in Santa Fe)	
2. Butane gas (25-gallon tanks)	4
3. Fuel and lubricants	
4. Miscellaneous supplies	
Manpower	
A. Fire Bosses	
1. Crew bosses	3
2. Straw bosses	12
B. Service Bosses	
1. Transportation boss	1
C. Specialists	
1. Cat bosses	2
2. Bulldozer operators	14
3. Clerks	10
4. Dispatchers	3
5. Mechanics	17
6. Power saw operators	8
7. Radio and telephone operators	10
8. Truck drivers	13
9. Tool sharpener	4

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

ZIA COMPANY (667-6196)

Manpower (cont)	Number
7. Radio and telephone operators	10
8. Truck drivers	13
9. Tool sharpener	4
D. Firefighters	
1. Organized crews (approximately 8 men per crew)	14 crews

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

EMERGENCY EQUIPMENT AT THE DOE FIRE DEPARTMENT
(9-911)

8 1000-gallons-per-minute pumper trucks
5 Minipumper trucks
5 1500-gallon tank trucks
4 Modular ambulances
1 Rescue vehicle
69 Self-contained breathing apparati
Various firefighting equipment
Emergency Medical Technician (EMT) medical equipment
98 Personnel with 81 hours MTA training
1 75-foot elevated platform

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

EMERGENCY RESOURCES AT THE MEDICAL FACILITY (HSE-2)
(667-7878) 8 am - 5 pm
(988-0539) off-duty hours

Manpower

6 (2 casual) physicians
2 physician's assistants
10 (1 part-time) nurses
3 (2 casuals) x-ray technicians
2 laboratory technicians

Special Equipment - Portable

1 Radio base station (HSE-Div. net, being installed)
3 Walkie talkies (HSE-Div. net)
1 Portable cardiac monitor and defibrillator
1 Crash cart - emergency equipment
1 Portable physicians bag - drugs
1 Portable suction unit
5 Portable stretchers
1 Ambulance stretcher with straps
6 Wheel chairs
1 Manual resuscitator
6 Portable oxygen units
Several intravenous holders and solutions
6 Otoscope/opthalmoscope sets
1 Portable sphygmomanometer
10 Stethoscopes
Many contamination apparel
1 Eye irrigation system
Many inflatable limb traction splints
3 Industrial first aid kits
Many extrication and cervical collars
Many crutches and canes
Many suture sets

Supplies

Bedding and pillows
Rescue blankets
Burn blankets
Thermal/icing pouches
Multitrauma dressing and bandages

TABLE 7-4. EMERGENCY EQUIPMENT
(Continued)

EMERGENCY RESOURCES AT THE MEDICAL FACILITY (HSE-2)
(667-7878) 8 am - 5 pm
(988-0539) off-duty hours

Special Facilities - Nonportable

Completely equipped medical clinic with emergency lighting system, x-ray machine, and ambulance entrance. Contamination showers, protective clothing, and wound counters. Suction unit, electrocardiograph (12 lead), pulse rate monitor/recorder, primary response trauma kits are included.

Transportation

1970 Plymouth Sedan

TABLE 7-5.

CREDIBLE NONSUDDEN RELEASES

Location	Credible Releases	Detection	Correction
TA-50-37	Incomplete incineration	Analysis and stack monitoring	Modify treatment procedure prior to continuing
	Failure of containment	Inspection for leaking containers and tanks, inspect secondary containment for integrity	Maintenance or replacement of containment
TA-54 Area L	Failure of containment	Inspection for leaks, inspect secondary containment for integrity	Maintenance or replacement of containment
	Toxic material migration from disposal shafts	Vadose zone monitoring	Develop in agreement with the NM EID a detection monitoring program and corrective action program in compliance with 40 CFR 264.99 and 264.100

TABLE 7-6.

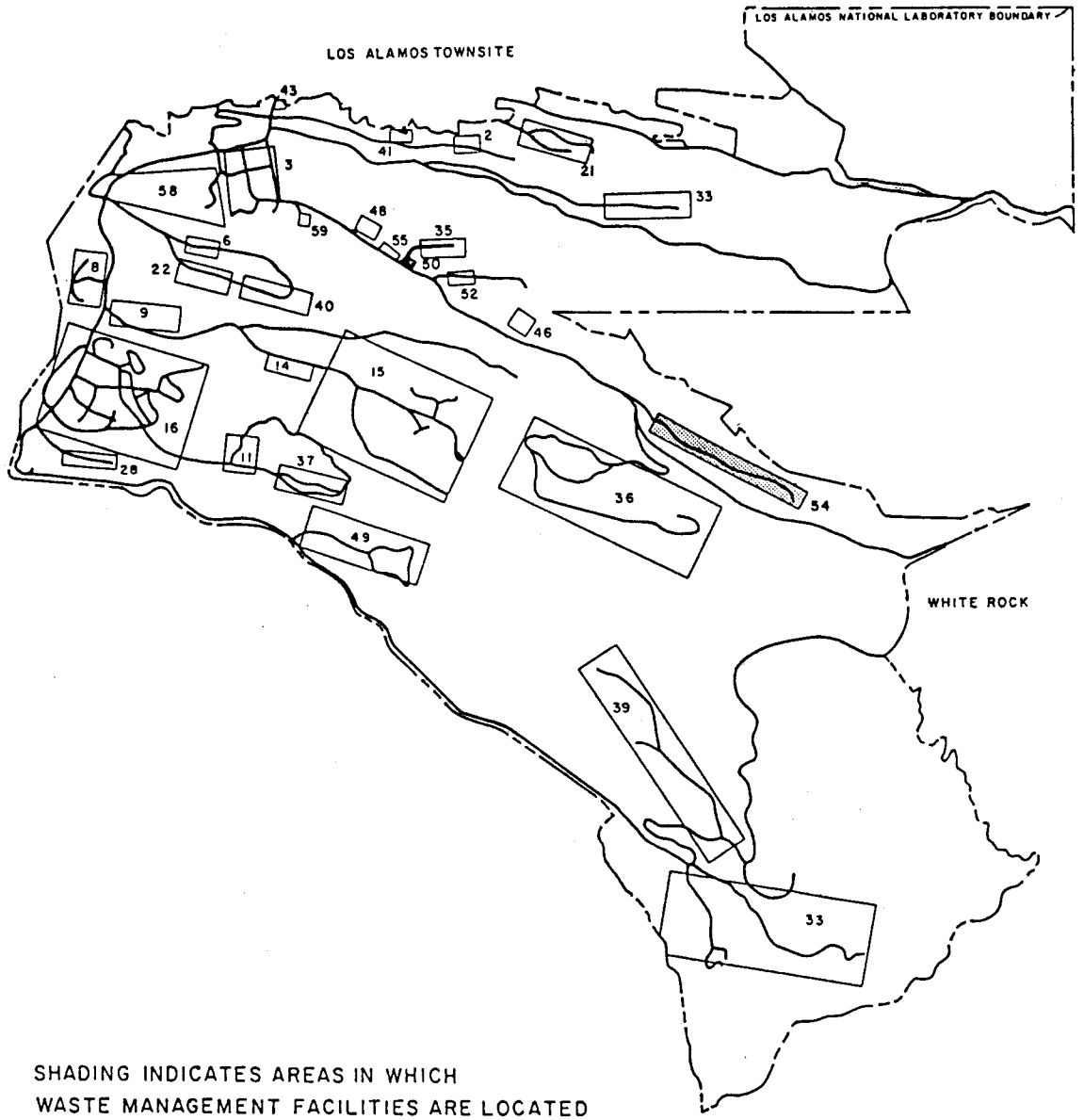
HAZARDOUS WASTE EMERGENCY COORDINATOR

Primary Coordinators	Laboratory Telephone	Telephone	Home Address
Ray Garde, HSE-7 Group Leader	7-7920/4301	753-7737	2560 Aeby Lane, Espanola, NM
Lud Emelity, HSE-7 Deputy Group Leader	7-5839/4301	662-7993	388 El Conejo, Los Alamos, NM
J. L. Warren, HSE-7 Associate Group Leader	7-5398	662-9639	1082 Big Rock Loop, Los Alamos, NM
Jerry Buchholz, Associate Group Leader	7-4301	672-3647	316 Potrillo Drive, White Rock, NM
Lee Borduin, Associate Group Leader	7-7391	455-2882	Rt. 1, Box 92G, Santa Fe, NM
Karen Balo Section Leader	7-6095	983-5169	1933 San Idelfonso, Santa Fe, NM

TABLE 7-7.

EVACUATION DETERMINATION AND REENTRY

Reason for Evacuation	Determination Made By	Reentry Conditions
Fire	Fire or Evacuation Alarm; Group Leader; Alternate; Lead Engineer, Senior Staff Member present, or HWEC	Following survey by the Chief Fire Officer, HSE-1 and/or HSE-5, and R&D Supervision
Explosion	Same as above	Same as above plus HSE-3
Loss of Ventilation	Group Leader, Alternate, Senior Staff Member, Lead Engineer, or Senior Technician	Following survey by HSE-1 and/or HSE-5, and R&D Supervision
Loss of Electric Power	Same as above	Same as above
Extensive Contamination	Same as above or HSE-1 Representative	Same as above
Airborne Contamination	Same as above or Rad Monitor	Same as above
Escape or Release of Toxic or Hazardous Gas or Fumes	Group Leader, Alternate, Senior Staff Member, Lead Engineer, Senior Technician, or HWEC	Same as above plus HSE-5
Bomb Threat	HSE-3 or Protective Representative, R&D Section Leader, Alternative, Senior Staff Member or Lead Engineer	Following determination by HSE-3 or Protective Force Representative and R&D Supervision



SHADING INDICATES AREAS IN WHICH WASTE MANAGEMENT FACILITIES ARE LOCATED

N

4000 0 4000

SCALE

FIGURE 7-1

LOS ALAMOS
TECHNICAL AREAS

PREPARED FOR
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LOS ALAMOS, NEW MEXICO

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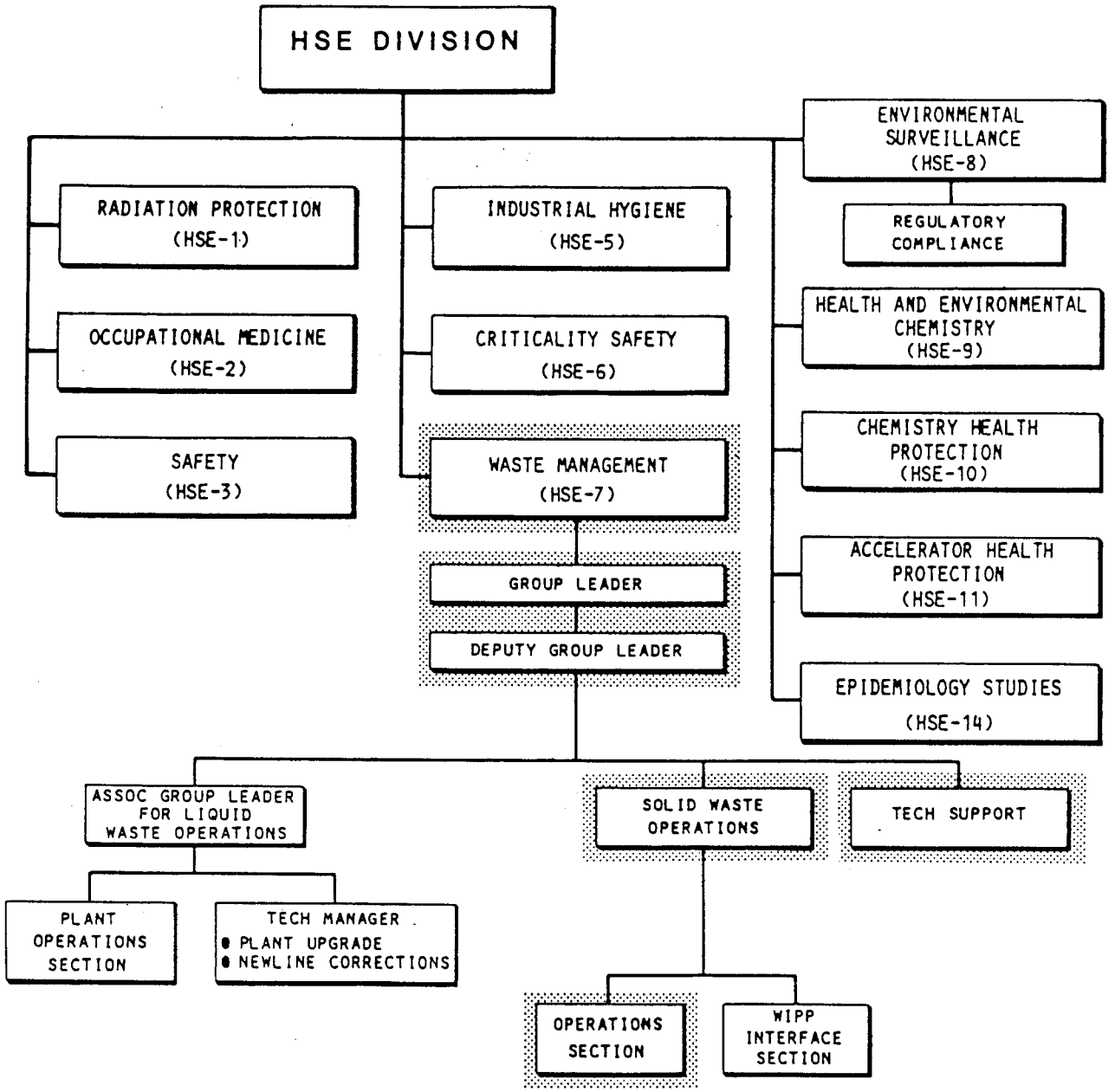

NOTE: SCREENED BOXES INDICATE PRIMARY RESPONSIBILITY FOR CHEMICAL WASTE MANAGEMENT

FIGURE 7-2

HEALTH, SAFETY AND ENVIRONMENT DIVISION MANAGEMENT CHART

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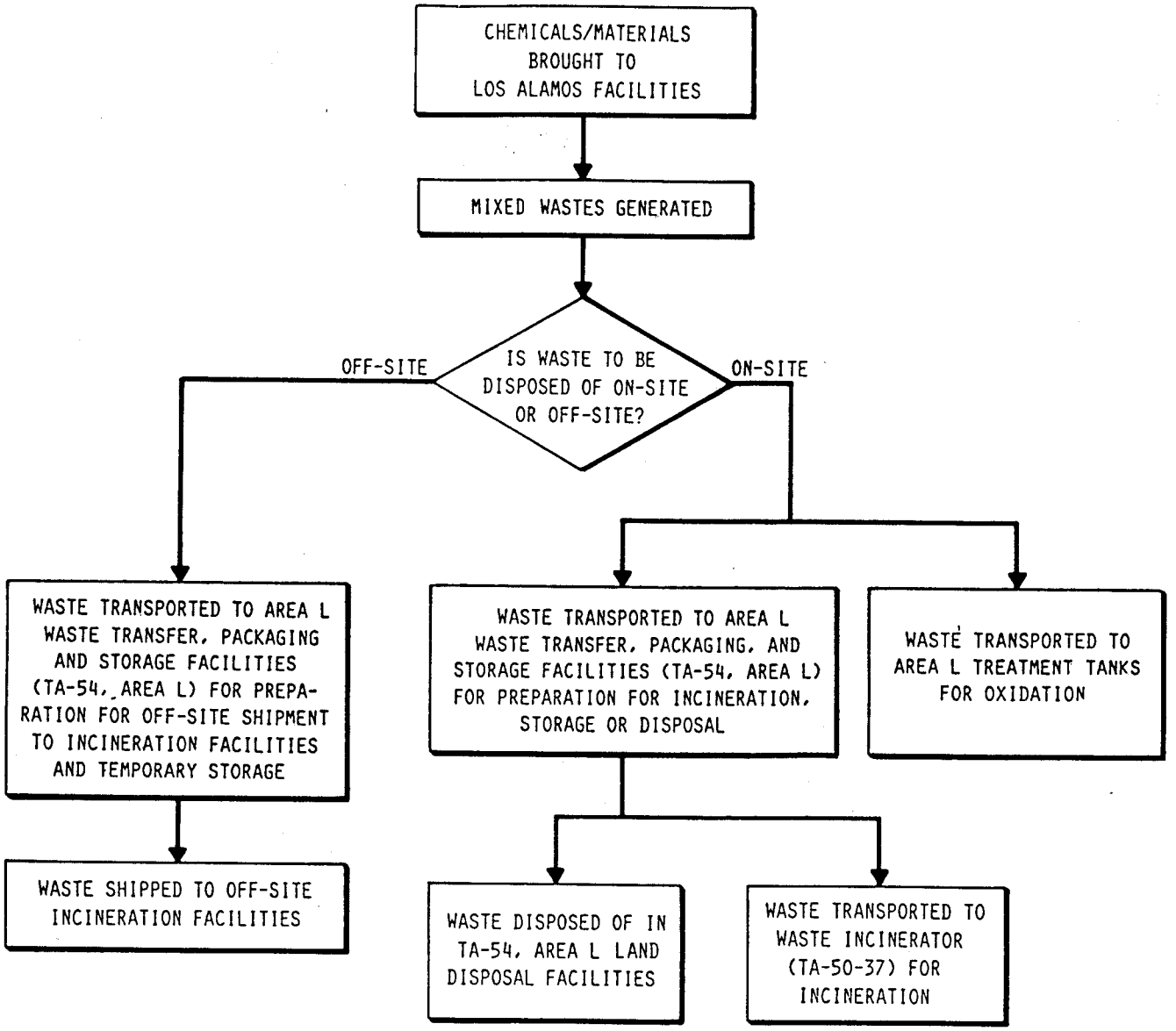

FIGURE 7-3

SCHEMATIC DIAGRAM OF LOS ALAMOS MIXED WASTE MANAGEMENT ACTIVITIES

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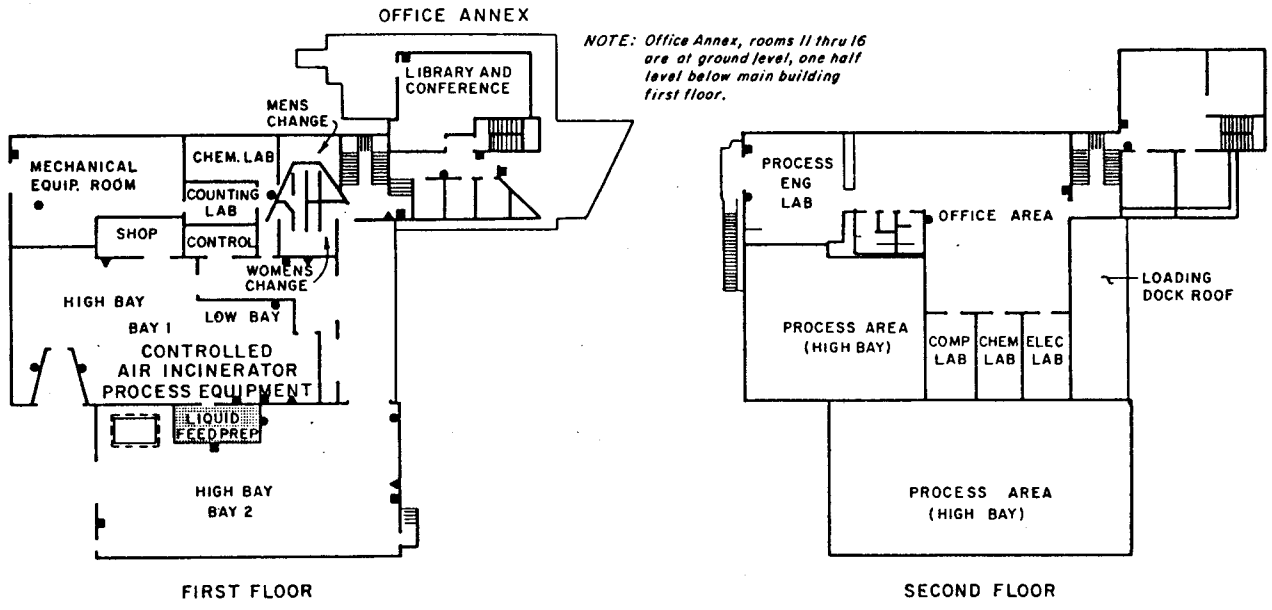

NOTE: Office Annex, rooms 11 thru 16 are at ground level, one half level below main building first floor.

TREATMENT DEVELOPMENT FACILITY
TA-50, BUILDING 37

NOTE: All rooms are covered by automatic sprinkler heads. Fire water flow activates automatic alarm pull.

▲ EVACUATION ALARM
■ ALARM PULL (FIRE)
● FIRE EXTINGUISHER
HALON SYSTEM

FIGURE 7-4

TREATMENT DEVELOPMENT FACILITY SHOWING LOCATIONS OF CHEMICAL WASTE INCINERATOR AND SUPPORT FACILITIES

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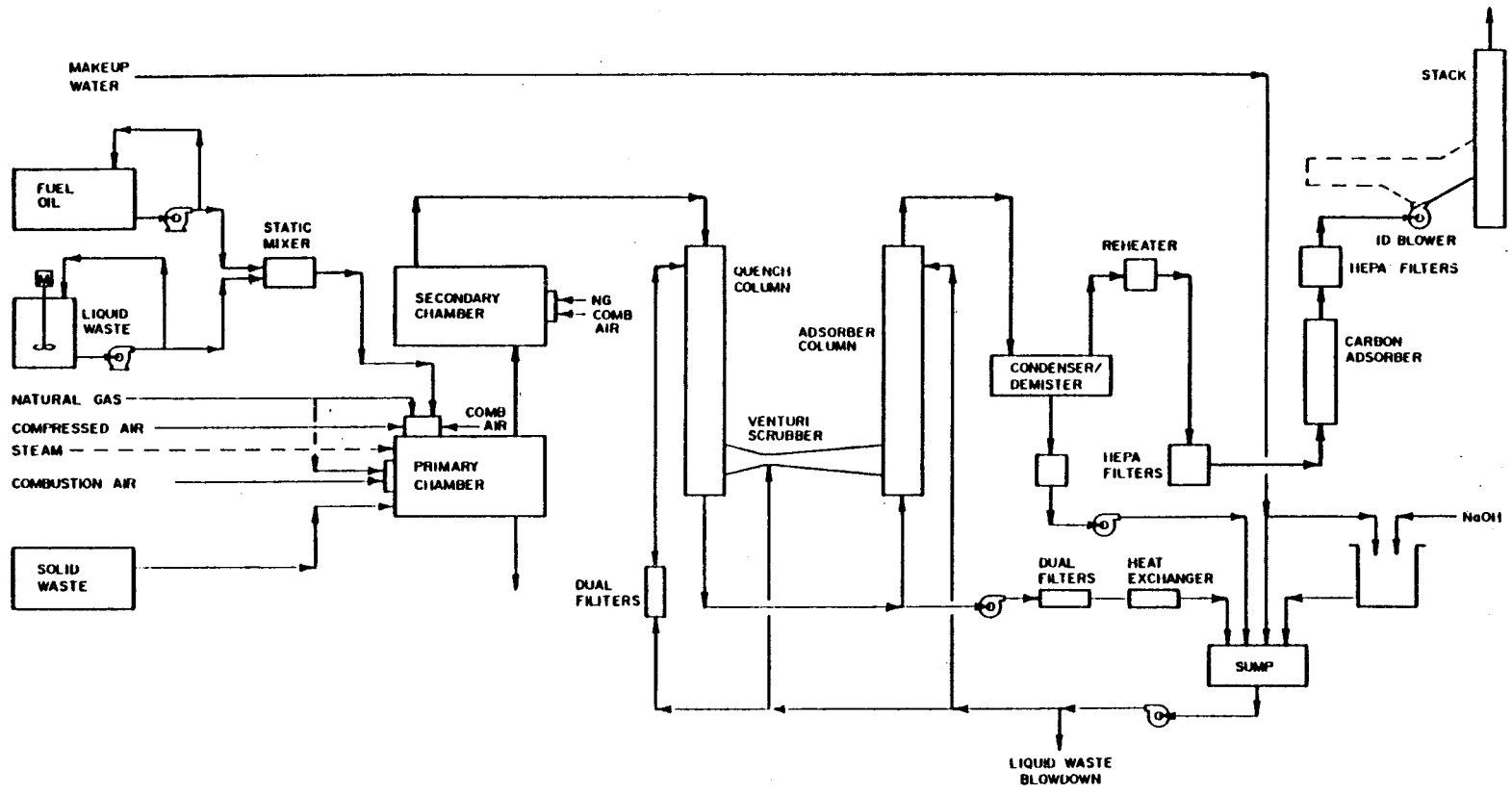

FIGURE 7-5

INCINERATOR
PROCESS DIAGRAM

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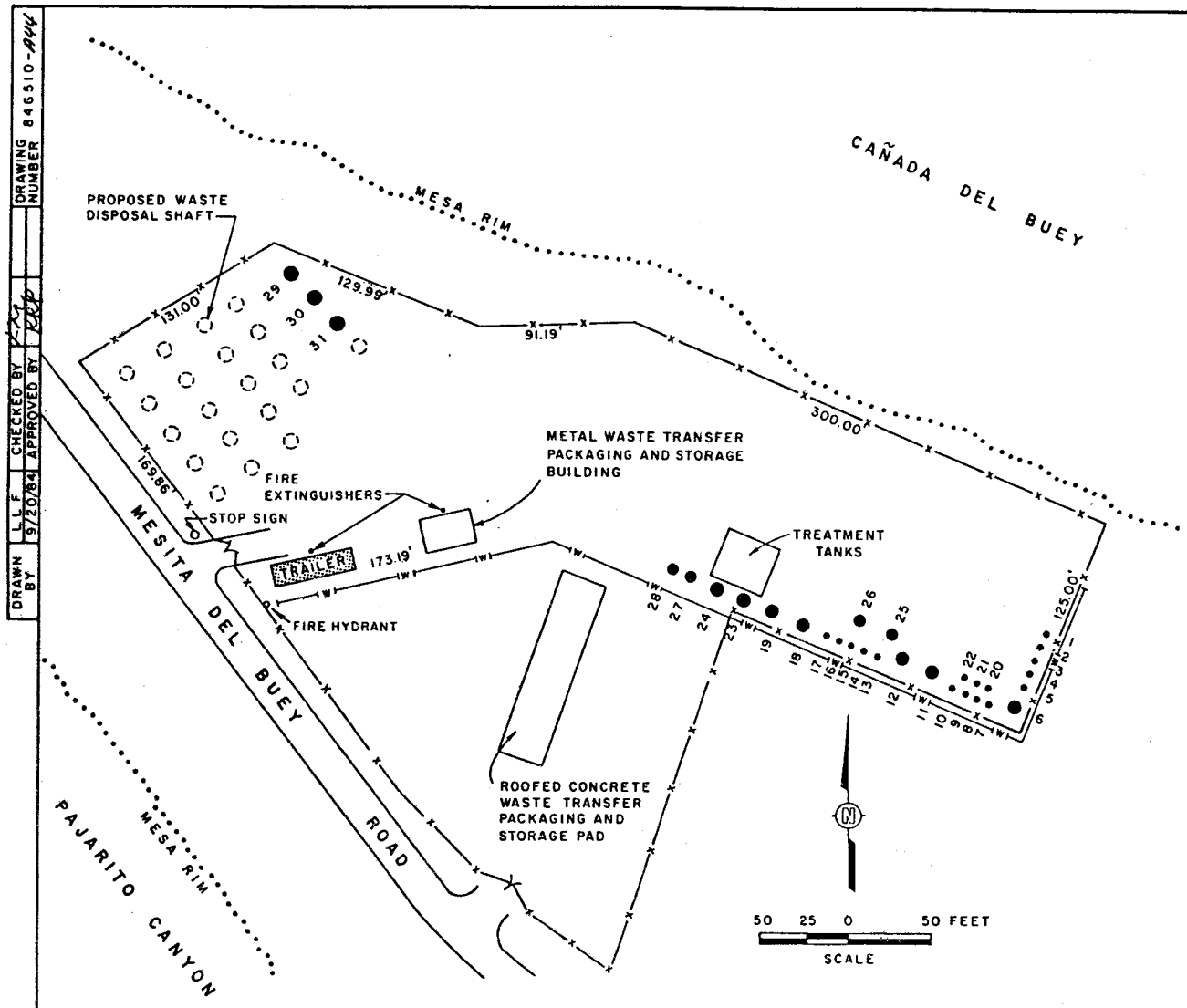

AREA L SHAFTS[1]
(INFORMATION CURRENT MARCH 1985)

SHAFT NO.	SHAFT DIAMETER (FEET)	DATE DRILLED	DATE CAPPED	CONTENTS
1	3	4/80	9/83	ORGANICS[2]
2	3	2/75	7/79	ACIDS & BASES
3	3	2/75	11/78	INORGANIC
4	3	2/75	5/80	ORGANIC
5	3	2/75	6/77	WASTE OIL
6	4	6/75	6/79	REACTIVE
7	3	6/75	6/79	REACTIVE
8	3	6/75	6/79	REACTIVE
9	3	6/75	6/79	GAS CYLINDERS
10	3	6/77	6/79	WASTE OIL
11	8	1/78	7/79	WASTE OIL/SOLVENT
12	4	1/78	7/79	WASTE OIL/SOLVENT
13	3	6/79	5/82	INORGANIC
14	3	6/79	5/82	REACTIVE
15	3	6/79	5/82	REACTIVE
16	3	6/79	5/82	GAS CYLINDERS
17	3	6/79	5/82	ORGANIC
18	8	6/79	6/80	WASTE OIL
19	8	4/80	5/82	WASTE OIL
20	3	4/80	9/83	INORGANIC
21	3	4/80	OPEN	GAS CYLINDERS
22	3	4/80	9/83	ORGANIC
23[3]	8	4/82	3/84	WASTE OIL
24[4]	8	4/82	4/84	ORGANIC & WASTE OIL
25	6	9/82	OPEN	INORGANIC
26	6	9/82	3/84	ORGANIC
27	4	1/83	2/85	SPECIAL[5]
28	4	1/82	OPEN	SPECIAL
29	6	12/83	8/84	ORGANIC
30	6	12/83	8/84	ORGANIC
31	6	12/83	9/84	ORGANIC
32	4	9/84	9/84	ORGANIC
33	6	9/84	2/85	ORGANIC
34	6	2/85	OPEN	ORGANIC

NOTES:
(1) ALL SHAFTS ARE APPROXIMATELY 60 FEET DEEP.
(2) SHAFT ONE CONTAINS WASTES NOT IN DRUMS.
(3) PRIOR TO SHAFT 23, LIQUIDS WERE DISPOSED OF IN DRUMS WITHOUT ADDING ABSORBENTS.
(4) MIDDLE SECTION OF THIS SHAFT NOT USED.
(5) USED FOR MISCELLANEOUS WASTE REQUIRING GREATER ISOLATION.

FIGURE 7-6

TA-54 AREA L
WASTE MANAGEMENT FACILITIES

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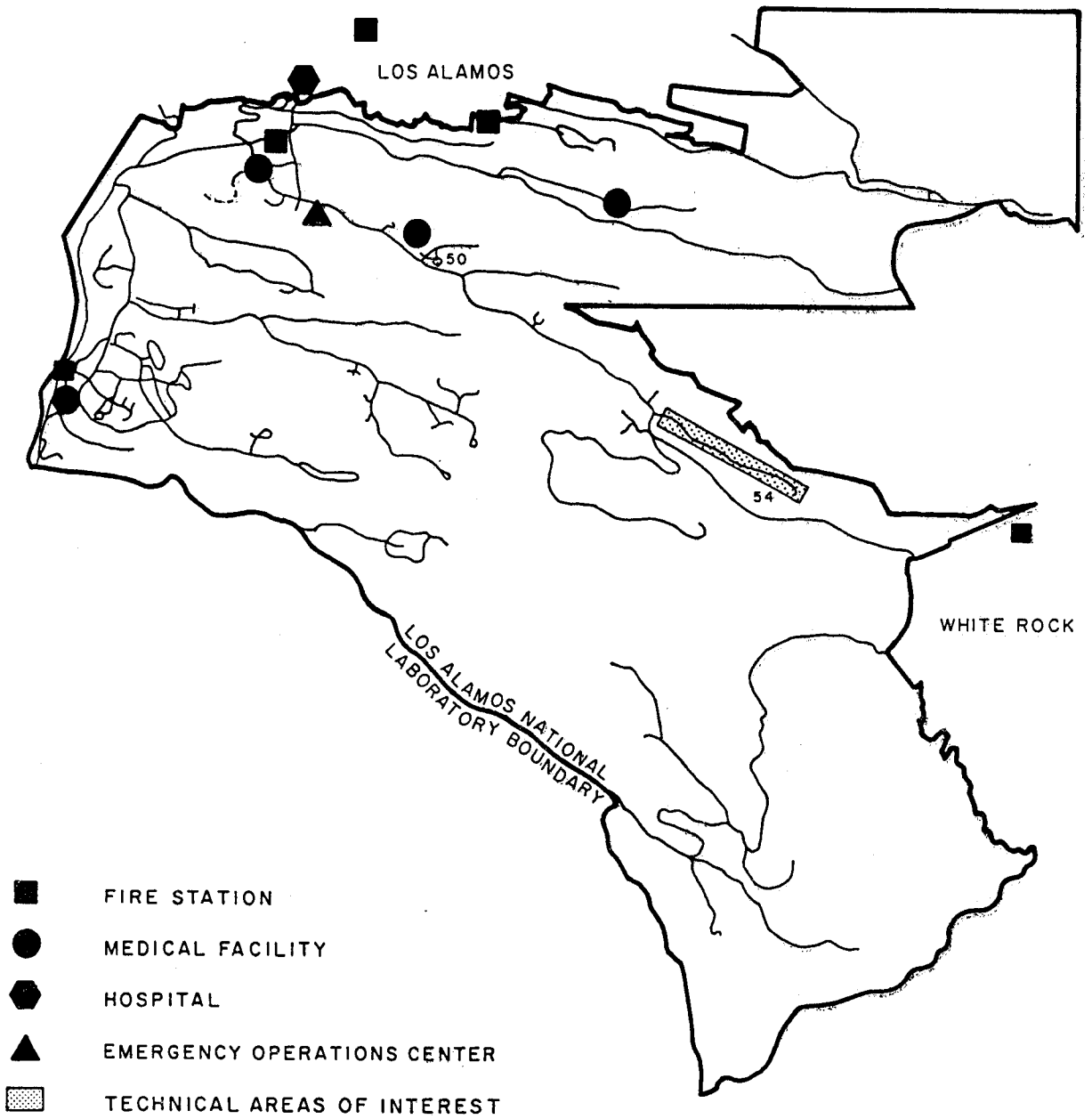

FIRE STATION

MEDICAL FACILITY

HOSPITAL

EMERGENCY OPERATIONS CENTER

TECHNICAL AREAS OF INTEREST

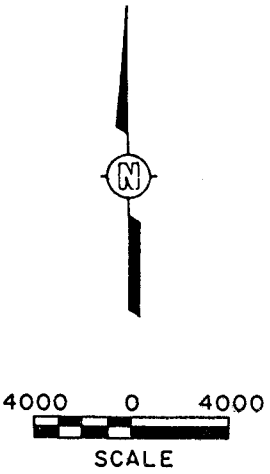

FIGURE 7-7

EMERGENCY FACILITIES

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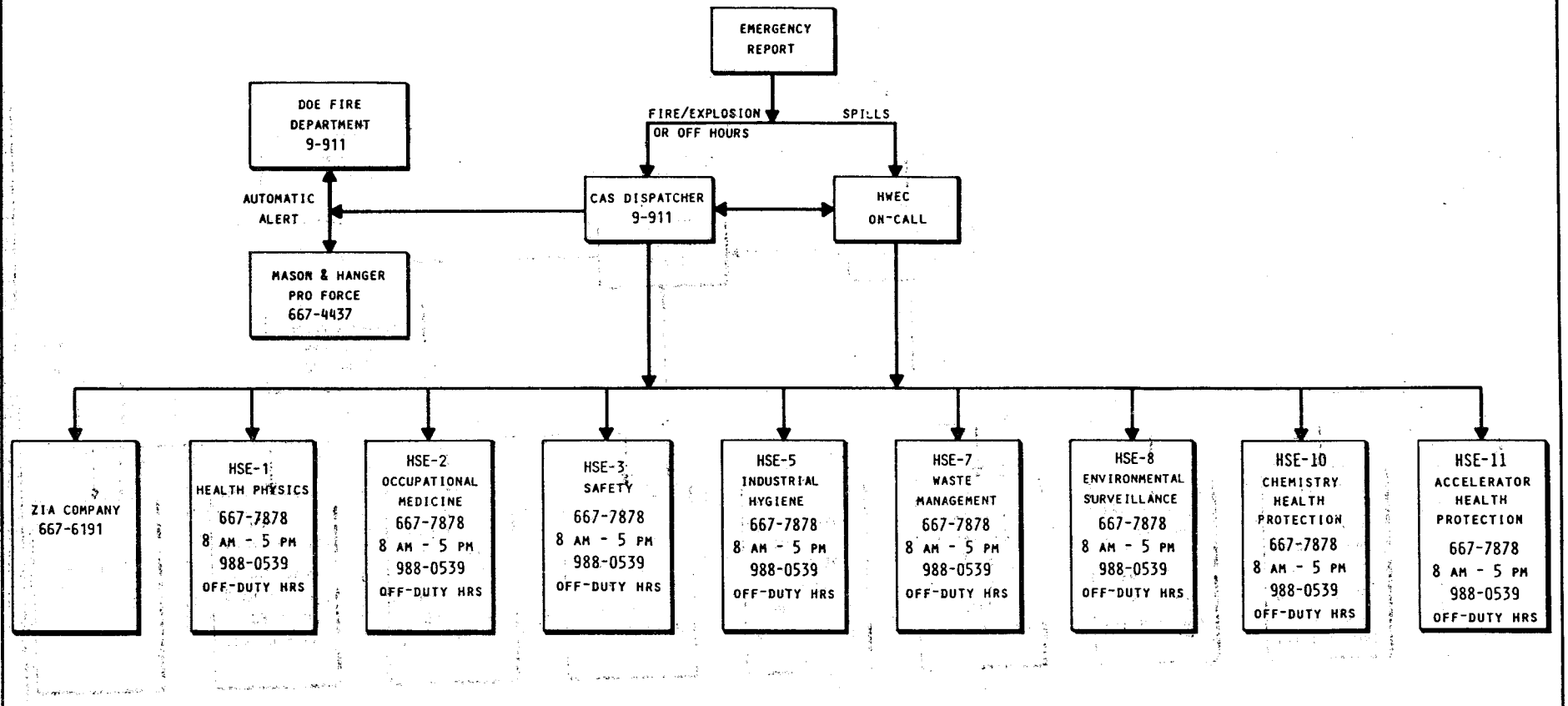

FIGURE 7-8

HAZARDOUS WASTE EMERGENCY NOTIFICATION STRUCTURE

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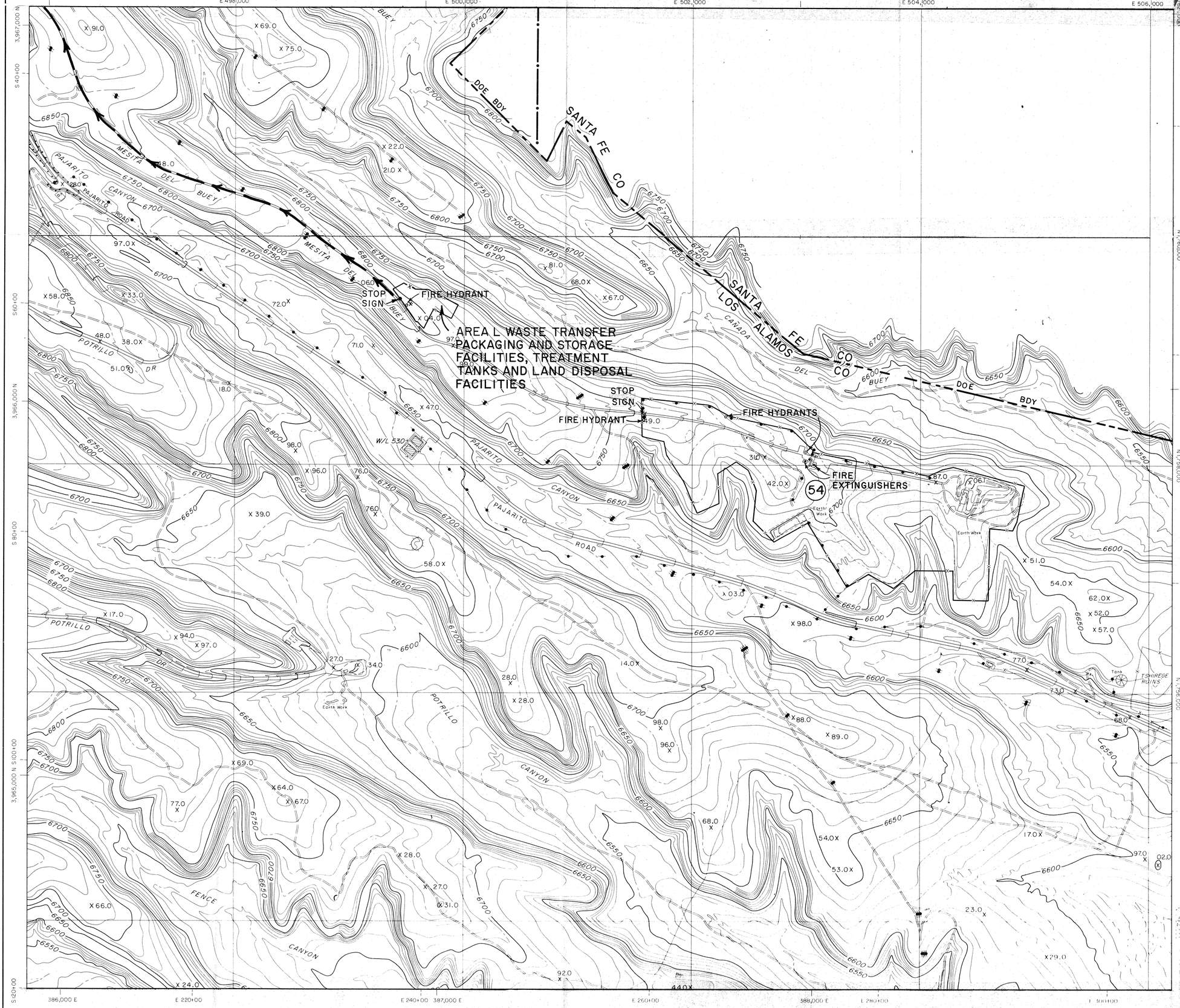
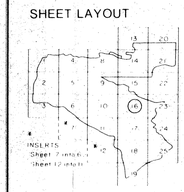


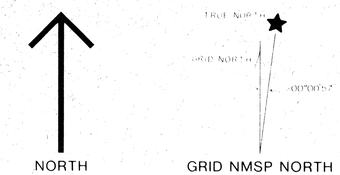
LEGEND

X 93.0	SPOT ELEVATION	N 1,768,000	NMSP GRID
6900	INDEX CONTOUR	3,989,000 N	UTM GRID
	INTERMEDIATE CONTOUR 10ft.	N 240+00	LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
	COUNTY LINES – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES.		
	DOE BOUNDARY – X & Y COORDINATE DATA PROVIDED BY LASL.		
	DOE BOUNDARY – SURVEY DESCRIPTIONS OR RECORD PLATS PROVIDED BY LASL.		
	DOE BOUNDARY – TRANSFERRED FROM USGS 1:24,000 QUADRANGLES BASED ON PROJECTED COUNTY LINES.		

35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD	Tank	TANK
	JEEP TRAIL		POND
	CULVERT	RW	RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL	Earth Work	EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT





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GRAPHIC SCALE 1 in =400 ft

CONTOUR INTERVAL 10 ft

TECHNICAL AREAS

(1-1) MD-SITE

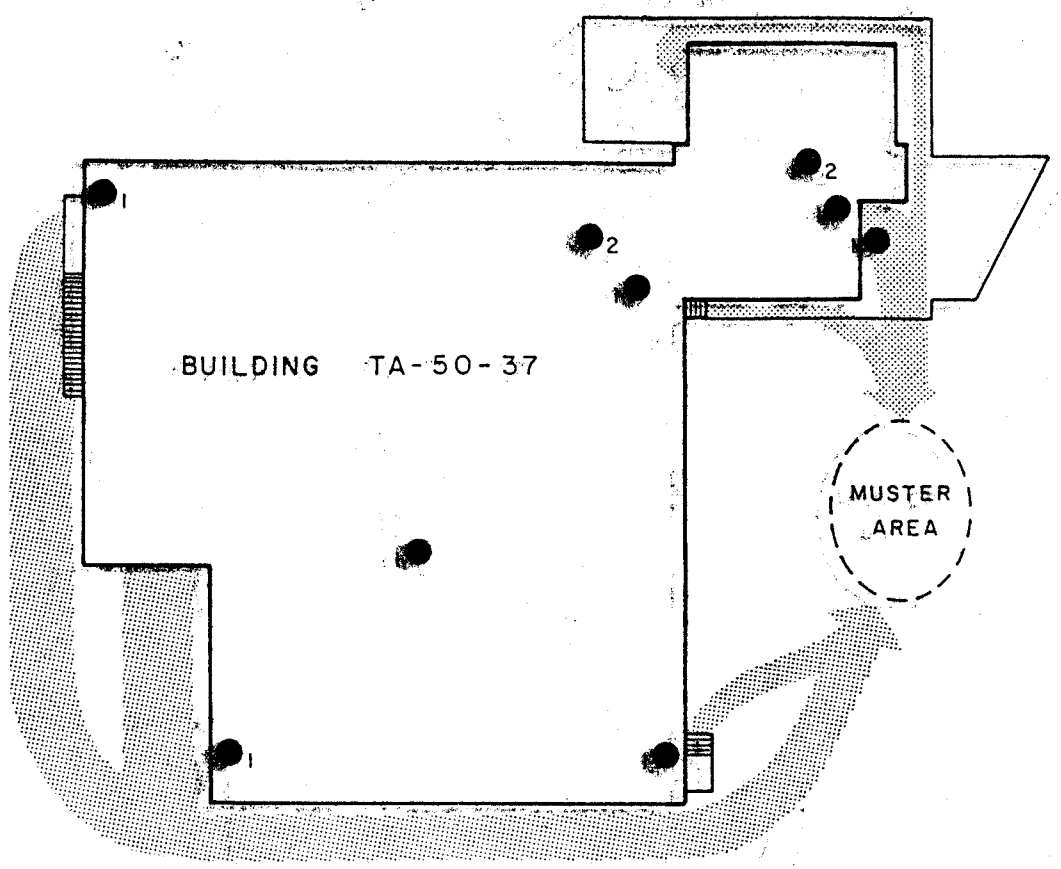
LOS ALAMOS SCIENTIFIC LABORATORY

FIGURE 7-9

CONTOUR MAP SHOWING THE LOCATION OF AREA L WASTE MANAGEMENT FACILITIES

LAB JOB NO 5682
1"=400' SCALE
PLAN / TOPO
SHEET 16 OF 25

14844 C



FIRE ALARM PULL
1 1st FLOOR
2 2nd FLOOR

FIGURE 7-10

TA-50
WASTE INCINERATOR BUILDING
EVACUATION ROUTE

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

JT CORPORATION

DRAWN BY 10/12/84 APPROVED BY NUMBER 846510-A46

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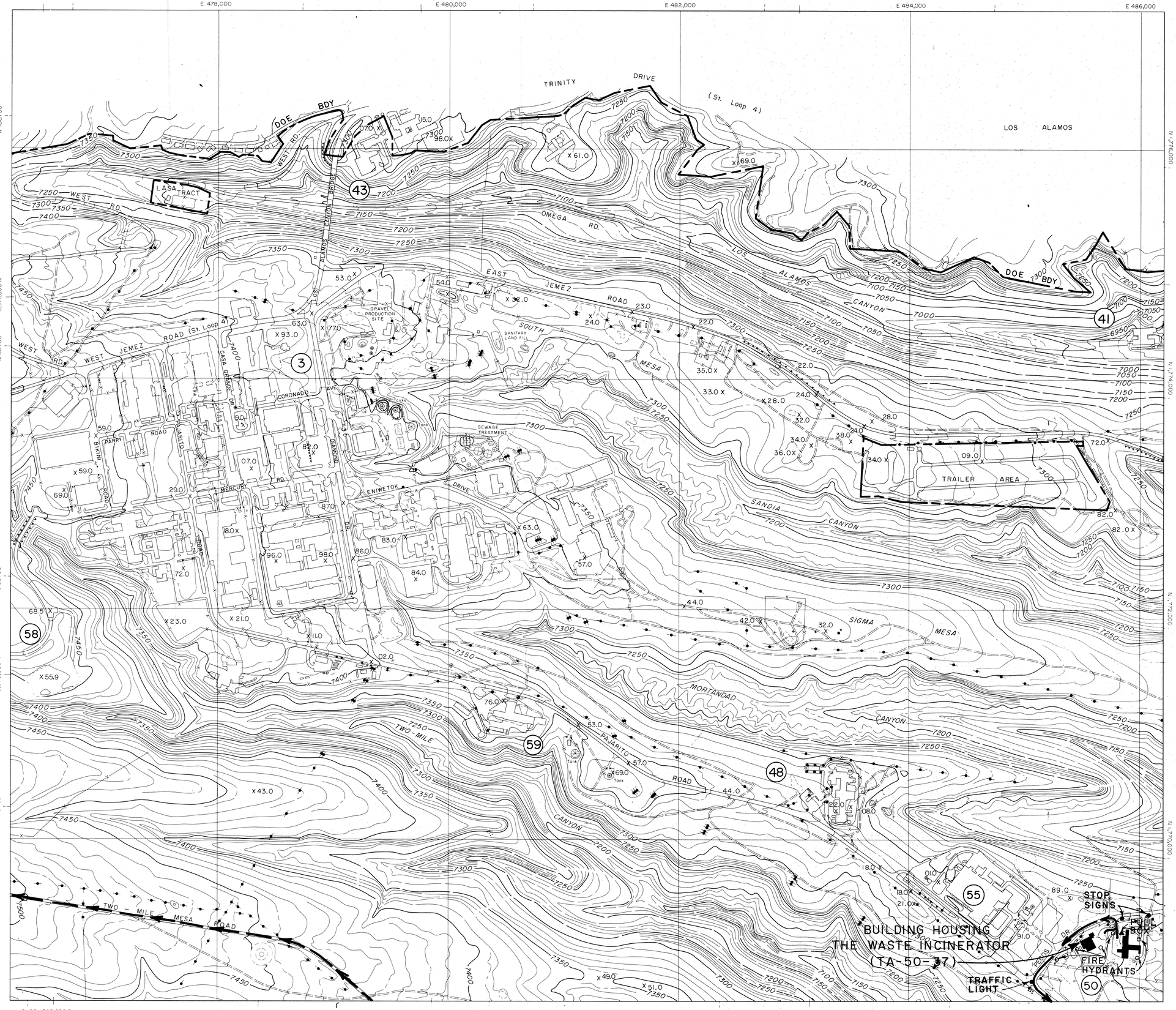

LEGEND

X 93.0	SPOT ELEVATION	N 1,768,000	NMSP GRID
6900	INDEX CONTOUR	3,989,000 N	UTM GRID
	INTERMEDIATE CONTOUR 10ft.	N 240+00	LASL GRID
	SUPPLEMENTARY CONTOUR 5ft.		
	CONTOURS THROUGH HEAVY VEGETATION		
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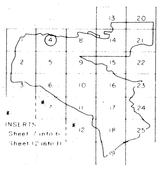
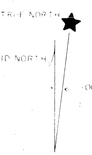
35	TECHNICAL AREA NO.		TOWER
	BUILDING		PIPE LINE
	FENCE		CUT LINE OR POWER LINE CLEARANCE SCAR
	PAVED ROAD		WATER TOWER
	DIRT ROAD	Tank	TANK
	JEEP TRAIL		POND
	CULVERT	RW	RETAINING WALL
	GUARD RAIL		EARTH DIKES OR BLASTING SHIELDS
	TUNNEL	Earth Work	EARTH WORK OR GRADED AREAS
	EARTHEN BUNKERS		GATE
	POWER POLE		EVACUATION ROUTE

SHEET LAYOUT





GRID NMSP NORTH

MAPPING COMPLETED BY PHOTOGRAMMETRIC METHODS, UTILIZING 1:30,000, 1:12,000 & 1:13,200 PHOTOGRAPHY, OBTAINED IN NOV. 1976 & JUNE 1980 WITH ZEISS RMK A 15/23 CAMERAS OF 153.42 & 152.43mm C.F.L. RESPECTIVELY, MAPPING BASED ON CONTROL SURVEYS TIED TO THE NEW MEXICO STATE PLANE COORDINATE SYSTEM (CENTRAL ZONE). MAPPING COMPLETED IN ACCORDANCE WITH NATIONAL MAP ACCURACY SPECIFICATIONS.

400 200 0 400 800 1200 1600 FEET

100 50 0 100 200 300 400 500 METER

GRAPHIC SCALE: 1 in.=400 ft. CONTOUR INTERVAL 10 ft.

TECHNICAL AREAS

- 3 SM–SITE
- 41 W–SITE
- 50 WM–SITE
- 43 HRL–SITE
- 48 RC–SITE
- 58 TWO MILE NORTH–SITE
- 55 PLUTONIUM FACILITY SITE
- 59 OH–SITE

LOS ALAMOS SCIENTIFIC LABORATORY

BOVAY ENGINEERS, INC. CARTOGRAPHIC AERIAL MAPPING DIVISION

FIGURE 7-11

CONTOUR MAP SHOWING THE LOCATION OF THE TA-50 WASTE INCINERATOR

LAB JOB NO. 5682

1"=400' SCALE

PLAN / TOPO

SHEET 4 OF 25

8.0 PERSONNEL TRAINING

This section describes the personnel training program for Los Alamos National Laboratory's facilities in accordance with the regulatory requirements of §264.16 (NMHWMR 206.B.6). These requirements are submitted with the Part B Application, as specified in §270.14(b) (12) (NMHWMR 302.A.4.b.[1]).

The information presented outlines the personnel training programs at the Laboratory. The primary objective of the program is to prepare persons to safely operate and maintain those areas containing hazardous wastes.

8.1 OUTLINE OF TRAINING PROGRAM

8.1.1 Responsibilities

Figure 8-1 presents the organization of Health, Safety, and Environment Division. HSE Division handles all mixed waste management activities. Individuals who are directly involved with waste management are in Health, Safety, and Environment Group 7 (HSE-7). The Environmental Surveillance Group is responsible for RCRA compliance. Personnel in the Health Physics Groups (HSE-1, 10 and 11), Occupational Medicine (HSE-2), Safety Group (HSE-3), Industrial Hygiene Group (HSE-5), and Environmental Surveillance Group (HSE-8) are trained in their specialties to provide emergency response support. Job descriptions for the Laboratory's hazardous waste management personnel are included in Appendix U.

8.2 TRAINING CONTENT, FREQUENCY, AND TECHNIQUES

Past training was conducted by a training contractor, J. T. Baker Chemical Company.

A new training program is being instituted at the Laboratory. It will include a combination of internal training courses, on-the-job training, and courses taught by outside contractors.

Records of each individual's formal training are maintained in the HSE Division office. Training records of current employees are kept until closure of the facility. Records of former employees are kept for at least three years from the date the employee last worked at the facility.

The training outline is on file in the HSE Division Office and is available for review by all hazardous waste management and handling personnel, emergency response personnel, and all regulatory agencies. Training records and procedures are reviewed by the DOE and the EPA and during internal audits/inspections. Provisions are made for updating and reviewing courses, as necessary, to ensure RCRA Part B compliance.

The training coordinator will work with the group leaders of HSE-1, 2, 3, 5, 7, 8, 10 and 11, WX and M Divisions to ensure that all employees receive the proper level of training. All new employees will receive training within six months of their date of hire or transfer. Personnel will not work in unsupervised positions until they successfully complete the training course.

8.2.1 Internal Training

The personnel training courses developed at the Laboratory emphasize the safe handling of hazardous wastes. Program instructors are trained in hazardous waste management procedures and RCRA provisions. The Laboratory's internal training program is designed to provide training commensurate with the employee's responsibilities. Three versions of a course are offered (intensive, limited, overview) so that the program can be molded to fit each employee's needs.

An outline of the Los Alamos National Laboratory Training Program can be found in Appendix V. Table 8-1 shows the employees who will participate in each of these courses and the level of the course they will be required to take.

8.2.2 On-the-Job Training

Appropriate personnel will participate in on-the-job training programs. These programs are designed to give field demonstrations of Laboratory procedures for hazardous waste handling, inspections, and hazardous waste transportation requirements. An outline of on-the-job training programs can be found in Appendix V.

8.2.3 External Training

In addition to internal training, appropriate personnel will participate in contractor-taught courses. Those personnel who will participate in the external training program are shown in Table 8-1. These contractor-taught courses will serve to supplement the internal training program.

8.2.4 Training Coordinator

The personnel training program is directed by Dr. Wayne Hansen. As Associate Division Leader for the Health, Safety, and Environment Division at Los Alamos National Laboratory, Dr. Hansen is knowledgeable about hazardous waste management facilities and practices and emergency procedures. Dr. Hansen's resume can be found in Appendix V.

8.2.5 Relevance of Training to Job Position

Dr. Wayne Hansen, the training coordinator, is responsible for coordinating the internal and external training courses and for assuring that all waste management and handling personnel receive the required training. The training program provides employees with training relevant to their positions within the organization. Supervisors and staff receive training appropriate to their degree of handling hazardous waste (e.g., reporting and other procedures required for compliance). For example, management responsibilities for compliance with RCRA are assigned to the HSE-7 Group Leader, who receives training in RCRA provisions. Material handlers are trained to maintain proper and safe operating procedures and to respond effectively to spills and other emergencies. Table 8-1 shows how training is applicable to job position.

8.3 EMERGENCY RESPONSE TRAINING

The outside professionals (Zia Company and the Protective Force) assist the Laboratory Emergency Coordinator as soon as they arrive on the scene of the emergency. These people are trained in their specialties (i.e., heavy equipment operations, traffic control). Personnel from these agencies do not require special training from the Laboratory, and are under the direct supervision of trained Laboratory personnel.

In order to ensure maximum protection of life and property and to mitigate the consequences of an emergency situation, it is imperative that all HSE personnel, WX and M personnel involved in waste handling and emergency response be knowledgeable about appropriate building and operating area emergency procedures. These groups will participate in the Laboratory's formal training program.

In addition to the Laboratory's formal program (Table 8-1), division and group leaders and immediate supervisors are responsible for providing education and training in emergency response procedures. Periodic unannounced emergency drills and exercises are used to familiarize employees with emergency procedures. Training is also provided through prominent instruction displays and through presentations and discussions in safety meetings.

Each new or transferred employee is indoctrinated by his immediate supervisor regarding the general emergency procedures and those specific procedures related to his/her work area. Each employee is advised of changes to any emergency procedures and is given an annual review of procedures affecting his/her work area. The review may be given separately in writing or included in an overall indoctrination.

Specialized training is given to those employees assigned special functions or specific emergency duties (see Table 8-1). Emergency response personnel (HSE-1, 2, 3, 5, 8, 10 and 11, the DOE Fire Department, Laboratory Emergency Coordinators, and Area Spill Coordinators)

participate in the formal Laboratory training program and are required to attend courses on spill response, the RCRA contingency plan and RCRA provisions. All waste handling personnel (HSE-7, WX and M) also participate in the formal training program in which they are instructed in emergency procedures pertinent to their work area. The emergency procedures instruction in which hazardous waste management and handling personnel and emergency response personnel are required to participate will ensure a coordinated response to hazardous waste emergencies.

8.4 IMPLEMENTATION OF TRAINING PROGRAM

The Los Alamos National Laboratory introductory training program (Table 8-1) is offered at six-month intervals, when needed, to ensure that all employees receive training within six months of their date of hire or transfer. Employees will not work in unsupervised positions until they have been trained.

All hazardous waste management and handling personnel must attend annual refresher courses. These courses are intended to update personnel on Laboratory procedures and provide them with an overview of their introductory training.

In addition, a complete Respirator/SCBA course is taught annually and must be successfully completed by all hazardous waste handling personnel.

Group leaders, along with the training coordinator, will ensure that all personnel participate in the introductory and annual training programs.

TABLE 8-1. LOS ALAMOS NATIONAL LABORATORY TRAINING

Course Content	High Explosives Handling Technicians	High Explosives Handling Staff	Incineration Technicians	Incineration Staff	Chemical Waste Technicians	Chemical Waste Staff	Associate Group Leaders	HSE-7 Group Leader	Training Coordinator	Health Physics Group, Occupational Medicine, Safety Group, Industrial Hygiene Group, Environmental Surveillance Group, Chemistry Health Protection Group, Accelerator Health Protection Group, DOE Fire Department, Hazardous Waste Emergency Coordinators, Area Spill Coordinators	Course Type
RCRA Provisions	L	I	L	I	L	I	L	L	L	L	IC, EC
Personal Safety	I	I	I	I	I	I	L				IC, EC
Respirator/SCBA*			I	I	I	I					IC
Hazardous Waste Handling and Operations											
a) Batch Treatment					I	I	O				OJT
b) Incineration			I	I	O	O	O				OJT
c) Detonation/Burning HE	I	I				O	O				OJT
d) Landfill Disposal					I	I	O				OJT
e) Reactives					I	I	O				EC, OJT
f) Acids/Bases					I	I	O				EC, OJT
g) Organics - General			I	I	I	I	O				EC, OJT
h) Inorganics - General					I	I	O				EC, OJT
Spill Response*			I	I	I	I	I	I		I	IC
RCRA Contingency Plan*	L	I	L	I	L	I	I	I		O	IC
Recordkeeping/Inspections	I	I	I	I	I	I	O				IC, EC, OJT
On-Site/Off-Site Transportation	L	L			I	I	L				OJT

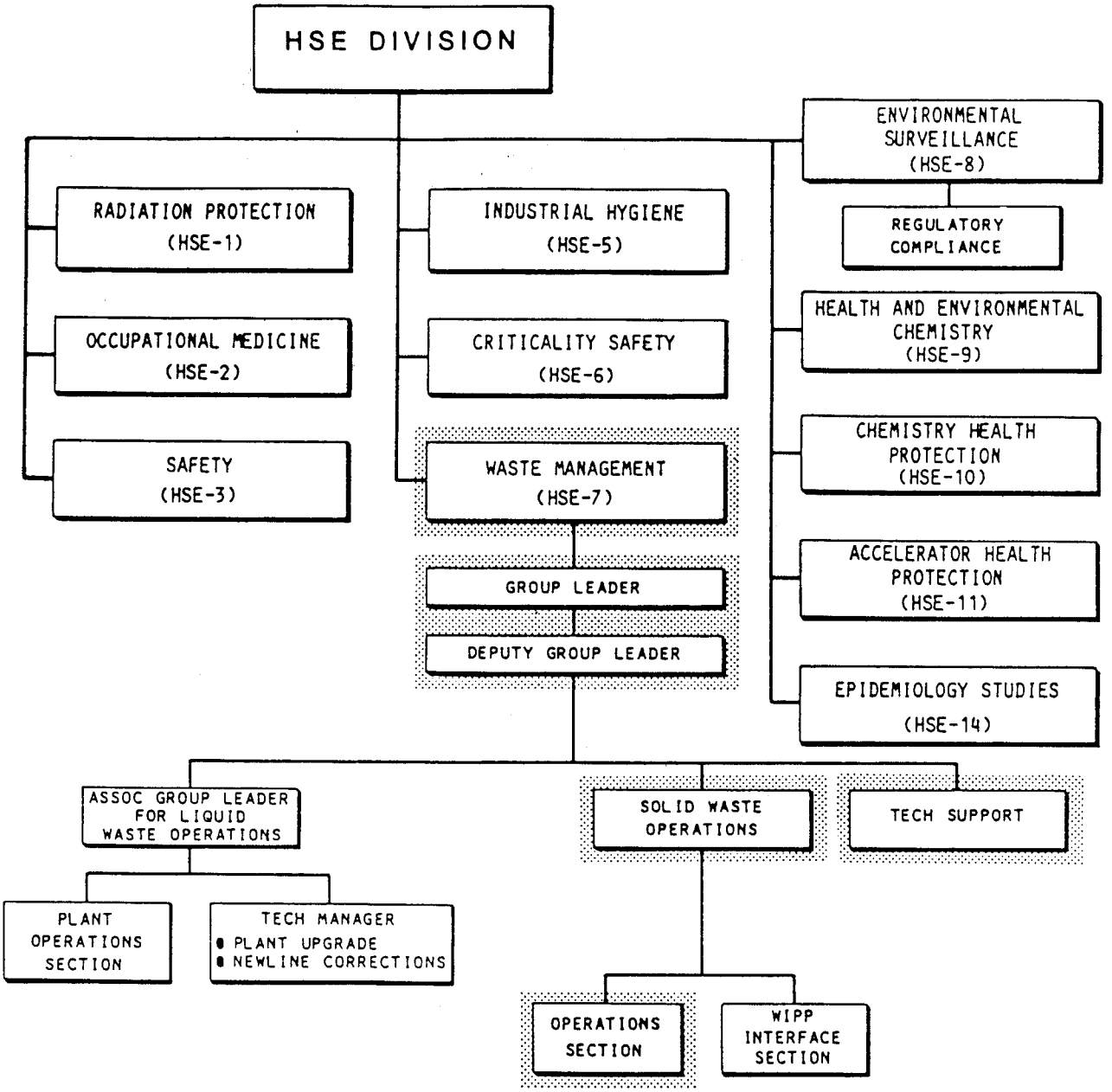
*Class taught internally only; others may be taught by any combination of internal/external classes.

I = Intensive L = Limited O = Overview

IC = Internal Classroom Instruction

EC = External Classroom Instruction (contractor taught)

OJT = On-the-Job Training



NOTE: SCREENED BOXES INDICATE PRIMARY RESPONSIBILITY FOR CHEMICAL WASTE MANAGEMENT

FIGURE 8-1

HEALTH, SAFETY AND ENVIRONMENT DIVISION MANAGEMENT CHART

PREPARED FOR

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

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9.0 CLOSURE AND POST-CLOSURE PLAN

9.1 GENERAL CLOSURE/POST-CLOSURE INFORMATION

Introduction

This section is submitted in accordance with the requirements of 40 CFR 264.110 through 120 (NMHWMR 206.D.2.a[1] through 206.D.2.j[2]), 264.178 (NMHWMR 206.D.4.i) and 270.14(b)(13) (NMHWMR 302.A.4.b[1]). This plan identifies all steps that will be necessary to close the facility at the end of its operating life or to partially close the facility at any point during its intended operating life.

Mixed hazardous waste management facilities at the Los Alamos National Laboratory consist of container storage, chemical treatment, controlled air incineration, and landfill disposal. The functions of the individual mixed hazardous waste facilities are outlined in Table 9-1.

9.1.1 Closure Performance Standard

The closure plans have been designed to meet the following performance standards:

- Protect human health and the environment
- Prevent the escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or atmosphere
- Minimize future maintenance

9.1.2 Partial and Final Closure

The Laboratory's hazardous waste facilities are to be closed in the year 2100. All hazardous wastes will be recycled, treated, and/or disposed of prior to closure.

Partial closure of treatment facilities may occur to accommodate upgrading of facilities to handle new wastes or to use new technology. No such partial closures are now anticipated.

Closure of individual landfill shafts located at TA-54, Area L is ongoing and performed as these pits are filled.

9.1.3 Closure and Post-Closure Cost Estimates

Federal facilities are exempt under 40 CFR 264.140(c) (NMHWMR 206.D.3.a[3]) from the requirements for closure and post-closure cost estimates and financial assurance. These data are therefore not included.

9.1.4 Groundwater Monitoring

Los Alamos National Laboratory has applied for a ground water monitoring waiver in accordance with the provisions of 40 CFR 264.90 (b)(4) (NMHWMR 206.D.1.a[2]). Groundwater monitoring is only applicable to the landfill operations at Area L. The waiver request is based on the determination that average annual precipitation is equaled or exceeded by runoff and evapotranspiration resulting in negative percolation rates. Past free liquids disposed of at this site are of inadequate volume to threaten the first aquifer 290 meters (950 feet) below Area L. Therefore, ground water monitoring at the disposal sites is only as described in Appendix N. Vadose zone monitoring at Area L is to be performed as described in Appendix O. Vadose Zone Monitoring at Area L is to be performed as described in Appendix O.

9.1.5 Personal Protection

Good industrial hygiene practices shall be followed during all phases of closure and post-closure to protect employees from exposure to hazardous waste constituents. Normal Los Alamos National Laboratory operating procedures require that the Laboratory's Industrial Hygiene Group (HSE-5) survey a site prior to personnel entry and specify protective clothing and respiratory protection equipment. Contaminated protective clothing and protection equipment shall be treated as hazardous and either decontaminated or disposed of in compliance with appropriate regulations.

9.1.6 Certification of Closure

When final closure of a facility has been performed, a certificate, attested to by registered professional engineer and signed by the appropriate Department of Energy official in accordance with 40 CFR 264.115 (NMHWMR 206.D.2.f.) shall be submitted to the Regional Administrator or the Director of the New Mexico Environmental Improvement Division, as appropriate stating that the facility has been closed in accordance with an approved closure plan.

9.1.7 Post-Closure Care Office

The following is the office to which contact may be made concerning the facility during the post-closure care period.

Area Manager
Los Alamos Area Office
U.S. Department of Energy
Los Alamos, New Mexico 87544
(505) 667-5105

A copy of the closure plan will be maintained at this office until the time of closure. The facility copy of the closure plan will be updated by the Area Manager or his designee. This office will also assure that other copies of the closure plan are updated as needed by maintaining a list of holders of the plan and by issuing plan modifications to all holders of the plan.

9.1.8 Security

Low-level radioactive wastes have been handled and buried at TA-54. TA-54 will therefore be under the permanent care of the Department of Energy (DOE) or other authorized federal agency. Fences and site security will be maintained in perpetuity to prohibit public access and to meet DOE requirements for radiation protection.

9.1.9 Notation of Deed

Notice to local land authority as per 40 CFR §264.119 (NMHWMR 206.D.2.i) and notation of deed as per §264.120 (NMHWMR 206.D.2.j[1]) shall be performed. Land plats for Los Alamos facilities will be provided to the local land authority indicating that the lands have been used for hazardous waste management activities. However, the past use of the site precludes any circumstances under which the deed for disposal areas will be transferred to the public domain. The land will remain federally owned in the care of the DOE or other authorized federal agency. The notice of hazardous waste management activities in the land record can be found in Appendix W.

9.1.10 Individual Closure and Post-Closure Plans

Details of the closure and post-closure plans for individual Los Alamos hazardous wastes facilities are included in the following sections.

9.2 CLOSURE PLAN FOR TA-50 INCINERATOR

9.2.1 Chemical Waste Incinerator

The waste incinerator is located in Building 37 at Technical Area 50. The highly modified, controlled air incinerator is rated at a nominal 45 kilograms per hour waste feed throughout. The incinerator was developed as part of a continuing incinerator study and demonstration program being conducted by Los Alamos and is currently permitted to burn PCB-contaminated liquid materials. Modifications to the incinerator include additions of liquid and solid waste feed preparation lines, a continuous ash removal system, a high-efficiency off-gas cleanup system, and backup utility systems. Standard combustion equipment has been modified to permit effective incineration of waste in solid, liquid, slurry, or gaseous form. Particular attention has been given to engineering for proper waste containment, resulting in a system that is safe for evaluating the incineration of hazardous chemicals and certain radioactive waste forms.

9.2.1.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes at the TA-50 waste incinerator is estimated at ten cubic meters (353 cubic feet).

9.2.1.2 Closure Plan

All remaining wastes will be incinerated before shutting down the incinerator. If for some reason it is not possible to incinerate all the waste on site, it will be sent to a designated treatment and disposal facility. Once all the waste inventory has been properly disposed of, the facility will be decontaminated as follows: First, the entire incineration system (incinerator, all relevant lines and pumps, and the air pollution control system) will be cleaned. The two incinerator chambers, including all attached refractory and residual solid residue, will then be sealed and sent to a designated treatment and disposal facility. Next, the remaining components of the system will be steamed for a minimum of 24 hours, after which they will be visually inspected, and may be dismantled, and will be disposed of in an appropriate manner. All radioactive components will be decontaminated and disposed of according to appropriate regulations.

A detailed description of decontamination procedures upon closure is not possible at this time since the equipment may be contaminated with transuranic (TRU) and low-level radioactive wastes. Decommissioning will follow Laboratory guidelines and procedures for handling radioactive contaminated equipment. Exact procedures are a function of the degree of contamination at the time of closure.

Upon the decision to close the facility, the equipment and building will be surveyed to determine the nature and levels of both radioactive and hazardous chemical contamination. Using the Laboratory guidelines and procedures, a decommissioning document will be prepared describing in detail the methods and procedures for decontamination, demolition, packaging, and disposal. All materials generated from decontamination and demolition will be treated as radioactive wastes and disposed of in accordance with DOE radioactive waste management guidelines.

Characterization of the final delivery of hazardous waste may require up to 30 days. An estimated 60 days will be required to schedule and process the final wastes received.

The survey to determine the nature and level of contamination and to prepare the decommissioning document is estimated to take one year. Decommissioning and final disposal are estimated to take up to two years.

9.2.1.3 Post-Closure

Post-closure plans are not required for incineration facilities.

9.3 CLOSURE AND POST-CLOSURE FOR TA-54, AREA L FACILITIES

9.3.1 Waste Transfer, Packaging and Storage Facilities

A single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1595 square feet are located in Area L of TA-54. These facilities are used for the accumulation, packaging and storage of waste containers generated from throughout the Laboratory.

Hazardous waste containers generated at the various Los Alamos laboratories are delivered to the Waste Transfer, Packaging and Storage Facilities on a routine basis. Wastes are segregated into compatible types and placed upon the three fiberglass grates located in the metal building or within one of the six storage cells on the roofed concrete pad. Wastes packaged in small containers are placed into lab packs. Also, vermiculite is added to 55-gallon drums containing liquids in these facilities. Wastes suitable for recycling are consolidated into drums and any damaged or leaking drums are repackaged into larger drums in these facilities.

9.3.1.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes in storage at the TA-54, Area L waste transfer, packaging and storage facilities is 67 cubic meters (2360 cubic feet).

9.3.1.2 Closure Plan

The waste transfer, packaging and storage facilities at TA-54, Area L will be visually inspected for evidence of leaks such as floor discoloration and the presence of residues. The facilities will be considered contaminated and will be decontaminated by removing residues using appropriate methods such as sweeping, scraping, washing, or steam cleaning. Residues and fluids created by these decontamination activities will be handled as hazardous materials and disposed of in accordance with the regulations. Successful decontamination will be verified by analysis of wipe/swab test samples.

The metal building and the roofed concrete storage pad will be disassembled and disposed of in an appropriate manner. The floor areas will be cleaned by washing, scraping, or steam cleaning. Contaminated floor and sump areas that cannot be adequately cleaned will be removed and disposed of as hazardous waste. The residues from these cleaning activities will be analyzed for hazardous components and disposed of appropriately.

Closure is expected to require 30 days to characterize and package the last wastes held in the facilities. Up to 60 days may be required to schedule and remove the last waste shipment. Decontamination, disassembly and disposal or shipment of equipment is expected to take 90 days from the time wastes have been removed from the facilities.

9.3.1.3 Post-Closure

Post-closure plans are not required for transfer, packaging and storage facilities.

9.3.2 Treatment Tanks

Four 1665-gallon ten-gauge steel tanks are located in Area L of TA-54. The tanks are lined with plastic. These tanks are used to neutralize, oxidize and evaporate wastes. The tanks are located on a bermed concrete pad as shown in Figure 2-7. The waste most commonly oxidized in

these tanks is lithium hydride. Ammonium bifluoride (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks. Los Alamos wishes to obtain a permit to treat hazardous wastes in these tanks.

9.3.2.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes at the TA-54, Area L treatment tanks is 25 cubic meters (890 cubic feet).

9.3.2.2 Closure Plan

The treatment tanks and the bermed concrete pad will be inspected for evidence of leaks or spills such as discoloration and the presence of residues. The equipment will be externally washed with water, detergent and/or solvents. The fluids from both operations will be analyzed for hazardous waste components and then disposed of as hazardous waste as appropriate. The equipment may be disassembled and removed from the site, and will be disposed of in an appropriate manner. Residues found on the equipment or the site will be removed and disposed of as hazardous waste.

Personnel involved in disassembly and handling of equipment will wear protective equipment to include the following items as minimum protection: acid/solvent-resistant coveralls, head protection, neoprene-coated gloves, and boots. Wrists and ankles will be taped to protect against upward and inward splash. As a minimum protection, face shields will be worn. Full-face respirators will be used if specified by the Laboratory's Industrial Hygiene Group.

Spills occurring during equipment disassembly will be contained with absorbents, and the area will be decontaminated to prevent tracking of wastes. The equipment will be packaged in order to contain any residues that may be present during transport to the disposal site.

No decontamination of the container handling equipment is anticipated during closure since the wastes are to be removed from the tanks prior

to closure and no contact is expected between the wastes and the handling equipment.

Closure is expected to require 30 days to characterize, collect and package any waste residues. Decontamination, disassembly and disposal or shipment of equipment is expected to take 90 days from the time wastes have been removed from the treatment tanks.

9.3.2.3 Post-Closure

Post-closure plans are not required for treatment tanks.

9.3.3 Land Disposal Shafts

Four land disposal shafts are currently open at TA-54, Area L and Los Alamos plans to excavate additional shafts as needed.

9.3.3.1 Closure

Disposal shafts are closed as they are filled. Shafts open at the initiation of closure shall be closed using the standard shaft closure procedure. Only wastes in solid or solidified form are accepted for shaft burial. Shafts shall be filled with wastes to a level no higher than three feet below the "spill point" (lowest point of shaft rim). Wastes are to be covered with a minimum of 0.5-foot layer of compacted crushed tuff. Partially filled shafts shall be backfilled with compacted tuff to three feet of the spill point. The final cover of a shaft shall be noncontaminated cement, a minimum of three feet thick, slightly rounded, and extending about 0.5 feet above the land surface. Identifying engineering markers shall be placed in the final pour of seal cement in the shafts. The marker is a brass cap. Information on the cap shall include the wording "Buried Hazardous Wastes" along with the shaft number, category of wastes stored, and dates of use.

No decontamination of equipment is anticipated during closure because hazardous wastes are containerized and no contact is expected between the wastes and equipment.

The area shall be graded and bermed to control run-on and run-off of surface water and minimize erosion. Disturbed areas shall be planted with turf-forming grasses and bunch grasses to prevent wind and sheet wash erosion.

9.3.3.2 Post-Closure

Post-closure activities would include the following items:

1. Within 90 days after closure is complete, the EPA, NMEID, DOE, and the County of Los Alamos shall be furnished a survey plat indicating the location and dimensions of the closed pits and shafts. The plat shall be prepared and certified by a professional land surveyor. The plat filed with Los Alamos County shall include a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the site in accordance with 40 CFR 264.117(c) (NMHWMR 206.D.2.g[3]). In addition, the EPA, NMEID, DOE, and County of Los Alamos shall be provided the records of type, location, and quantities of wastes stored. Information for wastes stored prior to the promulgation of hazardous waste regulations shall be estimated based on available records.

2. The property deed shall be noted or documented to comply with the requirements of 40 CFR 264.120 (NMHWMR 206.D.2.j).

3. The site shall be inspected semiannually or more frequently as determined necessary checking

   (a) the cover system for integrity, settlement, and erosion,

   (b) the site drainage system for any blockages or evidence of poor function,

   (c) the integrity of the fence, gate and lock, and

   (d) the condition of surveyed benchmarks.

4. Repairs shall be made to any of the items mentioned in activity No. 3 should the inspection reveal conditions requiring further attention for the proper function of the closure system.

5. Environmental sampling and monitoring programs at Area L will be consistent with key contaminants relative to environmental surveillance of the Laboratory waste management activities (see Appendices N and O for details of present and proposed monitoring).

6. Post-closure care activities shall be performed for 30 years as required by 40 CFR 264.117(a)(1) (NMHWMR 206.D.2.g[1][a]).

7. Records shall be kept of inspections, repairs, sampling, and analytical results for the duration of post-closure care activities.

The design of the closure and post-closure plans is based in large part on data developed for Los Alamos National Laboratory's Ground Water Monitoring Waiver Request. The conclusions of these data are that the site has a low infiltration rate, under worst case conditions and that past storage of free liquids are of insufficient volume to have a potential impact on the main aquifer 950 feet below the site.

TABLE 9-1. SUMMARY OF MIXED HAZARDOUS WASTE FACILITIES AT LOS ALAMOS NATIONAL LABORATORY

Facility	Treatment	Storage	Disposal
TA-50	Incineration	none	none
TA-54	Solidification Neutralization Oxidation Evaporation	container	landfill

10.0 OTHER FEDERAL LAWS

The Los Alamos National Laboratory, Los Alamos, New Mexico has reviewed and is in compliance with the following federal laws:

1. The Fish and Wildlife Coordination Act of 1934 (PL 121 and amendments). An act to promote the conservation of wildlife, fish and game, and for other purposes.

   (PL 85-624) An act to amend the Act of March 10, 1934, to provide for more effective integration of a fish and wildlife conservation program with Federal water-resource developments, and for other purposes.

   (PL 89-72) An act to provide uniform policies with respect to recreation and fish and wildlife benefits and costs of Federal multiple-purpose water resource projects, and for other purposes.

2. The National Historic Preservation Act of 1966 (PL 89-665 and subsequent amendments). An act to establish a program for the preservation of additional historic properties throughout the Nation, and for other purposes.

3. The Wild and Scenic Rivers Act of 1968 (Public Law 90-542 and subsequent amendments). An act to provide for a National Wild and Scenic Rivers System, and for other purposes.

4. The Coastal Zone Management Act of 1972 (PL 92-583 and subsequent amendments). An act to establish national policy and develop a national program for the management, beneficial use, protection, and development of the land and water resources of the Nation's coastal zones, and for other purposes.

5. The Endangered Species Act of 1973 (PL 93-205 and subsequent amendments). An act to provide for the conservation of endangered and threatened species of fish, wildlife, and plants, and for other purposes.

Further information will be provided at the request of the EPA Region VI or the New Mexico Environmental Improvement Division.

Los Alamos is also in full compliance with the Federal Water Pollution Control Act of 1977 and the Clean Air Act and its subsequent amendments. Los Alamos has on-going programs in support of the National Historic Preservation Act and the Endangered Species Act.

11.0 CERTIFICATION

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

_____ _____

Christopher S. Adams, Jr.
Associate Director
Los Alamos National Laboratory
Operator

Date Signed

_____ _____

Harold E. Valencia
Area Manager, Los Alamos Area Office
U.S. Department of Energy
Albuquerque Operations
Owner

Date Signed

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Project No. 846510
May, 1985

COPY

IT CORPORATION

Volume II - Appendices

RCRA PART B PERMIT APPLICATION

Los Alamos National Laboratory
Los Alamos, New Mexico

Prepared for:
Los Alamos National Laboratory
Waste Management Group HSE-7
Los Alamos, New Mexico 87545

Volume II – Appendices

RCRA PART B PERMIT APPLICATION

Any use of product trade names in this permit application is not to be construed as an endorsement of the product, either by the IT Corporation or Los Alamos National Laboratory.

INSTRUCTIONS FOR UPDATING VOLUME II - APPENDICES
RCRA PART B APPLICATION MAY 1985 SUBMITTAL
FOR OCTOBER 1985 SUBMITTAL

Appendices A, B, C, D, E, F, G, H, M, N, O, P, Q, R and S require no update. These appendices have not been revised since the May 1985 submittal. There are nine new appendices: F-1, I-1, I-2, M-1, M-2, M-3, M-4, M-5 and M-6, which have been added since the May 1985 submittal. The new appendices are inserted behind their respective Appendix letter; e.g., F-1 behind F, I-1 and I-2 behind I.

1. Appendices A, B, C, D, E, F, G, H, M, N, O, P, Q, R and S - no update required.

2. New Appendix F-1, "Vehicular Traffic Count Movements":

   - Insert F-1 tab and text behind existing Appendix F.

3. Existing Appendix I, "Detailed Specification and Plan for TA-50 Batch Treatment System":

   - Enclosed is new information which begins with page number I-67 and ends with page I-97. Add these pages to the end of existing Appendix I (after the "E" size drawing).

4. New Appendix I-1, "Manufacturers Information on Protective Coating, Primer and Finish":

   - Insert Appendix I-1 tab and text behind existing Appendix I text.

5. New Appendix I-2, "Manufacturers Information on Containers":

   - Insert Appendix I-2 tab and text behind new Appendix I-1 text.

6. Appendix J, "Incinerator Trial Burn Plan":

   - Replace the text of the Trial Burn Plan (all pages before Attachment A in Appendix J) with the new Trial Burn Plan text.

7. Appendix K, "Los Alamos Procedure for Operating Drum Pumps":

   - Add new information, "Manufacturers Information on Portable Pumps" to the end of existing Appendix K (May 1985 submittal).

Replace L

8. New Appendix M-1, "SOP for Treatment Tanks at Area L, TA-54":

   - Insert new Appendix M-1 tab and text behind Appendix M.

9. New Appendix M-2, "Manufacturers Information on Lorraine Crane and Training Manual":

   - Insert new Appendix M-2 tab and text behind new Appendix M-1.

10. New Appendix M-3:

    - Insert behind new Appendix M-2.

11. New Appendix M-4:

    - Insert behind new Appendix M-3.

12. New Appendix M-5:

    - Insert behind new Appendix M-4.

13. New Appendix M-6:

    - Insert behind new Appendix M-5.

14. Appendix T, "RCRA Contingency Plan":

    - Replace old Appendix T (May 1985 submittal) with new Appendix T.

15. Appendix U, "Job Descriptions":

    - Replace old Appendix U (May 1985 submittal) with new Appendix U.

16. Appendix V, "Personnel Training Information":

    - Replace old Appendix V (May 1985 submittal) with new Appendix V.

17. Appendix W, "Notice of Hazardous Waste Management Activities":

    - Insert new Appendix W.

18. Replace May 1985 ring binder spine and cover title blocks with October 1985.

APPENDIX A

EPA AUTHORIZATION FOR LOS ALAMOS TO OPERATE UNDER INTERIM STATUS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

August 11, 1982

Los Alamos Scientific Laboratory
Attn: William Crismon
Los Alamos Area Office
Los Alamos, New Mexico 87544

Re: EPA ID Number: NM0890010515
Facility Location: Los Alamos Area Office
Los Alamos, New Mexico

This is to acknowledge that the Environmental Protection Agency has completed processing the information submitted in your Part A Hazardous Waste Permit Application. It is the agency's opinion, based on the assumption that the information submitted is complete and accurate, that you as an owner or operator of a hazardous waste management facility, have met the requirements of Section 3005(e) of the Resource Conservation and Recovery Act (RCRA) for interim status. EPA has not verified the information submitted. If it is determined that the information is incomplete or inaccurate, you may be asked to provide additional information or in certain circumstances it may be determined that you do not qualify for interim status. In addition, this notice does not preclude a citizen from taking legal action under the provisions of Section 7002 of RCRA.

A facility not meeting the requirements for interim status under Section 3005 of RCRA may be required to close until such time as a Hazardous Waste Permit is issued. Interim status may also be terminated, according to procedures in 40 CFR, Part 124, if the owner or operator fails to furnish additional information which EPA requests in order to process a permit application.

As an owner or operator of a hazardous waste management facility, you are required to comply with the interim status standards as prescribed in 40 CFR, Parts 122 and 265, or with state rules and regulations in those states which have been authorized under Section 3006 of RCRA. In addition, you are reminded that operating under interim status does not relieve you from the need to comply with all applicable state and local requirements.

The enclosure to this letter identifies the processes your facility may use, their design capacities and the types of waste your facility may accept during interim status. This information was obtained from Part "A" of the Permit Application. If you wish to handle new wastes, change processes, increase the design capacity of existing processes, or change ownership or operational control of the facility, you may do so only as provided in 40 CFR, Sections 122.22 and 122.23.

If you have any questions concerning this letter, please contact Jack Paul at 214/767-9400 or write Environmental Protection Agency, Mail Code 6E-P, 1201 Elm Street, Dallas, Texas 75270.

Sincerely yours,

Allyn M Davis

Allyn Davis
Director, Air and Waste Management Division (6AW)

Enclosure

cc: New Mexico Health and
Environmental Department
Scott Nicholson

CONDITIONS OF OPERATION DURING INTERIM STATUS

Date prepared: August 11, 1982

The information shown below is based solely on the information that the owner and operator of this facility submitted in Part A of the Hazardous Waste Permit Application. This is not a determination by EPA that this facility is an environmentally acceptable facility for treating, storing or disposing of the hazardous wastes listed below.

I. Facility name, location and EPA identification number:

Name: Los Alamos Scientific Laboratory

Location: Los Alamos Area Office

Los Alamos, New Mexico

EPA ID No: NMO 89 001 0515

II. EPA considers the following to be the owner or operator of the facility and therefore the person(s) who must comply with the requirements set forth in 40 CFR Parts 122 and 265:

Owner's name: United States Department of Energy

Operator's name: Los Alamos National Scientific Laboratory

III. During the period of interim status, the facility may use only the following processes for treating, storing or disposing of hazardous waste, up to the design capacities that are indicated:

Process Code	Design Capacity Amount	Unit of Measure
D80	100.	Acre-feet
D83	4,000.	Gallons
T04	15,008.	Gallons per day

IV. During the period of interim status, the facility may handle only the hazardous wastes with the following EPA Hazardous Waste Numbers, and/or solid wastes exhibiting hazardous characteristics with the following EPA Hazardous Waste Numbers:

D000	D001	D002	D003	F001	F002	F003	F004	F005	F006	F007
F008	F009	P032	P035	P039	P040	P053	P073	P074	P075	P076
P077	P083	P090	P095	P098	P104	P106	P107	P113	P115	P120
P121	P122	U001	U002	U003	U004	U009	U011	U012	U013	U014

EPA Region VI, Dallas, TX 75270
(214) 767-2765

U017	U019	U020	U021	U023	U031	U032	U037	U044	U048	U052
U056	U057	U063	U068	U069	U070	U071	U072	U075	U077	U080
U081	U088	U092	U095	U108	U112	U115	U117	U122	U123	U127
U131	U134	U135	U138	U144	U145	U147	U151	U154	U156	U159
U160	U161	U166	U167	U168	U170	U188	U189	U190	U191	U194
U196	U197	U204	U207	U209	U210	U211	U213	U216	U217	U218
U219	U220	U226	U228	U229	U231	U239	D006	D007	D009	D010
D012	K044	P015	P018	P130	P105	U010	U022	U043	U045	U093
U102	U157	U201	U223							

P030

APPENDIX B

EPA REQUEST FOR LOS ALAMOS RCRA PART B PERMIT APPLICATION

Due Date 6/11/84

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
INTERFIRST TWO BUILDING, 1201 ELM STREET
DALLAS, TEXAS 75270

FEB 22 1984

CERTIFIED MAIL: RETURN RECEIPT REQUESTED

Donald Kerr
Laboratory Director
U.S. Department of Energy
Los Alamos Area Office
Los Alamos, New Mexico 87544

Re: NM0890010515

Dear Mr. Kerr:

This letter constitutes a formal request for your Part B permit application for a hazardous waste facility permit under the Resource Conservation and Recovery Act for the above referenced facility. This request is made under the authority of 40 CFR 270.10(e)(4).

The requirements for a Part B permit application are given in 40 CFR Parts 264 and 270. To assist you in preparing a Part B permit application, I have enclosed some guidance material. Please provide one (1) original and three (3) copies of your Part B permit application to the Environmental Protection Agency's Region VI office no later than September 1, 1984. In your application, if any of the information is being submitted under a claim of confidentiality, please indicate this fact in the cover letter and by separating out the confidential information. (For more details on confidentiality, see 40 CFR Part 2.) Should you decide to withdraw your Part A permit application which you filed in November 1980, please contact this office within thirty (30) days from the receipt of this request.

Any questions regarding this request or the Part B permit requirements should be directed to Mr. Strad Will at (214) 767-3451 or Mr. Will Focht at (214) 767-9878. Also, we will be happy to meet with you to discuss the requested Part B application in more detail. You may also wish to contact Mr. Ray Sisneros of the New Mexico Environmental Improvement Division (NMEID) at (505) 984-0020 regarding NMEID's permitting requirements.

Sincerely yours,

Allyn M. Davis

Allyn M. Davis, Director
Air and Waste Management Division

Enclosure (Permit Applicants Guidance Manual)

cc: Raymond Sisneros, Manager
Environmental Improvement Division

0 5 4 4 0 9 2 4

APPENDIX C

NMEID NOTICE OF JOINT EPA/EID PART B CALL-IN

HEALTH & ENVIRONMENT department

STATE OF NEW MEXICO

ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87504-0968
(505) 984-0020
STEVEN ASHER, Director

TONEY ANAYA
GOVERNOR

JOSEPH GOLDBERG
SECRETARY

TED GUAMBANA
DEPUTY SECRETARY

JOSEPH F. JOHNSON
DEPUTY SECRETARY

April 23, 1984

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Harold Valencia
Area Manager
U.S. DOE Los Alamos National Laboratories
Los Alamos Area Office
Los Alamos, New Mexico 87544

Re: EPA ID Number NM0890010515

Dear Mr. Valencia:

This letter constitutes a formal notice of joint Part B call-in by the New Mexico Environmental Improvement Division (EID), Hazardous Waste Section. This is in reference to the U.S. Environmental Protection Agency's (EPA) formal request for your Part B permit on February, 1984. By notice of this letter, EPA will be the lead agency for the processing of your Part B application and, upon Final Authorization of the New Mexico program (January, 1985), EPA will transfer your permit application (at whatever point of progress) to EID for final processing.

EPA and EID are presently working on coordinating the processing of your permit application. Therefore, please submit a copy of your upcoming EPA Part B submission to our office at the following:

Mr. Peter H. Pache, Acting Program Manager
Hazardous Waste Section
New Mexico Environmental Improvement Division
P.O. Box 969
Santa Fe, New Mexico 87504

If you have any questions concerning the processing of your permit, please contact either Strad Will of EPA at (214) 767-3451 or Peter H. Pache of EID at (505) 984-0020, Ext. 340.

Sincerely,

Peter H. Pache
Acting Program Manager
Hazardous Waste Section

cc: Strad Will, EPA
Susan Stark, EPA

APPENDIX D

EPA REQUEST FOR LOS ALAMOS PART B ADDRESSING RADIOACTIVE/CHEMICAL MIXED WASTE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
INTERFIRST TWO BUILDING, 1201 ELM STREET
DALLAS, TEXAS 75270

August 7, 1984

Mr. Harold Valencia
Department of Energy
Albuquerque Operations
Los Alamos Area Office
Los Alamos, New Mexico 87544

Dear Mr. Valencia:

Recent developments regarding the Environmental Protection Agency (EPA)/Department of Energy (DOE) Memorandum of Understanding (MOU) have complicated the situation between EPA Region VI and the call-in of Los Alamos National Scientific Laboratory's (LANSL) Resource Recovery and Conservation Act (RCRA) Part B permit application. The radioactive-mixed hazardous wastes, as defined in the MOU, are subject to regulation under RCRA and were to be included in the submission of a Hazardous Waste Compliance Plan. EPA Headquarters has indicated that DOE agreed to include these wastes in the RCRA Part B permit application. As you know, EPA Region VI called-in LANSL's Part B on February 22, 1984, with a subsequent due date of September 1, 1984.

There are several important issues which have yet to be resolved in a manner agreeable to both EPA and DOE. Such as: which radioactive-mixed hazardous wastes are subject to regulation under RCRA, and authorized state participation in the permitting of these wastes. With the inclusion of these wastes in the Part B, security clearances for EPA and State officials will be essential to complete the review of the Part B.

Security clearances require at least six (6) months to process, as a result, those recently applied for by EPA and State officials will not be granted by September. Additionally, it does not appear that EPA and DOE will resolve the stated problems in a timeframe which allows LANSL to submit a complete Part B on September 1, 1984. Therefore, Region VI feels it is mutually beneficial to extend the due date for LANSL's Part B permit application to May 1, 1985. This extension should grant DOE and EPA adequate time to come to an agreement and provide sufficient time to LANSL to submit a complete Part B.

This letter, also, constitutes a formal request for your Part B permit application for those radioactive-mixed hazardous wastes designated by EPA and DOE to be subject to regulation under the Resource Conservation

1 of 2

and Recovery Act. This request is being made by EPA, as agreed upon by DOE, under the authority of 40 CFR 270.10(e)(4). If any of your information will be submitted under a claim of confidentiality or is considered classified, please include this fact in the cover letter and separate out the classified and/or confidential information.

Please provide one (1) original and three (3) copies of your RCRA Part B permit application to the Environmental Protection Agency Region VI office no later than May 1, 1985.

Any questions regarding this request or the Part B requirements should be directed to Ms. Jamie Wright at FTS 729-2614. We will be happy to meet with you to discuss the requested Part B in more detail.

Sincerely yours,

Allyn M. Davis

Allyn M. Davis, Director
Air and Waste Management Division

cc: Peter Pache, Program Manager
New Mexico Environmental Improvement Division

Steven Asher, Director
New Mexico Environmental Improvement Division

APPENDIX E

DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS, FLOODPLAIN DOCUMENTATION

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580

November 20, 1984

REPLY TO
ATTENTION OF:

Engineering and Planning Division
Planning Branch

Mr. M. L. McCorkle
Mail Stop: E518
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Dear Mr. McCorkle:

In response to your letter of October 15, 1984 (HSE8-84-913) to Mr. Boyd Lare. I am providing the following four flood plain evaluations:

a. TA-54, area L is not in a 100-year flood plain.

b. TA-54, area G is not in a 100-year flood plain except for the "burial pits." The burial pits will collect rain that falls into the pits. Rainwater will drain, collect, and be confined to the lowest depressions in the pits.

c. TA-16, "S" site burn pits are not in a 100-year flood plain except for the northern portion of pad 388. More detailed site data are needed to accurately evaluate the flood plain at pad 388. There is a two-foot diameter culvert under the access road and adjacent to the northern edge of the pad. This culvert is subject to clogging by debris during intense thunderstorms such as the storm which would produce the 100-year flood plain.

d. TA-40, HE scrap burn pits are not in a 100-year flood plain.

The above flood plain information is based upon a September 5, 1984 site visit made by Mr. Boyd Lare and Mr. Thomas Ryan of my staff and on topographic information provided by Los Alamos National Laboratory from Lab. Job No. 5682 Plan/Topo Sheet No.s 2, 5, and 16.

If you should need further evaluation of TA-16, please call Mr. Boyd Lare at 766-3225 to discuss additional data needs.

Sincerely,

John J. Cunico, P.E.
Chief, Planning Branch
Engineering and Planning Division

APPENDIX F
PHYSICAL AND HYDROLOGIC CHARACTERISTICS OF THE BANDELIER TUFF

PHYSICAL CHARACTERISTICS OF THE BANDELIER TUFF

The Bandelier Tuff is formed by a series of ash flows and ash falls which are described as nonwelded, moderately welded, and welded tuff. The nonwelded, moderately welded, and welded tuff grade one into the other both vertically and horizontally.

The upper Tshirege Member is about 250 m thick along the western edge of the Pajarito Plateau and thins eastward to less than 15 m. Individual moderately welded and welded ash flows in the upper part of the Tshirege Member range from 6 to 40 m thick. Some of the uppermost ash flows are beveled off by erosion eastward across the plateau. Outliers of tuff overlie the Puye formation along Puye Escarpment. Most all ash flows thin eastward from the source area (Sierra de los Valles). Nonwelded ash flows of the Otowi Member may be as much as 90 m thick near the center of the plateau.

I. Welding

The welding process of an ash flow tuff begins after emplacement. The major factors affecting welding are heat at the time of emplacement, amount of volatiles in the mass, rate of cooling, and thickness of the ash flow. The degree of welding ranges from incipient stages marked by the cohesion of glassy fragments, to complete welding marked by the cohesion of the surfaces of glassy fragments accompanied by their deformation and the elimination of pore space.

Zonal variation of welding occurs vertically within individual flows or within a series of flows that have cooled as a single unit. Single ash flows or series of ash flow that have cooled as a unit may show a greater degree of welding near the center than near the upper and lower contacts. A series of ash flows that have been emplaced in rapid succession may cool as a single unit with the greatest degree of welding near the center.

Variation of welding occurs horizontally within individual flows with greater degree welding near the mountains (the source area). The degree of welding becomes less eastward across the plateau.

The tuffs in the Los Alamos area are classified according to the degree of welding--i.e., nonwelded, moderately welded, and welded tuffs. Welding results in increased cohesion and deformation of the glassy fragments in the tuff. Nonwelded tuff has high porosity, only slight cohesion of the glassy fragments, and crumbly fracture; moderately welded tuff has lesser porosity, moderate cohesion, slight deformation of the glassy fragments, and a somewhat brittle fracture; and welded tuff has lower porosity, good cohesion, a high degree of deformation by flattening of glassy fragments, and a brittle fracture.

The degree of welding influences most of the physical characteristics of the individual ash-flow tuff units.

The following shows a large range in porosity in each of the variations of tuff indicating that welding is only one of several factors determining porosity.

	Range in porosity (percent by volume)
Nonwelded tuff	40 to 60
Moderately welded tuff	30 to 55
Welded tuff	15 to 40

The surface of exposed tuff (nonwelded to welded) becomes "case hardened" as it is exposed to the weather. In this process, due to the porosity of the tuff, moisture is absorbed and some minerals are dissolved. The minerals are returned to the surface by evaporation as the tuff dries out where they are precipitated to form a rind. This rind forms a protective surface which resist the erosion of the surface by wind and water. However, exposed pumice fragments weather out rapidly leaving small cavities in tuff surface.

II. Density

The density of nonwelded tuff is lower than in welded tuff. This is due to the compaction of the matrix (glass shards and ash) and closer arrangement of the quartz and sanidine crystals, and rock fragments in a welded tuff. The specific gravity of the tuff matrix averages about 1.55. The range in bulk density of nonwelded to welded tuff depends on the porosity (i.e., the larger a porosity, the smaller the density).

The following table shows a comparison of the densities of pumice and the tuff (nonwelded towelded) with other rock types.

Rock Type	Range in density (gm/cm^3)
Pumice (nonwelded)	< 1.0
Nonwelded tuff	1.02-1.52
Moderately welded tuff	1.15-1.84
Welded tuff	1.52-2.16
Granite	2.64-2.76
Marble	2.60-2.84
Sandstone	2.14-2.36
Basalt	2.4 -3.1

III. Bearing Capacities

The bearing capacities of a tuff are dependent upon the density of tuff (i.e., the greater bearing capacities occur with the tuff of greater density). The density of the tuff is related to welding (i.e., density of the tuff increases from nonwelded tuff to welded tuff).

Data are available on the bearing capacities of the moderately welded tuff. The following table shows the relationship of density change to the resistance to crushing of a moderately welded tuff.

Density (gm/cm^3)	Resistance to Crushing (kg/m^2)
1.73	2.4×10^5
1.74	3.7×10^5
1.77	3.9×10^5
1.79 (probably with pumice inclusion)	3.4×10^5
1.81	4.8×10^5
1.83	5.6×10^5

Rock inclusions of pumice, rhyolite, and latite are found in the tuff. The frequency of occurrence of the rock fragments differs in individual ash flows and at different locations within the same ash flow.

The pumice fragments may be as much as 5 cm in length and 2 cm in diameter. The pumice is soft and friable. Pumice fragment inclusion in a small sample of the tuff would decrease the bearing capacity as failure would most likely occur within the pumice fragment. The rhyolite and latite fragments are dark gray, hard, and may be as much as five to seven cm across. These large rock fragments would add strength to the matrix of tuff.

The following table is a comparison of the bearing capacities of a moderately welded tuff (density 1.73 and ~ 1.82 g/cm^3) and miscellaneous rock type. The bearing capacity is computed as 1/5 of rupture strength of the material.

Rock Type	Bearing Capacity (kg/m^2)
Moderately welded tuff (1.73 g/cm^3)	4.7×10^4
Moderately welded tuff (1.82 g/cm^3)	1.1×10^5
Sandstone	3.4×10^5
Limestone	8.4×10^5
Marble	1.1×10^6
Granite	1.4×10^6

IV. Thermal Conductivity

The thermal conductivity of the tuff is inversely related to porosity, thus, the thermal conductivity of the nonwelded tuff would be less than a welded tuff as more pore space is available for insulation.

The only data available on the thermal conductivity was made of a moderately welded tuff in one area investigated. The following table is a comparison of the thermal properties of the tuff and miscellaneous rock types. A decrease in thermal conductivity increases the insulating value.

Rock Type	Range of Thermal Conductivity $\left(\frac{\text{cal, gm-cm}}{\text{hr x cm}^2 \text{ x oC}}\right)$
Moderately welded tuff	0.38-0.47
Limestone	4.9-11
Sandstone	9.9-20
Marble	17-25
Granite	16-35

V. Mineral Composition

The tuff is rhyolitic in composition and contains small rock fragments of rhyolite, latite and devitrified pumice and crystals and crystal fragments of sanidine and quartz, in a matrix of glass shards and welded ash. Dark minerals are scarce although traces of crystal fragments of biotite, hornblende, and pyroxene have been observed.

Seven samples of a moderately welded tuff were analyzed petrographically by C. S. Ross (written communication, July 7, 1960). Ross recalculated the proportions of phenocrysts in terms of proportion by weight. The results of all seven were similar, one of which is presented here:

Pore space	about 30 percent by volume
Phenocrysts	about 20 percent by weight
Sanidine	12 percent by weight
Quartz	6 percent by weight
Magnetite	1 percent by weight
Pyroxene	± 0.5 percent by weight

The ground mass is typical devitrified welded tuff. The devitrification products are very fine grained, but show typical cristobalite feldspar structure. Cavities contain radial groups of feldspar and tridymite. The rocks contain a few fragments of altered andesite, and some brown birefracting clay like material (probably montmorillonite).

VI. Chemical Composition

The color of the tuff ranges from very light gray to medium dark gray. Some units range from pinkish gray to light pink. Large fragments of pumice that appear much darker than the matrix in some units enchance the color of the tuff. Moderately welded units are generally lighter in color than the welded units. The coloring is inherent in the tuff and probably the result of minor changes in the chemical constituents and heat of emplacement.

In general the tuff is composed namely of silica and alumina. The range in chemical constituents is shown on the following table.

Chemical Constituents	Range (in percent)
Silica (SiO_2)	72.0-78.2
Alumina (Al_2O_3)	11.2-13.8
Ferric oxide (Fe_2O_3)	1.1-2.1
Ferrous oxide (FeO)	.21-.75
Magnesium oxide (MgO)	.02-.33
Calcium oxide (CaO)	.26-1.17
Sodium oxide (Na_2O)	3.5-4.5
Potassium oxide (K_2O)	4.2-4.7
Water (H_2O)	.15-2.8
Titanium oxide (TiO_2)	.10-.32
Phosphorous oxide (P_2O_5)	.10-.07
Manganese oxide (MnO)	.00-.98
Carbon dioxide (CO_2)	<.05

VII. Joints

Joints and joint systems are prominent in the Tshirege Member. The joints divide the rocks into polygonal blocks, many of which are prismatic or columnar.

The joints can be classified into two groups, master joints and minor joints. The term "master joint" signifies those joints that are numerically predominant, are most persistent in length, and pass through several groups of beds.

The master joints can be traced vertically across two or more units of the Tshirege Member. They are vertical or near vertical, dipping more than 80°. The overall vertical trends of the individual master joints are relatively straight; however, they curve slightly through individual units and upon entering a unit of different degree of welding, may be deflected slightly.

The minor joints dip at angles from about 40° to 80° and in most instances, intersect the master joints. These joints are not as persistent as master joints.

Master joint systems in Mortandad Canyon display orientation differences of about 60°. Joint systems mapped at Mesita del Buey also indicate orientation differences of 60°. The angular differences between these joint systems suggest that these sets are conjugate tension joints caused by shrinkage during cooling of the rocks.

HYDROLOGICAL CHARACTERISTS OF THE BANDELIER TUFF

The natural moisture content of the tuff forming the mesas between the eastward-trending canyons is generally less than five percent of volume. Thus, movement of moisture is under unsaturated conditions. The low moisture content of the tuff is caused by the protective cap of clay soil derived by weathering of the tuff near the surface and low rainfall and high evaportranspiration. The hydrologic characteristics of the tuff depend largely upon the degree of welding of the individual ash flows.

I. Hydrologic Effects of Soil

The surfaces of the finger-like mesas which form the Pajarito Plateau are covered by a clayey soil derived by weathering of the underlying tuff of the Tshirege Member. The soil is thickest near the axes of the mesas and thins toward the edges where the tuff is exposed. Thick sections of soil have also developed along slow draining arroyos cut into the surfaces of mesas and in relatively flat areas where water collects and stands, allowing some infiltration into the tuff. The greatest known thickness of soil is at Frijoles Mesa where 2.7 m was logged in a shallow test hole located in a relatively flat area.

Petrographic examination of the soil derived from the Tshirege Member was made by Staritzky of the Los Alamos Scientific Laboratory. He found that the size distribution of the "sand" fraction (greater than 50 microns in diameter) varied between 15 and 38 percent, the "silt" fraction (2 to 50 microns in diameter) varied between 58 and 73 percent, and the "clay fraction" (less than 2 microns in diameter) varied between 4 and 12 percent. Mineralogically, the principal constituents of the soil were quartz and feldspar, and the most important secondary constituents are the clay minerals, montmorillonite and illite. Montmorillonite is know to have the highest base-exchange capacity (85 to 100 millequivalents per 100 grams) and illite the next highest (25 to 30 millequivalents per 100 grams) among the clay minerals.

A study of the natural distribution of moisture in soil and in near surface tuff was made at Frijoles Mesa during a 2-year period. The moisture content in the soil cover, including the transition zone from the soil to weathered tuff, varied according to prevailing weather conditions. The moisture content was highest in March and April as the result of late winter snows and thawing and was generally lowest in the months of August through October owing to high evapotranspiration rates. Water from precipitation rarely infiltrated through the undisturbed soil cover into the underlying tuff and only in an extremely low moisture range (less than 5 percent moisture by volume) within the upper 1 m of the tuff.

The upper two units of moderately welded tuff (thickness about 36.5 m) at Frijoles Mesa blow air through open joints in response to a declining atmospheric pressure; therefore, the soil cover, which prevents most of the precipitation from infiltrating into the underlying tuff, also impedes the exchange of air from the atmosphere to the tuff.

II. Hydrologic Characteristics of Nonwelded, Moderately Welded and Welded Tuff

The hydrologic characteristics of tuff related to porosity, specific yield, specific retention, pore size distribution and hydrologic conductivity were determined of in six units of the Tshirege Member at Frijoles Mesa. These hydrologic characteristics were determined in the laboratory under saturated conditions. As saturated conditions rarely occur in the tuff, these parameters may be of only general interest.

The porosity of the tuff at Frijoles Mesa ranged from 19 to 54 percent by volume; the lowest porosities are in the welded tuffs. Specific yield and specific retention decrease with a decrease in porosity. Specific yield is greater than specific retention in a nonwelded tuff (high porosity); however, as the porosity decreases the difference becomes smaller and low porosity specific retention in a welded tuff may be greater than specific yield.

The relationship of porosity to pore size depends on the degree of welding, thickness of the flow, and position in the flow. The larger pore sizes and greater porosities are near the top of the flow and decrease vertically through the flow. This is due to the larger pores formed by escaping gases near the top and compaction and baking of the middle and lower portion of the flow as it cools.

The hydrologic conductivity is indirectly related to porosity depending upon pore size and the degree of interconnection of the pores. The permeability of the tuff matrix decreases with depth for the same reasons that the porosity decreases.

Hydrologic characteristics of the Tshirege Member of the Bandelier Tuff, as determined in the laboratory are shown in the following table.

Hydrologic Characteristics of the Tshirege Member at Frijoles Mesa

Hydrologic Characteristics						
Unit	Depth below surface of mesa (m)	Degree of welding	Porosity (percent)	Specific yield (percent)	Specific retention (percent)	Range of Hydrologic Conductivity (m/day)
6	0- 19.5	Moderate	38-54	18-34	16-27	0.004-0.25
5	19.5- 20.1	None (sand)	-	-	-	1.4-2.4
4	20.1- 41.1	Moderate	33-54	11-43	12-22	0.012-0.53
3	41.1- 53.3	Nonwelded	48	34	14	0.9
2	53.3- 83.5	Welded	19-37	.6-26	11-21	0.003-0.08
1B	83.5-152.7	Nonwelded	-	-	-	50-2.1

III. Movement of Water

The Tshirege Member is dry beneath the surfaces of the finger-like mesas. The moisture content of the tuff generally is less than 5

percent by volume, even though the specific retention ranges from 11 to 27 percent. Beneath the canyons which contain perennial or intermittent streams, the moisture content of the tuff may be as much as 60 percent by volume; however, the water movement through the tuff is as unsaturated flow. Test holes drilled through alluvium and into the tuff in Water and Mortandad Canyons penetrated thick sections (up to 55 m) of wet tuff (up to 60 percent moisture by volume); however, no free water moved into the test holes.

Instruments were used to measure moisture content of the bore wall in holes constructed in the tuff beneath the stream channel in upper Mortandad Canyon. These holes contained no free water, although the welded tuff beneath the stream contained as much as 25 percent moisture by volume. Specifically constructed moisture access holes in the tuff underlying water perched in the alluvium in lower Mortandad Canyon had moisture contents of the tuff as much as 45 percent by volume but the rock yielded no free water. The welded and nonwelded tuff in the canyon are transmitting water (high moisture content) downward by gravity into the tuff by unsaturated flow. There is some lateral movement by capillarity.

The water in the tuff moves as unsaturated flow. The majority of the pores are of capillary size. The energy relationship with moisture content of a moderately welded tuff was determined by Abrahams (Fig. 1). The saturated moisture content of the tuff was about 41 percent by volume. When moisture contents are below 4 percent there is no movement of water; from 4 to 8 percent moisture is redistributed by diffusion; from 8 to 23 percent distribution is by gravity and capillarity, and above 23 percent the movement is by drainage from gravity.

A study of the movement of water through the tuff was made at Mesita del Buey by adding water to an infiltration pit. The amount of water added was equivalent to 110 years of precipitation on the Pajarito Plateau. The movement of water from an infiltration pit was monitored by a series

of moisture access tubes set in the tuff and a neutron-scattering moisture probe and scaler. The average infiltration rate from a $1m^2$ pit under a constant head of 23 cm of water averaged about 0.34 m/day for a period of about 160 days. The wetted front moving into the tuff was sharpest during the first part of the test. After about 2 months of infiltration moisture had moved downward more than 4.5 m; moisture content ranged as follows: 35 percent by volume at 0.6 m below the pit, 30 percent at 0.9 m, 25 percent at 4 m, and 20 percent at 4.6 m.

IV. Hydrologic Effects of Welding

The uppermost ash flow at Frijoles Mesa exhibits zonal variations of welding in a single cooling unit which causes vertical changes in porosity. The moderately welded flow is about 24 m thick near the center of the mesa. The greatest porosities are in the upper and basal parts of the flow. Lesser porosities (zone of denser welding) are in the lower one-third of the flow, and pore size decreases with increased depth. The following table presents the hydrologic characteristics at different intervals in a single ash flow tuff.

Hydrologic Characteristics of an Ash-Flow Tuff at Frijoles Mesa

Height above base of flow (m)	Porosity (percent)	Specific yield (percent)	Specific retention (percent)	Hydrologic Conductivity (m/day)		Pore Size distribution (percent of porosity)	
				vert.	horiz.	>.01 mm	<.01 mm
17.9	54	35	19	10.082	-	-	-
14.3	50	34	16	0.12	0.12	39	61
14.3	54	38	16	0.25	0.21	26	74
12.2	51	34	17	0.16	0.16	20	80
8.8	49	28	21	0.041	-	-	-
6.7	41	24	17	0.004	0.082	20	80
6.1	47	27	20	0.082	0.082	15	85
5.8	42	23	19	0.041	0.033	-	-
3.6	38	18	20	0.037	0.041	-	-
0.3	51	33	18	0.041	-	17	83
0.3	49	24	25	0.037	0.082	20	80

A decrease in porosity in an ash flow tuff results in a decrease in specific yield and as the specific yield decreases, the specific retention increases proportionately (Fig. 2). The hydrologic conductivity is related to pore size and pore-size distribution rather than porosity. The permeability of the tuff matrix decreases at increased depth with a general decrease in the percentage of pore sizes greater than 0.1 mm.

Variations in vertical and horizontal permeability in the lower one third of the flow may be due to movement and compaction of the ash flow as it cooled. Movement of flow as it cools could result in elongation of the pores in a horizontal plane, and the greatest permeability probably is in this direction. Three of the five horizontal hydrologic conductivities in the lower one third of the flow are greater than the vertical conductivities; however, the conductivity measurements were taken in random directions and no attempt was made at orientation to the probable direction of movement of the flow.

V. Hydrologic Effects of Joints and Contacts

Joints and the fractures in the tuff are capable of transmitting fluid. The interconnection of the joint system is an important aspect of the hydrologic regime.

Joints in moderately welded to welded tuff of the Tshirege Member range from closed to open. Locally the amount of opening is as much a 5 cm; however, the majority of joints are open less than 1 cm. All joints terminating at the base of the soil zone, which covers the surfaces of the mesas, are filled with a light-brown clay. The depth of clay filling varies from 0.9 to 1.2 m below the soil zone at Mesita del Buey and Frijoles Mesa. The joint openings are plated with clay to depths of 21 m at Frijoles Mesa. Some of the joints are filled or plated with a light-gray clay. The light-gray clay is derived from weathering of the tuff and is composed of minerals leached from the tuff by water. This clay was precipitated along the joint openings prior to the development

of the soil zone. The joints are interconnected and master joints transect one or more flows. Joints are more numerous and open in ash flows of moderately welded to welded tuffs than in nonwelded tuff.

Joints in the moderately welded to welded tuffs will transmit depending upon availability of large volumes of water and the amount of opening and the degree of interconnection between different joint systems. More than 15,000 m^3 of drilling fluid was lost while drilling 300 m of Bandelier Tuff at Frijoles Mesa. Most of the loss was in the upper 150 m in the Tshirege Member which here consist of moderately welded to welded tuff in which open joints are numerous. During grouting of a casing in a large diameter hole at Frijoles Mesa (a 76 cm dia., 15.2 m depth casing filled with water to prevent collapse), the bottom seal in the casing ruptured and the water from within the casing drained into the formation within 3 hours. The number and orientation of joints in the hole were determined before the casing was installed. A joint near the bottom was open 1 to 3 cm for about 1.2 m. The 6.9 m^3 of water moved into the joint and downward into the joint systems of the underlying flow. Observation of another large-diameter hole 15.2 deep and located 7.6 m to the north failed to disclose a trace of the water.

The experiment at Mesita del Buey indicated that water from the infiltration pit (42 m^3 of water equivalent of 110 years of precipitation on the Pajarito Plateau) moved downward through a moderately welded tuff into a pumice zone which is more porous and permeable. Movement in the pumiceous zone was lateral. Infiltration into a moderately welded tuff underlying the pumice zone was from near the center of the saturated area in the pumiceous lense. The moisture content of the upper moderately welded tuff was much lower than the underlying pumiceous zone, which indicates that specific retention of the pumice zone is greater.

Vertical infiltration through the Tshirege Member would be affected by zonal variations of welding as well as by horizontal contacts between flows.

Vertical changes in hydrologic conductivity caused by contacts between flows tend to perch infiltrating water. In the stream channel in Mortandad Canyon, water is returned to the surface from underflow in the alluvium and in a moderately welded tuff at the contact with a nonwelded tuff.

Industrial wastes discharged into surface water in Acid Canyon move into the joints and tuff of the Tshirege Member, are perched on the top of the Otowi Member, and then move laterally along the contact into a seep area at the junction of Acid and Pueblo Canyons.

Results of an infiltration experiment in the soil near TA-50 indicated that precipitation that is not removed by surface drainage infiltrates into the soil on the mesas of the Pajarito Plateau; however, the downward movement of this water is impeded or stopped by the dense transition zone between the soil and tuff and the water is returned to the atmosphere by evapotranspiration. During this experiment, the amount of water added to the soil was equivalent to 50 years of precipitation on the Pajarito Plateau.

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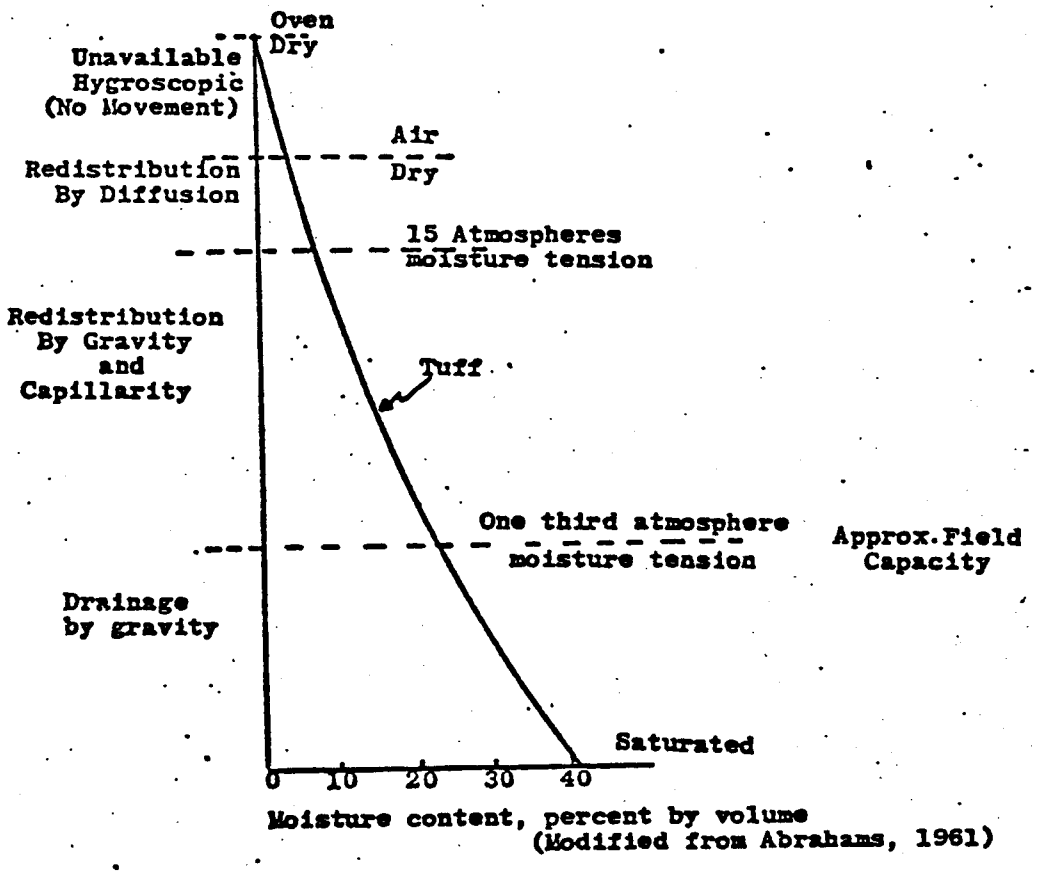


Figure 1. Energy relationships with moisture content of tuff.

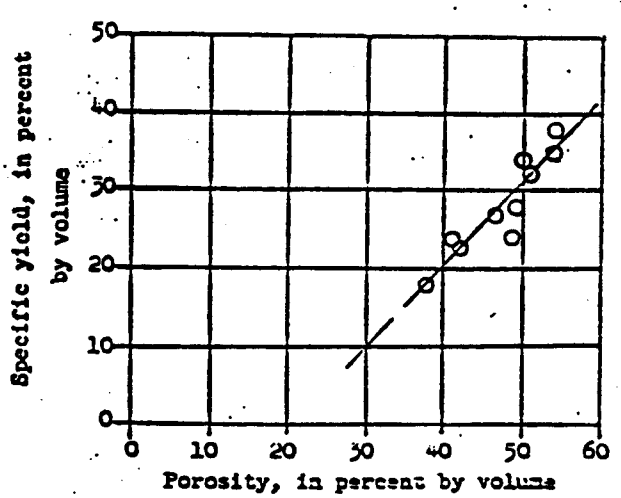


Figure 2. Relationship of specific yield to porosity of the tuff.

APPENDIX F-1

MAPS FROM "TA-3 TRAFFIC STUDY" DEPICTING VEHICULAR COUNT MOVEMENTS AT VARIOUS INTERSECTIONS

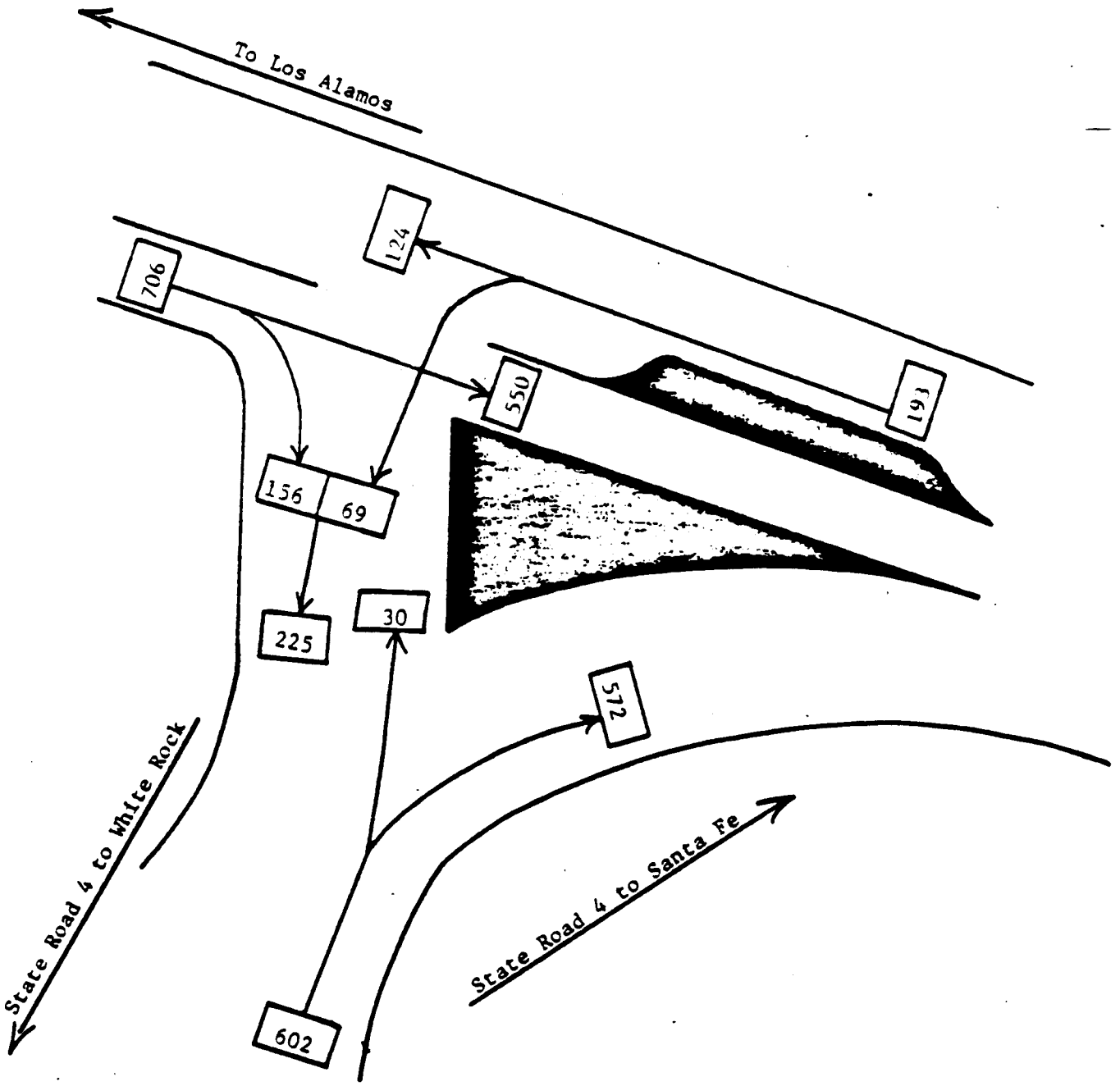
4/14/83
JB

TRAFFIC ENGINEERING DEPARTMENT
OF LOS ALAMOS COUNTY

Vehicular traffic count movements at the intersection of the White Rock Wye. Evening

Date of Survey: 4/13/83
Taken for 1 hours
from: 4:30 to 5:30 pm
Day of Week Wednesday
Weather: Cloudy
Road surface: dry
Survey taken by:
Holcomb & Haas

Indicate North
by arrow



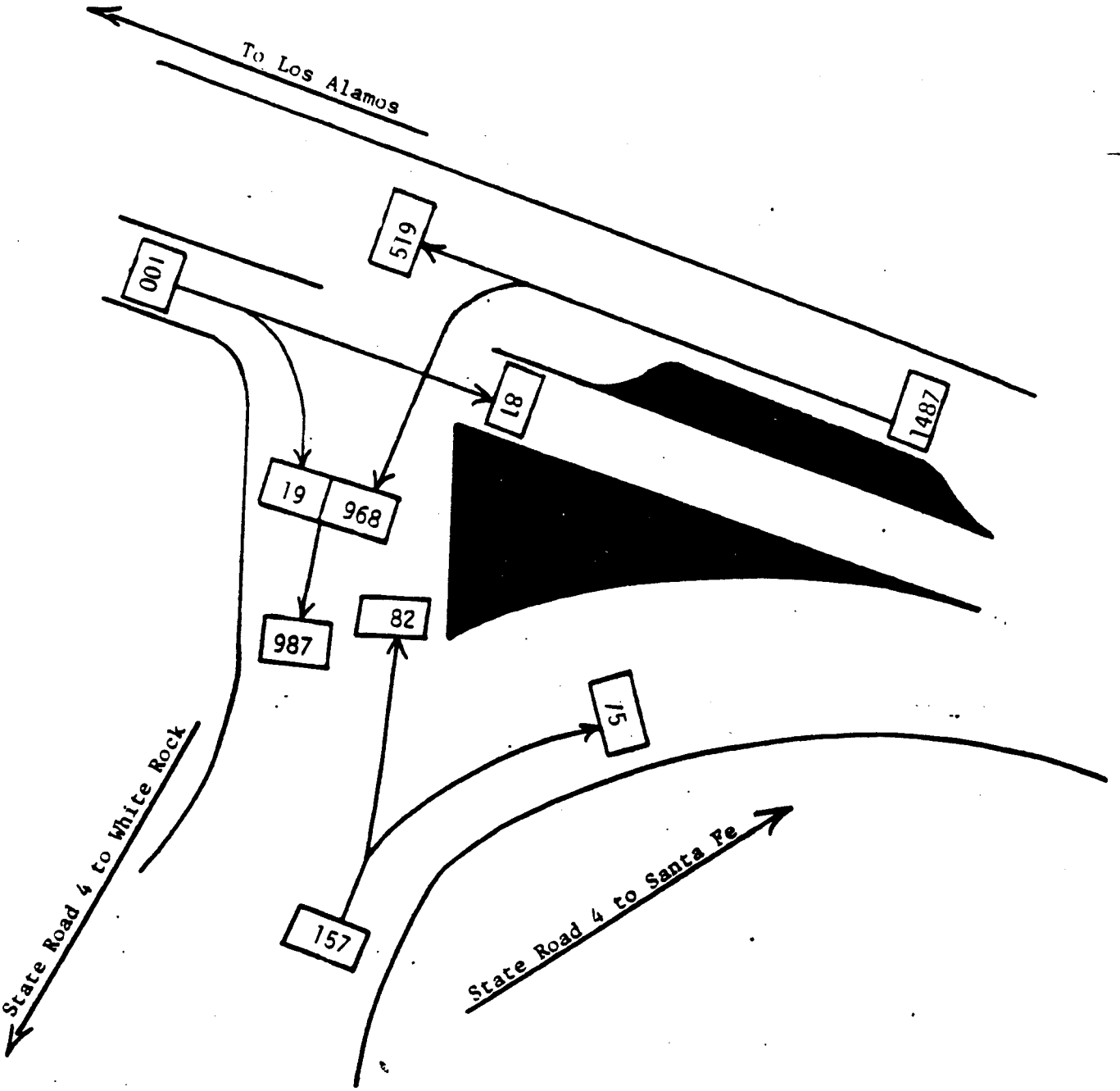
5/12/83
18

TRAFFIC ENGINEERING DEPARTMENT
OF LOS ALAMOS COUNTY

Vehicular traffic count movements at the intersection of the White Rock Wye.

Date of Survey: 5/9/83
Taken for 1 hours
from: 7:00 to 8:00
Day of Week Monday
Weather: Clear
Road surface: dry
Survey taken by:
Holcomb & Haas

Indicate North
by arrow



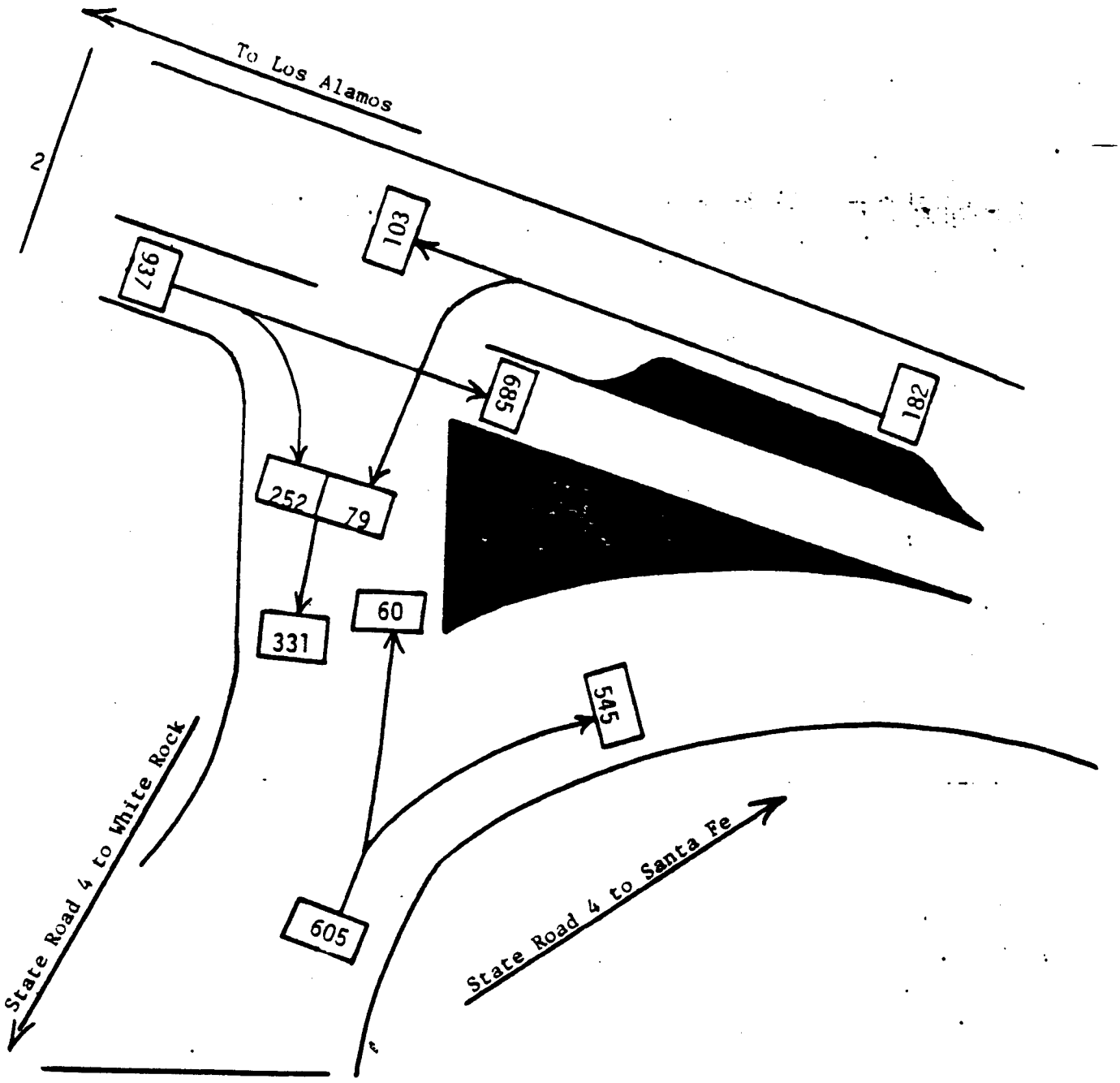
5/10/83
GB

TRAFFIC ENGINEERING DEPARTMENT
OF LOS ALAMOS COUNTY

Vehicular traffic count movements at the intersection of the White Rock Wye.

Date of Survey: 5/6/83
Taken for 1 hours
from: 4:30 to 5:30 pm
Day of Week Friday
Weather: Clear
Road surface: dry
Survey taken by:
Holcomb & Haas

Indicate North
by arrow



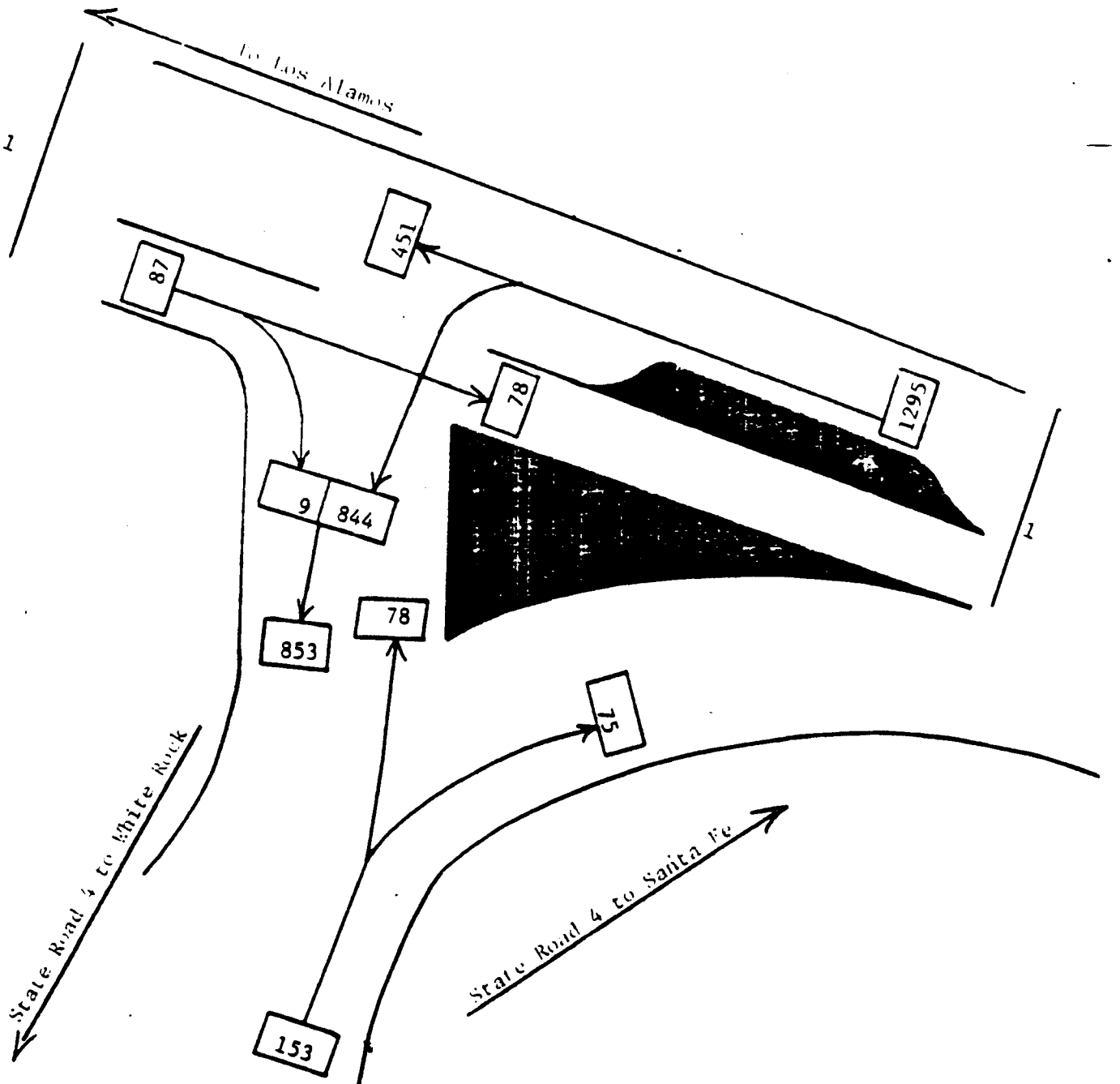
4/21/83
GB

TRAFFIC ENGINEERING DEPARTMENT
OF LOS ALAMOS COUNTY

Vehicular traffic count movements at the intersection of the White Rock Wyc.

Date of Survey: 4/18/83
Taken for 1 hours
from: 7:15 to 8:15 am
Day of Week Monday
Weather: Clear
Road surface: dry
Survey taken by:
Holcomb & Haas

Indicate North
by arrow



APPENDIX G

REPRESENTATIVE WASTE INVENTORY AND ANALYSES

APPENDIX G

REPRESENTATIVE WASTE INVENTORY AND ANALYSES

EPA Hazardous Waste Number	Estimated Annual Quantity of Waste (lb)	Process/Disposal Codes (1)	Waste Type for Segregation (2)	Waste Materials (3)
P001	250(4)	S01, D80	O	Warfarin (H)
P002	250(4)	S01, D80	O	1-Acetyl-2-thiourea (H)
P003	250(4)	S01, D80	O	Acrolein (H)
P004	250(4)	S01, D80	O	Aldrin (H)
P005	250(4)	S01, D80	O	Allyl alcohol (H)
P006	250(4)	S01, T04, D80	R	Aluminum phosphide (H)
P007	250(4)	S01, D80	O	Muscimol (H)
P008	250(4)	S01, D80	O	4-Aminopyridine (H)
P009	250(4)	S01, T04, D80	R	Ammonium picrate (R)
P010	250(4)	S01, D80	M	Arsenic acid (H)
P011	250(4)	S01, D80	M	Arsenic pentoxide (H)
P012	250(4)	S01, D80	M	Arsenic trioxide (H)
P013	250(4)	S01, T01, D80	M	Barium cyanide (H)
P014	250(4)	S01, D80	O	Benzenethiol (H)
P015	6000	S01, D80	M	Beryllium dust (H)
P016	250(4)	S01, D80	O	Bis(chloromethyl) ether (H)
P017	250(4)	S01, D80	O	Bromoacetone (H)
P018	250(4)	S01, D80	O	Brucine (H)
P020	250(4)	S01, D80	O	Dinoseb (H)
P021	250(4)	S01, T01, D80	M	Calcium cyanide (H)
P022	250(4)	S01, T04, D80	O	Carbon bisulfide (H)
P023	250(4)	S01, D80	O	Chloroacetaldehyde (H)
P024	250(4)	S01, D80	O	p-Chloroaniline (H)
P026	250(4)	S01, D80	O	1-(o-Chlorophenyl) thiourea (H)
P027	250(4)	S01, D80	O	3-Chloropropionitrile (H)
P028	250(4)	S01, D80	O	Chloromethylbenzene (H)
P029	250(4)	S01, T01, D80	M	Copper cyanide (H)
P030	250(4)	S01, T01, D80	M	Cyanide salts (H)
P031	250(4)	S01, T04, D80	M	Cyanogen (H)
P033	250(4)	S01, T04, D80	M	Cyanogen chloride (H)
P034	250(4)	S01, D80	O	2-Cyclohexyl-4,6-dinitrophenol (H)
P036	250(4)	S01, D80	O	Dichlorophenylarsine (H)
P037	250(4)	S01, D80	O	Dieldrin (H)
P038	250(4)	S01, D80	O	Diethylarsine (H)
P039	250(4)	S01, D80	O	Disulfoton (H)
P040	250(4)	S01, D80	O	Thionazin (H)
P041	250(4)	S01, D80	O	Paraoxon (H)
P042	250(4)	S01, D80	O	Epinephrine (H)
P043	250(4)	S01, D80	A	Isoflurophate (H)
P044	250(4)	S01, D80	O	Dimethoate (H)
P045	250(4)	S01, D80	O	Thiofanox (H)
P046	250(4)	S01, D80	O	Phentermine (H)
P047	250(4)	S01, D80	O	Dinitrocresol (H)
P048	250(4)	S01, T04, D80	O	2,4-Dinitrophenol (H)
P049	250(4)	S01, D80	O	2,4-Dithiobiuret (H)
P050	250(4)	S01, D80	O	Endosulfan (H)
P051	250(4)	S01, D80	O	Endrin (H)
P054	250(4)	S01, T04, D80	O	Ethylenimine (H)
P056	250(4)	S01, T01, T04, D80	G	Fluorine (H)
P057	250(4)	S01, D80	O	Fluoroacetamide (H)
P058	250(4)	S01, D80	O	Fluoroacetic acid, sodium salt (H)
P059	250(4)	S01, D80	O	Heptachlor (H)
P060	250(4)	S01, D80	O	Hexachlorohexahydro-exo, (H) exo-dimethanonaphthalene

REPRESENTATIVE WASTE INVENTORY AND ANALYSES (Continued)

EPA Hazardous Waste Number	Estimated Annual Quantity of Waste (lb)	Process/Disposal Codes (1)	Waste Type for Segregation (2)	Waste Materials (3)
P062	250(4)	S01, D80	A	Tetraphosphoric acid, hexaethyl ester (H)
P063	250(4)	S01, T04, D80	CN	Hydrogen cyanide (H)
P064	250(4)	S01, T04, D80	A	Isocyanic acid, methyl ester (H)
P065	250(4)	S01, T04, D80	R	Mercury fulminate (R, T)
P066	250(4)	S01, D80	O	Methomyl (H)
P067	250(4)	S01, D80	O	1,2-Propylenimine (H)
P068	250(4)	S01, D80	O	Methylhydrazine (H)
P069	250(4)	S01, T04, D80	CN	2-Methyllactonitrile (H)
P070	250(4)	S01, D80	O	Aldicarb (H)
P071	250(4)	S01, T04, D80	O	Methyl parathion (H)
P072	250(4)	S01, D80	O	2-Naphthylthiourea (H)
P073	250(4)	S01, T01, T04, D80	M	Nickel tetracarbonyl (H)
P074	250(4)	S01, T01, D80	CN	Nickel cyanide (H)
P075	250(4)	S01, D80	O	Nicotine and salts (H)
P076	250(4)	S01, T01, T04, D80	G	Nitric oxide (H)
P077	250(4)	S01, T04, D80	O	p-Nitroaniline (H)
P078	250(4)	S01, T01, D80	G	Nitrogen dioxide (H)
P081	250(4)	S01, T04, D80	R	Nitroglycerine (R)
P082	250(4)	S01, D80	O	Dimethylnitrosamine (H)
P084	250(4)	S01, D80	O	N-Nitrosomethylvinylamine (H)
P085	250(4)	S01, D80	O	Schradan (H)
P087	250(4)	S01, D80	M	Osmium tetroxide (H)
P088	250(4)	S01, D80	O	Endothall (H)
P089	250(4)	S01, D80	O	Parathion (H)
P092	250(4)	S01, D80	M	Phenyulmecuric acetate (H)
P093	250(4)	S01, D80	O	N-Phenylthiourea (H)
P094	250(4)	S01, D80	O	Phorate (H)
P095	250(4)	S01, D80	O	Phosgene (H)
P096	250(4)	S01, T04, D80	G	Phosphine (H)
P097	250(4)	S01, D80	O	Famphur (H)
P098	250(4)	S01, T01, D80	CN	Potassium cyanide (H)
P099	250(4)	S01, T01, D80	CN	Potassium silver cyanide (H)
P101	250(4)	S01, D80	CN	Acrylonitrile (H)
P102	250(4)	S01, D80	O	Propargyl alcohol (H)
P103	250(4)	S01, D80	M	Selenourea (H)
P104	250(4)	S01, T01, D80	CN	Silver cyanide (H)
P105	250(4)	S01, D80	O	Sodium azide (H)
P106	250(4)	S01, T01, D80	CN	Sodium cyanide (H)
P107	250(4)	S01, T04, D80	S	Strontium sulfide (H)
P108	250(4)	S01, D80	O	Strychnidin-10-one, and salts (H)
P109	250(4)	S01, D80	O	Sulfotepp (H)
P110	250(4)	S01, D80	O	Tetraethyl lead (H)
P111	250(4)	S01, D80	O	Tetraethyl pyrophosphate(H)
P112	250(4)	S01, T04, D80	R	Tetranitromethane (R)
P113	250(4)	S01, D80	M	Thallic oxide (H)
P114	250(4)	S01, D80	M	Thallium selenite (H)
P115	250(4)	S01, D80	M	Thallium sulfate (H)
P116	250(4)	S01, D80	O	Thiosemicarbazide (H)
P118	250(4)	S01, D80	O	Trichloromethanethiol (H)
P119	250(4)	S01, D80	A	Vanadic acid, ammonium salt (H)
P120	250(4)	S01, D80	M	Vanadium pentoxide (H)
P121	250(4)	S01, T01, D80	CN	Zinc cyanide (H)
P122	250(4)	S01, T04, D80	R	Zinc phosphide (R, T)
P123	250(4)	S01, D80	O	Toxaphene (H)

REPRESENTATIVE WASTE INVENTORY AND ANALYSES (Continued)

EPA Hazardous Waste Number	Estimated Annual Quantity of Waste (lb)	Process/Disposal Codes (1)	Waste Type for Segregation (2)	Waste Materials (3)
U001	250(4)	S01, D80	O	Acetaldehyde (I)
U002	1000	S01, D80	O	Acetone (I)
U003	250(4)	S01, D80	O	Acetonitrile (I, T)
U004	250(4)	S01, D80	O	Acetophenone (T)
U005	250(4)	S01, D80	O	2-Acetylaminofluorene (T)
U006	250(4)	S01, T04, D80	R	Acetyl chloride (C, R, T)
U007	250(4)	S01, D80	O	Acrylamide (T)
U008	250(4)	S01, T04, D80	A	Acrylic acid (I)
U009	250(4)	S01, D80	O	Acrylonitrile (T)
U010	250(4)	S01, D80	O	Mytomycin-C (T)
U011	250(4)	S01, D80	Q	Amitrole (T)
U012	250(4)	S01, D80	O	Aniline (I, T)
U014	250(4)	S01, D80	O	Auramine (T)
U015	250(4)	S01, D80	O	Azaserine (T)
U016	250(4)	S01, D80	O	3,4-Benzacridine (T)
U017	250(4)	S01, D80	O	Benzal chloride (T)
U018	250(4)	S01, D80	O	1,2-Benzanthracene (T)
U019	250(4)	S01, D80	O	Benzene (I, T)
U020	250(4)	S01, T04, D80	R	Benzenesulfonyl chloride (C, R)
U021	250(4)	S01, D80	O	Benzidine (T)
U022	250(4)	S01, D80	O	3,4-Benzopyrene (T)
U023	250(4)	S01, T04, D80	R	Benzotrichloride (C, R, T)
U024	250(4)	S01, D80	O	Bis(2-chloroethoxy) methane (T)
U025	250(4)	S01, D80	O	Dichloroethyl ether (T)
U026	250(4)	S01, D80	O	Chlornaphazine (T)
U027	250(4)	S01, D80	O	2,2 Oxybis-2-chloropropane (T)
U028	250(4)	S01, D80	O	Bis(2-ethylhexyl) phthalate (T)
U029	250(4)	S01, D80	G	Methyl bromide (T)
U030	250(4)	S01, D80	O	4-Bromophenyl phenyl ether (T)
U031	250(4)	S01, D80	O	n-Butyl alcohol (I)
U032	250(4)	S01, T01, D80	M	Calcium chromate (T)
U033	250(4)	S01, T04, D80	G	Carbon oxyfluoride (R, T)
U034	250(4)	S01, D80	O	Chloral (T)
U035	250(4)	S01, D80	O	Chlorambucil (T)
U036	250(4)	S01, D80	O	Chlordane (T)
U037	250(4)	S01, D80	O	Chlorobenzene (T)
U038	250(4)	S01, D80	O	Chlorobenzilate (T)
U039	250(4)	S01, D80	O	4-chloro-m-cresol (T)
U041	250(4)	S01, D80	O	Epichlorohydrin (T)
U042	250(4)	S01, T04, D80	O	Chloroethyl vinyl ether (T)
U043	250(4)	S01, T04, D80	G	Chloroethene (T)
U044	1000	S01, D80	O	Chloroform (T)
U045	250(4)	S01, T04, D80	G	Methyl chloride (I, T)
U046	250(4)	S01, D80	O	Chloromethoxymethane (T)
U047	250(4)	S01, D80	O	β-Chloronaphthalene (T)
U048	250(4)	S01, D80	O	o-Chlorophenol (T)
U049	250(4)	S01, D80	O	4-Chloro-o-toluidine, hydrochloride (T)
U050	250(4)	S01, D80	O	Chrysene (T)
U051	250(4)	S01, D80	O	Creosote (T)
U052	250(4)	S01, D80	O	Cresols (T)
U053	250(4)	S01, D80	O	Crotonaldehyde (T)
U055	250(4)	S01, D80	O	Cumene (I)
U056	250(4)	S01, D80	O	Cyclohexane (I)

REPRESENTATIVE WASTE INVENTORY AND ANALYSES (Continued)

EPA Hazardous Waste Number	Estimated Annual Quantity of Waste (lb)	Process/Disposal Codes (1)	Waste Type for Segregation (2)	Waste Materials (3)
U057	250(4)	S01, D80	O	Cyclohexanone (I)
U058	250(4)	S01, D80	O	Cyclophosphamide (T)
U059	250(4)	S01, D80	O	Daunomycin (T)
U060	250(4)	S01, D80	O	DDD (T)
U061	250(4)	S01, D80	O	DDT (T)
U062	250(4)	S01, D80	O	Diallate (T)
U063	250(4)	S01, D80	O	Dibenzanthracene (T)
U064	250(4)	S01, D80	O	Dibenzopyrene (T)
U066	250(4)	S01, D80	O	1,2-Dibromo-3-chloropropane (T)
U067	250(4)	S01, D80	O	Ethylene dibromide (T)
U068	250(4)	S01, D80	O	Methylene bromide (T)
U069	250(4)	S01, D80	O	Dibutyl phthalate (T)
U070	250(4)	S01, D80	O	o-Dichlorobenzene (T)
U071	250(4)	S01, D80	O	m-Dichlorobenzene (T)
U072	250(4)	S01, D80	O	p-Dichlorobenzene (T)
U073	250(4)	S01, D80	O	3,3-Dichlorobenzidine (T)
U074	250(4)	S01, D80	O	1,4-Dichloro-2-butene (T, I)
U075	250(4)	S01, T04, D80	G	Dichlorodifluoromethane (T)
U076	250(4)	S01, D80	O	1,1-Dichloroethane (T)
U077	250(4)	S01, D80	O	Ethylene dichloride (T)
U078	250(4)	S01, D80	O	1,1-Dichloroethylene (T)
U079	250(4)	S01, D80	O	1,2-Dichloroethylene (T)
U080	3000	S01, D80	O	Dichloromethane (T)
U081	250(4)	S01, D80	O	2,4-Dichlorophenol (T)
U082	250(4)	S01, D80	O	2,6-Dichlorophenol (T)
U083	250(4)	S01, D80	O	1,2-Dichloropropane (T)
U084	250(4)	S01, D80	O	1,3-Dichloropropene (T)
U085	250(4)	S01, D80	O	1,2:3,4-Diepoxybutane (I, T)
U086	250(4)	S01, D80	O	N,N-Diethylhydrazine (T)
U087	250(4)	S01, D80	O	O,O-Diethyl-s-methyl-dithiophosphate (T)
U088	250(4)	S01, D80	O	Diethyl phthalate (T)
U089	250(4)	S01, D80	O	Diethylstilbestrol (T)
U090	250(4)	S01, D80	O	Dihydrosafrole (T)
U091	250(4)	S01, D80	O	3,3-Dimethoxybenzidine (T)
U092	250(4)	S01, T04, D80	O	Dimethylamine (I)
U093	250(4)	S01, D80	O	Dimethylaminoazobenzene (T)
U094	250(4)	S01, D80	O	7,12-Dimethylbenzanthracene (T)
U095	250(4)	S01, D80	O	3,3-Dimethylbenzidine (T)
U096	250(4)	S01, T04, D80	R	γ-γ-Dimethylbenzylhydroperoxide (R)
U097	250(4)	S01, D80	O	Dimethylcarbamoyl chloride (T)
U098	250(4)	S01, D80	O	1,1-Dimethylhydrazine (T)
U099	250(4)	S01, D80	O	1,2-Dimethylhydrazine (T)
U101	250(4)	S01, D80	O	2,4-Dimethylphenol (T)
U102	250(4)	S01, D80	O	Dimethyl phthalate (T)
U103	250(4)	S01, D80	O	Dimethyl sulfate (T)
U105	250(4)	S01, D80	O	2,4-Dinitrotoluene (T)
U106	250(4)	S01, D80	O	2,6-Dinitrotoluene (T)
U107	250(4)	S01, D80	O	Di-n-octyl phthalate (T)
U108	250(4)	S01, T04, D80	O	1,4-Dioxane (T)
U109	250(4)	S01, D80	O	1,2-Diphenylhydrazine (T)
U110	250(4)	S01, D80	O	Dipropylamine (I)
U111	250(4)	S01, D80	O	Di-n-propylnitrosamine (T)
U112	250(4)	S01, T04, D80	O	Ethyl acetate (I)

REPRESENTATIVE WASTE INVENTORY AND ANALYSES (Continued)

EPA Hazardous Waste Number	Estimated Annual Quantity of Waste (lb)	Process/Disposal Codes (1)	Waste Type for Segregation (2)	Waste Materials (3)
U113	250(4)	S01, T04, D80	O	Ethyl acrylate (I)
U114	250(4)	S01, D80	O	1,2 Ethanediylbiscarbamodithioc acid (T)
U115	250(4)	S01, T04, D80	O	Ethylene oxide (I, T)
U116	250(4)	S01, D80	O	Ethylene thiourea (T)
U117	250(4)	S01, T04, D80	O	Ethyl ether (I)
U118	250(4)	S01, T04, D80	O	Ethyl methacrylate (T)
U119	250(4)	S01, D80	O	Ethyl methanesulfonate (T)
U120	250(4)	S01, D80	O	Benzo(j,k)fluorene (T)
U121	250(4)	S01, D80	O	Trichlorofluoromethane (T)
U122	250(4)	S01, D80	G	Formaldehyde (T)
U123	250(4)	S01, D80	A	Formic acid (C, T)
U124	250(4)	S01, D80	O	Furan (I)
U125	250(4)	S01, D80	O	Furfural (I)
U126	250(4)	S01, D80	O	Glycidylaldehyde (T)
U127	250(4)	S01, D80	O	Hexachlorobenzene (T)
U128	250(4)	S01, D80	O	Hexachlorobutadiene (T)
U129	250(4)	S01, D80	O	Hexachlorocyclohexane (T)
U130	250(4)	S01, D80	O	Hexachloropentadiene (T)
U131	250(4)	S01, D80	O	Hexachloroethane (T)
U132	250(4)	S01, D80	O	Hexachlorophene (T)
U133	250(4)	S01, T04, D80	R	Hydrazine (R, T)
U134	250(4)	S01, T01, T04, D80	G	Hydrogen fluoride (C, T)
U135	250(4)	S01, T04, D80	G	Hydrogen sulfide (T)
U136	250(4)	S01, D80	A	Cacodylic acid (T)
U137	250(4)	S01, D80	O	Indeno (1,2,3) pyrene (T)
U138	250(4)	S01, D80	O	Methyl iodide (T)
U139	250(4)	S01, D80	O	Iron dextran (T)
U140	250(4)	S01, D80	O	Isobutyl alcohol (I, T)
U141	250(4)	S01, D80	O	Isosafrole (T)
U142	250(4)	S01, D80	O	Kepone (T)
U143	250(4)	S01, D80	O	Lasiocarpine (T)
U144	250(4)	S01, D80	M	Lead acetate (T)
U145	250(4)	S01, D80	M	Lead phosphate (T)
U146	250(4)	S01, D80	M	Lead subacetate (T)
U147	250(4)	S01, D80	O	Maleic anhydride (T)
U148	250(4)	S01, D80	O	Maleic hydrazide (T)
U149	250(4)	S01, D80	O	Malononitrile (T)
U150	250(4)	S01, D80	O	Melphalan (T)
U151	250(4)	S01, D80	M	Mercury (T)
U152	250(4)	S01, D80	O	Methacrylonitrile (I, T)
U153	250(4)	S01, D80	G	Methanethiol (I, T)
U154	250(4)	S01, D80	O	Methanol (I)
U155	250(4)	S01, D80	O	Methapyrilene (T)
U156	250(4)	S01, D80	O	Methyl chlorocarbonate (I, T)
U157	1000	S01, D80	O	3-Methylcholanthrene (T)
U158	250(4)	S01, D80	O	4,4-Methylenebis[2-chloroaniline] (T)
U159	1000	S01, D80	O	Methyl ethyl ketone (I, T)
U160	250(4)	S01, T04, D80	R	Methyl ethyl ketone peroxide (R, T)
U161	250(4)	S01, D80	O	Methyl isobutyl ketone (I)
U162	250(4)	S01, D80	O	Methyl methacrylate (I, T)
U163	250(4)	S01, D80	O	N-Methyl-N-nitro-nitrosoguanidine (T)
U164	250(4)	S01, D80	O	Methylthiouracil (T)

REPRESENTATIVE WASTE INVENTORY AND ANALYSES (Continued)

EPA Hazardous Waste Number	Estimated Annual Quantity of Waste (lb)	Process/Disposal Codes (1)	Waste Type for Segregation (2)	Waste Materials (3)
U165	250(4)	S01, D80	O	Naphthalene (T)
U166	250(4)	S01, D80	O	1,4-Naphthalenedione (T)
U167	250(4)	S01, D80	O	1-Naphthylamine (T)
U168	250(4)	S01, D80	O	2-Naphthylamine (T)
U169	250(4)	S01, D80	O	Nitrobenzene (I, T)
U170	250(4)	S01, D80	O	p-Nitrophenol (T)
U171	250(4)	S01, T04, D80	O	2-Nitropropane (I)
U172	250(4)	S01, D80	O	N-Nitrosodi-n-butylamine (T)
U173	250(4)	S01, D80	O	N-Nitrosodiethanolamine (T)
U174	250(4)	S01, D80	O	N-Nitrosodiethylamine (T)
U176	250(4)	S01, D80	O	N-Nitroso-N-ethylurea (T)
U177	250(4)	S01, D80	O	N-Nitroso-N-methylurea (T)
U178	250(4)	S01, D80	O	N-Nitroso-N-methylurethane (T)
U179	250(4)	S01, D80	O	N-Nitrosopiperidine (T)
U180	250(4)	S01, D80	O	N-Nitrosopyrrolidine (T)
U181	250(4)	S01, D80	O	2-Methyl-5-nitrobenzenamine (T)
U182	250(4)	S01, D80	O	Paraldehyde (T)
U183	250(4)	S01, D80	O	Pentachlorobenzene (T)
U184	250(4)	S01, D80	O	Pentachloroethane (T)
U185	250(4)	S01, D80	O	Pentachloronitrobenzene (T)
U186	250(4)	S01, D80	O	1,3-Pentadiene (I)
U187	250(4)	S01, D80	O	Phenacetin (T)
U188	250(4)	S01, D80	O	Phenol (T)
U189	250(4)	S01, T04, D80	R	Phosphorous sulfide (R)
U190	250(4)	S01, D80	O	Phthalic anhydride (T)
U191	250(4)	S01, D80	O	2-Picoline (T)
U192	250(4)	S01, D80	O	Pronamide (T)
U193	250(4)	S01, D80	O	1,3-Propane sulfone (T)
U194	250(4)	S01, D80	O	n-Propylamine (I, T)
U196	250(4)	S01, D80	O	Pyridine (T)
U197	250(4)	S01, D80	O	p-Benzoquinone (T)
U200	250(4)	S01, D80	O	Reserpine (T)
U201	250(4)	S01, D80	O	Resorcinol (T)
U202	250(4)	S01, D80	O	Saccharin and salts (T)
U203	250(4)	S01, D80	O	Safrole (T)
U204	250(4)	S01, D80	M	Selenious acid (T)
U205	250(4)	S01, T04, D80	R	Selenium disulfide (R, T)
U206	250(4)	S01, D80	O	Streptozotocin (T)
U207	250(4)	S01, D80	O	1,2,4,5-Tetrachlorobenzne (T)
U208	250(4)	S01, D80	O	1,1,1,2-Tetrachloroethane (T)
U209	250(4)	S01, D80	O	1,1,2,2-Tetrachloroethane (T)
U210	500(4)	S01, D80	O	Tetrachloroethylene (T)
U211	250(4)	S01, D80	O	Carbon tetrachloride (T)
U212	250(4)	S01, D80	O	2,3,4,6-Tetrachlorophenol (T)
U213	250(4)	S01, T04, D80	O	Tetrahydrofuran (I)
U214	250(4)	S01, D80	M	Thallium acetate (T)
U215	250(4)	S01, D80	M	Thallium carbonate (T)
U216	250(4)	S01, D80	M	Thallium chloride (T)
U217	250(4)	S01, T04, D80	M	Thallium nitrate (T)
U218	250(4)	S01, D80	O	Thioacetamide (T)
U219	250(4)	S01, D80	O	Thiourea (T)
U220	1000	S01, D80	O	Toluene (T)

REPRESENTATIVE WASTE INVENTORY AND ANALYSES (Continued)

EPA Hazardous Waste Number	Estimated Annual Quantity of Waste (lb)	Process/Disposal Codes (1)	Waste Type for Segregation (2)	Waste Materials (3)
U221	250(4)	S01, D80	O	Toluenediamine (T)
U222	250(4)	S01, D80	O	o-Toluidine hydrochloride (T)
U223	1000	S01, D80	R	Toluene diisocyanate (R, T)
U225	250(4)	S01, D80	O	Bromoform (T)
U226	1500	S01, D80	O	1,1,1-Trichloroethane (T)
U227	250(4)	S01, D80	O	1,1,2-Trichlorethane (T)
U228	2000	S01, D80	O	Trichloroethylene (T)
U230	250(4)	S01, D80	O	2,4,5-Trichlorophenol (T)
U231	250(4)	S01, D80	O	2,4,6-Trichlorophenol (T)
U232	250(4)	S01, D80	O	2,4,5-Trichlorophenoxyacetic acid (T)
U233	250(4)	S01, D80	O	Silvex (T)
U234	250(4)	S01, T04, D80	R	syn-Trinitrobenzene (R, T)
U235	250(4)	S01, D80	O	Tris (2,3-dibromopropyl) phosphate (T)
U236	250(4)	S01, D80	O	Trypan blue (T)
U237	250(4)	S01, D80	O	Uracil mustard (T)
U238	250(4)	S01, D80	O	Ethyl carbamate (T)
U239	1000	S01, D80	O	Xylene (I)
U240	250(4)	S01, D80	O	2,4-D, salts and esters (T)
U242	250(4)	S01, D80	O	Pentachlorophenol (T)
U243	250(4)	S01, D80	O	Hexachloropropene (T)
U244	250(4)	S01, D80	O	Thiram (T)
U246	250(4)	S01, D80	M	Bromine cyanide (T)
U247	250(4)	S01, D80	O	Methoxychlor (T)

(1) S01 - Temporary Storage; D80 - Landfill Disposal; T01 - Tank Treatment; T04 - Thermal Treatment

(2) O - Organic Solvent Waste; R - Reactive Metals and Compounds; M - Non-reactive Metals, Salts and Compounds; A - Acids; CN - Cyanide Waste; G - Gases

(3) Potential hazardous property of a waste material cited is indicated as follows: (T) toxic; (I) ignitable; (R) reactive; (C) corrosive; (H) acutely hazardous

(4) Waste is generated in lab pack quantities only.

APPENDIX H
SAMPLE WASTE DISPOSAL RECORDS

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

CHEMICAL WASTE DISPOSAL REQUEST

Disposal Form Number(s)
This information is to be filled in by H-7 personnel.

Requested by	Telephone number	Group	Date

Location: Tech Area, building, area/wing, room number.

Number of Containers	Volume of Containers	Chemical Name	Solid(S) Liquid(L) Gas(G)	Hazards	Removed

Reviewed for disposal by

Other useful information

HS Form Number 10-3A (12/82) *Mail this form to Waste Management (H-7), Mail Stop E516*

FORM H-1

FORM H-2

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

LOS ALAMOS HAZARDOUS CHEMICAL WASTE DISPOSAL RECORD

1 Form Number	L = Lab Pack S = Secondary N = Other
H 8	

2 Date
M M D D Y Y

PRIMARY WASTE

3 Origin Of Waste					4 HSE-7	5 RCRA	6 WASTE	7 Storage
Group	TA	Bldg.	Wing	Room	Code	Code	Code	Code

8 Waste Description

9 Numbers Of Waste Packages					
Plastic	Card Board	Drums		Wooden Crates	
Bags	Boxes	No.	Gal.	No.	Volume - ft. 3

10 Gross Volume	Units (L = Liter, G = Gallon, M = Meter 3, F = Feet3)

11 Gross Weight	Units (K = Kilogram, P = Pound, T = Ton)

12 Treatment Code(s)	13 Disposal/Treatment Performed By	14 Disposal Code	15 Disposal Date
			M M D D Y Y

16 Disposal Location					
TA	Shaft	Pit	Post(s)	Layer	Pond

HSE-7 Representative(s)

SECONDARY WASTE

17 HSE-7 Code	18 RCRA Code	19 Waste Code	20 Waste Description

21 Numbers Of Waste Packages			
Drums			
No.	Gal.	No.	Gal.

22 Gross Volume	Units (L = Liter, G = Gallon, M = Meter3, F = Feet3)

23 Gross Weight	Units (K = Kilogram, P = Pound, T = Ton)

24 Treatment Code(s)	25 Disposal/Treatment Performed By	26 Disposal Code	27 Disposal Date
			M M D D Y Y

HSE-7 Representative(s)

28 Disposal Location					
TA	Shaft	Pit	Post(s)	Layer	Pond

HS Form Number 10-38 (3/84)

FORM H-3

CHEMICALS IN LABPACK DRUM

ANALYSES PERFORMED

Tested For	Original Concentration	Final Concentration *(After Treatment)*

FORM H-4

LABORATORY ANALYSES

SAMPLE SUBMITTED BY			DATE:		
ORIGIN OF SAMPLE (S)					
GENERAL DESCRIPTION RANGE OF ACTIVITY					
DATE SAMPLE COLLECTED					
Test/Analysis	Result/Conc	By (Initials)	Test/Analysis	Result/Conc	By (Initials)

REMARKS:

APPROVED: _____ DATE: _____
Chief Chemist

Lab Copy
H7-LAB-35

LABORATORY ANALYSES

SAMPLE SUBMITTED BY			DATE:		
ORIGIN OF SAMPLE (S)					
GENERAL DESCRIPTION RANGE OF ACTIVITY					
DATE SAMPLE COLLECTED					
Test/Analysis	Result/Conc	By (Initials)	Test/Analysis	Result/Conc	By (Initials)

REMARKS:

APPROVED: _____ DATE: _____
Chief Chemist

Lab Copy
H7-LAB-35

FORM H-5

LABORATORY ANALYSES

SAMPLE SUBMITTED BY:							DATE:		
ORIGIN OF SAMPLE(S)									
DATE SAMPLED		DATE BEGUN	METHOD	ANALYZED BY	DESCRIPTION		DATE BEGUN	METHOD	ANALYZED BY
Test/Analysis	Result/Conc				Test/Analysis	Result/Conc			
REMARKS:									

H7-LAB-35A

APPROVED: _____ DATE: _____

Chief Chemist

Lab Copy

APPENDIX I

DETAILED SPECIFICATIONS AND PLANS FOR TA-50 BATCH TREATMENT SYSTEM

·0089C

CONTRACT NO. DE-AC32-80AL13151

CONSTRUCTION SPECIFICATION
FOR
UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

MODIFICATION SPECIFICATION NO. 3

UPGRADING OF BATCH WASTE TREATMENT SYSTEM

REVISED

May 24, 1983

by

Los Alamos National Laboratory

CONSTRUCTION SPECIFICATION
FOR
UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

MODIFICATION SPECIFICATION NO. 3
UPGRADING OF BATCH WASTE TREATMENT SYSTEM

SUBMITTED _____ DATE 2-24-83
The Ralph M. Parsons Company

RECOMMENDED _____ DATE 2/24/83
Los Alamos National Laboratory

APPROVED _____ DATE 2/24/83
U.S. Department of Energy

REVISION _____ for DATE 5/25/83
Los Alamos National Laboratory
for (Technical Manager)
(Engineering Manager)

I. DESCRIPTION OF WORK

The work consists of furnishing, installing, and constructing a Batch Waste Treatment System, including treatment vessels, heat exchanger, pumps, piping, valves, platforming, floor curbing, partition walls, modifications to existing fume hood, drum and truck loading and unloading stations, power, and instrumentation as indicated on the drawings and in accordance with this Specification.

II. TECHNICAL PROVISIONS

Reference is made to Specifications for Upgrading of Industrial Liquid Waste Treatment Plant, Invitation No. DE-FB32-81AL16099, May 8, 1981, and all Amendments and Changes, and as follows:

1.0 GENERAL REQUIREMENTS

General Requirements shall be in accordance with Division 1.0, except as follows:

a. Par. 1.2 Work to be Performed by Others. Add as follows:

3. Demolition and removal of all existing equipment, furnishings, facilities, and services in Room 24 of Bldg. WM-1 at TA-50 as required to interface with the construction.

b. Par. 1.3.2 Schedule. Delete second sentence and Par. 1.3.2.1, 1.3.2.2, 1.3.2.3, and 1.3.2.4. Add the following: The Contractor shall provide, as a minimum, three weeks written notice to the Contracting Officer prior to commencing work within Room 24 of Bldg. WM-1 at TA-50, to allow for required demolition and removals by the Government.

c. Par. 4.4 Descriptive Submittal List. Delete all Submittal Package Nos. except 10001, 30101, 90601, 150301, 150302, 151101, and 151102.

2.0 NOT USED

3.0 CONCRETE

3.01 Cast-In-Place Concrete

Cast-In-Place Concrete shall be in accordance with Subdivision 3.01.

4.0 NOT USED

5.0 METALS

5.01 Structural Steel and Miscellaneous Metals

Structural Steel and Miscellaneous Metals shall be in accordance with Subdivision 5.01.

6.0 NOT USED

7.0 NOT USED

8.0 DOORS AND WINDOWS

8.01 Metal Doors and Frames

Metal Doors and Frames shall be in accordance with Subdivision 8.01.

8.02 Not Used

8.03 Not Used

8.04 Hardware

Hardware shall be in accordance with Subdivision 8.04.

8.05 Not Used

9.0 FINISHES

9.01 Not Used

9.02 Gypsum Wallboard

Gypsum Wallboard shall be in accordance with Subdivision 9.02.

9.03 thru 9.05 Not Used

9.06 Special Coating

Special Coating shall be in accordance with Subdivision 9.06. All new non-stainless steel surfaces, the north wall of Room 24, and the curbed floor area shall be special coated.

9.07 Not Used

9.08 Not Used

10.0 NOT USED

11.0 NOT USED

12.0 NOT USED

13.0 SPECIAL CONSTRUCTION

13.01 Not Used

13.02 Not Used

13.03 Pressure Vessels

Pressure Vessels shall be in accordance with Subdivision 13.03, except as follows:

a. Par. 2.1.2 Technical Requirements. Add as follows:

Tag No.	Name	Data Sheet
[redacted]		
TK-21	Reactor	13.03-11
TK-22	Blowdown Tank	13.03-12

b. Add Par. 2.7 Kynar Lining, as follows:

Surfaces to be lined shall be free from all sharp corners, edges, and projections, and shall have inside edges of nozzles and corners rounded to a radius of at least 1/8 inch. Kynar (polyvinylidene fluoride) lining shall consist of alternate layers of carbon veil or mat and Kynar dispersion compound, with a final Kynar dispersion seal coat. The lining shall be not less than 0.060 inches thick, and the final seal coat shall be not less than 0.010 inches thick, as determined by visual comparator and/or micrometer reading. The lining shall extend through all nozzles and cover the raised faces of all flanges. The finished lining shall be pinhole free when tested with a dc Spark Tester at 3000 Volts. Test results shall be documented and submitted to the Contracting Officer for approval.

c. Add Data Sheets 13.03-10, 13.01-11, and 13.03-12, as included herein.

13.04 thru 13.12 Not Used

13.13 Heat Exchangers

Heat Exchangers shall be in accordance with Subdivision 13.13 as included herein.

14.0 NOT USED

15.0 MECHANICAL

15.01 Piping

Piping shall be in accordance with Subdivision 15.01, except as follows:

a. Add the following services to Class AD: treated industrial waste, chemical gas, chemical liquid, acid vent, vent.

b. Add the following service to Class ND: chlorine.

c. Add Class NV in accordance with Piping Material Specification included herein.

d. Par. 3.7.4 Color Codes. Add the following identification colors:

Lettered Legend	Identification Band Color	Service Legend Color
Industrial Waste	Yellow	Black
Treated Industrial Waste	Yellow	Black
Chemical Gas	Yellow	Black
Chemical Liquid	Yellow	Black
Acid Waste	Yellow	Black
Acid Vent	Yellow	Black
Vent	Yellow	Black

e. Par. 3.10 Pressure Testing. Add as follows: Piping for compressed air and chemical gas shall be pneumatically tested per ANSI B31.1, Par. 137.4.5, because water is detrimental to these systems. All other piping shall be hydrostatically tested.

f. Add Piping - Specialty Items as included herein.

15.03 thru 15.09 Not Used

15.10 Control Instrumentation

Control Instrumentation shall be in accordance with Subdivision 15.10 except as follows:

a. Delete Par. 2.5 through 2.9.

b. [redacted]

Replace Data Sheet Nos. identified in sub-paragraph (2) with 43, 44.

c. Delete Par. 2.11 through 2.15.

d. Par. 2.16 Pressure Control Valves. Delete Tag Nos. and Data Sheet Nos. shown. Add as follows:

Tag No.	Data Sheet No.
PCV-226	45

e. Par 2.17 Pressure Gages. Delete Tag Nos. and Data Sheet Nos. shown. Add as follows:

Tag No.	Data Sheet No.
PI-203	46
PI-225	46

f. Par. 2.18 Safety and Relief Valves. Delete Tag Nos. and Data Sheet Nos. shown. Add as follows:

Tag No.	Data Sheet No.
PSV-205	47

g. Par. 2.19 Temperature Instruments. Delete Tag Nos. and Data Sheet Nos. shown. Add as follows:

Tag No.	Data Sheet No.
TE/TT-198A	48, 49

The flanged thermowell shall be Hastelloy rather than stainless steel. The Contractor shall coordinate the length of the element and well with the tank and agitator construction to assure no interference.

h. Par. 2.20 Bi-Metal Dial Thermometers. Delete Tag Nos. and Data Sheet Nos. shown. Add as follows:

Tag No.	Data Sheet No.
TI-263	50

i. Par. 2.21 Solenoid Valves. Delete Tag Nos. and Data Sheet Nos. shown. Add as follows:

Tag No.	Data Sheet No.
ZZ-222	51
ZZ-223	51

j. Par. 2.22. Revise title and first paragraph to read "Level and Temperature Indicator Receivers". Delete Tag Nos. and Data Sheet Nos. shown. Add as follows:

Tag No.	Data Sheet No.
LI-198	52
TI-198A	52

k. Add as follows:

2.23 RUPTURE DISCS

The Contractor shall provide rupture discs as specified herein and on the following Data Sheets:

Tag No.	Data Sheet No.
RD-227	53

Rupture discs shall have seals, discs, liners, covers, and retaining rings bolted together as one unit, and shall include the required ASME Code data on a permanently attached tab.

2.24 pH AND ORP ANALYZERS

The Contractor shall provide pH and ORP (oxidation reduction potential) analyzers as specified herein and on the following Data Sheets:

Tag No.	Data Sheet No.
AE-199A (pH)	54
AE-199B (ORP)	54
AIT-199A (pH)	54
AIT-199B (ORP)	54

The pH and ORP analyzers shall consist of the following components:

(1) Electrode station with pre-amplifier (transmitter) and probe.

(2) Monitor (microprocessor) and local indicator readout.

(3) Interconnecting cable and mounting hardware as specified on the Data Sheet.

The monitor and local indicator readout, and the electrode station with pre-amplifier, shall be housed in a NEMA 4 enclosure.

The electrical input power source to the AIT unit shall be 120V, 60 Hz, single phase. The enclosure shall have provisions and hardware for mounting on a flat plate.

Interconnecting cable shall be 20 feet long with 3/4 inch NPT connections. The cable inner and outer jacket insulation shall be non-PVC and flame retardant.

The pH analyzer shall be capable of display from 0.00 to 14.00 by four digit direct readout. Sensing range shall be 4.00 to 10.00 pH and adjustable to a minimum span of -0.5 to 2.0 units with an isolated output range of 4 to 20 madc. The analyzer shall have an accuracy and repeatability of plus or minus 0.5 percent of full scale.

The ORP analyzer shall be capable of display from -1400 to +1400 mv by four digit direct readout, with a minimum span of 200 mv and an isolated 4 to 20 madc output. The analyzer shall have an accuracy and repeatability of plus or minus 0.5 percent of full scale.

The analyzers and accessories shall be prepared for delivery in accordance with ANSI C83.66. Hardware and wiring shall be in accordance with the National Electric Code ANSI C1.

2.25 TIMING RELAYS

The Contractor shall provide timing relays in accordance with the following Data Sheet:

Tag No.	Data Sheet No.
KC-224	55
KC-278	56

2.26 SIGHT FLOW INDICATORS

The Contractor shall provide sight flow indicators in accordance with the following Data Sheet:

Tag No.	Data Sheet No.
FI-272	54
FI-273	54
FI-274	54

2.27 LEVEL TRANSMITTERS

The Contractor shall provide level transmitters as specified herein and on the following Data Sheets:

Tag No.	Data Sheet No.
LE/LT-198	58

The transmitter shall be remote mounted from the probe. The probe shall be a Kynar-coated capacitance type. The transmitter shall be a blind device installed in a NEMA 7 explosion-proof case with a 4-20 madc output. The probe length shall be approximately 66 inches. The Contractor shall coordinate the length of the probe with the tank and agitator construction to assure no interference.

2.28 RESTRICTING ORIFICES

The Contractor shall provide restricting orifices in accordance with the following Data Sheet.

Tag No.	Data Sheet No.
RO-199	59

1. Add Data Sheets 15.10-1, sheets 43 through 59, as included herein.

15.11 Agitators

Agitators shall be in accordance with Subdivision 15.11, except as follows:

a. Par. 2.1 Description. Add as follows:

Tag No.	Name	Data Sheet
[redacted]		
M-21	Reactor Agitator	15.11-05 1 of 2
M-21	Induction Motor	15.11-05 2 of 2

b. Add Data Sheets 15.11-04, sheets 1 and 2, and 15.11-05, sheets 1 and 2, as included herein.

15.12 Diaphragm Pump

Diaphragm Pumps shall be in accordance with Subdivision 15.12 as included herein.

16.0 ELECTRICAL

16.01 Interior Electrical Work

Interior Electrical Work shall be in accordance with Subdivision 16.01.

16.02 Not Used

III. DRAWINGS

The Contract Drawings are:

Drawing No.	Title
LA-RV-A-16	Reflected Ceiling Plan and Partial Floor Plans and Details
LA-RV-S-22	Upgrading of Batch Waste Treatment System Platform Framing Plan and Details
LA-RV-MP-9, Rev. 1	Piping and Instrument Diagram, Batch Waste Treatment System
LA-RV-P-19, Rev. 1	Batch Waste Treatment Piping Plan and Sections

Drawing No.	Title
LA-RV-E-27, Rev. 1	Batch Waste Treatment and Exhaust Air Filtration Plans and Diagrams
LA-RV-I-8	Instrument Symbols and General Notes
LA-RV-I-9	Instrument Installation Details
LA-RV-I-10	Instrument Installation Details
LA-RV-I-13, Rev. 1	Instrument Location Plan, Batch Waste Treatment System

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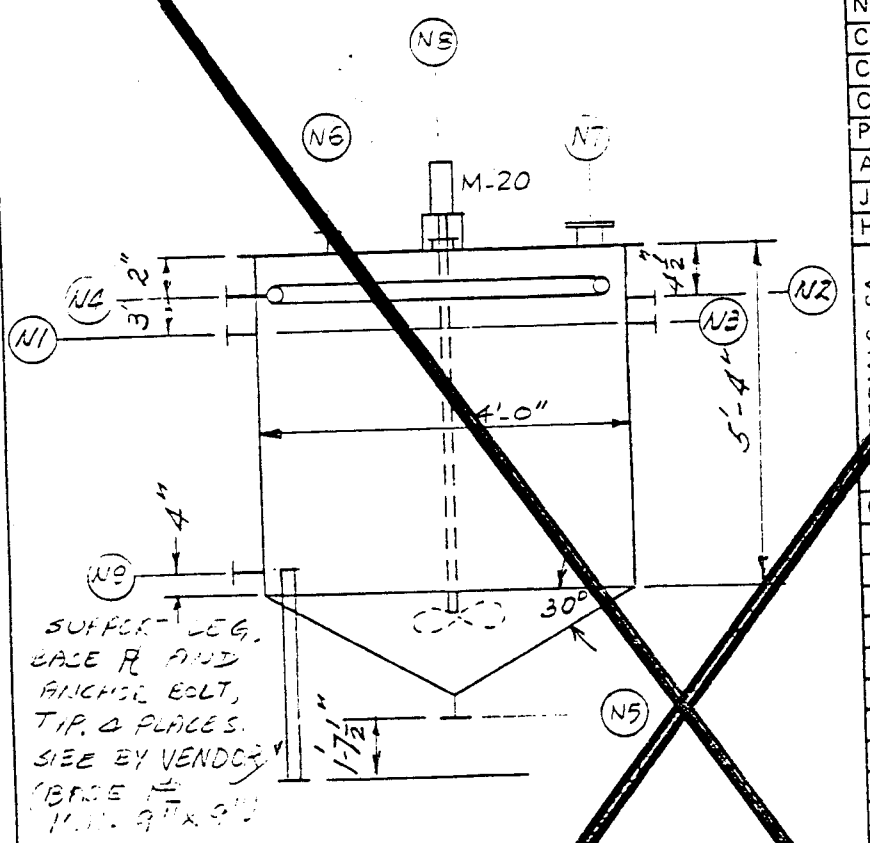
	C	2/16/83	[illegible]	[illegible]		INITIAL ISSUE

REVISIONS



NOTES:

1. FLANGES & NOZZLE NECKS ON TOP TO BE 304L S.S.
   TOP TO BE 304L S.S., FLAT, BOLTED, W/ TOP MOUNTED MIXER.
2. NOZZLE SIZES SHOWN ARE MINIMUM REQ'D FOR PROCESS. ACTUAL SIZES SHALL BE DETERMINED BY VENDOR FOR ADEQUATE LINING.
3. SPRAY HEADER: 1" SCH 40 304L S.S. PIPE W/ 1/8" Φ HOLES 4" APART @ 45° IN THE LOWER QUADRANT FACING THE WALL.
4. BAFFLES : AS DETERMINED BY AGITATOR VENDOR.

Opr Temp 200 °F	Press ATM psig		
Design Temp 225 °F	Press 15 psig		
Ext Temp AMB °F	Pre ATM psig		
New Ltd by BY CONTR	BY CONTR psig		
Crsn Allow S —	Hds ⅛"	N —	
Code Stamp YES			
Code ASME SEC VIII, DIV			
PWHT NON-S	X-Rayed NE	ET-E	
Allow Stress @ Desi Temp BY CONTR			
Joint Eff Shell 85%	Hds 85%		
Hydrotest (Hor 25.5 psig			
MATERIALS: SA			
Shell SA 285-C W/ KYNAR LINING			
Head SA-312-TP 304L			
Support SA-36			
Trays —			
Bolts SA-193-B7	Nuts SA-194-2H		
Flanges C.S. KYNAR LINED (NOTE)			
Nozzle-Necks C.S. KYNAR LINED (NOTE)			
Gaskets PER PIPING SPEC.			
Capacity 500 GAL.			
Weights BY CONTR.	Fab		
Trays	Empty		
Opr	Test		
Paint YES, PER SPEC			
Insulation YES, PERSONNEL PROTECTION			
Fireproofing NONE			
Access Supplied & Inst by Fabricator: YES NOTE 1			
Vessel Davit NO	Mark No. —		
Ladder & Platform Clips — NO			
Pipe Support & Guide Clips NO			
Insulation Supports NO			
Fireproofing Supports NO			
Openings NOTE (2)			

Item	No.	Size	Service
N1	1	1½"	IND. WASTE INLET
N2	1	1"	WATER INLET
N3	1	1½"	CHEM. LIQUID INLET
N4	1	1"	SPRAY WATER
N5		3"	PUMP SUCTION
N6	1	2"	VENT
N7	1	10"	SOLID CHEMICAL [illegible]
N8	1	[illegible]	MIXER MOUNT
N9	2	[illegible]	LEVEL ELEM [illegible]

ASA Rating & Facing NE = [illegible] K/[illegible]
[illegible]
NOTED

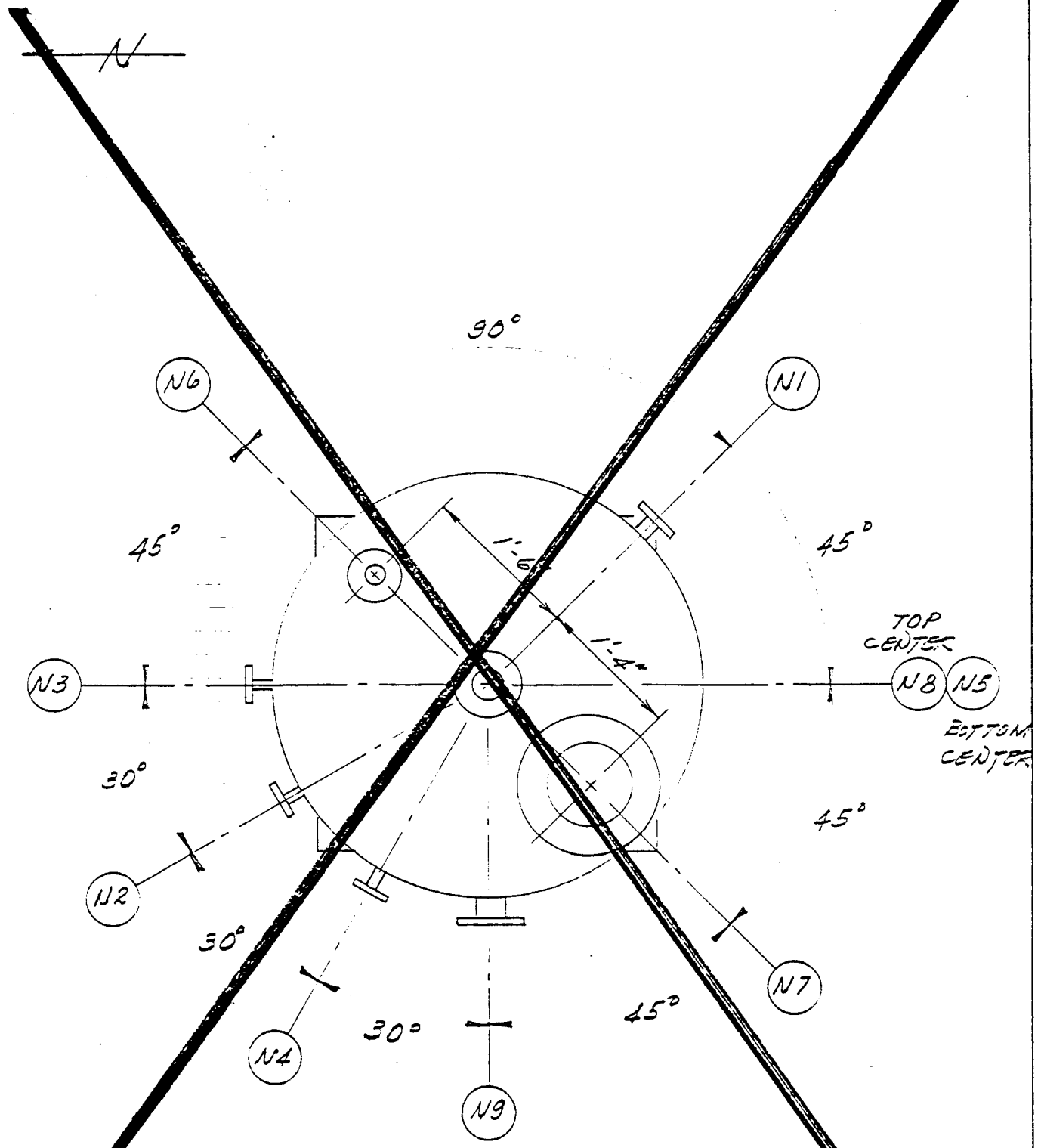
TA-50

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	VESSEL (PLAIN) WITH NOTES TK-20 RECEIVING/SETTLING CHEM MIXER TANK	SHEET 1 OF 2	JOB NUMBER 60-[illegible]
		NUMBER 13.03-10	REV C

DC-

ENG-VS-205

ENG-GE-3



TK-20

RECEIVING / SETTLING

CHEM. MAKE-UP TANK

TA-50

PMP THE RALPH M. PARSONS COMPANY	SHEET 2 OF 2	JOB NUMBER 4089-0001	DOCUMENT NO. 13.03-10	REV. 0

Mark Board Certificate of Compliance

I-14

REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION
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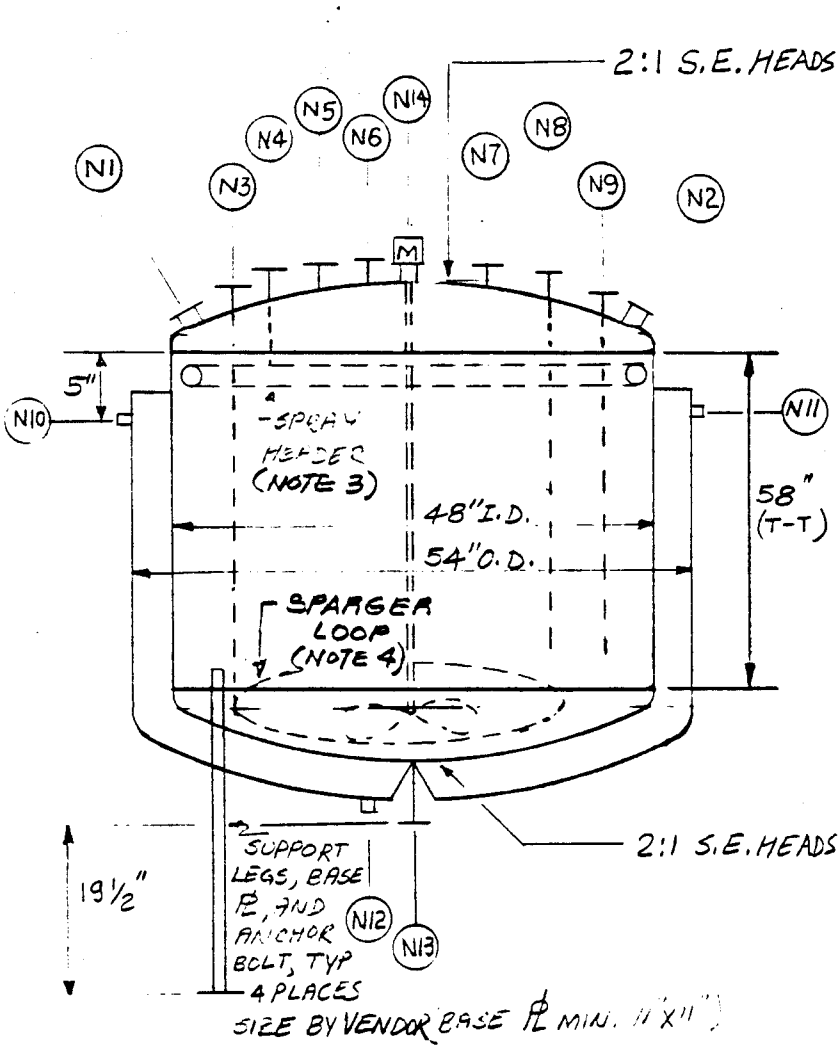

Opr Temp	250 °F	Press	ATM psig
Design Temp	275 °F	Press	50 psig
Ext Temp (NOTE 1)	°F	Press (NOTE 2)	psig
New Ltd by	BY CONTR.	@	BY CONTR. psig
Crsn Allow S	—	Hds	— N
Code Stamp	YES		
Code	ASME SEC VIII, DIV. 1		
PWHT	NONE	X-Rayed	YES, RT-3
Allow Stress @ Design Temp	BY CONTR.		
Joint Eff Shell	85%	Hds	85%
Hydrotest (Horiz)	75.		psig

MATERIALS: SA	
Shell	SA-285 C W/ KYNAR LINING
Heads	SA-285C W/ KYNAR LINING
Support	SA-36
Trays	—
Bolts	SA-193-B7 Nuts SA-194-2H
Flanges	C.S. W/ KYNAR LINING
Nozzle-Necks	C.S. W/ KYNAR LINING
Gaskets	PER PIPING SPEC

Capacity	500 GAL.
Weights	BY CONTR. Fab
Trays	Empty
Opr	Test
Paint	YES, PER SPEC.
Insulation	YES, PERSONAL PROTECTIO
Fireproofing	NONE
Access Supplied & Inst by Fabricator:	YES NO
Vessel Davit	NO Mark No.
Ladder & Platform Clips	NO
Pipe Support & Guide Clips	NO
Insulation Supports	NO
Fireproofing Supports	NO

Openings NOTE (5)

Item	No.	Size	Service
N1	1	6"	SIGHT & SOLID CHARG. PORT
N2	1	6"	SIGHT PORT
N3	1	1"	CHEMICAL GASES INLET
N4	1	1"	SPRAY WATER
N5	1	1 1/2"	CHEM. LIQ & ACID WASTE INL
N6	1	2"	ACID VENT
N7	1	1 1/2"	IND. WASTE RECIRC
N8	1	3"	TEMP. ELEMENT
N9	1	3"	LIQUID LEVEL ELEME
N10	1	2"	STEAM INLET
N11	1	1"	HOT WATER HEATING OUTL
N12	1	1"	HOT WATER HEATING INL
N13	1	3"	IND. WASTE INLET/OUTL
N14	1	BY VENDOR	MIXER MOUNT
M1	1	MIN. 24"	COVER HEAD (SEE SHT. 2

NOTE 6

ASA Rating & Facing 150# F.F. KYNAR

LINED EXCEPT AS NOTED.

NOTES

1. JACKET: AMBIENT ; SHELL : 250°F
2. JACKET : ATMOSPHERIC ; SHELL : 50 PSIG
3. SPRAY HEADER : 1" KYNAR PIPE W/ 1/8" Φ HOLES 4" APART, @ 45° IN THE LOWER QUADRANT FACING THE WALL.
4. SPARGER LOOP: 1" KYNAR PIPE W/ 1/8" Φ HOLES 4" APART, 30° DOWN, STAGGERED IN VERTICAL. THE LOOP SHALL BE REMOVABLE FOR MAINT.
5. NOZZLE SIZES SHOWN ARE MINIMUM REQ'D FOR PROCESS. ACTUAL SIZE SHALL BE DETERMINED BY VENDOR FOR ADEQUATE LINING.
6. ONE NOZZLE MIN. EACH.

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	VESSEL (PLAIN) WITH NOTES TK-21 REACTOR	SHEET 1 OF 2	JOB NUMBER 6084-01
		NUMBER 13.03-11	REV C

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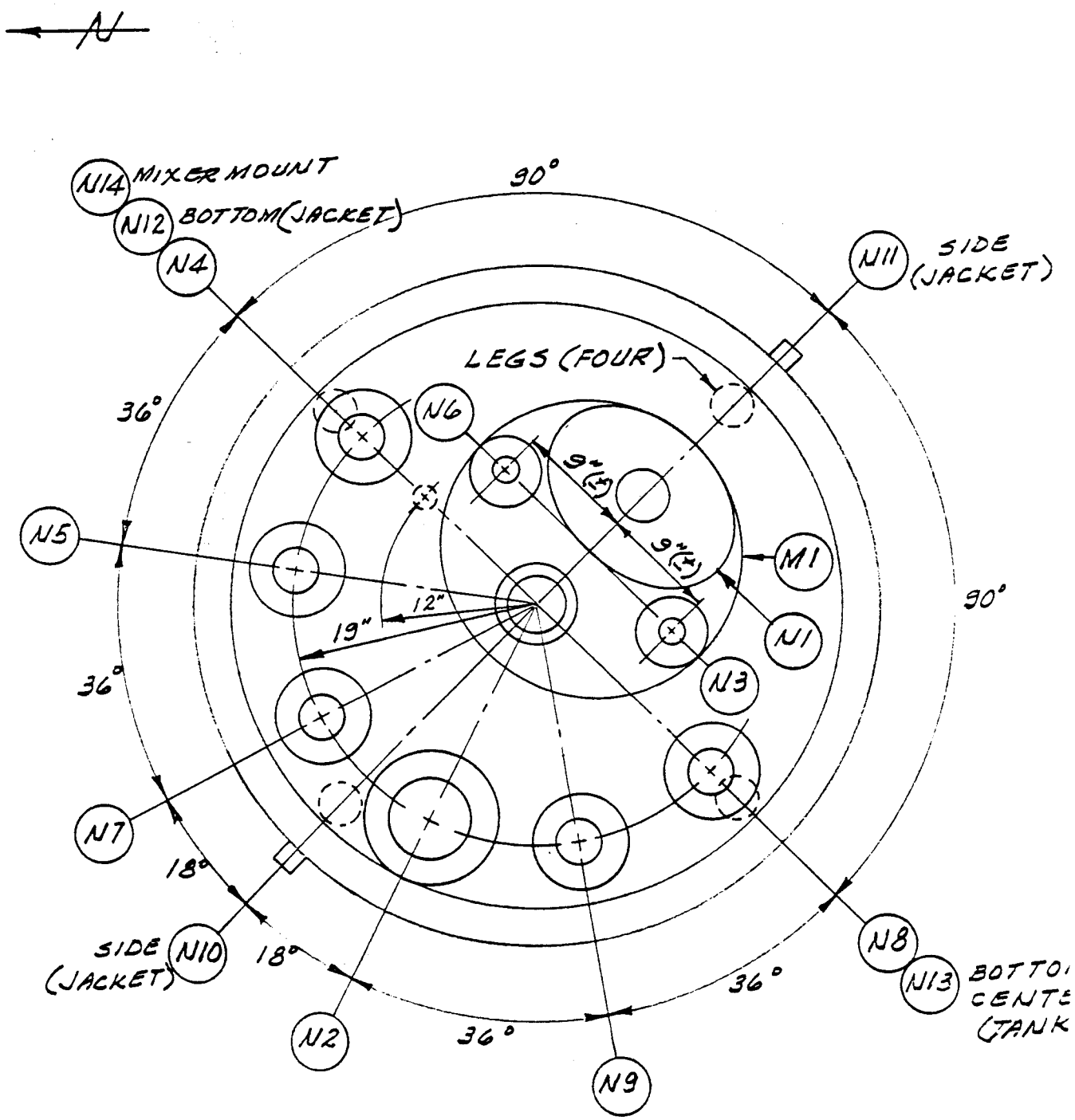
REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION



TK-21

REACTOR

TA-50

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	ORIENTATION NOZZLES, ~~LADDERS AND PLATFORMS~~ FOR: TK-21 REACTOR	SCALE NONE	JOB NUMBE 6089-(
		DOCUMENT NUMBER 13.03-11	

SHT 2

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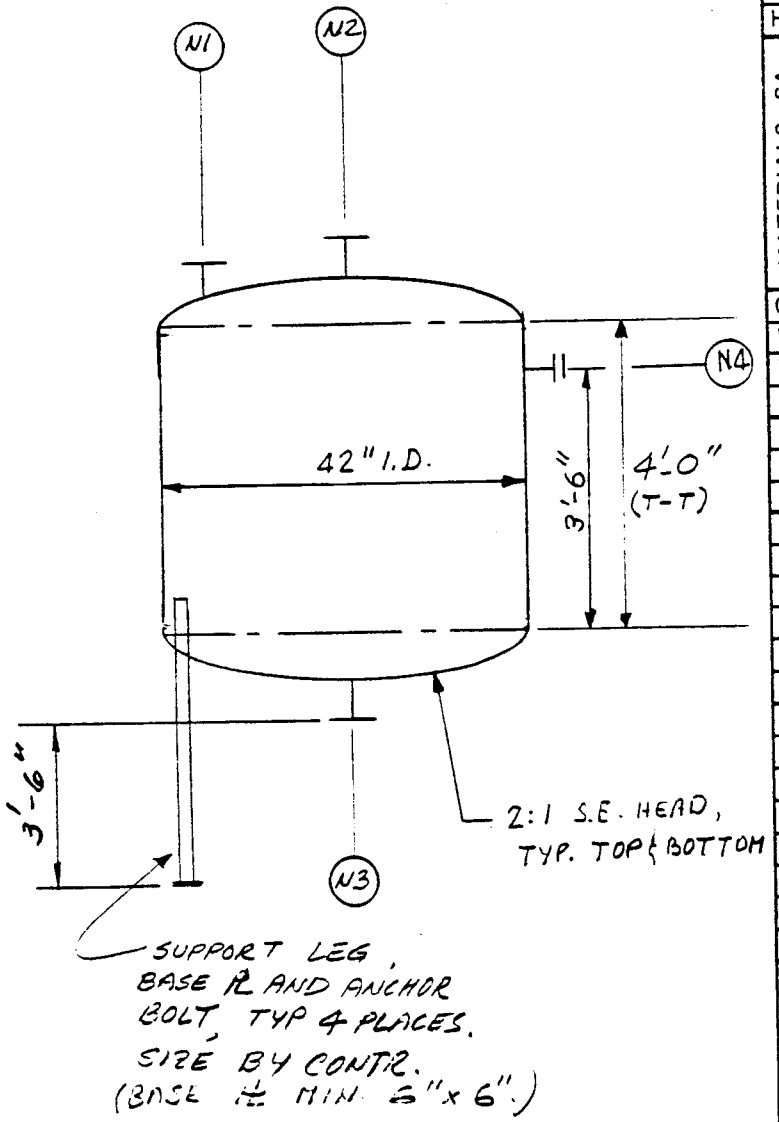


Opr Temp 250 °F		Press ATM	psig
Design Temp 275 °F		Press 50	psig
Ext Temp AMB °F		Press ATM.	psig
New Ltd by BY CONTR		@ BY CONTR	psig
Crsn Allow S 1/8"	Hds 1/8"	N 1/8"	
Code Stamp	YES		
Code	ASME SEC VIII, DIV. 1		
PWHT NONE	X-Rayed YES, RT-3		
Allow Stress @ Design Temp	BY CONTR.		
Joint Eff Shell 85%	Hds 85%		
Hydrotest (Horiz)	75.		psig

MATERIALS: SA-	
Shell	SA-285C
Heads	SA-285C
Support	SA-36
Trays	—
Bolts SA-193-B7	Nuts SA-194-2H
Flanges	SA-105
Nozzle-Necks	SA-53-B
Gaskets	PER PIPING SPEC.

Capacity	370 GAL		
Weights	BY CONTR	Fab	
Trays	—	Empty	
Opr		Test	
Paint	YES, PER SPEC		
Insulation	NO		
Fireproofing	NONE		
Access Supplied & Inst by Fabricator:			
Vessel Davit	NONE	Mark No.	
Ladder & Platform Clips	NO		
Pipe Support & Guide Clips	NO		
Insulation Supports	NO		
Fireproofing Supports	NO		

Openings

Item	No.	Size	Service
N1	1	1½"	GAS INLET
N2	1	2"	GAS OUTLET
N3	1	1"	DRAIN
N4	1	4"	HANDHOLE W/ BLIND FL

ASA Rating & Facing 150# R.F

UNLESS NOTED OTHERWISE

TA-50

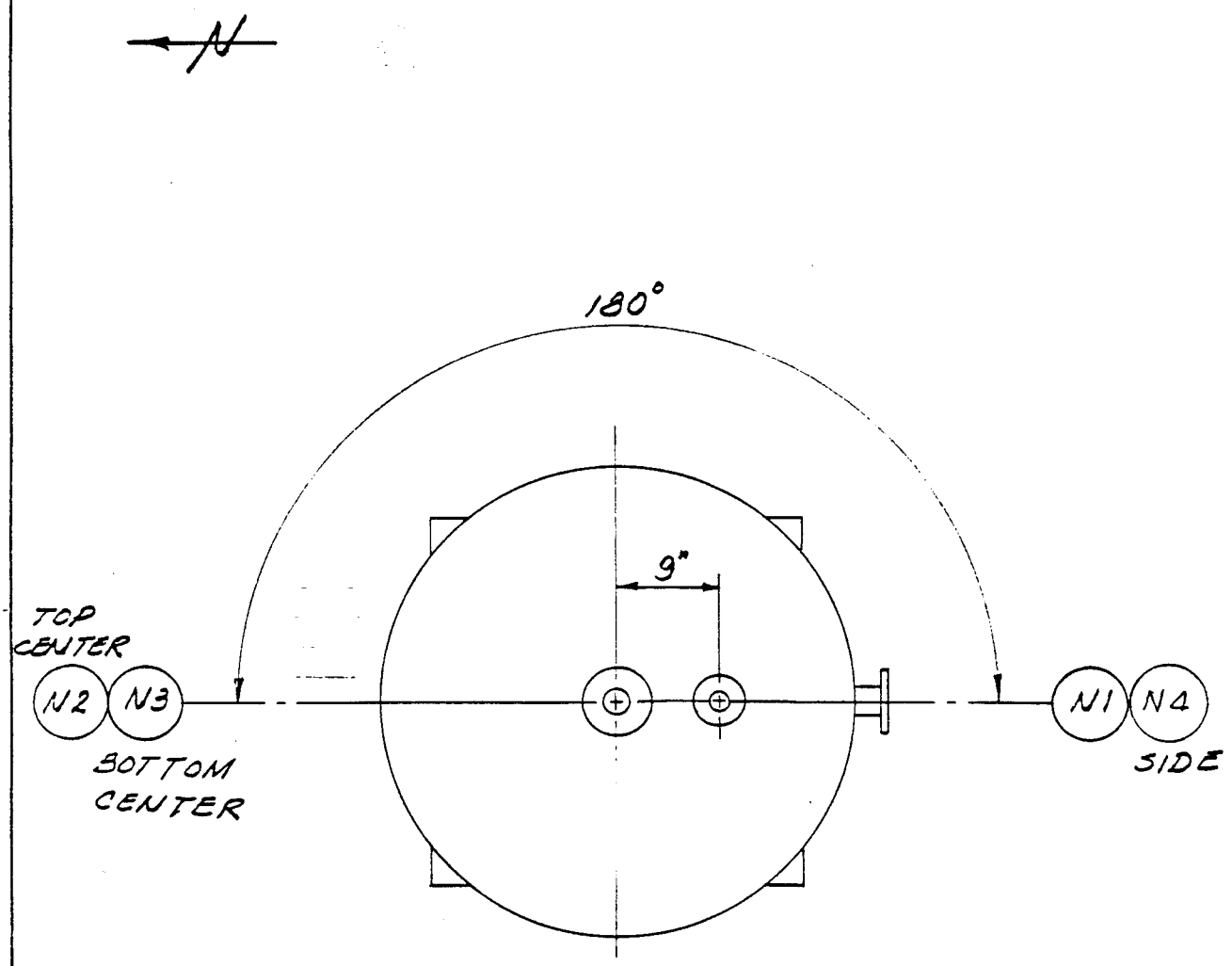
RMP DATA SHEET
THE RALPH M. PARSONS COMPANY

VESSEL (PLAIN) WITH NOTES
TK-22
BLOW DOWN TANK

SHEET	OF	JOB NUMBER
1	2	6069-000

NUMBER	R
13.03-12	1

ENG-GE-3



TK-22
BLOW DOWN TANK

TA-50

RMP THE RALPH M. PARSONS COMPANY	SHEET	OF	JOB NUMBER	DOCUMENT NO.	REV.
	2	2	6089-0001	13.03-12	0

0084C

CONTRACT NO. DE-AC32-80AL13151

CONSTRUCTION SPECIFICATION
FOR
UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

DIVISION 13 SPECIAL CONSTRUCTION

SUB-DIVISION 13.13

DOUBLE PIPE HEAT EXCHANGER

PART 1 GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and services to manufacturer, procure, inspect, install, and test double pipe vent gas condenser as indicated on the drawings and specified herein.

1.1.1 Furnished Equipment

The Contractor shall furnish the condenser as a complete unit, including support frame, special features, and accessories as specified herein.

The Contractor shall furnish to the Contracting Officer documents in accordance with Section 1.3.

Standard equipment and design are requested provided the performance requirements of this Specification are met. Engineering, fabrication, and quality assurance and control shall result in equipment capable of operation at specified design conditions.

1.1.2 Related Work

The following associated work shall be performed by the Contractor:

Emplacement, final alignment verification, and piping installation.

Work performed per this Sub-Division shall be coordinated with work accomplished per the following Sub-Divisions:

15.01 Piping

1.2 REFERENCE DOCUMENTS

The Contractor shall comply with codes and standards referenced in this Specification.

American National Standards Institute (ANSI)

ANSI B16.5 - 1977	Steel Pipe Flanges, Flanged Valves and Fittings

American Society of Mechanical Engineers (ASME)

Section VIII, Division 1 - 1980	Unfired Pressure Vessels
Section IX - 1980	Welding and Brazing Qualifications

American Society of Testing Materials (ASTM)

ASTM A 53-1980	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A 268-1980	Specification for Seamless and Welded Ferritic Stainless Steel Tubing for General Service

1.3 SUBMITTALS

1.3.1 Shop Drawings and Product Data

The Contractor shall submit to the Contracting Officer drawings, completed data sheets, parts lists, performance curves, inspection and test results installation and operating instructions, code data sheets, certificate of compliance, and recommended spare parts list with prices in accordance with Attachment "Data Requirements List".

PART 2 PRODUCTS

The condenser shall meet the technical and performance requirements outlined herein and on the data sheet "Double Pipe Heat Exchanger", Tag No. CD-2. In the event of conflict between this Specification and the data sheets, the data sheet information shall govern.

2.1 CONDENSER DESIGN

2.1.1 The fouling factor shall be as shown on the data sheet.

2.1.2 Nozzles shall be as follows:

Corrosion allowance for tube nozzles shall be equal to 1.5 times the corrosion allowance specified for the pipes. This allowance shall be added to the nozzle thickness required by the ASME Code.

2.1.3 All welds shall be by the shielded metal-arc, inert gas tungsten arc, or submerged arc process, unless otherwise approved by the Contracting Officer. Provide all seams with full penetration butt welds, double welded wherever possible.

2.1.4 Flange connections shall be per ANSI B16.5.

2.1.5 The Contractor shall advise the Contracting Officer of any shop remedial measure made to minor defects in materials as permitted by the ASME Code for Pressure Vessels. Information furnished shall include the type and extent of the defect, method of repair, location on exchanger, and the name of the inspection agency's inspector approving the repair. The Contractor shall require all fabricators to furnish this information. Correction of major defects will be performed only if approved by the Contracting Officer. Approval does not relieve the Contractor of responsibility.

PART 3 EXECUTION

3.1 FABRICATION REQUIREMENTS

3.1.1 Materials for double pipe condenser shall be as specified on the data sheet, this Specification, or any alternates or deviations specifically approved by the Contracting Officer.

3.1.2 Deposited weld metal for all pressure containing welds shall have: 1) a chemical composition within the range of the base material ASTM specification and 2) mechanical properties at ambient, design and operating temperatures that are within the range of the base material ASTM specification.

3.1.3 All welding procedures and welder qualifications shall be in accordance with Section IX of ASME Code and shall be submitted to the Contracting Officer and approval obtained before any welding is begun.

3.1.4 Tagging of Equipment

The nameplate for the exchanger shall be of 24 US Standard Gauge (minimum) stainless steel and shall be securely attached. The nameplate shall include as a minimum the manufacturer's name, design pressure and temperature (maximum fluid temperature), test pressure, corrosion allowance, dry and wet weight, manufacturer's serial number, date of fabrication and equipment item number.

3.1.5 Painting and Surface Preparation

Stainless steel surfaces shall not be painted. Carbon steel surfaces except heat transfer surfaces shall be painted using the Vendor's standard materials.

Standard paint used shall remain intact at operating temperature of carbon steel surfaces to which it is applied. All exposed surfaces shall receive a coat of rust preventative such as Exxon Chemical Co. Rust Ban 392 or Approved Equal.

3.2 SHIPPING AND STORAGE

Flange closures shall consist of a rubber gasket and a full size 1/4 inch thick exterior plywood cover. This cover shall be bolted in place by a minimum of four full size bolts. All drilled and tapped holes shall have metal or plastic plugs and all exposed pipe ends shall be capped.

Equipment shall be boxed or crated for full protection against damage during transport and yard handling. Exchangers shall be prepared to prevent damage from the elements and temperatures ranging from minus 40 deg F to plus 120 deg F.

The Contracting Officer reserves the right to inspect the equipment at the manufacturer's plant.

3.2.1 Receipt Inspection

The Contracting Officer will inspect the equipment and documentation specified herein upon receipt at the site to determine if the equipment as received has suffered damage during shipment. The inspection will include appurtenances shipped separately or together with the equipment.

3.2.2 Storage

The Contractor shall allocate sufficient storage space and employ protective measures to protect the equipment and appurtenances specified herein from any damage due to natural elements or the Contractor's equipment. Particular care shall be taken to prevent damage to flange faces, seal surfaces, and all interfacing parts or surfaces between equipment piping, or structures. The Contractor shall allocate equipment storage space in an area segregated from fabrication operations and maintained free from debris. Temporary structures, supports, cribbing, or bracing may be provided and employed by the Contractor to prevent damage to the equipment and appurtenances specified herein.

The Contracting Officer reserves the right to inspect, without notice, all equipment storage areas, protective measures, and temporary structures used to store equipment.

3.2.3 Handling

The Contractor shall provide and use suitable devices to handle without damage the equipment and appurtenances specified herein from receipt through installation. The Contractor shall be responsible for providing suitable access into the facility for handling devices with equipment for installation.

3.3 INSTALLATION

Installation of equipment shall be in accordance with the piping drawings and the Vendor's installation instructions. The Contractor shall be responsible to provide necessary foundations, brackets, anchorings, bolts, studs, and nuts for proper installation, and interfacing with equipment.

3.4 PRESSURE TESTING

The condenser shall be hydrostatically tested in accordance with Section VIII of ASME Code with clean water at a minimum temperature of 60°F in the shop.

(1) Vents shall be provided at all high points of the test set up to purge air pockets when the condenser is filling.

(2) The hydrostatic test pressure shall be maintained for a minimum of 10 minutes to verify that no leaks exist.

(3) Leakage of temporary gaskets and seals, installed for the purpose of conducting the hydrostatic test and which will be replaced or discarded later, is permitted provided the leakage does not exceed the capacity to maintain system test pressure for the required length of time or does not mask leaks from other joints.

(4) No visual weeping or leakage is permitted from any condensers assembly joint. If weeping or leakage occurs, proposed repair method shall be submitted to the Contracting Officer. After approval repairs shall be done and equipment retested per above procedure.

3.5 ACCEPTANCE

Equipment, materials, and workmanship not in accordance with the requirements specified herein shall be corrected by the Contractor.

UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

DATA REQUIREMENTS LIST

	DESCRIPTION	CHECK IF REQ'D.	* WHEN REQ'D.	NO. OF COPIES REQ'D.	REFERENCE	** REQ'd. FOR
1.	Outline Drawings, Cross-Section Drawing	X	BFR		1.3.1	ACO
2.	Parts Lists	X	WS		1.3.1	INFO
3.	Performance Characteristics	X	BFR		1.3.1	ACO
4.	Inspection and Test Results	X	PS		1.3.1	ACO
5.	Installation, Operating, and Maintenance Instructions	X	PS		1.3.1	INFO
6.	Data Sheets	X	BFR		1.3.1	ACO
7.	Recommended Spare Parts w/prices	X	PS		1.3.1	INFO
8.	Certificate of Compliance	X	WS		1.3.1	ACO
9.	Code Data Sheets	X	WS		1.3.1	ACO
10.	Weld Repair Procedures	X	BU		3.4	ACO

* "AC" - As Completed
"BC" - Before Contract can be awarded
"BU" - Before Use (of procedure or by personnel)
"BFR" - Before Fabrication Release
"PS" - Prior to Shipment
"WS" - With Shipment

** "ACO" - Approval by Contracting Officer "INFO" - Information

PARSONS	SHEET OF	JOB NUMBER	DOCUMENT NO.	F
	7 7	6089	13.13	

ENG-GE-3 (11/82)

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REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION
	0	2/16/83	J.S.	MJ		INITIAL ISSUE

REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION

Service: VENT GAS CONDENSER — Item No. CD-2

Type: DOUBLE PIPE HEAT EXCHANGER — Order No.

Mfr Type No. — Mfr

OPERATING CONDITIONS		SHELL SIDE	TUBE SIDE
Fluid Circulated		IND. COLD WATER	ACID GAS VENT
Total Fluid Entering	lb/hr	5500.	220.
Liquid	lb/hr	5500.	—
Vapor	lb/hr	—	220.
Noncondensables	lb/hr	—	
Steam	lb/hr	—	
Fluid Vaporized or Condensed	lb/hr	—	220.
Gravity Liquid at 60 °F		1.0	1.0
Molecular Weight – Vapor			
Viscosity at 60 °F	Cp	1.0	
Viscosity at °F	Cp		
Temperature – In	°F	70	210
Temperature – Out	°F	110	210
Inlet Pressure	psig	60	ATM

DESIGN CONDITIONS		SHELL	TUBES
Pressure	psig	85	50
Temperature	°F	160	240
Max Allowable Pressure Drop	psi		
Computed Pressure Drop	psi		
Hydrostatic Test Pressure	psig	130	75
Nozzle Size	In.	In 1" Out 1"	In 2" Out 2"
Nozzle Rating & Facing		150# R.F.	150# R.F.
Required Corrosion Allowance	In	1/8"	1/8"

Duty 220,000	Btu/hr	Fouling Factor – Minimum Shell	Tube
Transfer Rate – Clean 300		Fouling Factor – Actual Shell (0.0005 OVERALL)	Tube
Transfer Rate – Spec Service		Surface – Per Unit 6.0	sq ft
MTD (Corrected)	°F	Surface – Total 6.0	sq ft

MATERIALS AND CONSTRUCTION

No. of Units ONE	Tubeside Arrangement: NOTE 3	Parallel	Series
Setting	Shellside Arrangement: NOTE 3	Parallel	Series
Shell Diameter (IPS) 4"	Sched Wall 40	Overall Length 8 FT	
Tube – Diameter (IPS)	OD 2" BWG 16	Sched Wall	
Fins – No. —	Height — Thickness —	Finned Length —	
Weight – Each Unit	Bundle Only	Each Unit Full of Water	

PART	MATERIAL	PART	MATERIAL
Shell	ASTM A 53	Tubes	ASTM A 268 304L
Shell Cover		Fins	
Gasket, Shell Side	SEE PIPE SPEC. 15.01	Gasket, Tube Side	SEE PIPE SPEC
Bolts	SA-193 - B7		SA-194-2H

Notes: ~~(1) Stress Relieved Parts Marked SR – Radiographed Parts X-R~~

~~(2) ASME "UPV" Code, Section VIII Latest Edition, Code Stamp and Certificates Required~~.

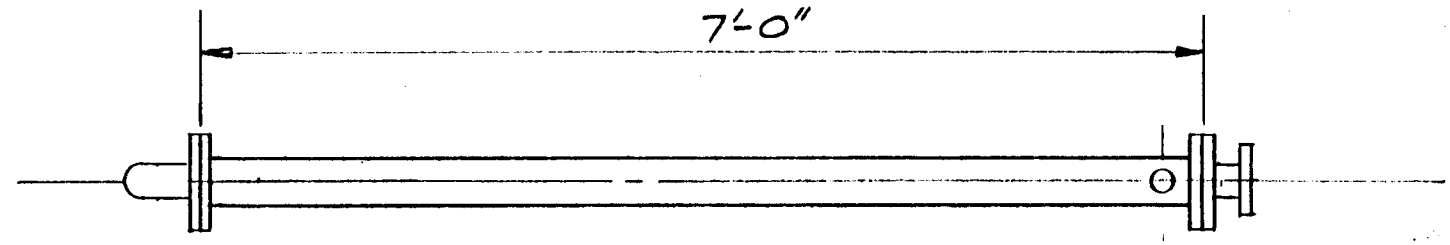
(1) DOUBLE PIPE U-TUBE EXCHANGER, TUBE LENGTH APPROX. 7' FLANGE TO FLANGE COUNTER-CURRENT

RMP DATA SHEET
THE RALPH M. PARSONS COMPANY

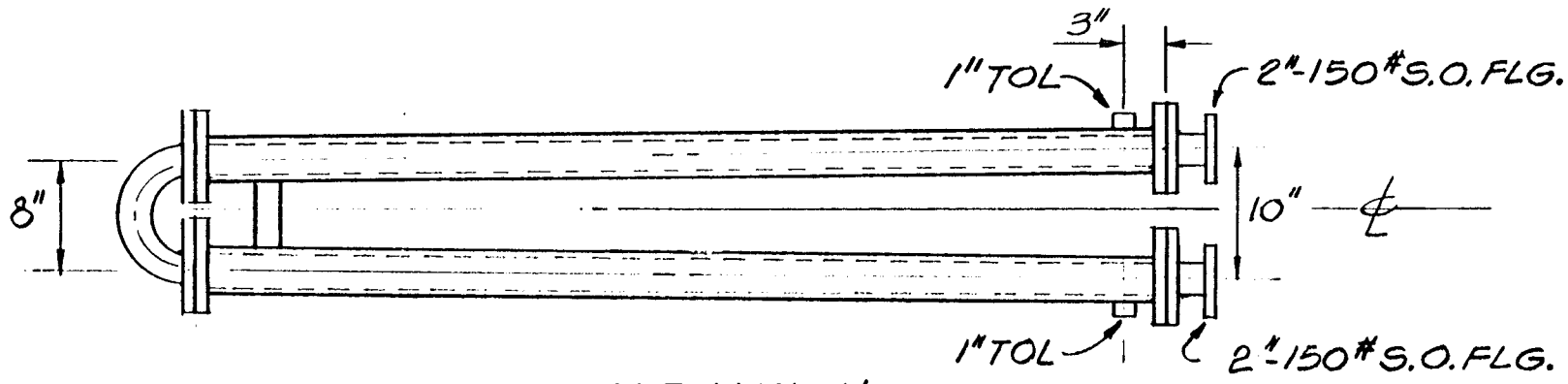
DOUBLE PIPE HEAT EXCHANGER
CD-2

SHEET 1 OF 2 | JOB NUMBER 6089-0001

DOCUMENT NUMBER 13-13-1 | REV 0



PLAN



ELEVATION

NOTE: INTERFACE FLANGE FACES AND TOL CENTER LINES TO BE PERPENDICULAR TO CONDENSER ASSEMBLY ℄.

VENT GAS CONDENSER

CD-2

PARSONS	SHEET 2 OF 2	JOB NUMBER 6089-01	DOCUMENT NO. 13.13-1	REV

SERVICE: Industrial Waste	CLASS NV PAGE 1 OF 2

RATING:	150# ANSI	CORROSION ALLOWANCE:	None
FACING:	Flat Faced	PRESSURE LIMIT:	B16.5
MATERIAL:	Carbon Steel - Kynar Lined	TEMPERATURE LIMIT:	300°F

CODE NUMBER	ENCODER	SIZE FROM	SIZE TO	DESCRIPTION	NOTES	REV
		1"	6"	----------PIPE---------- Carbon Steel, Schedule 40 Lined with Kynar, 160# ANSI Screwed Cast Steel Flanged Ends ASTM A53 Grade B		
		1"	6"	----------FITTINGS---------- Cast Steel Flanged Fittings, 150# ANSI Lined with Kynar, Molded Raised Face		
		1/2"	6"	----------DIAPHRAM VALVES---------- 150# FF Kynar Lined Cast Carbon Steel Hand Wheel Operated with TFE Diaphrams		
		1"	6"	----------CHECK VALVES---------- 150# RF Cast Steel, Kynar Lined		
				---------CONNECTIONS FLANGED---------- For Pressure Connection, Use 1" Flanged		
		1"	6"	----------COMPANION FLANGES---------- 150# ANSI, Forged Steel, Screwed, Chamfered ASTM A 105, ASTM A 181		
		1"	6"	---------(BLIND) FLANGES---------- 150# ANSI Forged Steel Blind Flanges (Use with Kynar Full Face Blind Spacer ASTM A 105, ASTM A 181		
				----------REDUCING FLANGES (LOOSE)------- Kynar Lined 150# ANSI Cast Steel ASTM A 105, ASTM A 181		
				----------FLANGES KYNAR---------- Solid Kynar 2" Thk with Stainless Steel Backup Washers		
				----------GASKETS---------- Viton A, 1/16" Thickness 60 Durometer		
				----------BOLTING---------- Hex Head Machine Bolt with Hex Nut, Chrome Moly Steel ASTM A193 Grade B7 ASTM A194 Grade 2H		

SERVICE Industrial Waste

CLASS NV

PAGE 2 OF 2

CODE NUMBER	ENCODER	SIZE FROM	SIZE TO	DESCRIPTION	NOTES	REV
		1" - 6"		----------BRANCHES---------- Use Full or Reducing Kynar Lined Flanged Fittings		
				----------SPACERS---------- Use Standard Full Face or Reducing Full Face Kynar Spacer of 1/2" Minimum Thickness when Mating Kynar Lined Piping Items with all Other Types of Flanged Piping		

NOTES:

1. All spool assemblies involving lined piping shall be fabricated from Kynar lined carbon steel pipe w/150# steel flanges and flanged cast steel Kynar lined fittings

2. Manufacturers suggested bolt torque shall be used in assembling flange joints.

3. No gaskets required between flanges with molded raised faces.

4. The following pressure limitations shall be followed for diaphram valves at 100°F.

Size	Max. Pressure	Size	Max. Pressure
1/2"-1"	200 psig	3"&4"	150 psig
1 1/2 - 2	175 psig	6" only	125 psig

PIPING – SPECIALTY ITEMS

SP

This symbol on P&ID or isometric denotes a piping specialty item not specified in the piping material specification. These items are as follows:

ITEM	SIZE	DESCRIPTION
13	3/4"	3/4" pipe size Combination Filter and Lubricator Unit. 5 micron filter Acceptable Model Model No. C4D-600-MIE-AU C.A. Norgren Co., or equal
15	1-1/2"	Quick Disconnect Socket - 316 stainless steel, female (ANPT) socket, automatic shut-off Acceptable Model Transamerica Delaval Fig. No. EC-250B24 w/Vitron "A" O-Rings or equal
16	1-1/2"	Quick Disconnect Nipple - 316 stainless steel, male (ANPT) nipple, automatic shut-off Acceptable Model Transamerica Delaval Figure No. EC-255A24 with Vitron O-Rings, or equal
17	1-1/2	Flexible Metal Hose - 316 stainless steel innercore, 321 stainless braid, heavy wall innercore, annular corrugations and close pitch with one hex male nipple on each end. Length 10'-0" long. Acceptable Model Titeflex 5920606241200 or equal
18	1"	Quick Disconnect Socket - 316 stainless steel, female (ANPT) socket, automatic shut-off Acceptable Model Transamerica Delaval Figure No. EC-250B16 with Vitron O-Rings, or equal

PIPING – SPECIALTY ITEMS

SP

This symbol on P&ID or isometric denotes a piping specialty item not specified in the piping material specification. These items are as follows:

ITEM	SIZE	DESCRIPTION
19	1-1/2"	Basket Cartridge Filter - Single filter housing with interchangeable cartridge or basket - bag type filter element. Housing material shall be 304L stainless steel and shall be designed and constructed to the ASME Code Sect. VIII, Div. 1 for pressure vessels. Max. flow thru filter shall be 20 GPM with allowable pressure drop when clean of 1 psi. The inlet and outlet nozzles shall be 150# FF flanges. Design pressure 150 PSIG @ 200°F. Acceptable Model AMF-CUNO 7PC1, or equal.

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REQUISITION NO.

Reference Specification Sheet No.

VENDOR FOXBORO (OR APPROVED EQUAL)

Model No. E17DM-1SM31A

GENERAL

1 Description: ☐ Recorder ☒ Indicator ☐ Blind ☐ Controller ☒ Transmitter

2 Case: ☐ Rectangular ☐ Circular ☒ Standard ☐ Other

3 Case Color: ☐ Black ☒ Standard ☐ Other

4 Mounting: ☐ Flush ☐ Surface ☒ Yoke

5 No. Points Recording ____ Indicating ____

6 Chart Type: ☐ 12-in. Circular ☐ Other

7 Chart Range ____ Number ____

8 Scale Range ____ Type ____

9 Chart Drive: ☐ Spring ☐ Electric ☐ Pneumatic

10 Chart Speed ____ Wind ____

Volts ____ Hertz ____ Explosion Proof

11 Air Pressure ____

12 Other

TRANSMITTER

13 Type: ☐ Pneumatic ☒ Electric

14 Output: ☐ 3-15 psi ☒ 4-20 mA DC ☐ Other

15

CONTROLLER

16 Type: ☐ Pneumatic ☐ Electric ☐ Other

17 Prop ____ % ☐ Auto-Reset ☐ Rate Action ☐ On/Off ☐ Other

18 Output: ☐ 3-15 psi ☐ 4-20 mA DC ☐ Other

19 On Measurement Increase Output: ☐ Increases ☐ Decreases

AUTO MANUAL SWITCH

20 No. Positions ☐ External ☐ Internal ☐ Integral

SETPOINT ADJUSTMENTS

21 Manual: ☐ Internal ☐ External

22 Remote: ☐ Pneumatic ☐ Electric

23 Control Point Span: ☐ Fixed ☐ Adjustable

24 Other

STATIC PRESSURE OR RECEIVER ELEMENT

25 Type ____ Material ____

26 Range ____

27 For other elements see Tag No. ____ on Sheet No. ____

DIFFERENTIAL UNIT

28 ☐ Flow Rate ☐ Level ☐ Pressure

28a Suppression ☐ Yes ☐ No

29 ☐ Mercury ☐ Bellows ☐ Diaphragm

30 Others

31 Material: Body 316 SS; Diaphragm or Bellows HASTELLOY C276

32 Body Rating 1500 psig @ 60°F

33 Differential Range AS NOTED

34 Differential Connection ☐ ¼-in. ☐ ½-in. ☒ Other NOTE

ACCESSORIES

35 Filter and Regulator ____

36 Air Supply Gauge ____

37 Local Indicator YES

38 Charts and Inkset ____

39 Mounting Yoke ____

40 Pulsation Dampener ____

41 Mercury ____

42 Lubricator and Isolation Valve ____

43 Integrator ____

44 Primary Measuring Element ____ Type ____

45 Alarm Switch ____

☐ Hermetically Sealed ☒ Explosion Proof ☐ General Purpose

Notes: 3" 150# FLANGED CONNECTION.
SEE SHEET ENG-IN-0611B
TAG NO FIT-207
* VENDOR TO PROVIDE 1- MOORE INDUSTRIES INC
24VDC POWER SUPPLY MODEL PPS/24DC-[illegible]/CT-[illegible]

RMP DATA SHEET
THE RALPH M. PARSONS COMPANY

DIFFERENTIAL PRESSURE INSTRUMENTS

SHEET 43 | JOB NUMBER 6083

DOCUMENT NUMBER 15-10-1 | REV C

ENG-IN-0611A

DC-

REQUISITION NO.	VENDOR [illegible] APPROVED EQUAL
Reference Specification Sheet No.	Model No. E17DV-[illegible]EM314

Rev	Tag No.	Item No.	P&ID No. and Section	Differential Range	Static Pressure Range	Scale or Chart Range	Measurement Increase Output	Service
	[illegible] 2[illegible]	1	[illegible]	0-[illegible] "H2O	[illegible]	① 0-100%	INCR	TK-20 RING/SETTLING [illegible] MAKE-UP TANK [illegible] GAL

Notes: ① VENDOR TO FURNISH OPTIONAL METER

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	DIFFERENTIAL PRESSURE INSTRUMENTS LEVEL	SHEET 44	JOB NUMBER [illegible]-3
		DOCUMENT NUMBER [illegible]-1	REV 0

ENG-IN-0611B-G

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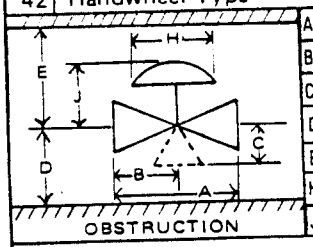
					VENDOR CASHCO OR APPROVED EQUAL		
	REQUISITION NO.						
1	Tag No.		PCV-2226				
2	Item No.		/				
3	Model No.		TYPE D				
4	Service		PLANT AIR TO				
			TRANS PUMP				
5	Line No.		1/2"-CA125-1129NE				
6	P&ID No./Section		LA-RV-MP9/C9				
	SERVICE CONDITIONS						
7	Fluid	Units	AIR	SCFM			
8	Min Flow	Max Flow	20				
9	Normal Flow	Sizing Flow	40				
10	Inlet Press Max	Norm	125	100			
11	△P Max	△P For Valve Sizing		0-100 PSI			
12	Temp Max	Norm °F		AMB			
13	sp gr @ 60° F	@ Opr Temp	12×10^{-3}	12×10^{-3}			
14	Viscosity @ Opr Temp	cp	$\simeq 1.84 \times 10^{-2}$				
	BODY						
15	Body Size	Port Size	3/4"	(1)			
16	Type of Body						
17	Material		BRONZE				
18	End Connections		SCREWED				
19	Bonnet		STD				
20	Lubricator	Isolating Valve	—	—			
21	Packing or Seal		—				
22	Position Indicator		—				
23	Guiding		—				
24	No. of Ports		ONE				
25	Valve Characteristic		—				
26	Trim Matl: Cage ☐	Disc ☐ Ball ☐	STD				
27	Trim Matl: Plug ☐	Shaft ☐ Shaft ☐	STD				
28	Trim Matl: Seat ☐	Seal ☐	STD				
29	Trim Matl:						
30	C_v for Sizing Flow	Furn C_v					
	NOISE DATA						
31	Line Size	Pipe Schedule	3/4"	XS			
32	Insulation		—				
33	Sound Pressure Level	dBA	—				
	ACTUATOR & ACCESSORIES						
34	Actuator Type		SELF REG.				
35	Fail Position		CLOSED				
36	Close @	Open @	—	—			
37	△P For Actuator Sizing		—				
38	Positioner Required	W/Filter Rgltr	—	—			
39	Bypass	Gauges	—	—			
40	For Input Signal of		—				
41	Output Shall Be		ADJ. 0-100 PSI				
42	Handwheel Type		—				



A	FACE TO FACE
B	FACE TO CENTER
C	FACE TO CENTER
D	CLEARANCE
E	CLEARANCE
H	ACTUATOR DIA
J	ACTUATOR HEIGHT

Notes: (1) BY VENDOR

PARSONS SPECIFICATION	CONTROL VALVES	SHEET 45	JOB NUMBER 6099
		DOCUMENT NUMBER 15.10-1	

DC-

ENG-IN-0211 (4/81)

REQUISITION NO.	VENDOR DRESSER/ASHCROFT (OR APP'D EQUAL)
Reference Specification Sheet No.	Model No. 127SS

1	Type:	☒ Indicating	☐ Receiver		8	Pressure Element:	☒ Bourdon	☐ Bellows	
		☐ Other					☐ Other		
2	Mounting:	☐ Surface	☐ Local	☐ Flush	9	Element Material:	☐ Bronze	☐ Steel	
3	Dial Diameter	4 1/2"				Type 316SS	☐ Stainless Steel	☐ Other	
4	Dial Color:	☐ Black	☒ White	BLACK	10	Socket Material:	☐ Bronze	☐ Steel	
5	Case Material:	☐ Cast Iron	☐ Aluminum	☒ Phenol		Type 316SS	☐ Stainless Steel	☐ Other	
		☐ Other			11	Connection - NPT		☐ ¼ - in.	☒ ½ - in.
6	Ring Type:	☐ Screwed	☐ Hinged	☐ Slip			☒ Bottom	☐ Back	
		☒ Other	SNAP		12	Movement:	☐ Bronze	☒ Stainless Steel	
7	☐ Liquid Filled	☐ Glycerine Fill					☐ Nylon	☐ Other	
	Case	☐ Other			13	Blowout Disk	☒ Yes	☐ No	

Rev	Tag No.	Item No.	P&ID No. and Section	Range (1) Tube	Range (1) Dial	Operating Pressure PSIG	Service	Accessories
	PI-203	1	LA-RV-MP -9/K6	0-100	0-600	0-60	REACTOR TK-21 TO SURGE TANK PRESSURE	
	PI-225	2	1/C9	0-200	0-200	100 TO 125	PLANT AIR TO TRANSFER PUMP	

Notes: (1) SCALES TO BE IN METRIC EQUIVALENTS

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	PRESSURE GAUGES	SHEET 46	JOB NUMBER 6059-3
		DOCUMENT NUMBER 15.10-1	REV 0

ENG-IN-1211A-G

REQUISITION NO.			VENDOR CLOSET IOR APPROVED [illegible]		
1	Tag No.	PSV-205			
2	Item No.	8			
3	Model No.	JMBUC			
4	Service	REACTOR VENT			
5	Line or Equipment No.	1" AV-1125-AD			
6	P&ID No./Section	LA-RV-MP.9/K7			
	SERVICE CONDITIONS				
7	Fluid	STEAM			
8	Required Capacity / Units	400 / #/HR			
9	Maximum Capacity				
10	Mol Wt or sp gr @ Opr Temp	18			
11	Viscosity @ Opr Temp cp	0.018			
12	Press psig: Norm / Relieving	ATM			
13	Temp °F: Norm / Relieving	210 / 240			
14	Spring Set Press (psig)	50			
15	Accumulation %	10			
16	Back Press—Constant	10 PSIG			
	Varies: From / To				
17	Bubble Tight @ 90% Set Press	COMMERCIAL			
	BASIS OF SELECTION				
18	Code	ASME SECTION VIII DIV. 1			
19	Fire				
20	Other				
21					
	ORIFICE AREA				
22	Calculated sq in				
23	Selected sq in				
24	Orifice Designation				
	GENERAL				
25	Seat Type	FULL NOZZLE			
26	Design Type	SAFETY RELIEF			
27	Bonnet	CLOSED			
28					
	BODY				
29	Material	CARBON STEEL			
30	Size Inlet / Outlet	1" / 1 1/2"			
31	Flange Rating ANSI	SCREWED			
32	Type Facing				
33					
	TRIM MATERIAL				
34	Seat and Disk	304 SS			
35	Guide & Ring(s)	316 SS			
36	Spring	CARBON STEEL			
37	Bellows	—			
	ACCESSORIES				
38	Cap	YES			
39	Lever Plain / Packed	NO / NO			
40	Gag	YES			
41	Other	—			
42	Code Stamp (ASME)	NOT REQ			

Notes:

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	RELIEF VALVES	SHEET 47	JOB NUMBER 60[illegible]
		DOCUMENT NUMBER [illegible]	REV

ENG-IN-0311-G

REQUISITION NO.

Reference Specification Sheet No.

VENDOR ROSEMOUNT (OR APPROVED EQUAL)

Model No. 444 RL2 U1A 1N4

GENERAL

1 Description ☐ Recorder ☐ Indicator ☒ Blind ☐ Controller ☒ Transmitter

2 Case ☐ Rectangular ☐ Circular ☒ Standard ☐ Other ____

3 Case Color ☐ Black ☒ Standard ☐ ____

4 Mounting ☐ Flush ☐ Surface ☐ Yoke

5 No. Points....Recording — Indicating —

6 Chart Type — -in. ☐ Strip ☐ 12-in. Circular ☐ Other —

7 Chart Range and No. —

8 Scale Range and Type —

9 Revolutions per Day — or Inches per Hour —

10 Pen or Pointer Speed — Seconds Full Scale Travel

11 Printing Speed — Seconds per Point

12 Balancing ☐ Electronic ☐ Mechanical ☐ Manual ☐ Other ____

13 Volts ~ 24 Hz dc

TRANSMITTER

14 Type ☐ Pneumatic ☒ Electric

15 Output ☐ 3-15 psi ☒ Other 4-20 MADC

16 ____

CONTROLLER

17 Type ☐ Pneumatic ☐ Electric ☐ Other ____

18 Prop ____ % ☐ Auto-Reset ☐ Rate ☐ On-Off ☐ Other ____

19 Output ☐ 3-15 psi ☐ 4-20 mA DC ☐ Other ____

20 On Measurement Increase Output: ☐ Increases ☐ Decreases

21 Electric Switch Type ____ ; On Measurement Increase Contacts: ☐ Open ☐ Close

22 Contact Rating Amps ____ Volts ____

AUTO MANUAL SWITCH

23 No. Positions ____ ☐ External ☐ Internal ☐ Integral

SETPOINT ADJUSTMENTS

24 Manual ☐ Internal ☐ External

25 Remote ☐ Pneumatic ☐ Electric

26 Control Point Span ☐ Fixed ☐ Adjustable

27 ☐ Other ____

MEASUREMENT

28 ☐ Thermocouple Type ☐ J(IC) ☐ K(CA) ☐ T(CC) ☐ Other ____ ☐ Reference Junction Compensation ☐ Automatic Standardization

29 ☐ Radiation Type

30 ☒ Resistance Bulb Type Material ☐ Nickel ☒ Platinum ☐ Other ____

31 ☐ Other Type ____

32 Range ____ to ____ ☐ °F ☐ °C

33 Other ____

ACCESSORIES

34 Filter and Regulator ____

35 Air Supply Gauge ____

36 Charts and Inkset ____

37 Zener Diode ____

38 Alarm Contacts ____

39 Other ____

Notes:
1. TRANSMITTER INTEGRAL PART OF RTD AND WELL
2. ZERO AND SPAN ADJUSTABLE
3. SEE FORM 1612B-G FOR RANGE, RTD, WELL

TAG NO. TT-198A

VENDOR TO PROVIDE 1- MOORE INDUSTRIES INC 24VDC POWER SUPPLY MODEL PPS/24DC/200MA/CT/STD

RMP DATA SHEET
THE RALPH M. PARSONS COMPANY

TEMPERATURE INSTRUMENTS (POTENTIOMETER, PYROMETER AND RESISTANCE)

SHEET 48 | JOB NUMBER 6089-3 | DOCUMENT NUMBER 15.10-1 | REV

ENG-IN-1612A-G

REQUISITION NO.	VENDOR ROSEMOUNT (OR APPROVED EQUAL)
Reference Specification Sheet No.	Model No. 88G81EC6050066 (SEE NOTE)

Rev	Tag No.	Item No.	P&ID No. & Sect	Range °F	Type of ~~TC~~ RTD ~~Rec Bulb~~ PLAT.	Scale and Chart	No. Points	Meas Incr Output	Service
	TE/TT-198A	1	MP-9 K-7	0-400	4-WIRE 100 OHM	—	—	INCR	REACTOR TANK TK-21 TEMP.

Notes: WELL TO BE SUITABLE FOR ELEMENT, WELL TO BE FLANGE MOUNTED STRAIGHT STYLE, 3" 150# RAISED FACE HASTELLOY MATERIAL

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	TEMPERATURE INSTRUMENTS (POTENTIOMETER, PYROMETER, AND RESISTANCE)	SHEET 49	JOB NUMBER 6019-3
		DOCUMENT NUMBER 15-10-1	REV

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REQUISITION NO.	VENDOR ASHCROFT (OR APPROVED EQUAL)
Reference Specification Sheet No.	

GENERAL

1 Bulb Type: [X] Threaded [ ] Plain [ ] Union [ ] Other ____
2 Case Material: [■] Manufacturer Standard [ ] Other ____
3 Dial Size 5" Color WHITE
4 Form: [ ] Straight [ ] Angle [ ] Fixed [X] Adjustable
5 Bulb or Union Thread Size: [X] ½-in. [ ] ¾-in.
6 Manufacturer Model No. 50 EI 42 E

WELL

7 Construction: [ ] Built-up [X] Drilled Bar Stock [ ] Other ____
8 Material: [ ] 304 SS [X] 316 SS [ ] Other ____
9 Process Connection: [ ] 1-in. NPT [X] Other ½" NPT
10 Lag Extension T: [X] None [ ] Shown Below [ ] 3-in.
11 Manufacturer Model No. * LIGHT DUTY TAPERED

Rev	Tag No.	Item No.	P&ID No. & Sect	Range	Opr Temp	Stem Length	*T Dim	Type Connection	Line Size and Spec	Service
	TI-263	1	LA-RY MP-9/M3	0° TO 100° C	≈ 80°C	*	—	—	1"-ICW 1121-NE	WASTE WATER

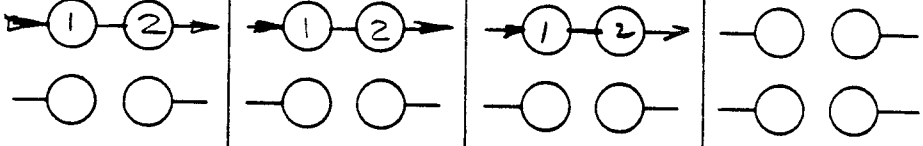
Notes:
* T Dimension is lag length.
* ½" MNPT SCREWED WELL "U" DIMENSION 2½"
STEM LENGTH OF ELEMENT MUST BE SELECTED FOR THIS "U" DIMENSION

RMP SPECIFICATION	INDICATING BIMETAL THERMOMETERS	SHEET 50	JOB NUMBER 0029-3
		DOCUMENT NUMBER	REV

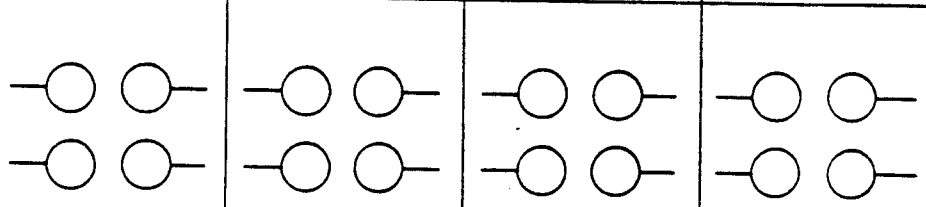
	REQUISITION NO.				VENDOR ASCO (OR APPROVED EQUAL)					
1	Tag No.		EZ-222		EZ-223		22-278			
2	Item No.		1		2					
3	Model No.		HT8211D89MO		→		HB8211C87MO			
4	Service		ICW TO		ICW TO		SEAL WATER			
			CONDENSER		REACTOR		TO REACTOR MAKE			
5	Line No.		1"-ICW-1120-NE		1"-ICW-1123-NE					
6	P&ID No./Section		LA-RY-MP9/H4		LA-RY-MP-9/H5		MP-9/J7			
	SERVICE CONDITIONS									
7	Fluid	Units	WATER	GPM	WATER	GPM	WATER	GPM		
8	Flow Normal	Maximum	11.0	15.0	11.0	15.0		.5		
9	Pressure in Normal	Maximum	60		60		60			
10	ΔP Normal	Maximum	2		2		2			
11	Temperature Normal	Maximum	70	80	70	80	70			
12	Visc @ Opr Temp Cp	Sp Gr	1.0	1.0	1.0	1.0		1.01		
13	Gas or Vapor Mol Wt		—		—					
14	S.G./VIS-CP@ F T		1.0		1.0					
	BODY									
15	Body Size	Port Size	1"	1"	1"	1"	1/2"	5/8		
16	Type of Body		2 WAY		2 WAY		2 WAY			
17	Material		316 SS		→		316SS			
18	End Connections		SCRD		→		SCRD			
19	Direct Lift	Internal Pilot	YES	—	YES	—	YES	—		
20	Packing or Seal		—		—		—			
21	Manual Operator		YES		YES		YES			
22	Reset		—		—		—			
23	Material Plug	Seat	SS	BUNA N	SS	BUNA N	SS	BUNA N		
24	Cv for Maximum Flow	Furnished Cv	8	11.2	8	11.2		4		
25										
	ACTION									
26	Normally Closed or Normally Open		CLOSED		CLOSED		CLOSED			
27										
	SOLENOID				All Solenoids Shall Be Designed for Continuous Duty					
28	Voltage DC or AC & Hz		120V 60 HZ		→		115V 60HZ			
29	~~Amps~~ WATTS Pull In	Hold	15.4		→		—	—		
30	Enclosure		NEMA 4		→		NEMA 4			
31	Electrical Connections and Size		1/2" FNPT		→		1/2" CONDUIT			
32	Coil		CLASS H		CLASS H		CLASS H			
33	Connections (Reference Sketch)		1 INLET		→		1 INLET			
34	" " "		2 OUTLET		→		2 OUTLET			
35	" " "									
36	" " "									

Notes:

37 Energized



38 Deenergized



RMP SPECIFICATION	SOLENOID VALVES	SHEET 51	JOB NUMBER 6087-3

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REQUISITION NO.

Reference Specification Sheet No.

VENDOR FISCHER PORTER (OR APPROVED EQUAL)

Model No. 51 EG 1212 ** B

Rev	Tag No.	Item No.	P&ID No. & Section	Chart Range	Scale Range **	Measurement Increase Output	Service
	LI-198	1	MP-9 K-3	#	0-66"	INC	REACTOR TANK LEVEL
	TI-198A	2	MP-9 K-8		0-400F	INC	REACTOR TANK TEMP

COORDINATE WITH REACTOR TO COORDINATE RANGE BASED ON FINAL LENGTH OF LEVEL PROBE TAG NO TE-198A

RMP DATA SHEET
THE RALPH M. PARSONS COMPANY

RECEIVER INSTRUMENTS

SHEET 52

JOB NUMBER 6084-3

DOCUMENT NUMBER 15.10-1

REV

ENG-IN-1611B-G

	REQUISITION NO.		VENDOR BS&B SAFETY SYSTEMS		(OR APPROVED EQUAL)
1	Tag No.	RD-227			
2	Item No.	1			
3	Model No.	B			
4	Service	REACTOR			
		VENT			
5	Line or Equipment No.	1"-AV-1112-NE			
6	P&ID No./Section	LA-RY-MP-9/K6			
	SERVICE CONDITIONS				
7	Fluid	STEAM VAPOR			
8	Required Capacity / Units	400 #/HR			
9	Maximum Capacity				
10	Mol Wt or Sp Gr @ Operating Temp	18 (APPROX)			
11	Viscosity @ Operating Temp Cp	0.018			
12	Pressure psig: Normal / Relieving	ATM			
13	Temp °F: Normal / Relieving	210 / 240			
14	Back Pressure - Constant	ATM			
	Varies: from / to				
15	Bursting Pressure, Desired psig	60			
16	Bursting Pressure, Minimum psig	57			
17	Bursting Pressure, Maximum psig	63			
	BASIS OF SELECTION				
18	Code				
19	Fire				
20	Other	PSV PROTECTION			
21					
	SAFETY HEADS				
22	Size	1"			
23	Type	QUIK-SERT	FA-7R		
24	Inlet Connection - Type	WELD NECK FLG			
25	Inlet Connection - Rating	1"-150# RF			
26	Inlet Connection - Material	304L SS			
27	Outlet Connection - Type	WELD NECK FLG			
28	Outlet Connection - Rating	1"-150# RF			
29	Outlet Connection - Material	304L SS			
30	Bolting	ANSI			
31	Gauge Tap	—			
32	BORE	SCHED. 40			
	RUPTURE DISK				
33	Disk Type	B			
34	Disk Material	316 SS			
35	Vacuum Support Material	NO			
36	Seal Material	TEFLON			
37	Protective Ring Material	—			
38	Lining	TEFLON			
39	Coating	—			
40	Knife Blade Material	—			
41	Gasket Material	—			
42					
	ACCESSORIES				
43	Spare Disks	2 REQ'D			
44	Code Stamp (ASME) on Handle	YES			
45	Excess Flow Valve	—			
46					
47					

Notes: RUPTURE DISC AND SAFETY HEAD BY VENDOR
CONTRACTOR TO ASSEMBLE PARTS AND INSTALL BETWEEN PIPE FLANGES

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	RUPTURE DISKS	SHEET 53	JOB NUMBER 6087-3
		DOCUMENT NUMBER 15.10	REV 0

H.C.H

REQUISITION NO.	VENDOR BECKMAN (OR APPROVED EQUAL)
Reference Specification Sheet No.	

MODEL Nº 942, pH MONITOR CONSISTING OF COMPONENTS AS FOLLOWS:

P&ID LA-RV-MP-9, REV 1

1 - MODEL 942 ANALYZER PN646949-pH, WITH PN636199 INTEGRAL PREAMPLIFIER

TAG Nº AIT-199A, ANALYZER

TAG Nº AE-199A, SUBMERSIBLE ELECTRODE STA./PREAMP

SERIES III ELECTRODE STATION 300-2-0-20-3-1-3-0

INCLUDING:

316 SS FLOW CHAMBER AND DOME ASSY

#19036 GOLD LABEL DOUBLE JUNCTION REFERENCE ELECTRODE

#19501 PH GLASS ELECTRODE, GENERAL PURPOSE

#19590 RTD THERMOCOMPENSATOR

POWER SUPPLY 120V ±5% 60HZ SINGLE PHASE

RANGE PH: ADJUSTABLE FROM 0-14

OUTPUT: 4-20 MA dc INTEGRAL (WITH ANALYZER) TRANSMITTER

HIGH IMPEDENCE CABLE #646983 20FT

1 - SAME AS ABOVE EXCEPT TAG NOS AE-199B AND AIT-199B WITH A MEASURING ELECTRODE FOR OXIDATION REDUCTION POTENTIAL (ORP) MEASUREMENT

ANALYZER #615300 -1400 TO +1400 mV (ADJUSTABLE)

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	pH/ORP ANALYZER	SHEET 54	JOB NUMBER 10089-3
		DOCUMENT NUMBER 15-10-1	REV 0

ENG-IN-0112-G

REQUISITION NO.	VENDOR ALLEN-BRADLEY (OR APPROVED EQUAL)
Reference Specification Sheet No.	

TAG NO : KC-224

P & ID : LA-RV-MP-9, REV 1/H6

TIMING RELAY

SERVICE : WATER FLOW SOLENOID VALVE CONTROL

MODEL NO : 700-RTA 20V200-A1

CONTACTS : 2 N.O. CONTACTS, CLOSE INSTANTANEOUS

2 N.C. CONTACTS, TIMED OPENING

TIMING RANGE : 1 TO 64 MINUTES

8 PROGRAM KEYS ARE PROVIDED FOR

THE FOLLOWING RANGES:

0.015 TO 1, 0.06 TO 4, 0.25 TO 16 & 1-64 MIN

UL LISTING : CLASS I DIV. 2 & GROUPS A, B, C & D

POWER REQMNTS : 120 V & 60 HZ

CONTACT RATING : 120 VAC 5 AMPS

PARSONS	TIMING RELAY	SHEET 55	JOB NUMBER 6089-3
		DOCUMENT NUMBER	REV

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REQUISITION NO.	VENDOR ALLEN-BRADLEY (OR APPROVED EQUAL)
Reference Specification Sheet No.	

TIME DELAY RELAY WITH SEC
CONTAINED POTENTIOMETER

TYPE : SOLID STATE
INPUT VOLTAGE : 115VAC 60 HZ

TIME DELAY (MAX) - 30 SEC. (MIN) - 0.5SEC.
CONTACTS (TDOAE) TIME DELAY OPEN AFTER ENERGIZING

AC RATING MAKE (30 AMPS) BREAK (3 AMPS)

MODEL : ALLEN-BRADLEY 8525-NSG

TAG. NO. RC-278

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	TIMING RELAY	SHEET 56	JOB NUMBER 6084-3
		DOCUMENT NUMBER	REV

REQUISITION NO.	VENDOR PENBERTHY - OUDAILLE (OR APPD EQ)
Reference Specification Sheet No.	REV 1,

TAG NOS: FI-272 FI-273 FI-274

P&ID : LA-RV-MP-9 ZONE M, N & O - 7, 8 & 9

SIGHT FLOW INDICATORS

MODEL No: SFR-1 ROTATOR STYLE - 3 REQ'D

SERVICE: COOLING WATER DISCHARGE VENT GAS CONDENSER

FLUID: WATER

S.G.: 1.0

TEMP:

LINE No: 1½"-AW-1111-AD 1"-ICW-1121-NE & 1"-HWHR-1124-NE

PHYSICAL LENGTH = 4 1/4 INCHES, 5½ INCHES

CONNECTION: SCREWED 1" NPT-F, 1½" NPT-F *

ROTATOR MAT'L: TEFLON PADDLE WHEEL

ANSI RATING: 150 #

SIGHT GLASS: TEMPERED

BODY MAT'L: 316 SS

* FI-272 - 1½"
FI-273, 274 - 1"

PARSONS SPECIFICATION	SIGHT FLOW INDICATORS	SHEET 57	JOB NUMBER 6089-3
		DOCUMENT NUMBER 15.10-1	REV 0

ENG-IN-0112 (4/81)

DC-

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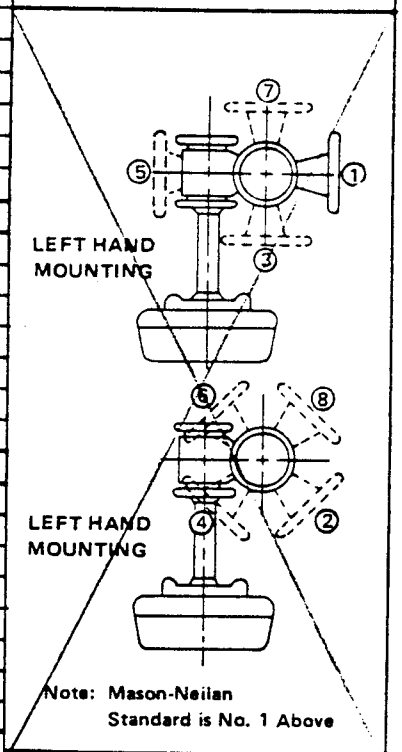
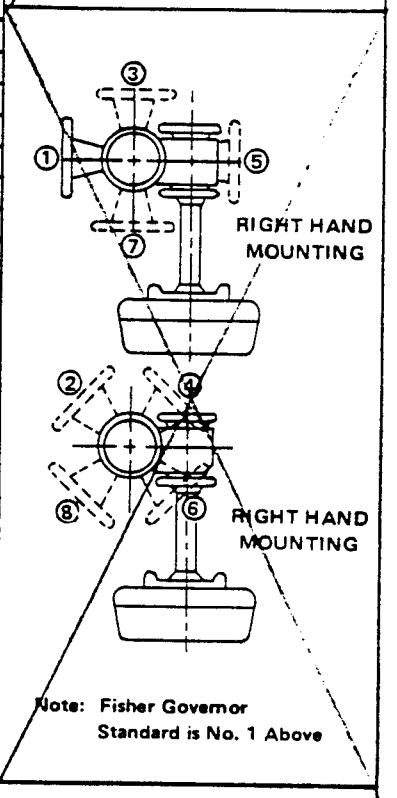
	REQUISITION NO.				VENDOR MAGNETROL (OR APPROVED EQUAL)			
1	Tag No.		LE/LT-148					
2	Item No.		1					
3	Model No.		82-7002-001					
4	Service		REACTOR TANK LEVEL					
5	Vessel or Equipment No.		TK-21					
6	P&ID No./Section		MP-9 K-8					
7	Type		CAPACITANCE TYPE					
	SERVICE CONDITIONS							
8	~~Upper~~ Fluid		TREATED WATER					
9	~~Lower~~ Fluid							
10	sp gr ~~Upper~~	sp gr ~~Lower~~						
11	Press Max	Norm (psig)	AMB					
12	Temp Max	Norm (°F)	240	210				
13								
14								
	~~BODY~~ PROBE		41-1001-001X					
15	Material		KYNAR COATED					
16	Size & Type Connections		3"-150# FLANGE R.F.		316 SS			
17	Top Connection ~~Location~~		NOZZLE TOP OF TANK					
18	Bot Connection ~~Location~~							
19	Case Mounting							
20	Flange Orientation							
21	Rotatable Head							
22	LENGTH		66"					
	FLOAT OR DISPLACER							
23	Diameter or Length, in.							
24	Extension, in.							
25	Material							
26	Torque Tube Material							
27	Air Fin							
28								
	TRANSMITTER							
29	Type		ELECTRIC					
30	Output		4-20 MADC					
31								
	CONTROL							
32	Type							
33	Proportional %	Reset						
34	Output							
35	On Level Increase, Output							
36								
	ACCESSORIES							
37	Filter & Regulator							
38	Gauge Glass Connections							
39	Gauge Glass							
40	Purge Connection							
41	Electric Switch							
42	CABLE 500F		37-3112-020		20FT			
43								

ORIENTATION





Notes:

RMP DATA SHEET
THE RALPH M. PARSONS COMPANY

LEVEL INSTRUMENTS

SHEET 58 | JOB NUMBER 6089-3 | DOCUMENT NUMBER | REV

REQUISITION NO.	VENDOR DANIEL INDUSTRIES (OR APPROVED EQUAL)

	ORIFICE PLATE		ORIFICE FLANGE	
1	Concentric: ☒ Other	7	Taps: Flange ☐ Pipe ☐ Other —	
2	Make to ASME Standard ☒ Other	8	Rating & Facing 150# FLAT FACE	
3	Plate Material: 316 SS ☐ Other HASTELLOY	9	Type: Weld Neck ☒ Other SLIP ON	
4	RTJ Ring Matl & Type	10	Material: Steel ☒ Other	
5	Bore Maximum Rate ☐ Nearest 1/8 in. ☒	11	Tap Size 1/2 in. NPT ☐ Other —	
6	Stamp to ISA Standard ☒ Other	12	Flanges by Mat'l Control ☐ — ☐	

13	Tag Number			RD-199						
14	Item Number			1						
15	Service			REACTOR						
				TK-21 PH						
16	Line No.			1" HW-HR-1124-NE						
17	P&ID No./Section			MP-9 M-7						
	SERVICE CONDITIONS									
18	Fluid			LIQUID						
19	Flow Units									
20	Full Scale Flow	Opr	Base							
21	Norm Flow	Opr	Base							
22	Press (psia)	Opr	Base	AMB						
23	Barometric Pressure (psia)									
24	Temperature °F	Opr	Base	210						
25	sp gr @ 60° F & Base Press									
26	sp gr @ Opr Conditions									
27	Supercomp Factor @ Opr Press									
28	Vapor, Gas Mol. Wt.									
29	Viscosity @ Opr Temp (cp)									
30	Steam Qual	Superheat °F								
31	Weep Hole Required									
32	Viscosity Correction (Fc)									
33	Liquid Compressibility Factor (Fp)									
34	Density (lbs/ft^3)	Opr	Base							
35	Compressibility	Opr	Base							
36	Cp/Cv									
37	Specific Volume (ft^3/lb)									
	MEASURING STATION DATA									
38	Actual Orifice ID in.			3/4"						
39	Line Flange ID in.			STD						
40	Orifice Plate Thickness in.			1/8"						
41	Seal sp gr @ 60° F			—						
42	Meter Type			—						
43	Diff Range in H_2O Dry			N/A						
44	Static Range psia			—						
45	Chart or Scale Range			—						
46	Chart Multiplier (C)			—						
47	Beta Ratio d/D			.75						
48	Manometer Correction (Fm)			—						
49	Flow Equals			—						
50	Line:	Size	Sched	1"	STD					

Notes:

1. Volume rates of flow are expressed at 60° F for liquids and on base conditions for gases and vapors.
2. Vents and drains (weep holes) when specified shall conform to ¶20 (i) of the ASME "Flow Measurement" Chap 4, PTC 19.5, 4-1959
3. "F" equals flow pen reading; "P" equals static pressure pen reading.

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	ORIFICE PLATES	SHEET 59	JOB NUMBER 6089-3
		DOCUMENT NUMBER 15.10-1	REV

ENG-IN-1511-G

REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION
	C	[illegible]	J.S	[illegible]		INITIAL ISSUE

REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION

For LOS ALAMOS NATIONAL LAB. Site LOS ALAMOS, NEW MEXICO
Unit TA-50 (WUM-1) Service AGITATOR - RECEIVING/SETTLING TANK
Item No. M-20 Quantity ONE
Mfr Size/Type /TURBINE Serial No.
Item No. (Motor Driver) M-20 Furn By VENDOR Mtd By VENDOR
Other

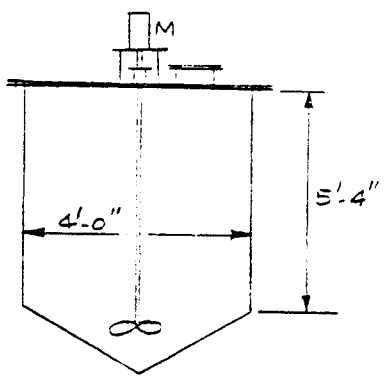
MIXING CONDITIONS

Mixer Function TO MAINTAINE SOLIDS IN SUSPENSION AND MIX THE CONTENTS
Final State Reqd: ☐ Complete Uniformity ■ 98 % Uniformity ■ Off Bottom Susp ☐ Other
Withdrawal Rate gpm Batch Blending Time hrs Solids Settling Velocity fpm

COMPONENTS

	1st Cmpnt	2nd Cmpnt	3rd Cmpnt	Mixture
Type of Liquid NOTE 1				
Type of Solid				
Specific Gravity @ 60 °F				1.5
Viscosity cp @ 60 °F				500
% of Mix ☐ Vol ☐ Wt				
Component Temp DESIGN °F	225	225	225	
Solids Size				

APPLICATION SKETCH



MIXER DWG
VESSEL DWG TK-20

MIXER DESIGN

■ Top Entry ☐ Side Entry ☐ Bottom Entry Wetted Parts Material HASTELOYC
Impeller: Type TURBINE No. ONE No. of Blades
Diameter in. Stabilizer Off Bottom in.
Speed rpm Pumping Capacity 20-30 gpm Tip Speed fpm
Shaft: Diameter in. Length in. bhp 1st Critical rpm
Coupling Type Location
Seal LIP SEAL Style
Seal Lubricator Style
Mixer Mount: ■ Closed Tank Flange Mounted ☐ Open Tank Beam Mounted
☐ Center Mounted ☐ Angle Riser Mount ☐ Off Center Mount in.
Mounting Flange Size in. Rating psig Facing
Design Loads: Vertical Downward Load lbs
Bending Moment in.- lbs Torque in.-lbs
Other

Gear Type
Mfr Ratio
Service Factor
Maximum Case Horsepower

VESSEL DESCRIPTION

Material SHELL CARBON STEEL KYNAR LINED/TOP 304L S.S.
Type CYL VERTICAL Diameter 4' Height 5'-4"
Top ☐ Open ■ Closed ■ Flat ☐ Dished Max Manway Dia in.
Bottom ~~☐ Flat ☐ Closed~~ 120° CONE BOTTOM Max Head Room Avail ft
Capacity 300 gal Normal 500 gal Maximum
Liquid Level 5' (NOTE 2) ft Normal 5' ft Maximum
Pressure ATMOSPHERIC psig Normal 15 psig Maximum
Agitator Flange Size in. For ☐ Mixer Support ☐ Shaft Seal
Baffles No. Width in. Height Off Wall in.
Other

WEIGHTS

Mixer lbs
Driver lbs
Shaft & Impeller lbs
Total lbs

MOTOR DRIVER

Mfr
rpm hp
Data Sheet

Notes 1. NITRIC ACID, HYDROCHLORIC ACID, FLUOROBORIC ACID, VARIOUS BASES, CYANIDES, CYANATES, CHROMATES AND CADMIUM SOLUTIONS AT VARIOUS CONCENTRATIONS.
2. MINIMUM CAPACITY 100 GAL (SEE SHT 2 OF 2 FOR SKETCH)

AMP DATA SHEET
THE RALPH M. PARSONS COMPANY

RECEIVING/SETTLING TANK
MIXER/AGITATOR
M-20

SHEET	OF	JOB NUMBER
1	2	60E 00

DOCUMENT NUMBER 15.11-02 REV 0

ENG-RE-404 DC-

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	0	2/16/83	JG	RC		INITIAL ISSUE							

DESIGN DATA AND ACCESSORY EQUIPMENT

No. of Identical Units ONE Tag No. M-20

Service RECEIVING/SETTLING TANK AGITATOR

Nameplate: 1.5 (ESTIMATED) hp 950 V 3 Phase 60 Hz (SEE NOTE) Service Factor

NOTE (3) r/min(syn) CONST Duty Locked-Rotor kVA

Insulation Class: A ☐ B ☐ F ☐ H ☐ °C Ambient

Sealed ☐ Encapsulated ☐

Area Classification: Class (I) (II) (III), Group (A) (B) (C) (D), Division (1) (2)

Atmospheric Mixture T-Rating °C Unclassified ☐

Enclosure: Weather-Protected Type (I) (II) Totally Enclosed Fan-Cooled ☒

Totally Enclosed Nonventilated ☐ Explosionproof ☐

Location: Indoor ☒ Outdoor ☐ Dusty ☐ Altitude 7200 FT

Bearing type: Ball ☐ Sleeve ☐ Forced-Feed Lubrication ☐

Specification: NEMA Standard MG 1 ☒ API RP 541 ☐

Sound Pressure Level Requirements:

Starting: Full Voltage ☐ Reduced Voltage ☐ % of Voltage

Unloaded ☐ Loaded ☐ Capacitors for Power Factor Correction ☐

Mounting Method: Horizontal ☐ Vertical ☒

Stainless Steel Nameplate ☒ Filter for WP (I) (II) ☐

Drain Plugs ☐ Thermal Temperature Switches ☐ Thermocouples ☐

Resistance Temperature Detectors ☐ Bearing Temperature Detectors ☐

Space Heaters ☐ V W Phase

Differential Protection ☐ Surge Protection ☐ Oversized Terminal Box ☐

INFORMATION BELOW TO BE COMPLETED BY VENDOR

Motor Mfr Type Style No.

Full Load, r/min Weight Frame No.

Bearing Mfr Bearing No.

Starting Torque

LOAD	FULL	¾	½
Amperes			
Efficiency, %			
Power Factor			
Speed, r/min			

Locked Rotor Torque

Locked Rotor Amperage

Pull Up Torque

Full Load Torque

Breakdown Torque

Accelerating Time in Seconds (0 – Full Speed)

Tests (When Specified)

Safe Time-Current Curve ☐

Speed-Torque Curve ☐

Stall Time at Zero r/min Seconds

Number of Consecutive Starts

Notes: 3. FOUR SPEED, TWO WINDING, HAVING SPEEDS 2/3, 1/2, AND 1/3 OF HIGH SPEED. STARTER SHALL BE FOUR SPEED, TWO WINDING NEMA SIZE 1.

PARSONS DATA SHEET	INDUCTION MOTOR M-20	ACCOUNT NUMBER SHT 2 OF 2	JOB NUMBER 602[illegible]
		DOCUMENT NUMBER 15.11-04	REV 0

ENG-EE-101 (6/81) DC–

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	0	2/16/83	J.C.			REVISED ISSUE

REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION

For LOS ALAMOS NATIONAL LAB — Site LOS ALAMOS, NEW MEXICO
Unit TA-50 (WM-1) — Service AGITATOR - REACTOR
Item No. M-21 — Quantity ONE
Mfr — Size/Type / TURBINE — Serial No.
Item No. (Motor Driver) M-21 — Furn By VENDOR — Mtd By VENDOR
Other

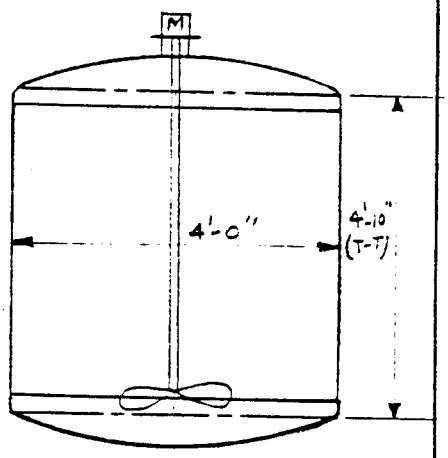
MIXING CONDITIONS

Mixer Function TO MAINTAIN SOLIDS IN SUSPENSION - GAS DISPERSION (NOTE 3)
Final State Reqd: ☐ Complete Uniformity ■ 98 % Uniformity ■ Off Bottom Susp ☐ Other
Withdrawal Rate — gpm Batch Blending Time hrs Solids Settling Velocity fpm

COMPONENTS

	1st Cmpnt	2nd Cmpnt	3rd Cmpnt	Mixture
Type of Liquid (NOTE 1)				
Type of Solid				
Specific Gravity @ 60 °F				1.5
Viscosity cp @ 60 °F				500
% of Mix ☐ Vol ☐ Wt				
~~Component~~ DESIGN Temp °F	225	225	225	
Solids Size				

APPLICATION SKETCH



MIXER DWG
VESSEL DWG TK-21

MIXER DESIGN

■ Top Entry ☐ Side Entry ☐ Bottom Entry Wetted Parts Material HASTELOY C
Impeller: Type TURBINE No. ONE No. of Blades
Diameter in. Stabilizer Off Bottom in.
Speed rpm Pumping Capacity 20-20 gpm Tip Speed fpm
Shaft: Diameter in. Length in. bhp 1st Critical rpm
Coupling Type Location
Seal DOUBLE MECH. Style BY VENDOR
Seal Lubricator IND. WATER (NOTE 4,5) Style
Mixer Mount: ■ Closed Tank Flange Mounted ☐ Open Tank Beam Mounted
☐ Center Mounted ☐ Angle Riser Mount ☐ Off Center Mount in.
Mounting Flange Size in. Rating psig Facing
Design Loads: Vertical Downward Load lbs
Bending Moment in.- lbs Torque in.-lbs
Other

Gear Type
Mfr Ratio
Service Factor
Maximum Case Horsepower

VESSEL DESCRIPTION

Material SA-285 C W/ KYNAR LINING
Type CYL VERTICAL Diameter 4' Height 4'-10"
Top ☐ Open ☐ Closed ☐ Flat ■ Dished Max Manway Dia in.
Bottom ☐ Flat ■ Dished Max Head Room Avail ft
Capacity 300 gal Normal 200 gal Maximum
Liquid Level 2'-7" (NOTE 2) ft Normal ft Maximum
Pressure ATMOSPHERIC psig Normal 50 psig Maximum
Agitator Flange Size BY VENDOR in. For ☐ Mixer Support ☐ Shaft Seal
Baffles No. Width in. Height Off Wall in.
Other

WEIGHTS

Mixer lbs
Driver lbs
Shaft & Impeller lbs
Total lbs

MOTOR DRIVER

Mfr
rpm hp
Data Sheet

Notes 1. NITRIC ACID, HYDROCHLORIC ACID, FLUOROBORIC ACID, VARIOUS BASES, CYANIDES, CYANATES, CHROMATES AND CADMIUM SOLUTIONS AT VARIOUS CONCENTRATIONS.
2. MINIMUM LIQUID VOLUME 100 GAL. (SEE SHT 2 OF 2 FOR CONT.)

RMP DATA SHEET THE RALPH M. PARSONS COMPANY	MIXER/AGITATOR M-21 REACTOR - AGITATOR	SHEET 1 OF 2	JOB NUMBER 6089-01
		DOCUMENT NUMBER [illegible]	REV 1

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REVISIONS	NO.	DATE	BY	CK	APP	DESCRIPTION

DESIGN DATA AND ACCESSORY EQUIPMENT

No. of Identical Units ONE Tag No. M-21

Service REACTOR AGITATOR

Nameplate: 1 (ESTIMATED) (SEE NOTE 6) hp 460 V 3 Phase 60 Hz (SEE SPEC) Service Factor

r/min(syn) _____ Duty _____ Locked-Rotor kVA _____

Insulation Class: A ☐ B ☐ F ☐ H ☐ _____ °C Ambient

Sealed ☐ Encapsulated ☐

Area Classification: Class (I) (II) (III), Group (A) (B) (C) (D), Division (1) (2)

Atmospheric Mixture _____ T-Rating _____ °C Unclassified ☐

Enclosure: Weather-Protected Type (I) (II) Totally Enclosed Fan-Cooled ■

Totally Enclosed Nonventilated ☐ Explosionproof ☐

Location: Indoor ■ Outdoor ☐ Dusty ☐ Altitude 7200 FT

Bearing type: Ball ☐ Sleeve ☐ Forced-Feed Lubrication ☐

Specification: NEMA Standard MG 1 ■ API RP 541 ☐

Sound Pressure Level Requirements: _____

Starting: Full Voltage ☐ Reduced Voltage ☐ _____ % of Voltage

Unloaded ☐ Loaded ☐ Capacitors for Power Factor Correction ☐

Mounting Method: Horizontal ☐ Vertical ■

Stainless Steel Nameplate ■ Filter for WP (I) (II) ☐

Drain Plugs ☐ Thermal Temperature Switches ☐ Thermocouples ☐

Resistance Temperature Detectors ☐ Bearing Temperature Detectors ☐

Space Heaters ☐ _____ V _____ W _____ Phase

Differential Protection ☐ Surge Protection ☐ Oversized Terminal Box ☐

INFORMATION BELOW TO BE COMPLETED BY VENDOR

Motor Mfr _____ Type _____ Style No. _____

Full Load, r/min _____ Weight _____ Frame No. _____

Bearing Mfr _____ Bearing No. _____

Starting Torque _____

LOAD	FULL	¾	½
Amperes			
Efficiency, %			
Power Factor			
Speed, r/min			

Locked Rotor Torque _____

Locked Rotor Amperage _____

Pull Up Torque _____

Full Load Torque _____

Breakdown Torque _____

Accelerating Time in Seconds (0 – Full Speed) _____

Tests (When Specified) _____

Stall Time at Zero r/min _____ Seconds

Number of Consecutive Starts _____

Safe Time-Current Curve ☐

Speed-Torque Curve ☐

Notes:

3) VENDOR TO INCLUDE IN HIS SHOP DRAWING SUBMITTAL GAS DISPERSION SCHEME PROPOSED TO THOROUGHLY MIX GASES FROM THE VESSEL VAPOR SPACE INTO THE LIQUID.

4) SEAL WATER AVAILABLE IS 0.5 G.P.M @ 60 PSIG

5) VENDOR TO PROVIDE STRAINER, REGULATOR (IF REQ'D), FLOW INDICATOR-SWITCH W/ N.C. CONTACTS ON NO FLOW AND C.S. SEAL WATER PIPING.

6) FOUR SPEED, TWO WINDING, HAVING 2/3, 1/2, AND 1/3 OF HIGH SPEED. STARTER SHALL BE FOUR SPEED, TWO WINDING NEMA SIZE 1.

PARSONS DATA SHEET	INDUCTION MOTOR M-21	ACCOUNT NUMBER SHT 2 OF 2	JOB NUMBER 6089-0001
		DOCUMENT NUMBER 15.11-05	REV 0

ENG-EE-101 (6/81)

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0083C

CONTRACT NO. DE-AC32-80AL13151

CONSTRUCTION SPECIFICATION
FOR
UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

DIVISION 15 MECHANICAL

SUB-DIVISION 15.12

DIAPHRAGM PUMPS

PART 1 GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and services to manufacture, procure, install, inspect, test and accept a double diaphragm pump as indicated on the drawings and specified herein.

1.1.1 Furnished Equipment

The Contractor shall furnish the pump as a complete unit, including air valve, silencer, baseplate, special features, and accessories as specified herein.

The Contractor shall furnish to the Contracting Officer documents in accordance with Section 1.3.

Standard equipment and design are requested, provided the performance requirements of this Specification are met. Engineering, fabrication, and quality assurance and control shall result in equipment capable of operation at specified design conditions.

1.1.2 Related Work

The following associated work shall be performed by the Contractor:

Emplacement, shimming, grouting, final alignment verification, piping installation and compressed air system.

Work performed per this Sub-Division shall be coordinated with work accomplished per the following Sub-Divisions:

3.01	Cast-In-Place Concrete
15.01	Piping

1.2 REFERENCE DOCUMENTS

The Contractor shall comply with codes and standards referenced in this Specification.

American National Standards Institute (ANSI)

ANSI B16.5 - 77	Steel Pipe Flanges, Flanged Valves and Fittings

US Department of Labor

Occupational Safety and Health Administration (OSHA)

29 CFR 1910 - 79	Occupational Safety and Health Standards for General Industry

1.3 SUBMITTALS

1.3.1 Shop Drawings and Product Data

The Contractor shall submit to the Contracting Officer drawings, completed data sheets, parts lists, performance curves, inspection and test results, installation, operating and maintenance instructions, certificate of compliance and recommended spare parts list with prices in accordance with Attachment "Data Requirements List".

PART 2 PRODUCTS

2.1 DESCRIPTION

The pumps shall meet the technical and performance requirements outlined herein.

2.1.1 Performance Characteristics

The pump shall be capable of flowing strong acids at 200°F (hydrochloric, sulfuric and fluroboric acid; 20% concentration) at 15 to 40 gpm with a maximum of 60 feet total differential head. Adjustable pressure compressed air will be supplied. Maximum air pressure will be 125 psig.

2.1.2 Material of Construction

2.1.2.1 Wetted Parts. Pump housing wetted with the process liquid shall be Kynar. Non-wetted parts shall be cast iron.

2.1.2.2 Valves. Valves shall be ball type, Teflon with Teflon seats.

2.1.2.3 Diaphragm. Diaphragm shall be Teflon.

2.1.3 Flanges

Pump flange connections shall be 2" 150# per ANSI B16.5, flat face Kynar lined.

2.1.4 Sound Level

Pump sound level shall not exceed 85 db as defined per OSHA.

PART 3 EXECUTION

3.1 FABRICATION REQUIREMENTS

3.1.1 Tagging of Pumps

The nameplate shall be of 24 US Standard Gauge (minimum) stainless steel and shall be securely attached to the pump. The nameplates shall include, as a minimum, the manufacturer's name, pump model, standard dimension designation, serial number, size, unit weight, impeller diameter (maximum and installed), materials of construction, horsepower rating, maximum design pressure for 40 deg C (100 deg F) service as shown on the pump data sheet, and equipment item number. The direction of rotation shall be marked on the pump.

3.1.2 Painting and Surface Preparation

Stainless steel surfaces shall not be painted. Carbon steel surfaces shall be painted using the Vendor's standard materials.

Standard paint used shall remain intact at operating temperature of the surfaces to which it is applied. All exposed surfaces shall receive a coat of rust preventative such as Exxon Chemical Co. Rust Ban 392 or Approved Equal.

3.2 SHIPPING AND STORAGE

All components shall be completely assembled and match-marked, as required, at the assembly area prior to shipment.

Flange closures shall consist of a rubber gasket and a full size 1/4 inch thick exterior plywood cover. This cover shall be bolted in place by a minimum of four full size bolts. All drilled and tapped holes shall have metal or plastic plugs and all exposed pipe ends shall be capped.

Pump shall be boxed or crated for full protection against damage during transport and yard handling. Pump shall be prepared to prevent damage from the elements and temperatures ranging from minus 40 deg F to plus 120 deg F.

3.2.1 Receipt Inspection

The Contracting Officer will inspect the equipment and documentation specified herein upon receipt at the site to determine if the equipment as received has suffered damage during shipment. This inspection will include appurtenances shipped separately or together with the equipment.

3.2.2 Storage

The Contractor shall allocate sufficient indoor, non-heated storage space and employ protective measures to protect the equipment and appurtenances specified herein from any damage due to natural elements or the Contractor's equipment. Particular care shall be taken to prevent damage to flange faces, seal surfaces, and all interfacing parts or surfaces between equipment piping, or structures. The Contractor shall allocate equipment storage space in an area

segregated from fabrication operations and maintained free from debris. Temporary structures, supports, cribbing, or bracing may be provided and employed by the Contractor to prevent damage to the equipment and appurtenances specified herein.

The Contracting Officer reserves the right to inspect, without notice, all equipment storage areas, protective measures, and temporary structures used to store equipment.

3.2.3 Handling

The Contractor shall provide and use suitable devices to handle, without damage the equipment and appurtenances specified herein from receipt through installation. The Contractor shall be responsible for providing suitable access into the facility for handling devices with equipment for installation.

3.3 INSTALLATION

Installation of equipment shall be in accordance with the piping drawings and the manufacturer's installation instructions. The Contractor shall be responsible to provide necessary foundations, anchorings, bolts, studs, and nuts for proper installation, and interfacing with equipment.

3.3.1 Foundations

The structural drawings will define the size, type, elevation, location, and material of equipment foundations and the size, type, location, and material of anchorings to be provided. Grouting, if required, shall provide full bearing support. Anchor bolts shall be provided with sufficient length to allow for double nuts above the face of base rings, base plates, or saddles. Double nuts shall be provided and installed on all anchor bolts.

3.3.2 Appurtenances

The Contractor shall be responsible for the lubrication and installation of all necessary appurtenances, blind flanges, studs, nuts, seals, gaskets, connectors, and clips, including removal of test gaskets, seals, bolts, or connectors, and installation of service gaskets, seals, bolts, or connectors, when such appurtenances are not installed prior to shipment. Installation of all such appurtenances shall be in accordance with the installation instructions.

3.4 PRESSURE TESTING

The pump shall be hydrostatically tested at 1.5 times the design pressure with clean water at a minimum temperature of 60 deg F.

(1) The hydrostatic test pressure shall be maintained for a minimum of 10 minutes and during pump examination for leakage.

(2) Leakage of temporary gaskets and seals, installed for the purpose of conducting the hydrostatic test and which will be replaced or discarded later, is permitted provided the leakage does not exceed the capacity to maintain system test pressure for the required length of time or does not mask leaks from other joints.

(3) No visual weeping or leakage is permitted from any pump assembly joint nor external component. If weeping or leakage occurs, defective part(s) shall be replaced with new ones, and pump shall be retested and inspected as above.

3.5 ACCEPTANCE

Equipment, materials, and workmanship not in accordance with the requirements specified herein shall be corrected by the Contractor.

UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

DATA REQUIREMENTS LIST

	DESCRIPTION	CHECK IF REQ'D.	* WHEN REQ'D.	NO. OF COPIES REQ'D.	REFERENCE	** REQ'd. FOR
1.	Outline Drawings, Cross-Section Drawing	X	BFR		1.3.1	ACO
2.	Parts Lists	X	WS		1.3.1	INFO
3.	Performance Characteristics	X	BFR		1.3.1	ACO
4.	Inspection and Test Results	X	PS		1.3.1	ACO
5.	Installation, Operating, and Maintenance Instructions	X	PS		1.3.1	INFO
6.	Data Sheets	X	BFR		1.3.1	ACO
7.	Recommended Spare Parts w/prices	X	PS		1.3.1	INFO
8.	Certificate of Compliance	X	WS		1.3.1	ACO

* "AC" - As Completed
"BC" - Before Contract can be awarded
"BU" - Before Use (of procedure or by personnel)
"BFR" - Before Fabrication Release
"PS" - Prior to Shipment
"WS" - With Shipment

** "ACO" - Approval by Contracting Officer "INFO" - Information

H-P HYDRO-PURE SYSTEMS COMPANY
WATER TREATMENT EQUIPMENT
75 BLOOMFIELD AVENUE-DENVILLE, N.J. 07834-(201) 627-1315

November 15, 1983

Brown-Olds Corp.
Mechanical/Industrial Contractors
P.O. Drawer 9158
El Paso, TX 79983

Attention: Mr. Ariel Gutierrez

Subject: Upgrading of Industrial Liquid Waste Treatment Plant, Los Alamos National Laboratory
Brown-Olds P.O. #: E-65076
Hydro-Pure Job No: 20831

Dear Ariel,

This letter shall serve to confirm our telephone conversation (11/10/83) in regards to the Kynar lining application to vessel TK-21, for the above specified job.

The vessel is being fabricated per the specification and approved submittal as follows:

Operating Temperature:	250 F
Jacket Design Pressure:	50 psig
Jacket Operating Pressure:	50 psig

If the jacket is actually operated with 50 psig saturated steam (approximately 300 F) the Kynar lining system cannot be guaranteed. The maximum allowable pressure for the jacket must not exceed 20 psig.

Please take the appropriate action and confirm to H-P.

If you require any clarifications , and/or additional information please do not hesitate to call.

Sincerely,

Larry Wnek
Project Manager

LW:vg

Enclosure

02:11/15.831
file: cust. corr.

H-P HYDRO-PURE SYSTEMS COMPANY
WATER TREATMENT EQUIPMENT
75 BLOOMFIELD AVENUE-DENVILLE, N.J. 07834-(201) 627-1315

August 2, 1981

Brown-Olds Corp.
Mechanical/Industrial Contractors
P.O. Box 740
Los Alamos, NM 87544

Attention: Mr. Tom Preckett

Subject: Upgrading of Industrial Liquid Waste Treatment Plant, Los Alamos National Laboratory
Brown-Olds P.O. #: E-65076
Hydro-Pure Job No: 20831

Dear Tom,

Per our telephone conversations of August 4, 1983, H-P would like to clarify the following items prior to formal approval:

1. Nozzle type (Vessel TK-21) - Due to the fact that this vessel is to be Kynar lined, a corrosion allowance is not required. Therefore, all listed nozzles (further detailed on H-P Dwg. C-20831-C01 and corresponding data sheet #N/C01.831) are to be schedule 40 with slip-on type flanges.

2. Vessel heads - Cold formed heads, which are in complete compliance with the ASME code Section VIII, are to be utilized. The vessel manufacturer requests the option of not using stress relieved heads, due to the fact that the heads are under 1-1/2" in thickness.

3. Welding tests and Inspection - All welding, including tests and inspection, has been bid in complete compliance with the ASME code Section VIII, as is normally performed on vessels in this industry. Therefore, we request that the extensive examination (above and beyond normal code requirements) of welds by the liquid penetrant method, which we were unaware of at bid time, be waived. By the elimination of this testing, less time will be required by the tank manufacturer to complete the fabrication of the vessels, which will keep in line with our present offering, otherwise an expected delay of 4 weeks may be encountered.

4. Film type for radiograph inspection to be: Type AA Film.

HYDRO-PURE SYSTEMS COMPANY

Please advise H-P as soon as possible regarding these items so that the tank shop may continue with material purchases. We request a response in regards to the types of heads to be utilized (item #2) as soon as possible, due to the long delivery associated with these items. Please note that this request for using these types of heads is in accordance with the specification where written approval from the Contracting officer is required.

A delay in correspondance regarding these items may consequently result in a delay in the overall delivery to the job site.

If you require any clarifications , and/or additional information please do not hesitate to call.

Sincerely,

Larry Wnek
Project Manager

LW:vg
Enclosure

cc:
Brown-Olds Corp.
Mechanical/Industrial Contractors
P.O. Drawer 9158
El Paso, TX 79983

Attention: Mr. Ariel Gutierrez

01:8/2.831
file: cust. corr.

NOTES

DIAMETER..... 48" STRAIGHT SIDE ... 58"

MATERIALS OF CONSTRUCTION:

HEAD(S).....	SA-285C	SHELL(S).....	SA-285C
FLANGES.....	SA-105	NOZZLE NECKS.....	SA-53-B
CLIPS.....	N/A	VESSEL ATTACHMENTS..	SA-36
BOLTS.....	SA-193-B7	NUTS.....	SA-194-2H

HEAD THICKNESS.... 3/8" SHELL THICKNESS.. 5/16" CORROSION ALLOWANCE. NONE
TYPE HEADS..... 2:1 ELLIPTICAL
DESIGN PRES..... 50 PSIG TEST PRESSURE.... 75 PSIG OPERATING PRES..... ATM
DESIGN TEMP..... 275 F TEST TEMP..... AMB OPERATING TEMP..... 250 F

OUTER JACKET DESIGN DATA:
DIAMETER..... 54" STRAIGHT SIDE ... 56-1/2"

MATERIALS OF CONSTRUCTION:

HEAD(S).....	SA-285C	SHELL(S).....	SA-285C
FLANGES.....	SA-105	NOZZLE NECKS.....	SA-53-B
CLIPS.....	N/A	VESSEL ATTACHMENTS..	SA-53-B
BOLTS.....	SA-193-B7	NUTS.....	SA-194-~~B~~2H

HEAD THICKNESS.... 3/8" SHELL THICKNESS.. 1/4" CORROSION ALLOWANCE. NONE
TYPE HEADS..... 2:1 ELLIPTICAL BOTTOM ONLY, 3" X 1" ROLLED BAR TOP ONLY.
DESIGN PRES..... 50 PSIG TEST PRESSURE.... 75 PSIG OPERATING PRES..... 50 PSIG
DESIGN TEMP..... 275 F TEST TEMP..... AMB OPERATING TEMP..... 250 F

NOZZLE/SPOOL/CONNECTION SCHEDULE:

ITEM	SIZE	TYPE	RATING	FUNCTION	DESCRIPTION
N1	6"	FF	150 #	SOLID CHARGE	PAD FLANGE WITH COVER (BLIND FLG)
N2	6	FF	150 #	SIGHT PORT	SCH 40 WITH COVER (BLIND FLG)
N3	~~2~~	FF	150 #	CHEM GASES INLET	PAD FLANGE
N4	3	FF	150 #	SPRAY WATER	SCH 40
N5	3	FF	150 #	CHEM & ACID INLET	SCH 40
N6	2	FF	150 #	ACID VENT	PAD FLANGE
N7	~~2~~	FF	150 #	IND WASTE	SCH 40
N8	3	FF	150 #	TEMP ELEMENT	SCH 40
N9	3	FF	150 #	LIQ LEVEL ELEMENT	SCH 40
N10	2	COUP	3000#	STEAM INLET	1/2 COUPLING
N11	~~1-1/2~~	COUP	3000#	HOT WATER OUTLET	1/2 COUPLING
N12	~~1-1/2~~	COUP	3000#	HOT WATER INLET	1/2 COUPLING
N13	3	FF	150 #	IND WASTE CONNECT	SCH 40
N14	6	FF	150 #	MIXER MOUNT	PAD FLANGE
N15	24	FF	150 #	MANWAY COVER	SCH 40 (32 " COVER)

1. NUMBER OF VESSELS TO BE FABRICATED: ONE (1)

2. IDENTIFICATION OF VESSELS (TAG NOS.): TK-21

3. DIMENSIONS AND DEGREES OF ORIENTATION TO BE HELD TO A TOLERANCE OF ±1/8".

4. DIMENSIONS ARE TO FACE OF STEEL (INSIDE WALL OF VESSEL FOR DIMENSIONS INSIDE TANK AND OUTSIDE WALL OF VESSEL FOR DIMENSIONS OUTSIDE OF TANK).

5. ALL NOZZLES ARE TO HAVE A DIMENSION OF 6" FROM VESSEL TO FLANGE FACE UNLESS OTHERWISE NOTED. (PAD FLANGES).

6. FOR MANHOLE SUPPLY; COVER, GASKETS, AND FASTENING HARDWARE.

7. EXTERIOR PAINTING AND SURFACE PREPARATION: STAINLESS STEEL SURFACES SHALL NOT BE PAINTED. CARBON STEEL SURFACES SHALL BE PAINTED USING THE VENDOR'S STANDARD MATERIALS BUT SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

   SURFACE PREPARATION- POWER TOOL CLEAN IMMEADIATELY PRIOR TO PRIMING. SURFACES SHALL BE FREE OF MILL SCALE, RUST, DIRT, DUST, OIL, GREASE, WELD SPLATTER, AND ANY FOREIGN MATTER.

   PRIME COAT-STANDARD PRIME COAT MATERIAL WHICH SHALL CONTAIN RUST INHIBITORS; MINIMUM DRY FILM THICKNESS SHALL BE 1.5 MILS.

8. LINING: KYNAR, 60 MILS
   SUPPLIED:

9. INTERIOR SURFACE PREPARATION: INTERIOR SURFACES, IF UNIT IS TO BE LINED, ARE TO BE PREPARED PER THE LINING MANUFACTURES REQUIREMENTS AND RECOMMENDATIONS (WELDS GROUND SMOOTH, SPLATTER REMOVED, ETC.).

10. IF THE VESSEL(S) ARE TO BE LINED, AFTER EXTERIOR PAINTING, PAINT ON THE OUTSIDE SHELL IN THREE OBVIOUS PLACES, WITH 6" LETTERS: "LINED VESSEL DO NOT WELD OR BURN".

11. ALL OPENINGS SHALL BE COVERED AND PROTECTED. FLANGE CLOSURES SHALL CONSIST OF OF RUBBER GASKET WITH FULL FACE, 1/4" THICK, PLYWOOD COVER FASTENED WITH AT LEAST FOUR (4) FULL SIZE BOLTS. THREADED OPENINGS SHALL BE PROTECTED WITH METAL OR PLASTIC INSERTS OR CAPS. OTHER METHODS OF PROTECTION MUST BE APPROVED BY HYDRO-PURE.

    ITEMS SHIPPED LOOSE ARE TO BE BOXED OR CRATED FOR FULL PROTECTION DURING SHIPMENT.

12. VESSEL IS TO BE BUILT IN ACCORDANCE WITH LATEST EDITION OF SECTION VIII A.S.M.E. CODE WITH STAMP.

13. LIFTING LUGS TO BE LOCATED BY TANK MANUFACTURER AND OF VESSEL MANUFACTURERS STANDARD DESIGN WITH A 2" DIAMETER HOLE.

14. BOLT HOLES TO STRADDLE CENTERLINE OF FLANGE CONNECTIONS.

15. SUPPLY ALL FASTENING HARDWARE (STUDS, NUTS, ETC.) AND GASKETS AS CALLED FOR BY DRAWING(S).

16. HYDRO-PURE TO BE NOTIFIED FOR: WITNESS HYDRO STATIC TESTING AND INSPECTION, IN ADDITION FORWARD ALL COPIES OF CERTIFICATIONS TO HYDRO-PURE.

17. SIESMIC REQUIREMENTS: ZONE 2, 'I' = 1.5; 'S' = 1.5

ADDITIONAL DETAILS (OR REFERENCE DRAWINGS):

A. LEGS: FOUR (4) EACH 6 X 6 X 1/2 WITH 11 X 11 X 1 PAD WITH 1-1/8" HOLE FOR 1" BOLT.
B. NAMEPLATE BRACKET/STAMPING: DRAWING 20831-_____

*** END ***

nder: Write or type message, pull out yellow sheet, mail the other two by folding in half and inserting in #771 DU-O-VUE envelope.

KAREN

FORM 187-3 Available from MEBS Inc., Townsend, Mass. 01470 NO CARBON PAPER REQUIRED: Type or write on original — impression will automatically appear on copies beneath.

FROM

BROWN-OLDS CORPORATION
P. O. Box ~~175~~ 740
LOS ALAMOS, NM 87544
Job ~~#1056~~ ~~P.O. #30082~~
1065

Message
Reply

DATE: 6/6/84

FILE NO.

PRIORITY
- ☐ URGENT!
- ☐ SOON AS POSSIBLE
- ☐ NO REPLY NEEDED

ATTENTION: ISAAC SUAZO

TO

LANL
TA-50

SUBJECT:
TEST REPORTS
KYNAR LINED TANK
TK-21

MESSAGE

ATTACHED PER YOUR REQUEST ARE CERTIFICATION REPORTS ON THE TESTING OF THE KYNAR LINING OF TK-21.

SIGNED: R Moungp

DATE OF REPLY:

REPLY TO:

REPLY

SIGNED:

SENDER: MAIL RECIPIENT WHITE AND PINK SHEETS.

RECIPIENT: WRITE REPLY. RETURN WHITE TO SENDER. KEEP THIS PINK COPY.

HRSL

HYDRO-PURE SYSTEMS COMPANY

75 BLOOMFIELD AVENUE
DENVILLE, N.J. 07834

PHONE: 201-627-1315

BROWN-OLDS CORPORATION
INCOMING
P.O. BOX 8739
ALBUQUERQUE, N.M. 87198

TRANSMITTAL NO: 06

DATE: 05/23/84

TO:
BROWN OLDS CORPORATION
P.O. BOX 8739
ALBUQUERQUE, NM 87198

ATTN: MR. ARIEL GUTIERREZ

JOB:
H-P 20231
B-O PO E-[illegible]

ITEM NO.	REV	DRAWING/DOCUMENT TITLE	QUANT	TYPE	CODE
1	---	KYNAR CERTIFICATION OF VESSEL TK-21	ONE	COPY	I

L. Wnek

LARRY WNEK
PROJECT MANAGER

A. APPROVAL
C. CERTIFIED
F. FOR FABRICATION
I. FOR INFORMATION
P. PRELIMINARY

FILE: L:03,TR/06.831

Electro CHEMical
ENGINEERING & MFG. CO.
Corrosion Specialists
965-9061 (Area Code 215)
750 BROAD STREET, PO BOX 509 • EMMAUS, PENNSYLVANIA 18049-0399

QUALIFIED APPLICATOR DISPERSIONS OF KYNAR

TEFLON DUPONT LICENSED INDUSTRIAL APPLICATOR

REC'D MAY 10 1984

May 8, 1984

Hydro Pure Systems Company
70 Bloomfield Avenue
Danville, New Jersey 07834

Attention: Larry Wnek

Re: Purchase Order 20831-4719
ELECTRO CHEMICAL Sales Order Y-1394

Gentlemen:

This is to certify that Reactor Vessel TK-21 has been lined with a nominal 60 mil thick KYNAR* laminate lining reinforced with carbon cloth, and that the lining has withstood a 5000 volt spark test without a burn through.

Very truly yours,

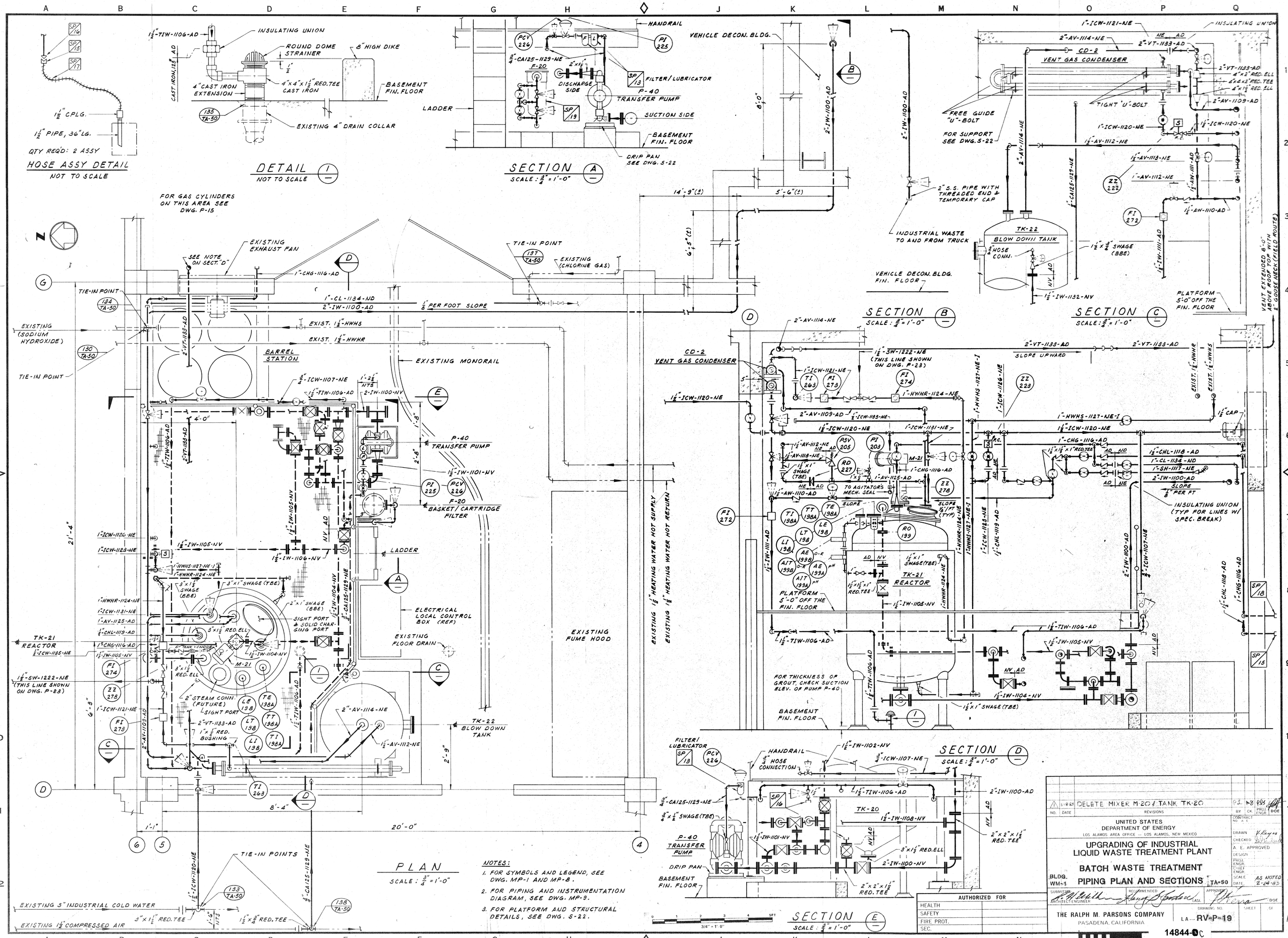
ELECTRO CHEMICAL ENGINEERING & MFG. CO.

Ernest V. Rohrbach

Ernest V. Rohrbach
Customer Service

EVR:tac
In duplicate

*tm of Pennwalt Corp.



NOTES:

1. FOR SYMBOLS AND LEGEND, SEE DWG. MP-1 AND MP-8.
2. FOR PIPING AND INSTRUMENTATION DIAGRAM, SEE DWG. MP-9.
3. FOR PLATFORM AND STRUCTURAL DETAILS, SEE DWG. S-22.

NO.	DATE	REVISIONS	BY	CK	PROJ ENGR	DOE
1	5/18/83	DELETE MIXER M-20 & TANK TK-20				

UNITED STATES
DEPARTMENT OF ENERGY
LOS ALAMOS AREA OFFICE — LOS ALAMOS, NEW MEXICO

UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

BATCH WASTE TREATMENT PIPING PLAN AND SECTIONS

BLDG. WM-1 | TA-50

CONTRACT NO. A.E.
DRAWN
CHECKED
A. E. APPROVED
DESIGN
PROJ. ENGR.
CHIEF ENGR.
SCALE: AS NOTED
DATE: 2-24-83

SUBMITTED: ARCHITECT-ENGINEER
RECOMMENDED: LASL
APPROVED: DOE

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

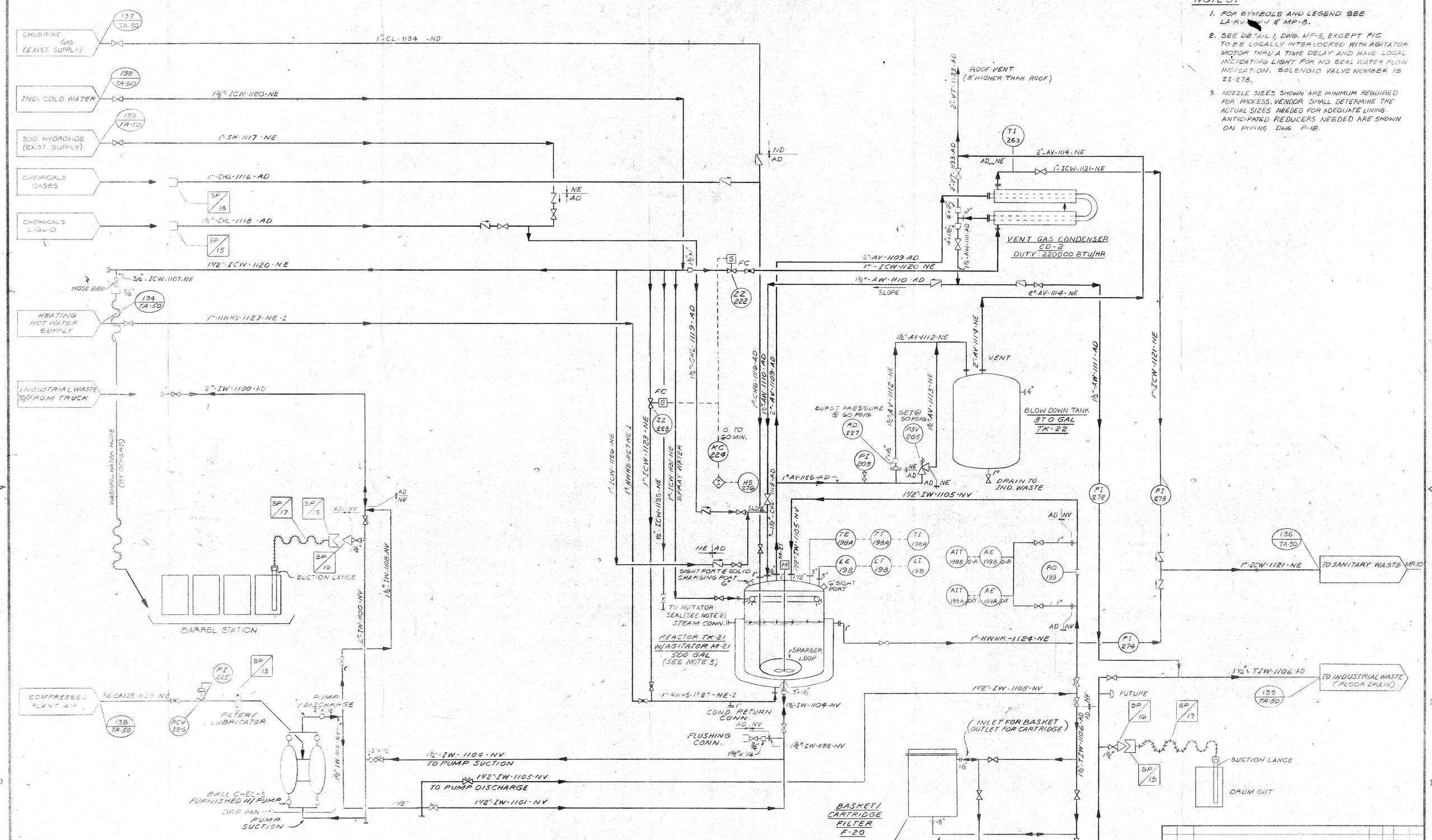
DRAWING NO. LA-RV-P-19 | SHEET | OF

AUTHORIZED FOR
HEALTH
SAFETY
FIRE PROT.
SEC.

14844-1C

NOTES:

1. FOR SYMBOLS AND LEGEND SEE LA-RV-[illegible]-1 & MP-8.
2. SEE DETAIL 1, DWG. MP-3, EXCEPT FIC TO BE LOCALLY INTERLOCKED WITH AGITATOR MOTOR THRU A TIME DELAY AND HAVE LOCAL INDICATING LIGHT FOR NO SEAL WATER FLOW INDICATION. SOLENOID VALVE NUMBER IS 22-278.
3. NOZZLE SIZES SHOWN ARE MINIMUM REQUIRED FOR PROCESS. VENDOR SHALL DETERMINE THE ACTUAL SIZES NEEDED FOR ADEQUATE LINING. ANTICIPATED REDUCERS NEEDED ARE SHOWN ON PIPING DWG. P-18.



NO.	DATE	REVISIONS	BY	CK	PROJ. ENGR.	DOE
1	5-18-83	DELETE MIXER M-20 & TANK TK-20	P.J.			

UNITED STATES
DEPARTMENT OF ENERGY
LOS ALAMOS AREA OFFICE — LOS ALAMOS, NEW MEXICO

UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

PIPING AND INSTRUMENTATION DIAGRAM BATCH WASTE TREATMENT SYSTEM

BLDG. WM-1 TA-50

CONTRACT NO. E-[illegible]
DRAWN J. SINGH
CHECKED
A. E. APPROVED
DESIGN
PROJ. ENGR.
CHIEF ENGR.
SCALE NONE
DATE 2-24-83

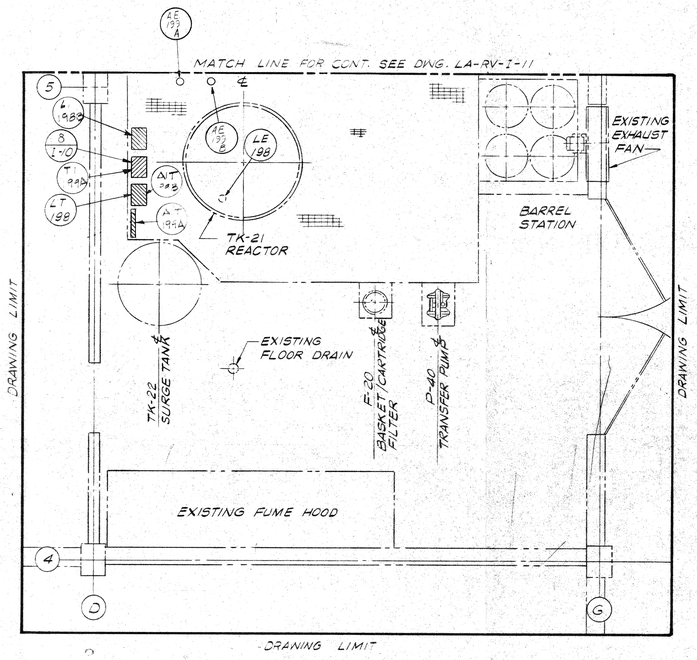
SUBMITTED ARCHITECT-ENGINEER | RECOMMENDED DSL | APPROVED DOE

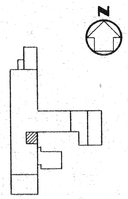
THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

DRAWING NO. LA-RV-MP-9
SHEET

AUTHORIZED FOR	
HEALTH	
SAFETY	
FIRE PROT.	
SEC.	

14844-D





KEY PLAN
NTS

NO.	DATE	REVISIONS	BY	CK.	PROJ ENGR.	DOE
1	1-84	AS BUILT				

UNITED STATES
DEPARTMENT OF ENERGY
LOS ALAMOS AREA OFFICE — LOS ALAMOS, NEW MEXICO

UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

INSTRUMENT LOCATION PLAN
BATCH WASTE TREATMENT SYSTEM
BASEMENT

BLDG WM-1 TA-50

CONTRACT NO. A.E.
DRAWN LIU
CHECKED
A. E. APPROVED
DESIGN EBERLY
PROJ ENGR
CHIEF ENGR
SCALE 3/8" = 1'-0"
DATE 2-24-83

SUBMITTED ARCHITECT-ENGINEER
RECOMMENDED
APPROVED DOE

THE RALPH M. PARSONS COMPANY
PASADENA, CALIFORNIA

DRAWING NO. LA-RV-I-13.1
SHEET OF

AUTHORIZED FOR	
HEALTH	
SAFETY	
FIRE PROT.	
SEC.	

14844-E

APPENDIX I

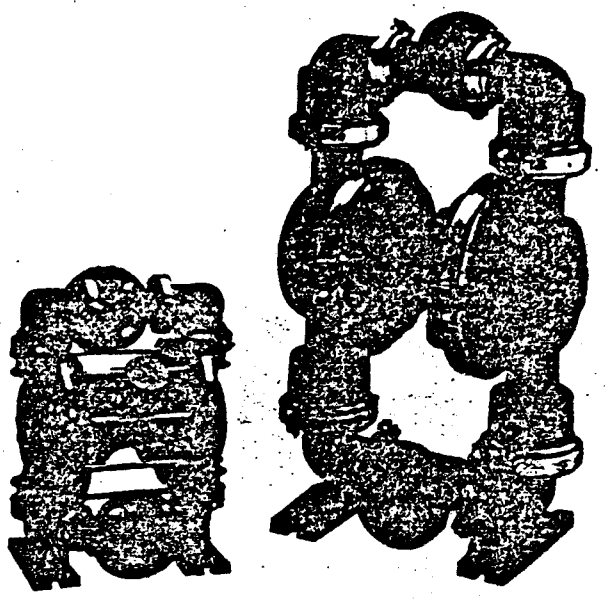
DETAILED SPECIFICATIONS AND PLANS FOR TA-50 BATCH TREATMENT SYSTEM

Note: Manufacturers specifications for pump to include in Appendix I. Add to end of Appendix. New information begins with page I-67.

The Wilden

Available in Two Sizes

THE PUMP THE CHEMICAL PROCESS INDUSTRY HAS DEMANDED



M2 Champ
1" Flanged Inlet/Outlet

M8 Champ
2" Flanged Inlet/Outlet

A CORROSION-RESISTANT, SEALLESS, VIRTUALLY INDESTRUCTIBLE, INJECTION-MOLDED, SOLID . . .

PVDF OR POLYPROPYLENE WILDEN PUMP

The Wilden Champs operate on pressure to 100 psi with variable flow from 0 to 130 GPM. Broad application potential with special appeal to the chemical process industry.

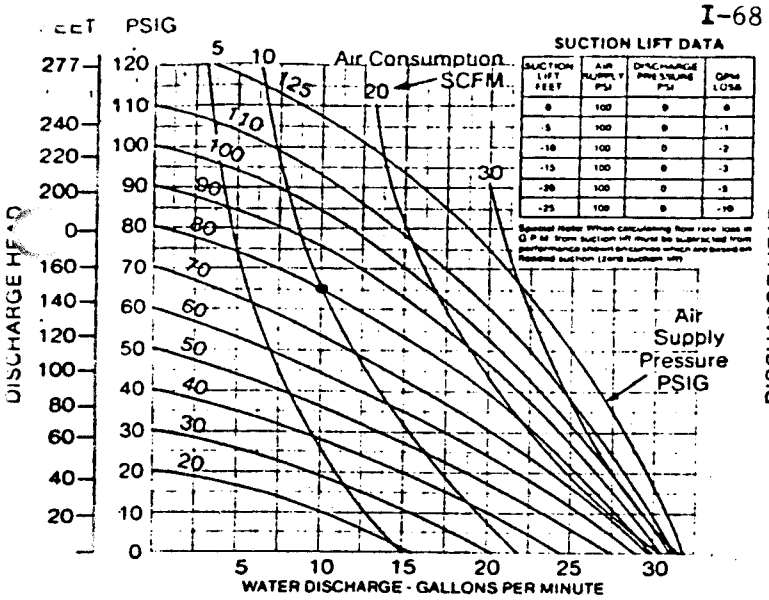
- Self Priming
- High Suction Lift
- Can Run Dry
- Variable Speed & Pressure
- No Pressure Relief Required
- Sealless/Packingless Construction
- Easily Portable
- Low Maintenance
- Ferric Chloride
- Etching Solutions
- Planting Solution
- Acids/Bases
- Photo/Graphic Solutions
- Textile/Dye Solutions
- Solvents
- Pickling Solutions
- Aqua Regia
- Drum Pumping

"Our Business is making tough pumping jobs simple."

WILDEN PUMP® & ENGINEERING CO.

22069 Van Buren Street / Colton, CA 92324 / (714) 783-0621 / Telex (714) 676-452

Copyright 1981 Wilden Pump & Engineering, Colton, CA



SUCTION LIFT DATA

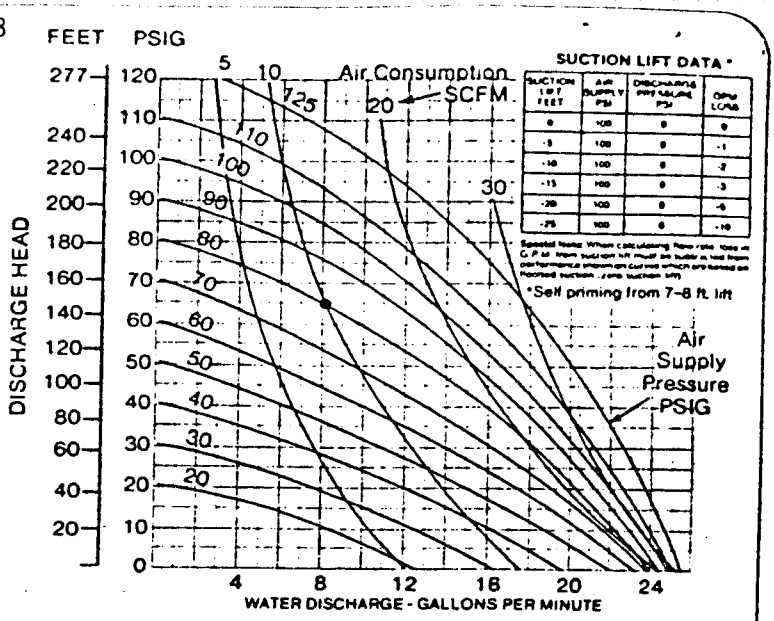
SUCTION LIFT FEET	AIR SUPPLY PSI	DISCHARGE PRESSURE PSI	GPM LOSS
0	100	0	0
-5	100	0	-1
-10	100	0	-2
-15	100	0	-3
-20	100	0	-5
-25	100	0	-10

Special Note: When calculating flow rate loss in G.P.M. from suction lift must be subtracted from performance shown on curves which are based on flooded suction (zero suction lift)

WILDEN MODEL M-2 SPECIFICATIONS AND PERFORMANCE

Height ..... 14"
Width ..... 10½"
Depth ..... 8 7/16"
Weight (Polypropylene) ..... 20 lbs
PVDF ..... N/A
Air Inlet ..... ¼" NPT
Inlet ..... 1" Flanged
Outlet ..... 1" Flanged
Suction Lift ..... 15' Dry 25' Wet
Max. Size Solids ..... ⅛" Dia.

Example: *With 80 PSIG inlet pressure and 10 SCFM air consumption, water discharge is 10 GPM against a head of 65 PSIG.*



SUCTION LIFT DATA*

SUCTION LIFT FEET	AIR SUPPLY PSI	DISCHARGE PRESSURE PSI	GPM LOSS
0	100	0	0
-5	100	0	-1
-10	100	0	-2
-15	100	0	-3
-20	100	0	-5
-25	100	0	-10

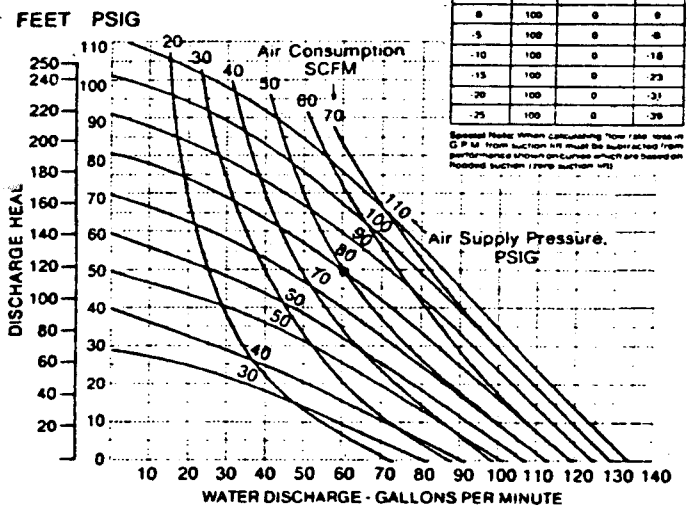
Special Note: When calculating flow rate loss in G.P.M. from suction lift must be subtracted from performance shown on curves which are based on flooded suction (zero suction lift)

*Self priming from 7-8 ft. lift

WILDEN MODEL M-2 T SPECIFICATIONS AND PERFORMANCE

Height ..... 14"
Width ..... 10½"
Depth ..... 8 7/16"
Weight (Polypropylene) ..... 20 lbs
PVDF ..... N/A
Air Inlet ..... ¼" NPT
Inlet ..... 1" Flanged
Outlet ..... 1" Flanged
Suction Lift ..... 7'-8' Dry 25' Wet
Max. Size Solids ..... ⅛" Dia.

Example: *To pump 8 GPM against a discharge pressure of 65 PSIG requires 80 PSIG and 10 SCFM air consumption.*
CAUTION: *Do not exceed 125 PSIG air supply pressure.*



SUCTION LIFT DATA

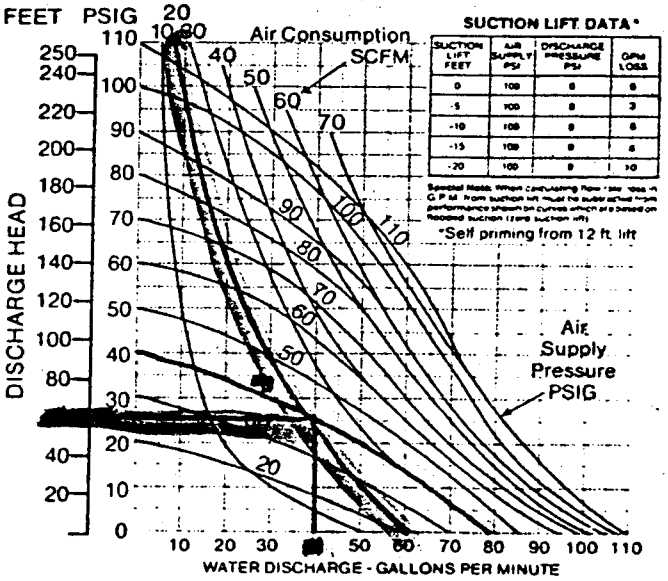
SUCTION LIFT FEET	AIR SUPPLY PSI	DISCHARGE PRESSURE PSI	GPM LOSS
0	100	0	0
-5	100	0	-8
-10	100	0	-16
-15	100	0	-23
-20	100	0	-31
-25	100	0	-39

Special Note: When calculating flow rate loss in G.P.M. from suction lift must be subtracted from performance shown on curves which are based on flooded suction (zero suction lift)

WILDEN MODEL M-8 SPECIFICATIONS AND PERFORMANCE

Height ..... 30⅝"
Width ..... 19½"
Depth ..... 13⅜"
Weight (Polypropylene) ..... 60 lbs
PVDF ..... 100 lbs
Air Inlet ..... ½" NPT
Inlet ..... 2" Flanged
Outlet ..... 2" Flanged
Suction Lift ..... 20' Dry 25' Wet
Max. Size Solids ..... ¼" Dia.

Example: *To pump 80 GPM against a discharge pressure of 50 PSIG requires 80 PSIG and 50 SCFM air consumption.*
Caution: *Do not exceed 125 PSIG air supply pressure.*



SUCTION LIFT DATA*

SUCTION LIFT FEET	AIR SUPPLY PSI	DISCHARGE PRESSURE PSI	GPM LOSS
0	100	0	0
-5	100	0	3
-10	100	0	6
-15	100	0	6
-20	100	0	10

Special Note: When calculating flow rate loss in G.P.M. from suction lift must be subtracted from performance shown on curves which are based on flooded suction (zero suction lift)

*Self priming from 12 ft. lift

WILDEN MODEL M-8 T SPECIFICATIONS AND PERFORMANCE

Height ..... 30⅝"
Width ..... 19½"
Depth ..... 13⅜"
Weight (Polypropylene) ..... 60 lbs
PVDF ..... 100 lbs
Air Inlet ..... ½" NPT
Inlet ..... 2" Flanged
Outlet ..... 2" Flanged
Suction Lift ..... 12' Dry 18' Wet
Max. Size Solids ..... ¼" Dia.

Example: *To pump 28 GPM against a discharge pressure of 40 PSIG requires 50 PSIG and 20 SCFM air consumption.*
Caution: *Do not exceed 125 PSIG air supply pressure.**

he Wilden "Champ" is tested and proven for handling corrosive, abrasive, or viscous liquids and slurries for the Chemical Process Industry. Engineered in response to your requests for a eliable, non-metallic, sealless, positive displacement pump, the "Champ" adds emphasis to the versatility of the Wilden Air Operated Diaphragm Pump line.

RELIABILITY, CORROSIVE RESISTANCE, AND SAFETY were key words in the "Champ" Research and Development Program.

RELIABILITY was insured by the decision to build the non-metallic wetted parts around the proven Wilden Air Valve System, and to incorporate the time tested Wilden M-2 and -8 diaphragms in the "Champ" design.

CORROSIVE RESISTANCE centered on selection of materials. Wilden engineers spent many months analyzing the broad range of available thermoplastic, thermoset, and other non-etallic equipment and evaluation of their field experience as well as discussions with material suppliers and plastics fabricators led to the selection of PVDF and Polypropylene as the ost suitable materials to complement the versatile Wilden Diaphragm Pump System.

POLYPROPYLENE has good chemical resistance, moderate heat resistance, and exceptional flex fatigue resistance at a reasonable cost.

PVDF (polyvinylidine fluoride), while higher in cost, offers exceptional chemical resistance, higher temperature resistance, and excellent mechanical properties.

These materials in combination with either the patented Wilden Teflon® diaphragm or any one of four elastomeric materials offer the broadest possible range of compatibility with he s and solvent.

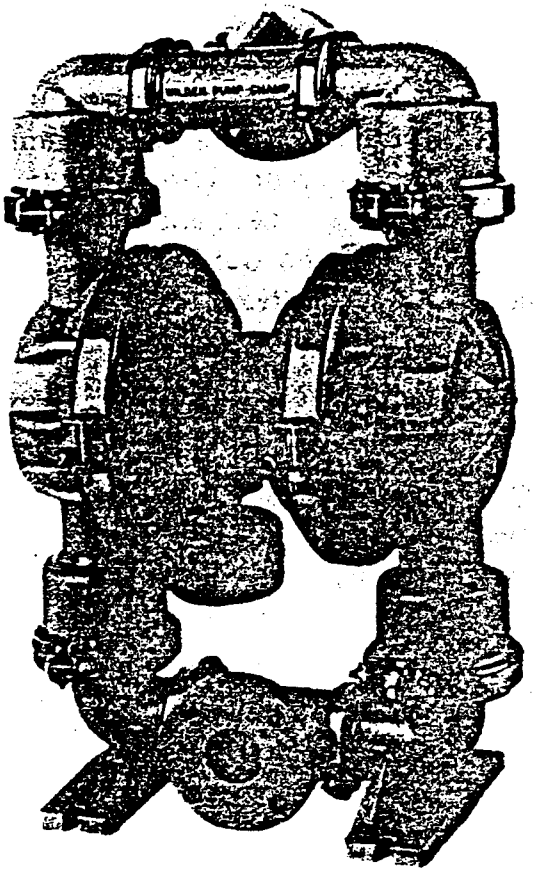
S r is evident in the rugged appearance of the "Champ". The massive ribs of the water chamber , the large flanges with sturdy, specially designed stainless steel clamp bands, and ick wall sections are testimony to the efforts of Wilden engineers.

We proudly present the "Champ", a pump we build with care and pride to handle your most difficult assignments. We ask your cooperation in carefully selecting the appropriate aterials for your specific applications. Many factors affect the chemical and mechanical properties of materials. These include, but are not limited to exposure time, extremes of tempera-ure and pressure, frequency of temperature and/or pressure cycling and attrition due to abrasive particles. Wilden Air Diaphragm Pumps are also available in four sizes in Aluminum, Cast ron, 316 Stainless Steel and Hastelloy C® for those applications where polypropylene and PVDF are not appropriate.

TEMPERATURE LIMITS: Polypropylene +32°F – 150°F; PVDF 200°F.

UTION: Temperature limits are based upon mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperatures. Consult engineering for chemical compatibility and temperature limits. M-2 Polypropylene is glass filled and not suitable for handling hydrofluoric acid.

M-8 "CHAMP"



IF IT POURS IT PUMPS

WILDEN PUMPS

AIR OPERATED DOUBLE DIAPHRAGM POLYPROPYLENE/KYNAR® MODEL M8 "CHAMP"

"OUR ONLY PRODUCT"

REPAIR PARTS LIST AND OPERATING INSTRUCTIONS

INSTALLATION INSTRUCTIONS

The Wilden "Champ" is a Wilden model M-8 pump (2 inch) with all wetted parts of injection molded polypropylene or Kynar* (PVDF) material. Performance and operation of the "Champ" are essentially the same as other Wilden model M-8 pumps of metal construction subject to temperature and chemical compatibility of the material being pumped with polypropylene and Kynar.

The M-8 Champ comes standard with aluminum/brass non-wetted parts. Optional cast iron/brass non-wetted parts are available. The M-8 Champ should not be used for submersible applications unless both wetted and non-wetted portions are compatible with the material being pumped.

The M-8 Champ has 150 psi American Standard two inch pipe flange inlet and outlet ports. In permanent installations, the pump should be attached to plant piping through flexible couplings on both the inlet and outlet ports to reduce pipe vibration due to the reciprocating nature of the pump. To further reduce vibration, a surge suppressor may be installed immediately adjacent to the discharge port.

Suction pipe size should be at least 2" diameter or even larger if highly viscous material is to be pumped. If suction hose is used, it must be of a noncollapsible, reinforced type as the M-8 is capable of pulling a high vacuum. Discharge piping should be at least 2". It is critical, especially on the suction side of the pump, that all fittings and connections are air tight or a reduction or loss of pump suction capability will result.

*Kynar (PVD Resin) is a registered trademark of Pennwalt Corp.

THE M-8 PUMP WILL PASS ¼" DIAMETER SOLIDS. WHENEVER THE POSSIBILITY EXISTS THAT LARGER SOLID OBJECTS MAY BE SUCKED INTO THE PUMP, A STRAINER SHOULD BE USED ON THE SUCTION LINE.

The inlet to the air valve is ½" NPT. The compressed air line to the pump should be at least ½". The air line should be large enough to supply the volume of air necessary to achieve the desired pumping rate (see M-8 pump performance curve.) Use air pressure up to 110 psig depending upon pumping requirements.

CAUTION: DO NOT EXCEED 125 PSIG AIR SUPPLY PRESSURE.

Pump discharge rate can be controlled by:

1. Limiting the volume and/or pressure of the air supply to the pump (preferred method). The use of a gate valve or needle valve installed at the air inlet to the pump is suggested for this purpose.
2. Throttling the pump discharge by installing a valve in the discharge line of the pump when the need to control the pump from a remote location exists. When the pump discharge pressure equals or exceeds the air supply pressure, the pump will stall out; no bypass or pressure relief valve is needed and pump damage will not occur.

Sound level can be reduced below 90 dba by attaching our optional muffler at pump air exhaust port.

Temperature Limits: Polypropylene – 150°F
Kynar* (PVDF) – 200°F

Caution: Maximum temperature limits are based upon mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperatures. Consult engineering guide for chemical compatibility and temperature limits.

OPERATING INSTRUCTIONS

A. The model M-8 comes with a built-in oil reservoir. This should be kept filled with a 10 weight motor oil. If the pump is placed in a permanent installation, the use of an air line oil lubricator is suggested. No alterations should be made to the pump. In cold weather operation or conditions of high discharge pressure, the air valve may freeze due to moisture in the air line. if this occurs the use of ehtylene glycol type anti-freeze or other deicer such as Tannergas can be substituted for the 10 weight oil.

B. Make sure air line to pump is free from dirt or other foreign matter. The air valve screen P/N 20E (see air valve diagram) will generally collect any particles too large to pass through the pump's air system. If pump performance drops off, check this screen for clogging.

C. Turn on air supply to pump. CAUTION: Make sure air supply pressure to pump does not exceed 125 psig. If it does, a pressure regulator should be installed and set at a maximum of 125 psig.

D. Pumping volume (gpm) can be set by counting the number of strokes per minute. The M-8 pumps approximately .77 gallons per stroke. A stroke is ½ cycle or one air exhaust.

When pump is used for moving thick materials, check stroke rate to determine that pump is not operating at a faster rate than material is capable of flowing, or cavitation will occur. If pump is operating at a speed too fast for available flow, reduce the volume of air to the pump until stroke rate approximates discharge volume.

E. Always flush pump after use if material being pumped will pack or solidify. The pump can be turned upside down and all liquid will drain out.

F. For pumps fitted with teflon diaphragms, limit suction inlet pressure to 10 psig maximum.

CAUTION: WEAR SAFETY GLASSES. WHEN DIAPHRAGM FAILURE OCCURS, MATERIAL BEING PUMPED MAY BE FORCED OUT AIR EXHAUST.

TROUBLE SHOOTING

Pump will not run or runs slowly

1. Check air inlet screen for dirt.
2. Check for sticking air valve, flush air valve in solvent.
3. Check for worn out air valve. If piston face in air valve is shiny instead of dull, air valve is probably worn beyond working tolerances and must be rebuilt by Wilden or replaced.
4. Check center block O-rings. If worn excessively they will not seal and air will simply flow through pump and out air exhaust. Use only Wilden O-rings as they are of special construction.

Pump runs but little or no product flows

1. Check for pump cavitation; slow pump speed down to match thickness of material being pumped.
2. Check for sticking valve balls. If material being pumped is not compatible with pump elastomers, swelling may occur; replace balls and seats with proper elastomers.
3. Check to make sure all suction connections are air tight, especially clamp bands around intake balls.

Pump air valve freezes

Check for excessive moisture in compressed air. Either install dryer for compressed air or use an anti-freeze such as Tannergas or Killfrost in lieu of SAE 10W oil.

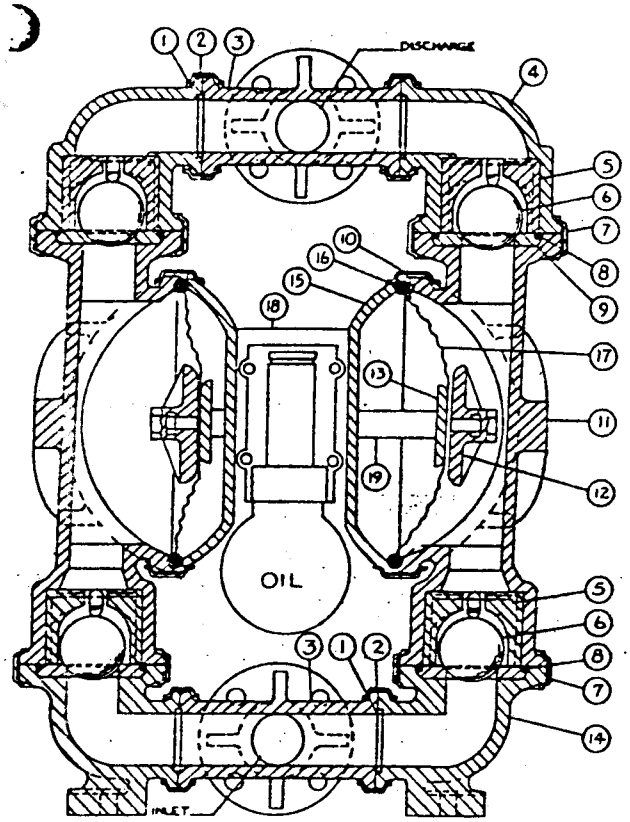
Air bubbles in pump discharge

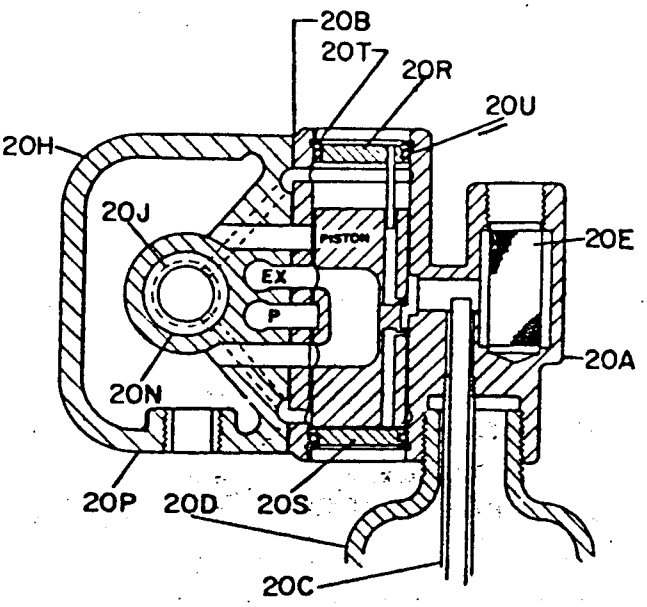
1. Check for ruptured diaphragm.
2. Check tightness of clamp bands, especially at intake manifold.

Product comes out air exhaust

1. Check for diaphragm rupture.
2. Check tightness of piston plates to shaft
3. Insure Piston O-Ring is in place, if required on model involved.

WILDEN AIR OPERATED DOUBLE DIAPHRAGM PUMP MODEL M-8 "CHAMP"





AIR VALVE ASSEMBLY, P/N 20

PARTS LIST

Drawing Index No.		Part Numbers for* M8/PT/TF/TF/PT
1	Manifold O-Ring	PT32B
2	Clamp Band, Small	P32
3	Manifold "T" Section	P33
4	Discharge Elbow	P36
5	Ball Guide Bushing	P41C
6	Valve Ball	TF41
7	Clamp Band, Medium	P39
8	Valve Seat O-Ring	PT40B
9	Valve Seat	P40
10	Clamp Band, Large	P30
11	Water Chamber	P35
12	Piston Outer W/Lug	PT21B
13	Piston Inner	T21C
14	Inlet Elbow	P37
15	Air Chamber	22
16	Teflon Diaphragm O-Ring	TF24A
17	Diaphragm	TF24
18	Air Valve Assembly	B20
19	Shaft	T21A

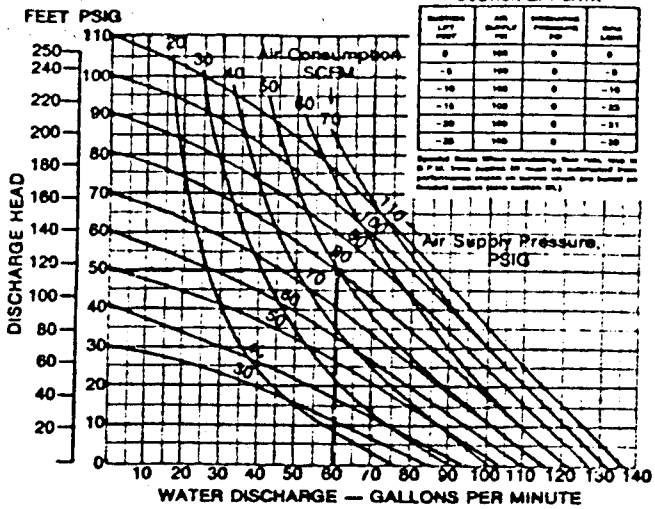
M-8 STANDARD AIR VALVE PARTS LIST

P/N	
20A	Valve Body & Piston (ii)
20B	Valve Gasket
20C	Capillary Rod
20D	Oil Bottle
20E	Valve Screen
20H	Center Block Assembly (iii)
20JH	O-Ring (7 each)
20N	Block Bushing
20P	Block Gasket (2 each)
20R	Valve Cap w/Guide Pin
20S	Valve Cap
S20T	Snap Ring (2 each)
20U	Valve Cap O-Ring (2 each)

(i) P/N 20 includes 20A through 20U
(ii) P/N 20A includes only 20E, 20R, 20S, 20T and 20U.
(iii) P/N 20H includes only 20N and 20JH.

NOTE: *Part numbers shown are for polypropylene pumps fitted with teflon diaphragms. See M-8 prices sheet for specific part number information on standard parts as well as on parts of other plastic and elastomeric materials or configurations.

SPECIFICATIONS & PERFORMANCE



SUCTION LIFT DATA

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-5	100	0	-5
-10	100	0	-10
-15	100	0	-15
-20	100	0	-21
-28	100	0	-28

[illegible]

WILDEN® MODEL M-8®

Height ..... 30⅜"
Width ..... 19½"
Depth ..... 13⅜"
Weight .....
..... POLYPROPYLENE 60 lbs.
..... KYNAR® 100 lbs.
Air Inlet ..... ½" N.P.T.
Inlet ..... 2" Flanged
Outlet ..... 2" Flanged
Suction Lift ... 20' Dry
25' Wet
Max. Size Solids ¼" Dia.

Example: *To pump 60 gpm against a discharge pressure of 50 psig, requires 80 psig and 50 scfm air consumption.*

CAUTION: Do not exceed 125 psig air supply pressure.

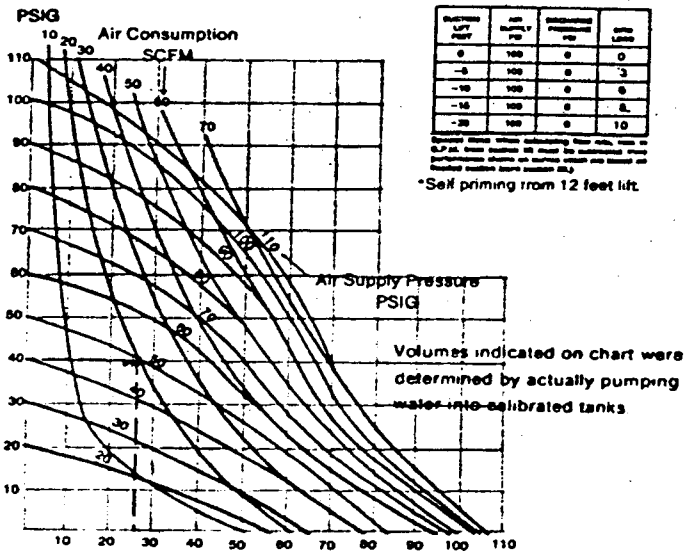
SPECIFICATIONS & PERFORMANCE
TEFLON DIAPHRAGMS

WILDEN® MODEL M-8®

Height ..... 30⅜"
Width ..... 19½"
Depth ..... 13⅜"
Weight .....
..... POLYPROPYLENE 60 lbs.
..... KYNAR® 100 lbs.
Air Inlet ..... ½" N.P.T.
Inlet ..... 2" Flanged
Outlet ..... 2" Flanged
Suction Lift ... 12' Dry
18' Wet
Max. Size Solids ¼" Dia.

Example: *To pump 28 gpm against a discharge pressure of 40 psig, requires 50 psig and 20 scfm air consumption.*

CAUTION: Do not exceed 125 psig air supply pressure.



SUCTION LIFT DATA*

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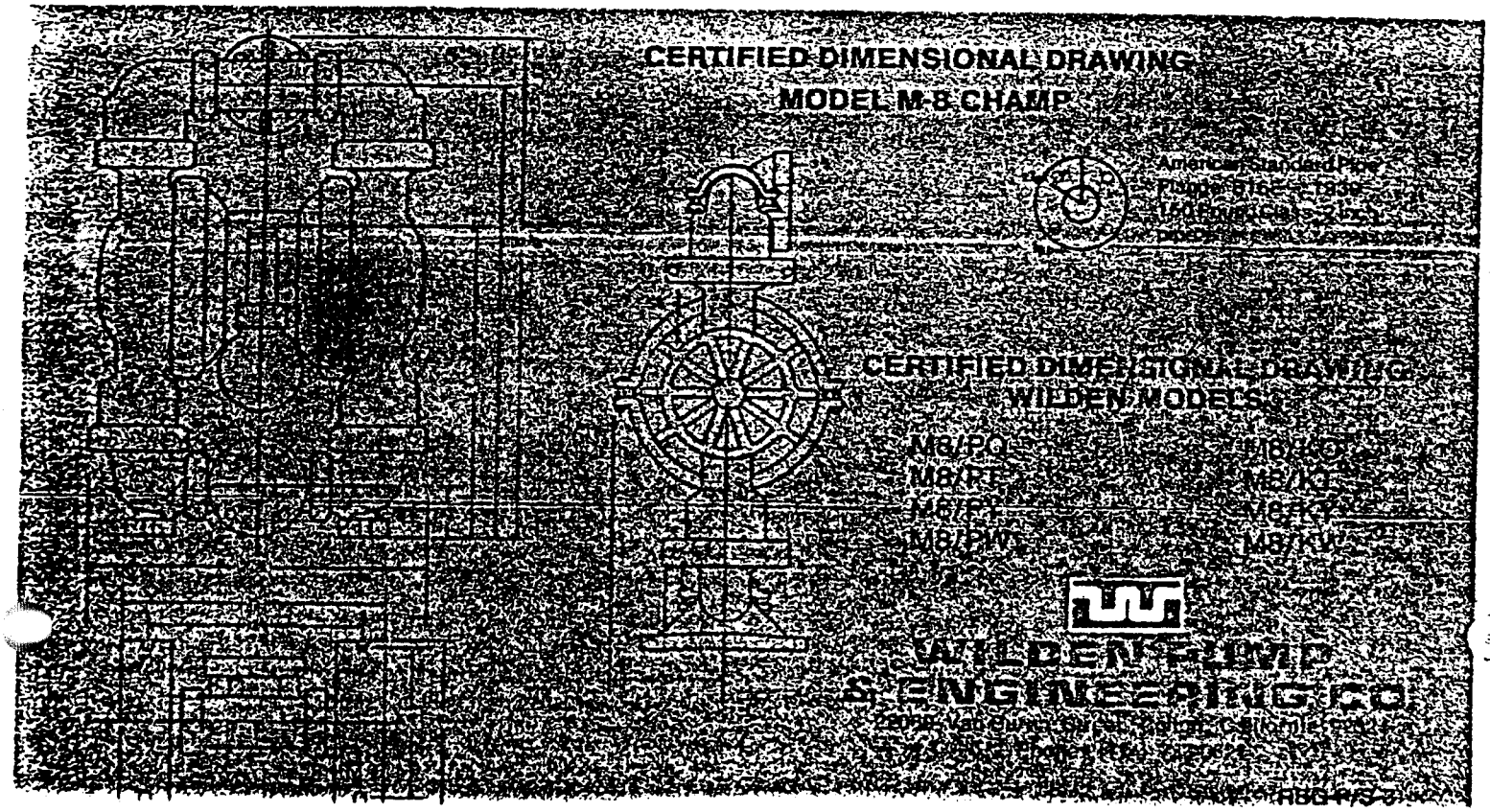
0	100	0	0
-5	100	0	3
-10	100	0	6
-15	100	0	8
-20	100	0	10

[illegible]

*Self priming from 12 feet lift.



WILDEN PUMP & ENGINEERING CO.
22069 VAN BUREN STREET, P.O. BOX 845, COLTON, CALIFORNIA 92324 / (714) 783-0621

February 27, 1981

(INTERIM) M8 "CHAMP" ASSEMBLY/DISASSEMBLY INSTRUCTIONS

The M8/PT/TF/TF/PT pump is essentially a standard Wilden M8 pump with injection molded wetted parts. The air valve, center assembly and diaphragms are standard proven Wilden components. Principal differences other than material include: 150 psi American Standard pipe flanges instead of threaded inlet and discharge ports; increased external dimensions; ten sets of clamp bands as compared with six; and the use of O-rings for seals. Performance and operation is the same as a metal construction M8 with one exception. The maximum temperature for the polypropylene is limited to 150 degrees Fahrenheit and 200 degrees Fahrenheit for the KYNAR^R PVDF Resin.

Dismantling and assembly is also very comparable to other Wilden pumps with a couple of minor variations. First, the inlet and discharge manifolds are obviously an assembly of three molded parts, two O-rings and two sets of clamp bands rather than a single casting. We would suggest that these components be treated as a single part when possible during diaphragm changes or other maintenance requiring dismantling of the pump. If it is necessary to disassemble the manifolds, the customer should plan on replacing the Teflon O-ring seals. If disassembled, the manifolds should be completely reassembled and the manifold clamp bands securely fastened prior to reinstalling the manifolds on the pump center assembly. A key factor during reassembly of the manifolds is correct alignment. The two flange surfaces which mate with the water chambers must be parallel and in the same plane. The inlet or discharge flange face should be perpendicular to the clamp band flanges.

To dismantle the manifolds, simply remove the clamp bands. To reassemble a manifold, first install the O-rings in the O-ring grooves on each of the manifold elbow sections, and place one elbow in a soft jawed vise with the smaller flanged surface horizontal. Next, the manifold "T" section may be placed in position and the clamp band installed. Insure that the flanged surfaces remain aligned while tightening the clamp band bolts. Correct, if necessary, by tapping the parts firmly with a rubber or plastic mallet. Now place the remaining elbow in position and install the second clamp band. As the clamp band is tightened, use a straight edge to insure that both of the larger flanges remain in the same plane.

Another significant difference is that the plastic pumps have removable ball cages in place of the cast-in fingers in the metal parts. Prior to reassembling a pump, insure that the ball cages are installed in each discharge elbow and the bottom of each water chamber. If required, the ball cage should be seated by tapping with a rubber or plastic mallet so that the surface of the ball cage is flush with the flange surface.

over . . .

The polypropylene and KYNAR pumps have removable ball seats with a step around the outer circumference which forms an O-ring groove when the seat is placed in the inlet elbow or top of the water chamber. When assembling the inlet and discharge manifolds to the center assembly, place the seats in the top of the water chambers and inlet elbows, and place an O-ring on the groove. Place the center assembly on the inlet manifold carefully aligning the flanges. Install both clamp bands and alternately tighten the bands maintaining correct flange alignment by tapping with a rubber or plastic mallet as required. Install the top manifold using the same technique.

Another tip which will minimize leakage problems is not to attempt to reuse the Teflon O-ring seals. The O-rings are intentionally distorted during the assembly process conforming to the exact shape of the O-ring groove and opposite flange, and may not be reusable.

Upon completion of our printed literature, copies will be mailed to you. If you have any questions or comments regarding these instructions or the plastic pumps, please do not hesitate to call.

The results of our research and testing conducted with the "Champ" have been excellent, and have exceeded our expectations. We trust your experience will be similar.

ADT:vv

SUGGESTED SPARE PARTS

WILDEN M-8 "CHAMP" WITH TEFLON

QUANTITY	PART NUMBER	DESCRIPTION
4	TF24	Diaphragm (Teflon)
4	TF24B	Back-up Diaphragm (Neoprene)
4	TF41	Valve Balls (Teflon)
8	KT40B	Valve Seat O-ring (Teflon)
8	KT32B	Manifold O-ring (Teflon)
2	20B	Air Valve Gasket
4	20P	Block Gasket
1	T21A	Shaft w/studs
7	20JH	Bushing O-rings

NOTE: Frequency replacement may vary depending on severity of service.

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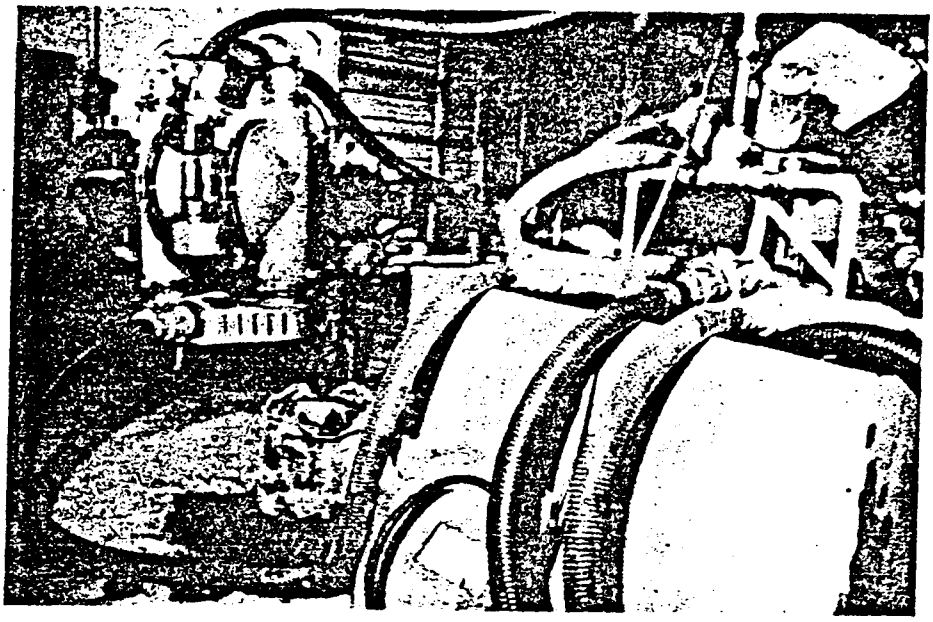


INFORMATION BULLETIN
PUMP TEST PROCEDURE

The following is an explanation of the procedure used to test every pump manufactured and shipped by Wilden Pump and Engineering Company.

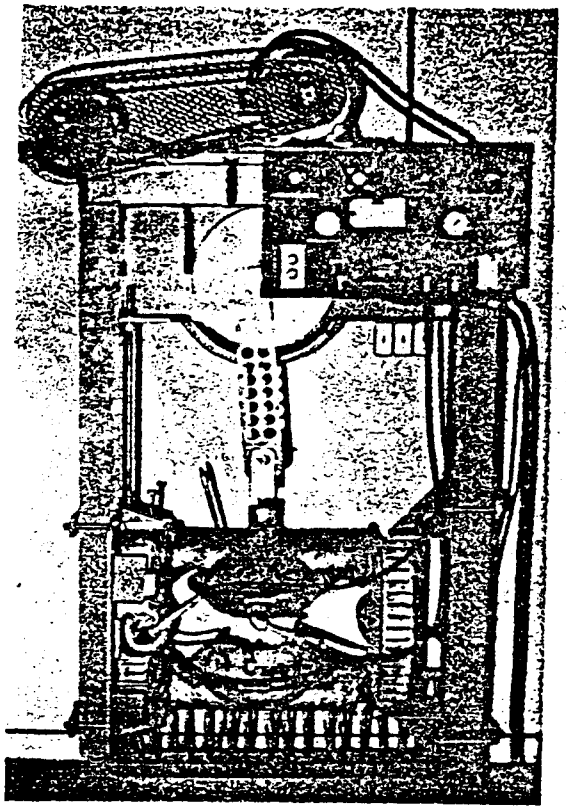
1. 90 to 100 PSI air is applied to the pump to verify that the air valve and the pump is shifting properly.

2. Hoses are hooked up to the suction and discharge manifolds. The pump is then operated by pumping water into a recirculating tank. Self-priming characteristics are verified and the pump is stalled out with a shut-off valve in the discharge line. The pump is allowed to set under pressure to check for any leaks in the casting and the air valve is tested at near-stall conditions for proper function.

3. The pump is then pressurized with an external pump to check for leaks in the intake manifold.

4. After every pump built by Wilden is tested in the above procedure, it is then sealed, painted and shipped to a distributor for resale.

WILDEN PUMP & ENGINEERING CO.
22069 VAN BUREN STREET, P.O. BOX 845, COLTON, CALIFORNIA 92324 / (714) 783-0621

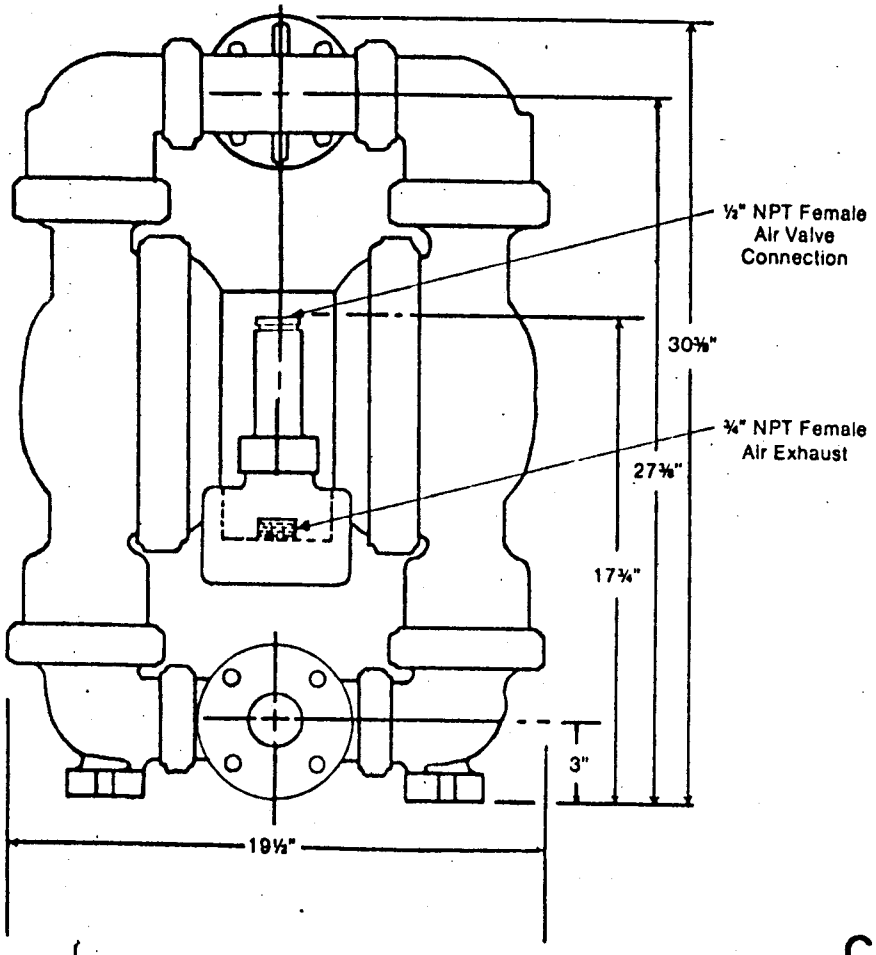


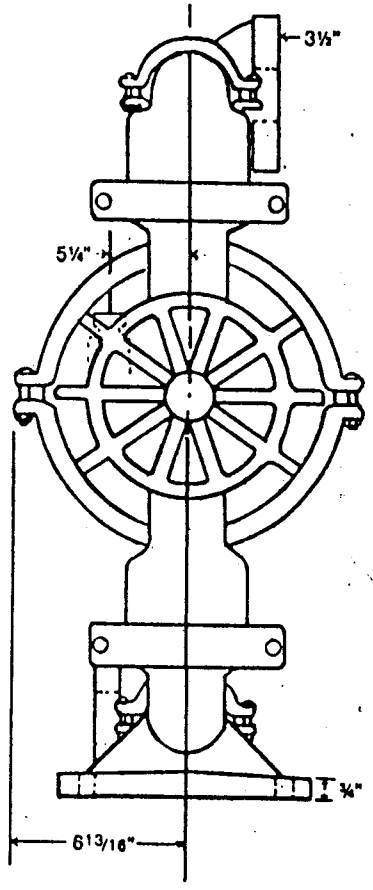
INFORMATION BULLETIN
DIAPHRAGM TESTING PROCEDURE

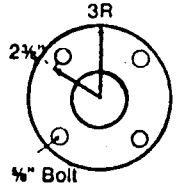
Wilden Pump and Engineering Company continuously tests the diaphragms for the pumps on the tester shown in the photo above. Through the use of this unique tester, we have been able to continually develop better, longer lasting diaphragms for the Wilden Pumps.

A specially modified pump is used in the horizontal position. The diaphragms are stroked mechanically by an electric motor connected through a cam and shaft arrangement to the diaphragms. The cycle rate is set at 200 rpm's and a 50 psi head of air is used to provide a working load on the diaphragms. An elapsed time counter is attached to a pressure-sensitive switch so that power is cut off when diaphragm failure occurs.

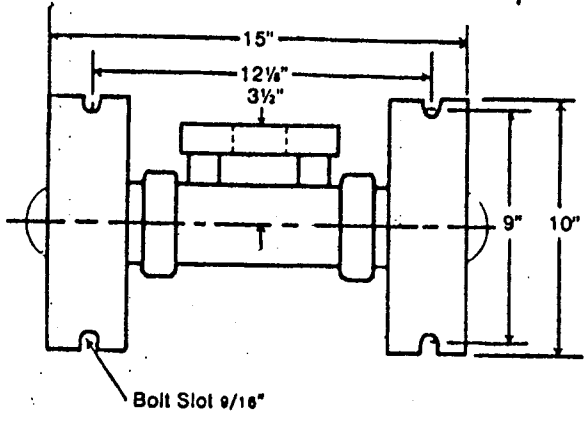
This unique tester, which can be used to test all diaphragm types and sizes, is one more way for Wilden Pump and Engineering to assure the finest quality for its pumps and parts.







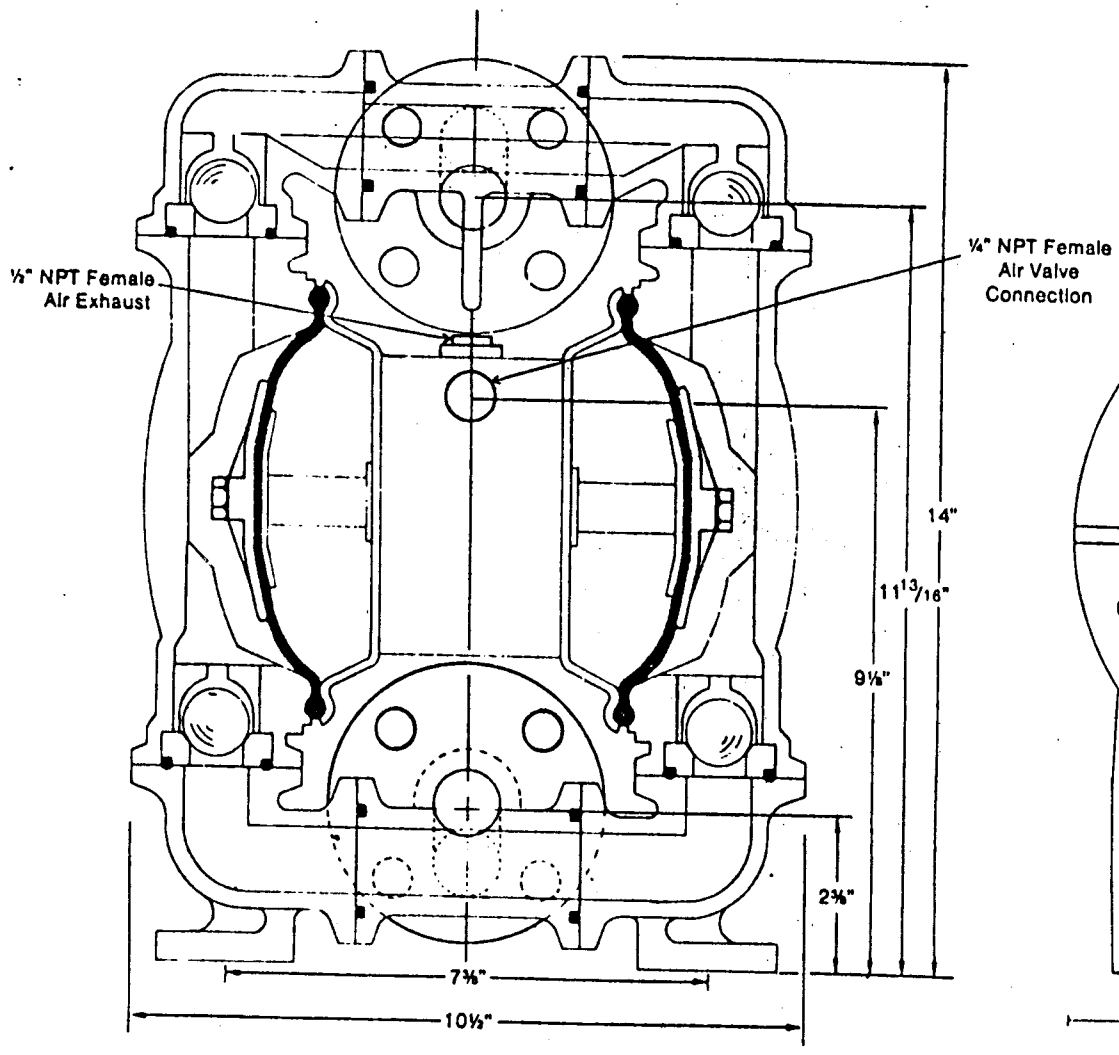
American Standard Pipe Flange B16E - 1939 - 150 Pound Class - 2 inch pipe.

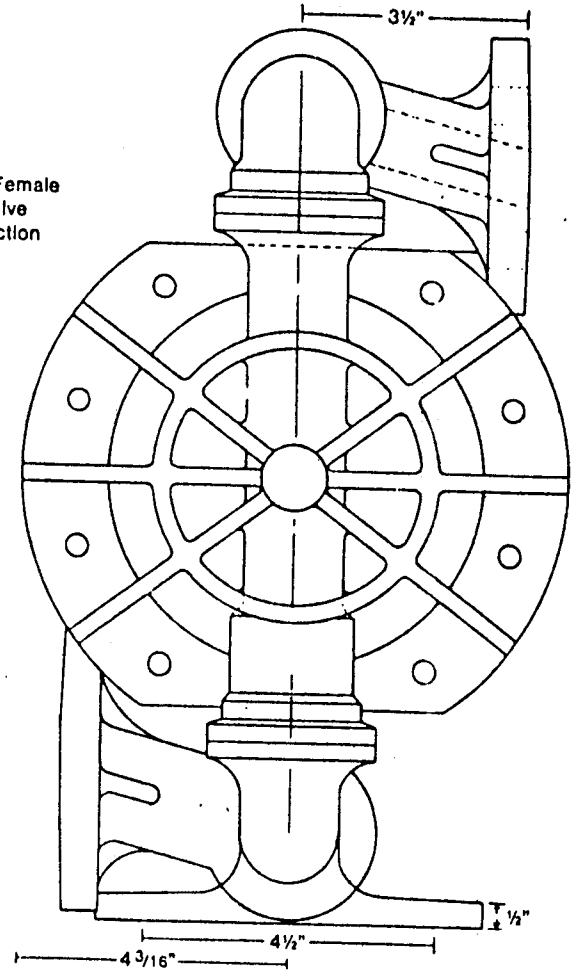


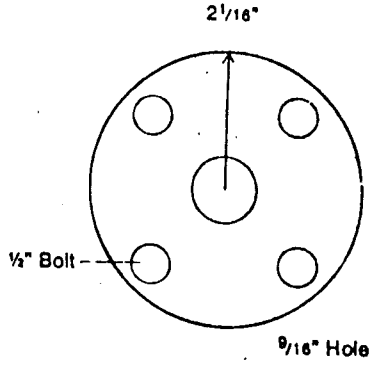
CERTIFIED DIMENSIONAL DRAWING
WILDEN MODELS
MODEL M-8 CHAMP

M8/PO	M8/KO
M8/PT	M8/KT
M8/PY	M8/KY
M8/PW	M8/KW

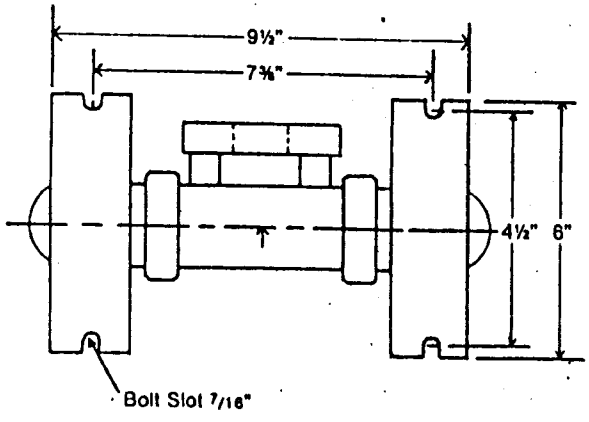
* Copyright Wilden Pump and Engineering, 1983







American Standard Pipe Flange 150 Pound Class – 1 inch pipe. 3 130" bolt circle.



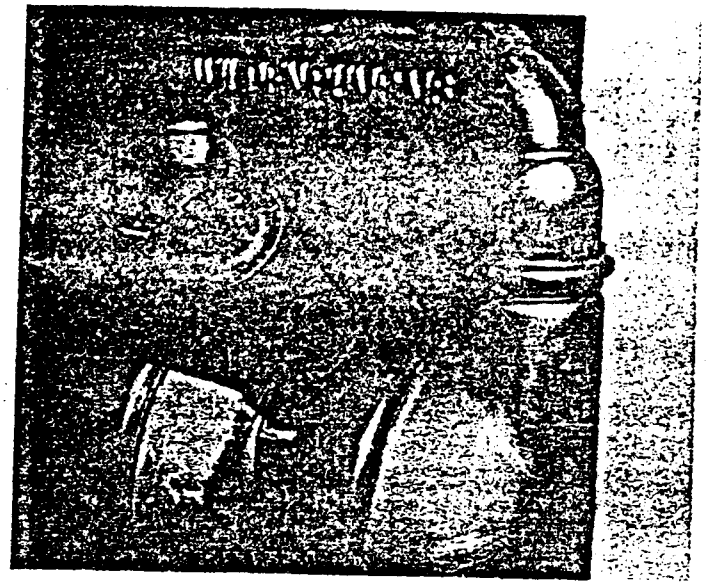
CERTIFIED DIMENSIONAL DRAWING

WILDEN MODELS
MODEL M2 CHAMP

M2/PO M2/PT

WILDEN PUMP & ENGINEERING CO.
22069 VAN BUREN STREET P.O. BOX 845, COLTON CA 92324
(714) 783-0621
Telex 678-452

WILDEN PUMP & ENGINEERING CO.
22069 VAN BUREN STREET, P.O. BOX 845, COLTON, CALIFORNIA 92324 / (714) 783-0621



NOISE CONTROL
WILDEN AIR OPERATED DOUBLE DIAPHRAGM PUMPS

All Wilden pumps can be ordered with an optional, large volume muffler.

This muffler reduces the exhaust sound level to below 90 decibels; the level which is generally accepted by OSHA as a cut-off for eight hours of continuous operator exposure.

Following are the db reading for all three Wilden models with and without a muffler.

MODEL	WITH MUFFLER	WITHOUT MUFFLER
M-4	81 db	108 db
[redacted]	[redacted]	[redacted]
M-15	89 db	115 db

The above readings were made at a distance of one meter from the pump and a height of one and one-half meters above the exhaust part of the pump.

AIR PUMP CO.
AREA CODE 313 PHONE 234-8894
P.O. BOX 4389 • FLINT, MICHIGAN 48504

SHOULD YOUR WILDEN AIR DRIVEN PUMP GIVE YOU TROUBLE BECAUSE OF "ICING" PLEASE READ THIS:

FREEZE UP OF EXHAUST PORTS OF AIR DRIVEN MACHINERY HAS BEEN A PROBLEM FOR MANY YEARS BLAMED ON TO THE MACHINE; WHEREAS ITS CAUSE IS THE INHERENT WATER VAPOR IN ALL COMPRESSED AIR SYSTEMS. 5412 PPM @ 100°F AND 100 PSIG AND ONLY 125 PPM @ 5°F AND 100 PSIG.

WHEN THE AIR EXPANDS FROM ONE PRESSURE TO ANOTHER LOWER PRESSURE IT REQUIRES HEAT AND THEREFORE PRODUCES A REFRIGERATION EFFECT IN ACCORDANCE WITH THE EQUATION PV/T = pv/t. THIS MAY FREEZE THE WATER OUT OF THE COMPRESSED AIR AND CLOG THE EXHAUST PORT.

SINCE THE INLET PRESSURE, VOLUME AND TEMPERATURE VARY ON ALMOST EVERY APPLICATION, IT REALLY FURTHER CONFUSES THE PROBLEM WHEN ONE AIR SYSTEM HAS A PRESSURE DEWPOINT OF 130°F BECAUSE OF INADEQUATE AFTERCOOLING AND THEN THE NEXT HAS A PRESSURE DEWPOINT OF 35°F. BECAUSE OF GOOD COMMERCIALLY AVAILABLE REFRIGERATED DRYER EQUIPMENT.

THE VARIABLES IN LOAD, AIR QUALITY AND AMBIENT TEMPERATURES ARE SO COMPLEX THAT IT ISN'T POSSIBLE TO MAKE A BLANKET STATEMENT AS TO WHEN FREEZE UP TEMPERATURES WILL OCCUR; HOWEVER, IF WE REMOVE WATER FROM THE COMPRESSED AIR DOWN TO 22°F. @ ATMOSPHERIC PRESSURE, WE ARE BELOW THE LIQUID STATE OF WATER WHICH FREEZES TO CAUSE THE ICE AND THUS THE CLOGGED PORT.

THE SOLUTIONS AVAILABLE ARE THE FOLLOWING AND ANY STEP BEYOND WHAT YOU ARE DOING TO YOUR COMPRESSED AIR MIGHT SOLVE YOUR PROBLEM, BUT WITH STEP 10 BEING MONEY BACK GUARANTEED TO SOLVE IT.

ON PUMP:

1. ETHYLENE GLYCOL IN THE OIL BOTTLE.
2. REMOVE AIR EXHAUST BALL CHECK AND COME OUT OF EXHAUST WITH ELBOW AND 6" OF STRAIGHT PIPE.
3. PUT AIR LINE LUBRICATOR (FILLED WITH ETHYLENE GLYCOL) IN AIR SUPPLY LINE.
4. TRY "KILL FROST" IN PUMP OIL BOTTLE AND AIR LINE LUBRICATOR.

ON AIR SYSTEM:

5. AIR COOLED AFTERCOOLER WITH SEPARATOR.
6. WATER COOLED AFTERCOOLER WITH SEPARATOR.
7. 25°F DEWPOINT DEPRESSANT (SALT) DESICCANT TYPE DRYER.
8. 50°F DEWPOINT DEPRESSANT GENERAL SUPER DRY DESICCANT DRYER.
9. REFRIGERATED TYPE COMPRESSED AIR DRYER 35°F DEWPOINT AT PRESSURE.
10. COMBINATION REFRIGERATED AND DESICCANT TYPE COMPRESSED AIR DRYER PRODUCING 5°F PRESSURE DEWPOINT @ 100 PSI.

Roy R. Haedt

Roy R. Haedt

Effective Date April 1, 1983

WILDEN PUMP & ENGINEERING CO.
22069 VAN BUREN STREET, P.O. BOX 845, COLTON, CALIFORNIA 92324 / (714) 783-0621 / Telex 678-452

MODEL M 8

POLYPROPYLENE PUMP PARTS

for Models:

M8/PO/ M8/PW/
M8/PT/ M8/PY/

(Suggested U.S. List Prices)

DESCRIPTION	Qty. Per Pump	M8/PO/		M8/PT/		M8/PW/		M8/PY/	
		P/N	Price	P/N	Price	P/N	Price	P/N	Price
Air Valve Assembly	1	B20	375.00	←		N/A		N/A	
Air Valve Body & Piston	1	B20A	175.00	←		W20A	180.00	←	
Air Valve Screen	1	20E	5.00	←					
Air Valve Cap w/Guide (Top)	1	20R	6.00	←		20RB	10.00	←	
Air Valve Cap (Bottom)	1	20S	5.00	←		20SB	9.00	←	
Snap Ring	2	S20T	2.00	←					
Air Valve Cap O-ring	2	20U	.50	←					
Air Valve Gasket	1	20B	1.00	←					
Lubricator Capillary Rod Assy.	1	20C	18.00	←					
Lubricator Oil Bottle	1	20D	26.00	←		W20D	32.00	←	
Center Block Assembly	1	20H	140.00	←		W20H	210.00	←	
O-ring	7	20JH	.50	←					
Block Bushing	1	20N	30.00	←					
Check Body	1	20K8	6.00	←		W20K8	12.00	←	
Nipple	1	20FS	5.00	←					
Check Ball	1	20M	2.00	←					
Block Gasket	2	20P	1.00						
Shaft	1	21A	45.00	T21A	45.00	21A	45.00	T21A	45.00
Piston, Inner	2	21B	25.00	T21C	20.00	21B	25.00	T21C	20.00
Piston, Outer w/Lug	2	P21B	125.00	PT21B	85.00	P21B	125.00	PT21B	85.00
Piston O-ring	2	N/R		N/R		N/R		N/R	
Air Chamber, Tapped (Replaced by 22B)				←					
Air Chamber, Counter Sunk	2	22B	60.00	←		W22B	86.00	←	
Water Chamber	2	P35	345.00	←					
Clamp Band (Large)	2	P30	45.00	←					
Clamp Band (Medium)	4	P39	25.00	←					
Clamp Band (Small)	4	P32	20.00	←					
Discharge Elbow	2	P36	125.00	←					
Inlet Elbow	2	P37	140.00	←					
Manifold "T" Section	2	P33	145.00	←					
Ball Guide Bushing	4	P41C	35.00	←					
Valve Seat	4	P40	20.00	←					
Valve Seat O-ring (Buna N)	4	P40B*	1.00	N/R		P40B*	1.00	N/R	
Manifold O-ring (Buna N)	4	P32B**	1.00	N/R		P32B**	1.00	N/R	
Valve Seat O-ring (TFE)	4	N/R*		PT40B	4.00	N/R*		PT40B	4.00
Manifold O-ring (TFE)	4	N/R**		PT32B	3.00	N/R**		PT32B	3.00
Teflon Diaphragm O-ring	2	N/R		TF24A	10.00	N/R		TF24A	10.00
Teflon Back-up Diaphragm (Neoprene)	2	N/R		TF24B	20.00	N/R		TF24B	20.00
Expanded Teflon Gasket Kit	1	N/R		TF4/8GK	25.00	N/R		TF4/8GK	25.00

* Check first to see if pump was supplied originally with Valve Seat O-rings of Teflon, P/N PT40B.
** M8/PO and M8/PW which have Nordel or Viton diaphragms are fitted with P/N PT32B, Manifold O-rings of Teflon.

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RBG-P-5

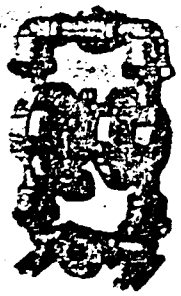
Effective Date April 1, 1983

WILDEN PUMP & ENGINEERING CO.
22069 VAN BUREN STREET, P.O. BOX 845, COLTON, CALIFORNIA 92324 / (714) 783-0621 / Telex 876-452

MODEL M 8

KYNAR PUMP PARTS for Models:

M8/KO/ M8/KW/
M8/KT/ M8/KY/



(Suggested U.S. List Prices)

DESCRIPTION	Qty. Per Pump	M8/KO/		M8/KT/		M8/KW/		[redacted]	
		P/N	Price	P/N	Price	P/N	Price	P/N	Price
Air Valve Assembly	1	B20	375.00	←		N/A		N/A	
Air Valve Body & Piston	1	B20A	175.00	←		W20A	180.00	←	
Air Valve Screen	1	20E	5.00	←					
Air Valve Cap w/Guide (Top)	1	20R	6.00	←		20RB	10.00	←	
Air Valve Cap (Bottom)	1	20S	5.00	←		20SB	9.00	←	
Snap Ring	2	S20T	2.00	←					
Air Valve Cap O-ring	2	20U	.50	←					
Air Valve Gasket	1	20B	1.00	←					
Lubricator Capillary Rod Assy.	1	20C	18.00	←					
Lubricator Oil Bottle	1	20D	26.00	←		W20D	32.00	←	
Center Block Assembly	1	20H	140.00	←		W20H	210.00	←	
O-ring	7	20JH	.50	←					
Block Bushing	1	20N	30.00	←					
Check Body	1	20K8	6.00	←		W20K8	12.00	←	
Nipple	1	20FS	5.00	←					
Check Ball	1	20M	2.00	←					
Block Gasket	2	20P	1.00	←					
Shaft	1	21A	45.00	T21A	45.00	21A	45.00	T21A	45.00
Piston, Inner	2	21B	25.00	T21C	20.00	21B	25.00	T21C	20.00
Piston, Outer w/Lug	2	K21B	265.00	KT21B	140.00	K21B	265.00	KT21B	140.00
Piston O-ring	2	N/R		N/R		N/R		N/R	
Air Chamber, Tapped (Replaced by 22B)				←					
Air Chamber, Counter Sunk	2	22B	60.00	←		W22B	86.00	←	
Water Chamber	2	K35	1125.00	←					
Clamp Band (Large)	2	P30	45.00	←					
Clamp Band (Medium)	4	P39	25.00	←					
Clamp Band (Small)	4	P32	20.00	←					
Discharge Elbow	2	K36	465.00	←					
Inlet Elbow	2	K37	495.00	←					
Manifold "T" Section	2	K33	410.00	←					
Ball Guide Bushing	4	K41C	65.00	←					
Valve Seat	4	K40	50.00	←					
Valve Seat O-ring (Buna N)	4	P40B*	1.00	N/R		P40B*	1.00	N/R	
Manifold O-ring (Buna N)	4	P32B**	1.00	N/R		P32B**	1.00	N/R	
Valve Seat O-ring (TFE)	4	N/R*		PT40B	4.00	N/R*		PT40B	4.00
Manifold O-ring (TFE)	4	N/R**		PT32B	3.00	N/R**		PT32B	3.00
Teflon Diaphragm O-ring	2	N/R		TF24A	10.00	N/R		TF24A	10.00
Teflon Back-up Diaphragm (Neoprene)	2	N/R		TF24B	20.00	N/R		TF24B	20.00
Expanded Teflon Gasket Kit	1	N/R		TF4/8GK	25.00	N/R		TF4/8GK	25.00

* Check first to see if pump was supplied originally with valve seat O-rings of teflon, P/N PT40B.
** M8/KO and M8/KW which have Nordel or Viton diaphragms are fitted with P/N PT32B, Manifold O-rings of Teflon.

* Copyright Wilden Pump & Engineering, 1983

APPENDIX I

Note: Specification for Epoxy Coating used on floor. New information begins on page I-84.

0053C

ENGGE 3

CONSTRUCTION SPECIFICATION
FOR
UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

DIVISION 9 FINISHES

SUB-DIVISION 9.06 SPECIAL COATING

ENG-OE-3

PART 1 GENERAL

1.1 SCOPE OF WORK

The Contractor shall furnish and apply special coatings in accordance with the contract drawings and this Specification. The Contractor shall apply the special coatings where indicated per the Room Finish Schedule.

1.2 RELATED WORK SPECIFIED ELSEWHERE

(1) CAST-IN-PLACE CONCRETE, Subdivision 3.01
(2) STRUCTURAL STEEL AND MISCELLANEOUS METALS, Subdivision 5.01
(3) METAL DOORS AND FRAMES, Subdivision 8.01
(4) PAINTING, Subdivision 9.07
(5) PIPING, Subdivision 15.01

1.3 REFERENCE DOCUMENTS

1.3.1 Codes and Standards

The Contractor shall comply with the applicable federal, state, and industry regulations and other codes and standards referenced in this Specification.

American National Standards Institute (ANSI)

ANSI N101.2	Protective Coatings (Paints) for Light Water Nuclear-Reactor Containment Facilities

American Society for Testing and Materials (ASTM)

ASTM D 659-74	Standard Method of Evaluation Degree of Chalking of Exterior Paints
ASTM D 714-56 (1974)	Standard Method of Evaluating Degree of Blistering of Paints
ASTM D 772-47 (1975)	Standard Method of Evaluating Degree of Flaking (Scaling) of Exterior Paints

Steel Structures Painting Council (SSPC)

SSPC-SP1-63	No. 1 Solvent Cleaning
SSPC-SP2-63	No. 2 Hand Tool Cleaning
SSPC-SP3	No. 3 Power Tool Cleaning
SSPC-SP5-63	No. 5 Blast Cleaning White Metal
SSPC-SP6-63	No. 6 Commercial Blast Cleaning

National Fire Protection Association (NFPA)

NFPA No. 30	Flammable and Combustible Liquids Code

0053C

ENG-GE 3

CONSTRUCTION SPECIFICATION
FOR
UPGRADING OF INDUSTRIAL LIQUID WASTE TREATMENT PLANT

DIVISION 9 FINISHES

SUB-DIVISION 9.06 SPECIAL COATING

ENG-OE-3

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National Fire Protection Association (NFPA)

NFPA No. 30	Flammable and Combustible Liquids Code

1.4 SUBMITTALS

The Contractor shall submit the following to the Contracting Officer in accordance with the "Data Requirements List".

1.4.1 Materials List

Before commencing work under this Subdivision, the Contractor shall furnish to the Contracting Officer for approval, a complete list of special coating materials to be used on the project, and printed recommendations of the Manufacturer of the special coatings, relating to the requirements for surface preparation, thinning, mixing, handling, application, and storage of materials. Also included shall be a list of approved form release agents which are certified by the special coating Manufacturer to be compatible with his coating products. A list of such form release agents shall be made available to the Contracting Officer preparatory to the concrete work.

1.4.2 Samples

The Contractor shall submit coating samples on 9" x 9" hardboard for approval. The samples shall be clearly marked with the Manufacturer's name and product identification, and shall be submitted in sufficient time to allow for approval and, if necessary, disapproval and resubmittal without causing any delay of the project. Color chips of finish special coatings shall be submitted showing the range of Manufacturer's standard colors.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery and Handling

The Contractor shall deliver all materials to the job site in original, new, and unopened packages and containers bearing Manufacturer's name and label, and the following information: name of material; Manufacturer's stock number and date of manufacture; contents by volume for major pigment and vehicle constituents; thinning instructions; application instructions, color name and number; and shelf life.

1.5.2 Storage

The Contractor shall store all special coatings, including, primers and fillers, in an enclosed area with adequate ventilation. Each type of coating material shall be stored in a separate area within the room or space. All containers shall be kept closed until ready for mixing procedures. The Contractor shall not damage the containers, labels, and tags. No materials shall be used which have been stored beyond the indicated shelf life. Special coating materials shall be stored at temperatures between 40°F and 90°F. Closed container storage instructions shall conform to NFPA No. 30, Chapter V.

1.6 SAFETY PRECAUTIONS

1.6.1 General

The Contractor shall comply with the safety precautions specified hereinafter during the time of mixing, preparation, installation and drying periods of the special coatings.

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In addition to the safety requirements specified herein, which shall be considered as minimum, the Contractor shall submit to the Contracting Officer additional safety procedures as may be required for the installation of the work.

Work shall not begin prior the Contracting Officer's approval of the submittal.

1.6.2 Acid Etching

When hydrochloric acid and water solution etching of surfaces is required the Contractor shall:

(1) Mix and apply the solution in accordance with the coating manufacturer's recommendations.

(2) Require that all employees wear proper protective clothing and equipment to prevent acid burns to skin and eyes, and irritation to nose and throat.

(3) Provide adequate ventilation during the application and drying period, and prevent drippage of acid solution onto personnel and equipment.

(4) Arrange for the provision of an on the spot water supply in each location where acid is used.

1.6.3 Sandblasting

When sandblasting of surfaces is required the Contractor shall:

(1) Provide respirators of types approved by the U.S. Bureau of Mines, selected to provide protection for the specific hazard.

(2) Provide cartridge type respirators where concentration of the injurious material is so low that damage will be produced only by long continued or repeated exposure.

(3) Exclude all employees not properly equipped with respiratory equipment from the sandblasting area. Dust respirators may be acceptable for inspectional or temporary conditions when combined with proper eye protection.

(4) Barricade the sandblasting area and post adequate warning signs.

1.6.4 Ventilation

The Contractor shall provide adequate ventilation during the application and drying periods of the special coatings as follows:

(1) A three-minute air change of the area shall be provided with proper air pattern maintained to uniformily flow downward through the area.

(2) The vapors shall flow naturally downward into the air pattern. Drafty overhead supply (due to poor distribution) or crossroom currents (due to outside atmospheric effects, open doors, windows, etc.) shall be prevented. Floor level exhausters shall be used to prevent the accumulation of explosive vapors.

(3) Air flow pattern shall be checked before application is started of any sealer, primer or coating.

(4) Fans used as exhausters shall be explosion-proof.

(5) Fans used as blowers to force fresh air under pressure into an area, need not be explosion-proof.

(6) Ventilation and fan capacities shall be sufficient in volume to prevent the accumulation of explosive vapors above 20% of the lower explosive limit of the solvents of the special coatings being applied.

(7) Fumes from operations inside buildings shall be exhausted directly to the atmosphere. Ventilation shall be continued for a minimum of 6 hours after application of each coating.

(8) Welding burning, flame or spark producing work shall be prohibited near the intake or exhaust outlets from or to such ventilation.

1.6.6 Electrical Equipment

The Contractor shall comply with the following:

(1) All metal receptacles (drums, pots, cans, etc.) used in the transfer of special coatings, including their primers and solvents from one container to another shall be bonded together by means of portable bonding cable, clamp type. Prior to start of work, the spray nozzle shall be effectively bonded to the paint pot and the paint pot shall be provided with a positive static ground.

(2) All energized lighting luminaires, switches, electric motors and other electrical equipment shall be of the explosion-proof type in the immediate area and in the vicinity of where air mixtures in the explosive range might possibly collect. All extension cords shall be of the one-piece type. Connecting sockets shall not be used.

(3) All metal parts of apparatus used in systems for the removal of vapor, including fans, ducts, etc., shall be electrically grounded in an effective and approved manner.

(4) All lighting luminaires, motors and other electrical equipment used in direct connection with this work shall be inspected. Defective equipment shall be removed and replaced with non-defective equipment.

1.6.7 Health and Fire Hazard Control Measures

The Contracting Officer will check all phases of the work from the standpoint of the hazards involved during all actual performance of the work.

The Contractor shall provide fire extinguishers.

The Contractor shall furnish all equipment and supplies required to conform to the following:

(1) Fresh air hoods or masks shall be worn by all personnel applying special coatings and by any other persons entering the immediate area. Approved filter respirator may be used by personnel when the concentrations of organic vapors are within permissible limits.

(2) Personnel handling and applying the special coatings shall wear plastic or acid-resistant type gloves.

(3) The Contractor shall arrange for a suitable area outside of permanent buildings for storage and mixing of the protective coatings. This area shall be situated so that these materials will not be exposed to any danger of fire. Adequate ventilation shall be provided at each storage and mixing area so as to prevent collection of flammable air mixtures.

(4) Only explosion-proof electric motors or air driven mixers shall be used for mixing the solvents and materials.

(5) Barricades or other markings acceptable to the Contracting Officer shall be installed around all special coating work. In the event the barricaded area is large in size and other crafts are involved, the barricaded area is to be cleared of other crafts until the coating is completed and properly dried.

(6) Welding, burning, flame or spark producing devices shall be prohibited inside the barricaded area. Spark-proof tools, such as nonferrous paint scrapers shall be used.

(7) Smoking, open flame or lights shall be prohibited inside the barricaded area and the Contractor will so post all entrances as well as conspicuous locations within the area.

(8) Tennis shoes or protective shoe covers are to be worn by all personnel within the immediate application area.

(9) In case of any power failure affecting the lighting or ventilation of any operation the personnel involved are to cease work immediately and evacuate the work area. Explosion proof emergency lighting shall be provided at all interior areas.

PART 2 PRODUCTS

2.1 DESCRIPTION

The Contractor shall apply special coatings, to floor, wall, and ceiling surfaces in accordance with the contract drawings and Specifications. The special coatings shall meet the performance tests in accordance with ASTM D 659, ASTM D 714, and ASTM D 772. The special coating materials shall consist of poly-amide and/or epoxy-amide surfacers, fillers, and epoxy hi-build enamels. Special coating systems of these materials shall be applied to the following surface types in accordance with the Manufacturer's instructions and the contract drawings:

(1) Coating A - concrete floors

(2) Coating B - concrete walls and concrete masonry unit

(3) Coating C - plaster walls and gypsum wallboard

(4) Coating D - structural steel, decking, carbon steel; doors and frames.

2.2 SPECIAL COATING SYSTEMS

The following special coating systems are based on Ameron protective coatings. Other manufacturers (such as Keeler and Long, Carboline, or Tnemec) of coating materials Approved Equal for nuclear coating systems may be used. The components of the coating systems shall be the products of one manufacturer.

2.2.1 Coating A - Concrete Floors

2.2.1.1 Primer/Sealer. Primer/Sealer shall be Nu-klad 108, or Approved Equal.

2.2.1.2 Intermediate Coat. Intermediate coat shall be Amercoat 66, polyamide-cured catalyzed epoxy, or Approved Equal; medium gray in color, with a dry film thickness of 5 mils.

2.2.1.3 Topcoat. Topcoat shall be 2 coats of Amercoat 66, polyamide-cured catalyzed epoxy, or Approved Equal; white in color, with a total 2 coat dry film thickness of 10 mils.

2.2.2 Coating B - Concrete Walls and Concrete Masonry Units

2.2.2.1 Primer/Sealer. Where a curing compound or form release agent has been used, the primer/sealer shall be Nuklad 105, or Approved Equal.

2.2.2.2 Filler. Filler shall be Nu-klad 114, or Approved Equal, where required.

2.2.2.3 Intermediate Coat. Intermediate coat shall be Amercoat 66, polyamide-cured catalyzed epoxy, or Approved Equal; medium gray in color, with a dry film thickness of 5 mils.

2.2.2.4 Topcoat. Topcoat shall be Amercoat 66, polyamide cured epoxy, or Approved Equal; white in color, with a dry film thickness of 5 mils.

2.2.3 Coating C - Plaster Walls and Gypsum Wallboard

2.2.3.1 Sealer. Sealer shall be Amercoat 66, polyamide-cured catalyzed epoxy or Approved Equal, with 2 quarts of thinner per one gallon of paint; the color shall be gray.

2.2.3.2 Topcoat. Topcoat shall be Amercoat 66, polyamide-cured catalyzed epoxy, or Approved Equal; the color shall be white with a dry film thickness of 5 mils.

2.2.4 Coating D - Structural Steel, Decking, Carbon Steel; Doors, and Frames

2.2.4.1 Primer for System with Sandblasting Preparation. Primer shall be Dimetcote 6, inorganic zinc primer, or Approved Equal.

2.2.4.2 Primer for System without Sandblasting Preparation. Primer shall be Amercoat 71, epoxy primer or Approved Equal. This preparation shall be used for doors and frames and for the sprinkler system. Cleaner for galvanized metals shall be Galvaprep, or Approved Equal.

2.2.4.3 Intermediate Coat. Intermediate coat shall be Amercoat 66, polyamide-cured catalyzed epoxy, or Approved Equal; medium gray in color with a dry film thickness of 5 mils.

2.2.4.4 Topcoat. Topcoat shall be Amercoat 66, polyamide-cured catalyzed epoxy, or Approved Equal, red in color for sprinkler system and white in color for other items, with a dry film thickness of 5 mils.

PART 3 EXECUTION

3.1 GENERAL

3.1.1 Inspection

The Contractor shall examine the substrates, adjoining construction, and the conditions under which the work is to be installed. The Contractor shall not proceed with the work until unsatisfactory conditions have been corrected. The Contractor shall co-ordinate the work with the work of other trades such that application of the special coatings does not hinder the progress or the quality of related work.

3.1.2 Environmental Conditions

The Contractor shall apply the special coatings only when the surfaces to coated and the surrounding air temperature is at or above 40 deg. F, or as otherwise recommended by the manufacturer. This temperature shall be maintained during application of coatings and for a minimum of 18 hours after application.

3.1.3 Protection

The Contractor shall provide suitable coverings to protect surfaces not requiring coating; place materials which might constitute fire or explosion hazard into metal containers and remove from premises at the close of each days work; and take every precaution to avoid damage by fire or explosion.

3.2 SURFACE PREPARATION

3.2.1 General

The Contractor shall prepare surfaces to receive special coatings. The Contractor shall thoroughly clean off substances that may interfere with proper adhesion. He shall coat or cover dry surfaces only. The Contractor shall fill dents, cracks, hollow places, open joints, and other irregularities with a filler suitable for the purpose and, after setting, sand to a smooth finish. The Contractor shall prime surfaces not more than 8 hours after cleaning. No more than 160 hours shall elapse between the installation of the first and successive coats.

3.2.2 Cementitious Surfaces

The Contractor shall perform the work as follows:

3.2.2.1 Preparation. Prepare cementitious surfaces of concrete and cement plaster to receive special coatings by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening if required to remove glaze. Use abrasive blast cleaning methods if recommended by coating system manufacturer.

3.2.2.2 Alkalinity and Moisture Content. Clean concrete surfaces with an alkaline wash of tri-sodium phosphate in a concentrate specified and where required by the manufacturer of the specified materials. Do not apply special coatings over surfaces where the moisture content exceeds that permitted in the manufacturer's printed directions.

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3.2.2.3 Acid Etch. Moist cured concrete shall be acid etched with one part 30 percent hydrochloric acid and two parts water, then neutralized with a rinse of potable water. The Contractor shall not apply the coating system until surfaces are thoroughly dry.

3.2.3 Ferrous Metal Surfaces

The Contractor shall clean and prepare surfaces by one of the following methods in accordance to the coating manufacturer's instructions for the metal substrate and applications required.

Clean non-galvanized, ferrous surfaces, which have not been shop-coated, of oil, grease, dirt, loose mill scale, and other foreign substances by solvent or mechanical cleaning, complying with SSPC-SP1. Blast clean steel surfaces as recommended by the coating system manufacturer and in accordance with SSPC-SP5 & SSPC-SP6. Hand tool cleaning shall be done in accordance with SSPC-SP2. Power tool cleaning shall be in accordance with SSPC-SP3.

3.2.4 Non-Ferrous Metal Surfaces

The Contractor shall clean non-ferrous and galvanized surfaces in accordance with the special coating system Manufacturer's instructions for the type of service, metal substrate, and application required.

3.3 MATERIALS PREPARATION

3.3.1 Mixing

The Contractor shall mix and prepare special coating materials in strict accordance with the Manufacturer's directions; stir all materials before application, and as required during the application of the materials to maintain a uniform consistency. If necessary, the Contractor shall strain before using. He shall not mix special coatings of different Manufacturers together.

3.4 APPLICATION

3.4.1 General

The Contractor shall provide a 24 hr written notice prior to application of special coatings in each room. The Contractor shall apply special coatings with brush, roller, spray, or other acceptable practice in accordance with the Manufacturer's directions; use brushes and rollers best suited for the type of material being applied; apply materials with care to a uniform thickness, showing no runs, holidays, sags, crawls, or other defects. He shall finish surfaces uniform in sheen, color, and texture; allow coats to cure thoroughly before succeeding coats are applied as specified by the coating materials Manufacturer; coat surfaces behind movable equipment and furniture the same as similar exposed surfaces; and coat all surfaces as indicated on the contract drawings and in this Specification.

3.4.2 Topcoat

Topcoat for Coating A, B, C, & D, specified hereinbefore shall be applied in accordance with the Manufacturer's application instructions.

ENG-GE

3.4.3 Primer/Sealer

The Contractor shall use Primer/Sealer specified hereinbefore. Oil or wax-based curing compounds and form release agents shall be removed by sandblasting. Apply the primer/sealer as soon as practical after cleaning to prevent foreign material (oil, salt, etc) from entering the concrete while it is porous. Apply the primer/sealer in accordance with the Manufacturer's recommendations.

3.4.4 Primer for System with Sandblasting Preparation

Primer specified hereinbefore shall be applied at a dry film thickness of 2-1/2 mils.

3.4.5 Primer for System without Sandblasting Preparation

Primer specified hereinbefore shall be applied at a dry film thickness of 2 mils.

3.4.6 Filler

Filler for concrete walls and ceilings, specified hereinbefore shall be used to fill small holes and voids so as to provide a smooth surface on which to place a topcoat.

3.5 PROTECTION AND CLEAN UP

3.5.1 Protection

(1) The Contractor shall protect work of other trades, whether to be painted or not, against damage by the special coating and plastic sheet work; leave all such work undamaged; and correct any damaged by cleaning, repairing or replacing, and recoating, as required.

(2) The Contractor shall provide "Wet Paint" signs to protect newly coated finishes; and remove temporary protective wrappings provided by others for protection of their work after completion of special coating operations.

3.5.2 Clean-up

(1) During the progress of the work, the Contractor shall remove from the site all discarded paint materials, rubbish, cans, and rags at the end of each work day and clean all coating equipment, brushes, sprayers, etc. as recommended by the manufacturer, at the end of each day's work.

(2) Upon completion of special coating work, the Contractor shall clean window glass and other special coating spattered surfaces; and remove special coating spatters by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces. The Contractor shall not use cleaners containing chlorides on stainless steel.

(3) At the completion of work the Contractor shall touch-up, restore, and/or recoat surfaces of unacceptable work.

3.6 FINAL ACCEPTANCE

Materials, workmanship, and installation not in accordance with the requirements of this specification shall be replaced or repaired by the Contractor.

APPENDIX I-1

MANUFACTURERS INFORMATION ON PROTECTIVE COATING, PRIMER AND FINISH

PLASITE®

TECHNICAL BULLETIN

7100
July 1984
(Replaces March 1980)

PLASITE 7100 HI-RESISTANT PROTECTIVE COATING

TYPE: A cross linked epoxy-phenolic cured with an alkaline curing agent and formulated with particular attention to wide chemical resistance and ease of handling.

INTENDED USE: PLASITE 7100 is an ideal heavy maintenance coating due to its thixotropic qualities and excellent edge coverage. PLASITE 7100 is similar in vehicle formulation to PLASITE 7122 but has a different pigment ratio and lower solids. It has lower comparative gloss and higher build characteristics. PLASITE 7122 is generally superior for immersion service. Refer to ZONE OF USAGE below.

CHEMICAL RESISTANCE: Excellent chemical resistance to a wide range of acids, alkalies, solvents and water solutions. Refer to CHEMICAL RESISTANCE on Page 2.

TEMPERATURE RESISTANCE: Dry film basis is 400°F for short periods; 250°F continuous. Continuous immersion temperatures depend on particular reagent.

SURFACE PREPARATION: Steel surfaces shall be prepared by blasting as required by ZONE OF USAGE. Refer to PRIMERS on Page 2.

APPLICATION: PLASITE 7100H is formulated for standard production spray equipment. PLASITE 7100B is formulated for brush and roller application and should be force cured for immersion service. Refer to last page for details on APPLICATION PROCEDURE.

COLORS: Standard colors are green, light gray, medium gray, black, white, tile red, clear. Special colors are available.

FILM THICKNESS PER COAT: A 6 to 7 mil film is easily produced in one multi-pass spray coat. A 2 to 4 mil film may be produced in one "flow on" brush coat.

COVERAGE: 769 mil ft^2/gallon ± 4% theoretical. For estimating purposes, 90 ft^2/gallon will produce a 6 to 7 mil film (20% loss included). Two coats will produce a 12 to 15 mil film for immersion service.

DRYING TIME: Surface will normally be tack free in 2 to 3 hours at 70°F.

CURING TIME: 5 to 7 days at 70°F to 90°F. Refer to page 2 for force curing.

PHYSICAL SPECIFICATIONS

PIGMENTS: Titanium dioxide, inerts and tinting colors.

SOLIDS: 60% by Weight; 48% ± 2% by Volume depending on color.

POT LIFE: Approximately 24 hours at 70°F.

SHELF LIFE: 24 months minimum at 70°F. Material in stock should be turned upside down every 3 to 6 months.

SPRAY VISCOSITY: 16 ± 7 seconds Ford Cup #4 depending on color.

SHIPPING WT.: Approximately 12 lbs./gallon.

ELECTRICAL RESISTANCE: 3.9 x 10^{12} ohm-cm Volume Resistivity. ASTM D257-66.

ABRASIVE RESISTANCE: 61 Milligrams loss average, 1000 Cycles Taber CS-17 Wheel, 1000 Gr. Wt. Lt. Gray Color.

HARDNESS: Barcol 55.

THERMAL SHOCK: Unaffected in 5 cycles, -70°F to +200°F.

FLEXIBILITY: ½" bend, Zuhr Conical Mandrel, 15 mil film.

NOTE: Above tests were conducted on film cured at 150°F.

ZONE OF USAGE

A ZONE: Includes immersion service for process, transportation and storage vessels, as well as exteriors of high temperature equipment, sumps, sewers, exhaust ducts, concrete bases and floors, or other surfaces subject to combinations of high temperature and heavy spills of corrosive chemicals. SSPC-SP5 blast and a film thickness of 12 to 15 mils required.

B ZONE: Interior process areas where structural steel, floors, equipment, ducts and other surfaces subject to attack by strong fumes, occasional spills and splashes at intermediate temperatures. SSPC-SP5 or SSPC-SP10 blast and a film thickness of 12 to 15 mils required. With surface preparation as indicated, the finish coating is considered self-priming although, if desired, a heavy duty primer may be incorporated as part of the system.

C ZONE: Interior and exterior area surfaces subject to fumes of fairly high concentration at ambient temperatures. Heavy or medium duty primer over SSPC-SP6 or SSPC-SP7 blast and a total film thickness, primer and topcoat, of 7 to 10 mils required.

D ZONE: Process plant exteriors subject to chemical atmosphere and weathering. Medium duty primer over SSPC-SP7 or SSPC-SP3 surface preparation and a total film thickness, primer and topcoat, of 6 to 8 mils required.

WISCONSIN PROTECTIVE COATING CORP.
614 Elizabeth Street
P.O. Box 216
Green Bay, WI 54305
414-437-6561

Represented by:

CHEMICAL RESISTANCE

The following list of laboratory tests is an indication of the range of chemical resistance. These tests consist of 1" x 5" mild steel test panels coated to a film thickness of 12 mils. The panels are one-half immersed in the solution at temperatures of 70° to 80°F for a period of six months with no effect on the coating.

ACIDS	ALKALIES	SOLVENTS	MISCELLANEOUS	
50% Sulfuric*	50% Sodium Hydroxide	Alcohol	50% Calcium Chloride	Reformate
50% Oxalic*	40% Potassium Hydroxide	Iso-Propyl	Glycol	Naptha
30% Phosphoric*	Calcium Hydroxide	Butyl, Decyl	Latex Rubber	Gasoline
25% Boric*	50% Sodium Carbonate	Gasoline	Linseed Oil	Sour Crude Oil
50% Citric*	Tri-Sodium Phosphate	Kerosene	Brine	
		Iso-Propyl Acetate	Ferric Chloride*	

***NOTE:**
Although the chemical tests indicated may show that PLASITE 7100 is unaffected by immersion as listed, it is not meant to imply an express guarantee in actual service. The service is dependent upon proper application and actual operating conditions and it is generally recommended that users confirm adaptability of the product for a specific use by their own tests.

PLASITE 7100 is classified as a relatively thin film coating and should not be used for total and continuous immersion in certain chemicals, such as, those acids referred to under CHEMICAL RESISTANCE which have extremely high corrosion rate to mild steel and other substrates. Use in such chemical exposure should be confined to fumes and spills.

THINNERS

The following thinners are recommended. The amounts required will vary depending on air and surface temperatures and application equipment. Normal application temperatures and conditions will require addition of approximately 10% by volume with approximately 5% additional thinner added for each 5° of increased temperature. Airless spray equipment and above normal temperatures require additional thinning.
It is recommended that the amount of thinner on each order amount to approximately 20% of the coating order.
PLASITE NO. 71 THINNER is a medium fast thinner and is to be used under most conditions.
PLASITE NO. 72 THINNER is a relatively slow thinner and coating must be force cured when used in A Zone applications. It is an aid to force curing and eliminating solvent popping and improves flow-out of coating.
PLASITE 69 THINNER is recommended for airless or conventional spray. It is a special blend of fast evaporating solvents and containing no hydrocarbons.

PRIMERS

Primers of the inhibitive type must be used when steel surfaces are not blasted to white metal and when finish coatings are below 8 mils in thickness.
PLASITE #7100 ANTI-CORROSIVE PRIMER described in Bulletin 7100-ACP is an epoxy-phenolic catalyzed primer of heavy duty type applicable for B, C, and D Zones.
PLASITE #7103 HEAVY DUTY PRIMER described in Bulletin 7103 is an epoxy metal primer with superior bond and water resistance as well as chemical resistance for B, C and D Zones.
These primers may be applied by either brush or spray application.

CURING

1. Normally polymerization and curing will take place in 5 to 7 days at 70°F. This coating should not be applied when air temperature or temperature of surface to be coated is below 50°F. Within 24 hours after coating is applied, a minimum substrate temperature of 70°F is required for proper polymerization.
2. Force curing at elevated temperature does increase resistance to certain exposures; therefore, when exposure is severe, force curing is recommended to obtain maximum resistance. Force curing is recommended for the PLASITE 7100B (Brush Formulation) when used in immersion service.
3. Below are listed a few curing schedules that may be used for time and work planning. Prior to raising the metal to the force curing temperature, it is necessary that an air dry time of 2 to 5 hours at temperatures from 70°F to 100°F be allowed. After the air dry period has elapsed, the temperature should be raised approximately 30°F each 30 minutes until the desired force curing temperatures are reached.

METAL TEMPERATURE °F	METAL TEMPERATURE °C	CURING TIME	METAL TEMPERATURE °F	METAL TEMPERATURE °C	CURING TIME
130	54.4	18 Hours	170	76.6	3½ Hours
140	60.0	10 Hours	180	82.2	2½ Hours
150	65.5	6 Hours	190	87.7	2 Hours
160	71.1	4½ Hours	200	93.3	1¾ Hours

4. Final cure may be checked by exposing coated surface to MIBK for ten minutes. If no dissolving and only minor softening of film occurs, the curing can be considered complete. The film should reharden after exposure.

SURFACE PREPARATION

STEEL

High Temperature & Immersion Service (A & B Zones as described under ZONE OF USAGE.)

1. All sharp edges shall be ground to produce a radius and all imperfections, such as, skip welds, delaminations, scabs, slivers and slag shall be corrected prior to abrasive blasting. All skip welds shall be welded solid.
2. Degrease surface prior to sandblasting. Organic solvents, alkaline solutions, steam, hot water with detergents or other systems that will completely remove dirt, oil, grease, etc. may be used. Prebaking of old tanks is required.
3. The surface shall be blasted to an SSPC-SP5 or NACE-1 white metal surface using a 5/16″ or 3/8″ blast nozzle supplied with 80 to 100 psi. An anchor pattern or "tooth" in the metal shall correspond to approximately 20 to 25% of the total film thickness of the coating.
4. Contaminated grit shall not be used for the finish work.
5. The grit used shall be a sharp silica sand, steel slag grit similar or equal to BLACK BEAUTY® BB1240 or any other abrasive that has a sharp, hard cutting surface, properly graded, dry and of best quality. The grit shall be of proper size to obtain the specified anchor pattern.
6. The anchor pattern shall be sharp and no evidence of a polished surface is allowed.
7. Remove all traces of grit and dust with a vacuum cleaner or by brushing. Care must be taken to avoid contaminating the surface with fingerprints or from detrimental material on the workers' clothes.
8. The surface temperature shall be maintained at a minimum of 5° above the dew point to prevent oxidation of the surface. The coating shall be applied within the same day that the surface has been prepared.

Service in Corrosive Atmospheres (B, C & D Zones as described under ZONE OF USAGE.)

1. Degrease as described in Item 2 under A & B Zones.
2. Remove all loose mill scale, rust scale, and old paint scale by one of the following methods:
   a. Near White Metal Blast Cleaning: (B Zone) SSPC-SP10 or NACE-2.
   b. Commercial Blast Cleaning; (C Zone) SSPC-SP6 or NACE-3.
   c. Brush-Off Blast Cleaning; (C & D Zones) SSPC-SP7 or NACE-4.
   d. Power Tool Cleaning; (D Zone) SSPC-SP3.

When utilized, inhibitive primer should be applied as soon as possible after surface preparation.

NOTE: The above specification numbers are from the Steel Structures Painting Council Surface Preparation Specifications, 4400 Fifth Ave., Pittsburgh, PA 15213 and National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218. D Zone application surface preparation as in above Paragraph 2(d) must result in a relatively rough surface. If the steel is new and this type of surface preparation does not leave a reasonably rough surface on the steel, then the heavy film system is not recommended.

CONCRETE

A ZONE: All concrete surfaces require whip blasting for immersion service. Fully cured concrete must be blasted to provide a hard, firm, clean and neutral surface for coating. All concrete surfaces must be filled and sealed with PLASITE 9028M1 or PLASITE 9028M2, applied in accordance with PLASITE Bulletin 9028. All surface imperfections, "bug holes", etc. must be completely repaired before application of PLASITE 7100. PLASITE 9028M1 and 9028M2 are not recommended for food service.

B ZONE: Severity of expected service will dictate minimum concrete surface preparation. Severe service (strong fumes, spillage, etc.) will probably require A Zone surface preparation and PLASITE 9028M1 or PLASITE 9028M2 filling and sealing before application of PLASITE 7100.

GALVANIZED SURFACE

The surface shall be clean and grease free and properly etched with a standard solution such as PARKER® #37 as produced by Occidental Chemical Company, Parker Division, or a phosphating solution. After the surface is properly etched, it should be thoroughly rinsed with water and thoroughly dried prior to coating application. No inhibitive primer is required providing the galvanized surface is continuous.

ALUMINUM

Surface shall be clean and grease free with a blast produced anchor pattern or "Tooth" as described earlier under "STEEL". In addition, the blasted surface shall be given a chemical treatment such as ALODINE® 1200S as produced by Amchem Products, Inc., Ambler, PA or IRIDITE® 14-2 as produced by Allied-Kelite Division of the Witco Chemical Corporation, Des Plaines, IL. For immersion, blasting with sharp grit followed by the chemical surface treatment is required.

NOTE: On metallic surfaces prepared only by chemical etching the total coating film thickness applied should be restricted to only half the film normally applied to blasted surfaces. This reduced film thickness should be considered during selection of the coating for the service and the type of surface preparation performed.

WOOD, TRANSITE AND SIMILAR SURFACES

Normally these materials need no surface treatment provided they are free of grease, oil and dirt and are dry. It is generally recommended that the first coat be diluted one part of recommended PLASITE Thinner to one part of material and brush applied.

EQUIPMENT

SPRAY APPLICATION

1. All spray equipment should be thoroughly cleaned and the hose, in particular, should be free of old paint film and other contaminants.
2. Use standard production-type spray guns:

GUN	FLUID	AIR
DeVilbiss JGA-502	E	704
Binks #18	66-SS	63-PB
Graco P800	04	02

3. When airless spray equipment is used the recommended liquid pressure is 1500-1800 psi with tip size from .013″ to .021″. Thinning requirements are more than for conventional spray.

BRUSH APPLICATION

A high quality brush should be used.

SAFETY AND MISCELLANEOUS EQUIPMENT

1. For tank lining work, it is recommended that the operator provide himself with clean coveralls and rubber soled shoes and observe good personal hygiene. Certain personnel may be sensitive to various types of resins which may cause dermatitis.
2. THE SOLVENT IN THIS COATING IS FLAMMABLE AND CARE AS DEMANDED BY GOOD PRACTICE, OSHA, STATE AND LOCAL SAFETY CODES, ETC. MUST BE FOLLOWED CLOSELY. Keep away from heat, sparks, and open flame and use necessary safety equipment, such as, air mask, explosion-proof electrical equipment, non-sparking tools and ladders, etc. Avoid contact with skin and breathing of vapor or spray mist. When working in tanks, rooms, and other enclosed spaces, adequate ventilation must be provided. Refer to Plasite Bulletin PA-3. Keep out of the reach of children.
3. U.S. Department of Labor approved Material Safety Data Sheet for this coating is available on request.

MIXING

The catalyst is in a separate container and measured for the coating unit supplied. Thoroughly mix the pigments. After the pigment and liquid is thoroughly mixed, add the measured liquid catalyst slowly and mix completely with the coating. The coating should stand approximately 30 minutes after the catalyst has been thoroughly mixed.

APPLICATION PROCEDURE

SPRAY GUN

1. Air supply shall be uncontaminated. Adjust air pressure to approximately 50 lbs. at the gun and provide 5 to 10 lbs. of pot pressure. Adjust spray gun by first opening liquid valve and then adjusting air valve to give an 8″ to 12″ wide spray pattern with best possible atomization.
2. Apply a "mist" bonding pass.
3. Allow to dry approximately one minute but not long enough to allow film to completely dry.
4. Apply criss-cross multi-passes, moving gun at fairly rapid rate, maintaining a wet appearing film. Observe the coating surface and, when it appears to be flowing together, you will have an average 4 to 5 mils wet film. By allowing the solvents to flash-off for a few minutes, several more fast multi-passes may be applied until you have a film thickness of approximately 5 to 7 mils (approximately 10 to 12 wet mils).
5. Overcoat time: This will vary both with temperature and ventilation. Probably will require from 8 to 12 hours at 70°F for enclosed spaces. Less time required for exteriors. Remove all overspray by dry brushing or scraping if required.
6. By repeating Steps 2 thru 4, a homogeneous film of 12 to 15 mils is obtained.
7. Equipment must be thoroughly cleaned immediately after use with PLASITE Thinner to prevent the setting of the coating.

NOTE: All welds, pits and rough metal areas should be coated by brush prior to spray application.

BRUSH APPLICATION

1. Apply a very light criss-cross brush coat.
2. Allow to dry approximately 5 minutes.
3. Apply a heavy coat using criss-cross brush pattern. "Flow" the coating on rather than try to "Brush out".
4. Allow to dry tack-free.
5. Repeat Steps 3 and 4 until sufficient film thickness is obtained. Normally a film thickness of 2½ to 3 mils can be obtained per coat by this method.

INSPECTION

Degree of surface preparation shall conform to appropriate specification as outlined in Surface Preparation section.
Film thickness of each coat and total dry film thickness of coating system shall be determined with a non-destructive magnetic gauge properly calibrated.
Refer to PLASITE Bulletin PA-3 for inspection requirements.

METRIC COMPARISONS

7100-4

1 mil = .001″ = 25.4 microns

1 U.S. gallon = 3.785 liters

1 Sq. Ft. = 0.0929 Sq. Meters

$$°C = \frac{5\,(°F - 32)}{9}$$

7/84

We guarantee our product to be free of defects in material and workmanship and to be in accordance with our company quality control standards. All data, statements and recommendations made herein are based upon information we believe to be reliable, but are made without any representation or guarantee or warranty of accuracy and are made with reservation of all patent rights. Our products are sold on the condition that the user himself will evaluate them, as well as our recommendations, to determine their suitability for his own purpose before adoption. Also, statements regarding the use of our products or processes are not to be construed as recommendations for their use in violation of any patent rights or in violation of any applicable laws or regulations. Liability under any condition shall be limited to replacement of material only. No liability is assumed or implied, for injury to personnel, labor costs, product loss or any other expenses incidental to the structure or operation of the plant and equipment where this coating is applied.

TECHNICAL BULLETIN

7100-ACP
MARCH 1984
(Replaces November 1980)

PLASITE 7100-AC HEAVY DUTY PRIMER - HI-RESISTANT ANTI-CORROSIVE PRIMER

TYPE: A cross-linked epoxy-phenolic, amine cured, combined with the proper modifying agents and Strontium Chromate inhibitive pigmentation.

INTENDED USE: Primarily as a combination inhibitive and high chemical resistant metal primer. It is an established fact that the paint or coating system chemical resistance is no better than the material next to the substrate. PLASITE No. 7100-AC Primer was designed to be used in combination with coatings of the high chemical resistant type.

CHEMICAL RESISTANCE: Excellent chemical resistance to spills and fumes of a wide range of acids, alkalies and solvents.

TEMPERATURE RESISTANCE: Dry temperature basis is 400°F for short periods, 350°F continuous.

SURFACE PREPARATION: Steel surfaces may be prepared by blasting or power tools as required by ZONE OF USAGE and SURFACE PREPARATION on Page 2.

APPLICATION: PLASITE 7100-AC Primer as formulated can be applied by standard production spray equipment or by brush and roller. Refer to Page 2 for details on application.

COLORS: Standard primer color is Moss Green.

FILM THICKNESS PER COAT: A 1½ to 3 mil DFT may be applied in one coat by any of the following methods: roller. spray or brush. A 2 mil minimum DFT is normally required.

COVERAGE: 625 mil ft.^{2}/gallon ± 4% (theoretical). 250 to 166 ft.^{2}/gallon will produce the 2 to 3 mil DFT recommended for use under a chemical resistance top coat for Zone B applications (20% loss included). 333 to 250 ft.^{2}/gallon will produce the 1.5 to 2 mil DFT required for use under a chemical resistant top coat for Zones C and D applications (20% loss included).

DRYING TIME: At 70°F the 2 mil film will normally be tack free in 3 to 4 hours and may be overcoated by spray application at this time. If the top coat is to be applied by brush, then it is recommended that the primer dry for at least 8 hours.

CURING TIME: 5 to 7 days at 70°F to 90°F. This coating should not be applied when air temperature or temperature of surface to be coated is below 50°F. Within 24 hours after coating is applied a minimum substrate temperature of 70°F is required for proper polymerization.

SOLIDS: By weight, 59% ± 2%; by volume, 39% ± 2%.

POT LIFE: Approximately 24 hours at 70°F.

SHELF LIFE: At 70°F 24 months. Material in stock should be turned upside down every 3 months.

SPRAY VISCOSITY: At 70°F 20 ± 7 seconds Ford Cup #4.

SHIPPING WT.: Approximately 12 lbs./gallon.

ZONE OF USAGE

B ZONE: Interior process areas where structural steel, floors, equipment, ducts and surfaces subject to attack by strong fumes, occasional spills and splashes at intermediate temperatures. Sandblasting to near white metal preferred for long life followed by 2 to 3 mils DFT PLASITE 7100-AC with top coat of appropriate PLASITE finish coating.

C ZONE: Interior and exterior areas of surfaces subject to fumes of fairly high concentration at ambient temperatures. Commercial blast surface preparation combined with PLASITE 7100-AC and appropriate PLASITE high resistant finish coat.

D ZONE: Process plant exteriors subject to chemical atmosphere and weathering. Good power tool cleaning or brush-off blast cleaning with the use of PLASITE 7100-AC Primer and appropriate PLASITE high resistant finish coat.

THINNERS

PLASITE 7100-AC Primer normally may be applied by brush as received. PLASITE 71 Thinner recommended to adjust spray viscosity and the amount required will vary depending on air and surface temperature and application equipment. Normal spray application conditions will require addition of approximately 10 to 20% PLASITE 71 Thinner by volume. Airless spray equipment and above normal temperatures require additional thinning.
It is recommended that the amount of thinner included on each order amount to approximately 20% of the coating order.

WISCONSIN PROTECTIVE COATING CORP.
614 Elizabeth Street
P.O. Box 216
Green Bay, WI 54305
414-437-6561

Represented by:

SURFACE PREPARATION

STEEL

Service in corrosive atmospheres (B, C & D Zones as described under ZONE OF USAGE).

1. Degrease surface prior to cleaning. Organic solvents, alkaline solutions, steam, hot water with detergents or other systems that will completely remove dirt, oil, grease, may be used.
2. Remove all loose mill scale, rust scale, and old paint scale by one of the following methods, listed in order of preference:
   a. Near White Metal Blast Cleaning - (B Zone) SSPC-SP10 or NACE-2.
   b. Commercial Blast Cleaning - (C Zone) SSPC-SP6 or NACE-3.
   c. Brush-Off Blast Cleaning - (D Zone) SSPC-SP7 or NACE-4.
   d. Power Tool Cleaning - (D Zone) SSPC-SP3.
3. PLASITE 7100-AC Primer should be applied as soon as possible after surface is prepared.

NOTE: The above specification numbers are from Steel Structure Painting Council Surface Preparation Specifications, 4400 Fifth Ave., Pittsburgh, PA 15213 and National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218. D Zone applications surface preparation as in above Paragraph 2(d) must result in a relatively rough surface. If the steel is new and this type of surface preparation does not leave a reasonably rough surface on the steel a heavy film system is not recommended.

EQUIPMENT

SPRAY APPLICATION

1. All spray equipment should be thoroughly cleaned and the hose in particular should be free of old paint film and other contaminants.
2. Use standard production-type spray guns:

GUN	FLUID	AIR
DeVilbiss JGA-502	E	704
Binks #18	66-SS	63-PB
Graco P800	04	02

3. When airless spray equipment is used the recommended liquid pressure is 1500 to 1800 psi with tip size from .015″ to .021″. Thinning requirements are more than for conventional spray.

BRUSH APPLICATION

A high quality brush should be used.

SAFETY AND MISCELLANEOUS EQUIPMENT

1. For tank lining work it is recommended that the operator provide himself with clean coveralls and rubber soled shoes and observe good personal hygiene. Certain personnel may be sensitive to various types of resins which may cause dermatitis.
2. THE SOLVENT IN THIS COATING IS FLAMMABLE AND CARE AS DEMANDED BY GOOD PRACTICE, OSHA, STATE AND LOCAL SAFETY CODES, ETC. MUST BE FOLLOWED CLOSELY. Keep away from heat, sparks, and open flame and use necessary safety equipment such as air mask, explosion-proof electrical equipment, non-sparking tools and ladders, etc. Avoid contact with skin and breathing of vapor or spray mist. When working in tanks, rooms, and other enclosed spaces adequate ventilation must be provided. Refer to Plasite Bulletin PA-3. Keep out of the reach of children.
3. U.S. Department of Labor approved Material Safety Data Sheet for this coating is available on request.

MIXING

The catalyst is in a separate container and measured for the coating unit supplied. Thoroughly mix the pigments. After the pigment and liquid is thoroughly mixed, add the measured liquid catalyst slowly and mix completely with the coating. The coating should stand approximately 30 minutes after the catalyst has been thoroughly mixed before using.

APPLICATION PROCEDURE

SPRAY GUN

1. Air supply shall be uncontaminated. Adjust air pressure to approximately 50 lbs. at the gun and provide 5 to 10 lbs. of pot pressure. Adjust spray gun by first opening liquid valve and then adjusting air valve to give an 8″ to 12″ wide spray pattern with best possible atomization.
2. Apply criss-cross multi-passes, moving gun at fairly rapid rate, maintaining a wet appearing film. Two to three passes should easily produce a 2 to 4 mil film.
3. Equipment must be thoroughly cleaned immediately after use with PLASITE thinner to prevent the hardening of the primer in the equipment.

NOTE: All welds, pits and rough metal areas should be brush applied.

BRUSH APPLICATION

1. Apply a very light criss-cross brush coat.
2. Allow to dry for approximately five minutes.
3. Apply a heavy coat using criss-cross brush pattern. "Flow" the coating on rather than "brushing out."

METRIC COMPARISONS

1 mil = .001″ = 25.4 microns

1 U.S. gallon = 3.785 liters

1 sq. ft. = 0.0929 sq. meters

$$°C = \frac{5(°F - 32)}{9}$$

We guarantee our product to be free of defects in material and workmanship and to be in accordance with our company quality control standards. All data, statements and recommendations made herein are based upon information we believe to be reliable, but are made without any representation or guarantee or warranty of accuracy and are made with reservation of all patent rights. Our products are sold on the condition that the user himself will evaluate them, as well as our recommendations, to determine their suitability for his own purpose before adoption. Also, statements regarding the use of our products or processes are not to be construed as recommendations for their use in violation of any patent rights or in violation of any applicable laws or regulations. Liability under any condition shall be limited to replacement of material only. No liability is assumed or implied, for injury to personnel, labor costs, product loss or any other expenses incidental to the structure or operation of the plant and equipment where this coating is applied.

carboline®

PHENOLINE® 373 Primer & Finish

SELECTION DATA

GENERIC TYPE: Modified Phenolic. Part A & Part B mixed prior to application.

GENERAL PROPERTIES: A low cost medium build modified phenolic tank lining having excellent all-around chemical, thermal shock and abrasion resistance. Cures to a hard, tough yet flexible film. A 3 coat system at 5 mils per coat can be used on steel or concrete. Phenoline 373 is acceptable under 21 CFR 121.2514 (FDA) for direct food contact surfaces, in appropriate colors, as recommended.

RECOMMENDED USES: Phenoline 373 is an effective and economical lining system for steel and concrete tanks containing dilute acids, caustic, salt or solvents. Also for tanks storing or processing wet, or dry food products. A system consisting of Phenoline 373 Primer and Phenoline 373 Finish is used for lining tanks of ocean-going chemical carriers because of resistance to wide range of chemicals and food products. Phenoline 373 Finish can be used to protect floors from splash and spillage of corrosives.

NOT RECOMMENDED FOR: Exposure to strong mineral and organic acids.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage
Acids	Very Good	Excellent
Alkalies	Excellent	Excellent
Solvents	Excellent	Excellent
Salt	Excellent	Excellent
Water	Very Good	Excellent

TEMPERATURE RESISTANCE: (Non-immersion)
Continuous: 180°F (82°C)
Non-continuous: 200°F (93°C)

Immersion temperature resistance depends on exposure. Consult Carboline Chart #18, Chart #42 or the Technical Service Department for specific recommendations. Metal tanks operating above 140°F (60°C) must normally be insulated.

FLEXIBILITY: Fair

WEATHERING: Good (Chalks)

ABRASION RESISTANCE: Excellent

SUBSTRATES: Apply over properly prepared steel, concrete, stainless steel, aluminum or others as recommended.

TOPCOAT REQUIRED: None for Phenoline 373 Finish. Phenoline 373 Primer may be topcoated with epoxies, modified phenolics or other generic types as recommended.

COMPATIBILITY WITH OTHER COATINGS: Phenoline 373 Finish is normally used over Phenoline 373 Primer or other modified phenolics and catalyzed epoxy primers as recommended.

SPECIFICATION DATA

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
Phenoline 373 Primer & Finish	75 ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT:
(Typical System)

1 coat Phenoline 373 Primer	5 mils (125 microns)
1 coat Phenoline 373 Finish Green	5 mils (125 microns)
1 coat Phenoline 373 Finish Gray	5 mils (125 microns)

THEORETICAL COVERAGE PER MIXED GALLON*:
1200 mil sq. ft. (29.4 sq. m/l @ 25 microns)
240 sq. ft. at 5 mils (5.9 sq.m/l @ 125 microns)

***NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 2 years minimum

COLORS: Phenoline 373 Primer — White 0810 only
Phenoline 373 Finish — Green 4339, Gray 2790

GLOSS: Medium

ORDERING INFORMATION

Prices may be obtained from Carboline Sales Representative or Main Office. Terms — Net 30 Days.

SHIPPING WEIGHT:	1's	5's
Phenoline 373 Primer	14 lbs. (6.5 kgs)	70 lbs. (31.8 kgs)
Phenoline 373 Finish	15 lbs. (6.8 kgs)	75 lbs. (34.1 kgs)
Phenoline Thinner	9 lbs. (4.1 kgs)	45 lbs. (20.4 kgs)

FLASH POINT: (Pensky-Martens Closed Cup)

Phenoline 373 Primer Part A	72°F (22°C)
Phenoline 373 Primer Part B	40°F (4°C)
Phenoline 373 Finish Part A	66°F (19°C)
Phenoline 373 Finish Part B	71°F (22°C)
Phenoline Thinner	77°F (25°C)

To the best of our knowledge the technical data contained herein are true and accurate at the date of issuance and are subject to change without prior notice. User must contact Carboline to verify correctness before specifying or ordering. No guarantee of accuracy is given or implied. We guarantee our products to conform to Carboline quality control. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of products. Prices and cost data if shown, are subject to change without prior notice. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY THE SELLER, EXPRESS OR IMPLIED, STATUTORY, BY OPERATION OR LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

line Thinner #2 or Toluol.

Steel: For immersion service, dry abrasive blast to a White Metal finish in accordance with SSPC-SP 5-63 to a degree of cleanliness in accordance with NACE #1 to obtain a 2 to 3 mil (50-75 microns) blast profile. For a non-immersion service, dry abrasive blast to a commercial finish in accordance with SSPC-SP 6-63 to a degree of cleanliness in accordance with NACE #3 to obtain a 2 to 3 mil (50-75 microns) blast profile.

Concrete: Remove fins and other protrusions by stoning, sanding or grinding. Concrete must be cured at least 28 days at 70°F (21°C) and 50% R.H. or equivalent time. Remove form oils, incompatible curing agents and hardeners by abrasive blasting.

IMMERSION SERVICE: Abrasive blast to open all voids and obtain a surface similar to medium grit sandpaper (horizontal surfaces may be acid etched). Blow or vacuum off sand and dust.

NON-IMMERSION SERVICE: Horizontal surfaces must be acid etched or abrasive blasted to remove laitance. For other surfaces blow off with compressed air to remove dust.

Phenoline 373 Finish can be applied over a recommended surfacer.

MIXING: Mix separately, then combine and mix in the following proportions:

	1 Gal	5 Gal
Phenoline 373 Primer or Finish Part A	.8 Gal.	4 Gal.
Phenoline 373 Primer or Finish Part B	.2 Gal.	1 Gal.

Thin up to 18% by volume with Phenoline Thinner

POT LIFE: 1½ hours at 75°F (24°C) and less at higher temperatures. Pot Life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65-85°F (18-29°C)	65-85° (18-29°C)
Minimum	55°F (13°C)	50°F (10°C)
Maximum	90°F (32°C)	110°F (43°C)

	Ambient	Humidity
Normal	65-85°F (18-29°C)	30-70%
Minimum	50°F (10°C)	0%
Maximum	110°F (43°C)	85%

SPRAY: Use adequate air volume for correct operation. Hold gun 8-10 inches from the surface and at a right angle to the surface.
Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable, however, equivalent equipment may be substituted.

Conventional: Use 3/8" I.D. Mat'l. Hose.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	66	66PE
DeVilbiss P-MBC or JGA	E	704
	Approx. .070"I.D.	Approx. 9-10 cfm @ 30 psi

Airless: Use a 3/8" I.D. Mat'l. Hose.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-514
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C

*Teflon packings are recommended and available from pump manufacturer. Use a .019-.025" tip with 2200 psi.

BRUSH: Brush application is recommended for touch-up only. Brush out well using full strokes and avoid rebrushing.

RECOAT AND CURE TIME:

Temperature	Primer Minimum	Finish Minimum	Primer & Finish Maximum*	Final Cure for Immersion*
50°F (10°C)	6 days	72 hours	30 days	60-120 days
60°F (16°C)	3 days	36 hours	14 days	15-60 days
75°F (24°C)	36 hours	18 hours	7 days	7-30 days
90°F (32°C)	12 hours	12 hours	4 days	5-15 days

*If maximum recoat time is exceeded and recoat is necessary, special surface preparation may be required. Force curing is recommended for all tank linings. Final cure temperatures below 60°F (16°C) are not recommended for tank linings. Final cure requirement varies depending on exposure.

CLEAN UP: Use Carboline Thinner #2 or Xylol.

STORAGE CONDITIONS:
Temperature: 40-110°F (4-43°C) Humidity: 0-100%

NOTE: Excessive film thickness or poor ventilating conditions require longer dry times and in extreme cases may cause premature failure. Excessive humidity or condensation on the surface during curing may result in a surface haze or blush; any haze or blush should be removed by water washing before recoating.

For more detailed information please consult specific Carboline Application Guides.

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

UNIVERS

Date of Request: 3/5/85

INSTA... STOCK ISSUE ITEMS IN LABORATORY WAREHOUSES

Requested By	Telephone	Group	Mail Stop	Realistic Date Req.
H. PATTERSON	7-6095	HSE7	J592	ASAP

Acct. Code	Program Code	Exp. Code	Job Order No.	Cap. Equip. Code	Correspondence to	Telephone	Mail Stop
707	W57W				H. PATTERSON	6095	J592

Deliver to (Name)	Area	Building	Room	Telephone	Mail Stop
L. Balo	TASY	AREAL			

KNOWN AVAILABLE EXCESS LISTS HAVE BEEN REVIEWED

Purchase approved by (Signature): H. Patterson

Z Number: 82174

Typed Name: H. PATTERSON

Title: STAFF

Auth. Level: $ | K

Foreign Country

ACT-1 Use Only

SHADED AREAS FOR MATERIALS MANAGEMENT USE ONLY

Screened for Excess	Date	Date Assigned	Buyer	Telephone
				(505) 667–

Invoice Terms	Required Shipping Date	Date of Order	SOCIO ECONOMIC SOURCE
			☐ Yes ☐ No

TO

PURCHASE REQUEST NUMBER: Y 2691

Quoted By	Telephone	Date	Quote Number

F.O.B.	Ship Via:
From	

ITEM	TYPE COMPLETE DESCRIPTION OF REQUIREMENTS OR SPECIFICATIONS	QTY.	UNIT	UNIT PRICE	EXTENSION
1	CARBOLINE- PHENOLINE 373- PRIMER	2	GAL.	$64.50	
2	CARBOLINE-PHENOLINE 373- FINISH	4	GAL	$62.80	
	(IN BLACK IF POSSIBLE OR DARKEST				
	COLOR AVAILABLE)				
	For Evaporation Tanks 9' Dia. 3½ High				
	Please Rush!!				
	Use Purchase Request Supplementary page if additional space is required.				

PAGE OF PAGES

SUGGESTED SOURCES (Sole source over $2.5K requires written justification)

JAMES COOKE + HOPSON CO.

125 EUBANK N.E.

ALBUQUERQUE, N.M. 87123

Telephone: 292-7100

Contact:

Total Estimated Cost: $400 ~~XX~~

Previous P.O. Number

Important handling or delivery information. QA? Hazards? Remarks.

Items	Total Cost	Account	Program	Loc.	Sor.	Exp.	Paren.	Job Order	Ord.	Proc.	Wk.	Surp.	Source	Accept

Bids Requested	Bids Received	Bids Rejected	Seller's Number	Ex.	Due Date	Ship Date

...NOSTIC LABORATORY

PURCHASE REQUEST

copies to MAT-12, MS-274. Return ruined or unused copies to MAT-12. Do Not Destroy. DO NOT USE FOR STOCK ISSUE ITEMS IN LABORATORY WAREHOUSES.

Date of Request	Requested by	Group	Mail Stop	Telephone	Realistic Date Reqd.	Date/Time Stamp
1-9-~~84~~ 85	A. Belo	HSE-7	J592	7-6095	1-25-84	

...ode	Program Code/J.O.	Capital Equip. Code	Correspondence to	Mail Stop
J707	W57W		Karen A. Belo	J592

...eliver to (name)	Area	Building	Room	Telephone	Mail Stop
Karen A. Belo	54			7-6095	J592

...NOWN AVAILABLE EXCESS LISTS HAVE BEEN REVIEWED

...rchase approved by (signature)

Typed Name: John L. Warren

Title: Assoc. Grp. Ldr.

Authority Level: $ 10 K

...HADED AREAS FOR MATERIALS MANAGEMENT USE ONLY

...creened for Excess	Date	Buyer	Date ...signed	Telephone

...nvoice Terms	Negotiated Shipping Date	Date of Order	Blanket Purchase Agreement

...O

PURCHASE REQUEST NUMBER: M 4713

Quoted By	Telephone	Date	Quote Number	SOCIO ECONOMIC SOURCE
				☐ Yes ☐ No

F.O.B.	Ship Via	Ship From

ITEM	TYPE COMPLETE DESCRIPTION OF REQUIREMENTS OR SPECIFICATIONS	QUAN.	UNIT	UNIT PRICE	EXTENSION
	3 ft-6 inches High MDB			9/25/81	
	Tank, 10 gauge carbon steel, 9 ft. diameter, 3'6" high,	4	ea.		
	with a 2"x2" angle iron stiffening ring at the lip,				
	2" screwed plug for drain mounted in shell.				
	THESE ARE THE EVAPORATION TANKS				
	(Use a plain sheet of paper for continuation pages.				

SUGGESTED SOURCES (Sole source over $2.5K requires written justification)	Total Estimated Cost	Previous P.O. No.
Canyon Steel Albuquerque, NM Talk to Garrett (873-0160)	$2480	

State important handling or delivery information. QA handling? _____

Please call 24 hours ahead of delivery as we need to have equipment available to off-load the tanks.

...otal Cost	Account	Program	Loc.	Sor.	Exp.	Paren.	Job Order	Sub.	Proc.	Wk.	Surp.	Source	Accept

Bids Requested				Bids Received				Bids Rejected				Seller's No.	Ex.	Due Date	Ship Date
B	S	D	W	B	S	D	W	Small	Disadvantaged	Women					

Group	Site	Building	Room	For	Foreign Country	ACT-1 Use

...239 (2/81)

[redacted]	[redacted]	J592	7-6095	Realistic Date Reqd. 1/23/85	Date/Time Stamp
Expense Code M 5707	Program Code/J.O. W57W	Capital Equip. Code	Correspondence to R. Gaccia	Mail Stop J592	
Deliver to (name) H. Patterson	Area TA-54	Building Area L	Room	Telephone 7-6095	Mail Stop J592

IN AVAILABLE EXCESS LISTS HAVE BEEN REVIEWED

Use approved by (signature)

Typed Name: Harry Patterson

Title: Staff Member

Authority Level: $ 1K K

ADED AREAS FOR MATERIALS MANAGEMENT USE ONLY

eened for Excess	Date	Buyer	Date Assigned	Telephone
oice Terms		Negotiated Shipping Date	Date of Order	Blanket Purchase Agreement

PURCHASE REQUEST NUMBER M 4721

ted By	Telephone	Date	Quote Number	SOCIO ECONOMIC SOURCE ☐ Yes ☐ No
B.		Ship Via		Ship From

EM	TYPE COMPLETE DESCRIPTION OF REQUIREMENTS OR SPECIFICATIONS	QUAN.	UNIT	UNIT PRICE	EXTENSION
	4" x 4" redwood lumber in 10 foot lengths	32	ea.	0.78/ linear foot	
	Please Rush				

(Use a plain sheet of paper for continuation pages.)

ESTED SOURCES (Sole source over $2.5K requires written justification)

e Rock Builders Supply

Meadow Lane

Alamos, NM 87544

672-3871

Total Estimated Cost: $250.00

Previous P.O. No.

State important handling or delivery information. QA handling?

Total Cost	Account	Program	Loc.	Sor.	Exp.	Paren.	Job Order	Ord.	Proc.	Wk.	Surp.	Source	Accept

s Requested			Bids Received				Bids Rejected			Seller's No.	Ex.	Due Date	Ship Date
S	D	W	B	S	D	W	Small	Disadvantaged	Woman				

Site	Building	Room	For	Foreign Country	ACT-1 Use

38 (2/81)

REQUESTER

Foreign Country ACT-1 Use

JOB NUMBER: 161
PO: 1-MAB-M47217 VENDOR: WHITE ROCK BUILDERS SUPPLY 1-MAB-M47217-
SUBSEQUENT RECEIPT NUMBER:
FOB: DESTINATION
DATE RECD: 23-JAN-85 RR NUMBER: DR NUMBER:
DATE WORKED: 24-JAN-85 SHIP FROM: WHITE ROCK, MA
PACKING LIST: SUPP

FGT CHARGES: PPD ROUTING: 00

CARRIER: Vendor's Truck FGT BIL: SUPP WEIGHT: 1100

GROUP: MBE-7 PIECES: 20

SITE: TA04 RECEIV: PATTERSON CLERK: THOMAS MICHAEL

BUILDING: AREA L ROOM:

ACCT CODES: 5707 -WE74 -0-1-10-

****

ITEM NO.	SUB-ITEM	DESCRIPTION	RECD	UNIT STAT	UNIT COST
001		4" X 4" REDWOOD LUMBER IN 10 FOOT LENGTHS	20	EA C	$7.50

RECEIVING REPORT TOTAL $149.00

Rec. by Tom Montoya
1-23-85

U.S. GOVERNMENT PRINTING OFFICE: 1981—579-097

Los Alamos National Laboratory

PURCHASE REQUEST

Requester: Retain pink (send all other copies to MAT-12, MS-27). Return ruined or unused copies to MAT-12. Do Not Destroy. DO NOT USE FOR STOCK ISSUE ITEMS IN LABORATORY WAREHOUSES.

Date of Request: 1/85

By	Group	Mail Stop	Telephone	Realistic Date Reqd.	Date/Time Stamp
Harry Patterson	HSE-7	J592	7-6095	3/15/85	

Reserve Unit	Program Code/I.D.	Capital Equip. Code	Correspondence to	Mail Stop
5707	W57W		Rosila Garcia	J592

Deliver to (name)	Area	Building	Room	Telephone	Mail Stop
H. Patterson	TA-54	22	104	7-6095	J592

KNOWN AVAILABLE EXCESS LISTS HAVE BEEN REVIEWED

Purchase approved by (signature): H. P. Patterson

Typed Name: Harry Patterson

Title: Staff Member

Authority Level: $ 1K K

MATERIAL MANAGEMENT USE ONLY

Buyer | Date | Buyer | Date Assigned | Telephone

Service Times | Negotiated Shipping Date | Date of Order | Original Requisition Approval

PURCHASE REQUEST NUMBER

Quoted By | Telephone | Date | Quote Number | ECONOMIC SOURCES ☐ Yes ☐ No

Ship Via | Ship From

	TYPE COMPLETE DESCRIPTION OF REQUIREMENTS OR SPECIFICATIONS	QUAN.	UNIT	UNIT PRICE	EXTENSION
1.	Plastic Bag Liner to fit a nine foot diameter tank with 3 1/2 foot sides. Should have excess for tie down. 8 mil thick. For Evaporation Tanks (9' Dia - 3½' High)	6	ea.		
	See PR. M4715 date 1/9/85				
	Brad. Please call ahead and confirm shipping arrangements and charges!!				

Use a plain sheet of paper for continuation pages.

SUGGESTED SOURCES (Sole source over $2.5K requires written justification)	Total Estimated Cost	Previous P.O. No.
Packaging Research Design Corp.	$225.00	M4715 1/9/85

State important handling or delivery information. CA handling? _____

12717 Pecos Ave.

Hill Springs, LA 70739

Ph: (504) 261-1474

Account	Program	Loc.	Ser.	Exp.	Rcpn.	Job Order	Acc.	Proc.	Wk.	Surp.	Source

Date Received	Not Received Partial	Not Received Complete	Normal	Exc.	Due Date	Ship Date

*U.S. GOVERNMENT PRINTING OFFICE: 1983—679-728

UNIVERSITY OF CALIFORNIA — LOS ALAMOS NATIONAL LABORATORY

PURCHASE REQUEST

Date of Request	INSTRUCTIONS: Requester retains pink copy and sends all other copies to MAT-10, MS P274. Return ruined or unused copies to MAT-12, MS P274. DO NOT DESTROY. DO NOT USE FOR STOCK ISSUE ITEMS IN LABORATORY WAREHOUSES.
21/85	

Requested By	Telephone	Group	Mail Stop	Realistic Date Req.
Harry Patterson	7-6095	HSE-7	J592	ASAP

Acct. Code	Program Code	Exp. Code	Job Order No.	Cap. Equip. Code	Correspondence to	Telephone	Mail Stop
5707	W57W1				Rose Garcia	7-6095	J592

Deliver to (Name)	Area	Building	Room	Telephone	Mail Stop
Harry Patterson	TA-54	Area L		7-6095	J592

KNOWN AVAILABLE EXCESS LISTS HAVE BEEN REVIEWED

Purchase approved by (Signature): Karen A. Balo

Z Number: 92928

Typed Name: Karen A. Balo

Title: Section Supervisor

Auth. Level: $ 1K K

Foreign Country

ACT-1 Use Only

SHADED AREAS FOR MATERIALS MANAGEMENT USE ONLY

Screened for Excess	Date	Date Assigned	Buyer	Telephone
				(505) 667--

Invoice Terms	Required Shipping Date	Date of Order	SOCIO ECONOMIC SOURCE
			☐ Yes ☐ No

TO

PURCHASE REQUEST NUMBER

Y 2695

Quoted By	Telephone	Date	Quote Number

FOB: Ship Via:

Ship From

ITEM	TYPE COMPLETE DESCRIPTION OF REQUIREMENTS OR SPECIFICATIONS	QTY.	UNIT	UNIT PRICE	EXTENSION
1.	CARGO NET - 20 feet x 20 feet 168 braided strand -	1	ea.		
	1/2" border treated to resist UV radiation				
	For Evaporation Tanks (9' Dia - 3½' High)				
	PLEASE RUSH!!				
	Use Purchase Request Supplementary page if additional space is required.				

PAGE OF PAGES

SUGGESTED SOURCES (Any source over $2.5K requires written justification)

NYLON NET COMPANY

Dept. P.O. Box 592

Memphis, TN 38101

Telephone: (901) 774-1500

Contact: Dee

Total Estimated Cost: $1050.00

Previous P.O. Number

Important handling or delivery information. QA? Hazards? Remarks

Items	Total Cost	Account	Program	Loc.	Sor.	Exp.	Purch.	Job Order	Ord.	Proc.	Wk.	Surp.	Source

APPENDIX I-2

MANUFACTURERS INFORMATION ON CONTAINERS

CHEC
CHEMICAL HANDLING EQUIPMENT CO., INC.

PRICE BULLETIN

"TUFF-TANK 225" & "TUFF-TANK 225W"
DOT Authorized Mini-Bulk Containers

No. 104T Date January 1, 1984 Superseding Bulletin Dated 1/1/83

U.S. Department of Transportation Approved Container (DOT E-9052)
and U.S. Coast Guard Approved Container

"TUFF-TANK 225" For Transporting and Storing Hazardous Liquids
"TUFF-TANK 225W" For Transporting and Storing Hazardous Liquid Wastes**

Standard Specifications

- Rotationally molded container made of tough polyethylene. (FDA Approved)
- 225 gallon capacity (850 liters)
- Molded-in bottom sump, for near complete drainage.
- Large recessed fill opening, 7" dia., with heavy duty buttress type threads.
- Injection molded polyethylene fill cap, 7" dia., with Hypalon elastomer seal. Cap has integral locking ring.
- Built-in, recessed, top mounted discharge outlet with 1" dia. suction pipe and foot valve with strainer mounted in depressed sump.**
- Quick-Disconnect coupling, 1" dia. polypropylene, with captured lever lock cap at discharge outlet for quick and safe connection to pumping source. **
- Rugged steel wire mesh enclosure to secure and protect polyethylene container. Enclosure is made of 2 guage wire mesh on all four sides and bottom, welded to rigid steel corner posts and to channel iron grid base support structure. Heavy duty self aligning stacking legs allow stacking of containers three high. Enclosure is painted with corrosion resistant epoxy paint in OSHA yellow color. Enclosure is manufactured to meet the Material Handling Institute Specifications for Industrial Metal Containers.
- Overall Dimensions - 48" long x 40" wide x 42" high
- Weight of Unit (Empty) - 360 lbs.
- Rated Gross Weight (DOT Approved) - 3850 lbs.
- Rated Maximum Liquid Weight (DOT Approved) - 15.3 lbs./gal.

** "TUFF-TANK 225W" for hazardous liquid wastes has a 2" dia. suction pipe, quick disconnect fitting and cap, but no foot valve.

PRICES

1 through 5 units	$975.00 ea.
6 through 10 units	945.00 ea.
11 through 19 units	895.00 ea.
20 through 39 units	825.00 ea.
40 or more units	795.00 ea.

Prices are FOB Detroit, Michigan

(OVER)

CHEC CHEMICAL HANDLING EQUIPMENT CO., INC.
20505 WOODINGHAM DRIVE, DETROIT, MICHIGAN 48221, PHONE 313/861-7555

check these

3/6 Stainless tank → too high not in market anymore can't compete

ACCESSORY ITEMS

ALTERNATE MATERIAL INNER TANKS

Interchangeable with Polyethylene Inner Tank

316 Stainless Steel ..... consult factory for price
Mild Steel ..... consult factory for price

FILLER CAP ACCESSORIES

Each "TUFF-TANK 225" comes standard with one polyethylene filler cap with Hypalon elastomer seal and locking ring.

EXTRA FILLER CAP, with Hypalon Seal $32.00

VITON SEAL in place of Hypalon Seal .... add 38.00

SUCTION/PRESSURE RELIEF DEVICE, EPT 16.00

LOCKING CABLE, vinyl coated stainless steel cable with cast locking lugs 9.00

CLEANING HEAD

316 Stainless Steel multi-nozzle spray head and 1" dia. stainless pipe secured to standard filler cap with stainless steel fasteners. Included in cap are polypropylene quick disconnect fitting and EPT suction relief device. Cleaning Head attaches to "TUFF-TANK" filler neck.

Price 885.00

MIXER HEAD

316 Stainless Steel Mixer, 27" long shaft with 4" dia. stainless steel propeller, attached to standard filler cap. A 1/3 HP air motor powers the mixer head. Mixer head attaches to "TUFF-TANK" filler neck.

Price 965.00

HOSE/VALVE ASSEMBLY

(For connecting "TUFF-TANK 225" to "CHEC-Mate II" Automatic Liquid Metering System, or any other pumping source.)

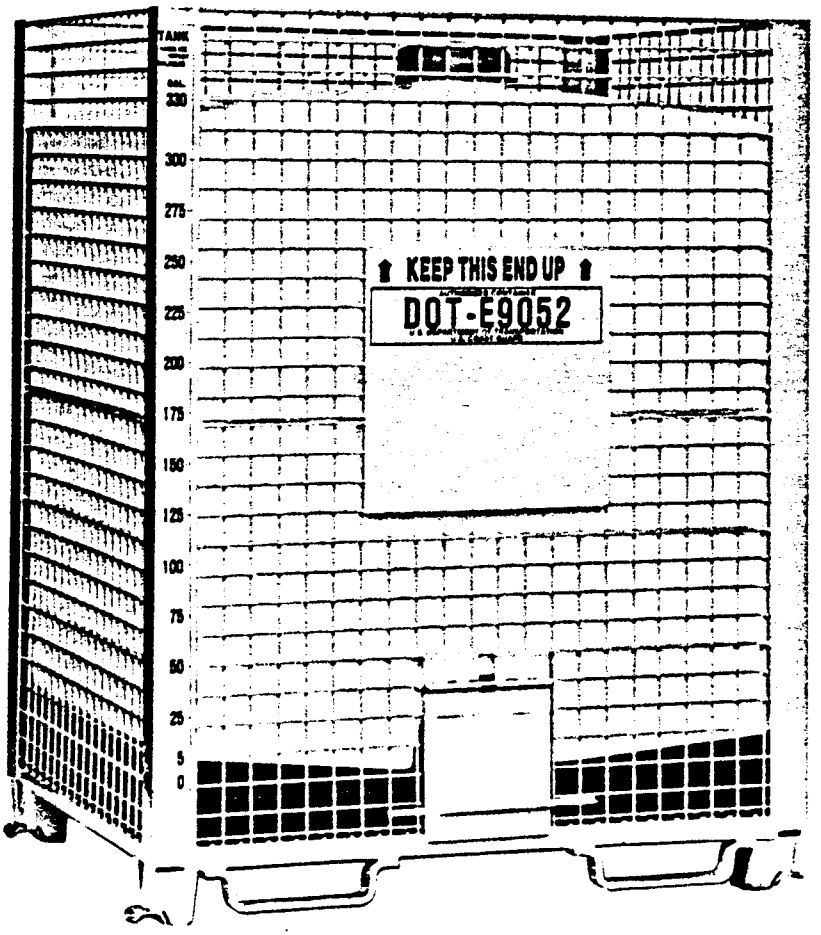
12' of reinforced polyethylene hose, 1" dia., with 1" polypropylene ball valve and quick disconnect fittings, to mate with "TUFF-TANK 225"

Price 395.00

Pat Norton
220 gal
330 gal

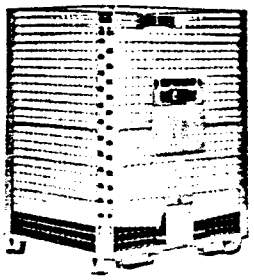
ALL PRICES ARE FOB: DETROIT, MICHIGAN

If you handle hazardous liquids you need the innovative new TUFF TANK System.



CHEC

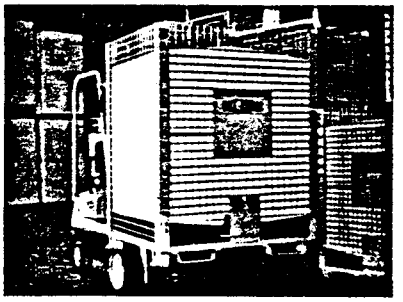
TUFF TANK vs. DRUMS
Compare for yourself.



Look at the TUFF TANK. Then look at a 55-gallon drum. TUFF TANK is square. The drum is round.
That might seem like a little thing at first. But it's the shape that makes TUFF TANK the modern way to handle hazardous liquids. And it's the shape that makes the 55-gallon drum obsolete.
Let's take a look at the facts.

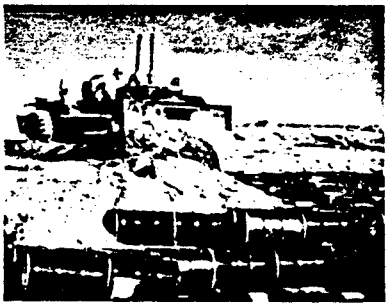
TUFF TANKS stack higher than drums. And handle easier.

The drum is round, cylindrical. It's difficult to handle. And almost impossible to stack. And drums take up more warehouse space. That means more cost to you.
TUFF TANK, with its cube-like shape, is designed for easy handling. TUFF TANK has 4-way lift truck entry and safety fork pockets for secure

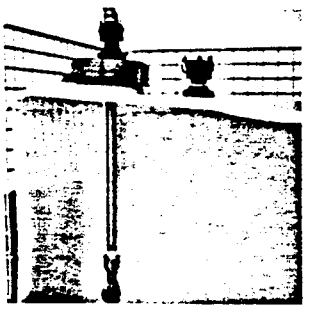


in-plant transportation. And TUFF TANK's self-aligning stacking legs make it easy to stack. Up to 3 high.
And since TUFF TANKS hold more liquid than drums, you won't need to move them as frequently. TUFF TANKS hold up to 330 gallons. Six times more than drums.

TUFF TANKS are reusable. No more disposal problems.

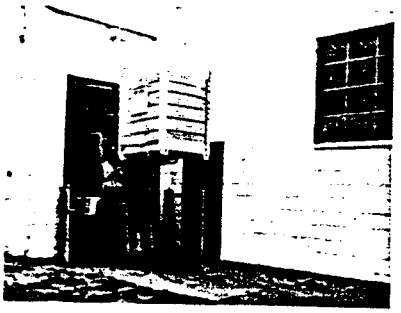


There's another problem using drums. How do you get rid of them? If drums are filled with a hazardous liquid, they too become a hazardous substance—with environmental and legal repercussions for those who try to dispose of them. Most drums are designed to be used once, then safely disposed of.



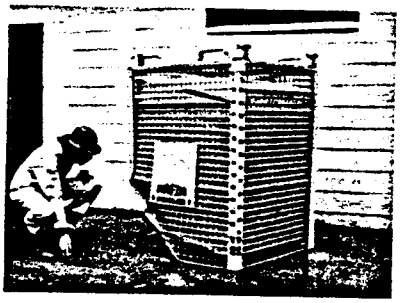
TUFF TANKS can be used over and over again. A specially designed cleaning head attaches securely to the top of TUFF TANK. The cutaway view above shows the rotating spray head which directs a steady stream of water over the entire inner surface of the container—making it ready for immediate reuse.

We tested TUFF TANK to DOT standards. Then we really tested it.



We subjected TUFF TANK to the tests required for authorization by the U.S. Department of Transportation and the U.S. Coast Guard. The stacking test. The pressure test. The vibration test. And the cold drop test.

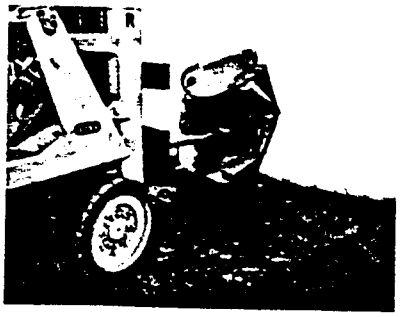
TUFF TANK passed with flying colors.



In fact, TUFF TANK proved capable of handling liquids as heavy as 15.3 pounds per gallon, the highest tested and authorized rating in the industry.

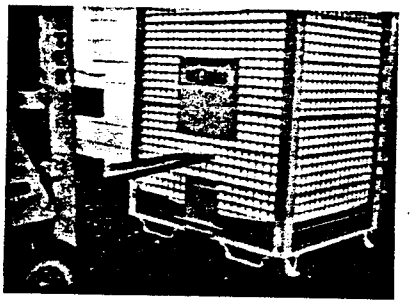
But we weren't satisfied. After we finished testing TUFF TANK to DOT standards, we really tested it.

The DOT drop test calls for the container to be dropped from the height of a flat bed trailer. About 4 feet.



We dropped TUFF TANK from 7 feet. And while the cage sustained some damage, the tank was unharmed. Absolutely no leakage.

Then we took the TUFF TANK, a 55-gallon drum, and four other competitive containers and we put them through the fork truck test.



The fork truck test recreates a real in-plant accident situation.

We rammed our lift truck into each container. From the same angle. At the same speed. Tank after tank was punctured, pierced, destroyed.

All except one. TUFF TANK.

Protected behind its heavy-duty wire mesh cage, TUFF TANK was the only container to survive the fork truck test.

TUFF TANKS cost less to handle. About half the cost of drums.

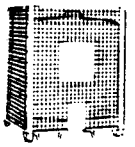
COST OF HANDLING

6 DRUMS = $240 to $300

A study made by a major Fortune 500 company determined that the cost of handling and disposing of a 55-gallon drum is between $40 and $50.

Since it takes six drums to equal one TUFF TANK 330; the cost of using six drums will range from $240 to $300.

COST OF HANDLING



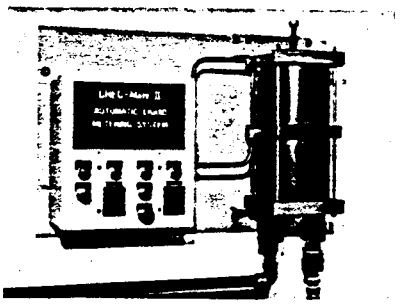
1 TUFF TANK = $130

A large 330-gallon TUFF TANK costs no more than $130 to handle, including return freight. About half the cost of drums. And the average payback period for TUFF TANK users is less than six months.

The TUFF TANK System.

TUFF TANK is more than a container, it's part of an engineered handling system that combines features and benefits no other storage container can match.

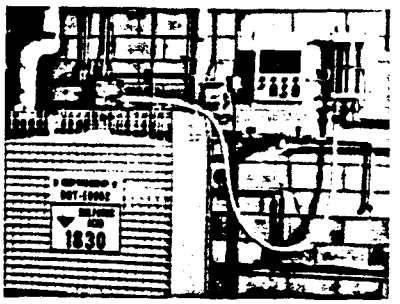
CHEC MATE II. The automatic liquid metering system. For hazard-free dispensing.



When you want to empty TUFF TANK, you can do it easily through the top or bottom discharge outlets—by gravity or with any pump.

But the most efficient way to dispense liquids is through our own specially designed liquid metering system: CHEC MATE II.

CHEC MATE II connects quickly and safely to TUFF TANK for hazard-free dispensing. You simply insert the number of gallons, or liters, to be pumped into the digital counter. Push the start button and the system will pump the exact

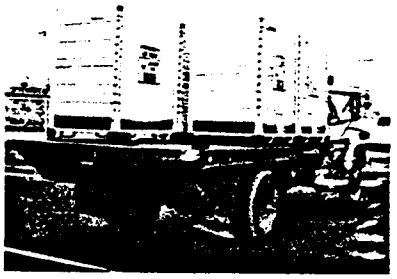


number of gallons you want. And turn itself off automatically.

CHEC MATE II will also record the number of gallons left in TUFF TANK—and stop the pumping action and give a visual sign when the tank is empty.

CHEC MATE II is completely air-operated and explosion-proof. It can be used with any container or storage tank for virtually all hazardous liquids.

We even have a way to transport TUFF TANKS.



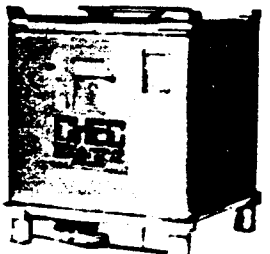
Our trucking system is designed to transport TUFF TANKS on a standard flat bed trailer. Specially designed containment brackets secure the tanks safely during transport. And allow for easy unloading wherever they're delivered.

TUFF TANK has an optional security top.

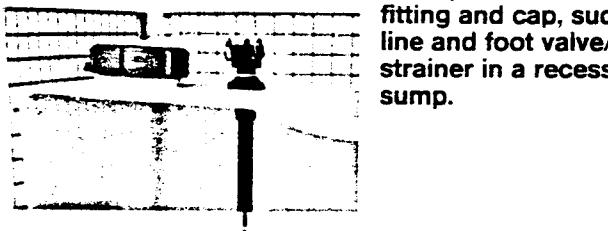
TUFF TANK's rigid, one-piece security top will support the weight of a man, but can still be easily removed for inspection or maintenance.

TUFF TANK comes in metal, too.

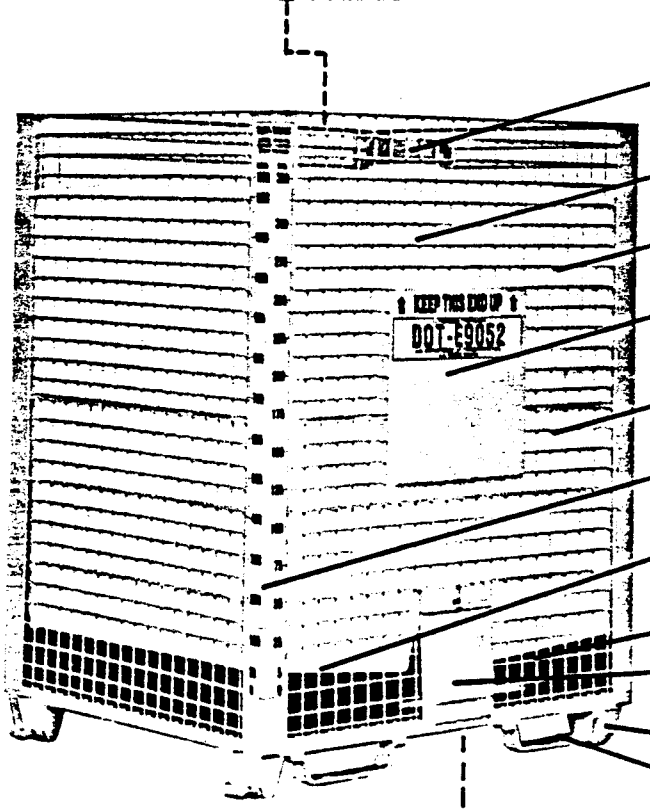
For liquids that are not compatible with polyethylene, we offer TUFF TANK in stainless steel, mild steel and aluminum.



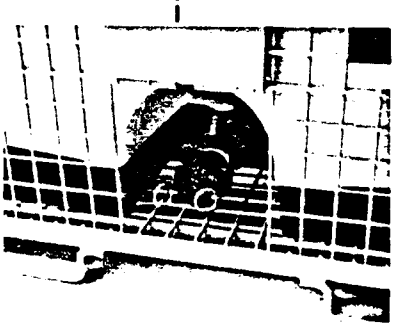
Introducing TUFF TANK. The safest, easiest, most cost effective way to handle hazardous liquids.



The top discharge option includes a 1-inch quick disconnect fitting and cap, suction line and foot valve/ strainer in a recessed sump.



- Large lockable fill cap with heavy-duty buttress-type threads.
- Rugged translucent polyethylene inner tank.
- Rigid heavy-duty wire mesh enclosure.
- Large panel (2 sides) for DOT, EPA safety labels.
- Liquid level constantly visible.
- Volume gauge (Gallons & Liters).
- Sloped bottom to recessed sump for complete emptying.
- Tapered polyethylene cushion.
- Rugged hinged door protects bottom valve assembly and is lockable.
- Self-aligning stacking legs.
- Four-way lift truck entry with safety fork pockets.



The bottom discharge option includes a 2-inch ball valve, quick disconnect coupling and cap, in a recessed sump.

U.S. Patent Pending

TUFF TANK SPECIFICATIONS

	220 Gal. (840 liter)	330 Gal. (1250 liter)
DOT Authorization:	DOT-E9052	DOT-E9052
Dimensions:	40" x 48" x 48" H	40" x 48" x 62" H
Tare Weight:	420 lbs.	550 lbs.
Authorized Gross Weight:	3790 lbs.	5600 lbs.
Maximum Liquid Density: (When filled)	15.3 lbs./gal.	15.3 lbs./gal.

Now you can see the remarkable TUFF TANK System in action. We'll send you a VHS copy of our video presentation demonstrating the unique features and benefits of TUFF TANK. Contact our master distributor:

GENERAL BOX COMPANY
5656 Opportunity
Toledo, OHIO 43612
(419) 476-6705

or your local distributor:

CHEC
CHEMICAL HANDLING EQUIPMENT CO., INC.
17700 Northland Park Ct.
Southfield, Michigan 48075
(313) 557-1151

CHEC TECHNICAL BULLETIN

CHEMICAL HANDLING EQUIPMENT CO., INC.
20505 WOODINGHAM DRIVE, DETROIT, MICHIGAN 48221 TELEPHONE (313) 861-7555

CHEMICAL SUITABILITY DATA

The following chemical suitability data is based upon rating information gathered from extensive laboratory and field testing, recommendations of our raw material suppliers and various technical publications. All ratings are based on a temperature of 73°F/23.3°C. This bulletin was prepared as a guide to be used only as a basis of recommendation. It is impossible to take into consideration the unlimited variations in physical properties that can affect a material's chemical resistance. Under no circumstances is the information contained herein to be construed as a guarantee. Materials should be tested under actual service to determine suitability for a particular application. Please consult factory for suitability ratings on any materials which do not appear in this bulletin.

RATING CODE

A .....Excellent = Recommended
B .....Good = Recommended
C .....Fair = Use under limited conditions
X .....Unsatisfactory = Not recommended
Blank.....Chemical Suitability Unknown

CHEMICAL NAME	CONC %	316 STAINLESS	PVC	POLYPROPYLENE	POLYETHYLENE	TEFLON	PVDF	BUNA N	VITON	ETHYLENE/PROPYLENE	HYPALON	KAL-REZ
Acetaldehyde		A	X	A	C	A	X	X	C	A	X	B
Acetaldehyde (Aqueous)	40		X	A		A	X	X	B	A		
Acetic Acid	10-40	A	A	A	A	A	A	X	B	B	B	A
Acetic Acid	40-80	B	A	A	A	A	A	X	B	X	B	A
Acetic Acid (Glacial)		B	X	A	A	B	A	X	B	X	B	
Acetic Anhydride	Pure	A	X	B	A	A	B	X	X	C	B	A
Acetone		A	X	A	B	A	X	X	X	B	X	A
Acetone (Aqueous)	Trace		A	A		A	A	B	A	A		
Acetonitrile				B		A	A	C		A		A
Acetophenone				A		A	A	X	C	A	X	A
Acetyl Acetone			X				X	X	X	A	X	
Acetyl Bromide						A	A					
Acetyl Chloride		A	A	A	A	A	A	X	B	X	X	A
Acetylene		A	X	A		A	A	A	A	C	B	A
Acrylic Acid Ethyl Ester			X			A	A					A
Acrylonitrile				B	A	A	A	X	X	A	C	
Adipic Acid Aqueous	Satu		A	A		A	A	A	A	A		A
Allyl Alcohol		A	X	A	B	A	A	A	A	B		A
Allyl Chloride			X			A	A	B	B	X		
Alum (Potassium Alum)	Satu	X	A	A	A	A	A	A	A	A	A	A
Aluminum Acetate	Satu		A	A		A	A	A	A	A	X	A
Aluminum Ammonium Sulfate	Satu			A		A	A	A	A	A		
Aluminum Bromide	Satu					A	A	A	A	A	A	
Aluminum Chloride	Satu	C	A	A	A	A	A	A	A	A	A	A
Aluminum Fluoride	Satu	C	A	A	A	A	A	A	A	A	A	A
Aluminum Hydroxide	Satu	A	A	A	A	A	A	A	A	A		A
Aluminum Nitrate	Satu		A	A	A	A	A	A	A	A	A	A
Aluminum Sulfate	Satu		A	A	A	A	A	A	A	A	A	A
Amber Acid (Succinic Acid)	Satu		A	A		A	A	A	A	A		
Ammonia Liquid	100	A	C	A	A	A	A	A	C	A	X	A
Ammonia Water	10		A	A		A	A	A	B	A		A
Ammonium Acetate	Satu		A	A	A	A		A	A	A		A
Ammonium Bifluoride	Satu	A	A	A	A	A	A	A	A	A		
Ammonium Carbonate	Satu	B	A	A	A	A	A	A	A	A	A	A
Ammonium Chloride	Satu	B	A	A	A	A	A	A	A	A	A	A
Ammonium Fluoride	20		A	A		A	A	A	A	A		A
Ammonium Hydroxide		A	A	A	A	A	A	B	B	A	A	A
Ammonium Metaphosphate			A	A		A	A	A	A	A		
Ammonium Nitrate		A	B	A	A	A	A	A	A	A	A	A
Ammonium Phosphate		C	A	A	A	A	A	A	A	A	A	A
Ammonium Sulfate	Satu	B	A	A	A	A	A	A	A	A	A	A
Ammonium Sulfide	Satu		A	A	A		A	A	X	A	A	A
Amyl Acetate	Pure	A	X	X	C	A	A	X	X	B	X	A
Amyl Alcohol	Pure	A	A	A	B	A	A	B	A	A	B	A
Amyl Borate	Pure					A	A	A	A	B		

CHEMICAL NAME	CONC %	316 STAINLESS	PVC	POLYPROPYLENE	POLYETHYLENE	TEFLON	PVDF	BUNA N	VITON	ETHYLENE/PROPYLENE	HYPALON	KAL-REZ
Amyl Chloride		B	X	X		A	A	B	B	X	X	A
Aniline	Pure	A	C	B	B	A	A	X	B	B	X	A
Aniline Hydrochloride	Pure		B	X	B	A	A	B	A	B	X	A
Antimony Trichloride	Satu	X	A	A	B	A	A		A	B		A
Aqua Regia			C	C	A	A	A	X	C	B	X	A
Arsenic Acid	Satu	B	A	A	A	A	A	A	A	A	A	A
Barium Carbonate	Satu	B	A	A	A	A	A	A	A	A	A	A
Barium Chloride	Satu	B	A	A	A	A	A	A	A	A	A	A
Barium Hydroxide	Satu	A	A	A	A	A	A	A	A	A	A	A
Barium Nitrate	Satu	A	A	A	A	A	A	A	A	A		A
Barium Sulfate	Satu	A	A	A	A	A	A	A	A	A	A	A
Barium Sulfide	Satu	A	A	A	A	A	A	B	A	A	B	A
Beer		A	A	A	A	A	A	B	A	A	A	
Benzaldehyde		A	A	A	A	A	A	X	C	C	X	A
Benzene	Pure	B	C	B	X	A	A	X	B	X	X	A
Benzene Sulfonic Acid	10		X	X		A	B	X	A			
Benzine	Pure		X	A	A	A	A	A	A	X		A
Benzoic Acid	Pure	B	A	A	A	A	A	B	A	A	X	A
Benzyl Alcohol	Pure			A		A	A	X	A	B		A
Benzyl Benzoate	Satu							X		B		A
Benzyl Chloride	Pure			A			A					A
Black Liquor	Satu		A	A	A	A	A	A	A	A	B	
Bleach	12.5	X	A		B	A	A	C	A	B	B	A
Borax	Satu	A	A	A	A	A	A	A	A	A	X	A
Boric Acid	Satu	A	A	A	A	A	A	A	A	A	B	
Borofluoric Acid			A	A		A	A		A	A		
Brine			A	A		A	A	A	A	A		A
Bromic Acid	Pure			X		A	A					
Bromine Water	Satu	X	B	C	X	A	A	X	A	X	X	
Butyl Acetate	Pure	C	C	C	C	A	A	X	X	B	X	A
Butyl Acrylate	Pure		X	X		A	A	X	X	A	X	
Butyl Alcohol	Pure		A	A	A	A	A	B	B	A	A	A
Butyl Amine	Satu		X	X			B	A	A	X	X	A
Butyl Bromide	Pure					A	A					
Butyl Cellosolve	Pure					A	A	X	X	B	X	
Butyl Chloride						A	A					
Butyl Diol			B			A	A	A	A	A		
Butyl Ether			X	X		A	A	B	X	X	X	
Butyl Mercaptan	Pure					A	A					A
Butyl Phenol						A	A					A
Butyl Phthalate				A		A	A	X	B	B		A
Butyl Stearate	Pure					A	A	B	A	C	X	A
Butylene						A	A		A			A
Butyric Acid	Pure	A	X	A	C	A	A	X	B	B	X	B
Caffeine Citrate						A	A					

CHEMICAL NAME	CONC %	316 STAINLESS	PVC	POLYPROPYLENE	POLYETHYLENE	TEFLON	PVDF	BUNA N	VITON	ETHYLENE/PROPYLENE	HYPALON	KAL-REZ
Calcium Acetate	Satu		A	A		A	A	A	A	A	B	A
Calcium Bisulfide	Satu		A	A	A	A	A	A	A	X		A
Calcium Bisulfite	Satu	B	A	A	A	A	A	A	A	B	A	A
Calcium Carbonate	Satu	A	A	A	A	A	A	A	A	A	A	A
Calcium Chlorate	Satu		A	A	A	A	A	C	A	A	A	A
Calcium Chloride	Satu	B	A	A	A	A	A	A	A	A	A	A
Calcium Hydroxide	Satu	A	A	A	A	A	A	A	A	A	A	A
Calcium Hypochlorite	Satu	X	A	A	A	A	A	C	A	B		A
Calcium Nitrate	Satu		A	A	B	A	A	A	A	A	A	A
Calcium Sulfate	Satu	B	A	A	A	A	A	A	A	A	A	A
Calcium Sulfide	Satu					A	A	A	A	A		A
Cane Sugar Liquors			A	A		A	A	A	A	A		
Caprylic Acid	Pure					A	A					
Carbitol	Pure		A			A		A	A	A		A
Carbon Disulfide	Pure	A	C	X	X	A	A	C	A	X	X	A
Carbon Tetrachloride	Pure	A	C	X	X	A	A	X	B	X	X	A
Carbonic Acid	Satu	A	A	A	A	A	A	A	A	A	A	
Casein						A	A		A	A		A
Caustic Potash	25		A	A		A	A	A	X	A		A
Cellosolve			B	A	A	A	A	C	C	B	X	A
Chlorasamine							X					A
Chloric Acid	20		A			A	A					
Chlorinated Solvents		A				A		X	B	X	X	A
Chlorine Dioxide	Pure		A	C		A	A		X			A
Chlorine Water	400	X	A	C	X	A	A	X	C	B	A	A
Chlorobenzene	Pure	A	X	B	X	A	A	X	A	X	X	A
Chloroform	Pure	A	X	B	C	A	A	X	B	X	X	A
Chlorosulfonic Acid	Pure	X	X	X	X	A	C	X	X	X	X	
Chromic Acid	10	A	A	X	A	A	A	X	A	B	X	A
Chromic Acid	50	X	C	X	B	A	A	X	X	X	X	A
Chromium Alum	Satu		A	A		A	A	A	A	A		
Citric Acid	10	A	A	A	A	A	A	A	A	A	A	
Copper Acetate	Satu		A	A		A	A	A	A	A	B	A
Copper Borofluoride			A	A		A	A	A	A	A		A
Copper Carbonate	Satu		A	A		A	A					A
Copper Chloride	Satu	B	A	A	A	A	A	A	A	A	B	A
Copper Cyanide	Satu	A	A	A	A	A	A	A	A	A	A	A
Copper Fluoride	Satu		A	A		A	A	A	A	A	A	A
Copper Nitrate		A	A	A	A	A	A	A	A	A	A	A
Copper Sulfate	Satu	A	A	A	A	A	A	A	A	A	A	A
Corn Oil		A	A	A		A	A	A	A	B		
Corn Syrup			A	A		A	A	A	A	A		
Cottonseed Oil		A	A	A	A	A	A	A	A	A	A	
Creosote			X			A		A	A	X		A
Cresol	Pure	A	C	C	B	A	A	X	A	X	X	A
Crotonaldehyde	Pure					A	A	C	A	B		A
Crude Oil		B	A		X	A	A	B	A	X	X	
Cumene			B	A		A	A					
Cupric Fluoride	Satu		A	A		A	A	A	A	A		
Cupric Sulfate	Satu		A	A		A	A	A	A	A		
Cuprous Chloride	Satu		A	A		A	A	A	A	A		
Cyclohexane	Pure	A	X	C	B	A	A	B	A	X		A
Cyclohexanol	Pure		X	A		A	A	C	A	B	X	A
Cyclohexanone	Pure		X	B		A	B	X	X	C		A
Decalin	Pure					A		X	A	X		
Decane	Pure					A	A	X		X		
Decanol	Satu		A	A		A	A	A	A	A		A
Dextrose		A	A	A		A	A	A	A	A	A	A
Diacetone	Pure						X					A
Diacetone Alcohol	Pure			A		A	A	X	X	A	B	A
Dibenzyl Ether	Pure					A	A	X	X	C	X	A
Dibutyl Amine	Pure					A	A					A
Dibutyl Ether	Pure						A	B	X	X	X	A
Dibutyl Phthalate	Pure					A	A	X	B	A	X	A
Dibutyl Sebacate						A	A	X	C	B	X	A
Dichlorobenzene	Pure					A	A	X	B	X		A
Dichloroethylene						A	A	X	A	X		A
Dichlorodisopropylether	Pure						A					
Diesel Fuels						A	A					
Diethylamine	Pure	A	X	A		A	B	X	X	A	C	A
Diethylenetriamine							A					
Diethyl Ether	Pure		X	C		A	A	C	C	C	X	A
Diglycolic Acid	Satu		A	A		A	A	A	A	A		
Diisobutyl Ketone	Pure						A	B	X	X		A
Diisobutylene	Pure					A	A	A	A	X	X	A

CHEMICAL NAME	CONC %	316 STAINLESS	PVC	POLYPROPYLENE	POLYETHYLENE	TEFLON	PVDF	BUNA N	VITON	ETHYLENE/PROPYLENE	HYPALON	KAL-REZ
Diisopropyl Ketone	Pure					A	B	X	X	B		A
Dimethyl Amine	Pure		X	A		A	B	X	X	A		A
Dimethylaniline	Pure						B	X		X		
Dimethylformamide	Pure		X	A		A	X	X	X	B		A
Dimethyl Phthalate						A	B	X	B	B	X	A
Dioctyl Phthalate						A	A	B	A	A	X	A
Dioxane	Pure			B			C	X	X	X	X	A
Dioxolane							X	X	X	X	X	A
Diphenyl Oxide	Satu							X	A	X	X	A
Disodium Phosphate			A			A	A		A		A	A
Epichlorohydrin	Pure		X	A		A	C	X	X	X	X	A
Epsom Salt	Satu	A			A	A	A	A	A	A		
Esters						A	A					A
Ethanolamine	Pure	A	X			A	X	A		A		A
Ethers		A	X	C	X		A	X	X	X	X	A
Ethyl Acetate	Pure	A	X	B	X	A	A	X	X	B	X	A
Ethyl Acetoacetate	Pure					A	A	X	X	A		A
Ethyl Acrylate	Pure		X		X	A	A	X	X	B	X	A
Ethyl Alcohol	Pure		A	A	A	A	A	A	A	A		A
Ethyl Benzene						A	A	C	A	X		A
Ethyl Chloride		A	X	C	B	A	A	B	A	A	X	A
Ethyl Ether	Pure	B	X	X	X	A	A	B	C	C	X	A
Ethyl Formate	Pure							X	X	B		A
Ethyl Hexanol						A	A	X				A
Ethyl Mercaptan	Pure							X	A	A		A
Ethyl Oxalate								X	X	A		A
Ethylene Bromide	Pure		X	X	X	A	A	X	C	B	X	A
Ethylene Chloride		A		B	D	A	A	X	A	X		A
Ethylene Chlorohydrin	Pure		X	A		A	A	X	X	A	B	A
Ethylene Diamine	Pure					A	B	A		A		A
Ethylene Dichloride	Pure		X			A	A	X	A	X	X	A
Ethylene Glycol	Pure	A	A	A	A	A	A	A	A	A	A	A
Ethylene Oxide		A	X		X	A	A	X	X	X	X	A
Fatty Acids		A	A	A	B	A	A	A	A	X	X	
Ferric Hydroxide	Satu		A	A	A	A	A	A	A	A		A
Ferric Nitrate	Satu	A	A	A	A	A	A	A	A	A	A	A
Ferric Sulfide			A	A		A	A	A	A	A		
Ferric Chloride	Satu	X	A	A	A	A	A	A	A	A	B	A
Ferrous Chloride	Satu	X	A	A	A	A	A	A	A	A	A	A
Ferrous Hydroxide	Satu		A	A		A	A	A	A	A		
Ferrous Nitrate	Satu		A	A		A	A	A	A	A		
Ferrous Sulfate		C	A	A	B	A	A	A	A	A	A	
Fluoboric Acid	Pure	B	A	A	A	A	A	B	A	A	A	
Fluosilicic Acid	50	B	B	A	A	A	A	A	A	A	A	
Formaldehyde	35	A	A	A	A	A	A	B	A	A	X	B
Formaldehyde	37	A	A	A	A	A	A	B	A	A	X	B
Formaldehyde	50	A			A	A	A	X	B	A	X	B
Formic Acid	90	B	A	A	A	A	A	X	X	A	A	
Freon F-11		A	A			A	A	X	B	C	A	B
Freon F-12		A	A	B		A	A	C	B	B	A	B
Freon F-21		A	X			A	A	X	C	C	A	A
Freon F-22		A	X	B		A	A	X	X	B	A	A
Freon F-113		A	B			A	A	X	B	X	A	B
Freon F-114			B			A	A	B	A	C	A	B
Fructose			A	A	A	A	A	A	A	A		
Fruit Juice	Pure	A	A	A	A	A	A	A	A		A	
Furane							X	X	X	X		
Furfural	Pure	A	X	C	C	A	A	X	B	A	X	A
Furfuryl Alcohol	Pure					A	B	X	X	C		A
Gallic Acid		A	A			A	A	A	A	A	B	
Gasoline Leaded		A	A	X	X	A	A	B	B	X	X	
Gasoline Unleaded		A	A	X	X	A	A	B	B	X	X	
Gasoline Sour		A	A	X	X	A	A	B	A	X	X	
Glucose		A	A	A	A	A	A	A	A	A	B	A
Glycerol (Glycerine)	Pure	A	A	A	A	A	A	A	A	A	A	A
Glycolic Acid	Satu		A	A	A	A	A	A	A	A		
Glycols					A	A	A	A	A	A		
Grape Sugar		A	A	A	A	A	A	A	A	A		
Heptane		A	A	B	X	A	A	A	A	X	B	A
Hexane		A	A	B	A	A	A	A	A	X	B	A
Hexyl Alcohol	Pure		A			A		A	A	B		
Hydrazine	Pure	A	X		A	A		A	X	A	A	A
Hydrobromic Acid	20	X	A	A	A	A	A	C	A	A	A	A
Hydrobromic Acid	50	X	A	A	A	A	A	C	A	A	A	A
Hydrochloric Acid	25	X	A	A	A	A	A	C	A	A	X	

CHEMICAL NAME	CONC %	316 STAINLESS	PVC	POLYPROPYLENE	POLYETHYLENE	TEFLON	PVDF	BUNA N	VITON	ETHYLENE/PROPYLENE	HYPALON	KAL-REZ
Hydrochloric Acid	38	X	A	A	A	A	A	C	B	C	X	
Hydrocyanic Acid		A	A	A	A	A	A	B	B	B	A	
Hydrofluoric Acid	Dilute	C	A	A	A	A	A	X	A	A	A	
Hydrofluoric Acid	40	C	B	A	A	A	A	X	A	A	A	
Hydrogen Fluoride						A	A	X	X	B		A
Hydrogen Peroxide	5	A	A	A	A	A	A	X	A	A		A
Hydrogen Peroxide	50	A	B	C	A	A	A	X	A	C	X	A
Hydrogen Peroxide	90	A			A	A	A	X	A	X	X	A
Hydrogen Sulfide (Aqueous)		A	A	A	A	A	A	A	A	A	B	A
Hydroquinone	Satu		A			A	A	A	A	A		A
Hypochlorous Acid	10		A	A	A	A	A	C	A	A	X	
Iodine		X	B	A	B	A	A		B	X	B	A
Iodine Solution	10	X	A			A	A					
Isobutyl Alcohol	Pure					A	A	B	A	A		
Iso-octane						A	A	A	A	X	A	A
Isophorone	Pure							X	X	X	X	A
Isopropyl Acetate	Pure	B				A		X	X	B	X	A
Isopropyl Alcohol	Pure		A	A	X	A	A	A	A	A	A	A
Isopropyl Chloride						A	A	B	A	X	X	A
Isopropyl Ether	Pure	A			C	A	A	A	C	C	C	A
Jet Fuel JP-4		A	A			A	A	B	A	X		A
Jet Fuel JP-5		A	A			A	A	A	A	X		A
Kerosene		A	A	A	X	A	A	A	A	X	X	A
Lacquer		A						X	X	X		A
Lactic Acid	25	A	A	A	A	A	A	A	A	A	B	
Lactic Acid	80	A	A	A	A	A	A	A	A	A	X	
Lauric Acid						A	A					
Lauroyl Chloride	Pure					A	A					
Lead Acetate	Satu	B	A	A	A	A	A	A	A	A	X	A
Lead Chloride			A	A	B	A	A	A	A	A		A
Lead Nitrate	Satu		A	A	B	A	A	A	A	A		A
Lead Sulfate			A	A		A	A	A	A	A		A
Linoleic Acid			B	B		A	A	B	A	X	X	
Linoleic Oil			B			A	A					
Linseed Oil		A	A	A		A	A	B	A	B	B	
Lithium Bromide	60		A			A	A		A			A
Lubricating Oil		A	A	B	X	A	A		A			
Machine Oil			A	A		A	A	A	A	X		
Magnesium Carbonate		A	A	A	A	A	A	A	A	A	A	A
Magnesium Chloride	Satu	A	A	A	A	A	A	A	A	A	A	A
Magnesium Citrate			A	A		A	A	A	A	A		A
Magnesium Hydroxide	Satu	A	A	A	A	A	A	A	A	A	A	A
Magnesium Nitrate		A	A	A	A	A	A	A	A	A	A	A
Magnesium Sulfate		A	A	A	A	A	A	A	A	A	A	A
Manganese Sulfate			A	A		A	A	A	A	A		A
Maleic Acid	Satu	A	A	A	A	A	A	A	A	A	X	A
Mercuric Chloride		X	A	A	A	A	A	A	A	A	A	
Mercuric Cyanide	Satu	A	A	A	A	A	A	A	A	A		A
Mercuric Sulfate	Satu		A	A		A	A	A	A	A		A
Mercurous Nitrate	Satu		A			A	A	A	A	A		A
Mercury		A	A	A	A	A	A	A	A	A	A	A
Methane Sulfonic Acid	50					A	A					
Methyl Acetate	Pure	A	X	B		A	A	X	X	B	X	A
Methyl Acrylate	Pure					A	A	X	X	B	X	A
Methyl Alcohol	Pure	A	A	A	A	A	A	B	B	A	A	A
Methyl Amine			X	X		A	C	C		A		A
Methyl Bromide					B	A	A	X	A	B	X	A
Methyl Cellosolve			A				A		X	B	B	A
Methyl Chloride		A	X	X	X	A	A	X	X	B	X	A
Methyl Chloroform						A	A	X	B	X	X	A
Methyl Ether								B	X	X	X	A
Methyl Ethyl Ketone		A	X	B	C	A	X	X	X	B	X	A
Methyl Formate								X	X	A	B	A
Methyl Isobutyl Carbinol				A		A		A	A	A		
Methyl Isobutyl Ketone		A	X	B	X	A	A	X	X	B	X	A
Methyl Isopropyl Ketone		A			X	A	A	X		X	X	A
Methyl Methacrylate			B			A	A	X	X	X	X	A
Methyl Sulfoxide						A	X					A
Methylene Bromide						A	A	X	A	X		A
Methylene Chloride		A	X	X	C	A	B	X	C	X		A
Methylene Dichloride						A		X	B	X		
Methylene Iodine			A			A	A		A			A
Milk		A	B	A	A	A	A					
Mineral Oil			B	A	A	A	A	A	A	X		A
Monobromo Benzene								X	A	X	X	

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Monochloracetic Acid	50		A	B		A	A	X	B	C		A
Monochlorobenzene				B		A	A	X	A	X	X	A
Monoethanolamine						A	X	A		A		A
Monomethylaniline								X	A	X		A
Motor Oil			A	A		A	A	A	A	X		
Naptha		A	A	A	C	A	A	A	C	A	X	A
Napthalene		B	X	B	C	A	A	X	A	X	X	A
Nickel Acetate			A			A		A	C	A	X	A
Nickel Chloride	Satu	C	A	A	A	A	A	A	A	A	A	A
Nickel Nitrate	Satu		A	A	A	A	A	A	A	A		A
Nickel Sulfate	Satu	B	A	A	A	A	A	A	A	A	A	A
Nicotine Acid			A	A	A	A	A			A		
Nitric Acid	10	A	A	A	A	A	A	X	A	A	X	A
Nitric Acid	30	A	A	A	A	A	A	X	A	B	X	A
Nitric Acid	50	A	A	A	B	A	A	X	A	X	X	B
Nitric Acid	70	A	A	C	B	A	A	X	C	X	X	B
Nitric Acid	98	A	X	X	X	A	A	X	C	X	X	B
Nitrobenzene		B	X	B	C	A	B	X	A	B	X	A
Nitroethane	Pure					A	A	X	X	A	B	A
Nitrogen Dioxide						A	A					
Nitromethane	Pure					A	A	X		B	B	A
Nitrous Acid	10			X				X	A	B		A
Nitrous Oxide			A	A		A	A		A	A		
Octane						A	A	A	A	X		
Octene	Pure					A	A	A	A	X		
Oleic Acid		A	A	A	A	A	A	X	A	X	X	
Oleum		A	X	X	X	A	X	X	X	X	A	A
Oxalic Acid	20-50	A	A	A	A	A	A	A	A	A	B	
Paint Solvents		A						X	X	X		A
Palmitic Acid	5			A		A	A	A	A	B	X	A
Palmitic Acid	10			A		A	A	A	A	B	X	A
Palmitic Acid	70			A		A	A	A	A	B	X	A
Paraffin		A	A	A	C	A	A	A	B	X		
Perchloroethylene	Pure	A			C	A	A					B
Perchloric Acid	10		A	A	A	A	A	X	A	B	B	A
Perchloric Acid	70				A	A	A				B	A
Perphosphate			A	A		A	A	A	A	A		
Petroleum Oils			A	B		A	A	A	A	X	B	A
Phenol		A	A	A	A	A	A	X	B	A	X	A
Phenyl Bisulfide	Pure					A		C	A	X		
Phenylhydrazine						A	A	X	X	B		A
Phosgene Liquid			A	A			A					A
Phosphoric Acid	10	A	A	A	A	A	A	A	A	A	C	A
Phosphoric Acid	50	B	A	A	A	A	A	A	A	A	X	A
Phosphoric Acid	80	C	A	A	A	A	A	A	A	A	X	A
Phosphorus Pentoxide			A	A	A	A	A					
Phosphorus Red			A	A		A	A					A
Phosphorus Trichloride	Pure	A				A	A	X	A	A	X	A
Phosphorus Yellow			A	A		A	A					A
Photographic Solutions		A	A	A	A	A	A					A
Phthalic Acid			X	X		A	A	A	A	A		A
Picking Solutions (Steel)			A	A		A	A	X	B	C	B	
Picric Acid	10	A	A	A	A	A	A	B	A	A	A	A
Plating Sol'n (Brass)		A	A	A	A	A	A	A	A	A	X	A
Plating Sol'n (Cadmium)			A	X	A	A	A	A	A	A	X	A
Plating Sol'n (Chrome)			A	X	B	A	A				X	A
Plating Sol'n (Copper)			A	A	A	A	A	A	A	A	X	A
Plating Sol'n (Gold)		A	A	X	A	A	A	A	A	A	X	A
Plating Sol'n (Lead)			A	A	A	A	A	A	A	A	X	A
Plating Sol'n (Nickel)			A	A	A	A	A	A	A	A	X	A
Plating Sol'n (Rhodium)			A	A	A	A	A		A	A	X	A
Plating Sol'n (Silver)		A	A	A	A	A	A	A	A	A	X	A
Plating Sol'n (Tin)			A	A	A	A	A	A	A	A	X	A
Plating Sol'n (Zinc)			A	A	A	A		A	A	A	X	A
Polyethylene Glycol			A	A		A	A		A	A		A
Polyvinyl Acetate						A	A	A	A	A	C	A
Polyvinyl Alcohol			A	A		A	A	A	A	A		
Potash		A	A	A	A	A	A	A	A	A		A
Potassium Acetate	Satu		A	A	A	A	A	A	A	A	A	A
Potassium Alum			A	A	A	A	A	A	A	A	A	A
Potassium Aluminum Sulfate			A	A	A	A	A	A	A	A	A	A
Potassium Bicarbonate	Satu	B	A	A	A	A	A	A	A	A	A	A
Potassium Bichromate	Satu		A	A	A	A	A	A	A	A	A	A
Potassium Bisulfate			A	A	A	A	A	A	A	A	A	A
Potassium Borate			A	A	A	A	A	A	A	A	A	A

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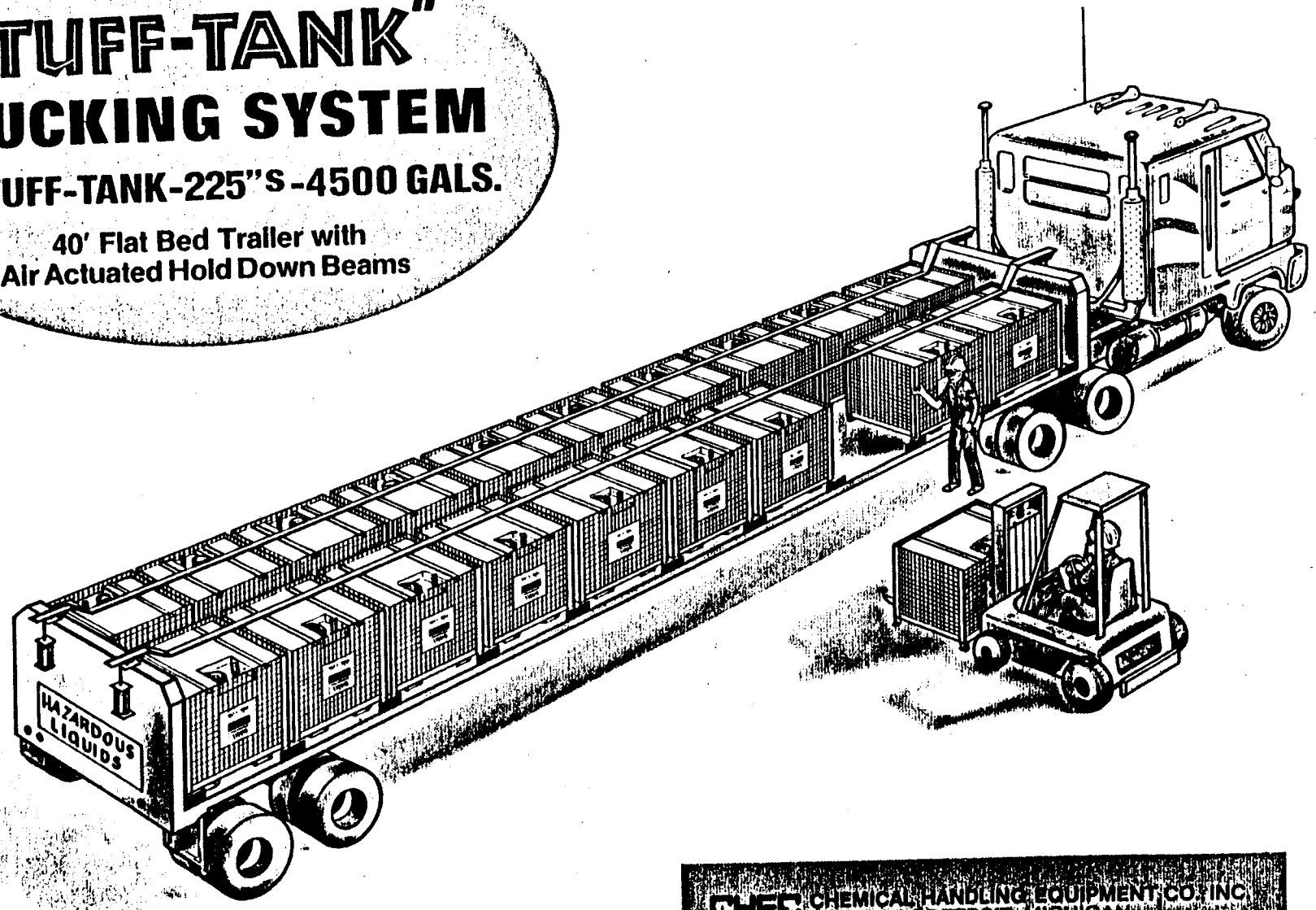
Potassium Bromate			A	A	A	A	A					A
Potassium Bromide		B	A	A	A	A	A	A	A	A	A	A
Potassium Carbonate		A	A	A	A	A	A	A	A	A	A	A
Potassium Chlorate		A	A	A	A	A	A	C	A	A	A	A
Potassium Chloride		A	A	A	A	A	A	A	A	A	A	A
Potassium Chromate		B	A	A	A	A	A	A	A	A	A	A
Potassium Coppercyanide			A	A	A	A	A	A	A	A	A	A
Potassium Cyanide		A	A	A	A	A	A	A	A	A	A	A
Potassium Dichromate	Satu	A	A	A	A	A	A	A	A	A	A	A
Potassium Ferricyanide			A	A	A	A	A	A	A	A	A	A
Potassium Ferrocyanide			A	A		A	A	A	A	A	A	A
Potassium Fluoride			A	A	A	A	A	A	A	A	A	A
Potassium Hydroxide	25	B	A	A	A	A	A	B	X	A	A	A
Potassium Hypochlorite			A	A		A	A	B	A	A	A	A
Potassium Iodide			A	A		A	A	A	A	A	A	A
Potassium Nitrate		B	A	A	A	A	A	A	A	A	A	A
Potassium Perborate			A	A		A	A					
Potassium Perchlorate			A	A		A	A					A
Potassium Permanganate	10	B	A	A	A	A	A	C	A	A	A	A
Potassium Permanganate	25	B	A	A	A	A	A	X	A	A	A	A
Potassium Persulfate			A	A		A	A					
Potassium Sulfate	Pure	B	A	A	A	A	A	A	A	A	A	A
Propane		A	A	A	A	A	A	A	A	X		A
Propyl Acetate	Pure					A	A	X	X	B		A
Propyl Acetone	Pure						X					
Propyl Alcohol	Pure		A	A	A	A	A	B	A	A		A
Propylene Dichloride	Pure		A	A	A			X	B	X		A
Propylene Oxide			X				X	X	X	X		
Pyridine		B	X		A		C	X	X	B	X	A
Rhodan Salts			A	A		A	A	C	A	A		
Salicylaldehyde						A	A	A	A	A		
Salicylic Acid			A			A	A	A	A	A		A
Sewage			A	A	A	A	A	A	A	A	A	A
Silicic Acid			A	A	A	A	A	A	A	A		A
Silicone Oil			A	A		A	A	A	A	A	A	A
Silver Cyanide		A	A	A		A	A	A	A	A		A
Silver Nitrate		A	A	A	A	A	A	A	A	A	A	A
Silver Sulfate			A	A		A	A	A	A	A		A
Soaps		A	A	A	C	A	A	A	A	A	A	A
Sodium	Satu		A	A		A	A	A	A	A		X
Sodium Acetate	Satu	B	A	A	A	A	A	A	B	A	X	A
Sodium Alum	Satu	A	A	A	A	A	A	A	A	A		
Sodium Benzoate			A	A		A	A					A
Sodium Bicarbonate	Satu	A	A	A	A	A	A	A	A	A	A	A
Sodium Bichromate	Satu		A	A		A	A	A	A	A		
Sodium Bisulfate		A	A	A	A	A	A	A	A	A	A	A
Sodium Bisulfite		A	A	A	A	A	A	A	A	A	A	A
Sodium Borate	Satu			A	A	A	A	A	A	A	A	A
Sodium Bromide	Satu		A	A		A	A					
Sodium Carbonate		A	A	A	A	A	A	A	A	A	A	A
Sodium Chlorate	Satu	B	A	A	A	A	A	C	A	A	A	A
Sodium Chloride		B	A	A	A	A	A	A	A	A	A	A
Sodium Chlorite	25		X	X		B	B	X	X	X		A
Sodium Cyanide		A	A	A	A	A	A		A	A	A	A
Sodium Ferricyanide	Satu		A	A	A	A	A	A	A	A		A
Sodium Ferrocyanide	Satu		A	A	A	A	A	A	A	A	A	A
Sodium Fluoride			A	A	A	A	A	A	A	A	A	A
Sodium Hydroxide	15	A	A	A	A	A	A	A	C	A	A	A
Sodium Hydroxide	30	A	A	A	A	A	A	A	C	A	A	A
Sodium Hydroxide	50	B	A	A	A	A	A	A	X	A	A	A
Sodium Hydroxide	70			B	A	A	A	X	X	A		
Sodium Hypochlorite	13	C	A	B	A	A	A	X	X	X	A	A
Sodium Metasilicate		A	A	A		A	A	A	A	A		A
Sodium Nitrate	Satu	B	A	A	A	A	A	A	A	A	A	A
Sodium Nitrite	Satu		A	A		A	A	A	A	A		
Sodium Palmitate	5					A	A					
Sodium Perborate		C	A	A	A	A	A	B		A		A
Sodium Perchlorate			A	A		A	A					A
Sodium Peroxide		A	A	A	A	A	A	A	A	A	B	A
Sodium Phosphate Acid		B	A	A	A	A	A	A	A	A		A
Sodium Phosphate Alkaline		B	A	A	A	A	A	A	A	A		A
Sodium Phosphate Neutral		A	A	A		A	A	A	A	A	A	A
Sodium Sulfate	Satu	B	A	A	A	A	A	A	A	A	A	A
Sodium Sulfide		B	A	A	A	A	A	A	A	A	A	A
Sodium Sulfite		B	A	A	A	A	A	A	A	A	A	A

CHEMICAL NAME	CONC %	316 STAINLESS	PVC	POLYPROPYLENE	POLYETHYLENE	TEFLON	PVDF	BUNA N	VITON	ETHYLENE/PROPYLENE	HYPALON	KAL-REZ
Sodium Thiocyanate			A	A		A	A	A	A	A		A
Sodium Thiosulfate		A	A	A	A	A	A	A	A	A	A	A
Sour Crude Oil		B		A		A	A	B	A	X		
Stannic Chloride		A	A	A	A	A	A	A	A	A	X	A
Stannous Chloride		X	A	A	A	A	A	A	A	B	A	A
Starch		A	A	A	A	A	A	A	A	A		A
Stearic Acid		B	A	B	A	A	A	B	A	X	X	A
Styrene		A				A	A	C	C	X		A
Succinic Acid			A	A		A	A	A	A	A		A
Sulfamic Acid	20		X	X			X					A
Sulfate Liquors (Oil)		C						A	A	A		A
Sulfite Liquors	6	C	A	A		A	A	X	A	A		
Sulfur		B	A			A	A	X	A	C	B	A
Sulfur Chloride		X		C		A	A	C	A	X		A
Sulfur Dichloride				C		A	A	X	A	X		A
Sulfur Dioxide	Wet	C	A	A	A	A	A		A	A		
Sulfur Trioxide		C	X	X	A	B	X	X	C	C	X	A
Sulfuric Acid	10-50	X	A	A	A	A	A	A	A	A	A	A
Sulfuric Acid	70-80	X	A	A	A	A	A	B	A	A	A	A
Sulfuric Acid	90	X	A	A	B	A	A	C	A	A	X	A
Sulfuric Acid	93	X	A	A	B	A	A	C	A	B	X	A
Sulfuric Acid	94	X	A	B	B	A	A	X	A	C	X	A
Sulfuric Acid	95	X	A	C	B	A	A	X	A	X	X	A
Sulfuric Acid	96-98	A	B	X	X	B	A	X	X	X	X	A
Sulfuric Acid	100	A	X	X	X	B	X	X	X	X	X	A
Sulfurous Acid		B	A	A	A	A	A	C	A	A	A	A
Summition (Insecticide)			X	A		A	A	C	A	A		
Tannic Acid		C	A	A	A	A	A	B	A	B	B	A
Tanning Liquors		A	A	A		A	A	A		B		A
Tar			X	B		A	A	A	A	X		A
Tartaric Acid		B	A	A	A	A	A	A	A	A		
Tertiary Butyl Alcohol			A	A		A	A	X	A	B		
Tertiary Butyl Catechol								X		B		
Tetrachloroethane	Pure	A			X	A	A	X	A	X	X	A
Tetrachloroethylene	Pure	A				A	A	X	A	X	X	B
Tetraethyl Lead	Pure	A				A	A	X	B	X	X	A
Tetrahydrofuran	Pure	A	X	B	X	A	B	X	X	X	X	A
Tetralin	Pure							C	A	X		A
Tetramethyl Ammonium (OH)	50					A	A					
Titanic Sulfate			A	A		A	A					A
Titanous Sulfate			A	A		A	A					A
Titanium Tetrachloride									A			A
Toluene (Toluol)		A	X	B	X	A	A	X	B	X	X	A
Tomato Juice		A	A	A		A	A					
Triacetin	Pure							B	B	A		
Tributyl Phosphate				B		A	A	X	X	B		A
Trichloroacetic Acid				A		A	A	X	X	X		A
Trichloroethylene		A	X	B	X	A	A	X	A	X	X	A
Triethanolamine			B	X	B		X	C	X	A	C	A
Triethylamine			B	X			B					
Trimethylpropane		A	A	X		A	A					A
Turbine Oil (#140)			A	B		A	A	A	A	X	X	
Turpentine		A	A	B	B	A	A	B	A	B	X	A
Urea			A	A	A	A	A	A	A	A		
Urine		A	A	A	A	A	A	A	A	A		
Varnish						A	A	A	A	X		A
Vaseline			A	A		A	A	A	A	A		
Vegetable Oil		A	A	A	A	A	A	A	A	A		
Vinegar		A	A	A		A	A	C	A	A	A	
Vinyl Acetate			X			A	A	X	X	B		
Water		A	A	A	A	A	A	A	A	A	A	A
Water Distilled		A	A	A	A	A	A	A	A	A	A	A
Water (Potable)		A	A	A	A	A	A	A	A	A	A	A
Water (Salt)	Satu	A	A	A	A	A	A	A	A	A	A	A
Water (Sea Water)		A	A	A	A	A	A	A	A	A	A	A
Water (Sewage)		A	A	A	A	A	A	A	A	A	A	A
Whiskey		A	A	A	A	A	A	A	A	A		
White Acid					A	A	A					
White Liquor		A	A	A	C	A	A	A	A	A		A
Wines		A	A	A	A	A	A	A	A	A	A	
Xylene		A	X	X	X	A	A	C	B	X	X	
Zinc Acetate			A	A		A	A	A	A	A		A
Zinc Chloride		B	A	A	A	A	A	A	A	A	A	A
Zinc Nitrate			A	A		A	A	A	A	A		A
Zinc Sulfate		A	A	A	A	A	A	A	A	A	B	A

"TUFF-TANK" TRUCKING SYSTEM

20 "TUFF-TANK-225"s -4500 GALS.

40' Flat Bed Trailer with
Air Actuated Hold Down Beams



CHEC CHEMICAL HANDLING EQUIPMENT CO. INC.
DETROIT, MICHIGAN

VAALER AWARDS

Material Handling

Portable, reusable container features 6-drum capacity

HONORS

"This is a safe, well engineered tank system that can eliminate the problem of moving and storing hazardous and non-hazardous liquids in hard-to-handle 55-gal drums," a chief judge comments about an *Honors* winning development in the 1984 CHEMICAL PROCESSING Vaaler Awards. Tanks are polyethylene containers placed in a rigid wire mesh enclosure for maximum protection and convenience. They are authorized by the U.S. Department of Transportation and the U.S. Coast Guard for the shipping and storing of hazardous liquids and wastes.

Containers are portable, reusable and built for extended, repeated filling. According to the developer, most hazardous and non-hazardous liquids have previously been shipped in 55-gal drums which often became a hazardous waste problem in themselves and were also unsafe and inconvenient to handle. The award-winning development is said to be novel because it replaces the smaller 55-gal drums with one container that can hold up to six times the capacity of the drum. It has the option of having top discharge with its built-in suction line in a depressed bottom sump, or can have a complete discharge bottom drain. The manufacturer describes the development as not just a container, but a complete liquid handling system with accessories for cleaning, locking, and convenient trucking.

Potential breadth of application of the container is wide. Every chemical processing operation is said to have an application for the unit for either receiving raw liquids or for shipping the liquid product.

Other features of the container are its system-engineered design, the ease of filling, a sloped bottom to depressed sump, complete emptying ability, a visual indication of liquid level, a puncture-resistant outer enclosure, stackability, and ease of transporting.

(Tuff-Tank Intermediate Bulk Container — Chemical Handling Equipment Co., Inc., 17700 Northland Park Court, Southfield, Michigan 48075)

APPENDIX J

INCINERATOR TRIAL BURN PLAN

RCRA Trial Burn Plan

for a

Modular Incinerator

at the

Los Alamos National Laboratory

in

Los Alamos, New Mexico

February 1985

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ATTACHMENTS

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C. Fan Curve

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SECTION D

PROCESS INFORMATION

D-5 INCINERATOR

Introduction

This trial burn plan is submitted as part of the RCRA Part B permit application requirements (40 CFR 270.62) for the Controlled Air Incinerator (CAI) system at the Los Alamos National Laboratory in Los Alamos, New Mexico.

D-5a Justification for Exemption

This section is not applicable.

D-5b Trial Burn

D-5b(1) New Incinerator Startup/Shakedown

This section is not applicable; the Los Alamos CAI system is an existing incinerator.

D-5b(2) Trial Burn Plan

D-5b(2)(a) Incinerator Performance

This section is not applicable.

D-5b(2)(b) Detailed Engineering Description of Incinerator

1. Manufacturer's Name and Model Number of Incinerator
   The Los Alamos CAI system was manufactured by Environmental Control Products (ECP) of Charlotte, North Carolina. The model number is ECP 500-T.

2. Type of Incinerator
   The CAI system consists of a waste feed system and a controlled air incinerator. The Los Alamos CAI was developed through extensive modification and integration of commercially available and custom fabricated equipment. The small

production-scale CAI system at Los Alamos was originally designed for the demonstration of volume reduction of combustible solid radioactive wastes. Components of the system include a dual chamber incinerator with a ram feeder for solids and a high intensity vortex liquid injection burner firing into the primary chamber, a secondary combustion chamber (SCC), an ash handling system, a water spray quench column, a high-energy venturi scrubber, a packed-column acid gas absorber followed by an off-gas condenser, gas reheater, high efficiency particulate air (HEPA) filters, an activated carbon adsorber, and a final HEPA filter. One of the primary purposes of the CAI is incineration research. Research studies which have been completed in the CAI unit have included the incineration of various radioactively contaminated solid wastes, liquid PCBs, and pentachlorophenol contaminated wood.

A block flow diagram of the CAI incinerator is shown on Figure 1. The block flow diagram begins where the waste and auxiliary fuel is injected into the primary chamber and then traces the flow of the hot combustion gases to the secondary chamber, quench tower, and other pollution control devices with all discharge points noted.

3. Linear Dimensions of the Incinerator Unit Including the Cross-Sectional Area of the Combustion Chamber

The CAI system has two combustion chambers. The lower chamber (primary chamber) dimensions are 6 feet outside diameter (O.D.) X 6 feet long. The upper chamber (secondary combustion chamber) measures 5 feet O.D. X 6 feet long. Each chamber is lined with 2 inches of fiberboard and 5 inches of high temperature plastic refractory. The resulting inside dimensions are therefore 4 feet-10 inches inside diameter (I.D.) X 4 feet-10 inches long for the lower chamber and 3 feet-10 inches I.D. X 4 feet-10 inches long for the upper chamber. The high temperature ductwork is 1 foot-8 inches I.D. X 12 feet long. Therefore the volume of the primary chamber is about 90 cubic feet. The volume of the secondary chamber including the high temperature ductwork is about 80 cubic feet. Figure 2 shows a schematic of the combustion chambers and associated ductwork. The cross-sectional area of the secondary chamber is about 11.5 ft^2. The residence time in the secondary chamber including the ductwork is approximately one second.

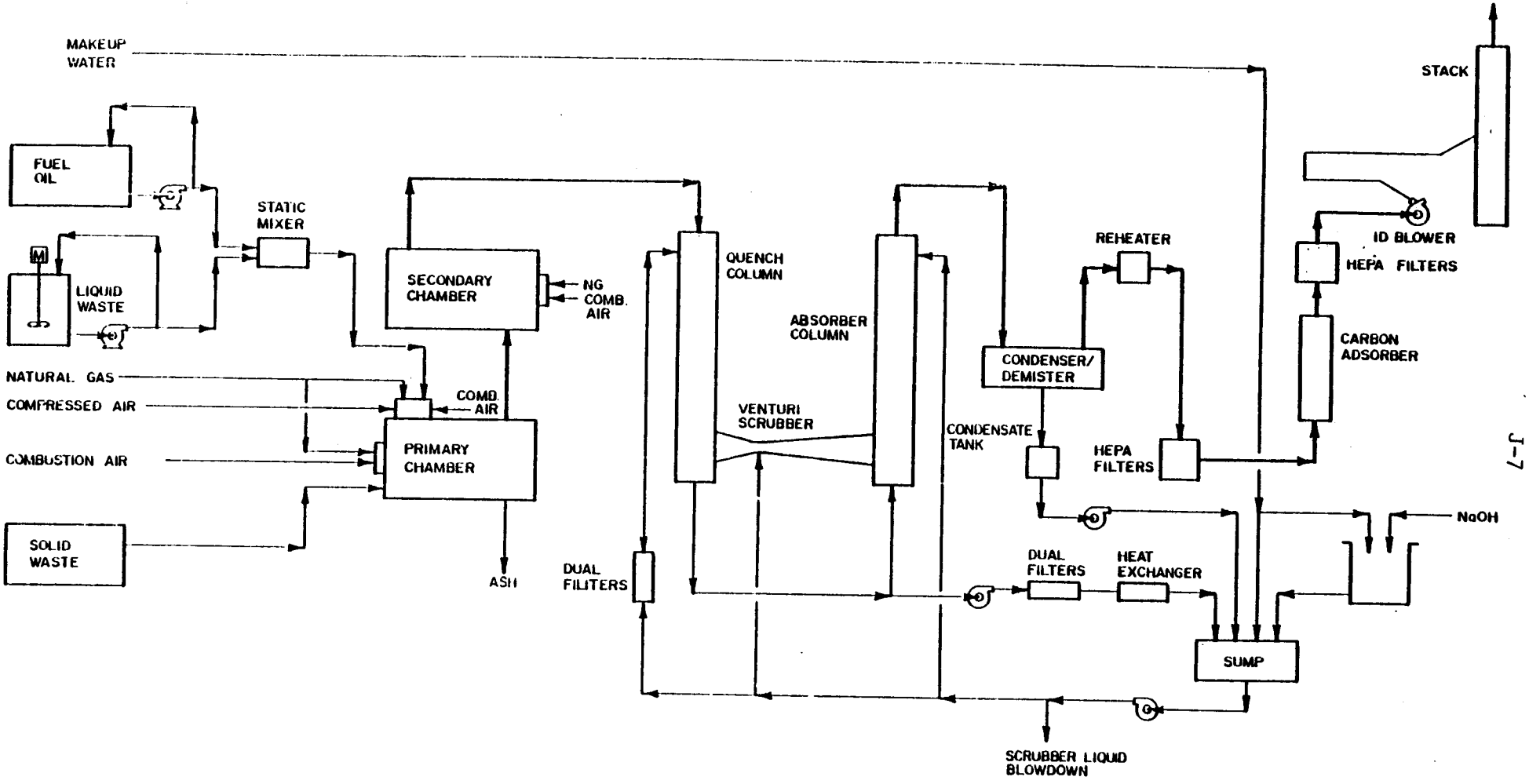

Fig. 1. Block Flow Diagram of CAI System

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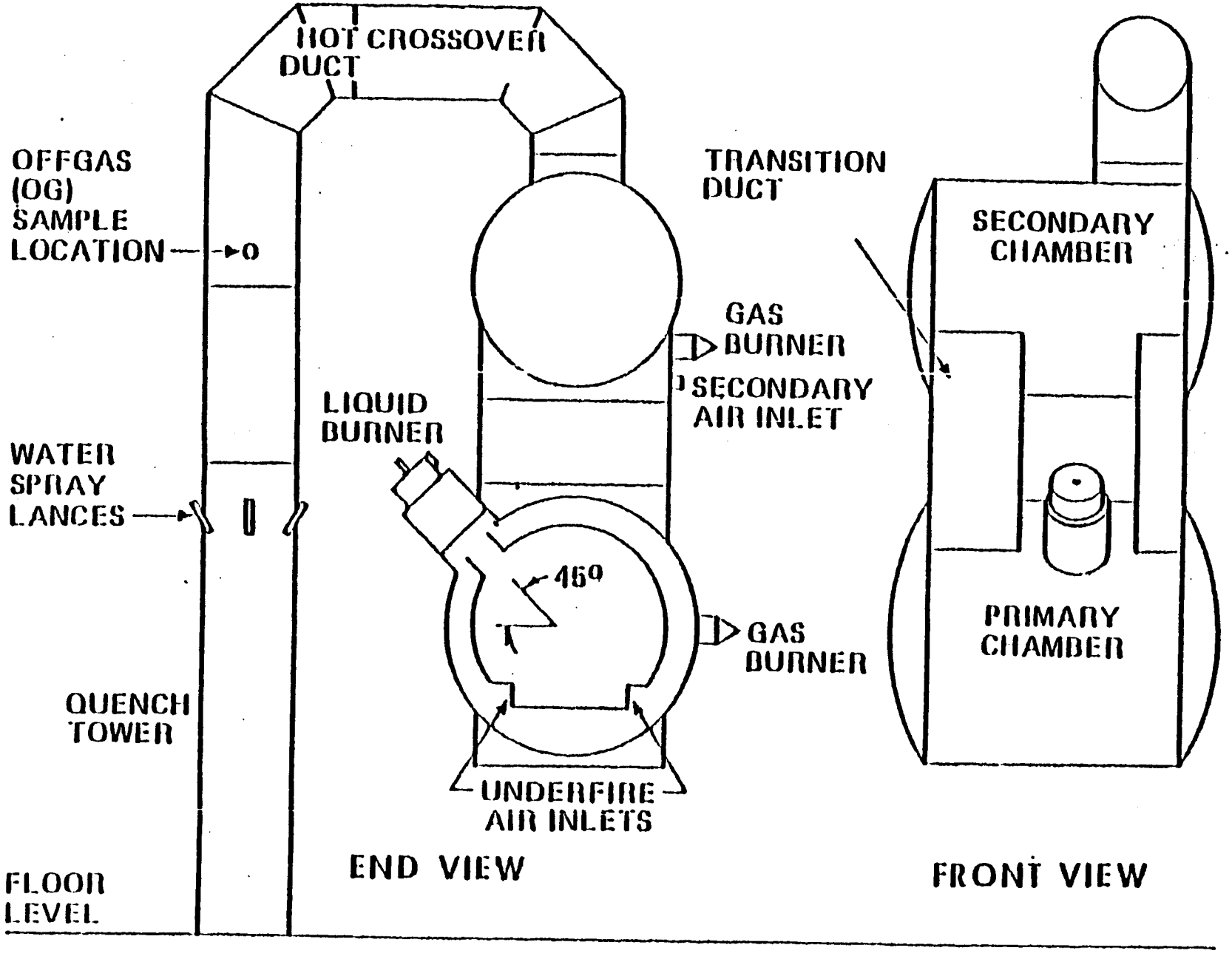

Fig. 2. Schematic of CAI

4. Description of the Auxiliary Fuel Burner System

The auxiliary fuel burner systems in the primary chamber and secondary chamber consist of gas burners. The primary and secondary chamber auxiliary fuel burners are identical. The primary chamber burner is located on the side of the primary chamber, and the SCC burner is located at the entrance to the SCC. Both of the auxiliary fuel burners are rated at 1,500,000 Btu per hour maximum output and are adjustable to suit operational requirements. The gas burners develop maximum rating with 3 inch W. G. gas pressure at the burners. All fittings, regulators, and control valves are Underwriters Laboratory, Chicago, Illinois, approved and assembled to meet the standards of Industrial Risk Insurers, Illinois, or other authority where applicable. Each of the auxiliary fuel burners is temperature controlled and is run with a preset combustion air to fuel ratio. The combustion air for both burners is supplied by a forced draft fan. Both burners are a pre-mix type manufactured by Pyronics, Inc., Cleveland, Ohio.

5. Capacity of Prime Mover

The CAI system prime mover is a Spencer Model G-3040-H-Spec turbine blower which operates as an induced draft (ID) fan. The ID fan is capable of producing an incineration negative pressure of 110 inch W.C. at a flow of 1900 cfm with a discharge pressure of 11.31 psia to accommodate the 7300 feet elevation at Los Alamos. The ID fan has a 40 hp, 3500 rpm motor.

6. Description of Automatic Waste Feed Cutoff

The primary function of the waste feed cut-off interlocks is to prevent the feeding of material at incineration conditions that are inadequate to assure destruction of the materials. During the startup and shutdown of the incinerator or during process upsets, the interlock system automatically stops all waste feed systems and prevents their restart until the incinerator is at proper operating conditions and the interlock is manually reset.

The process parameters identified in Table 1 are tied into an alarm panel and will also automatically cut-off the waste feed if the permit conditions for these parameters as stated in 40 CFR 264.345(e) are exceeded. The waste feed cut-off parameter permit condition values for permitted operation under 40 CFR Subpart O will be negotiated between EPA Region VI and Los Alamos based on the results of the RCRA trial burn. A discussion of the automatic waste feed cut-off parameters follows:

Table 1. Automatic Liquid and Solid Waste Feed Cut-Off Parameters

Parameter
Minimum primary chamber temperature
Minimum SCC temperature
Maximum CO concentration
Maximum combustion gas velocity indicator

D229-LA-T1

- Primary Chamber and SCC Temperatures -- The primary chamber and SCC temperatures are normally controlled to within 50°F below the temperature setpoint. It is expected that the 50°F temperature variation will be encountered during normal operation and should not be cause for automatic waste feed cut-off.

- Carbon Monoxide -- Carbon monoxide (CO) concentrations are measured in the HEPA filter plenum and are discussed in Section D-5b(2)(b)7. Based on previous experience with the CAI, Los Alamos suggests that the CO automatic waste feed cut-off system be a two-tier system. The two-tier CO system is suggested as an approach to reducing waste feed cut-off situations which are caused by CO spikes. CO spikes are a common occurrence in incinerators during the feeding of liquid and solid wastes. The two-tier CO aproach has previously been accepted by EPA Regions III and IV. The two-tier CO approach allows the use of a delay timer which starts if the CO level exceeds the first tier level, but not the second tier level. If at the end of a negotiated time the CO has not dropped below the first tier level, the waste feeds are automatically cut off. If, however, the CO drops below the first tier level before the time period has elapsed, the waste feeds are not cut off. If the second tier, however, is exceeded, the waste feeds are instantaneously cut off.

- Combustion Gas Velocity Indicator (CGVI) -- The CGVI will be measured during the trial burn and during permitted operation using a Fluidics HHR flow tube [see Section D-5b(2)(b)7 and Attachment D]. The CGVI permit conditio for permitted operation will be based on the trial burn using the Fluidics flow tube.

7. Stack Gas Monitoring and Pollution Control Equipment

Continuous monitoring of the off-gas will be conducted for the combustion gas velocity indicator (CGVI) and CO. A single gas sample stream will be continuously withdrawn from the duct downstream of the reheater and just upstream of the HEPA filter inlet plenum for the CO analyses. Concentrations will be measured using a Foxboro-Wilks Miran II infrared analyzer. Levels of CO will be recorded continuously on a strip chart in the control room.

The continuous CGVI monitoring will be recorded in the Control Room and measured by a Fluidic's HHR flow tube located in a straight run of duct between the ID fan outlet and the combustion gas stack. The CGVI flow meter information is supplied in Attachment D and the flow meter location is shown in Figure 3.

The Los Alamos CAI Pollution Control Equipment (PCE) is shown in Figure 1. The PCE includes the following equipment:

- Quench column
- Venturi scrubber

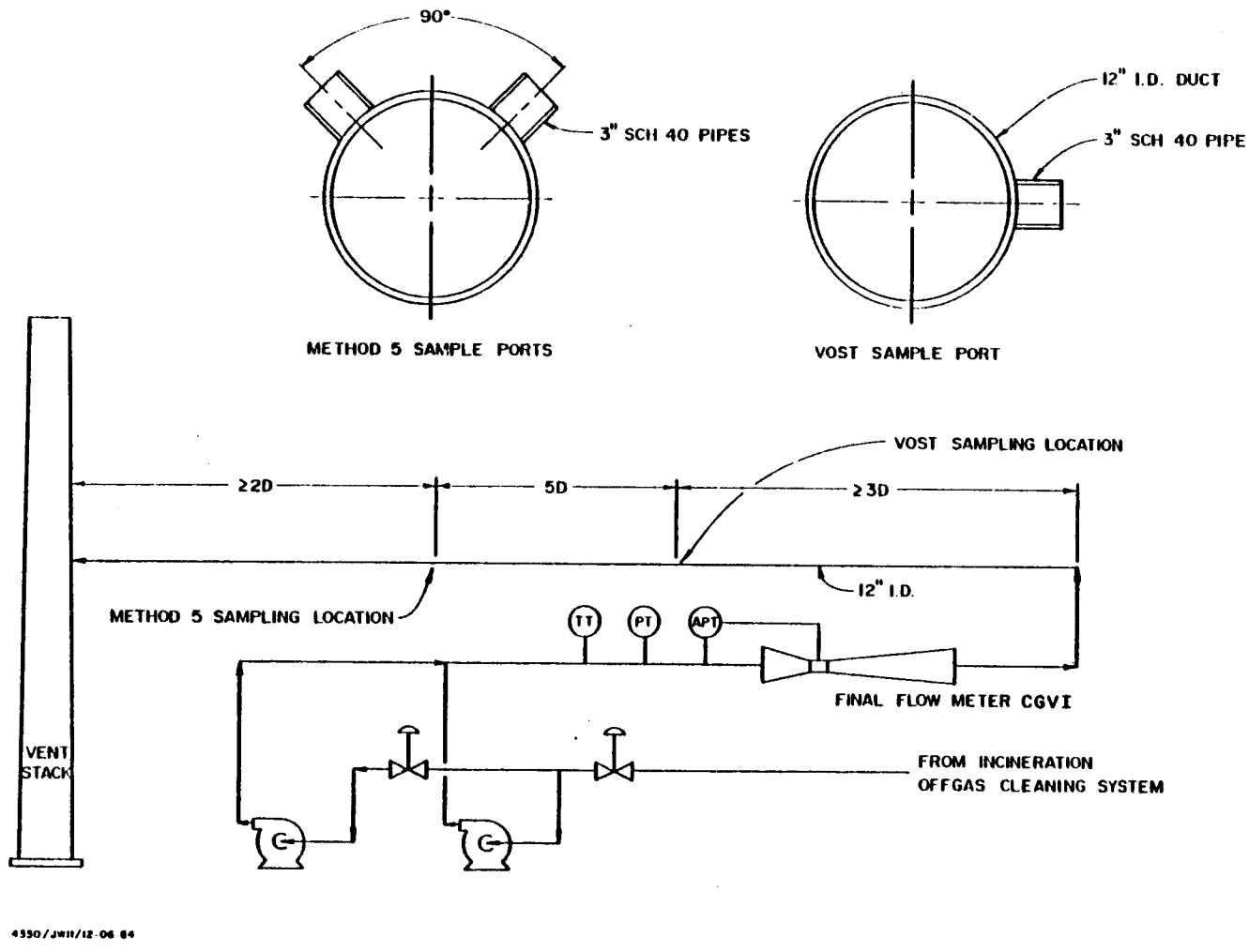

Fig. 3. Location of CGVI Flowmeter

- Packed absorber column
- Condenser/demister
- Reheater
- High efficiency particulate air (HEPA) filters
- Carbon bed adsorber
- Induced draft fan
- Recycle water system

In the quench column, combustion gases are cooled from the incinerator exit temperature to approximately 160°F by evaporation of recycled scrub solution. Excess solution collects in the separator in the base of the column while the saturated gas phase is routed to the inlet of the venturi scrubber.

The variable-throat venturi scrubber, located between the quench column and the absorber column, removes up to 99 weight percent of the off-gas particulates. The venturi assembly consists of converging and diverging cones with a clamp valve throat to allow the pressure drop to be varied. Venturi pressure drop normally is controlled in the 40 to 60 inch W.C. range. Scrub solution is injected through a nozzle located upstream of the throat.

Hydrochloric acid (HCl) is removed from the gas phase by counter-current contact with recycled scrub solution, or fresh water in the packed-column absorber column.

The condenser, mist eliminator, and reheater are included to condition the process exhaust gases before final HEPA filtration. The condenser lowers off-gas temperature, removing water vapor from the scrubbed gas stream. The off-gas is then reheated to a temperature above saturation temperature to avoid condensation and attendant plugging of the HEPA filters.

HEPA filtration is required for final removal of particulates. The filter module houses two frames in series, the first consisting of a prefilter and two HEPA filters, in parallel the second being similar but without the prefilter.

The activated carbon bed adsorber serves as a final removal system for trace organic compounds. The induced draft fan is the prime mover which pulls the combustion gas through the air pollution control equipment.

A scrub solution recycle system is used to minimize liquid blowdown from the offgas cleaning system. To control scrub solution acidity, an alkaline solution

is added at the process sump tank. The addition rate is controlled by a pH sensor on the outlet of the process sump tank. The purge stream from the recycle water system goes to the Los Alamos liquid wastewater treatment system.

8. Liquid Burner Design

The details of the two auxiliary fuel burners are given in Section D-5b(2)(b)4 and Attachment B. A liquid waste burning nozzle and burner system is also located in the primary chamber. The burner is a commercial high intensity vortex liquid injection-type. The burner, a Trane Thermal model LV-2 vortex burner, is mounted on the side of the primary chamber firing downward at a 45° angle from horizontal directly into the chamber (Figure 2). The unit is equipped with its own natural gas pilot and natural gas supply for supplemental heat. Atomization of the liquid feed stream is accomplished with either air or steam through an internal mix nozzle. Details of the Trane burner are given in Attachment B.

9. Construction Materials

The construction materials for the CAI system components are as follows:

COMPONENT	CONSTRUCTION MATERIAL
Primary chamber, secondary chamber and high temperature duct	Carbon steel shell Internal mastic membrane Internal fiberboard insulation (refractory fiber) Internal high density refractory (40% Al_2O_3)
Quench tower, venturi scrubber, absorber tower, duct to condenser	FRP shell (ATLAC 382 resin, with with 5% antimony oxide fire retardant) Hastelloy C-276 Polypropylene
Condenser/demister, duct to HEPA filter plenum	304L stainless steel shell with phenolic resin internal coating and plastite paint coating
HEPA filter plenum, absorption tower	Carbon steel shell, plastite paint coating
Induced-draft blower, ductwork to blower and from blower to vent stack, vent stack	Carbon Steel

10. Location of Temperature, Pressure, and Flow Indicating and Control Devices
The discussion in this section is based on Figure 4. The numbers given at the end of each heading refer to the equipment location in Figure 4.

a. Primary Chamber and Secondary Combustion Chamber Combustion Temperatures (1,2) -- The combustion gas temperatures of the primary chambers and the secondary combustion chamber are each measured with a type S (platinum/10% rhodium) thermocouple. The primary chamber thermocouple is located in the hot duct between the primary and secondary combustion chambers. The SCC thermocouple is located downstream of the SCC at the entrance to the high temperature duct.

b. Waste Liquid Flow (3) -- Waste liquid flow is measured by a Micro-Motion®, Model C25, gyroscopic/coriolis mass flow meter. The Micro-Motion flowmeter provides a measurement of instantaneous mass flowrate of the waste liquid being fed to the Trane burner. A detailed description of this flowmeter is given in Attachment D.

c. Solid Waste Flowrate (4) -- Solid waste is typically fed to the CAI in preweighed 1 foot X 1 foot X 2 foot cardboard boxes. These boxes are than transferred to the side ram feeder, which feeds the main ram feeder. The main ram feeder pushes boxes of solid waste into the primary chamber on a timed cycle which can be manually or automatically overriden when necessary. Each time a box of solid waste is fed to the primary chamber, the incinerator operator records the event on a log sheet.

The solid waste feed rate will be monitored, as is presently done, by the operator entering on a logsheet the weight and time each box of solid waste is fed to the primary chamber. Most of the solid wastes fed to the primary chamber are not RCRA hazardous wastes.

d. Combustion Gas Flowmeter (5) -- The combustion gas flowrate will be measured at a location between the ID fan and the stack by a Fluidic's HHR flow tube. This combustion gas flowrate will be the combustion gas velocity indicator (CGVI) (see Section D-5b(2)(b)7 and Attachment D).

e. Research Parameter Measurement -- Because the CAI is used and will be used partly as an incineration research system, it is more highly instrumented than typical industrial hazardous waste incinerators. The CAI has many temperature,

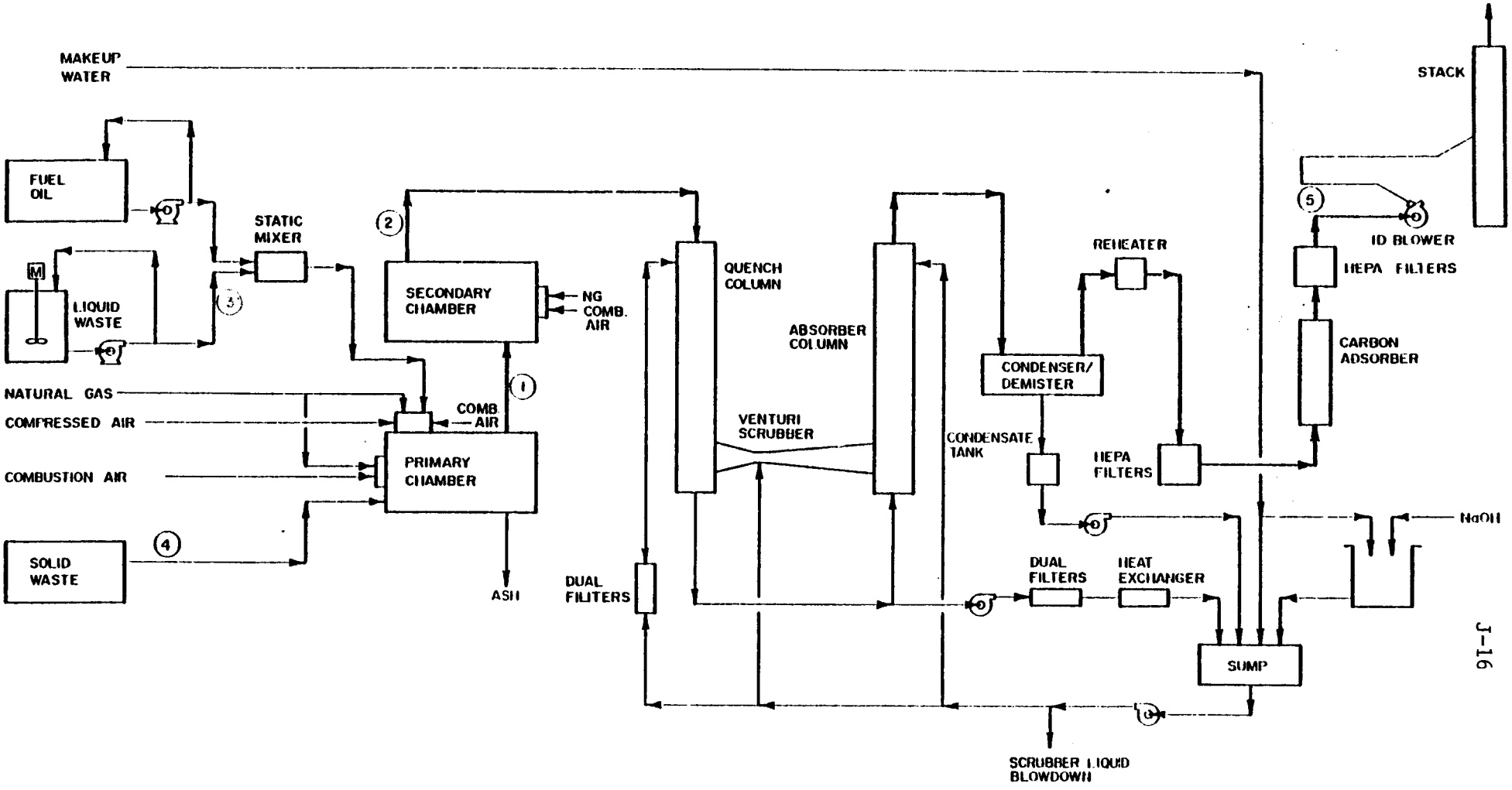

Fig. 4. Location of Temperature, Pressure, and Flow Indicating Control Devices

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pressure, and flow indicating instruments not mentioned in this section. These instruments are necessary from the research point of view, but are not necessary to meet the requirements of the 40 CFR 264 Subpart O and 40 CFR 270.62 RCRA incineration and trial burn regulations.

D-5b(2)(c) Sampling, Analysis, and Monitoring Procedures

The objective of a trial burn test is to obtain process data that will:

- Permit calculation of Principal Organic Hazardous Constituent (POHC) destruction and removal efficiency, HCl removal efficiency, and particulate emission concentrations
- Confirm the fate of POHCs treated by the system; that is, destroyed by thermal oxidation, and removed by the air pollution control system, or emitted in the stack gases, ash residues or scrubber water purge stream
- Document the test process feed and operating conditions that will be used in establishing operating permit conditions

The sampling and analysis procedures included in this section are therefore selected to determine the physical-chemical characteristics of the incinerator feed materials (especially the POHC concentrations), material feed rates, the composition and flow rates of the stack gases, and the amounts of POHC discharged in the incinerator ash, the stack gases and the quench-scrubber purge water. The monitoring procedures are selected to measure concentrations of O_2 in the combustion gases and CO in stack gases.

The following sampling and analysis procedures are based on carbon tetrachloride (CCl_4) being used as the POHC. The rationale for selection of CCl_4 as the POHC is presented in Section D-5b(2)(d).

1. Sampling Locations and Procedures

The locations where solid, liquid, and gaseous samples are collected from the incineration system are shown in Figure 5. All of the materials supplied to the incineration and air pollution control processes including fuel oil, liquid and solid waste feeds, and makeup water are sampled at locations 1, 2, 3, 4, 6, and 8. Samples of process solids (ash and carbon) and liquid (blowdown wate) effluents are collected at locations 5, 13, and 7, respectively. POHC, HCl, and particulate emission samples are collected from the stack gases at locations 10

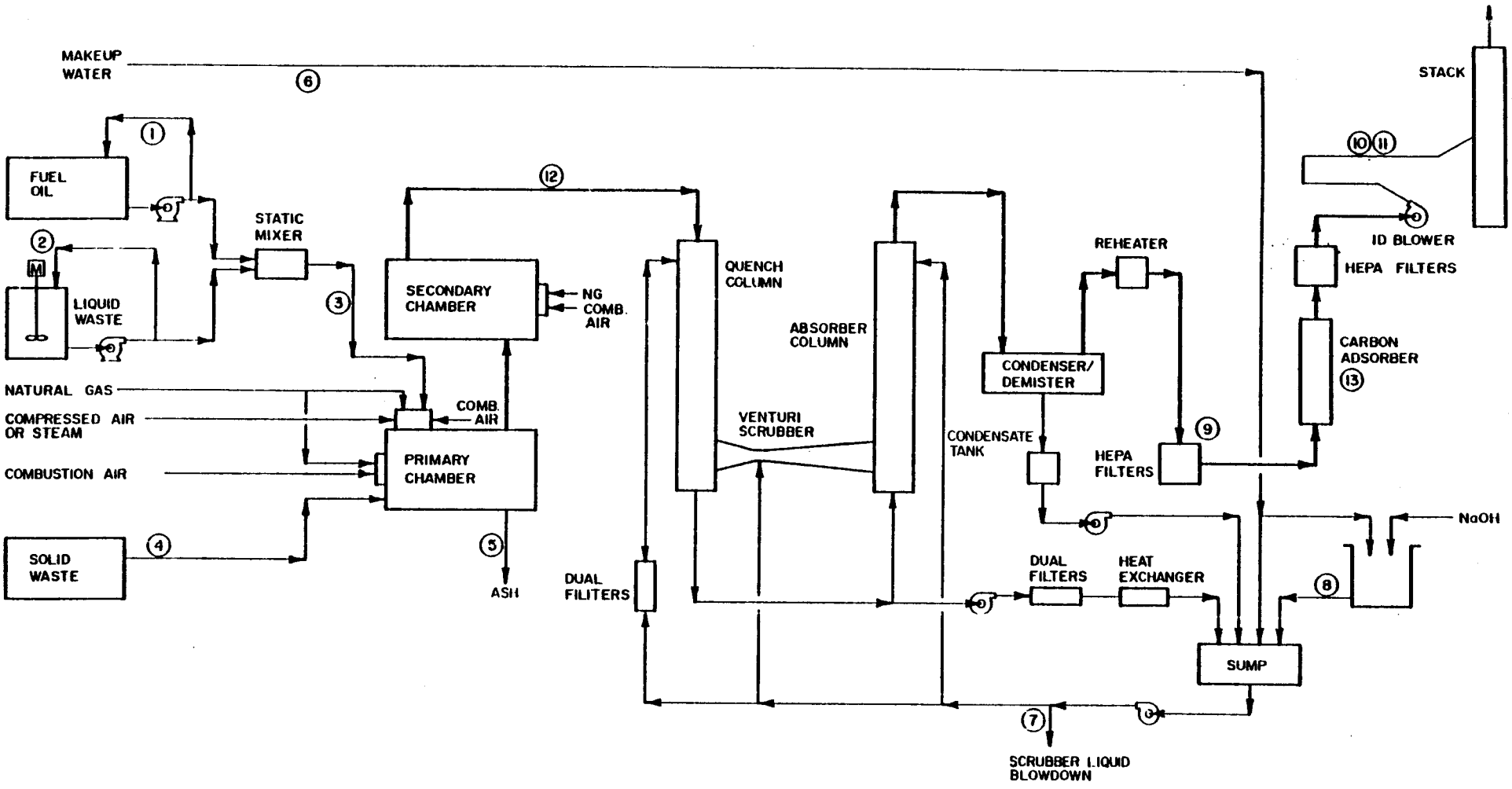

Fig. 5. Location of Sampling Points

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and 11. The O_2 concentration of the combustion gases is continuously monitored at location 12; CO_2 and CO concentrations are monitored at location 9.

The sampling equipment and the procedures for collecting samples at each location are summarized in Table 2. Sampling frequency and reference methods are included in that table. Additional details regarding each sampling location are discussed below.

a. Fuel Oil (1) -- A representative sample of fuel oil will be collected just before each test sampling run either by taking grab samples from a tap in the fuel oil recirculation line, or by using a coliwasa at an access port in the top of the tank. This sample will be retained for future analysis in case there are problems with analysis of the blended liquid sample taken at location 3.

b. Liquid Waste (2) -- A representative sample will be collected just before each test sampling run either by taking grab samples from the liquid waste recirculation line or by using a coliwasa at a access port in the top of the tank. This sample will also be retained for future analysis in case there are problems with analysis of the blended liquid sample taken at location 3.

c. Liquid Waste Blend (3) -- The organic liquid waste will be prepared in the liquid waste tank and either fed directly to the incinerator or blended with fuel oil in an inline static mixer before being fed to the incinerator. A flow diagram of the waste feed system is shown in Figure 6. Grab samples will be collected from a sample tap in the feed line to the incinerator at the beginning, middle, and end of each replicate sampling run and composited.

d. Solid Waste Blank (4) -- All solids materials will be prepared before the trial burn and stored in sealed containers. A scoop will be used to collect equal size samples from each bulk solids container before the actual waste feed containers are prepared. The samples will be composited to provide a blank of solids matrix material and placed in a wide-mouth glass bottle with Teflon-lined lid.

e. Incinerator Ash (5) -- Small and possibly negligible amounts of ash are expected to be accummulated during each test sampling run. The ash drop doors will be operated at the end of each test period allowing any accumulated ash to fall

Table 2. Sample Collection Locations, Equipment, and Methods

on	Description	Access	Equipment	General Procedures/Frequency	Reference Methods[a]
	Fuel oil recirculation line	Tap	Glass bottle	Grab sample at beginning and end of each run; composite for each replicate test run	S004,SW846
	Alternate: Fuel oil tank	Top port	Coliwassa; glass bottle	Grab sample prior to each replicate test run	S001,SW846
	Liquid waste recirculation line	Tap	Glass bottle	Mix tank contents, collect grab sample at beginning and end of each replicate run and composite	S004,SW846
	Alternate: Liquid waste tank		Coliwassa; glass bottle	Mix tank contents, collect sample prior to each test run	S001,SW846
	Liquid waste feed line	Tap	Glass bottle	Grab sample at beginning, middle, and end of each run; composite for each run	S004,SW846
	Solids storage containers	Open top	Scoop; glass bottle	Prior to loading waste feed boxes, collect sample from each bulk solids container; composite all samples to obtain blank of solids feed matrix	S007,SW846
	Ash drop chute	Valve	Glass bottle	Collect samples from valve at end of each run	S006,SW846
	Makeup water supply line	Tap	Glass bottle	Composite grab samples collected at beginning and end of run	S004,SW846
	Liquid waste blowdown	Tap	Glass bottle	Collect blank before run; composite hourly grab samples	S004,SW846
	Alkaline solution tank	Top port	Dipper, plastic bottle	Sample tank contents after preparing each batch	S002,SW846
	HEPA plenum exhaust	Port	Instrument vacuum pump	Continuously extracts and transports gas sample to instrument for CO/CO_2 analysis	
	Stack inlet duct	Port	VOST sampling train	Six pairs of sorbent cartridges collected over 3-hour period	S012
	Stack inlet duct	Port	EPA M5 sampling train	Collect integrated samples of particulates, moisture, and acid gases; measure stack gas velocity pressure and temperature over 3-hr sampling time; collect from the exhaust of the train integrated bag samples of stack gases for CO_2 and O_2 analysis every 30 min	S008, EPA Methods 1-5
	Secondary chamber	Port	Instrument aspirator pump	Continuously extracts and transports combustion gases to instrument for O_2 analysis.	
	Adsorber carbon	Port	Thief, glass bottle	Take core sample about 1/2 in. dia. X 6 in. long from inlet side of adsorber after each test	

ix S refers to Sampling and Analysis Methods for Hazardous Waste Combustion, EPA-600/8-84-002. SW refers to Test Methods for Evaluating Solid Waste, SW 846, Sec. Ed., July 1982

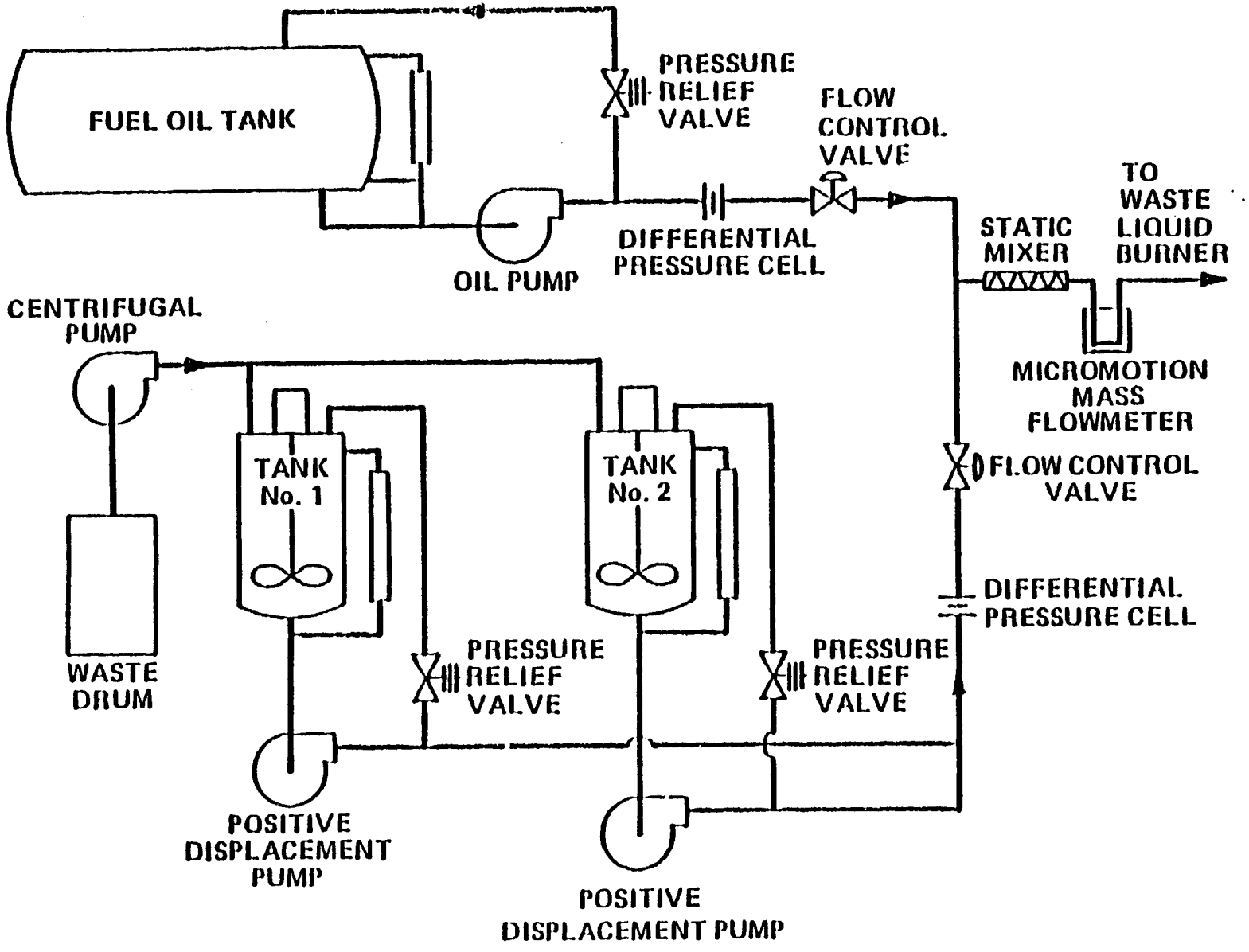

Fig. 6. CAI Liquid Feed System

into the drop-out hopper where it will be pneumatically conveyed to the ash collection hopper located above the glove box. The sample (if any) will be collected from the double valve drop chute inside the glove box. The ash drop doors and the pneumatic system will be operated before each test run to remove ash accumulated since the previous test.

The samples will be stored (archived) in this or another glove box until analysis is requested. Analysis of the ash for CCl_4 will be requested only if test and operating data indicate the unlikely possibility that CCl_4 could be present in the ash.

f. Makeup Water (6) -- Grab samples will be collected from a supply line tap at the beginning and end of each replicate sampling run and composited.

g. Blowdown Water (7) -- Grab samples will be taken from a tap in the liquid waste discharge line to the industrial (radioactive) waste treatment plant. Before each sampling run, two grab samples will be collected 30 minutes apart and composited to provide a blank sample. Grab samples will be taken every 60 minutes during each replicate sampling run and composited for the run.

h. Aklaline Solution (8) -- Sample tank contents after preparing new batch.

i. HEPA Plenum Exhaust Gas (9) -- A gas sample is continuously extracted for carbon monoxide analysis. (CO_2 analysis will be used to confirm stack gas Orsat analyses).

j. Stack Gases (10, 11) -- Samples of the particulates, acid gases, and volatile organics in the off-gas will be collected from the exhaust duct at locations 10 and 11 shown in Figure 7. The exhaust duct is designed for isokinetic sampling.

A volatile organic sampling train (VOST, Figure 8) will be used at location 10 to collect CCl_4 and other volatile organics on sorbent resin according to procedures given in Attachment E. The VOST will be operated for approximately 3 hours during each test duplicate sampling run. The VOST cartridges will be capped immediately upon removal from the train, wrapped in aluminum foil, placed in glass tubes, and sealed.

An EPA Method 5 (M5, Fig. 9) sampling train will be used at location 11 for collection of particulate and HCl acid gas. The M5 procedures include measure-

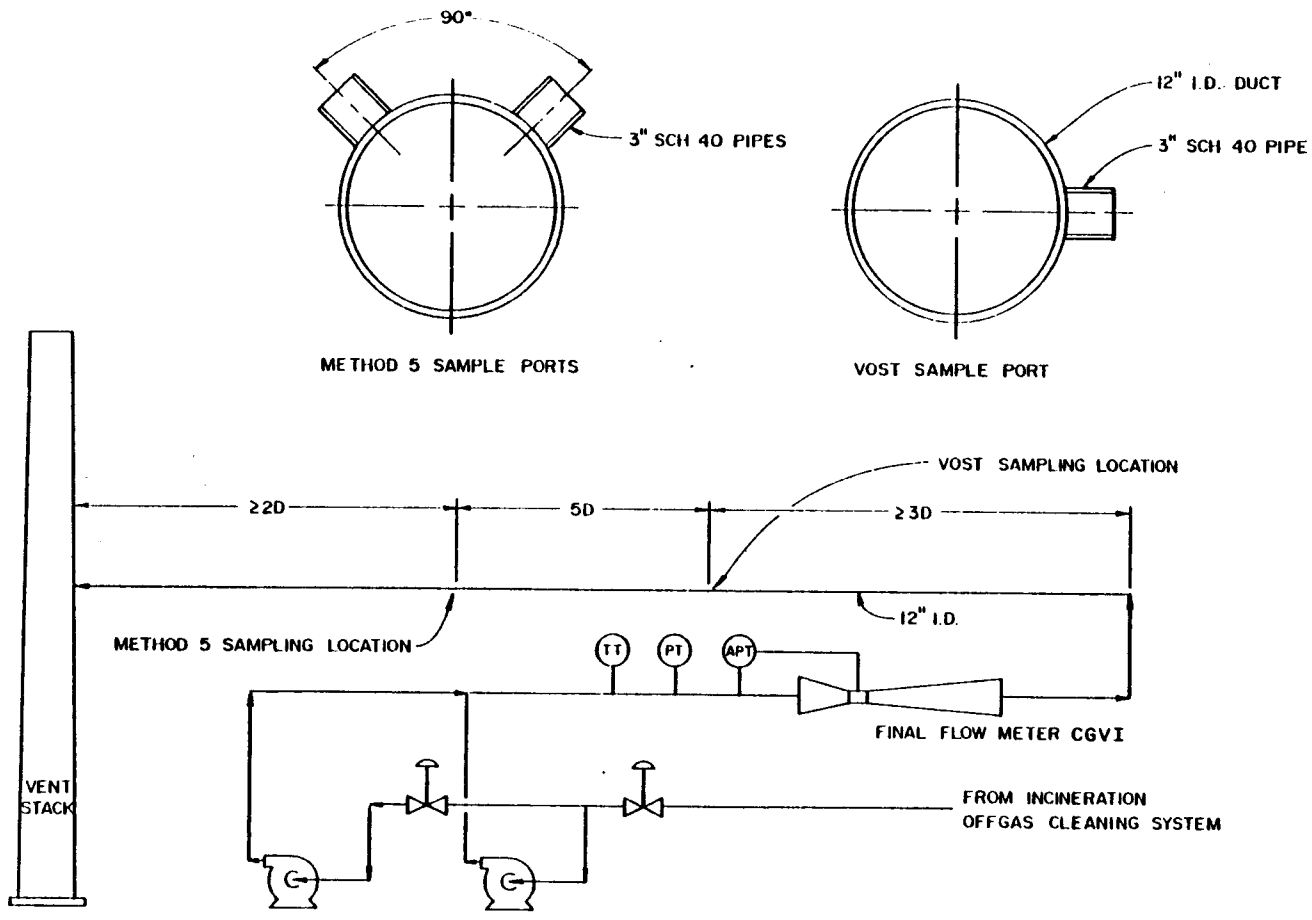

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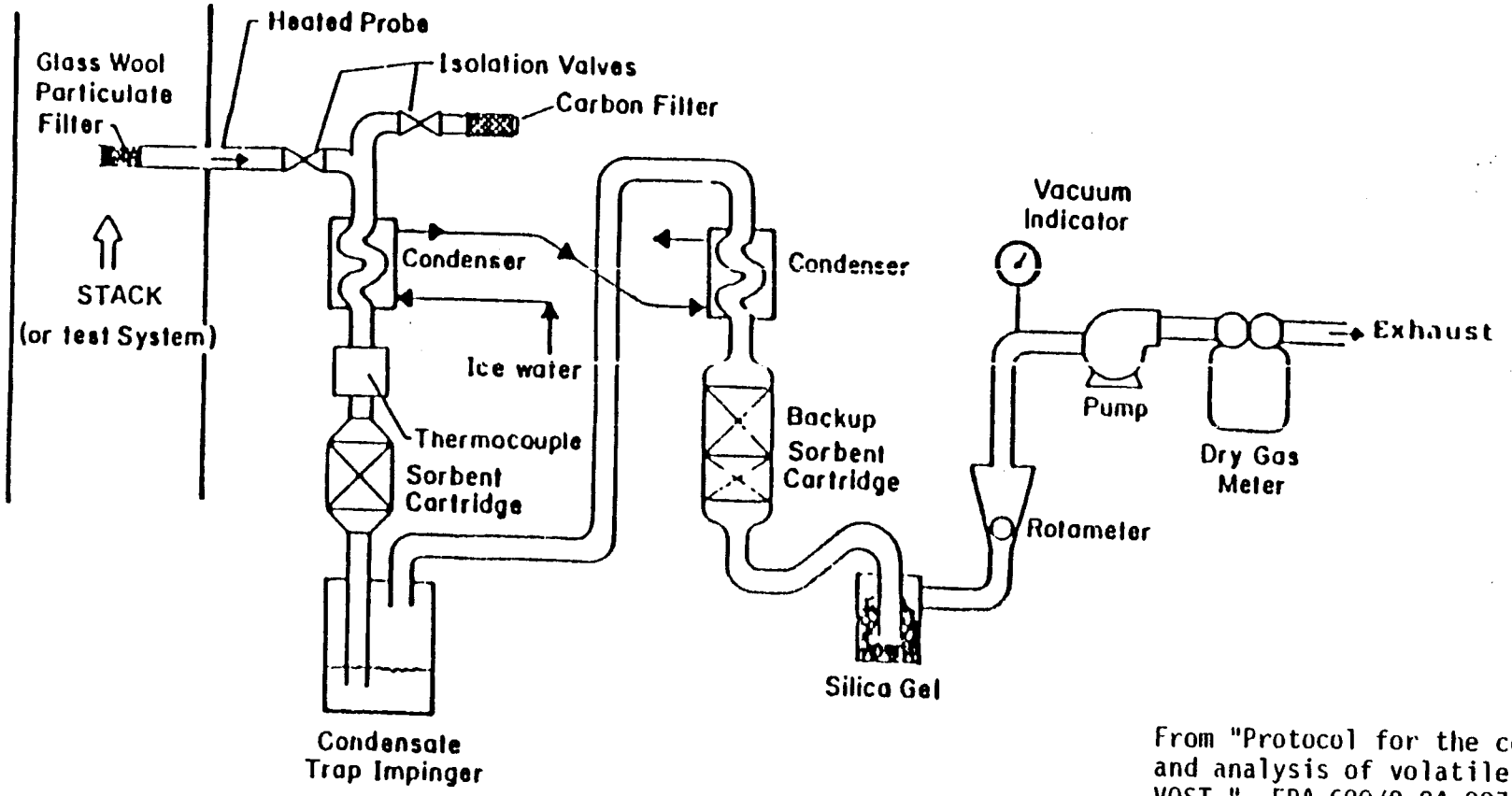
Fig. 7. Stack Gas Sampling Locations



From "Protocol for the collection and analysis of volatile POHC using VOST." EPA-600/8-84-007.

FIG. 8. Schematic of Volatile Organic Sampling Train (VOST)

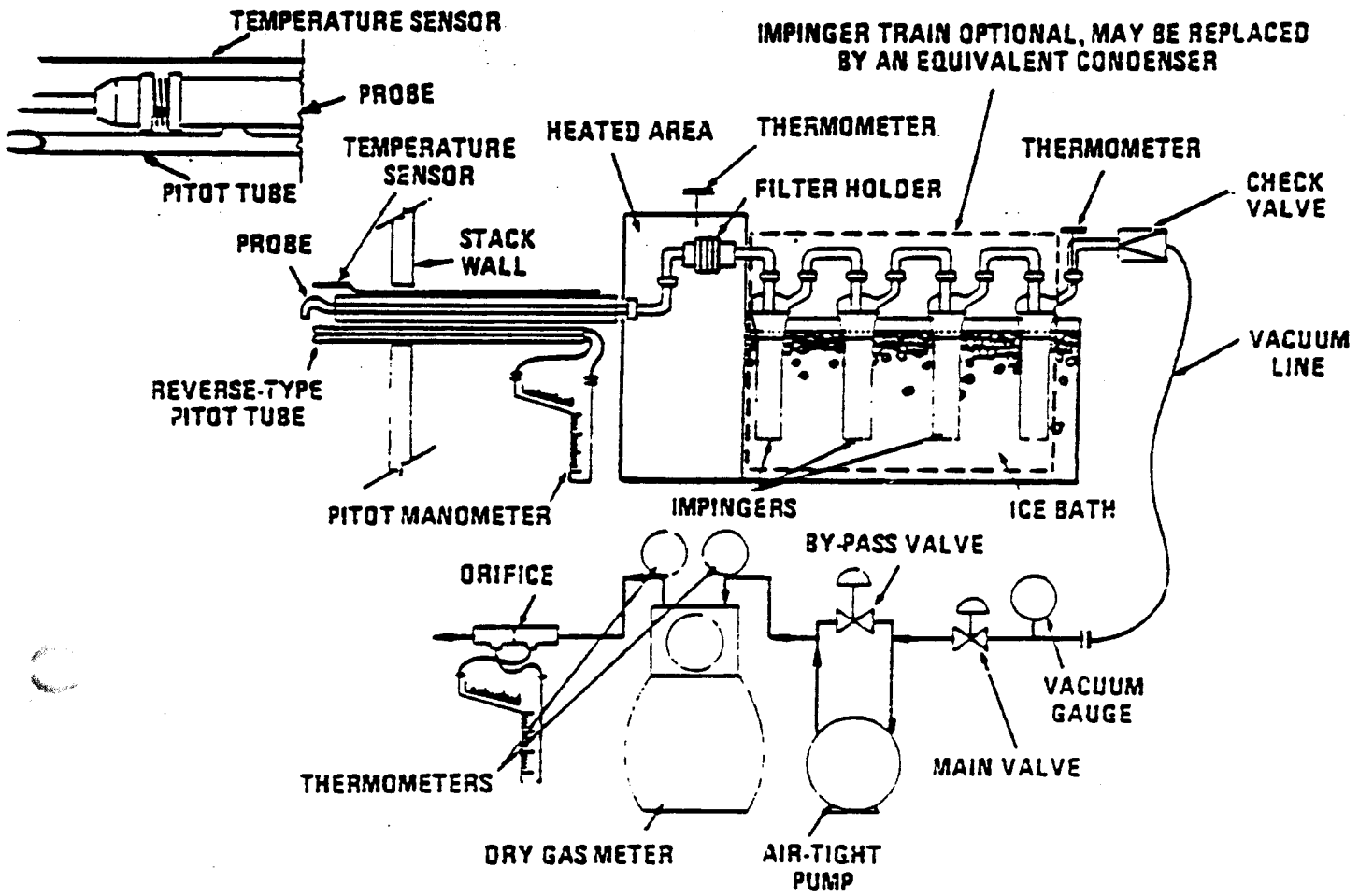


Fig. 9. EPA Method 5 Sampling Train

ment of the stack gas flow rate and temperature according to EPA Methods 1 and 2. Approximately every 30 minutes, integrated samples will be collected in gas bags from the M5 train exhaust for O_2 and CO_2 determinations by an Orsat analyzer according to EPA Method 3. The M5 train will be operated for approximately 3 hours to collect approximately 3.5 m^3 stack gas during each replicate sampling run.

k. Combustion Gas (12) -- A sample will be continuously extracted from the hot gas for O_2 concentration analysis.

l. Adsorber Carbon (13) -- A thief will be used to take a core sample (approximately 1/2 inch diameter X 6 inches long) from the inlet gas side of the absorber after each test. The sample will be placed in a glass container with a Teflon-lined lid.

There are three other process wastes that can potentially contain small amounts of CCl_4 in accumulated solids. These wastes are the off-gas HEPA filters, the quench recycle liquid filters, and the absorber discharge liquid filters. These filters are not included in the sampling program for the following reasons.

- The amount of solids that will be accumulated in the filters during a 3-hour run is believed to be insignificant because the systems are designed for long term (weeks, months) of service before the filters are removed for disposal.

- The total amount of CCl_4 retained by the solids during a sampling run is believed to be negligible because the gas and liquid streams are at elevated temperatures and because CCl_4 has low solubility in water. At the proposed process conditions, residual CCl_4, if any, will tend to remain in the gas streams rather than be retained in the liquids or the small amount of accumulated solids.

- The filter media will probably contain radioactive particulates, complicating cartridge removal, recovery of accumulated solids, extraction and analysis of CCl_4. Removal of the air and liquid filter cartridges after each of the twelve sampling runs would cause extension of the test schedule and significantly increase trial burn costs.

All sample containers and organic sorbent traps for the above sampling program will be prepared by the laboratory having primary responsibility for analyzing all samples. At the test site a sample manager will be responsible for distributing sample containers and traps, monitoring sample collection, taking custody

of samples from the sampling team, and preserving the samples. The sample manager will be responsible for shipping and for transferring sample custody to analysis coordinators in the primary and reference laboratories.

2. Sample Recovery Procedures

The laboratory analysis coordinators will inspect the samples as received and accept custody. Sample aliquots will be taken for the required analyses. Surrogate and/or reference compounds will be added to these samples before any preparation steps. The specific compounds and the amounts to be added will be as called for in the analytical procedures. Typically, the spike amounts will be near the analysis detection level. The laboratories will be responsible for implementing their own instrument calibration and QA/QC procedures.

The procedures for recovering compounds from the major sample groups are briefly summarized below.

Organic Liquids -- This group includes the fuel oil and the liquid waste blend samples. The fuel oil and liquid waste samples will be shaken to minimize stratification before removing aliquots for specific analyses. For organic analyses, small aliquots will be diluted in hexane for direct analysis or processed through cleanup, as required by the analytical procedures identified in the next section.

Solids -- This group includes solid waste blanks, incinerator ash, and adsorber carbon. The samples will be dispersed in methanol or polyethylene glycol for analysis using purge and trap procedures (Attachment E).

Aqueous -- This sample group includes makeup water, blowdown water, alkaline solution and VOST condensate. Sample recovery procedures are not required for these samples because they will be direct injected according to procedures referenced in the next section for volatile organic analysis.

Sorbent Resins -- This sample group will include the VOST resin cartridges (Tenax® and Tenax-charcoal). Each pair of VOST resin cartridges will be thermally desorbed to an analytical trap according to the protocol detailed in EPA-600/8-84-007.

M5 Train Components -- The samples will be recovered from the M5 train as follows:

- Particulate filter -- Will be removed from holder, placed in a glass petri dish, wrapped in aluminum foil, placed in a plastic bag and sealed.
- Probe rinse -- The nozzle, probe, and front half of the filter holder and any connecting glassware will be brushed and rinsed with acetone followed by a rinse with hexane. The rinses will be placed in glass jars with Teflon-lined lids.
- Impinger water -- The contents of the impingers will be volumetrically measured and placed in a glass sample bottle with a Teflon-lined lid. The impingers will be rinsed with distilled water and the rinse added to the sample.
- Silica gel -- The cartridge will be returned to its original container and sealed.

3. Analytical Procedures

The analyses planned for each trial burn sample are listed in Table 3. The procedures and reference methods for these analyses are summarized in Table 4. The standard methods referenced for heat content, ash content, elemental composition, organic chlorine, and stack gas O_2, CO_2, and particulates are self-explanatory. Analysis of samples for CCl_4 will be by the methods referenced in EPA-600/8-84-002. These methods involve the use of standard purge-and-trap, gas chromatography (GC/MS) techniques for identification and quantification of volatile organics. Copies of referenced procedures are included as Attachment E.

4. Monitoring

Monitoring for CO will be done during the trial burn tests using a Foxboro-Wilks Miran II Infrared analyzer [see Section D-5b(2)(b)7].

D-5b(2)(d) Detailed Trial Burn Protocol

1. Waste Characterization

The CAI will be used to incinerate the Los Alamos laboratory waste. The laboratory wastes are a mixture of liquid and solid hazardous wastes composed of various organic solvents and liquids as well as chemically contaminated paper, wood, and plastics. The liquids are basically small quantity lab chemicals which will be transferred from lab size containers into larger containers and

Table 3. Analyses Planned for Trial Burn Samples

Sample Name	Analyses
	Tests 1 and 2 (Liquids)
Fuel oil	(Archive)[a]
Raw liquid waste	(Archive)[a]
Liquid waste blend	Density, heat content, ash content, elemental (C,H,N,O,S, organic Cl), matrix constituents, CCl_4
Incinerator ash	(Archive)[b]
Makeup water	CCl_4
Blowdown water	CCl_4, pH, total chlorides
Alkaline feed	CCl_4
Adsorber carbon	CCl_4
Stack gas VOST	CCl_4
Stack gas M5	Particulates, moisture, HCl, O_2, and CO_2
Combustion gas monitor	O_2
Absorber gas monitor	CO and CO_2
	Tests 3 and 4 (Solids)
Fuel oil	Density, heat contnt, ash content, elemental (C,H,N,O,S, organic Cl), CCl_4
Solids feed blank	Density, heat content, ash content, elemental (C,H,N,O,S, organic Cl), moisture, CCl_4
Incinerator ash	(Archive)[b]
Makeup water	CCl_4
Blowdown water	CCl_4, pH, total chlorides
Alkaline feed	CCl_4
Adsorber carbon	CCl_4
Stack gas VOST	CCl_4
	Tests 3 and 4 (solids) (Continued)
Stack gas M5	Particulate, moisture, HCl, O_2, and CO_2
Combustion gas monitor	O_2
Absorber gas monitor	CO and CO_2

[a]Retain for same analysis as liquid waste blend if needed.

[b]Retain for CCl_4 analysis if needed.

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Table 4 . Summary of Analytical Procedures and Methods

nalysis	Sample Name	Test No.	Sample Matrix	No. of Samples	Procedure Description	Reference Methods[d]
y	Fuel oil	3,4	No. 2 fuel oil	6	Gravimetric/volumetric	
	Liquid waste blend	1,2	Fuel oil, CCl_4	6	Gravimetric/volumetric	
	Solids feed blank	3	Sawdust	1	Gravimetric/volumetric	
ontent	Fuel oil	3,4	No. 2 fuel oil	6	Bomb calorimeter	A006, ASTM D240
	Liquid waste blend	1,2	Fuel oil, CCl_4	6	Bomb calorimeter	A006, ASTM D240
	Solids feed blank	3	Sawdust	1	Bomb calorimeter	A006, ASTM D2015
ntent	Fuel oil	3,4	No. 2 fuel oil	6	Residue after combustion in muffle furnace	A001, ASTM D482
	Liquid waste blend	1,2	Fuel oil, CCl_4	6	Residue after combustion in muffle furnace	A001, ASTM D482
	Solids feed blank	3	Sawdust	1	Residue after combustion in muffle furnace	A001, ASTM D3174
tal Composition H. N. O)	Fuel oil	1,2	No. 2 fuel oil	6	Analyze combustion products and residue	A003, ASTM 3176
	Liquid waste blend	1,2	Fuel oil, CCl_4	6	Analyze combustion products and residue	A003, ASTM 3176
	Solids feed blank	3	Sawdust	1	Analyze combustion products and residue	A003, ASTM 3176
c Chlorine	Fuel oil	1,2	No. 2 fuel oil	6	Halide titration of combustion residue	A004, ASTM D2361
	Liquid waste blend	1,2	Fuel oil, CCl_4	6	Halide titration of combustion residue	A004, ASTM D2361
	Solids feed blank	3,4	Sawdust	1	Halide titration of combustion residue	A004, ASTM D2361
re	Solids feed blank	3	Sawdust	1	Heating under controlled conditions	A001, ASTM D3173
suspended solids	Blowdown water	1,2,3,4	Water	12	Filtration residue	EPA M160.1
dissolved solids	Blowdown water	1,2,3,4	Water	12	Filtrate residue	EPA M160.2
organic carbon	Blowdown water	1,2,3,4	Water	12	Oxidation/IR detection	EPA M415.1

Table 4. (Continued)

Analysis	Sample Name	Test No.	Sample Matrix	No. of Samples	Procedure Description	Reference Methods[a]
ganics						
CCl_4	Fuel oil	3,4	No. 2 fuel oil	6	Dilution, purge and trap, GC/MS	A101, SW 8240
	Liquid waste blend	1,2	Fuel oil	6	Dilution, purge and trap, GC/MS	A101, SW 8240
	Solids feed blank	3	Sawdust	1	Extraction, purge and trap, GC/MS	A101c, A101
	Incinerator ash	1,2,3,4	Combustion residue	0-12	Extraction, concentration, GC/MS	A101c, A101
	Makeup water	1,2,3,4	Water	4	Purge and trap, GC/MS	A101a, A101
	Blowdown water	1,2,3,4	Water	12	Purge and trap, GC/MS	A101a, A101
	Alkaline solution	1,2,3,4	20% NaOH	1-4	Purge and trap, GC/MS	A101a, A101
	Adsorber carbon	1,2,3,4	Carbon	12	Purge and trap, GC/MS	A101a, A101
	Stack gas VOST	1,2,3,4	Sorbent resins	36	Thermal desorption, trap, GC/MS	A101a
		1,2,3,4	Condensate	12	Purge and trap, GC/MS	A101a, A101
	Stack gas M5	1,2,3,4	Condensate H_2O combined with impinger NaOH solution	12	Ion specific electrode	Orion Manual
ticulates	Stack gas M5	1,2,3,4	Probe rinse residue, filter	12	Gravimetric	EPA Method 5
CO_2	Stack gas M5	1,2,3,4	Stack gas	-	Integrated bag samples for ORSAT analysis every 30 min	EPA Method 3
	Secondary Chamber	1,2,3,4	Combustion gas	b	Gas analysis by electrochemical cell (Thermox WDG-III)	
, CO	Adsorber exit gas	1,2,3,4	Combustion gas	b	Gas analysis by IR detector (Foxboro-Wilks Miran II)	

" refers to Sampling and Analysis Methods for Hazardous Waste Combustion, EPA-600/8-84-002, February 1984.
STM" refers to American Society for Testing Material Standards.
W" refers to Test Methods for Evaluating Solid Waste, SW 846, Second Edition, July 1982.
PA" refers to New Source Performance Standards, Test Methods and Procedures, Appendix A, 40 CFR 60.
PA M" refers to Chemical Analysis of Water and Wastes, EPA-600/4-79-020.
ntinuous monitoring.

9-LA-1-4

stored until ready to be incinerated. Laboratory liquids can contain either ignitable or U or P listed wastes containing Appendix VIII constituents.

Because the laboratory liquid wastes include numerous small bottles which are generated in a random fashion it is impossible to identify and quantify the Appendix VIII constituents by a sampling program. The POHC has therefore been selected based on an approach suggested by the EPA and discussed in the next section.

2. POHC Selection Rationale

In selecting the principal organic hazardous constituent (POHC) to be used in the CAI solids and liquids trial burn, several criteria were considered important for various reasons. Trade-offs or constraints imposed by these criteria were carefully evaluated in selecting the compound.

Thermal stability of organic compounds must be considered in examining the behavior of organic compounds in a combustion unit. EPA's approach to trial burns is to specify POHCs of high thermal stability so that results can be extrapolated to compounds of similar or lower thermal stability. According to the EPA's Guidance Manual for Hazardous Waste Incinerator Permits, heat of combustion is the EPA's preferred indicator of thermal stability.[1] Accordingly, compounds with low heats of combustion (ΔHc) were given priority consideration in the POHC selection process. Since it is important to obtain as flexible a permit as possible, artificial wastes containing carbon tetrachloride (CCl_4) are proposed as the POHC during the trial burn. This option is suggested in the March 1983 draft of the EPA's Guidance Manual for Hazardous Waste Incinerator Permits. The Guidance Manual makes the following statement relative to the use of artificial wastes[2]:

> "Using an artificial waste feed has the advantage of simplifying the analytical procedures because interference by organics other than the POHCs is greatly reduced. This approach also allows the applicant to create waste feed that is very difficult to burn. A successful trial burn conducted with such a waste feed results in permit conditions allowing the operator to accept a wide variety of wastes for treatment, perhaps eliminating any future need for permit modifications and additional trial burns."

Carbon tetrachloride has a very high rank (fourth highest) on the EPA's ranking list of the incinerability of organic hazardous constituents on the basis of

heats of combustion. Carbon tetrachloride has also been shown by the University of Dayton Research Institute to have a very high vapor phase thermal oxidation stability[3]. Therefore, CCl_4 is proposed for use as the POHC in both the solids and liquid trial burns.

Spiking the waste with CCl_4 will also provide a source of organic chlorine which will give maximum permit flexibility relative to the HCl performance standard. Los Alamos therefore recommends that CCl_4 be designated as the trial burn POHC.

The approximate composition and analytical parameters of the trial burn liquid and solid wastes are given in Tables 5 and 6. The values in Tables 5 and 6 are estimates.

3. Trial Burn Protocol and Operating Conditions
The trial burn will consist of four tests. Each trial burn will include triplicate sampling runs. A total of 12 sampling runs will be done. Table 7 presents the test protocol and schedule for each of these trial burn tests and 12 runs.

4. Waste Constituents

a. Liquid Wastes -- Trial burn tests 1 and 2 will involve the incineration of a liquid blend of fuel oil and carbon tetrachloride (CCl_4) as a suggested POHC in the primary chamber waste burner. The liquid blend will also be spiked with an ash surrogate which will generate particulate during incineration. The liquid waste will be spiked with an ash surrogate in order to obtain a more flexible RCRA liquid incineration permit relative to waste ash content. [See D-5b(2)(d) 8.] The approximate characteristics of the liquid waste blend are summarized in Table 5. The trial burn operating conditions are summarized in Table 8.

b. Solids Wastes -- Trial burn tests 3 and 4 will involve the incineration of sawdust and CCl_4. The CCl_4 was selected as a suggested POHC for the solids trial burn tests because of its commercial availability and high ranking on the EPA's heat of combustion hierachy. Because of CCl_4's high volatility, however, the CCl_4 will be fed to the incinerator in sealed containers. The sealed containers of CCl_4 and the sawdust will be placed in 1 foot X 1 foot X 2 foot cardboard boxes, weighed, and fed to the incinerator by a ram feed or on a timed cycle. This is the present procedure for feeding most solid wastes to the CAI [see

Table 5. Approximate Estimated Composition of Trial Burn Waste Liquid[a]

	Wt%	
Composition		
Carbon tetrachloride	60-65	
Fuel oil	35-40	
Heat value		~ 7,000 Btu/lb
Organic chlorine content	55-60	
Ash content	1- 2[b]	

[a]This is the CCl_4 spiked waste liquid which will be incinerated during the trial burn.

[b]An ash surrogate such as diatomaceous earth, fly ash or an organo-metallic compound will be added to the waste liquid to maximize permit flexibility.

Table 6. Approximate Estimated Composition of Trial Burn Solid Waste

	Wt%
Composition	
Carbon tetrachloride	20-25
Sawdust	75-80
Organic chlorine content	20-25

Table 7. Test Protocol and Schedule

Trial Burn Test	Run No.	Sampling[a] Run Duration(hr)	Waste Feeds/POHCs Trial Burn Tests: Liquid[b] Waste	Solid[c] Waste	Natural[d] Gas	Stack Testing: DRE	Particulate	HCl
1	1 - 1	5 - 6	CCl_4		X	X	X	X
	1 - 2	5 - 6	CCl_4		X	X	X	X
	1 - 3	5 - 6	CCl_4		X	X	X	X
2	2 - 1	5 - 6	CCl_4		X	X	X	X
	2 - 2	5 - 6	CCl_4		X	X	X	X
	2 - 3	5 - 6	CCl_4		X	X	X	X
3	3 - 1	5 - 6		CCl_4	X	X	X	X
	3 - 2	5 - 6		CCl_4	X	X	X	X
	3 - 3	5 - 6		CCl_4	X	X	X	X
4	4 - 1	5 - 6		CCl_4	X	X	X	X
	4 - 2	5 - 6		CCl_4	X	X	X	X
	4 - 3	5 - 6		CCl_4	X	X	X	X

[a]Includes incinerator equilibration time and equipment change-over time between runs.

[b]Blend of fuel oil and CCl_4.

[c]Sawdust and CCl_4.

[d]As required to maintain primary and SCC temperatures.

Table 8. Trial Burn Operating Conditions[a]

Trial Burn Test	Physical Forms	Waste Feed Rates Solid (lb/hr)	Waste Feed Rates Liquid (lb/hr)	Heat Value (Btu/lb)	HCl (lb/hr)	Temperatures (°F) Primary	Temperatures (°F) SCC
1	Liquid		250-300	∿ 7,000	150-185	1,600	1,800
2	Liquid		250-300	∿ 7,000	150-185	1,600	2,000
3	Solid	250-300		-	60-75	1,600	1,800
4	Solid	250-300		-	60-75	1,600	2,000

[a]The values given in this table are estimates which may vary during actual operation.

Section D-5b(2)(b)10]. The approximate composition of the solid waste in shown in Table 6. The trial burn operating conditions are shown in Table 8. The CCl_4 in plastic bottles simulates a lab solid waste which contains CCl_4 in a plastic bottle.

5. Combustion Temperature Ranges
   The combustion temperatures for the tests will be 1600°F for the primary, and 1800 and 2000°F for the SCC as indicated in Table 8. Combustion temperatures are normally controlled to within 50°F. It is expected that this range will prevail for the trial burn.

6. Waste Feed Rates
   The waste feed rates for trial burn test runs 1 through 4 are summarized in Table 8.

7. Combustion Gas Velocity
   The measured indicator of combustion gas velocity during the trial burn will be the combustion gas flow through the Fluidics HHR flowmeter [see Section D-5b(2)(b)7].

8. Waste Feed Ash Content
   In order to obtain permit flexibility relative to the waste liquid ash content, an inert material such as flyash, sodium chloride, diatomaceous earth or a metallo-organic compound will be added to the waste liquid before it is fed to the incinerator. The amount and type of inert to be added to the waste liquid will depend on the results of an analytical program which has not yet been completed.

9. Auxiliary Fuel
   Natural gas will be used as an auxiliary fuel as required to maintain temperatures, in both the primary and secondary combustion chambers.

10. Scrubber Water
    Recycle water sumps will be sampled after each sampling test and will be flushed clean within practical limits before the next sampling test.

D-5b(2)(e) Trial Burn Schedule

1. Schedule

The trial-burn is planned to begin within 6 months of the time that Los Alamos receives EPA approval for the Part B Permit application. The schedule for the test is shown in Table 9.

2. Duration of Each Trial Burn Test

Four trial burn tests are planned, each consisting of three replicate sampling runs. Each sampling run will last about 3 hours for a total of 9 hours per trial burn test. The incinerator will be fed test wastes for 2 to 3 hours before each sampling run for a total of 5 to 6 hours per test. This will establish steady operating at process test conditions. Sampling will be done 24 hours per day using two sampling shifts. Assuming minimal interruption of incinerator operation, the incinerator is therefore expected to operate on test waste feeds for 24 hours per day for about 3 days.

3. Ouantity of Waste to Be Burned

Test waste liquids and test waste solids will each be fed to the incinerator for an estimated 30 to 36 hours. Allowing a 25 percent safety factor the consumption of test wastes is expected to be about 1,250 gallons of waste liquid and 13,500 pounds of waste solids. The CAI will be operating on normal wastes under interim status prior to and following the tests. It is expected that the unit will be equilibrated at test conditions with normal waste or auxiliary fuel and switched to the test waste two to three hours before the start of each sampling run. A surplus of test waste will be prepared in case operational problems require a longer testing period. Unused waste will be incinerated at the conclusion of the tests. The amount of POHC (CCl_4) present in the liquid and solid wastes is expected to be about 12,150 pounds.

D-5b(2)(f) Trial Burn Permit Objectives

If the RCRA DRE, particulate, and HCl performance standards (40 CFR 264.343) are achieved during the trial burn as outlined in Table 8, the RCRA incineration operating permit should allow the Controlled Air Incineration System to be used to incinerate RCRA hazardous solid and liquid wastes at the rates and conditions discussed in this section [D-5b(2)(f)].

The expected RCRA incineration permit conditions discussed in this section are based on the March 1983 "Guidance Manual for Hazardous Waste Incinerator

Table 9. Test Schedule

Test	Sampling Run No.[a]	Day
1	1-1	1
	1-2	1
	1-3	1
2	2-1	1
	2-2	2
	2-3	2
3	3-1	2
	3-2	2
	3-3	3
4	4-1	3
	4-2	3
	4-3	3

[a]Each sampling run will be about 3 hrs long, preceded by a 2 to 3 hr equilibration period and equipment change-over period.

Permits," prepared by the U.S. EPA's Office of Solid Waste.

The expected RCRA permit conditions are discussed in the following pages and summarized in Table 10.

1. Anticipated RCRA Permit Conditions for Solid Wastes
The following expected permit conditions will be based on waste characteristics:

a. Appendix VIII Constituents -- Since the solids in trial burn tests 3 and 4 will contain CCl_4, the system permit should allow the incineration of wastes containing CCl_4 and any other Appendix VIII Constituent lower on the EPA's Ranking of Incinerability List. Only three Appendix VIII Constituents at levels above 1000 ppm would not be allowed: $CFCl_3$, $CHBr_3$, and CF_2Cl_2.

b. Minimum Heat Value -- There should be no permit requirement that specifies a maximum or minimum solids, sludge or slurry heat value. The minimum heat value concept, while relevant to organic liquid, is not relevant to low heat value solids such as contaminated soils. To quote the March 1983 Guidance Manual:

> "However, in the case of solids fed to rotary kilns, hearths and other solids handling incineration equipment, a different approach to specifying a heating value for waste is needed. Many solid wastes, by their very nature, are subject to wide variations in heating value, and rotary kiln, hearth, and similar incinerator designs attempt to deal with this problem. Such designs provide for the volatiles in the solids to be vaporized and subsequently destroyed in an afterburner or secondary combustion chamber. Thus in specifying heating values for solid waste feeds, a lower heating value limit may not be required if the incinerator is equipped and operated to maintain sufficient temperature by addition of liquid waste or auxiliary fuel."

Since the CAI has auxiliary fuel firing capability in both the primary and SCC chambers, the CAI should not have a heat value permit condition for solids incineration.

c. Maximum Organic Chlorine Content of Waste -- The maximum permitted pounds per hour of waste organic chlorine should be based on the trial burn results. If the CAI's air pollution control system for example removes 185 pounds of HCl per hour, then the permit condition should allow the CAI to incinerate up to 180 pounds of organic chlorine per hour in the combined liquid and solid waste

Table 10. Summary of Expected Permit Conditions

Content/Physical Form	Type of RCRA Permit: Solid	Type of RCRA Permit: Liquid	Comments
POHCs	CCl_4	CCl_4	
Trial burn tests	3-4	1-2	
Appendix VIII constituents	CCl_4	CCl_4	NPC = Not permit condition
Minimum Btu/lb	NPC	7000	
Max. organic chlorine (lb/hr)	180[a]	180	Total for liquid/solid and aqueous wastes
Maximum ash content (wt%)	NPC	2	Total ash for liquid and aqueous
Temperature			
Primary (°F)	1550-1600	1550-1600	
SCC (°F)	1750-1800	1750-1800	
Maximum primary chamber thermal duty (MM Btu/hr)	2	2	
Maximum primary chamber natural gas (MM Btu/hr)	NPC	NPC	
Water injection rate	NPC	NPC	
Liquid feed rate	NPC	NPC	
Solid waste feed rate	NPC	NPC	

[a]- All numerical values are estimates which will be finalized by the trial burn results.

feeds. Since the source of the HCl is irrelevant to the performance of the air pollution-control equipment, the permit should allow 180 pounds of organic chlorine per hour to be incinerated either as all liquid or solid or any combination of liquid and solid.

d. Maximum Ash Content of Waste -- There should be no solids ash content permit condition for the CAI. Particulate emissions will be measured during both solids trial burn tests. If the particulate emissions are at or below RCRA regulations, this testing should be considered as an acceptable particulate test for all solid wastes and sludges. When considering particulate emissions, it should be realized that for the CAI, the ash content of the liquid wastes is more important to particulate generation and emissions than is the ash content of the solid wastes being incinerated.

e. Physical Form -- The physical form given in the RCRA solid hazardous waste permit should specify solids, sludges, and slurries.

f. Incinerator Operating Permit Conditions -- The following permit conditions are anticipated to be based on the incinerator operating conditions during the trial burn tests:

- Temperature - Table 8 summarizes the temperature conditions for the solids trial burn tests.

- Maximum Thermal Duty - A maximum primary chamber thermal duty permit condition based on the trial burn results is desirable so that the permit will allow the incineration of any combination of aqueous, liquid, and solid/sludge wastes with a total thermal duty equal to the maximum permitted duty. The March 1983 version of the Guidance Manual covers this situation in Section 5, Example 2. On page 5-10, the Guidance Manual discusses a case in which 1 MM Btu/hr of solid wastes and 1.2 MM Btu/hr of liquid wastes are successfully incinerated. The Guidance Manual then goes on to state that hazardous wastes containing more readily incinerated Appendix VIII Constituents than those tested may be fed in greater amounts, provided that the total thermal input is less than 2.2 MM Btu/hr and the other permit restrictions on waste composition are satisfied. Since no waste will be fired in the secondary combustion chamber (SCC), the maximum thermal duty should only apply to the primary chamber.

- Natural Gas Feed Rate - During the incineration of solid wastes, the only permit limit on natural gas feed rate should be the maximum thermal duty. Natural gas feed rate can vary from near zero up to the maximum permitted thermal duty. When incinerating solids, the rate of liquid fuel or liquid waste fired in the primary chamber is not the important criterion. What is

important is the outlet temperature of the primary chamber combustion gas, which is controlled by a permit condition at a minimum level. This situation is covered on page 4-6 of the March 1983 Guidance Manual. The Manual states that the net effect of specifying the total thermal input is to permit the substitution of easily incinerated waste (higher waste heat value) for auxiliary fuel when specified operating conditions, such as combustion zone temperature and air feed rate, are maintained.

- Liquid Waste Feed Rate - As previously stated for the natural gas feed rate, the Guidance Manual states on page 4-6 that more easily incinerated wastes (constituents lower than CCl_4 and waste heat values greater than 7000 Btu/lb) can be permitted at rates up to the maximum permitted thermal duty of the primary chamber.

- Solid Waste Feed Rate - The only permit conditions related to the solid waste feed rate should be the maximum allowable primary chamber thermal duty and the primary chamber and SCC temperatures. As long as these permit conditions are met, organic solid wastes should be destroyed at the DRE levels specified in the RCRA regulations.

g. Other Permit Conditions -- Other expected permit conditions such as stack carbon monoxide concentration and combustion gas velocity indicator are not discussed in this section. These conditions will be established when the results of the trial burn tests are evaluated.

2. Anticipated RCRA Permit Conditions for Liquid Wastes
The following anticipated permit conditions will be based on waste characteristics:

a. Appendix VIII Constituents -- Since the liquid waste trial burn tests 1 and 2 will contain CCl_4, the incineration system should be permitted to incinerate CCl_4 and all other Appendix VIII Constituents lower on the EPA's Ranking of Incinerability List. Only three Appendix VIII Constituents at levels above 1000 ppm would not be allowed: $CFCl_3$, $CHBr_3$, and CF_2Cl_2.

b. Minimum Heat Value -- A minimum heat value of about 7000 Btu/lb (see Table 10) for the liquid waste mixture is an anticipated permit condition.

c. Maximum Organic Chlorine Content of Waste -- The maximum permitted pounds/hour of waste organic chlorine should be based on the trial burn results. If the CAI's air pollution control system removes 185 pounds of HCl per hour, then the permit condition should allow the CAI to incinerate up to 180 pounds of organic

chlorine per hour in the combined liquid and solid waste feeds. Since the source of the HCl is irrelevant to the performance of the air pollution control equipment, the permit should allow 180 pounds of organic chlorine per hour to be incinerated in either all liquid wastes or all solid wastes or any combination of liquid and solid wastes.

d. Maximum Ash Content of Waste -- The maximum permitted liquid waste ash content should be based on the ash content of the liquid wastes incinerated during trial burn tests 1 and 2.

e. Physical Form -- The physical form specified in the RCRA liquid hazardous waste permit should be liquid organic and aqueous wastes.

f. Incinerator Operating Permit Conditions -- The following anticipated permit conditions are based on the proposed incinerator operating conditions during the liquid trial burn tests:

- Temperature - Table 8 summarizes the temperature conditions for each liquid trial burn test.

- Maximum Thermal Duty - Los Alamos expects to obtain a maximum thermal duty permit condition based on the trial burn results that allows the incineration of any combination of liquid, aqueous, and solid/sludge wastes with a total thermal duty equal to the maximum permitted duty (see previous discussion on maximum thermal duty).

- Water Feed Rate - There should be no special permit restriction on the feeding of contaminated or non-contaminated water into the primary chamber. The previously quoted statement from page 4-6 of the Guidance Manual covers water injection. The statement " . . . specified operating conditions, such as combustion zone temperature and air feed rate, are maintained." indicates that as long as the total thermal duty and CAI combustion zone temperature are maintained, the water feed rate is irrelevant. When too much water is injected, it will be impossible, for example, to maintain combustion temperature at a specified thermal duty.

  Relative to the destruction of hazardous constituents in contaminated water, volatilization of CCl_4 from the solid waste in the primary chamber and volatilization of CCl_4 from a contaminated water are essentially equivalent processes. The CCl_4 that is volatilized from solid wastes or injected water would be subjected to essentially the same combustion temperature, gas mixing, and residence time in the SCC. Since CCl_4 volatilized from both matrices will be subjected to the same SCC combustion conditions, both the RCRA solid and RCRA liquid permits should allow the incineration of contaminated water that is injected into the primary chamber. Permit justification will be the successful demonstration of the

flameless oxidation of CCl_4 in the solids trial burn tests 3 and 4. Contaminated water means a liquid containing no less than 90 weight percent of water in which the organic contaminant, if any, is CCl_4 or falls below CCl_4 on the RCRA Ranking of Incinerability List.

- Natural Gas Feed Rate - During the incineration of liquid wastes, the only limit on natural gas feed rate should be the maximum thermal duty. Natural gas feed rate can range from zero to the maximum permitted thermal duty.

- Liquid Waste Feed Rate - As previously stated for the natural gas feed rate, the Guidance Manual states on page 4-6 that more easily incinerated wastes (constituents lower than CCl_4 and waste heat values greater than 7000 Btu/lb) can be permitted at rates up to the maximum permitted thermal duty of the primary chamber.

g. Other Permit Conditions -- Other expected permit conditions such as stack carbon monoxide concentration and combustion gas velocity indicator are not discussed in this section. These will be established when the results of the trial burn tests are evaluated.

D-5b(2)(g) Description and Planned Operating Conditions for the Emissions Control Equipment

The emissions control equipment is described in Section D-5b(2)(b)7. The operating condition ranges for normal operation and the trial burn are summarized in Table 11. During operation the system water flow rates and pressure drops typically fluctuate over a normal range, and these fluctuations are also expected to occur during the trial burn.

D-5b(2)(h) Shutdown Procedures

Procedures for shutting down the waste feed are described in Section D-5b(2)(b)(6). These procedures will be in effect during trial burn tests 1 through 4 while feeding the waste liquid and solids.

D-5b(2)(i) Site Clean-Up

After the trial burn program is completed, all residual wastes or POHC that remain will be destroyed. Assuming that incineration operations went smoothly based on on-site observations, and that preliminary analytical results are positive (e.g., as indicated by low CO values), Los Alamos will destroy any trial

Table 11. Planned Operating Conditions for the Emissions Control System During the Trial Burn

Equipment	ΔP Range (in. w.c.)
Quench chamber	0-2
Venturi	40-70
Packed bed	1-8

burn residual wastes in the CAI system. The unit will be operated at a primary temperature of 1600°F and a SCC of 1800°F during the incineration of any residual wastes.

D-5b(2)(j) Quality Assurance Plan

The Quality Assurance Project Plan is given in Attachment A.

D-5c Data in Lieu of Trial Burn

This section is not applicable.

D-5d Post Trial Burn Operation

The interim period between completion of the trial burn and receipt of final approval from EPA for full operating authority could be several months. During this time, Los Alamos intends to continue operating the incineration system on a full-time basis, operating under all state and federal requirements as per 40 CFR 265. All appropriate operating records will be maintained for documentation of operating conditions during this interim period.

D-5e Incinerator Inspection

The incinerator will be visually inspected daily during operation for fugitive emissions, leaks, and associated equipment, spills, and signs of tampering, as per 40 CFR 264.347(b).

D-5f Emergency Waste Feed Cut-Off Testing

During permitted operation the emergency waste feed cut-off system and associated alarms as described in D-5b(2)(b)6 will be tested, as per 40 CFR 264.347(c) on a monthly basis during periods of operation in order not to unduly restrict or upset operations. If the CAI is not routinely operating, the emergency waste feed cut-off system will be tested before start-up of the CAI, but not necessarily on a monthly basis.

D-5g Record Keeping

A written operating log will be kept at the CAI facility as per Appendix I of 40 CFR Part 264 and 40 CFR 264.73(b).

D-5h Performance Test Determination

Trial burn results and determinations will be provided after they become available and have been displayed in a report format.

REFERENCES

1. Guidance Manual for Hazardous Waste Incinerator Permits, U.S. EPA, Office of Solid Waste, Washington, D.C., March 1983 Draft, page 2-15.

2. Ibid, pages 2-37 and 2-38.

3. B. Dellinger, J. Torres, W. Rubey, D. Hall, J. Graham, R. Carnes, "Determination of the Thermal Stability of Selected Hazardous Organic Compounds," paper presented at the Ft. Mitchell, Kentucky Hazardous Waste Conference, April 1984.

ATTACHMENT A
QUALITY ASSURANCE PROJECT PLAN

ATTACHMENT A

QUALITY ASSURANCE

The Los Alamos National Laboratory will conduct the trial burn for its Controlled Air Incinerator System and will subcontract to selected qualified firms the stack sampling and the sample analysis operations. The selected firms will be required to submit the Quality Control procedures they will use for their activities.

A. Stack Sampling

An EPA Method 5 train will be used for determining particulates and acid gas. A volatile organic sampling train (VOST) will be used to collect the samples for the POHC, carbon tetrachloride, analysis. All EPA quality assurance requirements specified for these methods (pitot tube and gas meter calibrations, glassware cleaning, sample bottle and trap preservations, and reagent source) will be in effect.

B. Monitoring Equipment

The incineration and offgas systems are equipped with extensive monitoring and control devices. The critical elements will be checked regularly and calibrated to assure operability and reliability.

Prior to the run, on-line monitors, including analyzers for O_2, CO_2, and CO, will be zeroed and calibrated using the appropriate techniques. CO-CO_2 monitors will be calibrated with a zero gas, full-span gas, and a mid-range gas and the calibration will be checked at least daily during the burning of test materials.

C. Analytical

Extraction efficiency for carbon tetrachloride from the VOST resin and water condensate will be established. The precision and accuracy for the instrumental analysis for carbon tetrachloride will be established.

A comprehensive program, about 10 percent of the analytical samples, will be developed for split samples and for field and laboratory blanks. Standard grade chemicals will be obtained and used to spike samples for procedure verification and instrument standardization.

D. Records

Sample records will be maintained in a bound pre-numbered notebook. The records consist of the unique sample identification number, the sample type (impinger solution, ash, etc.), sample location, date, time, and initials of the operator who collected the sample. Analytical results were entered in the notebook when received.

Sample chain of custody procedures will be followed. Figures 1, 2, and 3 are examples of the type of records that will be maintained.

D258-APPA

(NAME OF SAMPLING ORGANIZATION)

SAMPLE DESCRIPTION _____

PLANT: _____ LOCATION: _____

DATE: _____

TIME: _____

MEDIA: _____ STATION: _____

SAMPLE TYPE: _____ PRESERVATIVE: _____

SAMPLED BY: _____

SAMPLE ID NO.: _____ - - - -

LAB NO. _____

REMARKS

Figure 1. Example of General Sample Label

W/O No. _____ Page____

FIELD TRACKING REPORT: _____-_____
(LOC-SN)

FIELD SAMPLE CODE (FSC)	BRIEF DESCRIPTION	DATE	TIME(s)	SAMPLER

Figure 2. Sample of Field Tracking Report Form

W/O No. _____ Page ____

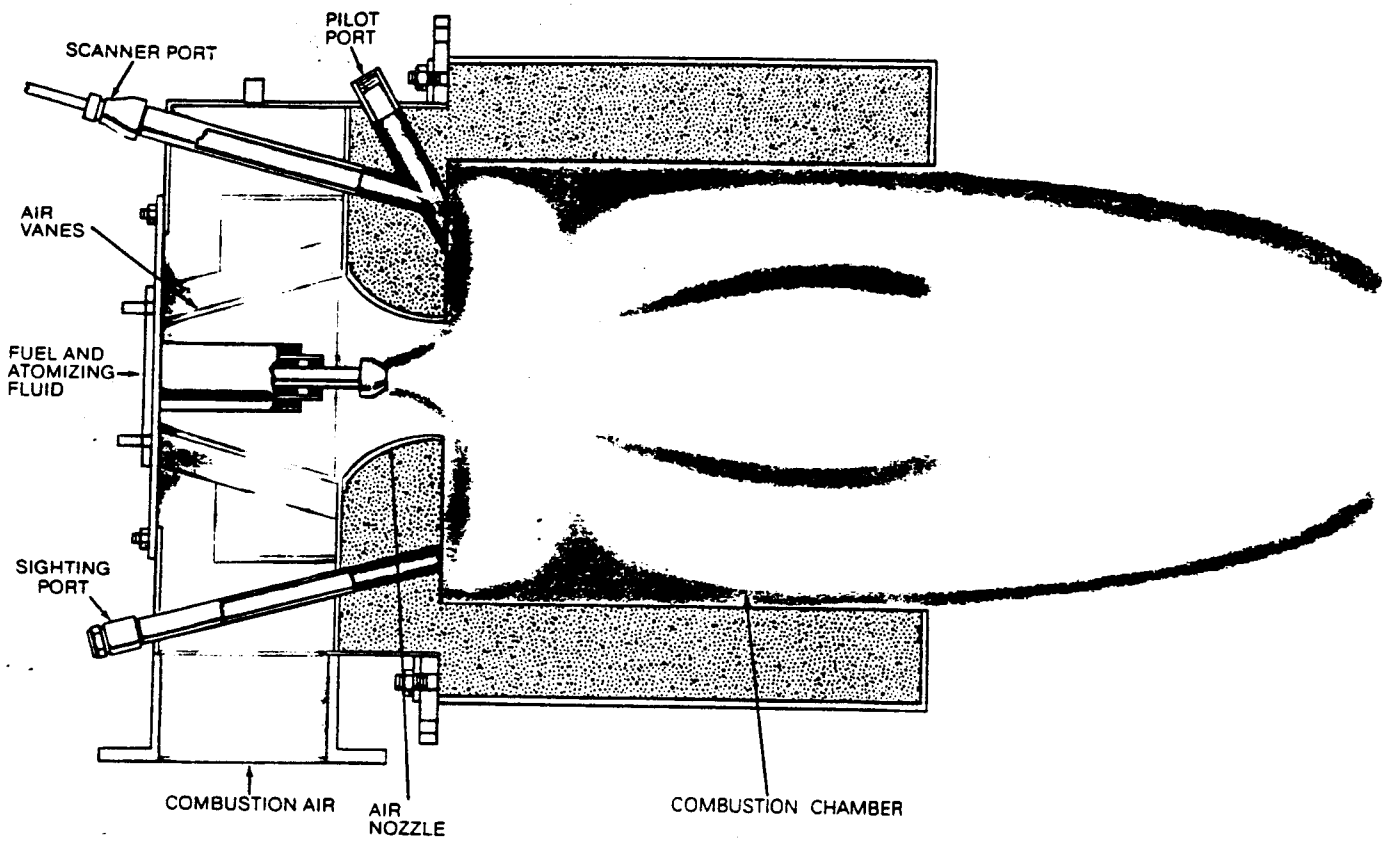
LAB TRACKING REPORT: _____ - _____ - _____
(LOC-SN-FSC)

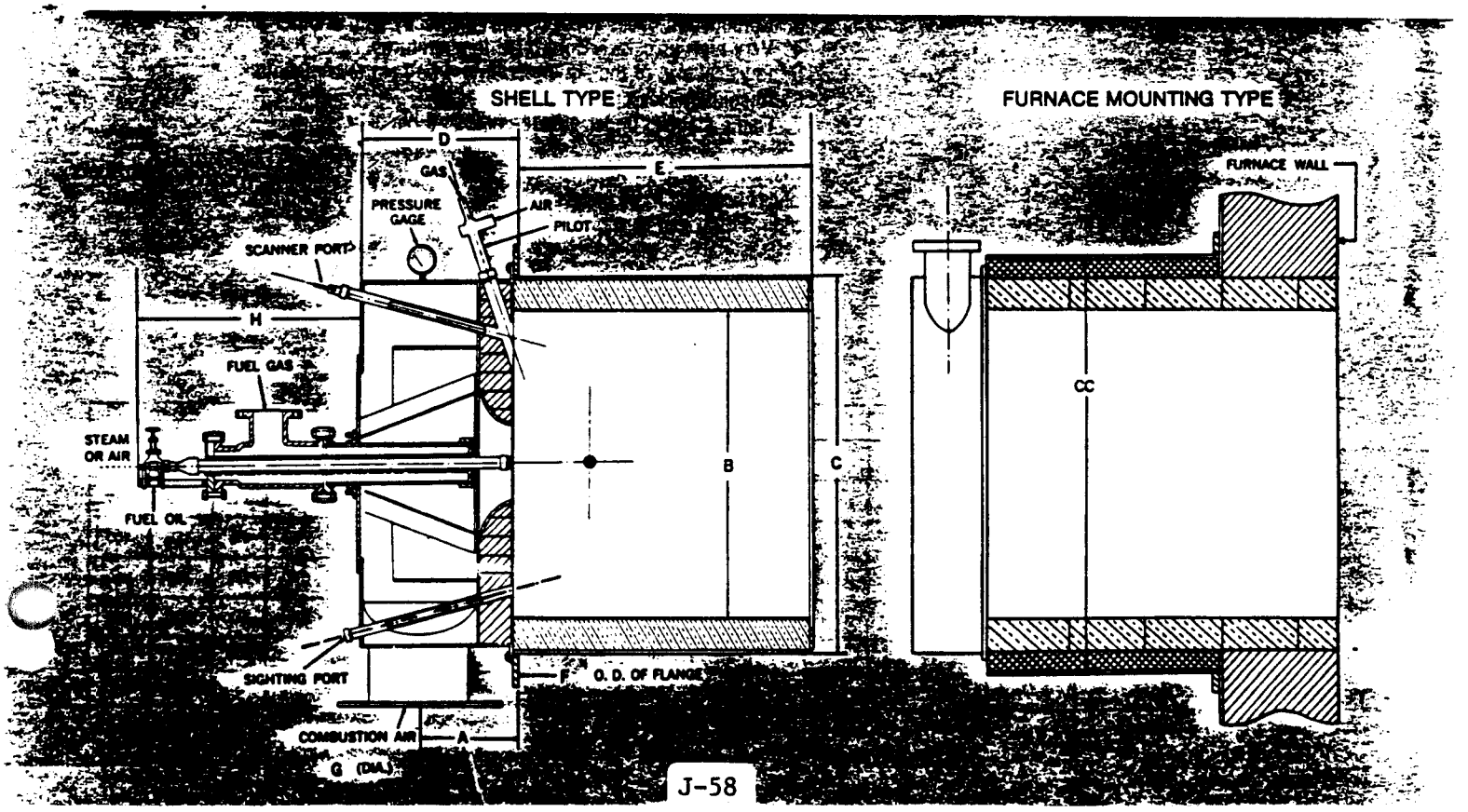
FRACTION CODE	X	PREP/ANAL REQUIRED	RESPONSIBLE INDIVIDUAL	DATE DELIVERED	DATE COMPLETED

Figure 3. Sample of Lab-Tracking Report Form

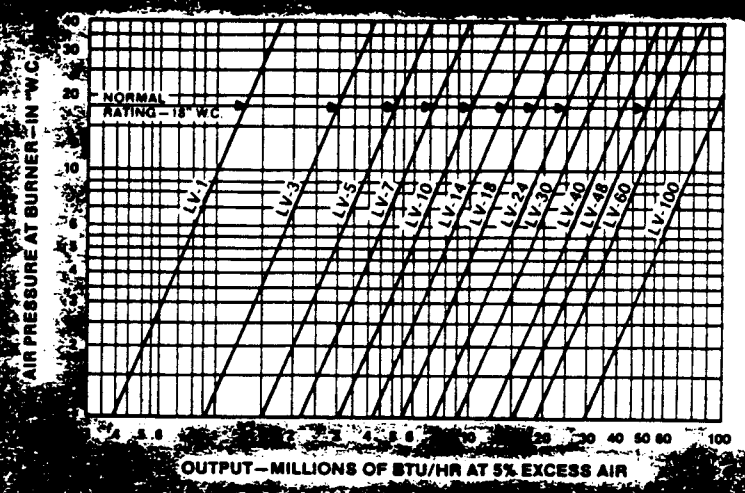
ATTACHMENT B
BURNER INFORMATION

LV VORTEX combination burner





Standing downstream looking into the flame produced the inspiration for the name Vortex burner. The whirling vortex of flame is awesome. Vortex action begins where combustion air is blown tangentially into the burner windbox. High rotational energy is imparted as the air accelerates through swirl vanes, whirls its way through the air nozzle and bursts like a cyclone into the combustion chamber. Fuel, either gas or finely atomized liquid, is injected through the burner gun centered in the air nozzle. Extreme turbulence in the nozzle area provides excellent mixing of fuel with air. Mixing is intensified as hot gases recycle into the low pressure zone which exists along the centerline of the vortex flame. This recycle mixing also brings heat to the liquid fuel injection area and helps to speed up vaporization. Thus liquid fuel is vaporized, mixed with combustion air and recycled gases, and heated to ignition temperature almost instantaneously.

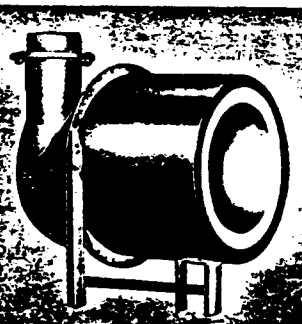


OUTPUT DATA — Trane Thermal Vortex burners are available in 13 standard models as shown. Turndown on liquid fuels is 3.5 to 1 from nominal high fire rating. Turndown on gaseous fuels is about 4 to 1. Burner curves shown are based upon furnace operation at standard atmospheric pressure with 5% excess air. Special designs may be supplied for unusual applications.

TRANE THERMAL VORTEX BURNER — High Outputs, Compact Design — Versatile Trane Thermal Vortex burners deliver outputs up to 100 MM Btu/hr. firing any liquid or gaseous fuel, separately or in combinations. Flame length is extremely short, about 1 to 1½ times the chamber diameter, with heat release rates upwards of one million Btu/hr. per cubic foot in the standard units. The Vortex can be fired horizontally or vertically. The high firing rates of single burners means that fewer burners are needed on some multiple burner applications simplifying and reducing the cost of controls. The compact design of the Vortex often permits space savings.

CHARACTERISTICS — Multi-Fuel — Vortex burners are capable of firing with fuel oils, all combustible gases (as low as 100 Btu/ft³.) and with combustible liquids (as low as 4500 Btu/lb.). These may be fired separately or in combination such as dual liquid, liquid-gas, or gas-gas. Special nozzle designs are available.

APPLICATIONS — Vortex burners are in service firing kilns, many types of dryers, process heaters and fired heat exchangers, incinerators and boilers. Where clean, really efficient combustion is mandatory, Vortex burners do the job.



VORTEX BURNER

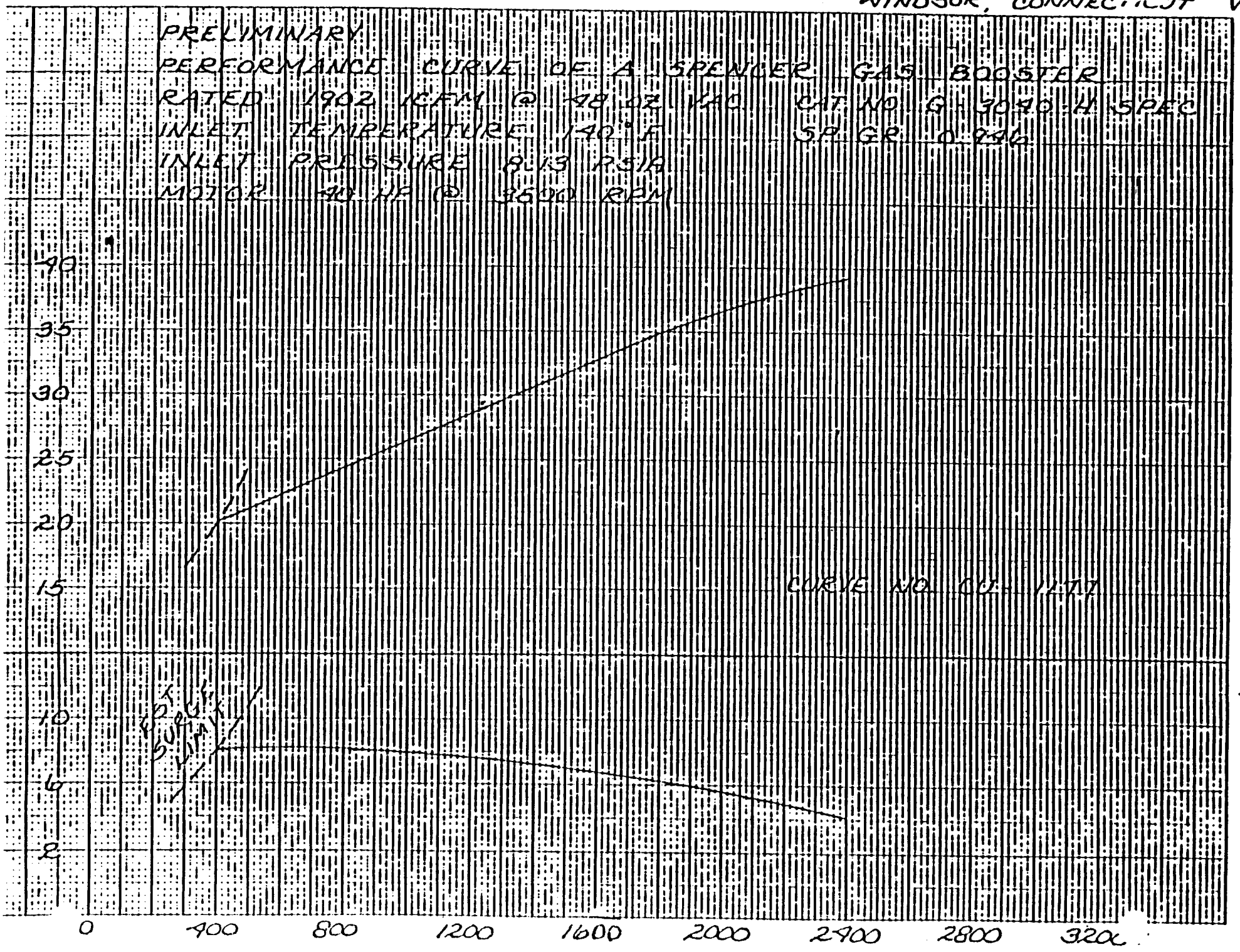
MODEL	MIL. of BTU/H	A	B	C	CC	D	E	F	G	H*	WT. LBS.
LV-1**	1.3	5¼	8½	12½	17	7 7/16	13⅛	16½	3	12½	161
LV-3	3	7⅛	15	24½	30¼	10¼	18 3/16	28	6	18⅛	900
LV-5	5	8 1/16	17¾	27	33	11 7/16	23 1/16	30½	6	20 3/16	1300
LV-7	7	8⅞	21	30¼	36¼	13¼	22 11/16	34	8	19⅛	1316
LV-10	10	9⅞	26	35¼	41⅜	15¼	27 3/16	39	10	19⅞	1826
LV-14	14	12¼	32	41¼	47⅜	19¼	30⅞	49⅜	12	20⅜	2621
LV-18	18	12¼	32	41¼	47⅜	19¼	30⅞	49⅜	12	28⅜	2822
LV-24	24	13	36	45¼	51⅜	20⅝	36	55	14	30⅝	3800
LV-30	30	13	42	51¼	57½	22 9/16	40	60½	16	30⅝	4250
LV-40	40	15¾	48	57¼	63⅝	25¾	48¾	66½	20	32	7130
LV-48	48	15¾	56	69½	75½	25¾	48¾	66½	20	32	8660
LV-60	60	21⅜	63	82½	82½	34½	63	88½	24	38¾	18108
LV-100	100	30	84	102	108	48	84	108	36	42	24000

*Allow 24" for gun removal
**LV-1 air atomized only

ATTACHMENT C
FAN CURVE

THE SPENCER TURBINE CO
WINDSOR, CONNECTICUT VLL

PRELIMINARY
PERFORMANCE CURVE OF A SPENCER GAS BOOSTER
RATED 1902 ICFM @ 48 OZ VAC CAT NO G 3040 H SPEC
INLET TEMPERATURE 140° F SP GR 0.996
INLET PRESSURE 8.13 PSIA
MOTOR 40 HP @ 3500 RPM

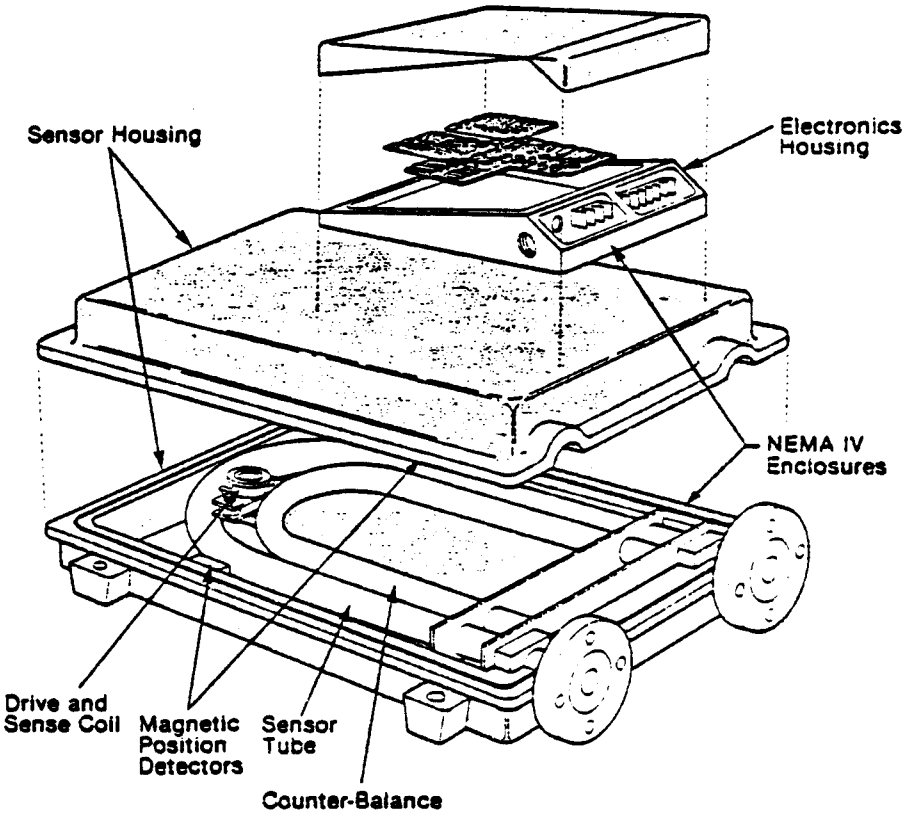


ATTACHMENT D
LIQUID WASTE AND CGVI FLOW METERS

Mass Flow Measurement by Micro Motion

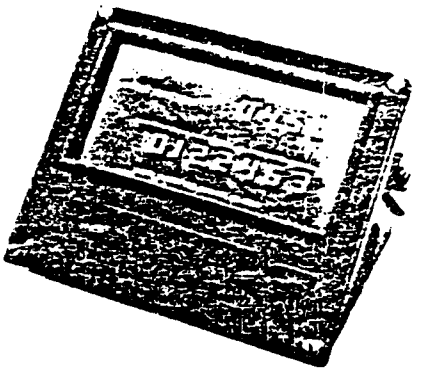
The flow sensor consists of a U-shaped tube which is vibrated at its natural frequency. The angular velocity of the vibrating tube in combination with the mass velocity of the flowing fluid causes the tube to twist. The amount of twist is measured with magnetic position detectors, producing a linear signal which is proportional to the mass flow rate of every particle passing through the U-shaped tube. The output of the meter is linearly proportional to mass flow rate and virtually unaffected by variations in fluid properties.

Physical Characteristics



Remote Flow Indicator D10-RT

The Micro Motion Model D10-RT is a digital flow indicator designed for use with Micro Motion Model C mass flow meters.



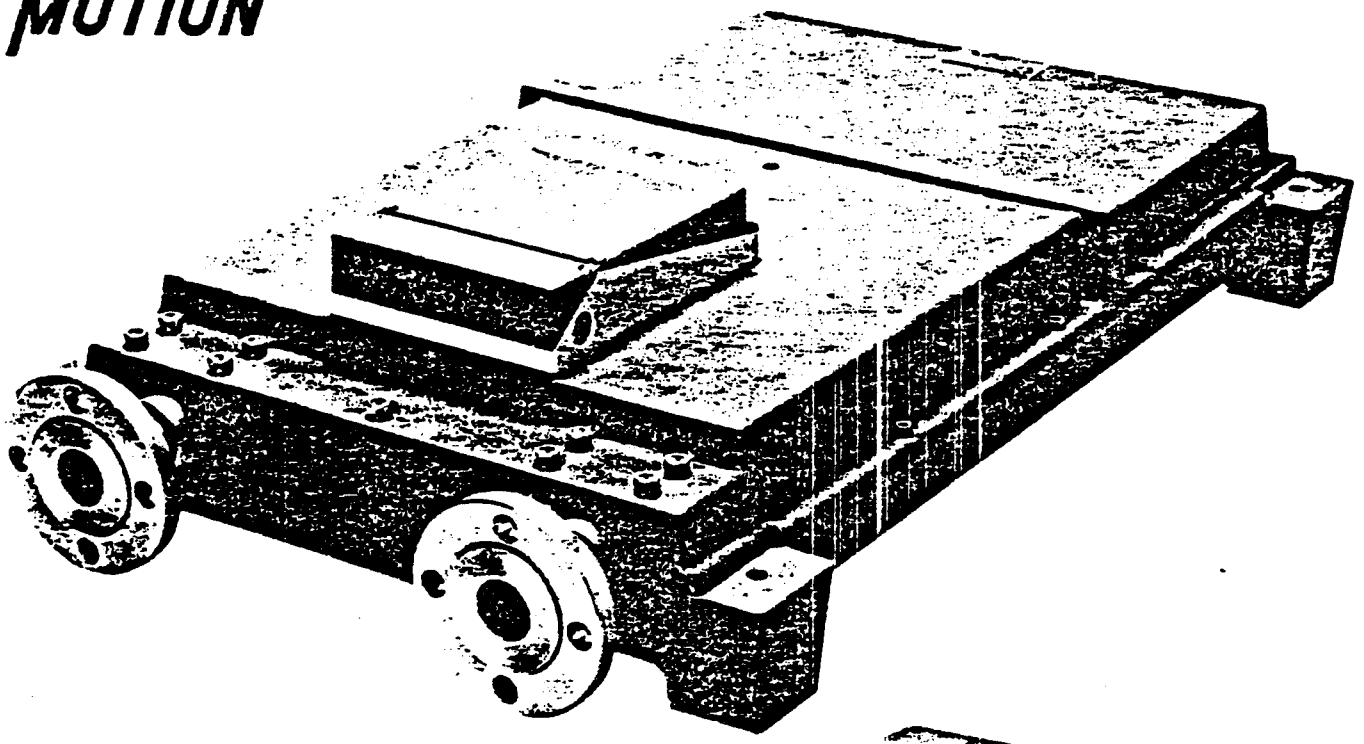
It converts the frequency of the meter output to a 4-digit flow rate indication, and a resettable, 7-digit totalizer displays the total flow. This compact and rugged instrument has a NEMA IV enclosure and can be operated on either AC or DC power.

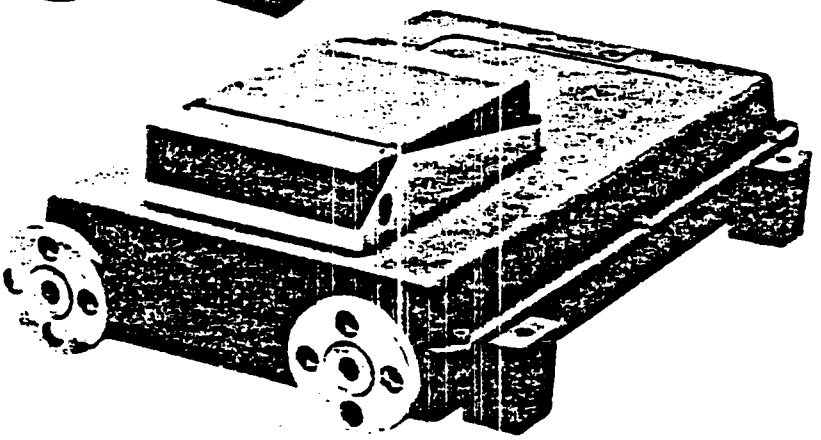
It may be set on a table top, mounted on a wall, or installed in a panel.

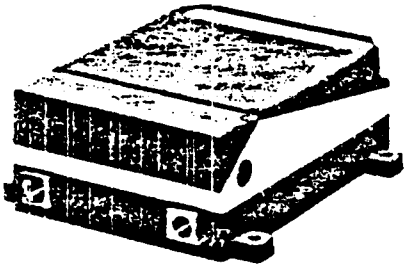
MICRO® MOTION

Model D Mass Flow Meters

MICRO® MOTION







Features

- Direct Mass Flow Measurement
- Non-Intrusive Sensor
- No Moving Parts
- Universal Calibration

Advantages

- Superior Accuracy
- Wide Range of Applications
- Reliable, Durable
- Simple Maintenance and Operation
- Factory Calibrated
- Easily Reranged in the Field

MICRO®

General Specifications

Accuracy	±0.4% of rate, ± zero stability*
Fluid Temperature Range	−67 °F to 257 °F (−55 °C to 125 °C)
Ambient Temperature Range	−40 °F to 185 °F (−40 °C to 85 °C)
Wetted Parts	316L stainless steel
Output Signal	
Analog:	0-20 mA or 4-20 mA, 500 Ω max load 0-5 VDC or 1-5 VDC, 100 kΩ min input
Frequency:	Max output adjustable 3-15,000 Hz Solid state switch, 30 VDC, 1 amp capability
Response Time	Adjustable 0.1 to 1.1 sec
Power	110 VAC, 220 VAC ± 10% or 24 VDC ± 20%, ≈8 watts

*Zero set at process temp. ±20 °F

Detail Specifications

	Flow Range lb/min (kg/min)	*Zero Stability lb/min (kg/min)*	*Max Line Pressure Psi (bars)*	*Process Connections*	*Shipping Weight lb (kg)*	*Case Dimensions in (mm)*
Model C6	0-2.2 (0-1.0)	.0002 (.00009)	2000 (138)	¼" FNPT	11 (5)	*Models C6, C12 and C25* 8.63 (219) *L* 8.0 (203) *W* 3.48 (88) *H*
Model C12	0-13.5 (0-6.1)	.002 (.0009)	2000 (138)	¼" FNPT	11 (5)	
Model C25	0-90 (0-41)	.01 (.0045)	1000 (69)	¼" FNPT	11 (5)	
Model C50	0-440 (0-200)	.05 (.02)	2000 (138)	½" Flange*	53 (24)	*Models C50 and C100* 31.0 (787) *L* 15.0 (381) *W* 6.3 (100) *H*
Model C100	0-1600 (0-726)	.15 (.07)	1500 (103)	1" Flange*	53 (24)	
Model C150	0-2020 (0-916)	.2 (.09)	1500 (103)	1½" Flange*	175 (79)	*Models C150 and C200* 31.0 (787) *L* 21.5 (546) *W* 8.28 (210) *H*
Model C200	0-3200 (0-1450)	.3 (.14)	750 (52)	2" Flange*	185 (84)	

*Flanges are ASA 150 lb raised face slip ring

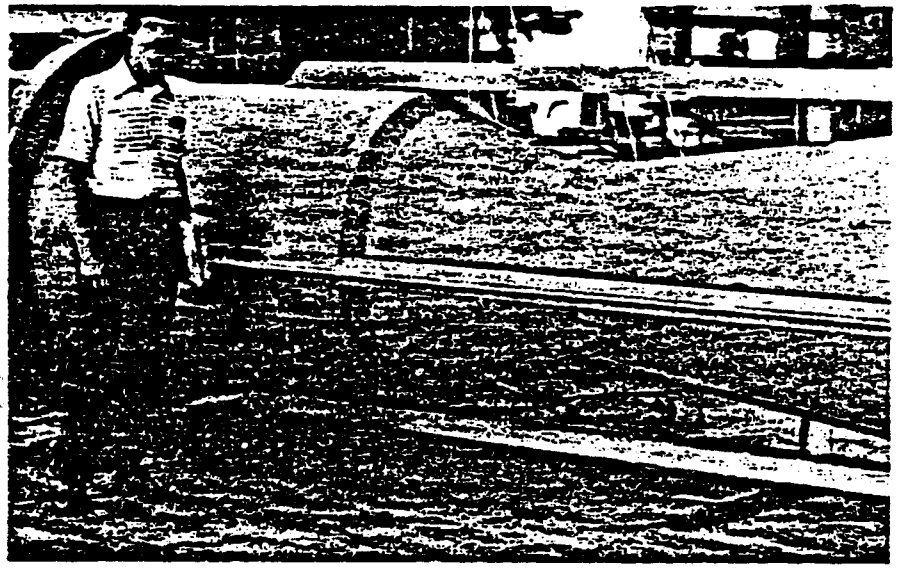
Options

Consult your local representative for information about the following options:

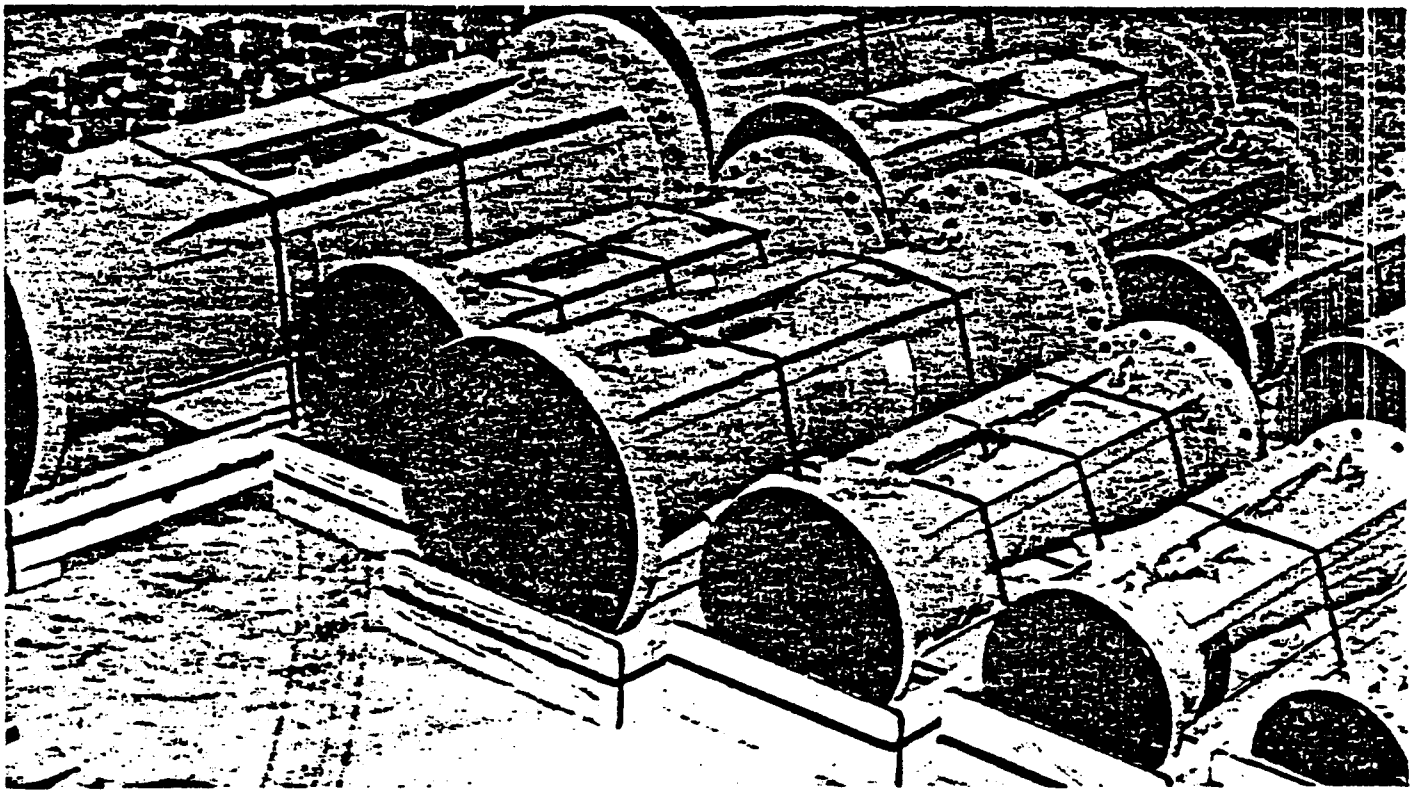
Expanded temperature range
Remote electronics
Corrosion resistant tubes
Abrasion resistant tubes
Expanded pressure ratings
Other process fittings
Intrinsically safe design, C6 - C200
(UL-Approved Models C12 - C200)

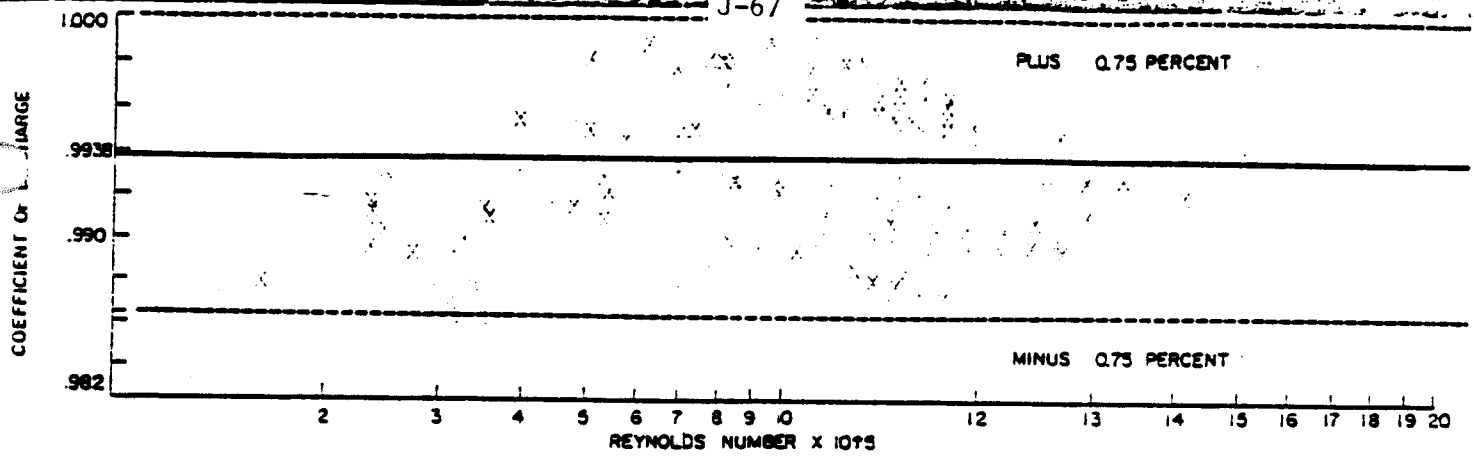
FLUIDIC'S HHR FLOW TUBE

- LOWEST OPERATING COST
- HIGHEST HEAD RECOVERY
- MORE EFFICIENT THAN AN ASME NOZZLE
- LOWEST UNCALIBRATED ERROR
- RUGGED FABRICATED CONSTRUCTION



The Fluidic Techniques, Inc. (FTI) High Head Recovery (HHR) Flow Tube is the most efficient differential producing flow measuring device available. The HHR Flow Tube provides significant savings in recurring operating costs over any other type primary flow element including the Venturi tubes. In addition to the low permanent loss, the HHR Flow Tube is probably the most efficient primary device available in terms of passing flow with an average coefficient of discharge of .9938. Calibration reports on the HHR Flow Tube consistently show less error than is present in the flow calibration of any other type of differential pressure producing primary flow element. These characteristics, combined with superior fabricated construction, make the HHR Flow Tube an ideal choice for flow measurement where accuracy, long life and low operating costs are important.





PLOT OF ACTUAL COEFFICIENT OF DISCHARGE VERSUS REYNOLDS NUMBER AS TAKEN FROM FLOW CALIBRATIONS OF THE ELLIPTICAL INLET FLOW TUBE AT BETA RATIOS VARYING FROM .4 TO .65 - THIS DATA REPRESENTS 127 FLOW CALIBRATION RUNS.

COEFFICIENT OF DISCHARGE

Shown above are the results of over 120 flow calibration runs of the FTI HHR Flow Tube. The chart shows that all points from 200,000 pipe reynolds number and up are within .75 of 1% of .9938. This coefficient of discharge is a measure of efficiency of a primary flow element and represents the actual flow rate versus the theoretical flow rate. A coefficient of discharge of 1.0 would be the most efficient possible. This high coefficient of discharge allows the HHR Flow Tube to be used with the lowest differential pressure ranges of any primary element device. The data shown above represents tests from 8" to 48" line size in beta ratios from .4 to .65.

OPERATING COSTS COMPARISONS

The following are two examples of actual operating situations comparing the Orifice Plate, the Venturi, and the HHR Flow Tube:

24 INCH STEAM LINE

Condition	Value	Device	Differential Pressure (in. wc)	Discharge Coefficient	Loss (%)	Power Loss at Normal Flow (HP)	Operating Cost at Normal Flow ($/year)
Line Size	24 in. (23.25 in. ID)						
Flowing Material	Steam						
Maximum Flow Rate	500,000 PPH	Orifice Plate	235.0	0.6625	58.5	670.0	219,000.
Normal Flow Rate	250,000 PPH	Venturi	75.0	0.985	12.5	44.0	14,406.
Flowing Pressure	164.73 psia	HHR Flow Tube	74.0	0.9938	3.6	13.0	4,273.
Flowing Temperature	550 deg F						
Density	0.2293 lb/cu ft						
Power Costs	$0.05/kWhr						
Beta Ratio	0.6566						

16 INCH AIR LINE

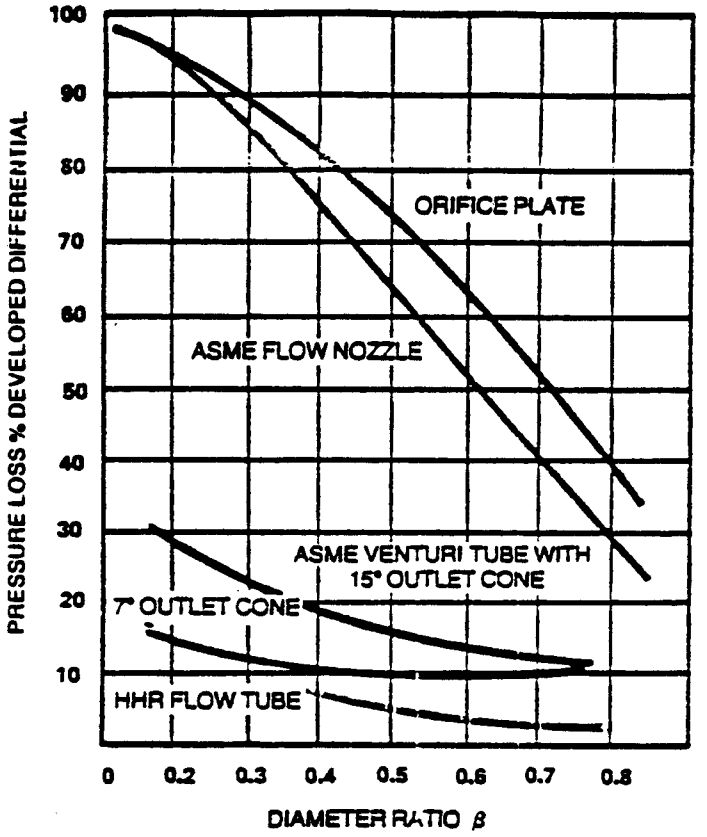
Condition	Value	Device	Differential Pressure (in. wc)	Discharge Coefficient	Loss (%)	Power Loss at Normal Flow (HP)	Operating Cost at Normal Flow ($/year)
Line Size	16 in. (15.250 in. ID)						
Flowing Material	Air						
Maximum Flow Rate	70,000 SCFM						
Normal Flow Rate	49,000 SCFM	Orifice Plate	275.02	0.6667	57.1	295.5	96,540.
Flowing Pressure	164.73 psia	Venturi	101.59	0.9850	12.1	23.13	7,556.
Flowing Temperature	60 deg F	HHR Flow Tube	99.74	0.9938	3.7	7.00	2,287.
Specific Gravity	0.8550						
Power Costs	$0.05/kWhr						
Beta Ratio	0.6446						

PERMANENT PRESSURE LOSS

The permanent pressure loss of the HHR Hi-Head Recovery Flow Tube is a well documented feature. The chart at right illustrates the permanent loss which can be expected versus Beta (bore/pipe I.D.) ratio.

For comparison, the permanent pressure loss of several other head type meter devices are given. In all cases, the percent loss shown is in percent of developed differential pressure.

As shown, the HHR Flow Tube has the lowest permanent loss of the primary elements shown, regardless of Beta ratio. This lowest loss combines with the HHR's high coefficient of discharge to achieve the lowest operating cost available.



DETAILS OF FTI HHR FLOW TUBE CONSTRUCTION

ENTRANCE SECTION

The HHR Tube inlet portion consists of a cylindrical section at least one diameter in length. This enables proper location of the high pressure meter tap at the proper distance from the beginning of the entrance nozzle.

ENTRANCE NOZZLE

An ASME eliptical nozzle is provided between the entrance section and the throat. This nozzle is machined from a one piece forging and is furnished with a smooth finish to assure efficiency.

ONE PIECE THROAT

Each HHR Tube is manufactured with a machined one piece stainless steel throat as standard. The transition from the throat bore to the cone angle is also machined to eliminate deformation of the bore due to welding and grinding of the throat-cone weld. Throats fabricated from rolled plate and throat liners are not recommended due to their effect on accuracy and repeatability. The machined HHR throat is furnished with better than 50 micro-inch finish to assure optimum performance.

EXIT CONE

The exit cone is attached to the discharge end of the HHR throat and is either fabricated or machined with all welds and protrusions ground smooth. HHR Flow Tubes are furnished with 15° exit cones.

EXIT SECTION

To facilitate field welding and installation, a cylindrical straight section matching the adjacent piping is furnished on all weld-in style HHR Tubes.

FLANGES

Flanged HHR Tubes are provided with raised face slip-on 150# flanges on each end of the tube as standard. Raised face weld neck flanges and flanges of other ratings are also available.

DIFFERENTIAL PRESSURE CONNECTIONS

All FTI HHR Tubes are furnished with one high pressure and one low pressure ½" NPT 3000# half coupling as standard. Full penetration weld adaptors, socket weld connections, higher ratings, and other sizes of threaded connections are available.

HHR Tubes are also available with multiple taps

MATERIALS OF CONSTRUCTION

Both fabricated and machined HHR Tubes are available in carbon steel, stainless steel, or other metals. When required, materials can be furnished as required by the ASME Boiler and Pressure Vessel Code or other piping codes.

METHOD OF CONSTRUCTION

In line sizes up to and including 5", all FTI HHR Tubes are machined from round bar material with flanges (if required) welded to each end. All HHR Tubes in line sizes from 6" and above are of fabricated construction.

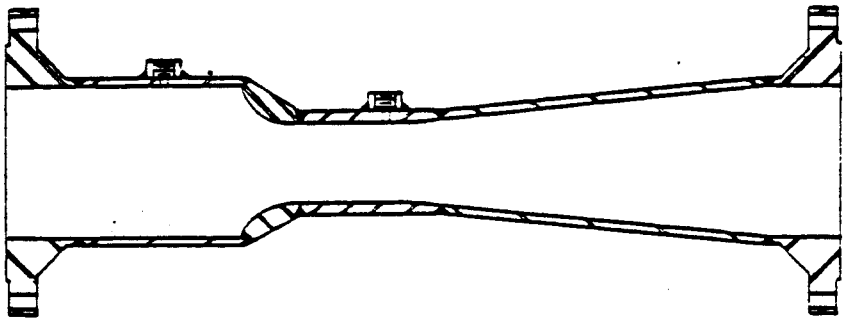
QUALITY CONTROL

HHR Flow Tubes are manufactured to exacting standards in a modern manufacturing facility under strict quality control. All welding is accomplished by code certified welders.

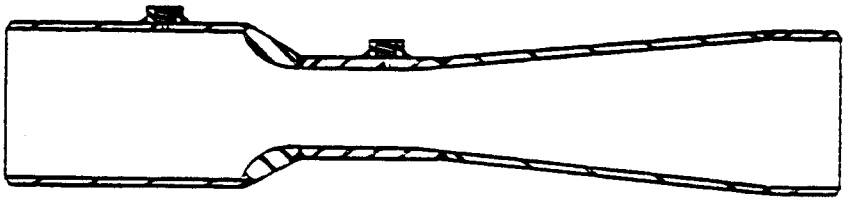
FTI's in-house testing capability includes radiography, hydrostatic, and other nondestructive tests. FTI holds both ASME Pressure Piping (PP) and ASME Pressure Vessel (U) Certificates of Authorization.

Special welding and quality procedures are available as required.

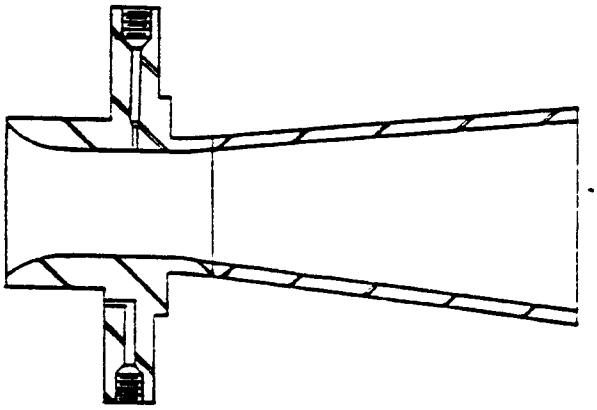
FTI Model HHR-F
Flanged Flow Tube

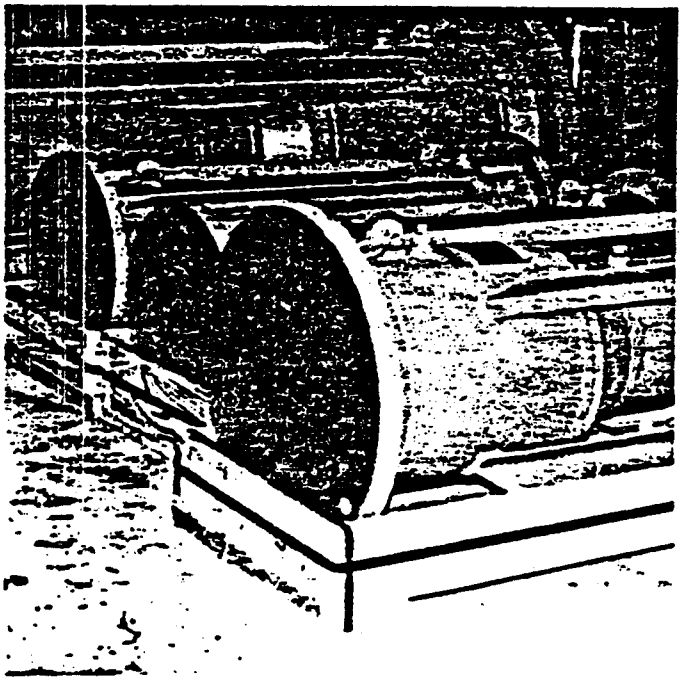


FTI Model HHR-W
Weld-In Flow Tube



FTI Model HHR-I
Insert Flow Tube





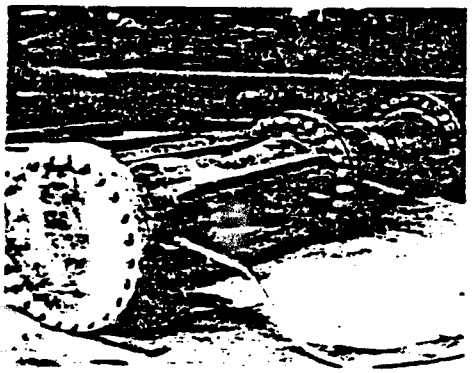
FLOW TUBE ACCURACY

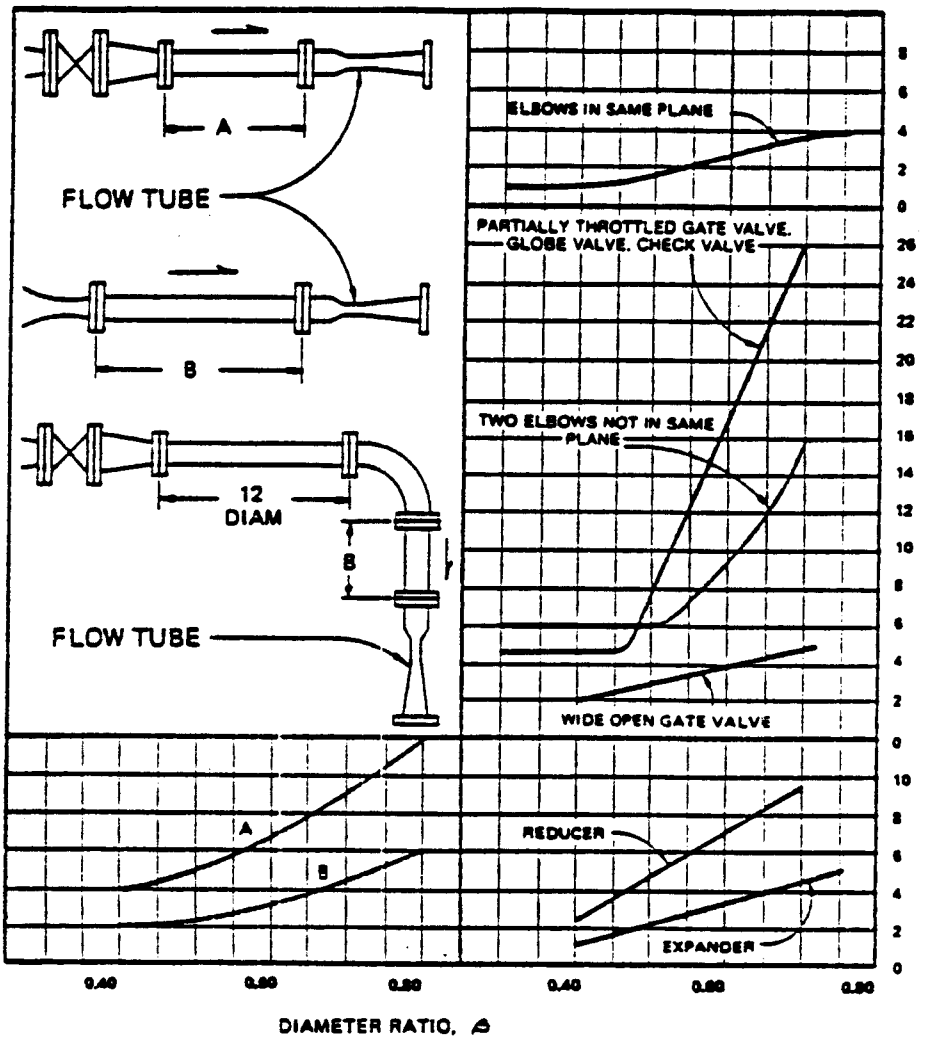
The uncalibrated HHR Flow Tube is accurate to within ± 0.75% of actual flow rate. This accuracy can only be maintained when FTI recommendations are used with regard to upstream piping requirements. Each FTI HHR Flow Tube throat section is machined to provide the smoothness and roundness necessary to assure that these accuracy limits are met. Throat forgings are lengthened to allow machining of the transition angle from the throat to the cone, eliminating the possibility of error due to the grinding of the cone throat weld.

When a higher degree of accuracy is desired, the Flow Tube can be flow calibrated after manufacture to establish an exact differential pressure range for the flow range desired. The accuracy of this data is dependent on the flow laboratory used. FTI recommends the use of laboratories traceable to the NBS who can certify their data to ± 0.25% .

UPSTREAM PIPING RECOMMENDATIONS

As with all head type metering devices, the accuracy of the HHR Flow Tube is in part, dependent on a well developed velocity profile of the flowing medium which contains a minimum of vortices and swirls. Such upstream piping effects can be reduced to an acceptable level by installing the metering device immediately after a length of straight pipe. The HHR Flow Tube offers a considerable savings in recommended upstream piping when compared to the orifice plate or the flow nozzle. The chart at right shows FTI's recommended minimum piping lengths for several typical piping configurations when used with a HHR Flow Tube.





SAMPLE SPECIFICATION

FLOW TUBES

The Flow Tube shall be a differential pressure producer sensing pure static pressure at the inlet and throat. Primary elements which amplify the differential by using velocity pressure shall not be considered.

The Flow Tube shall consist of an inlet straight section, a curved transition section, a straight throat section and a diffuser cone. The inlet straight section shall be of the same internal diameter as the mating piping and contain the high pressure tap. The curved transition section shall be machined to smoothly transition the flow from the internal pipe diameter to the throat diameter. The throat section shall be machined cylindrical in shape with a minimum length of two-thirds of the throat diameter and include the low pressure connection plus the start of the diffuser cone. The diffuser cone weld shall not be made at the back of the throat. The diffuser cone shall extend to the outlet flange or pipe section without truncation.

The Flow Tube shall be constructed of the following material (examples):

Flanged Ends - 150# RF - ANSI
Inlet Straight Section - A106 Gr. B pipe
Inlet Curved Section - A105 Carbon Steel
Throat Section - A182 F304SS
Diffuser Cone - A515-Gr. 70 Carbon Steel

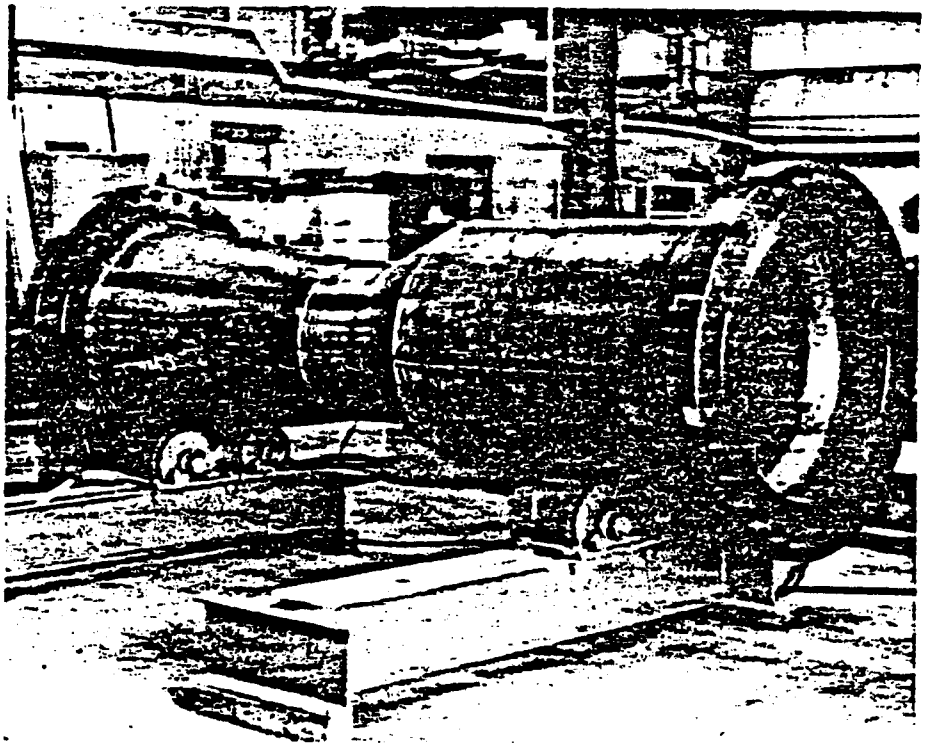
APPROXIMATE DIMENSIONS FOR FTI HHR FLOW TUBES

LINE SIZE	PIPE I.D. (INCH)	BETA RATIO	HHR-F LENGTH INCHES	HHR-W LENGTH INCHES	HHR-F WT. LBS.	HHR-W WT. LBS.	LINE SIZE	PIPE I.D. (INCH)	BETA RATIO	HHR-F LENGTH INCHES	HHR-W LENGTH INCHES	HHR-F WT. LBS.	HHR-W WT. LBS.
2	2.067	All	15	15	45	40	18	17.250	0.40	89	98	847	682
3	3.068	All	20	20	76	69	18	17.250	0.60	68	77	814	649
4	4.026	All	24	24	103	89	18	17.250	0.75	52	61	719	554
6	6.065	0.40	31	34	104	74	20	19.250	0.40	99	109	1099	869
6	6.065	0.60	24	27	96	66	20	19.250	0.60	76	86	1062	832
6	6.065	0.75	18	21	85	56	20	19.250	0.75	58	68	940	710
8	7.981	0.40	41	45	174	128	24	23.250	0.40	119	131	1645	1332
8	7.981	0.60	31	35	162	116	24	23.250	0.60	91	103	1604	1291
8	7.981	0.75	24	28	145	98	24	23.250	0.75	70	82	1414	1100
10	10.020	0.40	51	56	271	207	30	29.250	0.40	150	165	2737	2276
10	10.020	0.60	39	44	254	191	30	29.250	0.60	115	130	2703	2241
10	10.020	0.75	30	35	225	162	30	29.250	0.75	88	103	2371	1910
12	12.000	0.40	61	67	411	313	36	35.250	0.40	180	198	4249	3563
12	12.000	0.60	47	53	389	292	36	35.250	0.60	138	156	4241	3555
12	12.000	0.75	36	42	347	250	36	35.250	0.75	106	124	3715	3029
14	13.250	0.40	68	75	524	389	42	41.250	0.40	211	232	6251	5243
14	13.250	0.60	52	59	499	365	42	41.250	0.60	162	183	6296	5288
14	13.250	0.75	40	47	447	313	42	41.250	0.75	124	145	5515	4506
16	15.250	0.40	78	86	693	523	48	47.250	0.40	242	266	8581	7362
16	15.250	0.60	60	68	664	494	48	47.250	0.60	185	209	8714	7496
16	15.250	0.75	46	54	593	422	48	47.250	0.75	142	166	7607	6388

NOTES:
1. HHR-F WEIGHTS CALCULATED ON THE BASIS OF USING 150# RFSO FLANGED ENDS.
2. ABOVE FLOW TUBE WEIGHTS AND LENGTHS ARE BASED ON SCHEDULE STANDARD PIPE AND .375" THICK FLOW TUBE WALLS.
3. WEIGHTS AND LENGTHS ARE APPROXIMATE.
4. WEIGHTS AND LENGTHS OF HHR-I INSERT TYPE FLOW TUBES VARY WITH LINE I.D. - CONSULT FACTORY.

FTI FLOW TUBE ORDERING INFORMATION

(1) FTI Model Number
(2) Line Size
(3) Pipe Schedule or Actual I.D.
(4) Differential Pressure at Maximum Flow
(5) Material of Construction for Body and Throat
(6) Flange, Type and Rating (if applicable)
(7) Flowing Medium
(8) Maximum Flow (Specify Units)
(9) Operating Pressure and Temperature at Maximum Flow
(10) S.G. @ 60°F. Base Pressure and Temperature
(11) S.G. @ Flowing Conditions (liquid)
(12) Supercompressability Factor @ Operating Pressure (gas)
(13) Molecular Weight (gas)
(14) Viscosity



ATTACHMENT E
ANALYTICAL METHODS

Method Number: A101

Method Name: Volatiles

Basic Method: GC/MS - Purge and Trap

Matrices: Aqueous Liquids
Organic Liquids (neat or diluted)
Sludges
Solids

Constituents from Appendix VIII to which method may be applied:

Acetonitrile
Acrolein
Acrylamide
Acrylonitrile
Benzene
Bromoacetone
Bromomethane
Carbon disulfide
Carbon oxyfluoride
Chlorinated benzenes, N.O.S.
Chlorinated ethane, N.O.S.
Chlorinated fluorocarbons, N.O.S.
Chloroalkyl ethers, N.O.S.
Chlorobenzene
1-Chloro-2,3-epoxypropane
2-Chloroethyl vinyl ether
Chloroform
Chloromethane
Chloromethyl methyl ether
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
Dibromomethane
Dichlorobenzene (meta, ortho, and para isomers)
Dichlorobenzene, N.O.S.
1,4-Dichloro-2-butene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
trans-1,2-Dichloroethene
Dichloroethylene, N.O.S.
1,2-Dichloroethylene
Dichloromethane
Dichloropropane, N.O.S.
1,2-Dichloropropane
Dichloropropene, N.O.S.
1,3-Dichloropropene

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1,4-Dioxane
Formic acid
Halomethane, N.O.S.
Hexachloroethane
Hexachloropropene
Hydrazine
Iodomethane
Isocyanic acid, methyl ester
Methanethiol
Methyl ethyl ketone (MEK)
Methyl hydrazine
Tetrachloroethane, N.O.S.
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Tetrachloromethane
Tetranitromethane
Toluene
Tribromomethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichloromonofluoromethane
Trichloropropane, N.O.S.
1,2,3-Trichloropropane
Vinyl chloride

Apparatus: Finnigan 4000 GC/MS/DS or equivalent
Purge and Trap Device (Tekmar LSC-1 or equivalent)

Analysis Method Parameters:

Purge and Trap: A 25 cm trap will be prepared which contains 1/3 activated charcoal, 1/3 silica gel, and 1/3 Tenax. A 5 mL sample will be purged onto the trap (Methods A101a, A101b, or A101c) at 40 mL/min with helium or nitrogen for 12 min, and desorbed with backflushing at 180°C with 40 mL inert gas into GC for 4 min.

GC: Column - 6 ft 0.2% Carbowax 1500 on Carbopack C 60/80 mesh

Carrier Gas - He at 30 mL/min

Injector - 160°C

Temperature Program - 30°C for 7 min isothermal (beginning at start of purge); then, 30-160°C at 8°C/min; and 160°C for 15 min isothermal.

MS: Mass Range - 20-260 amu

Scan Rate - 2 s/scan

Ionization - EI, 70 eV

Detection Limit: 10-100 μg/L of each compound on-column.

References: U.S. Environmental Protection Agency, Federal Register, 44, 69464-69575 (December 3, 1979).

U.S. Environmental Protection Agency/Office of Solid Waste, Washington, D.C., "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," SW-846 (1980).

Method Number: A101a

Method Name: Volatiles

Basic Method: Purge and Trap

Matrix: Aqueous Liquids

Purging Method Parameters:

An aliquot (5 mL) of the aqueous sample will be transferred into the purging device; and purged with helium for 12 min at 40 mL/min.

Reference: U.S. Environmental Protection Agency, Federal Register, 44, 69464-69575 (December 3, 1979).

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Method Number: A101b

Method Name: Volatiles

Basic Method: Purge and Trap

Matrix: Sludges (including gels and slurries)

Purging Method Parameters:

An aliquot of a sludge sample will be diluted to 0.5% solids with reagent grade water. A 5-mL portion of this diluted mixture will then be transferred to the purging device and purged for 12 min with helium at 40 mL/min. If the sludge sample is not readily dispersible, polyethylene glycol (MW 400) will be used to dilute the sample.

Reference: Miller, H.C., R.H. James and W.R. Dickson, "Evaluated Methodology for the Analysis of Residual Wastes," Report prepared for U.S. Environmental Protection Agency/Effluent Guidelines Division, Washington, D.C., by Southern Research Institute, Birmingham, Alabama under Contract No. 68-02-2685 (December 1980).

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EPA-600/8-84-002 February 1984

Method Number: A101c

Method Name: Volatiles

Basic Method: Purge and Trap

Matrix: Solids

Purging Method Parameters:

An aliquot of the solid sample will be diluted to 2% solids with reagent grade water. A 5-mL portion of this diluted mixture will be transferred to the purging device and purged for 12 min with helium at 40 mL/minute. If the solid sample is not readily dispersible in water, polyethylene glycol (MW 400) will be used to dilute the sample.

Reference: Miller, H.C., R.H. James and W.R. Dickson, "Evaluated Methodology for the Analysis of Residual Wastes," Report prepared for U.S. Environmental Protection Agency/Effluent Guidelines Division, Washington, D.C., by Southern Research Institute, Birmingham, Alabama under Contract No. 68-02-2685 (December 1980).

From: Sampling and Analysis Methods for Hazardous Waste Combustion
EPA-600/8-84-002 February 1984

METHOD 5030

PURGE-AND-TRAP METHOD

1.0 Scope and Application

1.1 Method 5030 is used to determine the concentration of volatile organic compounds in a variety of liquid and solid waste matrices.

1.2 This method is applicable to nearly all types of samples, regardless of water content, including aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, groundwater, mousses, tars, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, soils, and sediments.

1.3 For highly volatile matrices, direct injection preceded by dilution should be used to prevent gross contamination of the instrumentation. For pastes, dilution of the sample until it becomes free-flowing is used to ensure adequate interfacial area. The success of this method also depends on the level of interferences in the sample; results may vary due to the large variability and complicated matrices of solid waste samples.

1.4 Method 5030 is based upon a purge-and-trap, gas chromatographic procedure.

1.5 This method is recommended for use by, or under the supervision of, analysts experienced in the use of purge-and-trap systems and gas chromatographs and skilled in the interpretation of chromatograms.

2.0 Summary of Method

2.1 A portion of solid waste is dispersed in polyethylene glycol (PEG) or distilled-in-glass methanol to dissolve the volatile organic constituents. A portion of the PEG or methanol solution is combined with water in a specially designed purging chamber. For liquid and some semiliquid samples, PEG or methanolic extraction will not be necessary. An inert gas is then bubbled through the solution at ambient temperature and the volatile components are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the volatile components are trapped. After purging is completed, the sorbent column is heated and backflushed with inert gas to desorb the components onto a gas chromatographic column. (SPECIAL NOTE: For Methods 8020 and 8030, drying of the trap for 4 min under helium flow is required. See Figure 5 for configuration.) The gas chromatographic column is heated to elute the components which are detected by the appropriate detector (Methods 8010, 8020, 8030).

2 / SAMPLE INTRODUCTION TECHNIQUES

3.0 Interferences

3.1 Low molecular weight impurities in PEG can be volatilized during the purging procedure. Thus, the PEG employed in this method must be purified before use as described in Section 5.3.

3.2 Impurities in the purge gas and organic compounds out-gasing from the plumbing ahead of the trap account for the majority of contamination problems. The analytical system must be demonstrated to be free from contamination under the conditions of the analysis by running laboratory reagent blanks. The use of non-TFE plastic tubing, non-TFE thread sealants, or flow controllers with rubber components in the purging device should be avoided.

3.3 Samples can be contaminated by diffusion of volatile organics (particularly fluorocarbons and methylene chloride) through the septum seal into the sample during shipment and storage. A field reagent blank prepared from reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.4 Contamination by carryover can occur whenever high-level and low-level samples are analyzed sequentially. Whenever an unusually concentrated sample is encountered, it should be followed by an analysis of reagent water (PEG or methanol solution) to check for cross contamination. After each use, the purging chamber is cleaned as described in Section 7.12. The trap and other parts of the system are also subject to contamination; therefore, frequent additional bakeout and purging or the entire system may be required.

4.0 Apparatus and Materials

4.1 Purge-and-trap device: The purge-and-trap device consists of three separate pieces of equipment: the purging chamber, trap, and the desorber. Several complete devices are commercially available.

4.1.1 The purging chamber must be designed to accept 5-ml or 25-ml samples with a water column at least 3 cm deep. The gaseous headspace between the water column and the trap must have a total volume of less than 15 ml. The purge gas must pass through the water column as finely divided bubbles with a diameter of less than 3 mm at the origin. The purge gas must be introduced no more than 5 mm from the base of the water column. The purging chamber, illustrated in Figure 1, meets these design criteria.

4.1.2 The sorbent trap consists of a 1/8-in. O.D. (0.105-in. I.D.) x 25-cm-long stainless steel tube packed with the appropriate absorbents as described in Table 1 (see Figures 2 and 3).

4.1.3 The desorber must be capable of rapidly heating the trap to 180° C within 30 sec.

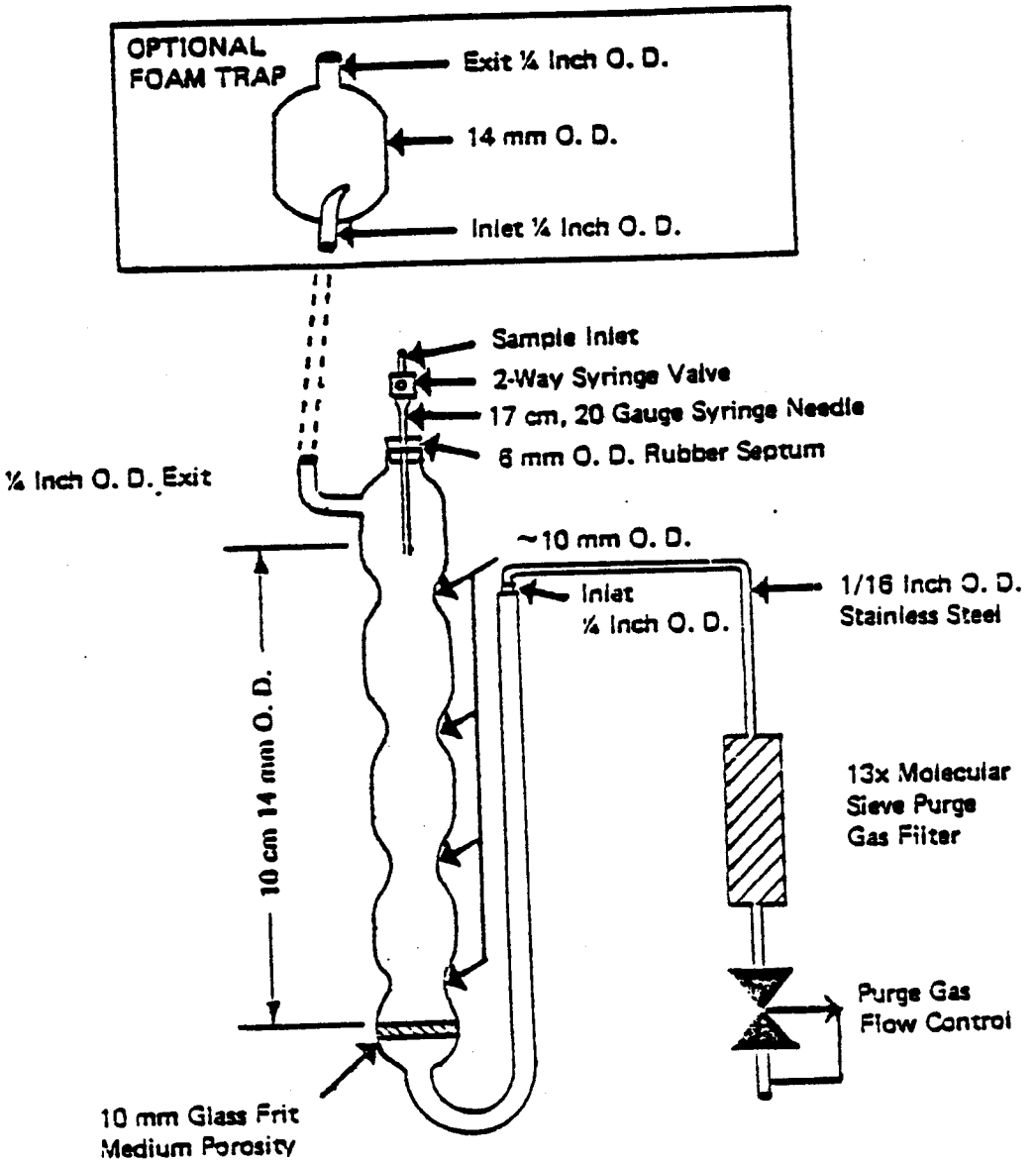


Figure 1. Purging chamber.

SAMPLE INTRODUCTION TECHNIQUES

TABLE 1. PURGE-AND-TRAP PARAMETERS

	Analysis method[a]		
	8010	8020	8030
Purge Gas	Nitrogen or Helium	Nitrogen or Helium	Helium
Purge Gas Flow Rate (ml/min)	40	40	20 ± 1
Purge Time (min)	11.0	12.0	30.0
Purge Temperature	Ambient	Ambient	85° C
Desorb Temperature (°C)	180°	180°	100°
Sorbents to be used in packing tube	A	B	B

[a]Measurement method to be employed for identification and quantification.

KEY: A = Porous polymer packing, 60/80 mesh, chromatographic grade Tenax GC (2,6-Diphenylene oxide).

Three percent OV-1 on Chromosorb-W 60/80 mesh (optional).

Silica gel, 35/60 mesh Davison grade-15 or equivalent.

Coconut charcoal, 6/10 mesh, Barnaby Chaney C.A. - 580-26 lot #M-2649 or equivalent.

Refer to Figure 2 for column packing.

B = Porous polymer packing, 60/80 mesh, chromatographic grade Tenax GC (2,6-Diphenylene oxide).

Three percent OV-1 on Chromosorb-W 60/80 mesh (optional).

Refer to Figure 3 for column packing.

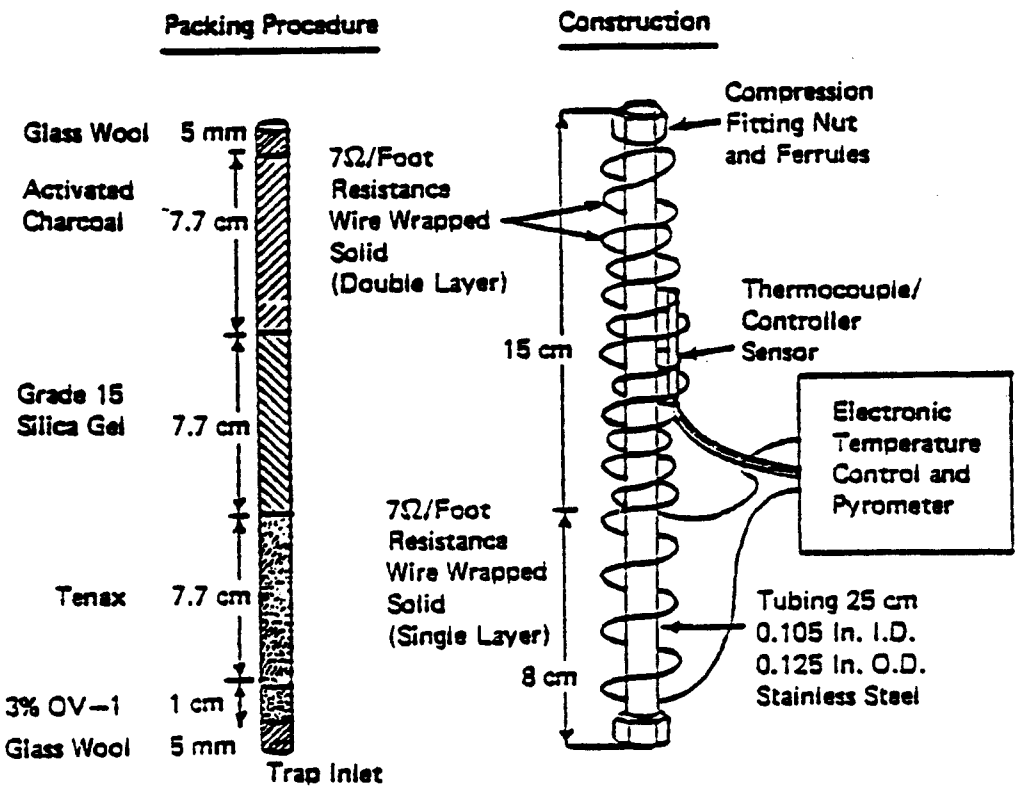


Figure 2. Trap packings and construction for Method 8010.

SAMPLE INTRODUCTION TECHNIQUES

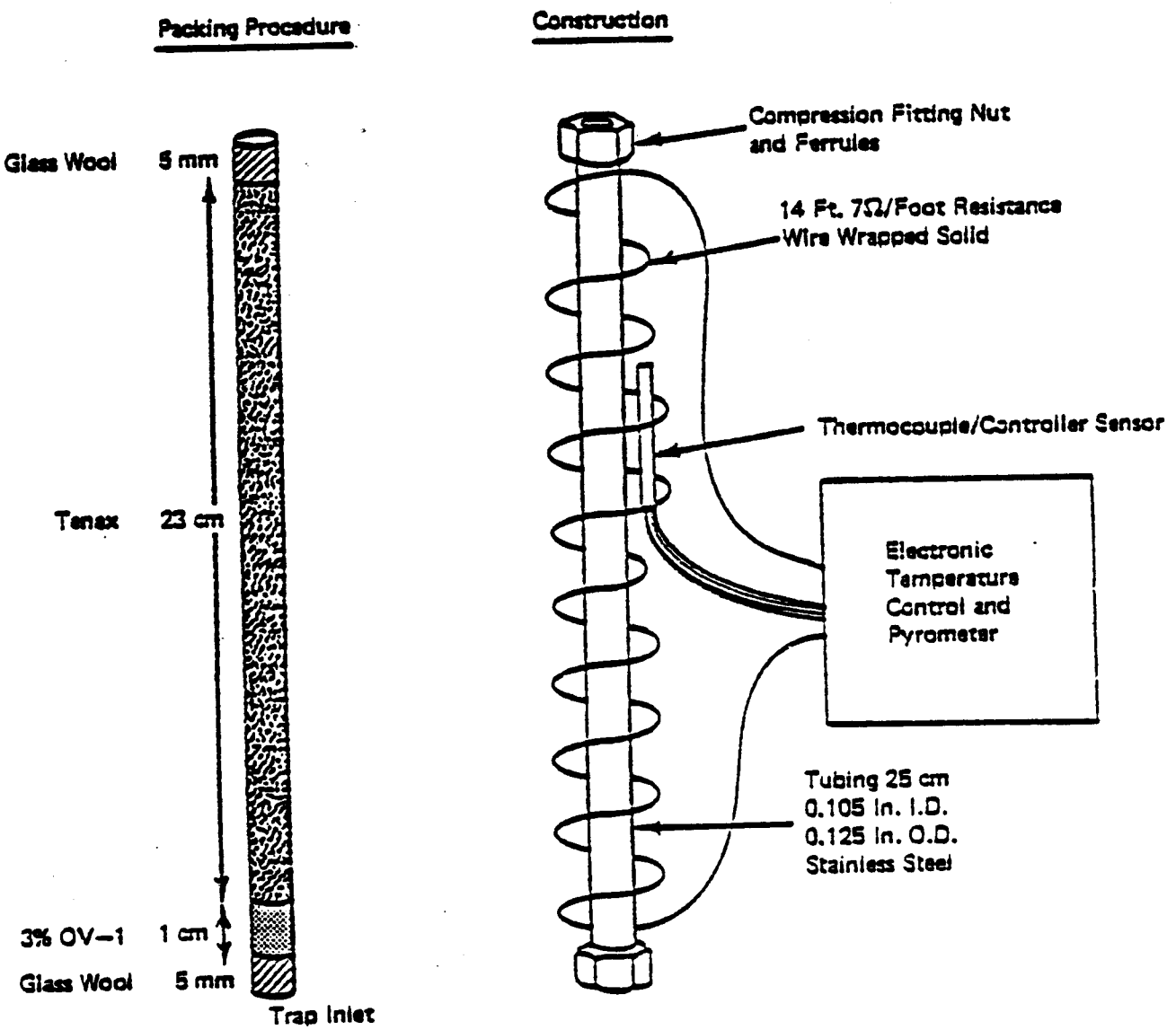


Figure 3. Trap packing and construction for Methods 8020 and 8030.

4.1.4 The purge-and-trap device may be assembled as a separate unit or be coupled to a gas chromatograph as illustrated in Figures 4 through 6.

4.2 Syringes: 5-ml and 25-ml glass hypodermic, equipped with 20-gauge needle, at least 15 cm in length.

4.3 Micro syringes: 10 µl, 25 µl, 100 µl, 250 µl, 500 µl, and 1,000 µl. These syringes should be equipped with 20-gauge needles having a length sufficient to extend from the sample inlet to within 1 cm of the glass frit in the purging device (see Figure 1). The needle length required will depend upon the dimensions of the purging device employed.

4.4 Centrifuge tubes: 50-ml round-bottom glass centrifuge tubes with Teflon-lined screw caps. The tubes must be marked before use to show an approximate 20-ml graduation (Kimble #45212 or equivalent).

4.5 Centrifuge: Capable of accommodating 50-ml glass tubes.

4.6 Syringe valve: 2-way, with Luer ends (2 each; Hamilton #86725 valve equipped with one Hamilton #35033 Luer fitting or equivalent).

4.7 Syringe: 5-ml, gas-tight with shutoff valve.

4.8 Bottle: 15-ml, screw-cap, Teflon cap liner.

4.9 Balance: Analytical, capable of accurately weighing 0.0001 g.

4.10 Rotary evaporator: Equipped with Teflon-coated seals (Buchi Rotavapor R-110 or equivalent).

4.11 Vacuum pump: Mechanical, two-stage.

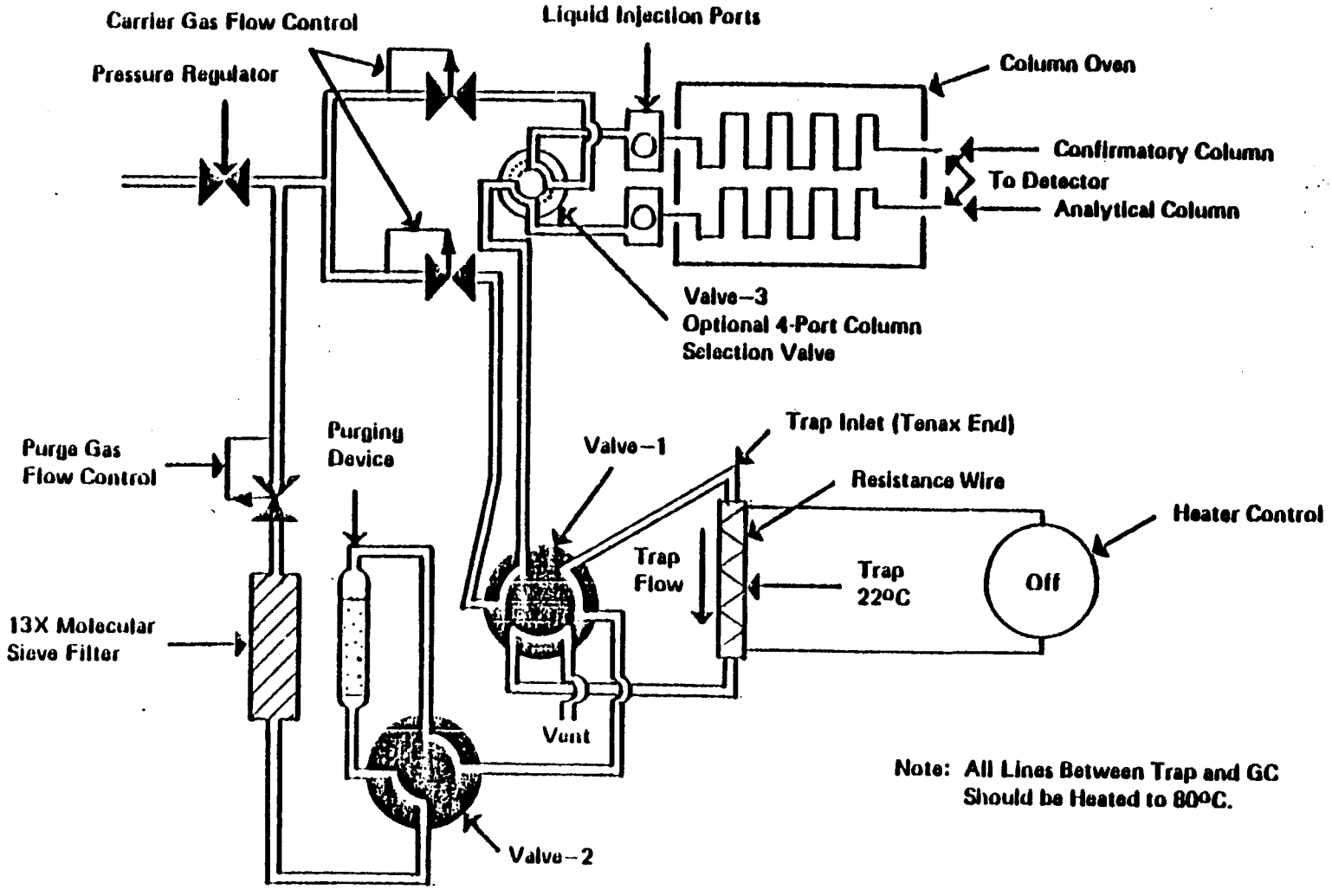
5.0 Reagents

5.1 Trap materials (see Table 1 and Figures 2 and 3 for configuration).

5.1.1 2,6-Diphenylene oxide polymer: 60/80 mesh Tenax, chromatographic grade or equivalent.

5.1.2 Methyl silicone packing: 3% OV-1 on 60/80 mesh Chromosorb-W or equivalent.

5.1.3 Silica gel, Davison Chemical (35/60 mesh), grade 15 or equivalent.



Note: All Lines Between Trap and GC Should be Heated to 80°C.

Figure 4. Purge-and-trap system, purge-sorb mode, for methods 8010, 8020 and 8030.

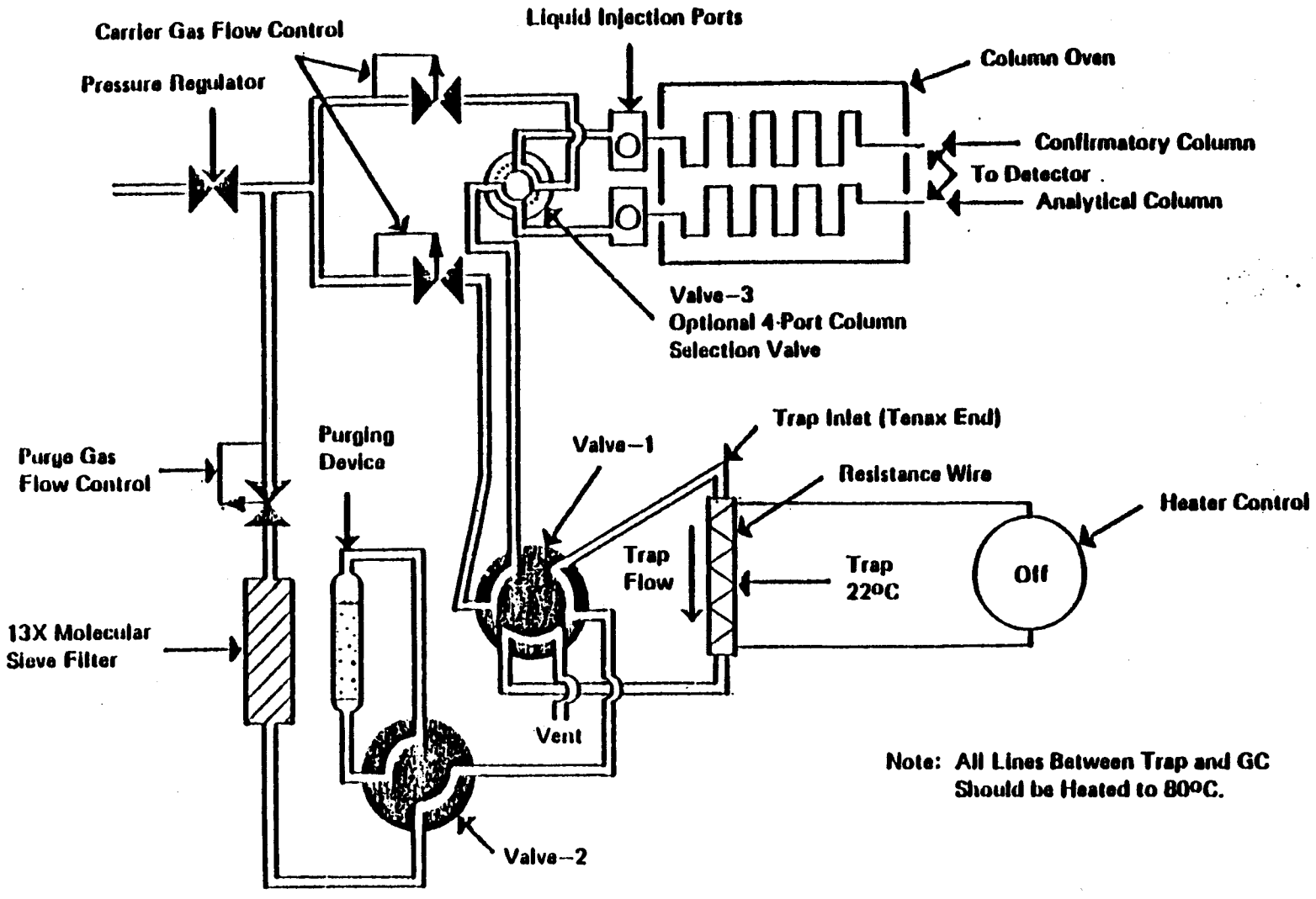


Figure 5. Purge-and-trap system, trap dry mode, for Methods 8020 and 8030.

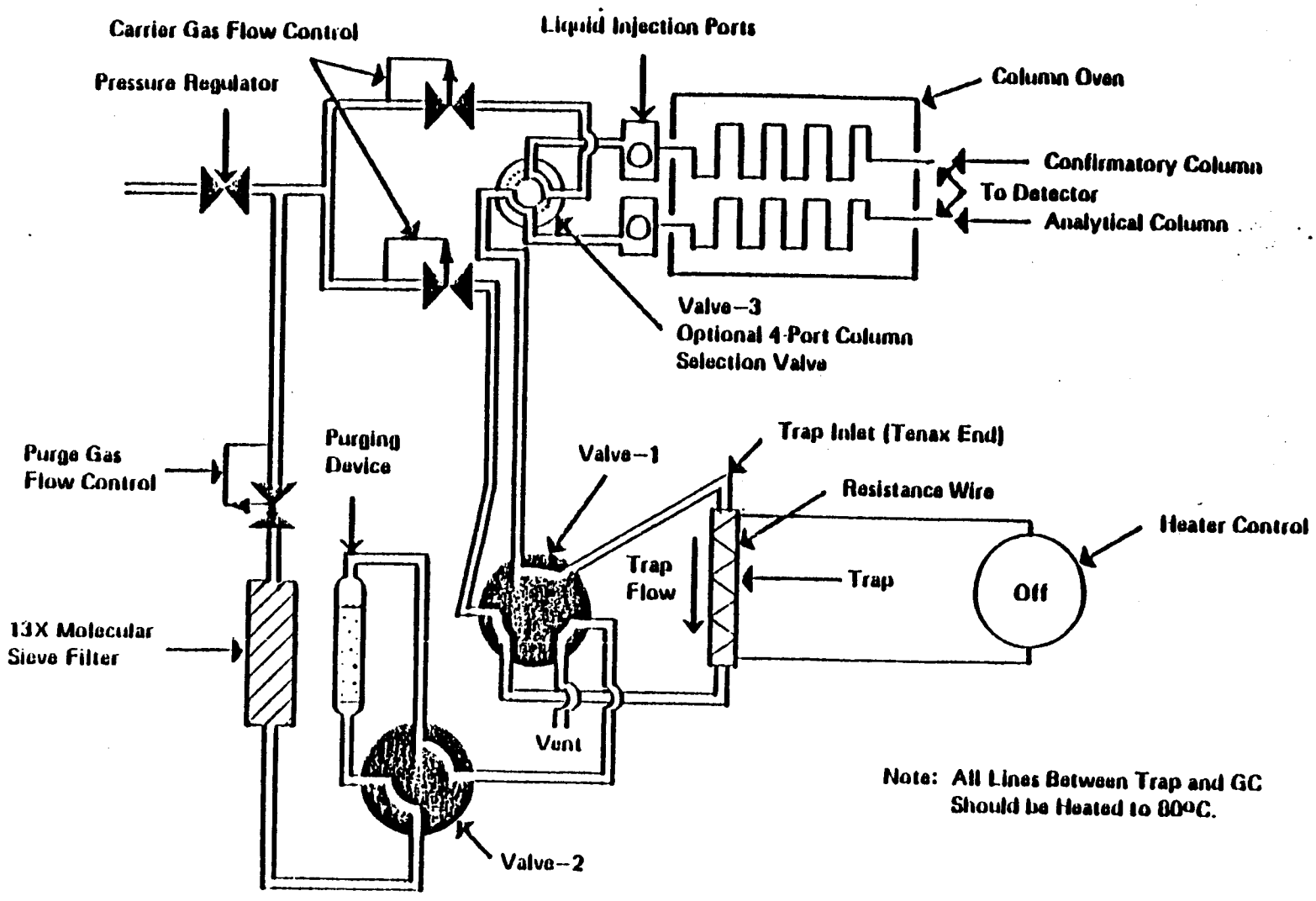


Figure 6. Purge-and-trap system, desorb mode, for Methods 8010, 8020 and 8030.

5.2 Reagent water: Reagent water is defined as a water in which an interferent is not observed at the method detection limit of the compounds of interest.

5.2.1 Reagent water may be generated by passing tap water through a carbon filter bed containing about 500 g of activated carbon (Calgon Corp., Filtrasorb-300 or equivalent).

5.2.2 A water purification system (Millipore Super-Q or equivalent) may be used to generate reagent water.

5.2.3 Reagent water may also be prepared by boiling water for 15 min. Subsequently, while maintaining the temperature at 90° C, bubble a contaminant-free inert gas through the water for 1 hr. While still hot, transfer the water to a narrow-mouth screw-cap bottle and seal with a Teflon-lined septum and cap.

5.3 Reagent PEG (polyethylene glycol; for solid samples): Reagent PEG is defined as PEG having a nominal average molecular weight of 400, and in which interferents are not observed at the method detection limit for compounds of interest. Methanol which has been distilled in glass can be used as a substitute for PEG.

5.3.1 Reagent PEG is prepared by purification of commercial PEG having a nominal average molecular weight of 400. The PEG is placed in a round-bottom flask equipped with a standard taper joint, and the flask is affixed to a rotary evaporator. The flask is immersed in a water bath at 90-100° C and vacuum is maintained at less than 10 mm Hg for at least 1 hr using a two-stage mechanical pump. The vacuum system is equipped with an all-glass trap, which is maintained in a dry ice/methanol bath.

5.3.2 In order to demonstrate that all interfering volatiles have been removed from the PEG, a reagent water/PEG blank must be analyzed.

6.0 Sample Collection, Preservation, and Handling

6.1 Refer to Method 8010, 8020, or 8030 for pertinent information.

7.0 Procedures

7.1 Assemble the purge-and-trap device (see Figures 4 through 6). Purge parameters to be used depend on the compounds being analyzed for; see Table 1. Pack the trap as shown in Figure 2 or 3 and condition overnight at a nominal 180° C by backflushing with an inert gas flow of at least 20 ml/min. Daily, prior to use, condition the trap for 10 min by backflushing at 180° C.

SAMPLE INTRODUCTION TECHNIQUES

7.2 Remove standards and samples from cold storage (approximately an hour prior to an analysis) and bring to room temperature by placing in a warm water bath at 20-25° C.

7.3 Adjust the purge gas (nitrogen or helium) flow rate according to Table 1.

7.4 Operate the gas chromatograph using the conditions described in the appropriate method, 8010, 8020, or 8030.

7.5 Attach the trap inlet to the purging device, and set the device to the purge mode. Open the syringe valve located on the purging device sample introduction needle.

7.6 Remove the plunger from a 5-ml syringe and attach a closed syringe valve. Open the sample bottle (or standard) and carefully pour the sample into the syringe barrel until it overflows. (NOTE: For pastes it may be necessary to dilute the sample by adding a nonvolatile solvent to the sample. In such cases diluting can be performed in the purging device.)

7.7 PEG extraction procedure for solids (methanol which has been distilled in glass can be used as a substitute for PEG). Sample aliquots for extraction should be transferred as quickly as possible to minimize loss of volatiles from the sample.

7.7.1 To a 50-ml glass centrifuge tube with Teflon-lined cap, add 40 ml of reagent PEG. Weigh the capped centrifuge tube and PEG on an analytical balance.

7.7.2 Using an appropriate implement, transfer approximately 2 g of sample to the PEG in the centrifuge tube in such a fashion that the sample is dissolved in or submerged in the PEG as quickly as possible. Take care not to touch the sample-transfer implement to the PEG. Recap the centrifuge tube immediately and weigh on an analytical balance to determine an accurate sample weight.

7.7.3 Disperse the sample by vigorous agitation for 1 min. The mixture may be agitated manually or with the aid of a vortex-mixer. If the sample does not disperse during this process, sonify the mixture in an ultrasonic bath for 30 min. Allow the mixture to stand until a clear supernatant is obtained as the sample extract. Centrifuge if necessary to facilitate phase separation.

7.7.4 The sample extract may be stored for future analytical needs. If this is desired, transfer the solution to a 10-ml screw cap vial with Teflon cap liner. Store at -10 to -20° C, and protect from light.

7.7.5 Add an aliquot of the sample extract to 5 ml reagent water.

7.8 Replace the syringe plunger and compress the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 ml. Since this process of taking an aliquot destroys the validity of the liquid samples for future analysis, the analyst should fill a second syringe at this time to protect against possible loss of data.

7.9 Attach the syringe-valve assembly to the syringe valve on the purging device. Open the syringe valve and inject the sample into the purging chamber. Close both valves and purge the sample for the time specified in Table 1. If Method 8020 will be used for analysis of the sample, dry the trap by maintaining a flow rate of 40 ml/min dry purge for 4 min.

7.10 Attach the trap to the chromatograph, and adjust the device to the desorb mode. Introduce the trapped materials to the GC column by rapidly heating the trap to the backflush temperature indicated in Table 1, while backflushing the trap with an inert carrier gas at 20 to 60 ml/min for 4 min. If rapid heating cannot be achieved, the gas chromatographic column must be used as a secondary trap by cooling it to 30° C (or subambient, if problems persist) instead of the initial program temperature of 45° or 50° C.

7.11 Return the purge trap device to the purge mode.

7.12 Allow the trap to cool for 8 min. Replace the purging chamber with a clean purging chamber. The purging chamber is cleaned after each use by sequential washing with acetone, methanol, detergent solution, and distilled water and drying at 105° C.

7.13 Close the syringe valve on the purging chamber after 15 sec to begin gas flow through the trap. Purge the trap at ambient temperature for 4 min. Recondition the trap by heating it to 180° C. Do not allow the trap temperature to exceed 180° C, since the sorption/desorption is adversely affected by heating the trap to higher temperatures. After heating the trap for approximately 7 min, turn off the trap heater. When cool, the trap is ready for the next sample.

7.14 The analysis of blanks is most important in the purge-and-trap technique since the purging device and the trap can become contaminated by residues from very concentrated samples or by vapors in the laboratory. Prepare blanks by filling a sample bottle with organic-free water. Blanks should be sealed, stored at 4° C, and analyzed with each group of samples.

SAMPLE INTRODUCTION TECHNIQUES

8.0 Quality Control

8.1 Before processing any samples, the analyst should demonstrate through the analysis of a distilled water method blank that all glassware and reagents are interference-free. Each time a set of samples is extracted or there is a change in reagents, a method blank should be processed as a safeguard against chronic laboratory contamination. The blank samples should be carried through all stages of the sample preparation and measurement.

8.2 Standard quality assurance practices should be used with this method. Field replicates should be collected to validate the precision of the sampling technique. Laboratory replicates should be analyzed to validate the precision of the analysis. Fortified samples should be carried through all stages of sample preparation and measurement; they should be analyzed to validate the sensitivity and accuracy of the analysis. If the fortified samples do not indicate sufficient sensitivity to detect less than or equal to 1 µg/g of sample, then the sensitivity of the instrument should be increased or the extract subjected to additional cleanup. Where doubt exists over the identification of a peak on the chromatograph, confirmatory techniques such as mass spectroscopy should be used.

9.0 References

1. Bellar, T.A., and J.J. Lichtenberg. 1974. J. Amer. Water Works Assoc. 66(12):739-744.

2. Bellar, T.A., and J.J. Lichtenberg. 1979. Semi-automated headspace analysis of drinking waters and industrial waters for purgeable volatile organic compounds. In: Van Hall (ed.), Measurement of organic pollutants in water and wastewater. ASTM STP 686, pp. 108-129.

3. Development and application of test procedures for specific organic toxic substances in wastewaters. Category 11 - Purgeables and Category 12 - Acrolein, Acrylonitrile, and Dichlorodifluoromethane. Report for EPA Contract 68-03-2635 (in preparation).

4. Ligon, W.V. and H. Grade. 1981. Poly(ethylene glycol) as a diluent for preparation of standards for volatile organics in water. Anal. Chem. 53:920-921.

METHOD 8240

GC/MS METHOD FOR VOLATILE ORGANICS

1.0 Scope and Application

1.1 Method 8240 is used to determine volatile organic compounds in a variety of solid waste matrices. This method is applicable to nearly all types of samples, regardless of water content, including groundwater, aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, mousses, tars, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, soils, and sediments.

1.2 The detection limit of Method 8240 for an individual compound is approximately 1 µg/g (wet weight) in waste samples. For samples containing more than 1 mg/g of total volatile material, the detection limit is proportionately higher.

1.3 Method 8240 is based upon a purge-and-trap, gas chromatographic/mass spectrometric (GC/MS) procedure. This method is restricted to use by or under the supervision of analysts experienced in the use of purge-and-trap systems and gas chromatograph/mass spectrometers and skilled in the interpretation of mass spectra and their use as a quantitative tool.

2.0 Summary of Method

2.1 The volatile compounds are introduced to the gas chromatograph by direct injection, the Headspace Method (Method 5020), or the Purge-and-Trap Method (Method 5030). Method 5030 should be used for groundwater analysis. The components are separated via the gas chromatograph and detected using a mass spectrometer which is used to provide both qualitative and quantitative information. The chromatographic conditions as well as typical mass spectrometer operating parameters are given.

2.2 If the above sample introduction techniques are not applicable, a portion of the sample can be dispersed in methanol or polyethylene glycol (PEG) to dissolve the volatile organic constituents. A portion of the methanolic or PEG solution is combined with water in a specially designed purging chamber. An inert gas is then bubbled through the solution at ambient temperature and the volatile comnponents are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the volatile components are trapped. After purging is completed, the sorbent column is heated and backflushed with inert gas to desorb the components onto a gas chromatographic column. The gas chromatographic column is heated to elute the components, which are detected with a mass spectrometer.

2.3 An aliquot of each sample must be spiked with an appropriate standard to determine percent recovery and detection limits for that sample.

ORGANIC ANALYTICAL METHODS - GC/MS

2.4 Table 1 lists detection limits that can be obtained in wastewaters in the absence of interferences. Detection limits for a typical waste sample would be significantly higher.

TABLE 1. CHROMATOGRAPHIC CONDITIONS AND METHOD DETECTION LIMITS

Parameter	Retention time (min) Column 1[a]	Method detection limit (µg/l)
Chloromethane	2.3	ND
Bromomethane	3.1	ND
Vinyl chloride	3.8	ND
Chloroethane	4.6	ND
Methylene chloride	6.4	2.8
Trichlorofluoromethane	8.3	ND
1,1-Dichloroethene	9.0	2.8
1,1-Dichloroethane	10.1	4.7
trans-1,2-Dichloroethene	10.8	1.6
Chloroform	11.4	1.6
1,2-Dichloroethane	12.1	2.8
1,1,1-Trichloroethane	13.4	3.8
Carbon tetrachloride	13.7	2.8
Bromodichloromethane	14.3	2.2
1,2-Dichloropropane	15.7	6.0
trans-1,3-Dichloropropene	15.9	5.0
Trichloroethene	16.5	1.9
Benzene	17.0	4.4
Dibromochloromethane	17.1	3.1
1,1,2-Trichloroethane	17.2	5.0
cis-1,3-Dichloropropene	17.2	ND
2-Chloroethylvinyl ether	18.6	ND
Bromoform	19.8	4.7
1,1,2,2-Tetrachloroethane	22.1	6.9
Tetrachloroethene	22.2	4.1
Toluene	23.5	6.0
Chlorobenzene	24.6	6.0
Ethyl benzene	26.4	7.2
1,3-Dichlorobenzene	33.9	ND
1,2-Dichlorobenzene	35.0	ND
1,4-Dichlorobenzene	35.4	ND

ND = not determined.

[a]Column conditions: Carbopack B (60/80 mesh) coated with 1% SP-1000 packed in a 6-ft by 2-mm I.D. glass column with helium carrier gas at a flow rate of 30 ml/min. Column temperature is isothermal at 45° C for 3 min, then programmed at 8° C per minute to 220° and held for 15 min.

3.0 Interferences

3.1 Interferences coextracted from the samples will vary considerably from source to source, depending upon the particular waste or extract being tested. The analytical system, however, should be checked to ensure freedom from interferences under the conditions of the analysis by running method blanks. Method blanks are run by analyzing organic-free water in the normal manner. The use of non-TFE plastic tubing, non-TFE thread sealants, or flow controllers with rubber components in the purging device should be avoided.

3.2 Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride) through the septum seal into the sample during shipment and storage. A field blank prepared from organic-free water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.3 Cross contamination can occur whenever high-level and low-level samples are sequentially analyzed. To reduce cross contamination, the purging device and sample syringe should be rinsed out twice, between samples, with organic-free water. Whenever an unusually concentrated sample is encountered, it should be followed by an analysis of organic-free water to check for cross contamination. For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds, or high organohalide levels, it may be necessary to wash out the purging device with a soap solution, rinse with distilled water, and then dry in a 105° C oven between analyses.

3.4 Low molecular weight impurities in PEG can be volatilized during the purging procedure. Thus, the PEG employed in this method must be purified before use as described in Section 5.2.

4.0 Apparatus and Materials

4.1 Sampling equipment

4.1.1 Vial: 25-ml capacity or larger, equipped with a screw cap (Pierce #13075 or equivalent). Detergent wash, rinse with tap and distilled water, and dry for 1 hr at 105° C before use.

4.1.2 Septum: Teflon-faced silicone (Pierce #12722 or equivalent). Detergent wash, rinse with tap and distilled water and dry at 105° C for 1 hr before use.

4.2 Purge-and-trap device: The purge-and-trap device consists of three separate pieces of equipment: the purging chamber, trap, and the desorber. Several complete devices are now commercially available.

ORGANIC-ANALYTICAL METHODS - GC/MS

4.2.1 The purging chamber must be designed to accept 5-ml or 25-ml samples with a water column at least 3 cm deep. The gaseous head space between the water column and the trap must have a total volume of less than 15 ml. The purge gas must pass through the water column as finely divided bubbles with a diameter of less than 3 mm at the origin. The purge gas must be introduced no more than 5 mm from the base of the water column. The purging chamber, illustrated in Figure 1, meets these design criteria.

4.2.2 The trap must be at least 25 cm long and have an inside diameter of at least 2.5 mm. The trap must be packed to contain the following minimum lengths-of-adsorbents: 1.0 cm of methyl-silicone-coated packing (Section 5.3.2), 15 cm of 2,6-diphenylene oxide polymer (Section 5.3.1), and 8 cm of silica gel (Section 5.3.3). The minimum specifications for the trap are illustrated in Figure 2.

4.2.3 The desorber must be capable of rapidly heating the trap to 180° C within 30 sec. The polymer section of the trap should not be heated higher than 180° C and the remaining sections should not exceed 220° C. The desorber design, illustrated in Figure 2, meets these criteria.

4.2.4 The purge-and-trap device may be assembled as a separate unit or be coupled to a gas chromatograph as illustrated in Figures 3 and 4.

4.3 Gas chromatograph/mass spectrometer system

4.3.1 Gas chromatograph: An analytical system complete with a temperature-programmable gas chromatograph and all required accessories including syringes, analytical columns, and gases.

4.3.2 Column: 2-m x 2-mm I.D. stainless steel or glass, packed with 1% SP-1000 on 60/80 mesh Carbopack B or equivalent.

4.3.3 Mass spectrometer: Capable of scanning from 40 to 250 amu every 3 sec or less, utilizing 70 volts (nominal) electron energy in the electron impact ionization mode and producing a mass spectrum which meets all the criteria in Table 1 when 50 ng of 4-bromofluorobenzene (BFB) is injected through the GC inlet or introduced in the purge-and-trap mode.

4.3.4 GC/MS interface: Any GC-to-MS interface that gives acceptable calibration points at 50 ng per injection for each compound of interest and achieves acceptable tuning performance criteria (see Section 9) may be used. GC-to-MS interfaces constructed of all glass or glass-lined materials are recommended. Glass can be deactivated by silanizing with dichlorodimethylsilane. The interface must be capable of transporting at least 10 ng of the components of interest from the GC to the MS.

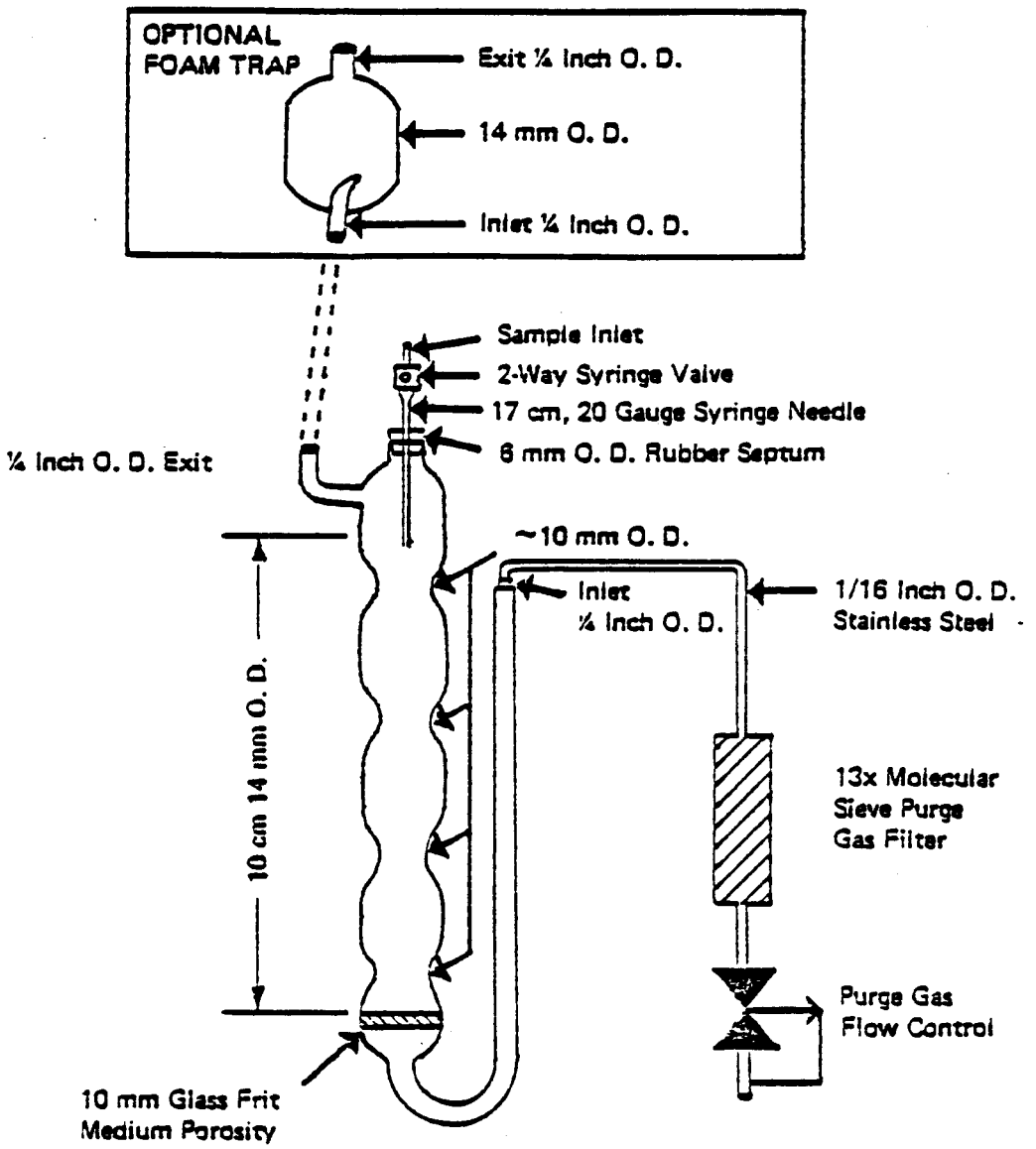


Figure 1. Purging chamber.

ORGANIC ANALYTICAL METHODS - GC/MS

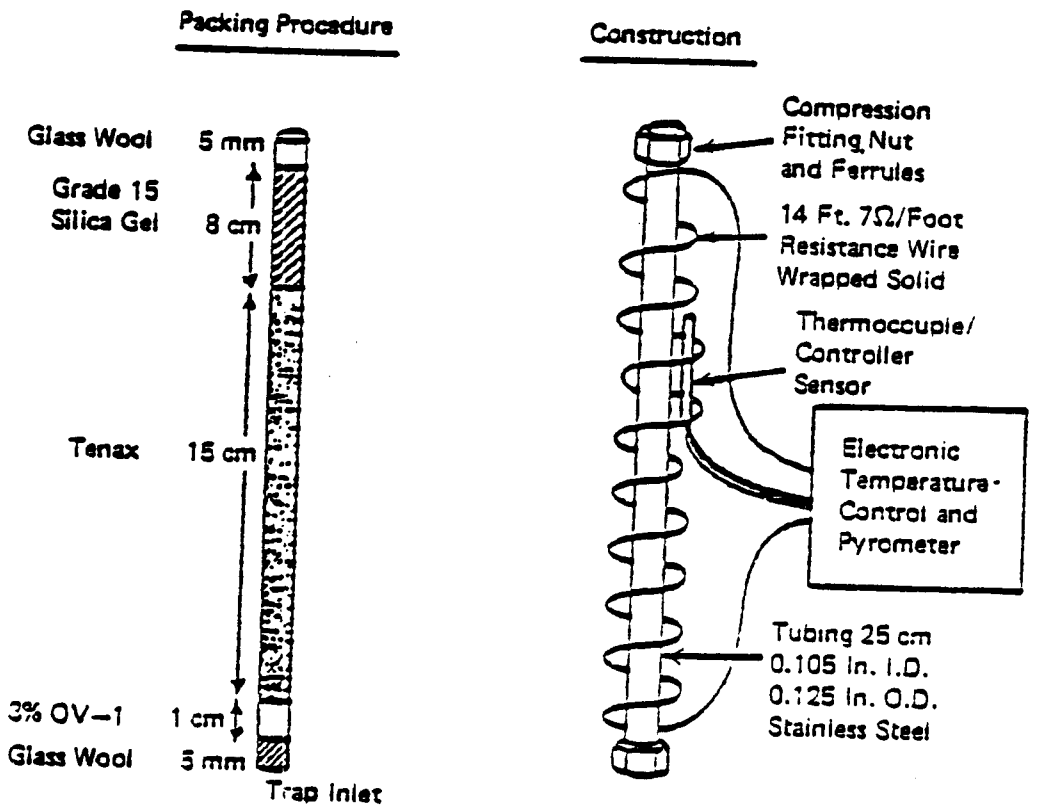


Figure 2. Trap packings and construction to include desorb capability.

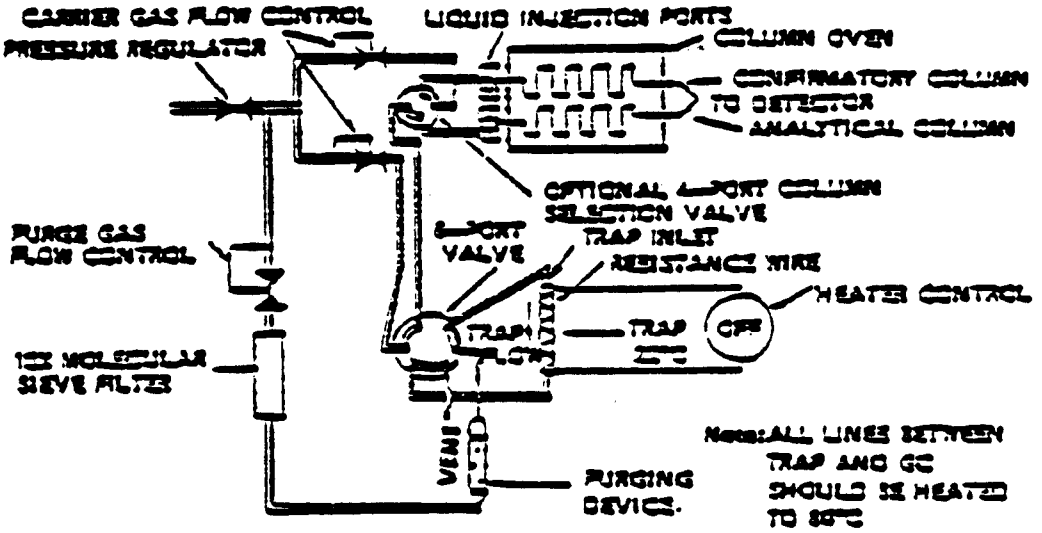


FIGURE 3. Schematic of purge and trap device – purge mode

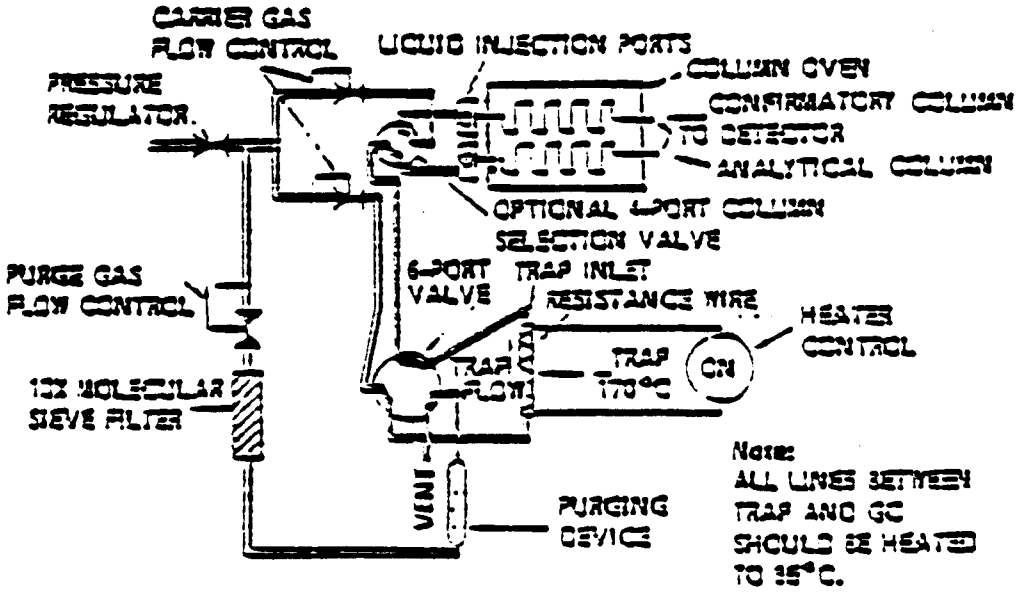


Figure 4. Schematic of purge and trap device - desorb mode

4.3.5 Data system: A computer system must be interfaced to the mass spectrometer that allows the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program. The computer must have software that allows searching any GC/MS data file for ions of a specific mass and plotting such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundance in any EICP between specified time or scan number limits. Hardware and software must be available to transform the data into a compatible format. These generally consist of a 9-inch, 800-bpi tape drive and the associated software.

4.4 Sample transfer implements: Implements are required to transfer portions of solid, semisolid, and liquid wastes from sample containers to laboratory glassware. The transfer must be accomplished rapidly to avoid loss of volatile components during the transfer step. Liquids may be transferred using a hypodermic syringe with a wide-bore needle or no needle attached. Samples should be introduced into the syringe by (1) removing the plunger from the syringe, (2) pouring the sample into the barrel, and (3) replacing the barrel and inverting the syringe to remove any air trapped in the syringe. Do not draw the sample up into the syringe. Solids may be transferred using a conventional laboratory spatula, spoon, or coring device. A coring device that is suitable for handling some samples can be made by using a glass tubing saw to cut away the closed end of the barrel of a glass hypodermic syringe.

TABLE 2. BFB KEY ION ABUNDANCE CRITERIA

Mass	Ion abundance criteria
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	Base Peak, 100% Relative Abundance
96	5 to 9% of mass 95
173	less than 2% of mass 174
174	greater than 50% of mass 95
175	5 to 9% of mass 174
176	greater than 95% but less than 100% of mass 174
177	5 to 9% of mass 176

4.5 Syringes: 5-ml and 25-ml glass hypodermic, equipped with 20-gauge needle, at least 15 cm in length.

4.6 Micro syringes: 10-µl, 25-µl, 100-µl, 250-µl, and 1000-µl. These syringes should be equipped with 20-gauge needles having a length sufficient to extend from the sample inlet to within 1 cm of the glass frit in the purging device (see Figure 1). The needle length required will depend upon the dimensions of the purging device employed.

4.7 Centrifuge tubes: 50-ml round-bottom glass centrifuge tubes with Teflon-lined screw caps. The tubes must be marked before use to show an approximate 20-ml graduation.

4.8 Centrifuge: Capable of accommodating 50-ml glass tubes.

4.9 Syringe valve: 2-way, with Luer ends (2 each) (Hamilton #86725 valve equipped with one Hamilton #35033 Luer fitting, or equivalent).

4.10 Syringe: 5-ml, gas-tight with shut-off valve.

4.11 Bottle: 15-ml, screw-cap, Teflon cap liner.

4.12 Balance: Analytical, capable of accurately weighing 0.0001 g.

4.13 Rotary evaporator: equipped with Teflon-coated seals (Buchi Rotavapor R-110, or equivalent).

4.14 Vacuum pump: mechanical, two-stage.

5.0 Reagents

5.1 Reagent water: Reagent water is defined as a water in which an interferent is not observed at the method detection limit of the compounds of interest.

5.1.1 Reagent water may be generated by passing tap water through a carbon filter bed containing about 500 g of activated carbon (Calgon Corp., Filtrasorb-300, or equivalent).

5.1.2 A water purification system (Millipore Super-Q or equivalent) may be used to generate reagent water.

5.1.3 Reagent water may also be prepared by boiling water for 15 min. Subsequently, while maintaining the temperature at 90° C, bubble a contaminant-free inert gas through the water for 1 hr. While still hot, transfer the water to a narrow-mouth screw-cap bottle and seal with a Teflon-lined septum and cap.

5.1.4 Reagent water may also be purchased under the name "HPLC water" from several manufacturers (Burdick and Jackson, Baker and Waters, Inc.).

5.2 Reagent PEG: Reagent PEG is defined as PEG having a nominal average molecular weight of 400, and in which interferents are not observed at the method detection limit for compounds of interest.

5.2.1 Reagent PEG is prepared by purification of commercial PEG having a nominal average molecular weight of 400. The PEG is placed in a round-bottom flask equipped with a standard taper joint, and the flask is affixed to a rotary evaporator. The flask is immersed in a water bath at 90-100° C and vacuum is maintained at less than 10 mm Hg for at least 1 hr using a two-stage mechanical pump. The vacuum system is equipped with an all-glass trap, which is maintained in a dry ice/methanol bath.

5.2.2 In order to demonstrate that all interfering volatiles have been removed from the PEG, a reagent water/PEG blank must be analyzed.

5.3 Trap materials

5.3.1 2,6-Diphenylene oxide polymer: 60/80-mesh Tenax, chromatographic grade or equivalent.

5.3.2 Methyl silicone packing: 3 percent OV-1 on 60/80 mesh Chromosorb-W or equivalent.

5.3.3 Silica gel, Davison Chemical (35/60 mesh), grade-15 or equivalent.

5.3.4 Prepared trapping columns may be purchased from several chromatography suppliers.

5.4 Methanol: Distilled-in-glass quality or equivalent.

5.5 Calibration standards; stock solutions (2 mg/ml): Stock solutions of calibration standards may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions of individual compounds in methanol using assayed liquids or gases as appropriate. Because of the toxicity of some of the organohalides, primary dilutions of these materials should be prepared in a hood. A NIOSH/MESA-approved toxic gas respirator should be worn by analysts when handling high concentrations of these materials.

5.5.1 Place about 9.8 ml of methanol in a 10-ml ground-glass-stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 min or until all alcohol-wetted surfaces have dried. Weigh the flask to the nearest 0.1 mg.

5.5.2 Add the assayed reference material as described below.

5.5.2.1 Liquids: Using a 100-µl syringe, immediately add 2 drops of assayed reference material to the flask, then reweigh. The liquid must fall directly into the alcohol without contacting the neck of the flask.

5.5.2.2 Gases: To prepare standards for any compounds that boil below 30° C (e.g., bromomethane, chloroethane, chloromethane, or vinyl chloride), fill a 5-ml valved gas-tight syringe with a reference standard to the 5.0-ml mark. Lower the needle to 5 mm above the methanol meniscus. Slowly introduce the reference standard above the surface of the liquid. The heavy gas rapidly dissolves in the methanol.

5.5.3 Reweigh, dilute to volume, stopper, then mix by gently inverting the flask several times. Calculate the concentration in µg/µl per microliter from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.5.4 Transfer the stock standard solution into a Teflon-sealed screw-cap bottle. Store, with minimal headspace, at -10 to -20° C and protect from light.

5.5.5 Prepare fresh standards weekly for gases or for reactive compounds such as 2-chloroethylvinyl ether. All other standards must be replaced after one month, or sooner if comparison with check standards indicates a problem.

5.6 Calibration standards; secondary dilution solutions: Using stock solutions described in Section 5.5, prepare secondary dilution standards in methanol that contain the compounds of interest, either singly or mixed together. The secondary dilution standards should be prepared at concentrations such that the methanol or aqueous PEG calibration solutions prepared as described in Section 6.3.2 will bracket the working range of the analytical system. Secondary dilution standards should be stored with minimal headspace and should be checked frequently for signs of evaporation, especially just prior to preparing calibration standards from them.

5.7 Surrogate standards: Surrogate standards may be added to samples and calibration solutions to assess the effect of the sample matrix on recovery efficiency. The compounds employed for this purpose are 1,2-dibromotetrafluoroethane, bis(perfluoroisopropyl) ketone, fluorobenzene, and m-bromobenzotrifluoride. Prepare methanolic solutions of the surrogate standards using the procedures described in Sections 5.5 and 5.6. The

concentrations prepared and the amount of solution added to each sample should be those required to give an amount of each surrogate in the purging device that is equal to the amount of each internal standard added, assuming a 100% recovery of the surrogate standards.

5.8 Internal standards: In this method, internal standards are employed during analysis of all samples and during all calibration procedures. The analyst must select one or more internal standards that are similar in analytical behavior to the compounds of interest. The analyst must further demonstrate that the measurement of the internal standard is not affected by method or matrix interferences. Because of these limitations, no internal standard can be suggested that is applicable to all samples. However, for general use, D_4-1,2-dichloroethane, D_6-benzene, and D_5-ethylbenzene are recommended as internal standards covering a wide boiling point range.

5.9 4-Bromofluorobenzene (BFB): BFB is added to the internal standard solution or analyzed alone to permit the mass spectrometer tuning for each GC/MS run to be checked.

5.10 Internal standard solution: Using the procedures described in Sections 5.5 and 5.6, prepare a methanolic solution containing each internal standard at a concentration of 12.5 µg/ml.

5.11 Sodium monohydrogen phosphate: 2.0 µ in distilled water.

5.12 n-Nonane and n-dodecane, 98+% purity.

5.13 N-Hexadecane, distilled-in-glass (Burdick and Jackson, or equivalent).

6.0 Sample Collection, Handling, and Preservation

6.1 All samples must be collected using a sampling plan that addresses the considerations discussed in Section One of this manual.

6.2 All samples must be stored in Teflon-lined screw cap vials. Sample containers should be filled as completely as possible so as to minimize headspace or void space. Vials containing liquid sample should be stored in an inverted position.

6.3 All samples must be iced or refrigerated from the time of collection to the time of analysis, and should be protected from light.

7.0 Procedure

7.1 Calibration

7.1.1 Assemble a purge-and-trap device that meets the specifications in Section 4.2 and connect the device to a GC/MS system. Condition the trap overnight at 180° C by backflushing with an inert gas flow of at least 20 ml/min. Prior to use, condition the trap daily for 10 min while backflushing at 180° C.

7.1.2 Operate the gas chromatograph using the conditions described in Section 7.3.5 and operate the mass spectrometer using the conditions described in Section 7.3.2.

7.1.3 Calibration procedure

7.1.3.1 Conduct calibration procedures using a minimum of three concentration levels for each calibration standard. One of the concentration levels should be at a concentration near but above the method detection limit. The remaining two concentration levels should correspond to the expected range of concentrations found in real samples or should define the working range of the GC/MS system.

7.1.3.2 Prepare the final solutions containing the required concentrations of calibration standards, including surrogate standards, directly in the purging device. To the purging device, add 5.0 ml of reagent water or reagent water/PEG solution. This solution is prepared by taking 4.0 ml of reagent water or reagent PEG and diluting to 100 ml with reagent water. The reagent water/PEG solution is added to the purging device using a 5-ml glass syringe fitted with a 15-cm 20-gauge needle. The needle is inserted through the sample inlet shown in Figure 1. The internal diameter of the 14-gauge needle that forms the sample inlet will permit insertion of a 20-gauge needle. Next, using a 10-µl or 25-µl micro-syringe equipped with a long needle (see Section 4.6), take a volume of the secondary dilution solution containing appropriate concentrations of the calibration standards (see Section 5.6). Add the aliquot of calibration solution directly to the reagent water or reagent water/PEG solution in the purging device by inserting the needle through the sample inlet. When discharging the contents of the micro-syringe be sure that the end of the syringe needle is well beneath the surface of the reagent water or water/PEG solution. Similarly, add 20 µl of the internal standard solution (see Section 5.10). Close the 2-way syringe valve at the sample inlet.

7.1.3.3 Carry out the purge and analysis procedure as described in Section 7.3.4. Tabulate the area response of the primary characteristic ion against concentration for each compound

including the internal standards. Calculate response factors (RF) for each compound as follows:

$$RF = (A_s C_{is})/A_{is} C_s)$$

where:

A_s = Area of the primary characteristic ion for the compound to be measured

A_{is} = Area of the primary characteristic ion of the internal standard

C_{is} = Concentration of the internal standard

C_s = Concentration of the compound to be measured.

The internal standard selected for the calculation of the RF of a compound and subsequent quantification of the compound is generally the internal standard that has a retention time closest to that of the compound. It is assumed that a linear calibration plot will be obtained over the range of concentrations used. If the RF value over the working range is a constant (less than 10% relative standard deviation), the RF can be assumed to be invariant, and the average RF can be used for calculations. Alternatively, the results can be used to plot a calibration curve of response ratios, A_s/A_{is}, versus RF.

7.1.3.4 The RF must be verified on each working day. The concentrations selected should be near the midpoint of the working range. The response factors obtained for the calibration standards analyzed immediately before and after a set of samples must be within ±20% of the response factor used for quantification of the sample concentrations.

7.2 Daily GC/MS performance tests

7.2.1 At the beginning of each day that analyses are to be performed, the GC/MS system must be checked to see that acceptable performance criteria are achieved for BFB (see Table 2).

7.2.2 The BFB performance test requires the following instrumental parameters:

Electron Energy:	70 volts (nominal)
Mass Range:	40 to 250 amu
Scan Time:	to give approximately 6 scans per peak but not to exceed 3 sec per scan.

7.2.3 Bleed BFB vapor into the mass spectrometer and tune the instrument to achieve all the key ion criteria for the mass spectrum of BFB given in Table 1. A solution containing 20 ng of BFB may be injected onto the gas chromatographic column in order to check the key ion criteria.

7.2.4 The peak intensity of D_6-benzene is used to monitor the mass spectrometer sensitivity. The peak intensity for D_6-benzene observed during each sample analysis must be between 0.7 and 1.4 times the D_6-benzene peak intensity observed during the applicable calibration runs. For example, if the peak intensity of D_6-benzene observed during calibration was 355,000 area counts, then each subsequent sample or blank must give a D_6-benzene peak intensity of between 250,000 and 500,000 area counts. If the D_6-benzene peak intensity is outside the specified range, the sample must be reanalyzed. If the peak intensity is again outside the specified range, the analyst must investigate the cause of the variability in sensitivity and correct the problem.

7.3 Sample extraction and analysis

7.3.1 The analytical procedure involves extracting the non-aqueous sample with methanol or polyethylene glycol (PEG) and analyzing a portion of the extract by a purge-and-trap GC/MS procedure. The amount of the extract to be taken for the GC/MS analysis is based on the estimated total volatile content (TVC) of the sample. The TVC is estimated by extracting the sample with n-hexadecane and analyzing the n-hexadecane extract by gas chromatography.

7.3.2 The estimated TVC is based on the total area response relative to that of n-nonane for all components eluting prior to the retention time of n-dodecane. The response factor for n-nonane and the retention time of n-dodecane are determined by analyzing a 2-µl aliquot of an n-hexadecane solution containing 0.20 mg/ml of n-nonane and n-dodecane.

7.3.2.1 The GC analyses are conducted using a flame ionization detector and a 3-m x 2-mm I.D. glass column packed with 10% OV-101 on 100-200 mesh Chromosorb W-HP. The column temperature is programmed from 80° C to 280° C at 8°/min and held at 280° for 10 min.

7.3.2.2 Determine the area response for n-nonane and divide by 0.2 to obtain the area response factor. Record the retention time of n-dodecane.

7.3.2.3 Add 1.0 g of sample to 20 ml of n-hexadecane and 2 ml of 2.0 M Na_2HPO_4 contained in a 50-ml glass centrifuge tube and cap securely with a Teflon-lined screw cap. Shake the mixture vigorously for one minute. If the sample does not disperse

during the shaking process, sonify the mixture in an ultrasonic bath for 30 min. Allow the mixture to stand until a clear supernatant is obtained. Centrifuge if necessary to facilitate phase separation.

7.3.2.4 Analyze a 2-µl aliquot of the n-hexadecane supernatant using the conditions described in Section 7.3.2.1. Determine the total area response of all components eluting prior to the retention time of n-dodecane and subtract the corresponding area of an n-hexadecane blank. Using the area response factor determined for n-nonane in Section 7.3.2.2, calculate the TVC as follows:

$$TVC = \frac{TAR_{sample} - TAR_{blank}}{\text{n-Nonane Area Response Factor}} \times 20$$

where:

TVC = total volatile content of the sample in mg/g

TAR_{sample} = total area response obtained for the sample

TAR_{blank} = total area response obtained for a blank.

7.3.3 The transfer of an aliquot of the sample for extraction with methanol or PEG should be made as quickly as possible to minimize loss of volatiles from the sample.

7.3.3.1 To a 50-ml glass centrifuge tube with Teflon-lined cap, add 40 ml of reagent methanol or PEG. Weigh the capped centrifuge tube and methanol or PEG on an analytical balance.

7.3.3.2 Using an appropriate implement (see Section 4.4), transfer approximately 2 g of sample to the methanol or PEG in the centrifuge tube in such a fashion that the sample is dissolved in or submerged in the methanol or PEG as quickly as possible. Take care not to touch the sample-transfer implement to the methanol or PEG. Recap the centrifuge tube immediately and weigh on an analytical balance to determine an accurate sample weight.

7.3.3.3 Disperse the sample by vigorous agitation for 1 min. The mixture may be agitated manually or with the aid of a vortex-mixer. If the sample does not disperse during this process, sonify the mixture in an ultrasonic bath for 30 min. Allow the mixture to stand until a clear supernatant is obtained as the sample extract. Centrifuge if necessary to facilitate phase separation.

7.3.3.4 The sample extract may be stored for future analytical needs. If this is desired, transfer the solution to a 10-ml screw cap vial with Teflon cap liner. Store at -10 to -20° C, and protect from light.

7.3.4 Reagent water, internal standard solution, and the sample extract are added to a purging chamber that is connected to the purge-and-trap device and that has been flushed with helium during a 7-min trap reconditioning step (see Section 7.3.4.4). The additions are made using an appropriately sized syringe equipped with a 15-cm 20-gauge needle. Open the syringe valve of the sample inlet (shown in Figure 1) and insert the needle through the valve.

7.3.4.1 Add 5.0 ml of reagent water or aqueous sample to which 20.0 µl of the internal standard solution has been added (see Section 5.10) to the purging chamber. Insert the needle of the syringe well below the surface of the water for the addition of the internal standard solution. If the sample is aqueous go to Section 7.3.5.

7.3.4.2 Add an aliquot of the sample extract from Section 7.3.3.4. The total quantity of volatile components injected should not exceed approximately 10 µg. If the total volatile content (TVC) of the sample as determined in Section 7.3.1.4 is 1.0 mg/g or less, use a 200-µl aliquot of the sample extract. If the TVC is greater than 1.0 mg/g, use an aliquot of the sample extract that contains approximately 10 µg of total volatile components; the volume (in µl) of the aliquot to be taken can be calculated by dividing 200 by the TVC. If the TVC is greater than 20 mg/g, take a 500-µl aliquot of the sample extract and dilute to 10 ml with PEG. In this case calculate the aliquot volume (in µl) of the undiluted extract to be taken by dividing 4,000 by the TVC. If the TVC is less than 1.0 mg/g and greater sensitivity is desired, use a large purging chamber containing 25 ml of reagent water and use a 1.0-ml aliquot of the sample extract.

7.3.4.3 Close the 2-way syringe valve at the sample inlet.

7.3.5 The sample in the purging chamber is purged with helium to transfer the volatile components to the trap. The trap is then heated to desorb the volatile components which are swept by the helium carrier gas onto the GC column for analysis.

7.3.5.1 Adjust the gas (helium) flow rate to 40 ± 3 ml/min. Set the purging device to purge, and purge the sample for 11.0 ± 0.1 min at ambient temperature.

7.3.5.2 At the conclusion of the purge time, adjust the device to the desorb mode, and begin the GC/MS analysis and data acquisition using the following GC operating conditions:

Column: 6-ft x 2-mm I.D. glass column of 1% SP-1000 on Carbo-pack B (60-80 mesh).

Temperature: Isothermal at 45° C for 3 min, then increased at 8° C/min to 220° C, and maintained at 220° C for 15 min.

Concurrently, introduce the trapped materials to the GC column by rapidly heating the trap to 180° C while backflushing the trap with helium at a flow rate of 30 ml/min for 4 min. If this rapid heating requirement cannot be met, the GC column must be used as a secondary trap by cooling it to 30° C or lower during the 4-min desorb step and starting the GC program after the desorb step.

7.3.5.3 Return the purge-and-trap device to the purge mode and continue acquiring GC/MS data.

7.3.5.4 Allow the trap to cool for 8 min. Replace the purging chamber with a clean purging chamber. The purging chamber is cleaned after each use by sequential washing with acetone, methanol, detergent solution and distilled water, and then dried at 105° C.

7.3.5.5 Close the syringe valve on the purging chamber after 15 sec to begin gas flow through the trap. Purge the trap at ambient temperature for 4 min. Recondition the trap by heating it to 180° C. Do not allow the trap temperature to exceed 180° C, since the sorption/desorption is adversely affected when the trap is heated to higher temperatures. After heating the trap for approximately 7 min, turn off the trap heater. When cool, the trap is ready for the next sample.

7.3.6 If the response for any ion exceeds the working range of the system, repeat the analysis using a correspondingly smaller aliquot of the sample extract described in Section 7.3.2.3.

7.4 Qualitative identification

7.4.1 Obtain an EICP for the primary characteristic ion and at least two other characteristic ions for each compound when practical. The following criteria must be met to make a qualitative identification.

7.4.1.1 The characteristic ions of each compound of interest must maximize in the same or within one scan of each other.

7.4.1.2 The retention time must fall within ±30 sec of the retention time of the authentic compound.

7.4.1.3 The relative peak heights of the characteristic ions in the EICP's must fall within ±20% of the relative intensities of these ions in a reference mass spectrum. Reference spectra may be generated from the standards analyzed by the analyst or from a reference library. All reference spectra generated from standards must be obtained from an appropriately tuned mass spectrometer.

7.5 Quantitative determination

7.5.1 When a compound has been identified, the quantification of that compound will be based on the integrated abundance from the EICP of the primary characteristic ion. In general, the primary characteristic ion selected should be a relatively intense ion, as interference-free as possible, and as close as possible in mass to the characteristic ion of the internal standard used. Generally, the base peak of the mass spectrum is used.

8.0 Quality Control

8.1 Each laboratory that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of laboratory capability and the analysis of spiked samples as a continuing check on performance. The laboratory is required to maintain performance records to define the quality of the data that are generated. Ongoing performance checks must be compared with established performance criteria to determine if the results of analyses are within the accuracy and precision limits expected of the method.

8.1.1 Before performing any analyses, the analyst must demonstrate the ability to generate acceptable accuracy and precision with this method. This ability is established as described in Section 8.2.

8.1.2 The laboratory must spike all samples including check samples with surrogate standards to monitor continuing laboratory performance. This procedure is described in Section 8.4.

8.1.3 Before processing any samples, the analyst should daily demonstrate, through the analysis of an organic-free water method blank, that the entire analytical system is interference-free. The blank samples should be carried through all stages of the sample preparation and measurement steps.

8.2 To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations using a representative sample as a check sample.

8.2.1 Analyze four aliquots of the unspiked check sample according to the method in Section 7.3.

8.2.2 For each compound to be measured, select a spike concentration representative of twice the level found in the unspiked check sample or a level equal to 10 times the expected detection limit, whichever is greater. Prepare a spiking solution by dissolving the compounds in methanol at the appropriate levels.

8.2.3 Spike a minimum of four aliquots of the check sample with the spiking solution to achieve the selected spike concentrations. Spike the samples by adding the spiking solution to the PEG used for the extraction. Analyze the spiked aliquots according to the method in Section 7.3.

8.2.4 Calculate the average percent recovery, R, and the standard deviation of the percent recovery, s, for all compounds and surrogate standards. Background corrections must be made before R and s calculations are performed. The average percent recovery must be greater than 20 for all compounds to be measured and greater than 60 for all surrogate compounds. The percent relative standard deviation of the percent recovery, s/R x 100, must be less than 20 for all compounds to be measured and all surrogate compounds.

8.3 The analyst must calculate method performance criteria for each of the surrogate standards.

8.3.1 Calculate upper and lower control limits for method performance for each surrogate standard, using the values for R and s calculated in Section 8.2.4:

Upper Control Limit (UCL) = R + 3s
Lower Control Limit (LCL) = R - 3s

The UCL and LCL can be used to construct control charts that are useful in observing trends in performance.

8.3.2 For each surrogate standard, the laboratory must maintain a record of the R and s values obtained for each surrogate standard in each waste sample analyzed. An accuracy statement should be prepared from these data and updated regularly.

8.4 The laboratory is required to spike all samples with the surrogate standards to monitor spike recoveries. The spiking level used should be that which will give an amount in the purge apparatus that is equal to the amount of the internal standard assuming a 100% recovery of the surrogate standards. If the recovery for any surrogate standard does not fall within the control limits for method performance, the results reported for that sample must be

qualified as being outside of control limits. The laboratory must monitor the frequency of data so qualified to ensure that it remains at or below 5%. Four surrogate standards, namely 1,2-dibromodifluoroethane, bis(perfluoroisopropyl) ether, fluorobenzene, and m-bromobenzotrifluoride, are recommended for general use to monitor recovery of volatile compounds varying in volatility and polarity.

8.5 Each day, the analyst must demonstrate through the analysis of a process blank that all glassware and reagent interferences are under control.

8.6 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Field replicates may be analyzed to monitor the precision of the sampling technique. Whenever possible, the laboratory should perform analysis of standard reference materials and participate in relevant performance evaluation studies.

8.7 Standard quality assurance practices should be used with this method. Field replicates should be collected to validate the precision of the sampling technique. Laboratory replicates should be analyzed to validate the precision of the analysis. Fortified samples should be carried through all stages of sample preparation and measurement; they should be analyzed to validate the sensitivity and accuracy of the analysis. If the fortified waste samples do not indicate sufficient sensitivity to detect less than or equal to 1 µg/g of sample, then the sensitivity of the instrument should be increased or the extract subjected to additional cleanup. Detection limits to be used for groundwater samples are indicated in Table 1. Where doubt exists over the identification of a peak on the chromatograph, confirmatory techniques such as mass spectroscopy should be used.

8.8 The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero. The MDL concentrations listed in Table 1 were obtained using reagent water. Similar results were achieved using representative wastewaters. The MDL actually achieved in a given analysis will vary depending on instrument sensitivity and matrix effects.

8.9 In a single laboratory, using reagent water and wastewaters spiked at or near background levels, the average recoveries presented in Table 3 were obtained. The standard deviation of the measurement in percent recovery is also included in Table 3.

APPENDIX K

LOS ALAMOS PROCEDURE FOR OPERATING DRUM PUMPS

OPERATING PROCEDURE FOR UTILIZING DRUM PUMPS

Introduction

This Operating Procedure summarizes the proper utilization of the Lutz drum pumps for the transfer of liquid hazardous wastes. The Lutz pumps have two main parts: the pump tubes and the motors. The pump tubes and motors are mutually interchangeable and care should be taken to utilize the correct combination of motor and pump tube for the particular waste being transferred.

Procedures

1. Identify the waste which will be transferred and know the hazards and incompatibilities associated with the waste.

2. If the waste is to be transferred to an empty drum, select a drum which will be compatible with the waste. Utilize polypropylene drums for all corrosive materials.

3. If the waste is to be transferred to a partially full drum, be certain that the material to be added is compatible with the material already in the drum.

4. Don personal protective equipment appropriate for the material being transferred.

5. Select a pump tube which is compatible with the waste by locating the waste in Pump Tube Selection Appendix. If the waste is not listed, then utilize the Drum Category Pump Tube Selection Chart below (see instructions for Identification and Segregation of Hazardous Wastes for further information on Drum Categories). Each pump tube has a tag attached to it which states the type of material it is constructed of. Carefully inspect the pump tube before using it to verify that it was properly cleaned of waste material after it was last used.

Waste Category	Pump Tube Type
Organics	Kynar
Corrosive acidic wastes	Kynar
Corrosive alkalic & caustic wastes	Polypropylene
Oxidizers	Kynar
Non-reactive metals	Polypropylene

6. Chemical compatibility of the waste with the motor is not a concern since the material does not come into contact with the motor. However, only explosion-proof motors should be used with wastes which are flammable or explosive. Air-driven motors should be used in areas where power is unavailable or in the event of a power failure. The air-driven motors are operated from compressed air cylinders.

7. After the waste has been transferred, the pump should be flushed with a solvent (including water) appropriate to the material transferred. The solvent should be collected and treated as a hazardous waste.

8. Record the material transfer on a Storage and Shipment Form for Hazardous Waste which should be attached to the receiving drum.

9. If the material transferred is not an Acutely Hazardous Waste, then the empty drum may be disposed of in the TA-54 Area G landfill.

10. If the material transferred is an Acutely Hazardous Waste, the empty drum must be rinsed three times with an appropriate solvent and then the empty drum may be disposed of in the landfill. The solvent must be collected and handled as a hazardous waste.

Maintenance and Repair

1. A back-up pump tube will be kept in storage for each type of pump tube available for transferring wastes. The Hazardous Waste Technician is responsible for promptly repairing unsuitable pump

tubes or ordering new pump tubes whenever a back-up pump tube is taken from storage and placed in use.

2. Once every three months, the Hazardous Waste Technician will operate all of the available motors and pump tubes to ascertain that they are properly working. Pumps which are not properly working will be disassembled and the parts inspected for damage or unacceptable wear. Any damaged or unacceptably worn parts will be promptly replaced or repaired or the pump tube or motor taken out of service until the parts are replaced or repaired.

3. Records of all pump maintenance and/or repair will be made on the Inspection Log Form.

PUMP TUBE SELECTION APPENDIX

Chemical Resistance Table and Material Selection Guide

The data in the following table gives the corrosion resistance of the five materials to various chemical media. This information may be considered only as a basis for recommendation, but not as a guarantee. Where compatibility is in question, material should be tested under actual field conditions to determine the proper choice. All test data listed is at room temperature (72°F) unless otherwise stated.

R = Recommended
F = Fair, should be tested under field conditions
D = Not Recommended
— = Unknown
B = Minor to moderate effect

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Acetaldehyde	B	R	—	R	R
Acetamide	R	—	—	—	R
Acetate Solvents	B	R	R	R	R
Acetic Acid, 10-80%	—	R	R	R	F
Acetic Acid, Glacial	B	R	R	R	F
Acetic, 80%	—	R	R	—	F
Acetic Anhydride	B	R	B	B	F
Acetone	R	R	D	F	F
Acetophenone	B	—	R	—	B
Acetyle Chloride	D	—	R	—	B
Acetylene	R	R	—	R	R
Acriflauine	—	—	—	R	—
Acrylic Emulsions	R	—	—	—	—
Alcohols					
Allyl	—	R	—	R	R
Amyl	B	R	R	R	R
Butyl	B	R	—	R	R
Ethyl	B	R	—	R	R
Methyl	B	R	—	R	R
Propyl	R	R	—	R	R
Aluminum Chloride	B	R	R	R	D
Aluminum Fluoride	—	R	R	R	D
Aluminum Hydroxide	R	—	R	R	R
Aluminum Nitrate	B	—	R	R	R
Aluminum Oxychloride	—	—	—	F	—
Aluminum Sulfate	R	R	R	R	R
Aluminum Sulfate Acid	—	F	—	—	—
Aluminum (All types)	—	—	—	R	—
Ammonia, Aqua, 10%	—	R	R	R	R
Ammonia, Aqueous	—	R	—	R	R
Ammonia (Concentrated)	—	—	—	R	R

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Ammonia Gas (Dry)	—	—	—	R	R
Ammonium Bifluoride	D	B	R	R	R
Ammonium Carbonate	D	B	R	R	R
Ammonium Chloride	—	R	R	R	F
Ammonium Fluoride, 10%	—	R	—	—	—
Ammonium Fluoride, 25%	—	R	—	R	—
Ammonium Hydroxide	D	R	R	R	R
Ammonium Nitrate	B	R	R	R	R
Ammonium Nitrite	—	—	—	—	—
Ammonium Oxalate	—	R	—	R	R
Ammonium Persulfate	D	R	—	R	R
Ammonium Phosphate, Dibasic	F	R	—	R	R
Ammonium Phosphate, Monobasic	F	R	—	R	R
Ammonium Phosphate, Tribasic	F	R	—	R	R
Ammonium Sulfate	F	F	R	R	R
Ammonium Sulfide	—	R	—	—	—
Ammonium Thio-Sulfate	—	—	—	—	R
Ammonium Thicyanate	—	—	—	—	—
Amyl Acetate Kynar, R, to 120°F)	F	F	R	D	R
Amyl Alcohol	F	R	R	R	R
Amyl Borate	—	—	—	—	—
Amyl Chloride	D	R	R	D	R
Amyl Chloronapthalene	—	—	—	—	—
Amyl Napthalene	—	—	—	—	—
Aniline (Kynar, R to 70°F)	F	F	R	F	R
Aniline Dyes	F	—	—	—	F
Aniline Hydrochloride	D	—	—	—	D
Animal Fats	R	—	—	—	R
Anisole	—	R	—	F	R

Chemical Resistance Table and Material Selection Guide (Continued).

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Antimony Chloride	—	R	—	R	—
Anti-Freeze	R	R	—	R	R
Antimony Trichloride	—	—	—	R	U
Aqua Regia (80%), (Kynar, R, 70°)	D	D	R	D	D
Arsenic Acid	D	R	R	R	F
Barium Carbonate	F	F	R	R	F
Barium Chloride	D	R	R	R	F
Barium Hydroxide	D	R	R	R	R
Barium Sulfate	D	—	—	—	R
Barium Sulfide	D	—	R	R	R
Beer	R	—	—	D	R
Beet Sugar Liquors	R	R	—	R	R
Bensaldehyde (Kynar, R, 70°F)	F	—	R	D	R
Benzene, Benzol (Kynar, R, 70°F)	F	F	R	D	R
Benzene Sulfonic Acid (Kynar, R, 70°F)	D	—	R	—	F
Benzoic Acid	F	R	R	D	R
Benzyl Alcohol	—	—	—	R	—
Benzyl Chloride	—	—	—	—	—
Bismuth Carbonate	—	R	—	R	—
Black Liquors	—	F	—	R	—
Bleach, 12.5% Active	—	R	—	R	R
Borax (Sodium)	F	R	R	R	R
Boric Acid	F	R	R	R	R
Brine Acid	—	R	—	—	—
Bromic Acid	—	R	—	R	D
Bromine Liquid	—	R	—	—	D
Bromine Water	D	—	R	—	F
Butane	R	—	—	D	R
Butyl Acetate (Kynar, R, 70°F)	R	F	R	D	F
Butyl Phthalate	—	—	—	R	—
Butylene	R	—	R	—	R
Butyl Phenol	—	R	—	—	—
Butyric Acid	F	R	R	R	R
Calcium Bisulfite	F	—	R	R	F
Calcium Carbonate	F	R	R	R	R
Calcium Chlorate	F	R	R	R	R
Calcium Chloride	F	R	R	R	R
Calcium Hydroxide	F	R	R	R	R
Calcium Hyprochlorite	F	R	R	R	R
Calcium Nitrate	F	—	R	R	F
Calcium Sulfate	F	F	R	R	R
Calcium Sulfite	R	—	—	R	F
Cane Sugar Liquors	R	R	R	R	R
Carbon Dioxide	R	—	R	R	R
Carbon Disulfide (Kynar, R, 70°F)	F	—	R	D	R
Carbonic Acid	R	R	—	R	R
Carbon Tetrachloride	F	R	R	D	R
Castor Oil	—	R	—	R	R
Caustic Soda	—	—	—	R	—
Cellosolve	F	—	R	R	F
Cetyl Alcohol	—	—	—	R	R
Chlorine (Dry)	—	—	R	—	—
Chlorine (Wet)	D	R	R	—	D
Chlorine Liquid	D	R	R	D	D
Chloroacetic Acid	—	F	—	—	—
Chlorobenzene (Kynar, R, 150°F)	F	R	R	D	R
Chlorobenzyl Chloride	—	—	—	—	—
Chloroform	D	F	R	D	R
Chlorosulfonic Acid, 100%	D	F	D	D	D
Chromic Sulforic Acid	—	—	—	D	—
Chromic Acid, 10%	F	R	—	R	R
Chromic Acid, 50% (Kynar, R, 120°F)	F	R	R	F	F
Cider	F	R	R	F	R
Citric Acid	F	R	R	F	R
Copper Chloride	D	—	R	R	D
Copper Cyanide	D	R	R	R	R
Copper Nitrate	D	R	R	R	R
Copper Sulfate	D	R	R	R	R
Cottonseed Oil	—	R	—	R	R
Cresylic Acid (Kynar, R, 150°F)	F	F	R	—	R
Cyclohexane	R	—	R	D	R
Cyclohexanol (Kynar, R, 150°F)	F	—	R	—	F
Cyclohexanonene (Kynar, R, 70°F)	F	—	R	R	F
Decain	—	—	—	D	R
Detergents	R	—	—	R	R

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Developing Solutions	—	—	—	R	F
Dextrose	—	R	—	—	R
Diacetone Alcohol	R	—	—	—	R
Dichloroethylene	—	R	—	R	—
Diesel Fuels	R	R	R	D	R
Diethyl Ether (Kynar, R, 70°F)	F	—	R	R	B
Diisobutylene	F	—	R	—	F
Dimethyl Formamide	R	—	—	—	R
Dioctyl Phthalate	R	—	—	—	R
Distilled Water	—	R	—	R	R
Epichlorohydrine	R	—	D	—	R
Ethanolamine (Kynar, R, 70°F)	—	—	R	—	R
Ether (Kynar, R, 70°F)	R	F	R	—	R
Ethyl Acetate (Kynar, R, 70°F)	F	F	R	F	R
Ethyl Chloride	F	F	R	D	R
Ethyl Ether	F	—	—	—	R
Ethylene Chloride (Kynar, R, 70°F)	F	F	R	D	R
Ethylene Dichloride	D	F	—	R	R
Ethylene Glycol	R	—	R	D	R
Ethylene Oxide	R	—	R	—	—
Ethylene Trichloride	F	—	R	—	R
Fatty Acids	F	R	R	—	R
Ferric Chloride	D	F	R	R	F
Ferric Nitrate	D	R	R	R	R
Ferric Sulfate	D	R	R	R	R
Ferrous Chloride	D	F	R	R	D
Ferrous Sulfate	D	F	R	R	F
Fluboric Acid	—	R	—	—	F
Fluosilicic Acid	D	—	F	—	—
Formaldehyde (Kynar, R, 120°F)	R	F	R	R	R
Formic Acid	D	R	R	R	R
Freon (Seal-less Pump Tubes Only)	—	—	—	R	R
Fruit Juices	F	—	—	R	R
Fuel Oil	R	—	R	—	R
Furfural	R	F	F	D	R
Gallic Acid (Kynar, R, 70°F)	R	F	R	F	F
Gasoline	R	R	R	F	R

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Gelatine	R	R	—	R	R
Glucose	R	—	R	R	R
Glycerine	R	R	—	R	R
Glycolic Acid (Kynar, R, 70°F)	—	R	R	R	—
Glycols	F	—	R	—	F
Heptane	R	—	R	D	R
Hexane	R	R	R	F	R
Hydrobromic Acid	D	R	R	F	D
Hydrochloric Acid (20%)	D	R	R	R	D
Hydrochloric Acid (37%) (Hot)	D	D	R	—	D
Hydrochloric Acid (37%) (Cold)	D	R	R	R	D
Hydrofluoric Acid (20%)	D	F	R	R	F
Hydrofluoric Acid (50%)	D	F	R	D	D
Hydrofluoric Acid (75%)	D	—	R	D	D
Hydrofluoric Acid (Conc.) (Hot)	D	—	R	—	D
Hydrofluoric Acid (Conc.) (Cold)	—	—	R	—	—
Hydrofluosilicic Acid (20%)	D	—	R	R	D
Hydrogen Fluoride	—	R	—	R	R
Hydrogen Peroxide (Kynar, R, 70°F)	R	R	R	R	R
Hydrogen Sulfide (Wet) (Cold)	F	—	R	—	R
Hydrogen Sulfide (Wet) (Hot)	F	—	R	—	R
Hydrogen Sulfide Aqueous Solution	F	—	R	R	R
Hypochlorous Acid	D	—	R	—	D
Iodine (Kynar, R, 150°F)	D	F	R	D	D
Isopropyl Ether	R	—	R	D	R
Jet Fuel (JP3, JP4, JP5)	R	—	R	D	R
Kerosene	R	—	R	D	R
Lacquers	R	—	—	R	R
Lacquer Solvents	R	—	—	—	R
Lactic Acid (Kynar, R, 70°F)	F	—	R	R	R
Lard Oil	R	—	R	R	R
Latex	R	—	—	—	R
Lead Acetate	D	—	R	R	F
Lubricating Oils	R	—	R	—	R

Chemical Resistance Table and Material Selection Guide (Continued).

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Magnesium Carbonate	—	F	R	R	R
Magnesium Chloride	D	R	R	R	R
Magnesium Hydroxide	D	—	R	R	R
Magnesium Sulfate	F	F	R	R	R
Maleic Acid	F	—	R	F	R
Malic Acid	F	—	R	—	R
Mercuric Chloride (Dilute Solution)	D	F	R	R	D
Mercuric Cyanide	D	—	R	R	R
Methyl Acetone	R	—	R	—	R
Methyl Chloride	D	—	R	D	R
Methyl Ethyl Ketone	R	—	D	R	R
Methyl Isobutyl Ketone (Kynar, R, 70°F)	—	—	R	F	R
Methylene Chloride	F	R	F	D	R
Milk	R	—	R	R	R
Monoethanolamine	F	—	D	—	R
Naptha	R	F	R	R	R
Napthalene	F	—	R	—	F
Nickel Chloride	D	—	R	R	R
Nickel Sulfate	D	F	R	R	R
Nitric Acid (5-10%)	D	R	—	R	R
Nitric Acid (20%)	D	R	—	R	R
Nitric Acid (50%)	D	R	—	D	R
Nitric Acid, Concentrated (Kynar, R, 120°F)	D	F	R	—	R
Nitric Acid, Red Fuming	R	—	F	—	R
Nitrobenzene (Kynar, R, 70°F)	F	F	R	F	F
Oils, Vegetable	—	R	—	R	R
Oleic Acid	F	—	R	R	R
Oleum	F	—	D	D	R
Oxalic Acid, (Cold)	F	F	—	R	R
Palmitic Acid	F	—	R	—	R
Perchloric Acid Kynar, R, 125°F)	D	—	R	—	D
Petrolatum	F	—	—	—	R
Petroleum Oils, Refined	—	R	—	R	R
Phenol (Carbolic Acid) (Kynar, R, 150°F)	F	R	R	F	R
Phosphoric Acid, 20%	D	R	R	—	F
Phosphoric Acid, 20-40%	D	F	R	R	R
Phosphoric Acid, 45%	D	—	—	—	F
Phosphorus, Yellow	—	R	—	—	R
Phosphorus, Red	—	R	—	—	R
Photographic Solutions	F	R	—	R	R
Plating Solutions:					
Chrome 40	F	—	R	R	R
Copper	F	—	R	R	R
Gold	F	—	—	R	R
Iron	F	—	—	R	R
Lead	F	—	—	R	—
Nickel	F	—	R	R	—
Silver	F	—	R	R	R
Tin	F	—	—	R	R
Zinc	F	—	R	R	R
Potassium Bicarbonate	F	R	—	—	F
Potassium Bromide	F	R	R	R	R
Potassium Carbonate	F	F	R	R	R
Potassium Chlorate	F	—	R	R	R
Potassium Chloride	F	R	R	R	F
Potassium Chromate	R	R	—	—	F
Potassium Dichromate	R	F	R	R	R
Potassium Hydroxide (Kynar, R, 150°F)	D	F	R	R	R
Potassium Nitrate	F	F	R	—	R
Potassium Permanganate	F	R	R	F	F
Potassium Sulfate	R	F	R	R	F
Pyridine	F	R	D	F	F
Rayon Coagulating Bath	—	R	—	—	—
Rust Inhibitors	—	—	—	R	R
Sea Water	F	R	R	R	R
Silicone Oil	F	—	—	R	R
Silver Nitrate	D	—	R	R	R
Soap Solutions	F	—	—	R	R
Sodium Acetate	B	R	R	R	R
Sodium Bicarbonate	R	F	R	R	R
Sodium Bisulfate	D	R	R	R	R
Sodium Bisulfite	R	R	R	R	R
Sodium Borate	B	—	—	—	F
Sodium Bromide	—	R	—	R	R
Sodium Carbonate	B	R	R	R	R
Sodium Chlorate, 50%	B	R	R	R	R

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Sodium Chloride	B	R	R	R	R
Sodium Cyanide	D	—	R	R	R
Sodium Hydroxide, 20% (Kynar, R, 212°F)	D	R	R	R	R
Sodium Hydroxide, 30% (Kynar, R, 212°F)	D	R	R	R	B
Sodium Hydroxide, 80%	D	F	U	R	D
Sodium Hyprochlorite to 20%	D	R	R	D	D
Sodium Metaphospate	R	—	—	D	R
Sodium Nitrate	R	—	R	R	R
Sodium Perborate	B	—	—	R	D
Sodium Phosphate	D	—	R	—	B
Sodium Silicate	D	—	R	R	R
Sodium Sulfphate	B	B	R	R	R
Sodium Sulfide	D	—	R	R	R
Sodium Thiosulphate	B	—	R	R	R
Stannic Chloride	D	—	R	—	D
Stearic Acid	B	R	R	D	R
Sulfate Liquors	B	R	—	R	D
Sulfur	R	—	—	R	R
Sulfur Chloride (Kynar, R, 70°F)	D	—	R	D	D
Sulfur Dioxide[2] (Kynar, R, 212°F)	R	B	R	D	R
Sulfuric Acid, 10% (Kynar, R, 230°F)	D	R	R	R	F
Sulfuric Acid, 10%-75% (Kynar, R, 175°F)	D	R	R	R	B
Sulfuric Acid, Concentrated	D	R	—	D	F
Sulfurous Acid (Kynar, R, 212°F)	D	F	R	R	B
Tannic Acid (Kynar, R, 230°F)	D	F	R	R	R
Tanning Liquors	D	R	—	—	R

	Aluminum	Hastelloy C®	Kynar®	Polypropylene	Stainless Steel 316
Tar Bituminous	—	—	—	—	B
Tartaric Acid (Kynar, R, 250°F)	D	R	R	R	R
Tetrahydrofuran	—	—	D	D	R
Tetralin	R	—	—	—	R
Titanium Tetrachloride	D	R	—	—	F
Toluene, Toluol (Kynar, R, 212°F)	R	R	R	R	R
Tomato Juice	R	R	—	R	R
Transformer Oil	R	R	—	R	R
Trichloroacetic Acid (Kynar, R, 70°F)	D	F	R	—	D
Trichloroethylene	B	R	R	D	R
Triethylamine (Kynar, R, 120°F)	—	—	R	—	—
Turpentine	R	R	R	B	R
Urine	B	R	—	R	R
Vegetable Oil	R	R	—	—	R
Vinegar	D	R	—	R	R
Vinyl Chloride	—	R	—	—	—
Water, Acid	D	R	—	R	R
Water, Distilled	B	R	—	R	R
Water, Fresh	R	R	R	R	R
Water, Salt	B	R	—	R	R
Whiskey and Wines	D	R	—	R	R
White Liquor	—	R	—	R	R
Xylene or Xylol	R	R	—	D	R
Zinc Chloride	D	F	R	R	R
Zinc Sulfate	D	R	R	R	R

APPENDIX K

MANUFACTURERS INFORMATION ON PORTABLE PUMPS

Got from Dave Mace & Dave Salazar on 5/1/85

Explosion Proof Motor w/S.L. Polypropylene Tubes

DRUM & BARREL PUMPS

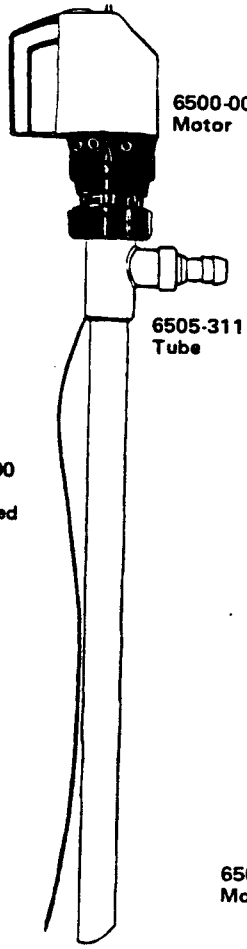
HOW TO ORDER: Motor and pump tube must be ordered separately. Any motor listed immediately below will assemble to any standard pump tube or to any S.L. (Seal-Less) pump tube.

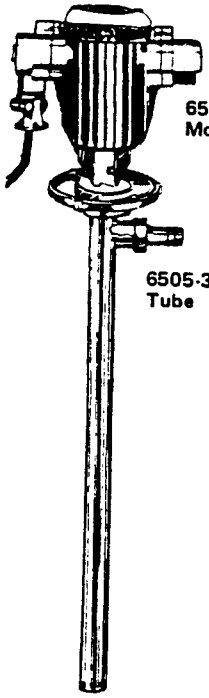
MOTOR PRICES:

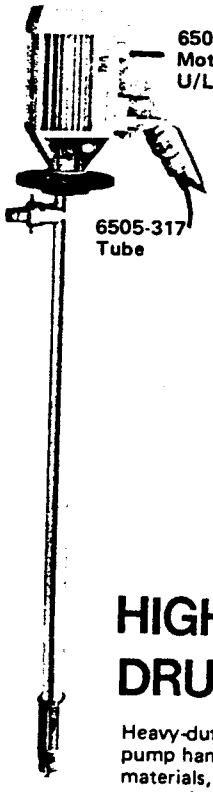
6500-000 PUMP MOTOR, portable electric motor, drip-proof . $220.00
6501-000 PUMP MOTOR, high-volume air motor 340.00
6502-000 PUMP MOTOR, heavy-duty electric motor, explosion-proof construction. 340.00
6503-000 PUMP MOTOR, extra-heavy duty electric motor, explosion-proof construction. 360.00
6504-000 PUMP MOTOR, low-volume air motor. 175.00
6506-000 PUMP MOTOR, heavy-duty electric motor, drip-proof 250.00
6507-000 PUMP MOTOR, extra-heavy-duty electric motor, explosion-proof construction, U/L-listed 525.00

TUBE PRICES: ORDER 6505-(Size No.) PUMP TUBE

Size No.	Price Each	Length (in.)	Material
-216	$235.00	27	S.L. Polypropylene
-316	250.00	34	S.L. Polypropylene
-416	260.00	47	S.L. Polypropylene
-217	340.00	27	S.L. Stainless
-317	370.00	34	S.L. Stainless
-417	380.00	47	S.L. Stainless
-218	460.00	27	S.L. Kynar
-318	475.00	34	S.L. Kynar
-418	500.00	47	S.L. Kynar
-211	215.00	27	Polypropylene
-311	240.00	34	Polypropylene
-411	250.00	47	Polypropylene
[illegible]	305.00	27	316 Stainless
-312	340.00	34	316 Stainless
-412	370.00	47	316 Stainless
-215	150.00	27	Aluminum
-315	160.00	34	Aluminum
-415	185.00	47	Aluminum







SEAL-LESS DRUM PUMP

- HIGH PERFORMANCE
- RUNS DRY WITHOUT DAMAGE

It's quality and simplicity in engineering that enable the S.L. drum pump to give high performance. It safely and efficiently transfers corrosives and other chemicals from 55-gallon drums, carboys or open tanks. This pump is interchangeable with all the motors listed above and is available in stainless steel and polypropylene. The new S.L. pump can run dry without damage to either pump or motor. A patented Teflon sleeve prevents material from progressing up the pump shaft. A new design of the impeller maximizes performance on high-viscosity material and high-specific-gravity solutions.

EXAMPLE: To order a pump combining a heavy-duty drip-proof motor and a Seal-Less stainless steel tube 34" long, you would specify: **6506-000 PUMP MOTOR**
6505-317 PUMP TUBE, S.L. Stainless

HIGH-VISCOSITY DRUM PUMP

Heavy-duty, progressive-cavity pump handles high-viscosity materials, such as paint, polymers, oils, sucrose, etc. Efficiently pumps any material that will flow to the pump, from water to 100,000 SSU. Flows to 4.5 gpm at 100 psi. All 316 stainless steel pump tube is 2" dia. x 38" long. Stator is Teflon; rotor and all wetted parts 316 stainless. Available with a carbon/ceramic mechanical seal or stuffing box with Teflon packing. 6506-000 motor is recommended, but the tube is interchangeable with any Lutz motor.

ORDER:
6505-501 HIGH-VISCOSITY PUMP TUBE with mechanical seal $1180.00
6505-502 HIGH-VISCOSITY PUMP TUBE with stuffing box 1180.00
MOTORS — order separately from above table.

RH RYAN HERCO

Ryan Herco Products Corporation
P.O. Box 588, Burbank CA 91503

Address Correction Requested

Bulk Catalog Rate
U.S. Postage
PAID
Tempe AZ
Permit No. 209

458151 03 7391
LOS ALAMOS U C NATL LAB
MORT SANDERS BUYER
M/S 518

P O BOX 1663
LOS ALAMOS NM 87544

Your Western Service Centers for Industrial Plastics
Burbank CA 91504–2509 N. Naomi St., (818) 841-1141, (213) 849-1141, (714) 522-1141
San Diego CA 92126–9779 Candida St., (619) 693-1141
San Jose CA 95131–1819 Junction Av., (408) 286-1141, (415) 452-1140
Tempe AZ 85282–1245 W. Geneva Dr., (602) 968-1141
Seattle WA 98188–18200 Olympic Av. South, (206) 575-1141

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Harry Patterson	HSE-7	J592	7-6095	2/28/85	

Expense Code	Program Code/J.C.	Capital Equip. Code	Correspondence to	Mail Stop
707	W57W		Rose Garcia	J592

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H. Patterson	TA-54	22	104	7-6095	J592

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Typed Name: Harry Patterson

Title: Staff Member

Authority Level: $ 1K

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Invoice Terms	Negotiated Shipping Date	Date of Order	Blanket Purchase Agreement

TO

PURCHASE REQUEST NUMBER: V 4728

Quoted By	Telephone	Date	Quote Number	SOCIO ECONOMIC SOURCE
				☐ Yes ☐ No

F.O.B.	Ship Via	Ship From

ITEM	TYPE COMPLETE DESCRIPTION OF REQUIREMENTS OR SPECIFICATIONS	QUAN.	UNIT	UNIT PRICE	EXTENSION
1.	Portable submersible pump Goulds Model SNW S0511B	2	ea.		
	1/2 HP, 115V, 1 phase, 1725 RPM				

Use a plain sheet of paper for continuation pages.

SUGGESTED SOURCES (Sole source over $2.5K requires written justification)

GOULD PUMPS INC.

SENECA FALLS, NY 13148

Total Estimated Cost: $600.00

Previous P.O. No.

State important handling or delivery information. QA handling? _____

Items	Total Cost	Account	Program	Loc.	Sec.	Exp.	Partn.	Job Order	Ord.	Proc.	Wk.	Surp.	Source	Accept

Bids Requested			Bids Received				Bids Requested			Seller's No.	Ex.	Due Date	Ship Date
S	D	W	B	S		W		Disadvantaged	Woman				

Date	Building	Room	For	Foreign Country	MAT-1 Use

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5/1/85	H. Patterson	HSE7	J592		5/17/85	

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5707	W57W			

Deliver to (name)	Area	Building	Room	Telephone	Mail Stop
	TA54	22	104		

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Invoice Terms | Negotiated Shipping Date | Date of [illegible] | Blanket Purchase Agreement

TO

PURCHASE REQUEST NUMBER M 4739

Quoted by | Telephone | Date | [illegible]

SOCIO ECONOMIC SOURCE ☐ Yes ☐ No

F.O.B.

ITEM	TYPE COMPLETE DESCRIPTION OF REQUIREMENTS OR SPECIFICATIONS	QUAN.	UNIT	UNIT PRICE
1	PUMP MOTOR (EXPLOSION PROOF)	1	EA	
	Cat no 6502-000			
2	PUMP TUBE – S.L. POLYPROPYLENE	1	EA	
	Cat. no → 6505-316			
	(Use a plain sheet of paper for continuation pages.			

SUGGESTED SOURCES (Sole source over $2.5K requires written justification)

RYAN HERCO PRODUCTS CORP.
~~P.O. BOX 5788~~ 2509 N. NAOMI St.
Burbank, Calif. 91503
818-841-1141

Total Estimated Cost $590.00 XX

Previous P.O. No.

State important handling or delivery information. QA handling?

Items	Total Cost	[illegible]	[illegible]	Sole	Exp.	Paren.

Bids Requested				Bids Received				Bids Rejected				Date
B	S	D	W	B	S	D	W	Small		Disadvantaged		

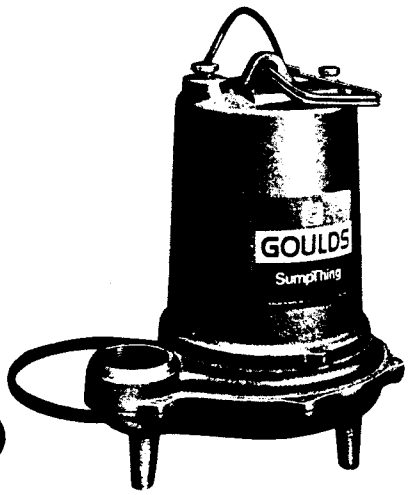
Group	Site	Building	Room	For	Acct.

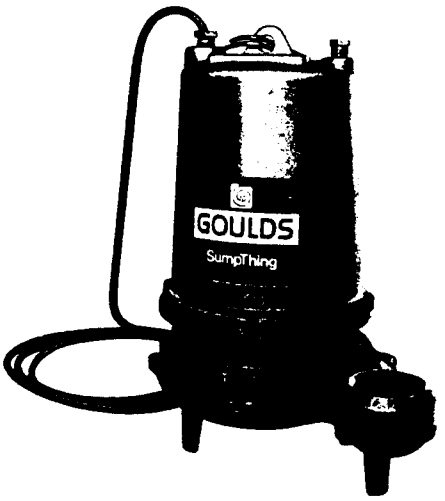
m 838 (2/81)

BUYER FILE/ACT TO MAT-4

Installation Instructions for Submersible Effluent Pumps

Model 3870
WPO311E
WPO312E
WPH1012E
WPH1032E
WPH1034E



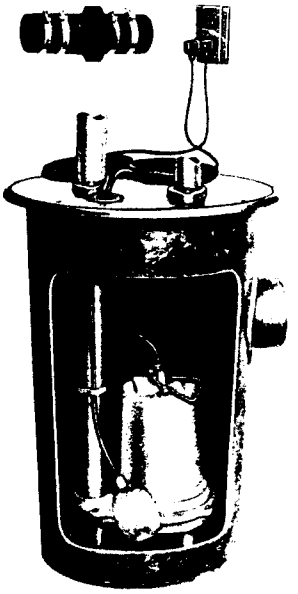


Pump Installation Consideration

The first steps in insuring the proper installation of your submersible effluent pump are to make certain: (1) a suitable receiver, sump, or sewage basin such as those offered in the Goulds Catalog is available; (2) supply voltage and phase matches pump nameplate power requirements; (3) wiring is adequate to carry maximum nameplate amperage, and (4) electrical installation conforms to applicable codes.

Mercury Level Control switch ALS2-5, 6, 7, if used, should be mounted to the discharge pipe.

Diaphragm Level Control Switch ALS2-1, 2, 4, if used, should be bracket mounted.



GOULDS PUMPS, INC.
SENECA FALLS, NEW YORK 13148

Pump & Piping Installation

Thread discharge pipe into discharge flange connection. If a check valve (ALS 9-2) is used in a system handling solids try to avoid installing it vertically, but instead position it horizontally or at a 45° angle with the valve pivot on top. This will guard against solids lodging on to the valve preventing it from opening. Drill a 3/16" hole in discharge pipe approximately 2" above the pump discharge connection to prevent air locking the pump. A gate valve should be installed in the system after the check valve, if used, to permit removal of pump and/or check valve for servicing. A union should be installed between the check valve and the pump so that the pump can be removed without disturbing too much of the piping.

Three-phase pumps must be checked for proper rotation after wiring is complete. Rotation must be counterclockwise looking into the suction of the pump. **Caution:** Do not attempt to feel for the rotation with fingers. Rotating impeller can cause severe body injury.

Single phase pumps have built-in thermal overload protection with automatic reset. Three-phase units must be protected by means of a starter having the appropriate overload protection. Consult your Goulds dealer for a recommendation.

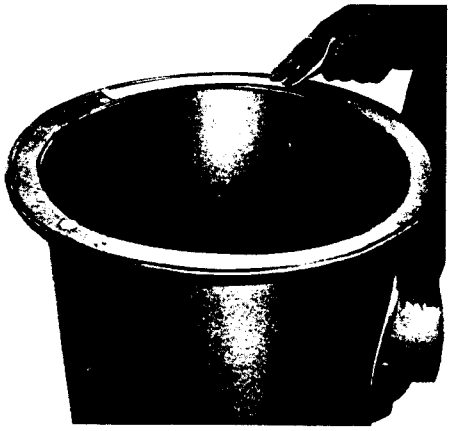
Sewage Basin Installation

The basin should have a hard bottom to give the legs of the pump adequate support. The legs are of sufficient height to elevate the pump above the bottom of the basin to allow wastes to reach the suction opening without clogging around the base of the pump.

When using fiberglass sewage basins supplied by Goulds attach 4" cast iron inlet hubs to sewage and/or drain lines as required. In the case of the duplex basins with two (2) cast iron inlet hubs, seal second inlet hub if it is not used.

Basin Covers

Remove protective strip from gasket material and press onto the recessed portion of the basin rim. See diagram below. With a



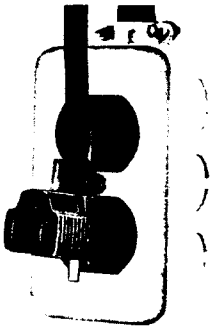
pointed tool, poke holes through the gasket into the tapped holes. Do not damage threads. Route all electrical cords through the appropriate opening in the basin cover.

Fit basin cover onto the protruding discharge pipe. Power cords are sealed with the split rubber stopper. The rubber "O" ring is placed over the discharge pipe and compressed between the pipe and cover by the smooth bore flange (chamfered side down) to form a seal. The vent pipe is threaded into the threaded flange provided with the basin cover.

Switch Operation

1. Diaphragm Level Control Switch (ALS2-1, or ALS2-4)

The diaphragm switch is a pressure activated switch which provides automatic operation with a 6" differential in liquid level. Switch will turn on when liquid level is 10" above bottom of switch unit, and turn off at 4" above bottom of switch.



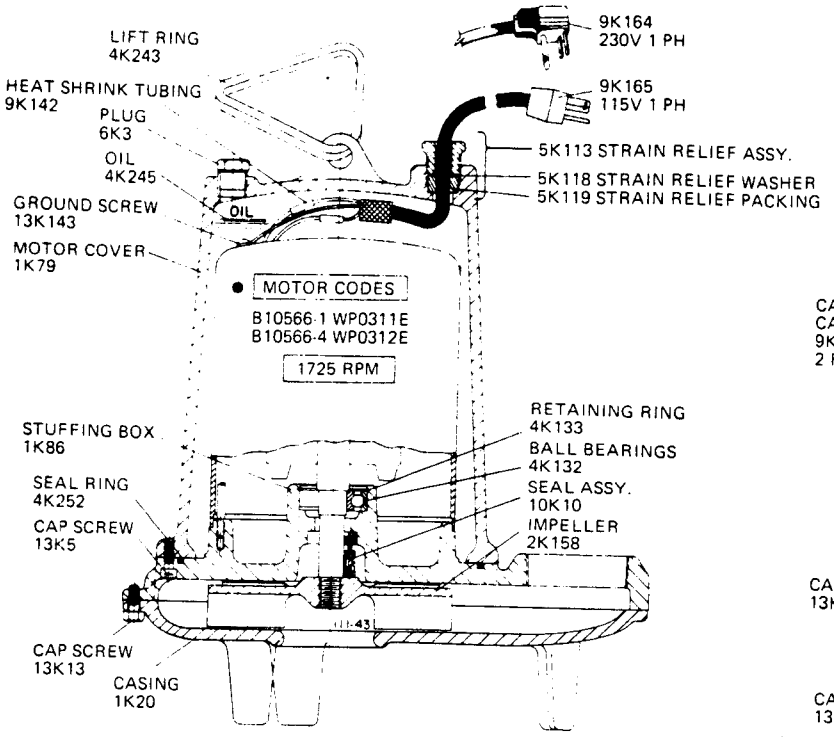
Caution: This type of control switch has a vent which must be left unobstructed and protected from moisture, dirt, or foreign material. Mount electrical cord so that the vent tube is pointed downwards. ⅓ H.P., 115V or 230V, 1 Ø pumps may be controlled directly by the switch. 1 H.P. units, 1 Ø require a contactor, such as ALS 3-1. 1 H.P. 3 Ø units require a starter, such as ALS3-3.

2. Mercury Level Control Switch (PIL)

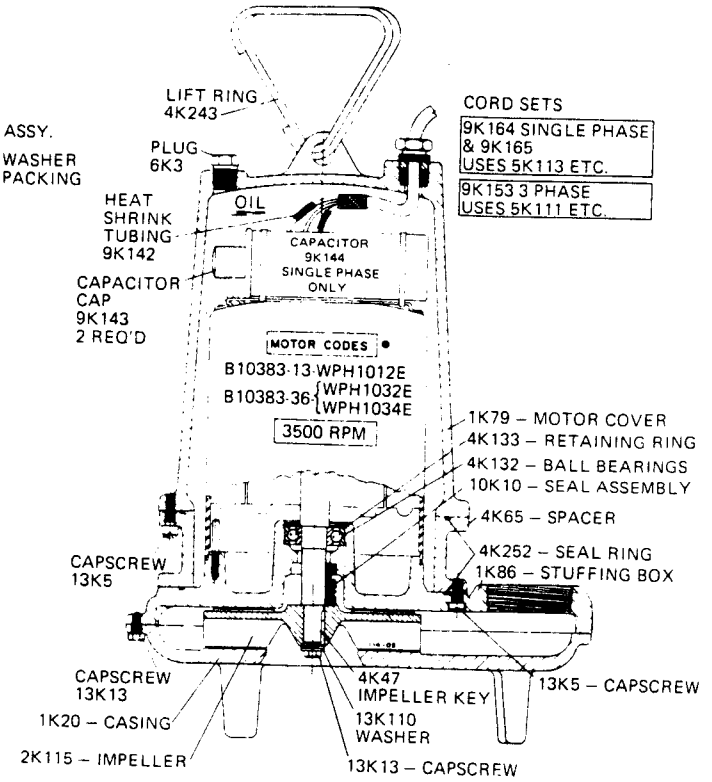
Mercury level control switch is a single float switch with adjustable differential level capability. Turn-on and turn-off levels are determined by how far the power cord is secured from the switch or the lead weight is located.

Caution: Electrical rating is ½ H.P. at 115 volts, 60 cycle, or 15 amps. Do not exceed rating.

Model 3870
WPO311E
WPO312E



Model 3870
WPH1012E
WPH1032E
WPH1034E



REPAIRS OR REPLACEMENTS

Before inspecting pump, **disconnect** all electrical power to pump(s) and accessories.

Caution: Motor section of this pump is oiled filled for lubrication and sealed against outside contamination. **Do Not** attempt to remove motor dome from the stuffing box. In the event motor or mechanical seal problems are diagnosed after all other possibilities have been eliminated, return the pump to your Goulds Pump dealer for servicing.

If motor, switch or other parts of this unit need replacement contact the supplier from whom this unit was purchased.

Warranty

1. The Company's standard warranty shall apply to submersible effluent pumps, except as hereinafter stated.

2. The period of one year from date of shipment of the Company's pumps, regarding any defective material or workmanship is enlarged as to submersible pumps to the first occurrence of a period of one year from date of installation or a period of eighteen (18) months from date of purchase.

3. This warranty shall not apply when damage is caused by improper installation, negligent or careless handling, lightning, or improper voltage supply.

Operating trouble chart

PROBLEM	PROBABLE CAUSES	CORRECTIVE ACTION
Pump Will Not Shut Off. **Note:** Before trouble shooting automatic control, check to see that pump operates on manual control. If it does, automatic controls are at fault. If not, fault is in pump or power supply.	Diaphragm Switch Weak rubber diaphragm Plugged vent tube Dirt or sediment lodged between retainer ring and rubber diaphragm causing contacts to remain closed.	Replace switch. Clear vent tube of any obstruction. Clean area around rubber diaphragm.
	Pump is air locked.	Shut power off for approximately 1 minute, then restart. Repeat several times to clear air from pump. If system includes a check valve, a 3/16″ hole should be drilled in discharge pipe approximately 2″ above discharge flange connection.
	Liquid inflow matches pump capacity.	Larger pump required.
Pump Runs But Does Not Discharge Liquid	Check valves installed backwards.	Check flow indicating arrow on check valve body to insure it is installed properly.
	Check valve stuck or plugged.	Remove check valve and inspect for proper operation.
	Lift too high for pump.	Check rating table.
	Inlet to impeller plugged.	Pull pump and clean.
	Pump is air locked.	(See corrective action above)
Pump Does Not Deliver Rated Capacity	Lift too high for pump.	Check rating table.
	Low voltage, speed too low.	Check for proper supply voltage to make certain it corresponds to nameplate voltage.
	Impeller or discharge pipe is clogged.	Pull pump and clean. Check pipe for scale or corrosion.
	Impeller may be rotating in the wrong direction.	**Single Phase Units**—Shut off power and allow impeller to stop rotating. Turn pump on again, and pump should self-correct rotation. Long discharge pipe without check valve allows liquid to drain back to sewage basin, rotating impeller backwards. If pump starts while impeller is rotating in the wrong direction, it will continue to operate in that direction. **Three Phase Units**—Interchange any two (2) power lead connections.
	Impeller wear due to abrasives or corrosion.	Replace worn impeller.
Pump Cycles Continually	No check valve in long discharge pipe allowing liquid to drain back into basin.	Install a check valve in discharge line.
	Check valve leaking.	Inspect check valve for correct operation.
	Sewage basin too small for inflow.	Install larger size sewage basin.

Note: Pump will not handle larger than ¾″ soft solid.

GOULDS PUMPS, INC.
SENECA FALLS, NEW YORK 13148

Form No. 9864A-WS

APPENDIX L

LOS ALAMOS PROCEDURE FOR IDENTIFICATION AND SEGREGATION OF HAZARDOUS WASTE

APPENDIX L

LOS ALAMOS PROCEDURE FOR IDENTIFICATION AND SEGREGATION OF HAZARDOUS WASTE

I. IDENTIFICATION

When chemical waste is ready for disposal, personnel at the generating laboratory fill out a Chemical Disposal Request Form and submit it to HSE-7. Since this form lists the chemicals to be disposed of, HSE-7 staff can assign a Reactivity Group Number (RGN) to each container or bottle. The RGN is found from Figure 1 (excerpted from EPA-600/2-80-076). The referenced EPA document, "A Method for Determining the Compatibility of Hazardous Waste," serves as the basis for the Los Alamos procedure. For additional information, the user is referred to the EPA document cited.

II. SEGREGATION

The basic segregation scheme is organics, corrosive acidic waste, corrosive basic waste, oxidizers, reactive materials, and nonreactive metals. Utilizing the RGN assigned to the container and Table 1, an area for storage/packaging of the waste is assigned. The organics and oxidizers have subcategories of segregation that will be followed by packaging/mixing of wastes to ensure that potential incompatibles are not combined together.

TABLE 1

Storage Category	Packaging Category	RGN
Organics (1)	A	4, 5, 9, 13, 14, 16, 17, 19, 26, 29, 31, 32, 101
	B	6, 7, 8, 27, 28
	C	12, 20
	D	34, 18
Oxidizers (2)	A	2
	B	104
	C	30
Acids (3)	N/A	1,3
Bases (4)	N/A	10, 11, 33, 105
Reactives (5)	N/A	21, 22, 25, 102, 107 - ALL STORED INDIVIDUALLY - NO COMBINING ALLOWED
Nonreactive Metals (6)	N/A	11, 15, 23, 24, 33 - 11 and 33 would only be allowed in labpack, solid quantities -
Others		The following must be evaluated on a case-by-case basis to determine which of the above categories is appropriate: 25, 102, 103.

REACTIVITY GROUP NO	REACTIVITY GROUP NAME	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Acids, Mineral, Non-oxidizing	1												
2	Acids, Mineral, Oxidizing		2											
3	Acids, Organic		G H	3										
4	Alcohols and Glycols	H	H F	H P	4									
5	Aldehydes	H P	H F	H P		5								
6	Amides	H	H GT				6							
7	Amines, Aliphatic and Aromatic	H	H GT	H		H		7						
8	Azo Compounds, Diazo Compounds and Hydrazines	H G	H GT	H G	H G	H			8					
9	Carbamates	H G	H GT						G H	9				
10	Caustics	H	H	H		H				H G	10			
11	Cyanides	GT GF	GT GF	GT GF					G			11		
12	Dithiocarbamates	H GF F	H GF F	H GF GT		GF GT		U	H G				12	
13	Esters	H	H F						H G		H			13
14	Ethers	H	H F											
15	Fluorides, Inorganic	GT	GT	GT										
16	Hydrocarbons, Aromatic		H F											
17	Halogenated Organics	H GT	H F GT					H GT	H G		H GF	H		
18	Isocyanates	H G	H F GT	H G	H P			H P	H G		H P G	H G	U	
19	Ketones	H	H F						H G		H	H		
20	Mercaptans and Other Organic Sulfides	GT GF	H GT						H G					
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 GT H	GF H
22	Metals, Other Elemental & Alloys as Powders, Vapors, or Sponges	GF H F	GF H F	GF					H F GT	U	GF H			
23	Metals, Other Elemental & Alloys as Sheets, Rods, Drops, Moldings, etc.	GF H F	GF H F						H F G					
24	Metals and Metal Compounds, Toxic	S	S	S			S	S			S			
25	Nitrides	GF HF	H F E	H GF	GF H E	GF H			U	H G	U	GF H	GF H	GF H
26	Nitriles	H GT GF	H F GT	H							U			
27	Nitro Compounds, Organic		H F GT			H					H E			
28	Hydrocarbons, Aliphatic, Unsaturated	H	H F			H								
29	Hydrocarbons, Aliphatic, Saturated		H F											
30	Peroxides and Hydroperoxides, Organic	H G	H E		H F	H G		H GT	H F E	H F GT		H E GT	H F GT	
31	Phenols and Cresols	H	H F						H G					
32	Organophosphates, Phosphothioates, Phosphodithioates	H GT	H GT						U		H E			
33	Sulfides, Inorganic	GT GF	HF GT	GT		H			E					
34	Epoxides	H P	H P	H P	H P	U		H P	H P		H P	H P	U	
101	Combustible and Flammable Materials, Miscellaneous	H G	H F GT											
102	Explosives	H E	H E	H E					H E		H E			H E
103	Polymerizable Compounds	P H	P H	P H					P H		P H	P H	U	
104	Oxidizing Agents, Strong	H GT		H GT	H F	H F	H F GT	H F GT	H E	H F GT		H E GT	H F GT	H F
105	Reducing Agents, Strong	H GF	H F GT	H GF	H GF F	GF H F	GF H	H GF	H G				H GT	H F
106	Water and Mixtures Containing Water	H	H						G					
107	Water Reactive Substances	← EXTREMELY REACTIVE!												

Figure 1. Hazardous waste compatibility chart.

Reactivity Code	Consequences
H	Heat generation
F	Fire
G	Innocuous and non-flammable gas generation
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

	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
14																												
15																												
16																												
17																												
18																												
19																												
20				H	H	H																						
21				H_E	GF_H	GF_H	GF_H																					
22				H_E	GF_H		H_{GF_F}																					
23				H_F																								
24																												
25				GF_H	U	GF_H	GF_H	E																				
26								H_P			S	GF_H																
27								H_{GF_E}				H_{GF_E}																
28									H_E																			
29																												
30				H_E	H	E	$H_{F_{GT}}$	H_E	P_G		H_G	H_{GF_E}	$H_{P_{GT}}$		H_P													
31					H_P			GF_H				GF_H					H											
32								H									U											
33					H												H_{GT}											
34							H_P	H_P	H_P		H_P	H_P					H_P	H_P	U	H_P								
101								H_{G_F}				H_{GF_F}					$H_{F_{GT}}$											
102								H_E	H_E	H_E	E	E					H_E	H_E		H_E	H_E	H_E						
103								P_H	P_H	P_H	P_H	P_H					P_H	P_H		P_H			H_E					
104	H_F		H_F	H_{GT}	$H_{F_{GT}}$	H_F	$H_{F_{GT}}$	H_{F_E}	H_{F_E}	H_F		H_{F_E}	$H_{F_{GT}}$	H_E	H_F	H_F	H_G	H_F	$H_{F_{GT}}$	$H_{F_{GT}}$	H_{F_G}	H_{F_G}	H_E	$H_{F_{GT}}$					
105				H_E	GF_H	GF_H	GF_H						H_{GF}	H_E			H_E	GF_H	GT_{GF_H}		H	GF_H	H_E	$H_{P_{GF}}$	H_{F_E}			
106					H_G			GF_H	GF_H		S	GF_H								GT_{GF}						GF_{GT}		
107																												

DO NOT MIX WITH ANY CHEMICAL OR WASTE MATERIAL! EXTREMELY REACTIVE! →

Figure 1. Hazardous waste compatibility chart (continued).

APPENDIX M

BULGING DRUM PROCEDURE

LOS ALAMOS PROCEDURE FOR HANDLING BULGING OR LEAKING DRUMS

Bulging Drums

1. Identify the material inside the drum, based on drum log or inventory records.

2. Based upon the hazardous characteristics of the material in the drum, select appropriate personnel protective, emergency equipment and new receiving drum.

3. After donning personnel protective equipment and securing emergency equipment, carefully and slowly open a bung to relieve the internal pressure.

4. Use a portable hand-pump to transfer the material from the bulging drum to the new receiving drum. Properly mark new receiving drum.

5. Be certain that the contents of the bulging drum have been emptied into the new receiving drum.

6. If the material is an acutely hazardous waste, rinse the bulging drum three times with an appropriate solvent and handle rinsate as a hazardous waste.

7. Clean up any material that spilled during the transfer.

8. Remove or cover labels and send the empty bulging drum to the TA-54, Area L landfill.

9. Promptly complete an inspection log and record details of transfer on the log.

Leaking Drums

1. Identify the material inside the drum, based on drum log or inventory records.

2. Based on the hazardous characteristics of the material in the drum, select approriate personnel protective, emergency equipment and new receiving drum.

3. After donning personnel protective equipment and securing emergency equipment, spread absorbent material around the drum to absorb the leak.

4. Use a portable hand-pump to transfer the material from the leaking drum to the new receiving drum. Properly mark new receiving drum.

5. Be certain that the contents of the leaking drum have been emptied into the new receiving drum.

6. If the material is an acutely hazardous waste, rinse the leaking drum three times with an appropriate solvent and handle rinsate as a hazardous waste.

7. Remove or cover labels and send the empty leaking drum to the TA-54, Area L landfill.

8. Containerize the contaminated absorbent material and treat as a hazardous waste.

9. Promptly complete a weekly inspection log and record transfer and clean-up actions on the log.

What will be done?

APPENDIX M-1

SOP FOR THE TREATMENT TANKS AT AREA L, TA-54

SOP FOR THE TREATMENT TANKS AT AREA L, TA-54

I. INTRODUCTION

This SOP establishes the operational and general health and safety procedures for the use of the treatment tanks at Area L, TA-54. Individuals responsible for the overall operations under this SOP are the HSE-7 Section Leader and Associate Group Leader for Solid Waste Operations. They must approve any deviations from this SOP.

II. DESCRIPTION OF OPERATIONS

A. General

1. A minimum six-inch freeboard must be maintained in the tanks at all times.
2. If a snow or rainstorm is pending, the tanks shall be covered. The covers consist of four-inch rigid foam with removable plastic slip covers. They are held in place with elastic straps. Since the solutions in the tanks are agrieous and neutral, there is not a problem of incompatibility with the covers.
3. The tanks will be lined in the following manner except when reactives are treated.
   a. A cargo net is laid in the tank. This aids in the removal of the liner.
   b. Two plastic liners are placed in the tank, the excess brought to the outside of the tank and tied in-place with rope. This minimizes the wind causing the liner to billow.

B. Chemical Treatment of Ammonium Bifluoride

1. The waste shall be pumped into the lined tank by use of the submersible pump if delivered by tank truck or drum pump if delivered in drums.
2. While agitating the waste, lime and calcium chloride will be added. This binds the free fluoride as calcium fluoride.
3. Solution is left in tank to evaporate free liquid.
4. When solution has evaporated to a slurry, cement is added. The cement mix is placed in 55-gallon drums for disposal.
5. Liner is removed and disposed of at Area G since this is a non-RCRA waste.

C. Evaporation of Treated Salt Solutions

1. Treated cyanide, chromium or metal acid/base solutions can be transported from the TA-50 batch treatment system to Area L in drums.
2. The drums will be emptied with the drum pump into the lined tank.
3. Solution will remain in tank to evaporate.
4. When the solution has evaporated to a slurry, cement will be added. The cement mix will be placed in 55-gallon drums for disposal at Area L. Liner will be removed and disposed of in Area L as a RCRA-regulated waste.

D. Treatment of Radioactive Lithium Hydride

1. A liner will not be used during the treatment of reactives.
2. The tank will be filled to the halfway mark with water.
3. The chunks of lithium hydride will slowly be added to the tank. No more than five pounds of LiH should be in the tank reacting at any time.
4. When treatment is complete, the crustic solution will be pumped into drums and transported to TA-50 for treatment in the radioactive liquid waste treatment system.

III. HEALTH AND ENVIRONMENTAL CONCERNS

A. Chemical exposure of personnel.

B. Leak from a tank/release of tank contents.

C. Fire from lithium hydride treatment.

IV. PROCEDURES FOR SAFE OPERATIONS

A. Personal protective equipment/measures.

1. Safety glasses/face shields, gloves, and labcoats or coveralls are required to be worn.
2. Safety shoes shall be worn during all waste handling operations.
3. Respirators, either full-face or SCBA, will be used as necessary per instructions from HSE-5.
4. The emergency shower and eyewash must be checked to assure that it is operative prior to starting any treatment operations.
5. Two people must be present during treatment operations.

B. Spill control measures

Any release from a treatment tank will be contained within the concrete containment. A major release from a tank would initiate the procedures of the Hazardous Waste Contingency Plan. A minimum of the following materials will be maintained at Area L for emergency draining of a tank:

- Ten 55-gallon metal drums
- Ten drum liners
- Ten bags of vermiculite

The submersible pump would be used to draw down the liquid in the tanks. It would also be used for pumping any solution from within the containment area. The drums would be stored at Area L.

C. Fire protection measures

1. Smoking is prohibited inside the Area L enclosure at all times.
2. The quantity of lithium hydride to be treated at any one time is limited to five pounds because of hydrogen production. Only large pieces and incidental fines of lithium hydride will be treated by this method. TREATMENT OF LARGE QUANTITIES OF LiH FINES IS NOT PROVIDED FOR BY THIS SOP.

3. In case of a fire, the emergency procedures listed below and the Hazardous Waste Contingency Plan will be instituted.

V. RELATIONSHIPS BETWEEN OPERATIONS AND SUPPORT ACTIVITIES

HSE-7 uses the expertise and guidance of HSE-3 (Safety), HSE-5 (Environmental Surveillance) in the use of the treatment tanks. If the tanks were to be used for other waste streams, a Special Work Permit would be written and approved by these groups.

VI. TRAINING

The training requirements for personnel involved in this operation are covered in SOP CW-1. In addition, personnel shall read this SOP at least semi-annually. The Site Supervisor shall periodically review the tank performances of the technical personnel to insure understanding and compliance with these procedures.

VII. EMERGENCY PROCEDURES

A. Fire, explosion, or a major chemical release at Area L.

1. Evacuate immediate vicinity.
2. Call 9-911 and furnish information.
3. Notify HSE-7 Group Office (7-4301) and Site Supervisor.
4. Call the HSE-DO emergency number (7-7878).
5. Report to the muster area at Building 22.

B. Personnel injury

1. If toxic fumes are suspected, DO NOT ENTER AREA WITHOUT RESPIRATORY PROTECTION.
2. Render assistance to the injured party.
3. Remove any chemically contaminated clothing and keep party warm.
4. Call 9-911 for ambulance.
5. Notify HSE-7 Group Office and Site Supervisor.

VIII. RESPONSIBILITIES

The HSE-7 Section Leader for Solid Waste Disposal Operations has the overall responsibility for all operations at Area L. The Section Leader reports directly to the Associate Group Leader.

The Area L Supervisor is responsible for assuring that all personnel involved in the treatment of chemical wastes know and understand these procedures. All instances of non-compliance will be reported by the Site Supervisor to the

Section Leader, who is responsible for initiating appropriate corrective action.

CALL LIST

		Work	Home
Site Supervisor			
Section Leader	Karen Balo	7-6095	672-1369
Asso. Group Leader	John Warren	7-5397	662-9639
Deputy Group Leader	Lud Emelity	7-5839	753-7737
Group Leader	Ray Garde	7-4301	753-7737

APPENDIX M-2

MANUFACTURERS INFORMATION ON LORRAINE CRANE AND TRAINING MANUAL

22 Ton

22 Ton Capacity
(20 Metric Ton Capacity)

Lift Capacity PCSA 10-74
LRT 220 with 72′ (21.9 m) boom
— 5100 CWT

Note:
When lifting off main boom head and jib is erected, DEDUCT 800 lbs. for stow-away jib or 1300 lbs. for side-stow jib from main boom load chart capacities.

* up to 2.5 mph

*** ON TIRES 360°**

RADIUS	MAX. ANGLE°	MIN. ANGLE°	17.50 x 25 20.5 x 25	16.00 x24
10	70	59	15,900	18,800
12	70	57	13,700	15,200
15	70	52	9,500	11,500
20	70	38	5,500	6,900
25	70	0	3,400	4,200
30	63	0	2,200	2,600
35	59	0	1,400	1,600

*** ON TIRES STRAIGHT OVER FRONT**

RADIUS	MAX. ANGLE°	MIN. ANGLE°	17.50 x 25 20.5 x 25	16.00 x24
10	70	59	26,000	35,000
12	70	57	22,800	30,300
15	70	52	18,100	24,600
20	70	38	13,400	14,400
25	70	0	9,600	9,600
30	63	0	7,100	7,100
35	59	0	5,400	5,400
40	54	0	4,000	4,000
45	49	0	3,100	3,100
50	42	0	2,300	2,300
55	36	0	1,700	1,700

OUT AND DOWN OUTRIGGERS OVER FRONT

RADIUS	ANGLE°	BOOM LENGTH Retracted	ANGLE°	BOOM LENGTH 37′	ANGLE°	BOOM LENGTH 44′	ANGLE°	BOOM LENGTH 51′	ANGLE°	BOOM LENGTH 58′	ANGLE°	BOOM LENGTH 65′	ANGLE°	BOOM LENGTH Extended
10	59	44,000	68	44,000										
12	56	33,800	65	32,000	69	30,900								
15	50	29,200	60	27,700	65	26,600	69	25,700						
20	36	21,800	49	22,100	57	21,600	63	20,800	67	20,200				
25			38	16,800	49	16,900	56	17,000	62	16,600	65	16,000	68	15,500
30			23	13,200	40	13,400	49	13,500	55	13,600	60	13,200	64	12,800
35					28	10,800	41	10,900	49	11,000	54	11,100	59	10,800
40							31	8,000	42	9,000	49	9,150	54	9,000
45							16	7,100	33	7,200	42	7,300	48	7,400
50									22	5,900	35	5,900	43	6,000
55											26	4,900	36	4,900
60											0	4,000	29	4,000
65													18	3,350

OUT AND DOWN OUTRIGGERS 360°

RADIUS	ANGLE°	BOOM LENGTH Retracted	ANGLE°	BOOM LENGTH 37′	ANGLE°	BOOM LENGTH 44′	ANGLE°	BOOM LENGTH 51′	ANGLE°	BOOM LENGTH 58′	ANGLE°	BOOM LENGTH 65′	ANGLE°	BOOM LENGTH Extended
10	59	44,000	68	44,000										
12	56	33,800	65	32,000	69	30,900								
15	50	29,200	60	27,700	65	26,600	69	25,700						
20	36	21,800	49	22,100	57	21,600	63	20,800	67	20,200				
25			38	16,800	49	16,900	56	17,000	62	16,600	65	16,000	68	15,500
30			23	12,400	40	12,600	49	12,700	55	12,800	60	12,900	64	12,800
35					28	9,400	41	9,500	49	9,600	54	9,700	59	9,800
40							31	7,400	42	7,500	49	7,500	54	7,600
45							16	5,800	33	5,900	42	6,000	48	6,000
50									22	5,500	35	5,600	43	5,600
55											26	4,600	36	4,600
60											0	3,700	29	3,800
65													18	2,500
70														2,700
75														2,200
80														1,800
85														1,600

MODEL 150 series A SAFE LOAD CHART – 4 SEC. PWR. BOOM

15 Ton

BASED ON 85% OF TIPPING – CRANE ON LEVEL

WORKING RADIUS IN FEET	LOAD IN POUNDS			
	360° ROTATION		OFF FRONT OF CRANE	
	WITHOUT OUTRIGGERS	WITH OUTRIGGERS	WITHOUT OUTRIGGERS	WITH OUTRIGGERS
8	30,000	30,000	30,000	30,000
10	23,200	30,000	30,000	30,000
12	17,000	25,000	23,700	25,000
14	13,000	21,400	18,350	21,400
15	11,600	20,000	16,350	20,000
16	10,500	18,800	14,600	18,800
18	8,900	16,750	11,950	16,750
20	7,300	15,000	9,800	15,000
22	6,150	13,350	8,150	13,700
24	5,100	11,400	7,000	12,500
25	4,750	10,700	6,500	12,000
30	3,200	7,800	4,750	9,800
35	2,150	6,000	3,500	7,800
40	1,400	4,600	2,650	6,000
45	800	3,750	1,850	4,800
50	300	2,800	1,250	3,900
55		2,350	950	3,250
60		1,800	600	2,700

The maximum allowable load on the 15 foot jib is 4000 lbs.

Deduct 400 lbs. plus the weight of any load handling device from the above ratings, due to dead weight, to determine the safe working load at any given radius.

The jib can be adjusted to operate at three different angles. Under no circumstances should the jib be operated below a horizontal position regardless of the boom angle.

All booms should be operated as short as conditions permit.

GALION

H-93022

GALION

18 Ton

CRANE LOAD RATINGS-POUNDS

Boom Radius Feet	Boom Angle Degrees	Boom Peak Height Feet	With Outriggers 360°
	25 Ft. Boom		
[illegible]	59.1	30.9	36000★
[illegible]	55.2	30.1	33000★
[illegible]	50.5	28.9	30000★
[illegible]	47.4	28.0	27700★
[illegible]	[illegible]	26.9	25700★
[illegible]	4[illegible]	25.7	24000★
[illegible]	1[illegible]	14.4	17200★
	30 Ft. Boom		
[illegible]	58.2	35.2	30000★
[illegible]	55.8	34.5	27700★
[illegible]	53.4	33.8	25700★
[illegible]	51.0	32.9	24000★
[illegible]	33.6	27.3	17200★
[illegible]	10.6	14.8	13200★
	36 Ft. Boom		
[illegible]	64.0	42.2	30000★
[illegible]	62.2	41.6	27700★
[illegible]	60.4	41.0	25700★
[illegible]	58.6	40.4	24000★
[illegible]	48.4	36.5	17200★
[illegible]	36.1	30.7	13200★
[illegible]	17.3	20.0	10500★
	42 Ft. Boom		
13	66.5	48.4	27400★
14	65.0	47.9	25700★
1[illegible]	63.4	47.4	24000★
[illegible]	55.4	44.3	17200★
[illegible]	46.4	40.0	13200★
30	35.8	34.0	10500★
35	21.6	24.1	8250★
	48 Ft. Boom		
15	67.0	5[illegible]	23000★
20	60.3	51.4	17200★
25	53.0	48.0	13200★
30	45.0	43.5	10500★
35	35.5	37.3	8250★
40	22.7	27.8	6750★

Boom Radius Feet	Boom Angle Degrees	Boom Peak Height Feet	With Outriggers 360°
	54 Ft. Boom		
20	63.9	58.3	17200★
25	57.7	55.4	13200★
30	51.1	51.7	10500★
35	43.8	46.9	8250★
40	35.3	40.6	6750★
45	24.2	31.5	5700
	60 Ft. Boom		
20	66.7	65.0	17000★
25	61.3	62.4	13200★
30	55.7	59.2	10500★
35	49.6	55.3	8250★
40	42.8	50.3	6750★
45	35.1	43.9	5700
50	25.3	35.0	4650
55	7.0	16.6	3850
	15 Ft. Jib Main Boom Extended to 60 Ft.		
25	67.5	79.1	6000★
30	63.2	76.8	6000★
35	58.8	73.9	5200★
40	54.2	70.5	4800
45	49.3	66.5	4100
50	44.0	61.6	3500
55	38.1	55.7	3100
60	31.2	48.2	2700
65	22.5	38.0	2400
70	6.2	17.3	2150
	20 Ft. Jib Main Boom Extended to 60 Ft.		
25	68.9	84.6	4500★
30	65.0	82.4	3800★
35	61.0	79.7	3400★
40	56.8	76.6	3000★
45	52.3	73.0	3000★
50	47.6	68.7	3000★
55	42.5	63.5	3000★
60	36.8	57.4	2700
65	30.2	49.6	2400
70	21.8	39.0	2150
75	6.0	17.6	1900

Without Outriggers

Boom Radius Feet	Max. Boom Extension Feet	14.00 x 24 (16 P.R.) Tires		16.00 x 24 (16 P.R.) Tires		17.5 x 25 (14 P.R.) Tires	
		Over Front	Over Side	Over Front	Over Side	Over Front	Over Side
12	36	21800★	15800	24600★	16000	17450★	16000★
15	42	17850★	11300	18600★	11450	13500★	11450
20	48	11600	7400	11600	7500	9700★	7500
25	60	8000	5200	8000	5300	8000	5300
30	60	5800	3600	5800	3600	5800	3600
35	60	4350	2500	4350	2500	4350	2500
40	60	3250	1700	3250	1700	3250	1700
45	60	2450		2450		2450	
50	60	1850		1850		1850	
55	60	1350		1350		1350	

NOTES

1. Crane load ratings in pounds as determined by boom length, radius or boom angle apply to the LRT-18U rough terrain crane only as originally manufactured and equipped. THEY ARE MAXIMUM LOAD RATINGS.
2. Operating radius is the horizontal distance from the axis of rotation before loading to the center of the vertical hoist line or tackle with load applied. Crane load ratings are for machines with 6,000 lbs. of counterweight and do not exceed 85% of tipping loads. Ratings identified with (★) are based on the machine's structural competence and not on the machine stability. Weight of hooks, hook blocks, slings and all other load handling devices, except hoist rope shall be considered a part of the load. Crane load ratings with outriggers are based on Powrspan outriggers fully extended and set to a distance of 8'0" from the longitudinal axis of the carrier to the outrigger float pivot connection and wheels within the boundary of the outriggers. Crane load ratings without outriggers depend on tire capacity and condition of tires inflated to 90 P.S.I. with 14.00 X 24 tires (75 P.S.I. with 16.00 X 24 and 65 P.S.I. with 17.5 X 25 tires.)
3. Crane load ratings are based on freely suspended loads with the machine leveled and standing on a firm, uniform supporting surface. Practical working loads depend on supporting surface, wind and other factors affecting stability, hazardous surroundings, experience of personnel and proper handling, all of which must be taken into account by the operator. Positioning or operation at radii and boom or jib lengths beyond the maximum and minimum shown, is not intended or approved. FOR BOOM RATINGS NOT SHOWN, USE THE RATINGS OF NEXT LONGER BOOM.
4. The operator and other personnel should fully read and acquaint themselves with Operator's Manual furnished by the manufacturer BEFORE operating this machine, and rules for safe operation of equipment should be adhered to at all times.
5. This crane and its load ratings are in accordance with Power Crane & Shovel Association Standard No. 2, SAE Crane Load Stability Test Code J-765a, and Safety Code for Cranes, Derricks and Hoists, ANSI B30.15.
6. When telescoping out with a load, do not exceed load ratings at longest boom length required.
7. Maximum length of main telescoping boom .....60 ft.
8. With outriggers set maximum boom and jib can be raised over the front or rear.
9. The ability to telescope the load is limited by boom angle, hydraulic pressure and boom lubrication.
10. Load ratings for the 25 ft. boom require the boom to be fully retracted.

JIB NOTES

1. Jibs may be used straight or offset. The 15 ft. telescoping jib may be extended to 20 ft. The following data applies:

Boom Angle Degrees	15 Ft. Jib Load Ratings		20 Ft. Jib Load Ratings	
	No Offset (Lbs.)	27° Offset (Lbs.)	No Offset (Lbs.)	27° Offset (Lbs.)
65	6000	5750	5000	3000
60	6000	5500	4400	2800
50	6000	4900	3700	2700
40	6000	4500	3100	2500
30	6000	4300	2700	2400
20	5200	3900	2400	2000
10	5000		2400	
0	4800		2400	

2. Load ratings for jibs are the same as for the boom length which is equal to the length of main boom plus jib, BUT IN NO CASE MAY THEY EXCEED THE RATINGS SHOWN ABOVE.
3. With jib installed, load ratings over main boom head must be reduced 840 lbs.

Hoist Cable Reeving

Number of Parts of Hoist Lines	1	2	3	4	5	6
Main Hoist Max. Loads (Lbs.)	6,500	13,000	19,500	26,000	32,500	36,000
Use ½" diameter hoist cable (6 x 25, IWRC, IPS) of 11.5 tons breaking strength.						

Note: These loads are based on safe load capacity. See chart for crane load ratings.

We reserve the right to amend these specifications at any time without notice. The only warranty applicable is our standard written warranty. We Make No Other Warranty, Expressed Or Implied.

KOEHRING

Koehring
Lorain Division
Chattanooga, Tennessee 37405

Printed in USA

L-3047A

This is the drum hook used at Area G&L. We have tried different types over ten years & this has been the safest and most reliable to date. [illegible] 9/21/85

To Place An Order Call TOLL FREE 1-800-828-7540
In New York State Reverse the Charges CALL 716-885-0155

DRUM HANDLING

TRUCKS
DRUMS

Wght. Lbs.	PRICE
STYLE	
135	$265.00
143	225.00
STYLE	
165	$300.00
225	310.00

On Single Models ..... Add $25.00

FOB TN

SINGLE DRUM LIFTER

CAPACITY 1000 LBS.

Bright Yellow Finish

MODEL DH-161

$52.00

Weight Approx. 6 Lbs.

See page 100 for tine hooks.

FOB NY

DRUM UPENDER

This heavy-duty steel 40" offset Upender takes the strain and effort out of positioning drums from horizontal to vertical position. A wide 2½" toe plate prevents denting of drums, and the 1½" hook has adequate clearance for the largest chime.

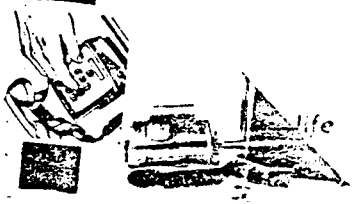
MODEL DH-194 $18.70 Weight 8 Lbs.

TIL[illegible]

This Drum [illegible] Makes tip[illegible] double ba[illegible] engaged [illegible] stock. Fi[illegible] 6½".

MOD[illegible] DH-1[illegible]

[illegible]ERS



CHAIN SLING LIFTER

Capacity 2000 Lbs.

Bright Yellow Finish

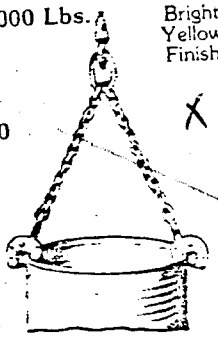
FOR LIFTING ALL SIZES OF DRUMS

MODEL DH-160

$147.85

Weight, Approx. 15 Lbs.

Complete with two grabs and alloy chain.



See page 100 for tine hooks.

FOB NY

CAN TIPPING STAND

Weight 9 lbs.

Will handle 5 gal. round cans and accommodate square cans by bending center rod to fit. Dispensing ht. 10" above floor level. Folds flat for storage.

MODEL DH-529

$22.30

FOB NY

WOOD DRUM SKIDS

13½" Between Rails

Hook one end on truck and other end rests on the ground. Barrel will slide down skid by force of gravity.

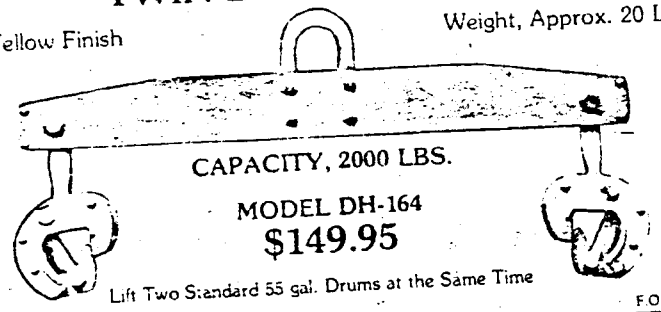
MODEL	Lgth.	1½" Rail	No. Bars	Wgt. Lbs.	PRICE
DH-196	6'	x 3½"	2	40	$ 60.00
DH-197	7'	x 3½"	2	45	63.00
DH-198	8'	x 3½"	2	55	71.00
DH-199	10'	x 5"	3	65	87.00
DH-200	12'	x 5"	4	70	106.00

FOB NY

TWIN DRUM LIFTER

Bright Yellow Finish

Weight, Approx. 20 Lbs.



CAPACITY, 2000 LBS.

MODEL DH-164

$149.95

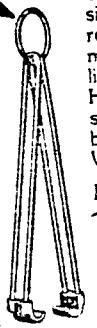
Lift Two Standard 55 gal. Drums at the Same Time

FOB NY

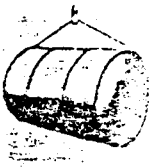
See page 100 for tine hooks.

DRUM LIFTING HOOKS

STEEL DRUM LIFTING HOOK



This Drum Lifting Hook consists of 7/16" double steel rods which are attached to malleable iron hooks. Welded lifting ring is 3" in diameter. Hook is designed for lifting steel drums. Can be used for barrels. Capacity, 1000 lbs. Weight, 5 lbs.



MODEL DH-165 (Steel) $16.50

BRONZE DRUM LIFTING HOOK

This non-sparking hook has the same construction features as above except entire unit is made of brass or bronze and has a 750 lbs. capacity. Weight 3 lbs.

MODEL DH-166 (Bronze) $40.70

FOB NY

[illegible]OUR

[illegible] DH-218 and DH-220

FOB IL

[illegible]-4-5-6-7-8

[illegible]EL DH-222
[illegible] 4 fiber drums

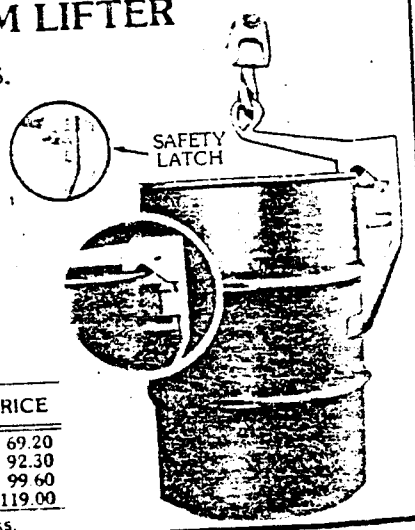
[illegible]EL DH-239
[illegible] ship loading

[illegible]ng [illegible]s.	Wgt. Lbs.	PRICE
[illegible]	440	$2300.00
[illegible]32	440	2300.00
[illegible]x28	455	2800.00
[illegible]x32	455	2800.00
[illegible]8x37	400	2300.00
[illegible]8x35	994	5900.00

SINGLE TINE DRUM LIFTER

CAPACITIES 2000 and 3000 LBS.

The single tine drum lifter provides positive grip and automatically locks as lifting force is applied. Models to handle 2000 and 3000 lbs. with and without positive safety lock. One man can handle full drums. No tilt lifting. Drums will lift straight up. Works with tight head or removeable head 30 and 55 gallon steel drums. Use existing overhead lifting equipment or fork truck equipped with the tine hook attachment (see page 96). Painted orange.



MODEL	Description	Cap. Lbs.	Wgt. Lbs.	PRICE
DH-167	Standard	2000	22	$ 69.20
DH-168	With Lock	2000	22	92.30
DH-527	Standard	3000	24	99.60
DH-528	With Lock	3000	24	119.00

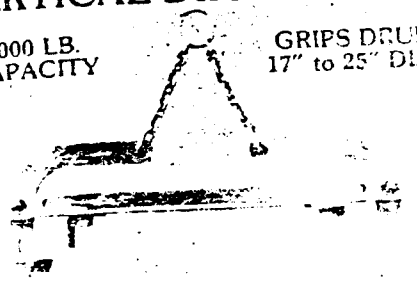
FOB IL

See page 100 for tine hooks.

VERTICAL DRUM LIFTER

1000 LB. CAPACITY

GRIPS DRUMS 17" to 25" DIAM.



Just hook to your crane. Positive grip holds drums that are open or closed. Heavy-duty -- forged chain. Bright red enamel finish.

MODEL DH-169 $116.35 Weight, 21 lbs.

FOB [illegible]

(716) 885-0155

TURNKEY MATERIAL HANDLING INC., 36 Letchworth St., Buffalo, N.Y. 14213 (716) 885-0155

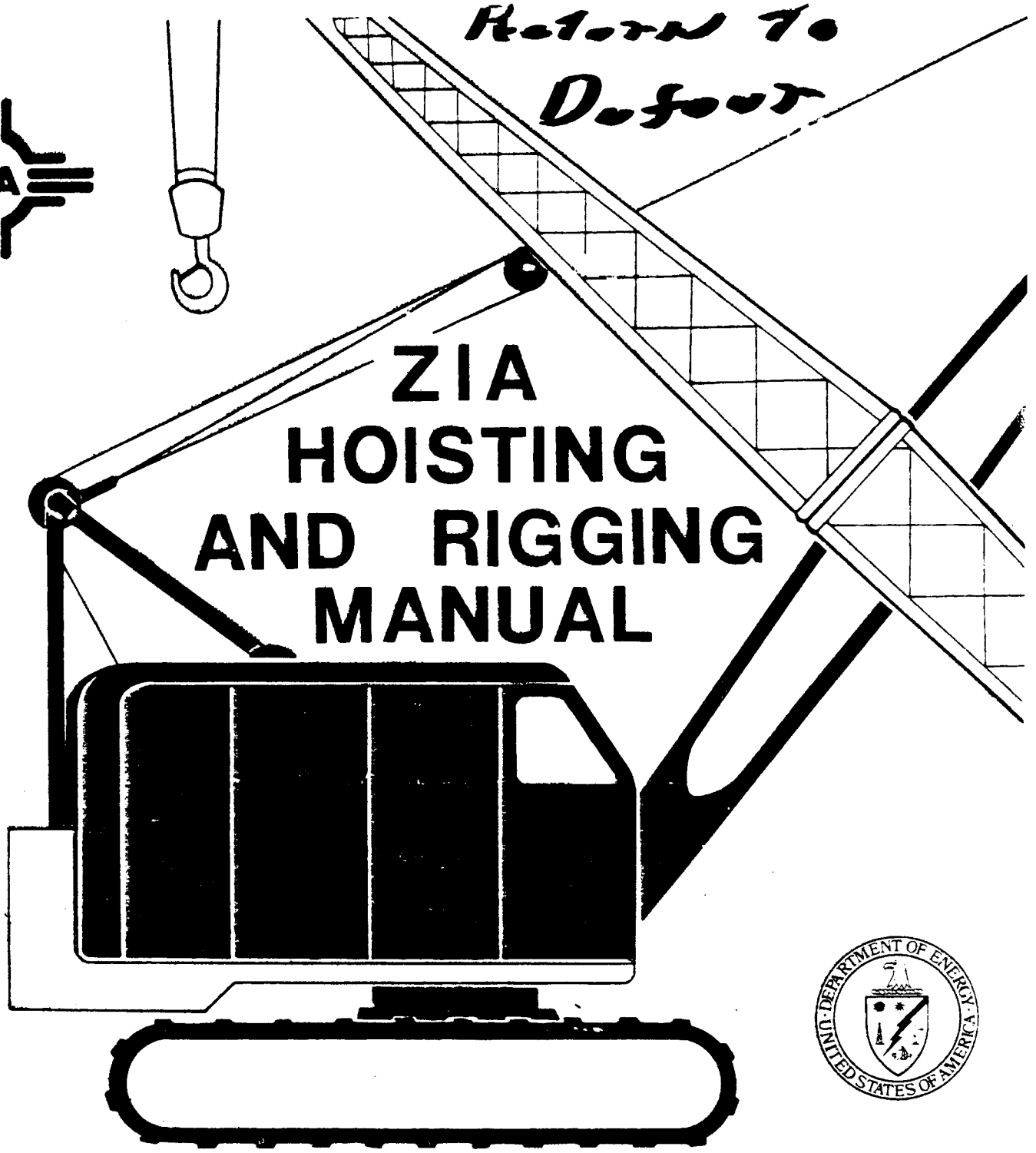
PN#			Zia Rate x G & A 13%
30157	Manitowoc Crane	140 ton	54.30
30346	P & H Crane	90 ton	33.50
~~30058~~	~~Koehring Crane~~	~~55 ton~~	28.20
30342	Lorain Crane	22 ton	14.00
30260	Lorain Crane	18 ton	14.85
30248	Lorain Crane	15 ton	14.00
30329	Fork Lift	20 ton	17.80
30388	Fork Lift	10 ton	14.10
30298	Fork Lift	7½ ton	14.40
30145	Fork Lift	6 ton	12.35
30331	Fork Lift	2 ton	5.25
30384	IHC Loader	2½ yd.	17.45
30334	Fiat Loader	3 yd.	15.95
30315	Yale Loader	3 yd.	14.85
30149	Michigan Loader	3½ yd.	24.85
30220	Michigan Loader	3 yd.	22.75
30360	Liebherr Backhoe 7/8 yd. 36" wide x 27' deep		33.40
30386	John Deere Backhoe or Crawler Dozer		7.65
30279	Case Backhoe		4.40
30247	IHC Backhoe		9.50
30349	IHC Track Dozer 25 w/ripper		30.35
30299	IHC Track Dozer 25 w/ripper		25.00
30223	Cat Track Dozer 46A w/ripper		30.10
30261	Michigan Dozer 280 Rubber Tired		30.10
30301	Terex Scraper	14 yd.	35.00
30332	Fiat Scraper	15 yd.	46.75
30324	John Deere Blade		15.05
30288	Champion Blade		14.10
30008	Buck Eye Ditcher 24" wide 5'9" deep		1.55
30316	Ditch Witch Ditcher 8" or 12" 6' deep		9.70
30202	Davis Ditcher 4" to 12" 4' deep		11.05
32449	Air Auger 1',2' or 3' diameter		2.45
30076	Chip Spreader		21.15
30308	Barber Green Lay down machine		17.10
30301	Ray Go- Vibratory Roller		18.25
30309	Ray Go- Vibratory Sheep foot		12.45
30153	Ingram- Pneumatic		6.60
30087	Bros- Pneumatic		4.65
30017	Pull type Sheep foot roller		1.45
30094	Ingram Steel wheel		4.20
30317	Bob Cats ¼ yd.		4.85
30318	Bob Cats ¼ yd.		4.85
30320	Bombadier rubber track dozer		9.35
30339	Bombadier rubber track dozer		9.35
30344	Vac All	Broom	33.45
30341	Bros	Broom	6.40

Used by Zia to lower Riggers into the shaft.

All Zia Riggers & Operators who dispose off
Waste at Area G & L (drum lowering into the shafts, etc)
are certified by the Crane Inspection Certification Bureau.

M Salyer HSE-7 9/26/85

Return to Dufour



ZIA HOISTING AND RIGGING MANUAL

ZIA HOISTING AND RIGGING MANUAL

The Zia Company
Los Alamos, New Mexico

1985

This manual is a Zia revised edition of DOE Hoisting and Rigging Manual with the following acknowledgments:

ACKNOWLEDGMENTS

1. Permission to reprint specific portions of the following documents has been granted by the American Society of Mechanical Engineers.
   ANSI B30.2.0-1976, Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)

   ANSI B30.5-1978, Crawler, Locomotive, and Truck Cranes

   ANSI B30.9-1971, Slings

   ANSI B30.10-1975, Hooks

   ANSI B30.16-1973, Overhead Hoists (Underhung)

   ANSI B56.1-1975, Low Lift and High Lift Trucks

   ANSI MH11.4-1973, Forks and Fork Carriers for Powered Industrial Fork Lift Trucks

   ANSI/ASME NQA-1-1979, Quality Assurance Program Requirements for Nuclear Power Plants

2. Permission to reprint specific illustrations from the Rigging Manual has been granted by the Construction Safety Association of Ontario.

3. Permission to reprint specific figures from SAE J1028, Mobile Crane Working Area Definitions, has been granted by the Society of Automotive Engineers, Inc., SAE.

How to Use This Manual

This Manual is intended to be used as a reference by line managers, supervisors, and personnel responsible for the safety of hoisting, rigging, and other material-handling activities in which mechanical assistance is required. Compliance with this Manual will be considered to be in compliance with applicable codes, standards, and regulations.

Revisions will be issued as the occasion warrants. The Manual is issued on a controlled distribution and all revisions will be distributed to Manual holders.

Section 1.0 contains definitions and terminology arranged alphabetically for easy reference. The subject of personnel qualifications is covered in Section 2.0. Sections 3.0 and 4.0 give the general requirements for lifting equipment and common below-the-hook devices.

The required operating practices may be followed for each specific type of lifting equipment and each type of below-the-hook device by reading the appropriate subsections of Section 5.0. For example, if the lifting equipment to be used is an overhead crane, Subsection 5.2 will delineate the general requirements for use of the crane and the specific requirements for Ordinary Lifts, High-Consequence Lifts, or Special High-Consequence Lifts (see Section 1.0 for definitions). Then, if the below-the-hook devices are wire-rope slings, Subsection 5.6 is to be used to determine the sling requirements, in the appropriate lift category.

Section 6.0 contains load tables, loading charts, weights of materials, and other information intended to help assure that the load is properly rigged and handled.

The inspection, test, maintenance, and storage requirements for each item in each lift category are contained in Secton 7.0.

Section 8.0 contains other safety considerations. Section 9.0 lists the references upon which this Manual is based.

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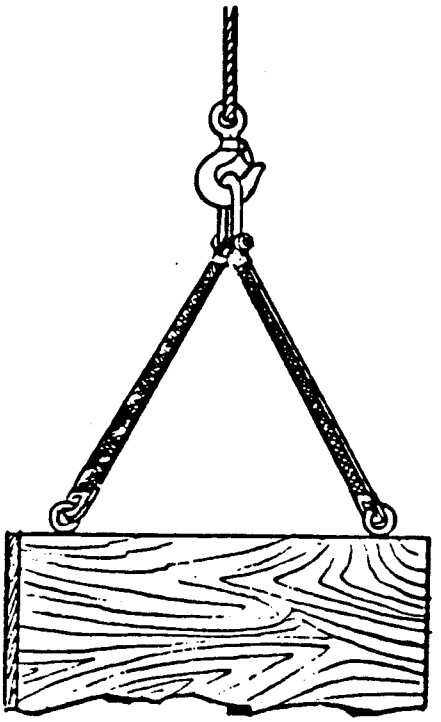
ZIA RIGGERS



TRAINING MANUAL

JANUARY 1985

ZIA RIGGERS TRAINING MANUAL

by Jules Dufour, Tito Trujillo and Dale Zarecor

ZIA TRAINING AND DEVELOPMENT CENTER

The Zia Company
PO Box 1539
Los Alamos NM 87544

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INTRODUCTION

Handling materials with any kind of overhead crane is an important job. Your life and those of many people, Zia employees and others, may depend on how well you work, and how carefully you follow safety and good crane-operating practice. Efficiency, cost-effectiveness and on-time achievement all depend on how well you handle your crane. Each kind of job has its special problems. You have to understand the basic principles behind the equipment you use. Each lift is, in effect, an engineering problem you must solve.

This manual, the larger Zia Hoisting and Rigging Manual, the CICB Student Manual, and many other safety manuals used in the industry, are designed to help you use basic rigging equipment correctly to do the job right. Any manual of this kind, though, only works if you read it, learn the ideas it contains, and practice using them in your work. Many tables in this manual, and tables like your crane's load chart, are designed for you to look up the information you need. Don't try to memorize the chart; instead, learn how to use it, so you can get the information you need about safe limits. Learn how to attach slings and hitches, then check back with the book when you do one. Make the principle that your always inspect ropes a part of your life, then refer to illustrations in the text to be sure you know how the rope should look.

Above all, don't expect this or any other manual to do your job for you. The information here will help you do a better and safer job, but only if you use it correctly and consistently.

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(6) If hooks are painted, visual inspection should take this coating into consideration. Surface variations can disclose evidence of heavy or severe service to require more detailed analysis of 10-1.4.1-(b)(2)(b) or 10-1.4.1(b)(2)(c). The surface condition may then call for stripping the paint in such instances.

(b) Repair of cracks, nicks, and gouges shall be carried out by a designated person by grinding longitudinally, following the contour of the hook, provided that no dimension is reduced more than 10% (or as recommended by the manufacturer) of its original value. (A qualified person may authorize continued use if the reduced area is not critical.)

(c) All other repairs shall be performed by the manufacturer or other qualified person.

Section 10-1.5 Operating Practices

Personnel using hooks shall be aware of the following:

(a) It shall be determined that the weight of the load to be lifted does not exceed the lesser of the load rating of the hook or the load rating of the equipment of which the hook is a part.

(b) Shock loading should be avoided.

(c) Load shall be centered in the base (bowl-saddle) of the hook to prevent point loading of the hook.

(d) Hooks shall not be used in such a manner as to place a side load or back load on the hook.

(e) When using a device to close the throat opening of the hook, care shall be taken that the load is not carried by the closing device.

(f) Hands, fingers, and body shall be kept from between hook and load.

(g) Duplex (sister) hooks shall be loaded equally on both sides unless the hook is specifically designed for single loading. When using an articulated duplex hook (sister) (see Fig. 6), care should be taken because articulation of the hook may cause instability in the slung load.

(h) If the duplex (sister) hook is loaded at the pinhole instead of at the two saddles, the load applied shall not exceed the rated load that would normally be shared by the two saddles, or the rated load of the supporting equipment.

AMERICAN NATIONAL STANDARD

SAFETY STANDARDS FOR CRANES, DERRICKS, HOISTS, HOOKS, JACKS, AND SLINGS

SLINGS

ANSI B30.9 - 1971

OCT 30 1972
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SECRETARIAT

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HAZARDOUS WASTES DISPOSED AT TA-54, AREA L, IN DISPOSAL SHAFTS

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

SHAFT NUMBER: 19

H 830063L	TRANSFORMER OIL ON ZORBAL & VERMICULITE	H-CODE: 06	VOL=	.113562 M3	WGT=	68.0389 KG	D-DATE:	830325

GROSS-VOL THIS SHAFT= .113562 M3 GROSS-WGT THIS SHAFT= 68.0389 KG

SHAFT NUMBER: 20

H 830016N	CHROMIC ACID BURIED IN 15 GAL DRUM	H-CODE: 00	VOL=	.567812E-01 M3	WGT=	36.2874 KG	D-DATE:	830223
H 830020L	ALUMINUM CHLORIDE IN DRUM #17 PLUS BE	H-CODE: 00	VOL=	.113562 M3	WGT=	79.3788 KG	D-DATE:	830223
H 830021L	INORGANICS IN DRUM #18	H-CODE: 00	VOL=	.113562 M3	WGT=	79.3788 KG	D-DATE:	830223
H 830022L	INORGANICS IN DRUM #19	H-CODE: 00	VOL=	.113562 M3	WGT=	86.1827 KG	D-DATE:	830223
H 830027L	PERCHLORIC ACID	H-CODE: 03	VOL=	.378541E-02 M3	WGT=	.907186 KG	D-DATE:	830203
H 830059N	INORGANICS DISPOSED OF IN OWN DRUM	H-CODE: 00	VOL=	.454250 M3	WGT=	453.597 KG	D-DATE:	830324
H 830066N	10 GAL OF FUME LITHARGE (PBO)	H-CODE: 00	VOL=	.378541E-01 M3	WGT=	37.8297 KG	D-DATE:	830324
H 830195L	OIL ON VERMICULITE	H-CODE: 06	VOL=	.416325 M3	WGT=	226.776 KG	D-DATE:	830929
H 830196L	CUTTING OIL ON VERMICULITE	H-CODE: 06	VOL=	.454250 M3	WGT=	249.476 KG	D-DATE:	830929
H 830211L	OIL ABSORBED ON VERMICULITE	H-CODE: 06	VOL=	.624593 M3	WGT=	226.776 KG	D-DATE:	830929

GROSS-VOL THIS SHAFT= 2.38860 M3 GROSS-WGT THIS SHAFT= 1476.63 KG

SHAFT NUMBER: 21

H 830091N	CORRODED CL2 AND HF CYLINDERS-VENTED	H-CODE: 08	VOL=	.757083E-01 M3	WGT=	90.7186 KG	D-DATE:	830525
H 830205N	F2 CYCLINDER VENTED PUT IN SHAFT	H-CODE: 08	VOL=	.141584E-01 M3	WGT=	9.07186 KG	D-DATE:	830929
H 830281N	8 CYLINDERS FROM C AREA TO CYL. SHAFT	H-CODE: 08	VOL=	.200000 M3	WGT=	136.078 KG	D-DATE:	831215
H 840127N	EMPTY CYLINDERS TO SHAFT	H-CODE: 08	VOL=	.141584E-01 M3	WGT=	18.1437 KG	D-DATE:	840424
H 840306N	EMPTY GAS MIXING CYLINDER	H-CODE: 08	VOL=	.100000E-01 M3	WGT=	9.07186 KG	D-DATE:	840703
H 840353N	EMPTY GAS CYLINDERS	H-CODE: 08	VOL=	.566336E-01 M3	WGT=	18.1437 KG	D-DATE:	840806
H 840409N	EMPTY CYLINDERS	H-CODE: 08	VOL=	.141584 M3	WGT=	45.3593 KG	D-DATE:	840924
H 840411N	EMPTY CYLINDERS	H-CODE: 08	VOL=	.481386E-01 M3	WGT=	11.3398 KG	D-DATE:	840926
H 840454N	EMPTY GAS CYLINDERS	H-CODE: 08	VOL=	.849505E-01 M3	WGT=	22.6796 KG	D-DATE:	841120
H 840455N	EMPTY GAS CYLINDERS	H-CODE: 08	VOL=	.206138 M3	WGT=	90.7186 KG	D-DATE:	841120

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54 AREA L, IN DISPOSAL SHAFTS

H 850051N	GAS CYLINDERS THAT HAVE BEEN VENTED	H-CODE:	08	VOL=	.113267 M3	WGT=	45.3593 KG	D-DATE:	850319
H 850163N	EMPTY HELIUM CYLINDERS	H-CODE:	08	VOL=	.500000E-02 M3	WGT=	13.6078 KG	D-DATE:	850715
H 850165N	EMPTY KRYPTON CYLINDERS	H-CODE:	08	VOL=	.198218E-01 M3	WGT=	4.53593 KG	D-DATE:	850725
H 850214L	EMPTY FLOURINE CYCLINDERS	H-CODE:	08	VOL=	.842505E-01 M3	WGT=	102.058 KG	D-DATE:	850813
H 850215N	BATTERIES	H-CODE:	00	VOL=	.416395 M3	WGT=	181.437 KG	D-DATE:	850805

GROSS-VOL THIS SHAFT= 2.12021 M3 GROSS-WGT THIS SHAFT= 228.324 KG

SHAFT NUMBER: 22

H 830009L	ORGANICS IN DRUM #40	H-CODE:	01	VOL=	.113562 M3	WGT=	104.326 KG	D-DATE:	830223
H 830010L	ORGANIC SOLVENT WITH KEROSENE BASE	H-CODE:	01	VOL=	.113562 M3	WGT=	90.7136 KG	D-DATE:	830223
H 830011L	ORGANIC CHEMICALS	H-CODE:	01	VOL=	.113562 M3	WGT=	83.9147 KG	D-DATE:	830223
H 830012L	ORGANICS	H-CODE:	01	VOL=	.113562 M3	WGT=	97.1108 KG	D-DATE:	830223
H 830013L	ORGANICS DRUM #44	H-CODE:	01	VOL=	.113562 M3	WGT=	61.6886 KG	D-DATE:	830223
H 830014L	ORGANICS IN DRUM #45	H-CODE:	01	VOL=	.113562 M3	WGT=	91.1722 KG	D-DATE:	830223
H 830017L	ORGANICS IN DRUM #46	H-CODE:	01	VOL=	.113562 M3	WGT=	47.6273 KG	D-DATE:	830223
H 830018L	ORGANICS IN DRUM #47	H-CODE:	01	VOL=	.113562 M3	WGT=	81.6467 KG	D-DATE:	830223
H 830019L	ORGANICS IN DRUM #39	H-CODE:	01	VOL=	.113562 M3	WGT=	99.7905 KG	D-DATE:	830223
H 830023N	CUTTING OIL ON VERMICULITE	H-CODE:	06	VOL=	.340687 M3	WGT=	299.371 KG	D-DATE:	830223
H 830024N	PAINT THINNER IN VERMICULITE	H-CODE:	01	VOL=	.624593 M3	WGT=	635.036 KG	D-DATE:	830223
H 830038L	ORGANICS DRUM #48	H-CODE:	01	VOL=	.208198 M3	WGT=	122.224 KG	D-DATE:	830325
H 830039L	ORGANICS DRUM #49	H-CODE:	01	VOL=	.208198 M3	WGT=	103.419 KG	D-DATE:	830325
H 830060N	CHEMICALS DISPOSED OF IN OWN CONTAINER	H-CODE:	01	VOL=	.227125 M3	WGT=	83.9147 KG	D-DATE:	830315
H 830061N	UNREACT ORGANICS BURIED IN OWN CONTAINER	H-CODE:	01	VOL=	3.10000 M3	WGT=	1905.11 KG	D-DATE:	830324

GROSS-VOL THIS SHAFT= 5.23086 M3 GROSS-WGT THIS SHAFT= 3887.77 KG

SHAFT NUMBER: 23

H 830086L	OIL ON VERMICULITE	H-CODE:	06	VOL=	.832791 M3	WGT=	725.755 KG	D-DATE:	830525
H 830087L	OIL ON VERMICULITE	H-CODE:	06	VOL=	.832791 M3	WGT=	362.874 KG	D-DATE:	830525
H 830088L	VACUUM PUMP OIL ON VERMICULITE	H-CODE:	06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	830525
H 830082L	OIL ABSORBED ON VERMICULITE	H-CODE:	06	VOL=	.113562 M3	WGT=	79.3788 KG	D-DATE:	830525

HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 830020L	REGAL OIL GR AND O	H-CODE: 06	VOL=	.378541E-01 M3	WGT=	40.8234 KG	D-DATE:	830525
H 830141L	CUTTING OIL ON VERMICULITE	H-CODE: 06	VOL=	.454250 M3	WGT=	453.597 KG	D-DATE:	830526
H 830268L	LOW PCB OIL FOR AREA L	H-CODE: 06	VOL=	2.91477 M3	WGT=	1360.79 KG	D-DATE:	831216
H 830269L	CUTTING OIL ON VERMICULITE	H-CODE: 06	VOL=	.454250 M3	WGT=	272.156 KG	D-DATE:	831216
H 830273L	LOW PCB OIL ON VERMICULITE	H-CODE: 06	VOL=	1.87378 M3	WGT=	1088.63 KG	D-DATE:	831216
H 830274L	OIL AND H20 ABSORBED ON VERMICULITE	H-CODE: 06	VOL=	.624593 M3	WGT=	362.878 KG	D-DATE:	831216
H 830275N	DIRTY OIL TO OIL SHAFT	H-CODE: 06	VOL=	.189271E-01 M3	WGT=	22.6796 KG	D-DATE:	831216
H 830276L	DIESEL FUEL OIL ON VERMICULITE	H-CODE: 06	VOL=	5.60000 M3	WGT=	1814.39 KG	D-DATE:	831216
H 830286N	LIGHT WEIGHT OIL TO OIL SHAFT	H-CODE: 06	VOL=	.100000E-03 M3	WGT=	2.26796 KG	D-DATE:	831216
H 840030L	OIL ON VERMICULITE	H-CODE: 06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840223
H 840031N	PCB FREE OIL ON VERMICULITE	H-CODE: 06	VOL=	.832791 M3	WGT=	453.597 KG	D-DATE:	840223
H 840032L	USED CUTTING OIL ON VERMICULITE	H-CODE: 06	VOL=	.454250 M3	WGT=	272.156 KG	D-DATE:	840223

GROSS VOL THIS SHAFT= 15.4611 M3 GROSS WGT THIS SHAFT= 7504.13 KG

SHAFT NUMBER: 24

H 830259L	ORGANICS IN DRUM 91	H-CODE: 01	VOL=	.208198 M3	WGT=	192.777 KG	D-DATE:	831216
H 830260L	OIL AND KEROSENE ON VERMICULITE	H-CODE: 06	VOL=	.832791 M3	WGT=	544.317 KG	D-DATE:	831216
H 830261L	TRICHLOROETHANE ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	90.7186 KG	D-DATE:	831216
H 830262L	RESIN	H-CODE: 01	VOL=	.624593 M3	WGT=	453.597 KG	D-DATE:	831216
H 830263L	ETHYLENE GLYCOL ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	90.7186 KG	D-DATE:	831216
H 830264L	STODDARD SOLVENT ON VERMICULITE	H-CODE: 01	VOL=	.832791 M3	WGT=	544.317 KG	D-DATE:	831216
H 830265L	ORGANICS IN DRUM 88	H-CODE: 01	VOL=	.208198 M3	WGT=	217.725 KG	D-DATE:	831216
H 830266L	ORGANICS IN DRUM #89	H-CODE: 01	VOL=	.200000 M3	WGT=	204.117 KG	D-DATE:	831216
H 830267L	ORGANICS IN DRUM 90	H-CODE: 01	VOL=	.208198 M3	WGT=	222.261 KG	D-DATE:	831216
H 830288N	2-ETHYL-1-HEXANOL	H-CODE: 00	VOL=	.302833 M3	WGT=	302.547 KG	D-DATE:	830929
H 840033L	PAINT THINNER ABSORBED ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	181.437 KG	D-DATE:	840223
H 840034L	2-PROPANOL ABSORBED ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	181.437 KG	D-DATE:	840223
H 840035L	ORGANICS IN DRUM 92	H-CODE: 01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840223
H 840036N	SURFACTANT OVERPACKED IN VERMICULITE	H-CODE: 01	VOL=	.321760 M3	WGT=	158.758 KG	D-DATE:	840223
H 840037L	ORGANICS IN DRUM 93	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840223
H 840038L	ORGANICS IN DRUM 94	H-CODE: 01	VOL=	.208198 M3	WGT=	226.776 KG	D-DATE:	840223
H 840039L	PAINT THINNER ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	272.156 KG	D-DATE:	840223
H 840040L	GLYCOL ETHER EB ON VERMICULITE	H-CODE: 01	VOL=	.132487 M3	WGT=	68.0389 KG	D-DATE:	840223

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 840041L	OILS WITH SOLVENT ON VERMICULITE	H-CODE:	06	VOL=	2.22017 M3	WGT=	2267.99 KG	D-DATE:	840223
H 840042L	1,1,1 TRICHLOROETHANE ON VERMICULITE	H-CODE:	01	VOL=	1.04099 M3	WGT=	907.194 KG	D-DATE:	840223
H 840043L	ORGANICS IN DRUM 95	H-CODE:	01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840223
H 840044L	ORGANICS IN DRUM 96	H-CODE:	01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840223
H 840045L	ORGANICS IN DRUM 97	H-CODE:	01	VOL=	.208198 M3	WGT=	120.509 KG	D-DATE:	840223
H 840046L	ORGANICS IN DRUM 98	H-CODE:	01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840223
H 840047L	ORGANICS IN DRUM 99	H-CODE:	01	VOL=	.208198 M3	WGT=	226.796 KG	D-DATE:	840223
H 840095L	ORGANICS IN DRUM 111	H-CODE:	01	VOL=	.208198 M3	WGT=	170.097 KG	D-DATE:	840405
H 840096L	ORGANICS IN DRUM 110	H-CODE:	01	VOL=	.113562 M3	WGT=	90.7186 KG	D-DATE:	840405
H 840097L	ORGANICS IN DRUM 109 (BENZENE)	H-CODE:	01	VOL=	.113562 M3	WGT=	90.7186 KG	D-DATE:	840405
H 840098L	ORGANICS IN DRUM 108	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840099L	ORGANICS IN DRUM 107	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840100L	ORGANICS IN DRUM 106	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840101L	ORGANICS IN DRUM 105	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840102L	ORGANICS IN DRUM 104	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840103L	ORGANICS IN DRUM 103	H-CODE:	01	VOL=	.208198 M3	WGT=	158.758 KG	D-DATE:	840405
H 840104L	ORGANICS IN DRUM 102	H-CODE:	01	VOL=	.208198 M3	WGT=	170.097 KG	D-DATE:	840405
H 840105L	ORGANICS IN DRUM 101	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840106L	ORGANICS IN DRUM 100	H-CODE:	01	VOL=	.113562 M3	WGT=	113.398 KG	D-DATE:	840405
H 840115L	LOW LEVEL PCB OIL ON VERMICULITE	H-CODE:	06	VOL=	2.91477 M3	WGT=	1814.39 KG	D-DATE:	840405
H 840116L	VACUUM PUMP OIL ON VERMICULITE	H-CODE:	06	VOL=	.340697 M3	WGT=	272.156 KG	D-DATE:	840405
H 840117L	TEXACO REGAL OIL ON VERMICULITE	H-CODE:	06	VOL=	1.04099 M3	WGT=	725.755 KG	D-DATE:	840405
H 840118L	ORGANIC AND OIL ON VERMICULITE	H-CODE:	06	VOL=	3.47185 M3	WGT=	2267.99 KG	D-DATE:	840405

GROSS-VOL THIS SHAFT= 20.7169 M3 GROSS-WGT THIS SHAFT= 15504.8 KG

SHAFT NUMBER: 25

H 830034L	INORGANIC IN DRUM #20	H-CODE:	00	VOL=	.208198 M3	WGT=	88.4506 KG	D-DATE:	830325
H 830035L	INORGANICS IN DRUM #21	H-CODE:	00	VOL=	.113562 M3	WGT=	117.934 KG	D-DATE:	830325
H 830036L	INORGANICS IN DRUM #22	H-CODE:	00	VOL=	.113562 M3	WGT=	74.8428 KG	D-DATE:	830325
H 830037N	GaAs ABSORBED ON PAPER TOWELS DRUM #23	H-CODE:	00	VOL=	.113562 M3	WGT=	181.437 KG	D-DATE:	830325
H 830079L	PERCHLORIC ACID	H-CODE:	04	VOL=	.189271E-01 M3	WGT=	4.53593 KG	D-DATE:	830405
H 830104L	PHOTOCHEMICAL WASTES IN DRUM 23	H-CODE:	00	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	830525
H 830105L	INORGANICS IN DRUM #24	H-CODE:	01	VOL=	.208198 M3	WGT=	120.509 KG	D-DATE:	830525

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 830106L	PHOTOCHEMICALS INORGANIC DRUM #25	H-CODE:	02	VOL=	.113562 M3	WGT=	90.7186 KG	D-DATE:	830525
H 830107L	PHOTOCHEMICALS IN DRUM INORGANIC 26	H-CODE:	02	VOL=	.113562 M3	WGT=	22.7905 KG	D-DATE:	830525
H 830108L	UNKNOWN WHITE POWDER IN INORG. DRUM #27	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	830525
H 830164L	INORGANICS IN DRUM #29	H-CODE:	00	VOL=	.208198 M3	WGT=	36.2874 KG	D-DATE:	830725
H 830168L	INORGANICS IN DRUM #28	H-CODE:	00	VOL=	.208198 M3	WGT=	158.758 KG	D-DATE:	830725
H 830169L	INORGANICS IN DRUM #29	H-CODE:	00	VOL=	.113562 M3	WGT=	22.9866 KG	D-DATE:	830725
H 830170L	INORGANICS IN DRUM #30	H-CODE:	00	VOL=	.208198 M3	WGT=	158.758 KG	D-DATE:	830725
H 830171L	INORGANICS IN DRUM #31	H-CODE:	00	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	830725
H 830209N	INORGANICS IN OWN CARTONS	H-CODE:	00	VOL=	1.36275 M3	WGT=	1360.79 KG	D-DATE:	830929
H 830277L	INORGANICS IN DRUM #34	H-CODE:	00	VOL=	.208198 M3	WGT=	120.509 KG	D-DATE:	831216
H 830278N	SODA LIME IN OWN DRUM	H-CODE:	02	VOL=	.113562 M3	WGT=	68.0389 KG	D-DATE:	831216
H 830279L	INORGANICS IN DRUM #33	H-CODE:	00	VOL=	.208198 M3	WGT=	272.156 KG	D-DATE:	831216
H 840003N	INORGANICS BURIED IN OWN CONTAINERS	H-CODE:	00	VOL=	.226535 M3	WGT=	204.117 KG	D-DATE:	840127
H 840027L	INORGANICS IN DRUM 35	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840223
H 840028N	OAKITE - STRONG DETERGENT	H-CODE:	01	VOL=	.567812E-01 M3	WGT=	45.3593 KG	D-DATE:	840223
H 840029N	CHLOROFORM WITH OIL, ACIDS IN PLASTIC	H-CODE:	02	VOL=	.113562 M3	WGT=	22.6796 KG	D-DATE:	840223
H 840107L	INORGANICS IN DRUM 41	H-CODE:	00	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840108L	INORGANICS IN DRUM 40	H-CODE:	00	VOL=	.113562 M3	WGT=	90.7186 KG	D-DATE:	840405
H 840109L	INORGANICS IN DRUM 39	H-CODE:	00	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840110L	INORGANICS IN DRUM 38	H-CODE:	00	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840111L	INORGANICS IN DRUM 37(HG)	H-CODE:	00	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840112L	INORGANICS IN DRUM 36	H-CODE:	00	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840405
H 840121N	GLASSWARE-HG CONTAMINATED	H-CODE:	09	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	840405
H 840123N	VARIOUS ARTICLES CONTAM. WITH AS	H-CODE:	02	VOL=	.113562 M3	WGT=	68.0389 KG	D-DATE:	840405
H 840129L	INORGANICS IN DRUM #46	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840426
H 840130L	INORGANICS IN DRUM #45	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840426
H 840131L	INORGANICS IN DRUM #44	H-CODE:	00	VOL=	.208198 M3	WGT=	226.796 KG	D-DATE:	840426
H 840132L	INORGANICS IN DRUM 42	H-CODE:	00	VOL=	.208198 M3	WGT=	158.758 KG	D-DATE:	840426
H 840196L	INORGANICS IN DRUM #51	H-CODE:	00	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840618
H 840197L	GALLIUM ARSENIDE IN DRUM #50	H-CODE:	00	VOL=	.113562 M3	WGT=	34.0195 KG	D-DATE:	840618
H 840198L	INORGANICS IN DRUM #49	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840618
H 840199L	INORGANICS IN DRUM #48	H-CODE:	00	VOL=	.208198 M3	WGT=	192.777 KG	D-DATE:	840618
H 840208N	SIGMA CHEMICALS DISPOSED OF IN OWN DRUMS	H-CODE:	02	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840618
H 840209L	BROKEN BATTERY PLUS CLEANUP ON VEB.	H-CODE:	02	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	840618
H 840210L	ENBOND Z-72	H-CODE:	02	VOL=	.208198 M3	WGT=	90.7186 KG	D-DATE:	840618
H 840305N	LEAD CHIPS	H-CODE:	00	VOL=	.113562 M3	WGT=	113.398 KG	D-DATE:	840723

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 840317L	INORGANICS IN DRUM 57 COPIER FLUID	H-CODE:	02	VOL=	.208198 M3	WGT=	217.725 KG	D-DATE:	840724
H 840318L	INORGANICS IN DRUM 56 COPIER FLUID	H-CODE:	02	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840724
H 840319L	INORGANICS IN DRUM 55 COPIER FLUID	H-CODE:	02	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840724
H 840320L	INORGANICS IN DRUM 54	H-CODE:	00	VOL=	.208198 M3	WGT=	217.725 KG	D-DATE:	840724
H 840321L	INORGANICS IN DRUM 53	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840724
H 840390L	INORGANICS IN DRUM 60	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841029
H 840391L	INORGANIC DRUM 59	H-CODE:	00	VOL=	.208198 M3	WGT=	190.509 KG	D-DATE:	840924
H 840392L	INORGANIC DRUM 58	H-CODE:	00	VOL=	.208198 M3	WGT=	192.777 KG	D-DATE:	840924
H 840398N	SODIUM SILICATE	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840924
H 840435L	BE WASTES PACKED IN VERMICULITE	H-CODE:	00	VOL=	.113562 M3	WGT=	36.2874 KG	D-DATE:	841029
H 840468L	INORGANICS IN DRUM#64 (SALTS)	H-CODE:	00	VOL=	.208198 M3	WGT=	215.457 KG	D-DATE:	841219
H 840473N	EBONAL-C	H-CODE:	02	VOL=	.302033 M3	WGT=	302.547 KG	D-DATE:	841219
H 840474N	PHOTO RESIST STRIPPER	H-CODE:	02	VOL=	.416395 M3	WGT=	453.597 KG	D-DATE:	841219
H 840476N	AMMONIA ETCHANT	H-CODE:	00	VOL=	.624593 M3	WGT=	635.036 KG	D-DATE:	841219
H 840479L	INORGANICS IN DRUM #62	H-CODE:	00	VOL=	.208198 M3	WGT=	208.653 KG	D-DATE:	841219
H 840480L	INORGANICS IN DRUM #61	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841219
H 840482L	INORGANICS IN DRUM #63	H-CODE:	00	VOL=	.208198 M3	WGT=	.453593 KG	D-DATE:	841219
H 840487L	INORGANICS IN DRUM 365	H-CODE:	00	VOL=	.208198 M3	WGT=	249.476 KG	D-DATE:	841219
H 840491L	HYDROGEN CHLORIDE ON SODIUM CARBONATE	H-CODE:	00	VOL=	.113562 M3	WGT=	22.6796 KG	D-DATE:	841219
H 850022L	INORGANICS IN DRUM #66	H-CODE:	00	VOL=	.208198 M3	WGT=	238.136 KG	D-DATE:	850221
H 850030L	INORGANICS IN DRUM #67	H-CODE:	00	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	850221
H 850034L	INORGANICS IN DRUM #68	H-CODE:	00	VOL=	.208198 M3	WGT=	158.758 KG	D-DATE:	850221
H 850061L	INORGANICS IN DRUM #69	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	850426

GROSS-VOL THIS SHAFT= 13.2676 M3 GROSS-WGT THIS SHAFT= 12150.9 KG

SHAFT NUMBER: 26

H 830040L	ORGANICS IN DRUM #50	H-CODE:	01	VOL=	.208198 M3	WGT=	104.326 KG	D-DATE:	830325
H 830041L	ORGANICS IN DRUM #51	H-CODE:	01	VOL=	.208198 M3	WGT=	131.542 KG	D-DATE:	830325
H 830042L	ORGANICS IN DRUM #52	H-CODE:	01	VOL=	.208198 M3	WGT=	122.016 KG	D-DATE:	830325
H 830043L	ORGANICS DRUM #56	H-CODE:	01	VOL=	.208198 M3	WGT=	77.1108 KG	D-DATE:	830325
H 830044L	ORGANICS IN DRUM #57	H-CODE:	01	VOL=	.208198 M3	WGT=	131.542 KG	D-DATE:	830325
H 830045L	FLAMMABLE ORGANICS IN DRUM #58	H-CODE:	01	VOL=	.208198 M3	WGT=	147.418 KG	D-DATE:	830325
H 830046L	ORGANICS IN DRUM #59	H-CODE:	01	VOL=	.208198 M3	WGT=	167.829 KG	D-DATE:	830325

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54 AREA L, IN DISPOSAL SHAFTS

H 830047L	ORGANICS IN DRUM #60	H-CODE: 01	VOL=	.208198 M3	WGT=	156.470 KG	D-DATE:	830325
H 830062L	ORGANICS IN DRUM #60	H-CODE: 01	VOL=	.208198 M3	WGT=	61.2350 KG	D-DATE:	830325
H 830064N	DIOCTYL PHTHALATE CONTAMINATED EQUIPMENT	H-CODE: 01	VOL=	.416395 M3	WGT=	272.156 KG	D-DATE:	830325
H 830067L	1 PT. TRIFLUOROMETHANE & SULFAMIC ACID	H-CODE: 01	VOL=	.113562 M3	WGT=	31.7515 KG	D-DATE:	830325
H 830092L	ETHANOL AND FREON ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	830525
H 830101L	SOLVENT PACKED ON VERMICULITE	H-CODE: 01	VOL=	.624593 M3	WGT=	454.597 KG	D-DATE:	830525
H 830103L	CHLOROTHENE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	830525
H 830109L	PHOTOCHEMICAL WASTES IN DRUM #61	H-CODE: 01	VOL=	.208198 M3	WGT=	170.097 KG	D-DATE:	830525
H 830110L	ORGANICS IN DRUM #62	H-CODE: 01	VOL=	.208198 M3	WGT=	190.509 KG	D-DATE:	830525
H 830111L	ORGANICS IN DRUM #63	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	830525
H 830112L	ORGANICS IN DRUM #64	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	830525
H 830113L	ORGANICS IN DRUM #65	H-CODE: 01	VOL=	.208198 M3	WGT=	190.509 KG	D-DATE:	830525
H 830114L	ORGANICS IN DRUM #66	H-CODE: 01	VOL=	.208198 M3	WGT=	158.758 KG	D-DATE:	830525
H 830115L	ORGANICS IN DRUM #67	H-CODE: 01	VOL=	.208198 M3	WGT=	190.509 KG	D-DATE:	830525
H 830116L	ORGANICS IN DRUM #68	H-CODE: 01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	830525
H 830117L	ORGANICS IN DRUM #69	H-CODE: 01	VOL=	.113562 M3	WGT=	63.5030 KG	D-DATE:	830525
H 830118L	CHSO4 AND OIL ON VERMICULITE IN DRUM #70	H-CODE: 01	VOL=	.113562 M3	WGT=	49.8932 KG	D-DATE:	830525
H 830119L	ORGANICS IN DRUM #71	H-CODE: 01	VOL=	.113562 M3	WGT=	122.470 KG	D-DATE:	830525
H 830120L	ETHYLENE DIAMINE LEAKING DRUM #72	H-CODE: 01	VOL=	.113562 M3	WGT=	68.0389 KG	D-DATE:	830525
H 830142N	4-5 GAL. CANS OF OIL	H-CODE: 06	VOL=	.757083L-01 M3	WGT=	68.0389 KG	D-DATE:	830620
H 830163L	ORGANICS IN DRUM #77	H-CODE: 01	VOL=	.208198 M3	WGT=	61.2350 KG	D-DATE:	830725
H 830166L	CLEANING SOL. CONTAIN Be ON VERMICULITE	H-CODE: 00	VOL=	.832791 M3	WGT=	1360.79 KG	D-DATE:	830725
H 830173L	ORGANICS IN DRUM #73	H-CODE: 01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	830725
H 830174L	ORGANICS IN DRUM #74	H-CODE: 01	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	830725
H 830175L	ORGANICS IN DRUM #75	H-CODE: 01	VOL=	.208198 M3	WGT=	158.758 KG	D-DATE:	830725
H 830176L	ORGANICS IN DRUM #76	H-CODE: 01	VOL=	.208198 M3	WGT=	147.418 KG	D-DATE:	830725
H 830177L	ORGANICS IN DRUM #77	H-CODE: 01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	830725
H 830178L	ORGANICS IN DRUM #78	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	830725
H 830179L	ORGANICS IN DRUM #79	H-CODE: 01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	830725
H 830194L	ORGANIC CHEMICALS FROM S-SITE CLEANUP	H-CODE: 01	VOL=	2.66872 M3	WGT=	2267.99 KG	D-DATE:	830929
H 830207L	SOLVENT WASTE ON VERMICULITE	H-CODE: 01	VOL=	.624593 M3	WGT=	635.036 KG	D-DATE:	830929
H 830208L	ORGANICS ABSORBED ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	830929
H 830218L	ORGANICS IN DRUM 80	H-CODE: 01	VOL=	.208198 M3	WGT=	172.365 KG	D-DATE:	830929
H 830219L	ORGANICS IN DRUM 81	H-CODE: 01	VOL=	.113562 M3	WGT=	68.0389 KG	D-DATE:	830929
H 830220L	DYE ON VERMICULITE DRUM 82	H-CODE: 01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	830929
H 830221L	ORGANICS IN DRUM 83	H-CODE: 01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	830929

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 830222L	ORGANICS IN DRUM 84 ON VERMICULITE	H-CODE: 01	VOL=	.113562 M3	WGT=	34.0175 KG	D-DATE:	830929
H 830223L	DRUM 85 DYE ON VERMICULITE	H-CODE: 01	VOL=	.113562 M3	WGT=	68.0389 KG	D-DATE:	830929
H 830224L	ORGANICS IN DRUM 86	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	830929
H 830225L	ORGANICS IN DRUM 87	H-CODE: 01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	830929
H 850104L	BERYLLIUM WASTE	H-CODE: 00	VOL=	.454250 M3	WGT=	102.058 KG	D-DATE:	850307

GROSS-VOL THIS SHAFT= 13.8925 M3 GROSS-WGT THIS SHAFT= 10904.0 KG

SHAFT NUMBER: 27

H 830078L	SULFAMIC ACID ABSORBED ON VERMICULITE	H-CODE: 01	VOL=	.567812E-01 M3	WGT=	45.3593 KG	D-DATE:	830405
H 830098N	MERCURY WITH HIGH EXPLOSIVE TO SHAFT #27	H-CODE: 00	VOL=	.900000E-03 M3	WGT=	15.8758 KG	D-DATE:	830512
H 830102N	LIH ON MISC. ARTICLES I-55 GAL, I-30GAL	H-CODE: 05	VOL=	.321760 M3	WGT=	136.078 KG	D-DATE:	830525
H 830165L	LiH CONTAMINATED ARTICLES	H-CODE: 03	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	830727
H 830172L	Na-K CONTAMINATED MATERIAL IN DRUM #32	H-CODE: 03	VOL=	.113562 M3	WGT=	49.8952 KG	D-DATE:	830725
H 830204N	MERCURY VAPOR LIGHT IN SHAFT 27	H-CODE: 02	VOL=	.500000E-03 M3	WGT=	.907186 KG	D-DATE:	830928
H 830210L	Be WASTE IN SPECIAL SHAFT	H-CODE: 00	VOL=	.757083E-01 M3	WGT=	45.3593 KG	D-DATE:	830909
H 840019N	BERYLLIUM OXIDE	H-CODE: 00	VOL=	.302833E-02 M3	WGT=	4.53593 KG	D-DATE:	840227
H 840024L	CLEANUP FROM HYDROXYL AMMINE NO3 SPILL	H-CODE: 02	VOL=	1.04099 M3	WGT=	453.597 KG	D-DATE:	840223
H 840025N	HG TURNINGS	H-CODE: 00	VOL=	.832791 M3	WGT=	272.155 KG	D-DATE:	840223
H 840026N	LASER CELL WITH OSMIUM TETROXIDE	H-CODE: 00	VOL=	.283168E-02 M3	WGT=	6.80389 KG	D-DATE:	840201
H 840064L	CLOTHING,GLOVES ETC.CONTAMINATED WITH AS	H-CODE: 00	VOL=	.113562 M3	WGT=	36.2874 KG	D-DATE:	840223
H 840074N	ROLL OF ASBESTOS	H-CODE: 11	VOL=	.283168E-01 M3	WGT=	13.6078 KG	D-DATE:	840309
H 840076N	MATERIALS CONTAMINATED WITH NA K	H-CODE: 03	VOL=	.378541E-01 M3	WGT=	2.26796 KG	D-DATE:	840423
H 840124L	LOW LEVEL PCB CONTAM. ARTICLES IN VERM.	H-CODE: 01	VOL=	.113562 M3	WGT=	45.3593 KG	D-DATE:	840405
H 840158L	BE SCRAPS	H-CODE: 00	VOL=	.189271E-01 M3	WGT=	6.80389 KG	D-DATE:	840426
H 840161L	CELLULOSE NITRATE FILM	H-CODE: 01	VOL=	.567812E-01 M3	WGT=	13.6078 KG	D-DATE:	840514
H 840166N	HG VAPOR TUBE FROM OZALID MACHINE	H-CODE: 00	VOL=	.283168E-02 M3	WGT=	.907186 KG	D-DATE:	840510
H 840438N	BARIUM NITRATE	H-CODE: 04	VOL=	.900499 M3	WGT=	1179.35 KG	D-DATE:	841029
H 840453N	4-EMPTY KRYPTON CYLINDERS	H-CODE: 00	VOL=	.566336E-01 M3	WGT=	4.53593 KG	D-DATE:	841114
H 840457L	PICRIC ACID	H-CODE: 03	VOL=	.500000E-03 M3	WGT=	.453593 KG	D-DATE:	841128
H 840480N	HEPA FILTERS WITH CARCINOGENS	H-CODE: 02	VOL=	.141584 M3	WGT=	31.7515 KG	D-DATE:	841218
H 850014L	BERYLLIUM WASTE	H-CODE: 00	VOL=	.681374 M3	WGT=	204.117 KG	D-DATE:	850221

GROSS VOL THIS SHAFT= 4.81248 M3 GROSS-WGT THIS SHAFT= 2705.20 KG

SHAFT NUMBER: 28

H 840352N	BERYLLIUM OXIDE FROM MACHINING	H-CODE: 00	VOL=	.141584E-01 M3	WGT=	4.53593 KG	D-DATE:	840806
H 850062L	ORGANICS IN DRUM #154	H-CODE: 01	VOL=	.208198 M3	WGT=	106.594 KG	D-DATE:	850426
H 850063L	PHOTO CHEMICALS IN DRUM #155	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	850426
H 850064L	EPOXY IN DRUMS #156 & 157	H-CODE: 01	VOL=	.227125 M3	WGT=	102.058 KG	D-DATE:	850426
H 850065L	ORGANICS IN DRUM #158	H-CODE: 01	VOL=	.208198 M3	WGT=	117.027 KG	D-DATE:	850426
H 850068L	ORGANICS IN DRUMS # 162,163 & 164	H-CODE: 01	VOL=	.624593 M3	WGT=	635.036 KG	D-DATE:	850426
H 850070N	PAINT ON VERMICULITE	H-CODE: 01	VOL=	1.87378 M3	WGT=	1905.11 KG	D-DATE:	850426
H 850071N	EPON RESIN	H-CODE: 01	VOL=	.208198 M3	WGT=	147.418 KG	D-DATE:	850426
H 850072N	OIL ON VERMICULITE	H-CODE: 06	VOL=	.624593 M3	WGT=	840.000 KG	D-DATE:	850426
H 850079N	WEED KILLER & COMPOUND SPRAY ON VERMIC.	H-CODE: 01	VOL=	.416395 M3	WGT=	249.476 KG	D-DATE:	850426
H 850080N	DISEL FUEL ON VERMICULITE	H-CODE: 06	VOL=	.208198 M3	WGT=	207.746 KG	D-DATE:	850426
H 850082N	USED CUTTING OIL ON VERMICULITE	H-CODE: 06	VOL=	.227125 M3	WGT=	226.796 KG	D-DATE:	850426
H 850083N	TRANSFORMER OIL ON VERMICULITE (50 PPM	H-CODE: 06	VOL=	.416395 M3	WGT=	415.945 KG	D-DATE:	850426

GROSS VOL THIS SHAFT= 5.46515 M3 GROSS WGT THIS SHAFT= 5161.86 KG

SHAFT NUMBER: 29

H 840093L	ORGANICS IN DRUM 113-OIL	H-CODE: 06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840405
H 840094L	ORGANICS IN DRUM 112	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840405
H 840114L	OIL ON VERMICULITE	H-CODE: 06	VOL=	3.54936 M3	WGT=	2721.58 KG	D-DATE:	840405
H 840126N	HYDRAULIC OIL (REGAL R) ON VERMICULITE	H-CODE: 06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840405
H 840132L	ORGANICS IN DRUM #116	H-CODE: 01	VOL=	.208198 M3	WGT=	215.457 KG	D-DATE:	840426
H 840133L	ORGANICS IN DRUM #115 (METHANOL)	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840426
H 840135L	VACUUM PUMP OIL ON VERMICULITE	H-CODE: 06	VOL=	.454250 M3	WGT=	226.796 KG	D-DATE:	840426
H 840137L	OIL ON VERMICULITE	H-CODE: 06	VOL=	4.00000 M3	WGT=	3628.78 KG	D-DATE:	840426
H 840138L	INORGANICS IN DRUM 43 (CD)	H-CODE: 00	VOL=	.208198 M3	WGT=	294.835 KG	D-DATE:	840426
H 840140L	ORGANICS IN DRUM 114	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840426
H 840141L	MECHANICAL PUMP OIL	H-CODE: 06	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	840426
H 840142L	CHLOROETHANE,ETOH AND ACETONE(ACETONE)	H-CODE: 01	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	840426
H 840143L	DYE,METHANOL AND ETOH ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840426
H 840186L	ORGANICS IN DRUM #122[illegible]	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840610

LOS ALAMOS NATIONAL LABORATORY
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AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 840187L	ORGANICS IN DRUM #126	H-CODE:	01	VOL=	.208198 M3	WGT=	213.182 KG	D-DATE:	840618
H 840188L	ORGANICS IN DRUM #125	H-CODE:	01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840618
H 840189L	ORGANICS IN DRUM #123	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840618
H 840190L	ORGANICS IN DRUM #122	H-CODE:	01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840618
H 840191L	ORGANICS IN DRUM #121	H-CODE:	01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840618
H 840192L	ORGANICS IN DRUM #120	H-CODE:	01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840618
H 840193L	ORGANICS IN DRUM #119	H-CODE:	01	VOL=	.208198 M3	WGT=	192.777 KG	D-DATE:	840618
H 840194L	ORGANICS IN DRUM #118	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840618
H 840195L	ORGANICS IN DRUM #117	H-CODE:	01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	840618
H 840200L	INORGANICS IN DRUM #47	H-CODE:	00	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840618
H 840201L	SLUDGE WITH PCB <10PPM	H-CODE:	01	VOL=	.832791 M3	WGT=	635.036 KG	D-DATE:	840618
H 840202L	DIELECTRIC FLUID WITH TRACE OF AS	H-CODE:	06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840618
H 840203L	MISC. ORGANIC FLUIDS ON VERMICULITE	H-CODE:	01	VOL=	.416395 M3	WGT=	272.156 KG	D-DATE:	840618
H 840204L	OIL WITH ACETONE ON VERMICULITE	H-CODE:	06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840618
H 840205L	METHYL ETHYL KETONE ON VERMICULITE	H-CODE:	01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840618
H 840206L	OIL ON VERMICULITE	H-CODE:	06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840618
H 840207L	SLIMICIDE FUNGICIDE F-16	H-CODE:	01	VOL=	1.66558 M3	WGT=	1088.63 KG	D-DATE:	840618
H 840213L	ORGANICS IN DRUM 128	H-CODE:	01	VOL=	.208198 M3	WGT=	192.777 KG	D-DATE:	840618
H 840214L	OIL ABSORBED ON VERMICULITE	H-CODE:	06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840618
H 840216L	DMSO ON VERMICULITE	H-CODE:	01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840618

GROSS-VOL THIS SHAFT= 12.5372 M3 GROSS-WGT THIS SHAFT= 13514.2 KG

SHAFT NUMBER: 30

H 840218L	OIL ON VERMICULITE	H-CODE:	06	VOL=	6.20000 M3	WGT=	4082.37 KG	D-DATE:	840618
H 840283L	MIXED ORGANIC WASTES ON VERMICULITE	H-CODE:	01	VOL=	.624593 M3	WGT=	408.234 KG	D-DATE:	840723
H 840284L	SOLVENTS AND OILS ON VERMICULITE	H-CODE:	01	VOL=	.624593 M3	WGT=	408.234 KG	D-DATE:	840723
H 840286N	SOLIDIFIED PAINT	H-CODE:	01	VOL=	.378541 M3	WGT=	226.796 KG	D-DATE:	840723
H 840287L	DIBUTYL PHTHALATE ON VERMICULITE	H-CODE:	01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840289L	OIL ON VERMICULITE	H-CODE:	06	VOL=	3.53936 M3	WGT=	1925.83 KG	D-DATE:	840723
H 840290L	CHLOROETHANE,ETOH,ACETONE,OIL ON VERMIC.	H-CODE:	01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840723
H 840291L	DIBUTYL CARBITOL ON VERMICULITE	H-CODE:	01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840292L	STODDARD SOLVENT ON VERMICULITE	H-CODE:	01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840223L	TRICHLOROETHYLENE ON VERMICULITE	H-CODE:	01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723

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AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 840294L	ISOBUTYL ACETATE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840295L	METHYL ISOBUTYLKETONE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840296L	DOWCLENE ON VERMICULITE	H-CODE: 00	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840297L	CIMCOOL CONCENTRATE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840299L	TRIBUTYL PHOSPHATE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840300L	DIESEL OIL ON VERMICULITE	H-CODE: 06	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	840723
H 840301L	ACETONE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840302L	METHYLENE CHLORIDE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840723
H 840303L	FREON ON VERMICULITE	H-CODE: 01	VOL=	.624593 M3	WGT=	340.195 KG	D-DATE:	840723
H 840304L	WASTE OIL ON VERMICULITE	H-CODE: 06	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	840723
H 840322L	ORGANICS IN DRUM 132	H-CODE: 01	VOL=	.208198 M3	WGT=	192.777 KG	D-DATE:	840723
H 840323L	ORGANICS IN DRUM 131	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840723
H 840324L	ORGANICS IN DRUM 130	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840723
H 840325L	ORGANICS IN DRUM 129	H-CODE: 01	VOL=	.208198 M3	WGT=	217.725 KG	D-DATE:	840723

GROSS VOL THIS SHAFT= 18.0294 M3 GROSS WGT THIS SHAFT= 11138.0 KG

SHAFT NUMBER: 31

H 840312L	ORGANIC DYE ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	840724
H 840313L	PAINT THINNER ON VERMICULITE	H-CODE: 01	VOL=	.624593 M3	WGT=	340.195 KG	D-DATE:	840724
H 840314L	VACUUM PUMP OIL ON VERMICULITE	H-CODE: 06	VOL=	.208198 M3	WGT=	90.7186 KG	D-DATE:	840724
H 840315N	DIRT WITH ORGANICS	H-CODE: 02	VOL=	.032791 M3	WGT=	725.755 KG	D-DATE:	840724
H 840383L	ORGANICS IN DRUM 139	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840924
H 840385L	ORGANICS IN DRUM 137	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840924
H 840386L	ORGANICS IN DRUM 136	H-CODE: 01	VOL=	.208198 M3	WGT=	192.777 KG	D-DATE:	840924
H 840387L	ORGANICS IN DRUM 135	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	840924
H 840395L	OILON VERMICULITE	H-CODE: 06	VOL=	.340687 M3	WGT=	340.195 KG	D-DATE:	840924
H 840397L	TRICHLOROETHYLENE ON VERMICULITE	H-CODE: 01	VOL=	.416395 M3	WGT=	226.796 KG	D-DATE:	840924
H 840403L	ORGANICS IN DRUM 143	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841029
H 840404L	ORGANICS IN DRUM 144	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841029
H 840406L	OIL ON VERMICULITE	H-CODE: 06	VOL=	3.74756 M3	WGT=	2086.55 KG	D-DATE:	840924

GROSS VOL THIS SHAFT= 7.62761 M3 GROSS WGT THIS SHAFT= 5159.65 KG

LOS ALAMOS NATIONAL LABORATORY
HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

SHAFT NUMBER: 32

H 840394L	OIL ON VERMICULITE	H-CODE: 06	VOL=	.624593 M3	WGT=	408.234 KG	D-DATE:	840924
H 840396L	SHEATHESTUDDARD SOLVENTS ON VERMICULITE	H-CODE: 01	VOL=	1.04029 M3	WGT=	1542.23 KG	D-DATE:	840924

GROSS-VOL THIS SHAFT= 1.66558 M3 GROSS-WGT THIS SHAFT= 1950.46 KG

SHAFT NUMBER: 33

H 840380L	ORGANICS IN DRUM 142	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841029
H 840381L	ORGANICS IN DRUM 141	H-CODE: 01	VOL=	.208198 M3	WGT=	215.457 KG	D-DATE:	841029
H 840382L	ORGANICS IN DRUM 140	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841029
H 840384L	ORGANICS IN DRUM 138	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841029
H 840388L	ORGANICS IN DRUM 134	H-CODE: 01	VOL=	.208198 M3	WGT=	204.117 KG	D-DATE:	841029
H 840389L	ORGANICS IN DRUM 133	H-CODE: 01	VOL=	.208198 M3	WGT=	108.862 KG	D-DATE:	841029
H 840393L	ORGANICS SOLVENTS ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	841029
H 840399L	LOW LEVEL PCB OIL ON VERMICULITE	H-CODE: 06	VOL=	2.70657 M3	WGT=	1814.39 KG	D-DATE:	841029
H 840436L	NON PCB TRANS. OIL AND H2O ON VERMIC.	H-CODE: 06	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	841029
H 840466L	ORGANICS IN DRUM #148	H-CODE: 01	VOL=	.208198 M3	WGT=	231.342 KG	D-DATE:	841219
H 840467L	ORGANICS IN DRUM #149	H-CODE: 01	VOL=	.208198 M3	WGT=	235.868 KG	D-DATE:	841219
H 840469P	OIL ON VERMICULITE	H-CODE: 06	VOL=	1.66558 M3	WGT=	907.194 KG	D-DATE:	841219
H 840470L	ORGANICS IN DRUM #146	H-CODE: 01	VOL=	.208198 M3	WGT=	226.796 KG	D-DATE:	841219
H 840471L	ORGANICS IN DRUM #145	H-CODE: 01	VOL=	.208198 M3	WGT=	213.169 KG	D-DATE:	841219
H 840475L	ORGANICS IN DRUM #147	H-CODE: 01	VOL=	.208198 M3	WGT=	222.261 KG	D-DATE:	841219
H 840477L	MACHINE OIL ON VERMICULITE	H-CODE: 06	VOL=	.208198 M3	WGT=	68.0359 KG	D-DATE:	841219
H 840478N	TRICHLOROETHANE 1-1-1 ON VERMICULITE	H-CODE: 01	VOL=	1.66558 M3	WGT=	1632.95 KG	D-DATE:	841219
H 840484L	ORGANICS ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	215.457 KG	D-DATE:	841219
H 840486N	USED PUMP OIL ON VERMICULITE	H-CODE: 06	VOL=	.643520E-01 M3	WGT=	29.4835 KG	D-DATE:	841219
H 840494L	USED VACUUM PUMP OIL ON VERMICULITE	H-CODE: 06	VOL=	.227125 M3	WGT=	68.0359 KG	D-DATE:	841219
H 850015L	CHLOROETHANE ON VERMICULITE	H-CODE: 01	VOL=	.208198 M3	WGT=	181.437 KG	D-DATE:	850221
H 850016L	ORGANICS	H-CODE: 01	VOL=	.340687 M3	WGT=	158.758 KG	D-DATE:	850221
H 850017L	ORGANICS IN DRUM #152	H-CODE: 01	VOL=	.208198 M3	WGT=	235.868 KG	D-DATE:	850221
H 850018L	METHANOL & LASER DYE ON VERMICULITE	H-CODE: 01	VOL=	.113562 M3	WGT=	45.3523 KG	D-DATE:	850221
H 850019L	MOTOR OIL ABSORBED ON VERMICULITE	H-CODE: 06	VOL=	.113562 M3	WGT=	43.0913 KG	D-DATE:	850221

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HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, IN DISPOSAL SHAFTS

H 850020L	ORGANICS IN DRUM #150	H-CODE: 01	VOL=	.208198 M3	WGT=	26.6153 KG	D-DATE:	850221
H 850021L	ORGANICS IN DRUM #151	H-CODE: 01	VOL=	.208198 M3	WGT=	249.476 KG	D-DATE:	850221
H 850022L	ORGANICS IN DRUM #153	H-CODE: 01	VOL=	.208198 M3	WGT=	217.725 KG	D-DATE:	850221
H 850024L	USED TRASH FLUIDS IN VERMICULITE	H-CODE: 01	VOL=	1.04099 M3	WGT=	1360.79 KG	D-DATE:	850221
H 850025L	CHLOROETHANE,ETHANOL IPO, ACETONE, OIL	H-CODE: 01	VOL=	.416395 M3	WGT=	385.554 KG	D-DATE:	850221
H 850026L	ACETONE ON VERMICULITE	H-CODE: 01	VOL=	.832791 M3	WGT=	1451.51 KG	D-DATE:	850221
H 850027L	VACUUM PUMP OIL ON VERMICULITE	H-CODE: 06	VOL=	.113562 M3	WGT=	38.5554 KG	D-DATE:	850221
H 850028L	VACUUM PUMP OIL ON VERMICULITE	H-CODE: 06	VOL=	.416395 M3	WGT=	367.410 KG	D-DATE:	850221

GROSS-VOL THIS SHAFT= 13.8811 M3 GROSS-WGT THIS SHAFT= 12110.1 KG

SHAFT NUMBER: 34

H 850066L	ORGANICS IN DRUM #159	H-CODE: 01	VOL=	.208198 M3	WGT=	147.410 KG	D-DATE:	850426
H 850067L	ORGANICS IN DRUM #160	H-CODE: 01	VOL=	.416395 M3	WGT=	415.945 KG	D-DATE:	850426
H 850069N	PSEUDO (TRI-METHYL-BENZENE)	H-CODE: 01	VOL=	1.87378 M3	WGT=	1905.11 KG	D-DATE:	850426
H 850073N	LOW PCB OIL ON VERMICULITE	H-CODE: 06	VOL=	3.75586 M3	WGT=	5352.45 KG	D-DATE:	850426
H 850077N	NEUTRALIZED ACIDS HYDRIDES & SULFATES	H-CODE: 00	VOL=	.321760 M3	WGT=	204.117 KG	D-DATE:	850426
H 850097L	ORGANICS IN DRUM #161	H-CODE: 01	VOL=	.208198 M3	WGT=	113.398 KG	D-DATE:	850507
H 850098L	ORGANICS IN DRUM #165	H-CODE: 01	VOL=	.208198 M3	WGT=	136.078 KG	D-DATE:	850507
H 850099L	TRICHLOREthANE ON VERMICULITE	H-CODE: 01	VOL=	1.04099 M3	WGT=	725.735 KG	D-DATE:	850507
H 850100N	PHOTO STRIPPER ON VERMICULITE	H-CODE: 01	VOL=	.738155 M3	WGT=	453.597 KG	D-DATE:	850507
H 850101L	WASTE FLUID MIXED WITH VERMICULITE	H-CODE: 06	VOL=	.624593 M3	WGT=	635.036 KG	D-DATE:	850507
H 850106N	ORGANICS OF VARIOUS TYPES	H-CODE: 01	VOL=	.208198 M3	WGT=	3084.46 KG	D-DATE:	850507

GROSS-VOL THIS SHAFT= 9.80433 M3 GROSS-WGT THIS SHAFT= 13173.4 KG

LOS ALAMOS NATIONAL LABORATORY

HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, SURFACE IMPOUNDMENT 'B'

HSE-7 WASTE TYPE CODE: 00

H 830092N	DEVELOPER TO INORGANIC PIT	GROSS-VOL=	.151417E-01	M3	GROSS-WT=	18.1437	KG	D-DATE:	830525
H 830231N	CORRSIVE LIQUID TO PIT B	GROSS-VOL=	.378541E-02	M3	GROSS-WT=	3.62874	KG	D-DATE:	831024
H 830239N	AQUEOUS SOLUTION TO INORGANIC PIT	GROSS-VOL=	.100000E-01	M3	GROSS-WT=	68.0389	KG	D-DATE:	831101
H 840007N	BORIC ACID SOL TO PIT	GROSS-VOL=	.624593	M3	GROSS-WT=	635.036	KG	D-DATE:	840126
H 840309N	AMMONIUM BIFLUORIDE	GROSS-VOL=	2.27125	M3	GROSS-WT=	2177.27	KG	D-DATE:	840713
H 840310N	P.T.ACTIVATOR-DEVELOPER	GROSS-VOL=	.283906E-01	M3	GROSS-WT=	27.2156	KG	D-DATE:	840716
H 840326N	AMMONIUM BIFLUORIDE	GROSS-VOL=	1.89271	M3	GROSS-WT=	1814.39	KG	D-DATE:	840725
H 840351N	AMMONIUM BIFLUORIDE	GROSS-VOL=	2.27125	M3	GROSS-WT=	2267.99	KG	D-DATE:	840801

HSE-7 WASTE TYPE CODE: 01

H 840354N	ZN.NI.AS MELPHALAN	GROSS-VOL=	.800000E-02	M3	GROSS-WT=	8.16467	KG	D-DATE:	840807

HSE-7 WASTE TYPE CODE: 02

H 830203N	AMMONIA FROM OZALID MACHINE TO PIT	GROSS-VOL=	.757083E-02	M3	GROSS-WT=	6.80389	KG	D-DATE:	830902
H 830243N	AMMONIA FROM OZALID MACHINE TO PIT	GROSS-VOL=	.378541E-02	M3	GROSS-WT=	3.62874	KG	D-DATE:	831114
H 830244N	AMMONIA FROM OZALID MACHINE TO PIT	GROSS-VOL=	.189271E-02	M3	GROSS-WT=	2.26796	KG	D-DATE:	831129
H 830280N	PHOTOCHEMICALS TO PIT	GROSS-VOL=	.454250E-02	M3	GROSS-WT=	4.53593	KG	D-DATE:	831220
H 840005N	BASIC PHOTO CHEMICALS IN INORGANIC PIT	GROSS-VOL=	.681374	M3	GROSS-WT=	635.036	KG	D-DATE:	840119

HSE-7 WASTE TYPE CODE: 03

H 830240N	LIH REACTED IN PIT	GROSS-VOL=	.189271E-02	M3	GROSS-WT=	2.26796	KG	D-DATE:	831117

LOS ALAMOS NATIONAL LABORATORY

HAZARDOUS CHEMICAL WASTES DISPOSED
AT TA-54, AREA L, SURFACE IMPOUNDMENT 'B'

TOTAL GROSS VOLUME= 7.02617 M3 TOTAL GROSS WEIGHT= 7674.41 KG

M-4

GUIDELINES FOR CONSTRUCTION AND USE OF SOLID WASTE DISPOSAL FACILITIES AT AREA G, TA-54

Note: Guidelines are also applicable to Area L facilities.

LOS ALAMOS SCIENTIFIC LABORATORY
UNIVERSITY OF CALIFORNIA
LOS ALAMOS, NEW MEXICO 87545
Telephone Ext: 4301

OFFICE MEMORANDUM

TO : Distribution

DATE: 10 December 1980

THRU: Harry Jordan, H-DO

FROM : W. D. Purtymun, H-8
M. Wheeler, LS-6
J. L. Warren, H-7

SUBJECT : GUIDELINES FOR CONSTRUCTION AND USE OF SOLID WASTE DISPOSAL FACILITIES AT AREA G, TA-54

SYMBOL : H7-80-660

MAIL STOP : 518

The final version of the guidelines, revised after review by the Operational Waste Management Committee, is being submitted for your information. Groups H-7 and H-8 plan to implement the guidelines immediately.

WDP,MLW,JLW/HSJ/rmb

Enc. a/s

Distribution:
- J. W. Healy, H-DO, MS-400
- W. J. Maraman, CMB-DO, MS-756
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- T. K. Keenan, H-7, MS 518
- J. Steger, LS-6, MS 495
- M. A. Rogers, LS-6 MS 495
- W. R. Hansen, H-8, MS 490

LASL GUIDELINES FOR CONSTRUCTION AND USE OF SOLID WASTE DISPOSAL FACILITIES AT AREA G, TA-54

I. INTRODUCTION

These recommended practices for the location, construction, and operation of the LASL TA-54, Area G waste disposal/storage site have been prepared to document procedures that will minimize and control releases from the site, and to provide a continuing documentation of site control. The overall responsibility for ensuring compliance with these guidelines rests with the H-7 Solid Waste Disposal Section Leader. Other LASL groups, as required, will be called on to provide special assistance in providing necessary information.

Deviations from these criteria in specific instances will be necessary, and will be allowed when justified and properly documented. Approval for such deviations will be obtained from the Waste Management (H-7) and Environmental Surveillance (H-8) Group Leaders. Additional approval from the LASL Waste Management Operations Advisory Committee may also be required if requested by either Group Leader.

In all instances the LASL criteria and operations will be consistent with established DOE Burial Site Criteria (Appendix A).

II. RESPONSIBILITY AND DOCUMENTATION

A. Documentation of site suitability studies, current maps and engineering drawings, copies of site and individual pit/shaft inspections, and other related information will be maintained in the files by Group H-7.

B. The Area G Site Engineer is responsible for notifying the H-8 office, in writing, of each activity requiring their attention.

C. Following the completion of all required facility inspections, site studies, and site evaluations, written notification including approvals, results, and recommendations shall be provided to the Area G Site Engineer by the Environmental Surveillance Group Office (H-8).

C. The Site Engineer will call upon the Engineering Department to provide the required topographic maps, engineering drawings, pit surveys, etc., as described in Sections IV, V, and VI.

III. SITE EXPANSION

TA-54, the location of Area G, includes all of Mesita del Buey. This site is of sufficient size that all LASL radioactive solid waste can be buried/stored at this location through the foreseeable future. Consequently, these criteria do not address new site selection. It is assumed that all appropriate DOE and other Federal Agency criteria, as well as the NEPA process, would be followed should any new site ever be required.

Presently, approximately 63 acres of the TA-54 site are fenced, and future expansion of this fenced area will eventually be required. During any such site expansion the following criteria will apply:

A. Prior to the expansion of the useable portion of Area G, notification will be provided to the Environmental Surveillance Group (H-8). The Group will perform the required environmental and archaeological studies, and will provide the necessary documentation.

B. The ecology of the expanded area will be considered in relation to plants and animal communities that are classified as rare or endangered. Any such entities observed will be preserved and protected as specified in the "Endangered Species Act of 1973" (50 CFR-Part 17).

C. Prior to the use of an expanded portion of the disposal site, a thorough site evaluation will be performed by H-8 to determine the suitability of the area for its intended use.

D. Appropriate review and evaluation of the expansion area for archaeological ruins must be conducted as prescribed in Federal Regulations (36 CFR Part 800, as amended March 1, 1979).

IV. GENERAL SITE CRITERIA

A. The use of the TA-54 site is restricted to the top of Mesita del Buey and must be consistent with these Guidelines.

B. A topographic contour map of the fenced portion of Area G will be developed and kept current. Topography will be shown at contour intervals of 5' or less. Filled and proposed burial/storage facilities will be designated. The map will also indicate the final grade contours of the filled portion of Area G.

C. Engineering drawings will be developed, and maintained, which locate the position of site facilities (buildings, retrievable storage areas, disposal pits and shafts, permanent and significant monitoring installations, fence lines, bench marks, etc.).

V. BURIAL PIT/SHAFT CONSTRUCTION

Several weeks prior to clearing and excavation of a pit or shaft, notification will be provided to H-8. At the discretion of H-8, samples may be collected during the construction of a pit or shaft. Following completion of the construction, and before a facility is placed into use, H-8 will be responsible for preparing a geologic/hydrologic description of the pit (and shaft to the extent possible). Upon completion of this inspection, written notification will be provided to the Site Engineer by the H-8 Group Office. This notification will identify any features in the pit or shaft requiring the attention of the Site Engineer. If any additional documentation is necessary the ESG will provide it to the Site Engineer at a later time.

A. Location (see Fig. 1)

1. The "spill point" (the lowest elevation of the undisturbed rock surrounding the pit or shaft) determines the maximum utilization volume of the pit or shaft (Section VI-D). Thus, the layout of the pit will be with the long dimension more or less parallel to the topographic contours.
2. As protection against lateral erosion of the mesa, leading to possible eventual exposure of waste material, the nominal design distance between the edge of a pit or shaft and the canyon rim will be 50 feet. The "rim" is interpreted to be the significant break in slope between the surface and the side of the mesa. The position of this rim will be physically identified by suitable markers

as established by the Engineering Department, and identified on a designated topographic map of the site (Section IV-B). Some variation in this 50-foot separation can be expected over the length of a pit due to localized topographic or pit edge variabilities. These variations should not reduce the separation distance to less than about 45 feet.

3. The nominal design surface distance between the edges of adjacent pits will be 15 feet but in no case less than 10 feet.

B. Burial Pit/Shaft Excavation

1. To the extent possible, natural vegetation and topsoil in the area will remain undisturbed (see Fig. 2).
2. Topsoil from an area to be excavated will be removed either for immediate use elsewhere in revegetation or for stockpiling for future use. Any stockpiling will be done in a manner as to minimize erosion.
3. Tuff removed during construction of the pits will be separately stockpiled in the same manner as the topsoil. No stockpiling will be done on top of rehabilitated or undisturbed areas.
4. In order to protect against water movement from saturated alluvium into the waste, the deepest point in a pit or shaft shall be no deeper than 65', which has been determined as being at least 10' above the adjacent canyon floors.

5. The floors of the pits do not need to be level.
6. Horizontal dimensions (length, width) and shape of pits or shafts are not restricted.
7. The walls and access ramps of the pit will be constructed at a slope deemed to be safe by the Site Engineer and Group H-3.
8. Crushed tuff 0.5 to 1 ft deep will be compacted on the floor of each pit before emplacement of wastes.
9. Upon completion of a pit, excavation engineering drawings will be prepared showing lengthwise profiles at walls and centerline, and crosswise profiles at significant breaks in bottom slope and every 100 ft length. At the time of this survey, the location of the first and last reference posts (for waste disposal location) will be established and recorded on the drawings.

VI. BURIAL PIT/SHAFT USE

A goal of the LASL Waste Disposal Facility is to conduct waste management operations in accordance with DOE and LASL criteria and in a manner that will restrict the release of radioactive materials to the environment to levels below existing standards, and further, to levels that are as low as reasonably achievable. The primary release mechanisms of concern are transport by moving soil moisture (either towards the surface or towards ground water aquifers); erosion of the cover material overlying buried waste; or intrusion into the waste by plants, animals, or man.

A. Only wastes in solid or solidified form will be accepted for burial.

B. As much as possible, wastes will be layered in pits with each layer covered with a minimum of at least 0.5 ft of compacted crushed tuff.

C. Loose combustible wastes subject to wind dispersal will be covered by the end of the day of disposal.

D. Pits and shafts will be filled with wastes to a level no higher than 3 ft below the "spill point" (lowest point on pit rim, Fig. 2.)

E. As a pit is filled, care will be taken to ensure that sufficient room is allowed between waste and large open fractures in the walls and access ramps to allow crushed tuff to fill these fractures.

F. Open joints or fractures are difficult or impossible to identify, inspect, or fill in vertical shafts. Special measures may be required to insure containment of some wastes within disposal shafts. These measures may include the use of shaft liners and/or special waste containers.

G. Surface drainage will be constructed and maintained so that surface runoff does not enter the waste storage or disposal facilities.

VII. FINAL PIT/SHAFT COVER

A. The final cover of a pit will be crushed tuff (minimum of 3') overlain by topsoil (approximately 4").

B. The final cover of a pit will be at or above the original land-surface, as required for contouring to provide the desired drainage within the area.

C. The final cover of a shaft will be noncontaminated cement, a minimum of 3 ft thick, slightly rounded, and extending about 0.5 ft above land surface.

D. Provisions will be made to control runoff in the disposal area to minimize infiltration and erosion of the final cover of pits or shafts.

E. Turf-forming grasses and bunch grasses will be planted in the final cover to prevent wind and sheet wash erosion.

F. Identifying engineering type markers will be placed at two diagonal corners (surveyed) of each pit, and in the final pour of seal cement in the shafts. For pits the markers, at least 12 in. in diameter, will be set approximately 2-3 ft deep in undisturbed tuff and will extend about 0.5 to 1 ft above the ground surface. This marker will be a single brass cap set in concrete as illustrated in Fig. 3. Information on the cap shall include the wording "Buried Radioactive Waste" along with the pit number, corner, radionuclides buried, and dates of use.

Shaft markers will contain information (along with the above wording) including shaft number, radionuclides buried, total curies, and dates of use.

G. Prior to site closure, criteria will be developed for construction and placement of permanent site identifying markers. Site decommissioning will include placement of these markers.

H. Access roads to pits or shafts will be laid out so that vehicles do not transverse rehabilitated areas.

VII. ENVIRONMENTAL MONITORING

The disposal site is a potential source of radionuclides in the environment. There should be no routine release of effluents containing radionuclides from either site operations or site facilities. Further, all releases, whether from operations or through migration of disposed radionuclides, should be as low as reasonably achievable.

A. A routine environmental surveillance program will be conducted by Group H-8, to identify and monitor for any contaminant releases from the site.

B. The monitoring data should be sufficient to allow identification of the processes responsible for contaminant release, and to assess the significance of any releases.

C. The operations of the site will be conducted in a manner consistent with these monitoring programs.

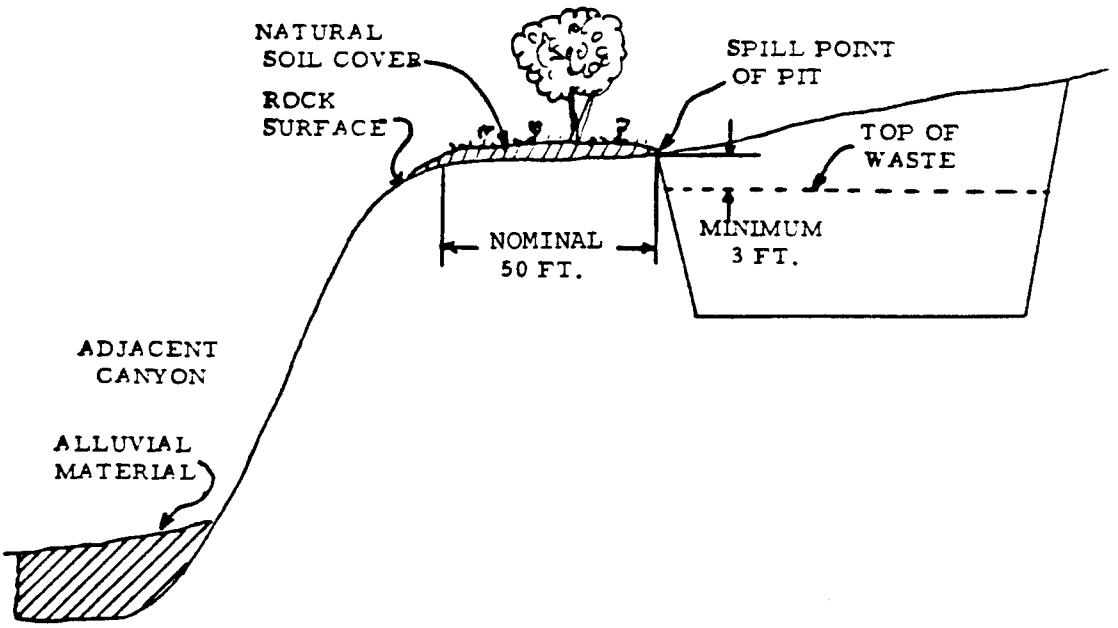


Fig. 1. Cross-section showing details of pit location and placement of wastes.

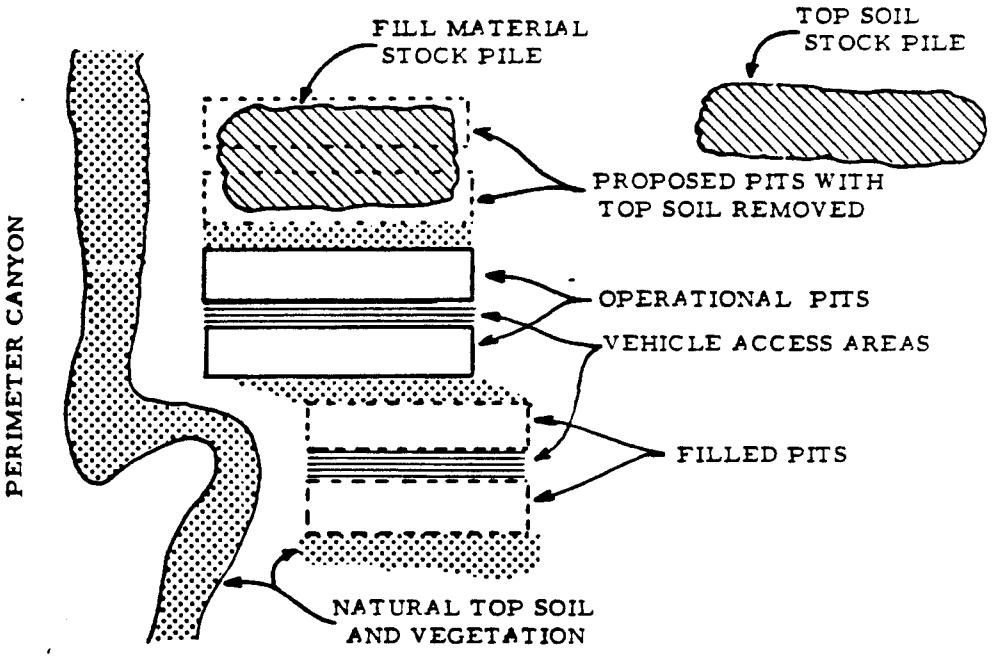


Fig. 2. Example layout of disposal pit, stockpile areas, and biotic sanctuaries.

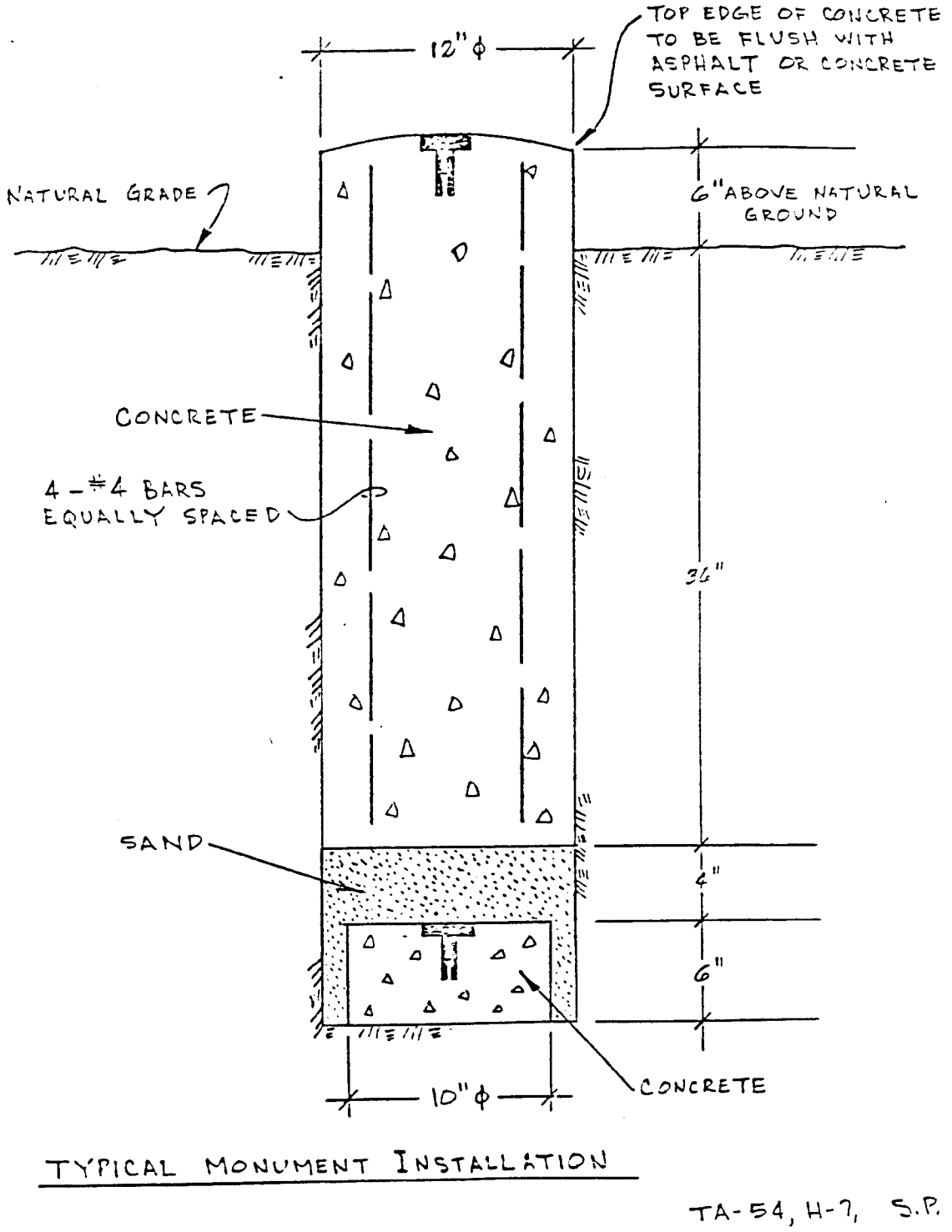


Fig. 3. Typical Monument to Identify Pit or Shaft

Initial Disposal Criteria for DOE Solid Low-Level Waste

Purpose

The purpose of these criteria is to provide that DOE solid low-level waste (LLW) is disposed of (1) in a safe and economical manner, (2) with an acceptable environmental impact, (3) with minimum reliance on long-term surveillance and/or maintenance activities, (4) with acceptable risk to future generations, and (5) with minimum land usage. It is recognized that the general and preliminary nature of these initial criteria will lead to substantive changes in order to provide system-wide, quantified final criteria in FY 1980.

Goals

Disposal site operations should:

1. Encourage minimum waste generation and minimum land usage by applying good housekeeping practices, volume-reduction techniques, better landfill designs and improved disposal methods consistent with operational, health and safety requirements.

2. Use disposal methods and waste conditioning techniques which minimize long-term environmental impact, dependence upon long-term surveillance and/or maintenance, and potential risks to future generations.

3. Generate a properly recorded operating experience data base reflecting environmental and health and safety results of the disposal method(s) in use.

4. Operate, and interpret results of existing and improved site performance surveillance system(s) to assist in the evaluation of the performance of the disposal site and practices.

Criteria

1. General

   a. Good housekeeping and industrial operating practices shall be employed.

   b. Occupational health and safety, environmental and security standards shall be met in all operations.

   c. Land usage for disposal shall be minimized without compromising health and safety.

   d. Emergency response systems should be tested routinely.

e. Technology should be assessed periodically to upgrade practices (volume reduction, containment, surveillance).

f. Plans shall be made for the long-term control and ultimate disposition of the site using the latest technical and land use information.

g. A quality assurance program shall be maintained.

II. Administrative

a. An individual responsible for all disposal site operations shall be specified. The responsibilities and authorities shall be documented and shall include (but not be limited to):

(1) Documenting compliance with appropriate directives, standards and procedures.

(2) Developing and implementing standard operating procedures.

(3) Establishing waste acceptance criteria and, where appropriate, determining the acceptability of input waste.

(4) Providing estimates of resources necessary to assure that site and operations meet standards.

(5) Providing waste volume projections.

b. Generators shall be encouraged to minimize waste generation. Consideration should be given to charging a portion of disposal costs to the generator, such as a sliding charge scale that discourages generation.

c. An independent review system shall be established.

d. Anomalous occurrences at the waste disposal area shall be reviewed and analyzed, and corrective measures implemented and documented as required.

III. Site Selection

a. The site shall have suitable geological, hydrological and climatological properties which are tested, documented, reviewed and accepted by competent authorities to avoid excessive dose to man from radioactive and nonradioactive contaminants.

b. Impact on ecological and archaeological conditions shall be minimized.

c. Transportation of waste, population distribution, and availability of utilities and other site support factors should be considered.

d. Recognized potential uses should be considered for an area prior to its being dedicated for waste disposal so as to minimize the impact of land withdrawal.

IV. Site Operation

a. Approved standard operating procedures shall be centrally documented, implemented, reviewed annually and revised as necessary. Procedures shall include:

(1) Waste acceptance requirements including contents and labeling

(2) Disposal method and location

(3) Criticality, radiation and occupational safety

(4) Method of handling unacceptable waste or packaging

(5) Proper handling equipment and techniques to be used

(6) Decontamination of personnel, vehicles, equipment and facilities

(7) Fire prevention methods

(8) Segregation of TRU waste for retrievable storage

(9) Emergency response plans

(10) Consideration of potential future discovery of artifacts

(11) Quality assurance program

(12) Site surveillance program

b. Methods should be established to control:

(1) Wind dispersion of waste or contamination

(2) Water intrusion

(3) Dust

(4) Chemical hazards

(5) Vehicle and personnel traffic

(6) Materials with the potential of mobilizing waste (solvents, organics, etc.)

(7) Intrusion by vegetation or animals

c. Specifications for containment designs and construction shall be developed and implemented for all packaging and disposal techniques.

d. Measurement methods will be implemented, documented and updated as appropriate for.

(1) Radiological conditions in and around the disposal area

(2) Migration of contaminants (radioactive and nonradioactive) in surface and ground water

(3) Uptake of radionuclides by vegetation and animals

(4) Release of airborne contaminants

e. Exposures to site operating personnel and off-site population shall be kept as low as practicable.

V. Site Maintenance

a. Adequate site drainage systems shall be maintained.

b. Final cover shall be maintained to control surface accumulation of water.

c. Adequate erosion control measures shall be employed.

d. Corrective action shall be taken when maximum authorized levels of radiation are approached or predicted to occur.

e. A method to identify the location of disposed waste shall be maintained.

f. Conceptual hydrological model shall be developed utilizing local geohydrological and radiological data, and surveillance systems shall be maintained to aid in detecting and evaluating subsurface migration.

VI. Support

a. Adequate fire suppression shall be available.

b. Security shall be adequate to prevent unauthorized access to waste.

c. Operators shall be qualified for their duties, and an adequate training program should be implemented.

d. Permanent records shall be maintained on:

(1) Waste volume, content, properties and location

(2) Interpreted results of surveillance and monitoring programs

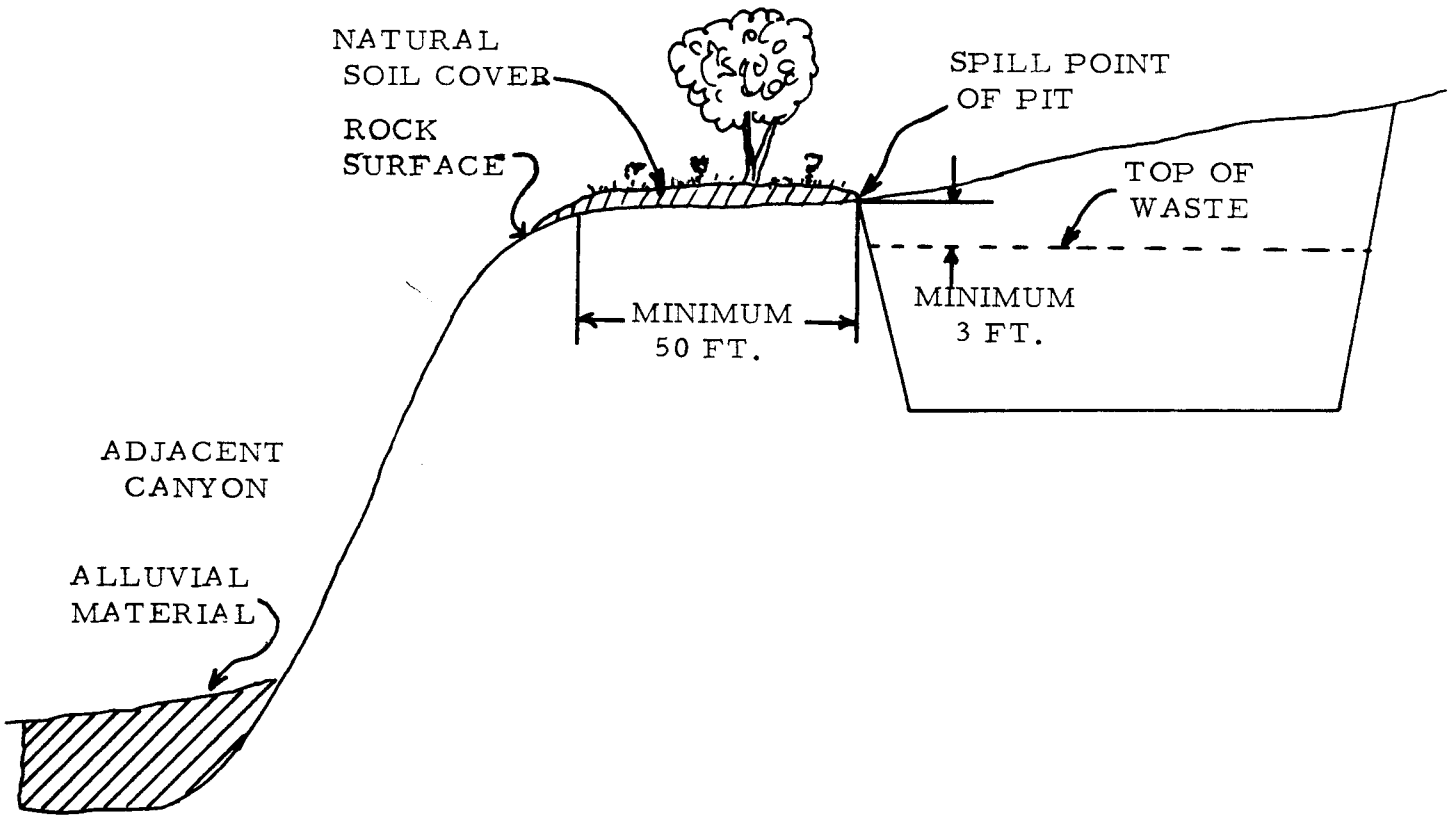
(3) Routine and significant nonroutine events

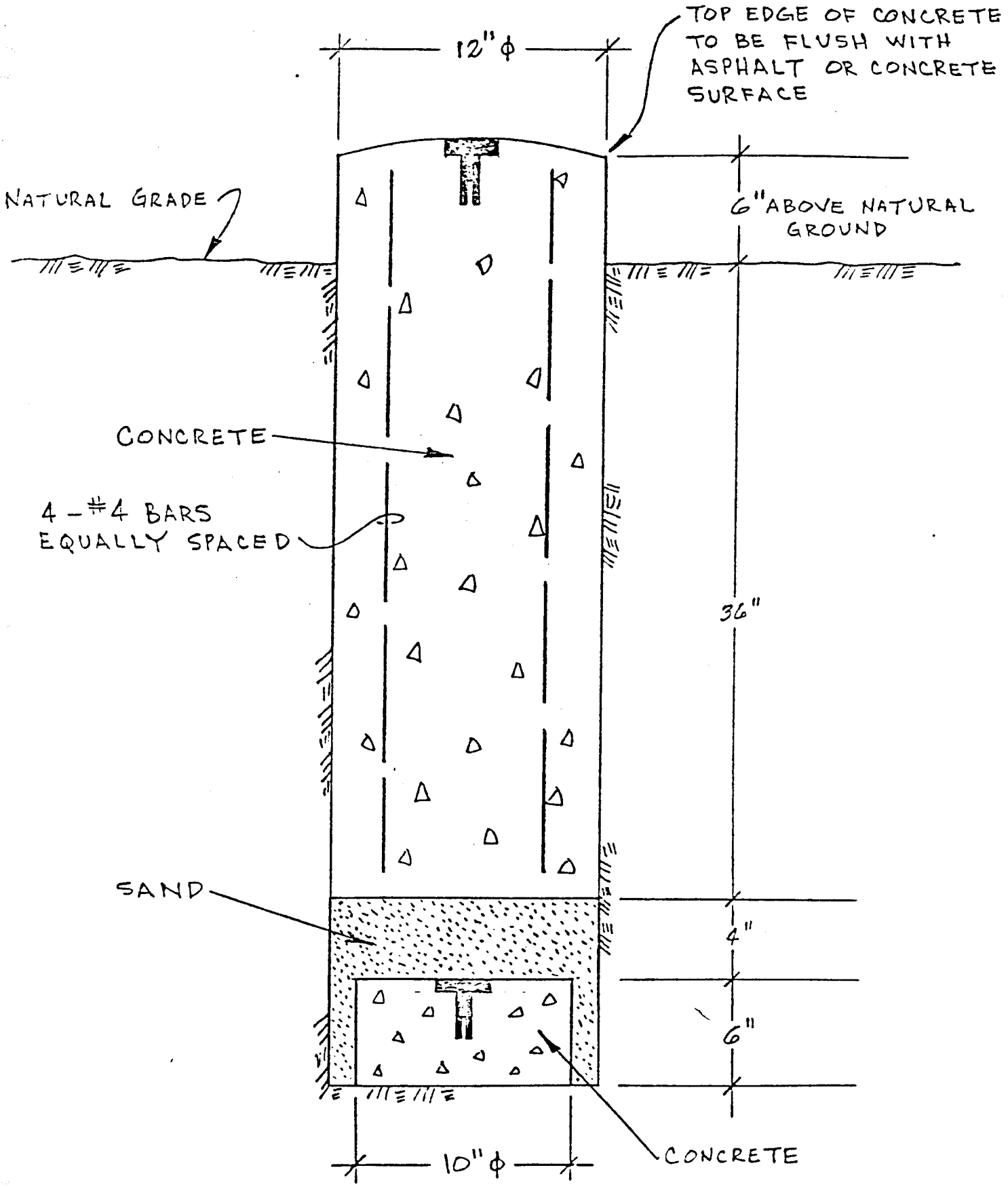
(4) Results of periodic independent evaluation of operations

(5) Results of emergency response tests

(6) Site geological, hydrological and climatological properties

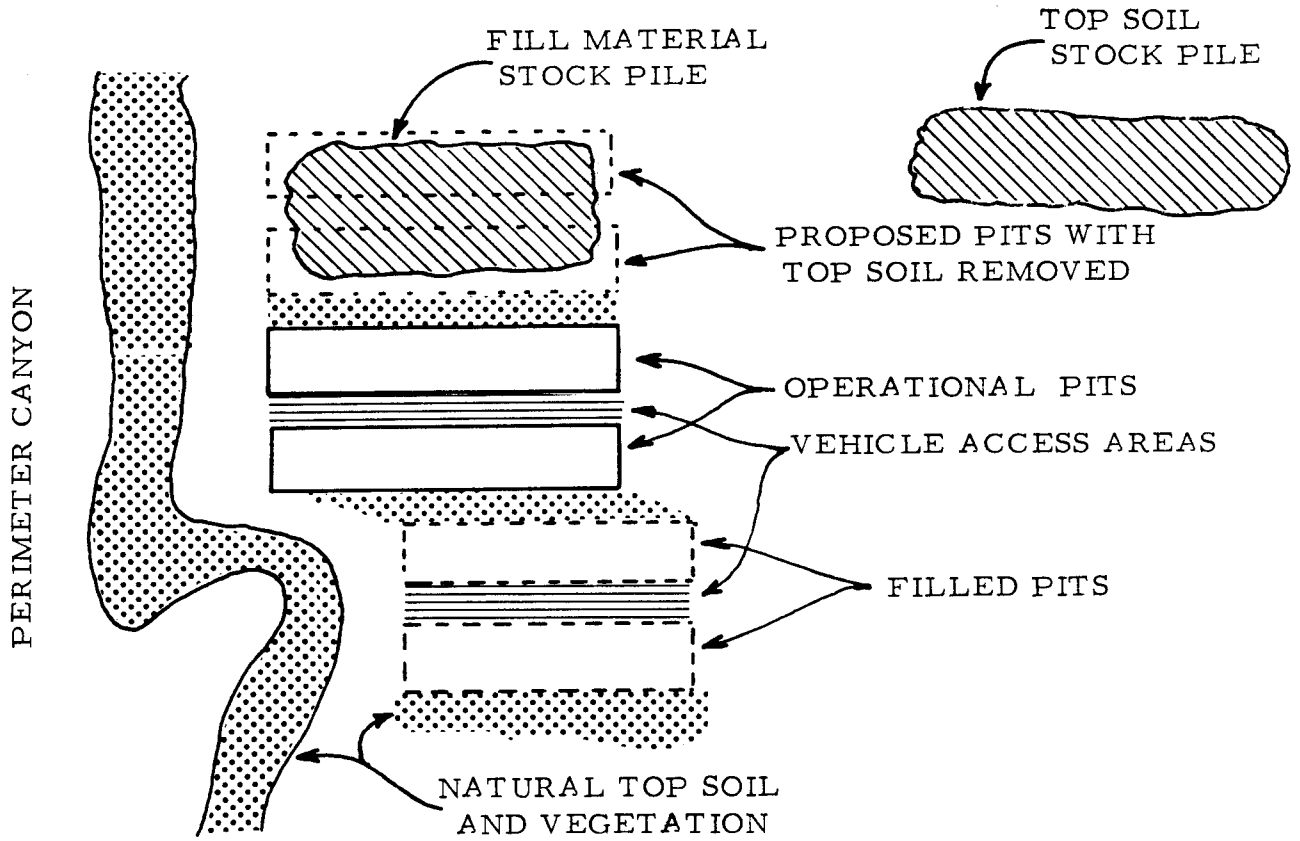
(7) Operating personnel and dose accumulation


NATURAL
SOIL COVER
ROCK
SURFACE
SPILL POINT
OF PIT
TOP OF
WASTE
MINIMUM
50 FT.
MINIMUM
3 FT.
ADJACENT
CANYON
ALLUVIAL
MATERIAL



TYPICAL MONUMENT INSTALLATION

TA-54, H-7, S.P.


FILL MATERIAL
STOCK PILE
TOP SOIL
STOCK PILE
PROPOSED PITS WITH
TOP SOIL REMOVED
PERIMETER CANYON
OPERATIONAL PITS
VEHICLE ACCESS AREAS
FILLED PITS
NATURAL TOP SOIL
AND VEGETATION

APPENDIX M-5

SOP FOR HSE-7 CHEMICAL BATCH TREATMENT SYSTEM

STANDARD OPERATING PROCEDURES
FOR HSE-7 CHEMICAL BATCH TREATMENT SYSTEM

I. INTRODUCTION

This Standard Operating Procedure (SOP) establishes operational and general health and safety procedures for the chemical treatment of wastes at TA-50-1, Room 24. Most of these wastes will require storage at Area L, TA-54 until treatment can be performed. Individuals responsible for the overall operations are the HSE-7 Section Leader and Associate Group Leader for Solid Waste Operations. Any deviation from this SOP must receive their approval.

II. DESCRIPTION OF OPERATIONS

Liquid waste requiring chemical treatment prior to disposal is transported to TA-50 in 55-gallon drums or one of the container tanks. This SOP will describe the treatment processes in general terms. Specific operating instructions for each process will be written after treatment parameters have been developed.

A. Cyanide Waste

Cyanide wastes are treated by alkaline chlorination. The wastes are rendered harmless by conversion to CO_2, N_2, and H_2O.

1. The pH of waste is verified and adjusted, if necessary, to at least 10, prior to transfer to the reaction tank.
2. Wash all pipelines and tanks that will be used in treatment/transfer of waste with water.
3. Waste is pumped to the reaction vessel.
4. Waste is diluted and pH adjusted to 12.
5. Gaseous chlorine is added with agitation to convert cyanide to cyanate.
6. When complete, adjust the pH to 8.
7. Continue adding chlorine until cyanate is destroyed.
8. Discontinue chlorine addition.
9. Adjust pH by adding sodium hydroxide to precipitate metal ions present.

10. Analyze for cyanide presence. If any remains, continue treatment.

11. When total CN is approximately 10 ppm, filter sludge in basket filter and solidify with cement in 55-gallon drum for disposal at Area L.

12. Liquid effluent is discharged to TA-50-1 effluent tank.

13. Wash all pipelines and tanks used in process with water.

B. Chromium Waste

Chrome wastes are reduced by a two-stage process of reduction by sulfur dioxide and precipitation with sodium hydroxide.

1. Wash all pipelines and tanks that will be used in treatment/transfer of wastes with water.

2. Add 100 gallons of water to reaction tank.

3. Pump waste into tank and adjust pH to 2 with sulfuric acie.

4. Add sulfur dioxide to reduce Cr^{+6} to Cr^{+3}.

5. Discontinue sulfur dioxide flow and analyze a sample to demonstrate conversion.

6. Adjust the pH to 8 to precipitate chrome ion.

7. Filter sludge in basket filter and solidify with cement in a 55-gallon drum for disposal at Area L.

8. Effluent is discharged to TA-50.

9. Wash all pipelines and tanks used in process with water.

C. Heavy Metal Separation

Waste containing heavy metals will be treated by pH adjustment to precipitate the metal ion.

1. Wash all pipelines and tanks that will be used in treatment/transfer of wastes with water.

2. Pump waste into reaction vessel.

3. Adjust the pH to the predetermined point by addition of either sodium hydroxide or acid. (Usually the pH will need to be increased by caustic addition).

4. Filter sludge in basket filter and solidify with cement in 55-gallon drum for disposal at Area L.

5. Effluent is discharged to TA-50-1 effluent tank.

6. Wash all pipelines and tanks used in process with water.

D. Acid Waste

These waste streams contain no heavy metals and require only neutralizaiton. The 10,000-gallon neutralization tank at TA-50-1 is used in place of the 500-gallon reaction vessel.

1. Wash all transfer lines that will be used in process with water.

2. Add necessary dilution water and caustic to neutralization tank.

3. Monitoring temperature and pH, slowly add acid to tank.

4. Stop acid addition and adjust pH with sodium hydroxide as necessary.

5. Wash all transfer lines that were used with water.

6. Treated solution will be pumped to either the wiped film evaporator system or to the TA-50-1 effluent tank.

III. Health, Safety, and Environmental Concerns

A. Exposure to toxic and corrosive chemicals

B. Reactions out-of-control

C. Spills of wastes during transfer or treatment

IV. PROCEDURES FOR SAFE OPERATIONS

A. Personal Protective Equipment/Measures

1. Safety glasses/face shields, gloves, and lab coats or coveralls are the minimum protection that must be worn. During transfer of >50% acid wastes, acid wear suits must also be worn.

2. Safety shoes shall be worn during all waste handling operations.

3. Respirators, either full-face or SCBA, will be used as necessary per instructions from HSE-5.

4. The emergency shower and eyewash must be checked to assure that it is operative prior to starting any treatment operations.

5. Two people must be present during treatment operations.

B. Treatment Process

1. All instrumentation will be recalibrated at least yearly.

2. Pressure gauges will be monitored for pressure increases during treatment processes. If sudden pressure increases are detected, treatment will cease immediately. Agitation and cooling water in the jacket will continue to control the reaction.

3. The operating instructions are written to prevent a run-away reaction. Strict adherence to these procedures is required.

C. Spill Control Measures

1. The treatment process takes place inside a concrete bermed area designed to contain all spills and releases.

2. If the reaction overpressurizes the system, any blowdown will be contained in the overflow tank.

3. A major release would initiate the procedures of the Hazardous Waste Contingency Plan.

V. RELATIONSHIPS BETWEEN OPERATIONS AND SUPPORT ACTIVITIES

HSE-7 uses the expertise and guidance of HSE-3 (Safety), HSE-5 (Industrial Hygiene), and HSE-8 (Environmental Surveillance) in the use of the treatment system. If the system were to be used for other waste streams than those described above, a Special Work Permit would be written and approved by these groups.

VI. TRAINING

The training requirements for personnel involved in this operation are covered in SOP CW-1. In addition, personnel shall read this SOP at least semi-annually. The treatment supervisor shall periodically review the task performances of the technical personnel to ensure understanding and compliance with these procedures.

VII. EMERGENCY PROCEDURES

The TA-50-1 Emergency Procedures shall be followed for all emergencies.

VIII. RESPONSIBILITIES

The HSE-7 Section Leader for Solid Waste Operations has the overall responsibility for the treatment system. The Section Leader reports directly to the Associate Group Leader.

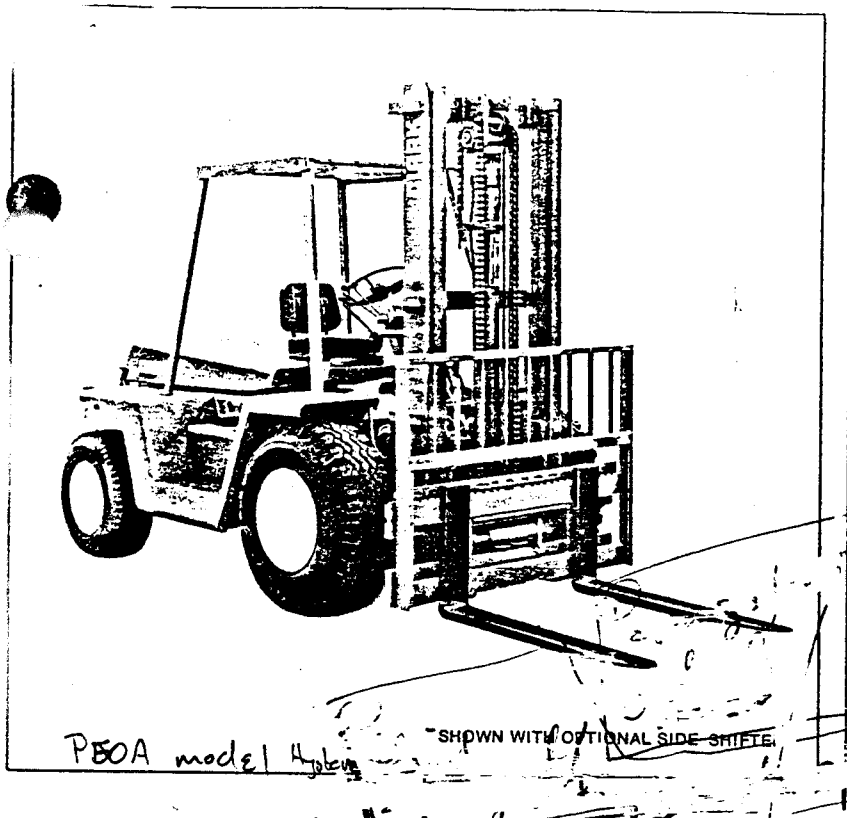
The treatment supervisor is responsible for assuring that all personnel involved in the treatment of chemical wastes know and understand these procedures. All instances of non-compliance will be reported by the supervisor to the Section Leader who is responsible for initiating appropriate corrective action.

CALL LIST

		Work	Home
Treatment Supervisor			
Section Leader	Karen Balo	7-6095	672-1369
Assoc. Group Leader	John Warren	7-5397	662-9639
Deputy Group Leader	Lud Emelity	7-5389	662-7993
Group Leader	Ray Garde	7-4301	753-7737

APPENDIX M-6

MANUFACTURERS SPECIFICATIONS ON DRUM HANDLING EQUIPMENT USED AT TA-54



SHOWN WITH OPTIONAL SIDE SHIFTER

P50A model Hyster

Clark
Rough Terrain Truck

IT 60

Internal Combustion
2 Wheel Drive Towable Truck

6000 lbs. Rated Capacity at 24-in. (600 mm) Load Center

2720 kg Rated Capacity at 500 mm (20-in.) Load Center

Gasoline

SPEED ON GRADE:	Loaded mi/h	Loaded km/h	Empty mi/h	Empty km/h
0%	35.7	*57.4*	36.5	*58.7*
5%	12.2	*19.6*	20.6	*33.1*
10%	7.7	*12.4*	11.3	*18.2*
15%	5.5	*8.9*	8.9	*14.3*
41.2% @	1.0	*1.6*	—	—

MAX. GRADEABILITY %:	Loaded	Empty
(.9 cf)	49.6	33.4

MAX. DRAWBAR PULL:	lbs.	*N*
Rated Load	8168	*36 331*
Empty 0.9 cf	6082	*27 053*

	Standard		Triple Stage	
LIFTING SPEEDS:	ft/min	m/s	ft/min	m/s
Loaded	63	*0.32*	75	*0.38*
Empty	65	*0.33*	80	*0.41*
LOWERING SPEEDS:				
Loaded	84	*0.43*	80	*0.41*
Empty	39	*0.20*	75	*0.38*

ENGINE: Ford 300, in-line, 6 cylinder overhead valve industrial engine. The engine incorporates cast iron cylinder block and head with 7 main bearing crankshaft, chrome plated piston rings, hard faced exhaust valves and valve seat inserts, positive exhaust valve rotators, full pressure lubricating system, and a sealed maximum velocity governor. 7 PSI *(48 kPa)* cooling system has 15 quart *(14 L)* capacity.

Model	300
Bore	4.00 in *(102 mm)*
Stroke	3.98 in *(101 mm)*
Displacement	300 cu in *(4.9 L)*
Max. No Load Governed Speed	2600 RPM
Crankcase Capacity	7 quarts *(6.6 L)*
Fuel Tank Capacity	20 gallons *(76 L)*

FILTERS: Spin-on engine oil filter with pleated paper element. Filtered crankcase breather. Donaldson Cyclopac, two stage, air cleaner with replaceable cartridge. Gasoline filter in a metallic bowl on inlet side of pump. Gas filler equipped with strainer. Spin-on transmission oil filter with a built-in bypass valve. Hydraulic system has ten micron *(ten micrometer)* replaceable filter at inlet side of pump, 30 mesh screen in filler neck, and replaceable fiber disc type filler cap breather.

ELECTRICAL SYSTEM: 60 amp hour battery and 37 amp Delco alternator with built-in electronic regulator. Enclosed electric starter with positive pinion engagement. Gauges for reading engine hours, engine oil pressure, engine temperature, battery charging rate and fuel level.

HYDRAULIC SYSTEM: Lift, lower, tilt and auxiliary control levers are mounted on steering column pylon for right hand operation. Full feathering spool type valves. Main hydraulic pump is direct driven. System fluid capacity is 17 gallons *(64 L)*. Sump tank of 25 gallon *(95 L)* capacity is integral with truck frame.

DRIVE TRAIN: Clark full floating drive axle driven by a double universal joint propeller shaft. Axle reduction ratio 6.3:1.

TRANSMISSION: Powershift forward and reverse transmission coupled to a four speed, fully synchronized gear case to provide 4 speeds in forward and reverse. A torque converter multiplies engine torque 2:1. Transmission fluid oil cooler located in the engine radiator. Equipped with neutral start switch. Left foot transmission release pedal, and right foot auxiliary throttle mounted on brake pedal that enables simultaneous operation of engine speed, brakes and transmission engagement. Left hand directional control lever and right hand floor mounted speed selector lever with latch to hold lever in neutral while towing.

STANDARD UPRIGHT: Interlocking "I" beam and channel rails that are reinforced with heavy tie bars. Four canted, variable retainment upright rollers and six canted load rollers on the carriage. Four lateral thrust carriage rollers that bear on the inner rails to resist deflection due to off-center loading. Upright rollers are shim adjustable without major upright disassembly. Non-rigid lift cylinder and tilt cylinder mounts minimize size loading on cylinder rods, seals and packings. Lift and tilt cylinders are serviceable without cylinder removal. Tilt cylinders are key locked to yokes for positive adjustment. Cylinder rods are chrome plated. The upright is mounted to a heavy tubular cross member with greaseable steel backed bushings. Urethane rod wipers and double 'U' cup packings on tilt cylinders. Anti-cavitation valve in tilt circuit. Hook mounted forks are upset forged for full section strength at fork heel. Pivot type forks are optional.

FRAME: Heavy, precision aligned, one-piece structure with integral fuel and hydraulic tanks of .25 in. *(6.3 mm)* plate. First step to operators compartment is open grating to reduce dirt and snow accumulation.

BRAKES: Hydraulic brakes with two stage master cylinder and dual wheel cylinders. Brake shoes are 4.0 in. *(102 mm)* wide and operate in 16.25 in. *(413 mm)* diameter drums. Equipped with Orscheln adjustable lever and cable that actuates drum and band type parking brake at rear of transmission.

POWER STEERING SYSTEM: Fully fluid linked hydrostatic steering for positive hand wheel control. Dual steering cylinders provide constant steering rate. Cast steer axle is mounted on center pivot pin and two semi-elliptical leaf springs that allow up to 10 in. *(254 mm)* variation in tire height. Inclined king pins and axle caster promote improved tracking and towing characteristics. Pressure lubricant fittings on king pins and other steering components.

OVERHEAD GUARD: Meets ANSI B56.1 safety standards and has been subjected to an impact test of 16 000 ft-lbs *(21 693 N·m)*.

ADDED ADVANTAGES: 48 in. *(1220 mm)* high load backrest extension; protectoseal fuel tank cap; couple provision for towing auxiliary equipment; and multipass muffler. Standard bolts are SAE Grade 5, and are zinc phosphate coated or cadmium plated to resist corrosion.

OPTIONAL ACCESSORIES: Towing equipment, pivoting forks, block handling forks, lights, and tires for varied operating surfaces.

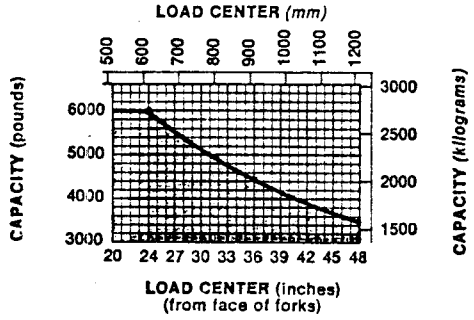
PAINT: Exposed surfaces have been shot blasted, primed, and painted with weather-resistant paint. Standard color is Clark green.

IT 60

6000 lbs. Rated Capacity at 24 in. (600 mm) Load Center
2720 kg Rated Capacity at 500 mm (20 in.) Load Center

GENERAL DATA

CAPACITY CHART



NOTE: Capacities shown above are computed with upright in vertical position. Capacity up to 6,000 lbs. applies to uprights with maximum fork height up to 184 inches. Capacity up to *2720 kg* at *500 mm* load center applies to uprights with maximum fork heights to *3300 mm*. For trucks equipped with uprights above these maximum fork heights, contact a Clark representative. Specific capacities will be shown on truck nameplates.

UPRIGHT DIMENSION TABLE

TYPE	MAXIMUM FORK HEIGHT		OVERALL HEIGHT LOWERED		FREE LIFT	
	in	mm	in	mm	in	mm
STANDARD	*136	3454	104	2642	5.5	140
	148	3760	110	2794	5.5	140
	160	4064	116	2946	5.5	140
	184	4674	128	3251	5.5	140
TRIPLE STAGE	*288	7315	145	3683	112	2845
	360	9144	162	4115	129	3277

*Preferred standard heights.

Other upright heights available, contact Clark representative.

SERVICE WEIGHTS:	136 in. (3454 mm) Std.		288 in. (7315 mm) TSU	
	lb	kg	lb	kg
IT 60	12 400	5625	13 400	6078

UNDERCLEARANCES:

With Rated Load
- Upright ..... 9.2 in *(234 mm)*
- Drive Axle ..... 9.1 in *(231 mm)*

With No Load
- Steer Axle ..... 10.0 in *(254 mm)*
- Frame ..... 12.0 in *(305 mm)*
- Counterweight ..... 11.3 in *(287 mm)*

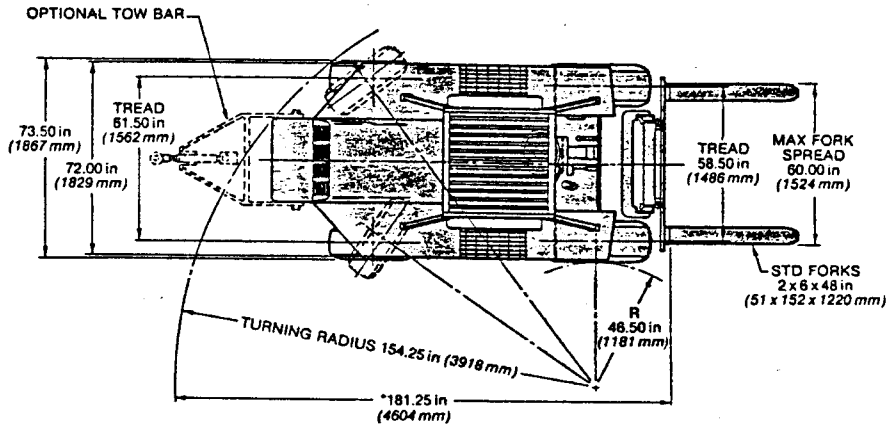
INSURANCE CLASSIFICATIONS: Classified by Underwriters' Laboratories, Inc. as to fire hazard only; type G industrial trucks. See UL Index of Classified Products.

PERFORMANCE CRITERIA . . .
Performance values based on full power engine operating conditions in accordance with SAE Standard J816 [85°F and 500 ft. altitude *(29°C and 152 m)*].

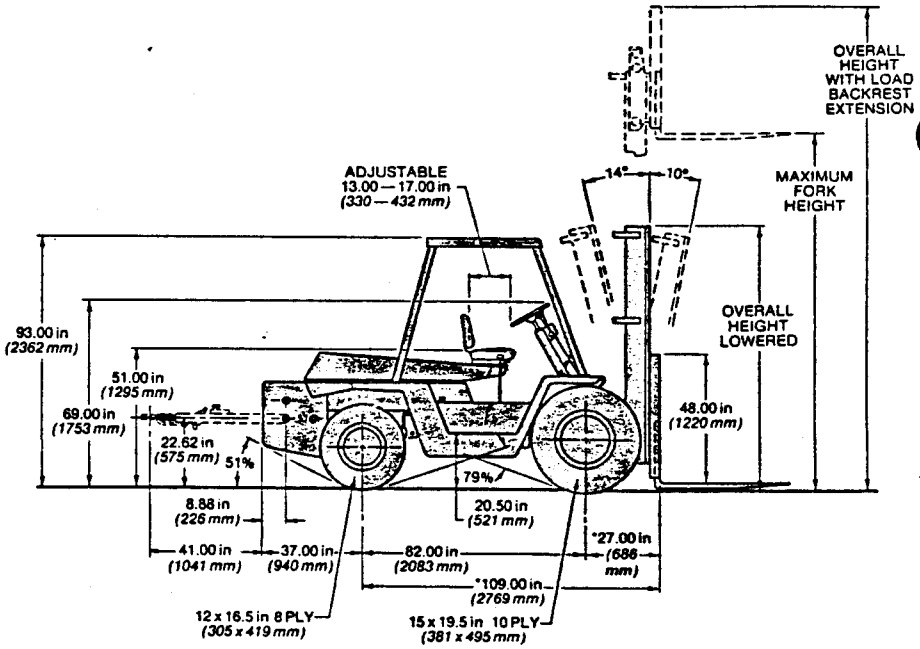
NOTE: Production engine driveline components may vary in output and/or efficiency by ± 5%. The performance shown represents nominal values which may be obtained under typical operating conditions of a standard machine. Slight variations may be expected due to local temperature and altitude and/or individual machine accessory and loaded weight conditions.

Metric specifications shown are equivalents of U.S. dimensions.

Clark products and specifications are subject to improvements and changes without notice.



FOR BASIC RIGHT ANGLE STACKING AISLE ADD LOAD LENGTH



*ADD 1.50 in *(38 mm)* FOR FULL FREE LIFT TRIPLE STAGE UPRIGHT

CLARK Industrial Truck Division

Internal Combustion Trucks
Battle Creek, Mi 49016

electric and internal combustion lift trucks / narrow aisle trucks / walk and walk-ride electric trucks / tow tractors / complete line of attachments

PRODUCT IDENTIFICATION

SERIAL NUMBER	IT581-32-4915 BC	MODEL	IT60
CUSTOMER	Los Alamos Scientific Labs Los Alamos, NM	DEALER/ORDER 0308	S.R. NO. 263155
		JOB/ITEM 1219-11	SHIPPING DATE 28jan82
		DEALER Albuquerque	
		COUNTY Los Alamos	

20.376	187885	DRIVE AXLE SERIAL: 5045583	34.000	249M0798	UPRIGHT
20.287	124444	DIFFERENTIAL GEAR & CASE			PAGE 34-176,536,874
20.248	122574	RING & PINION SET	34.013a	1654614	ROLLER
23.016a	1317603	DRIVE TIRES 15x19.5x14"Ply	34.400	2358012	CYLINDER 34.400VP 358
00.000	2350186	ENGINE - MAKE FORD			PAGE 34-470
		SPEC. 300CID SERIAL: 17789		IN-18735	WIRING DIAGRAM
34.359a	1810170	FORK STOP PIN KIT	53.099	2377223-40	Side Shifter w/Flow
34.999a	2362721	LOAD BACK REST EXTENSION			Control Valve 33-038,
26.100	190996	STEERING AXLE SERIAL: 626979			53-102, 53-206, 53-678
26.142a	840867	KNUCKLE PIN KIT	33.000	2346216	Flow Control Valve
23.006a	1315821	STEER TIRES 12x16.5x8"Ply	33.002	999603	Valve Sub-Assy.
32.000/001	1763793	TILT CYLINDER	33.009	999601	Seal Kit
06.200	995856	TRANSMISSION, FWD & REV MAKE	53.020	2329090	Cylinder Assy.
		MODEL SERIAL: 3157	54.222	1811244	Packing Kit
08.440	1772754	TRANSMISSION (SPEED CHANGE)		2343579	Aux Valve Inst.
34.300	2356049	CARRIAGE PAGE 34-924	30.200	2343270	Aux Valve 30-190,
34.340a	2356048	WELDED ASSEMBLY			75(30)234
34.316a	1654614	ROLLER		2321584	Hose Adapt 50-237,
34.350a	1772403	FORKS 60"			50-191, 50-543

a No SERVICEABLE PARTS mb — Fold — MRC 65 — REV 9

P.I.C.	PARTS MANUAL #	MAINT. MANUAL #	P.M.A. MANUAL # 387.2	OP. MANUAL # 387
DATE 1 FEB 1982	DATE 1-100-19	DATE	DATE FEB 1 - 1982	DATE FEB 1 - 1982

DIVERSIONS	Los Alamos Scientific Labs, Los Alamos	PER NM 2z 22 Feb 82 342734
		PER
		PER
		PER
MODIFICATIONS AND CHANGES		PER
		PER
		PER
		PER

Dealer Use Only

MANUALS DELIVERED TO NAMES _____ TITLE _____

COMPANY _____

REMARKS

John Fenlemer

254574

02.225	1615458	AIR CLEANER
02.242a	886525	ELEMENT
12.200	2365377	ALTERNATOR
12.234a	999307	BRUSH W/HOLDER
12.316a	994381	VOLTAGE REGULATOR
12.372a	2345324	ALTERNATOR BELT
13.043a	949286	AMMETER
12.010a	1310125	BATTERY - DRY
14.026a	784751	BATTERY GROUND CABLE
14.025a	1314543	BATTERY STARTER CABLE
23.245	119089	BRAKE - L.H.
23.214	894305	WHEEL CYLINDER
23.216a	863668	CYLINDER REPAIR KIT
23.244	119088	BRAKE - R.H.
23.215	894305	WHEEL CYLINDER
23.217a	863668	CYLINDER REPAIR KIT
23.247a	120450	SHOE & LINING - AXLE SET
23.150	2348867	BRAKE MASTER CYLINDER
23.159a	857949	REPAIR KIT
02.100		CARBURETOR GAS: 997411 LPG:
02.102a	992780	GASKET KIT
02.101a	992781	REPAIR KIT
11.201a	881097	COIL
11.300	1810871	DISTRIBUTOR
11.319a	899850	CAP
11.388a	996396	POINTS/ROTOR/CONDENSER
23.020	2372560	DRIVE WHEEL
21.001	1772755	DRIVE AXLE PROP SHAFT
21.002a	861452	CENTER CROSS REPAIR KIT
01.307a	899839	ENGINE OIL FILTER
13.052a	2353857	ENGINE OIL PRESSURE GAUGE
13.013a	6000171	ENGINE OIL PRESSURE GAUGE SENDER
13.057a	2353859	ENGINE TEMPERATURE GAUGE
13.011a	2338565	ENGINE TEMPERATURE GAUGE SENDER
01.406a	997412	FAN BELT
01.381a	997413	FAN BLADE
13.028a	947257	FUEL GAUGE
13.070a	1723625	FUEL GAUGE SENDER
02.755	890384	FUEL PUMP
02.760a	890729	REPAIR KIT
02.762a	890385	ELEMENT
02.060a	2344433	FUEL TANK CAP
13.003a	1330006	HORN
25.002a	1810444	HORN BUTTON SET
13.001a	733623	HORN RELAY
13.023a	1743826	HOUR METER
13.015a	740342	HOUR METER PRESSURE SWITCH

29.100	2364603	HYDRAULIC PUMP - MAIN
29.147a	991166	CARTRIDGE KIT
29.146a	888543	SEAL KIT
29.144a	991635	VANE KIT
21.200	2339903	HYDRAULIC PUMP PROP SHAFT
21.205a	992624	CENTER CROSS REPAIR KIT
13.047a	1790936	KEY SWITCH
02.582a	1756435	MUFFLER
13.022a	2345322	NEUTRAL STARTING SWITCH
39.932a	2340572	OVERHEAD GUARD
23.268	888025	PARKING BRAKE SHOE & LINING
23.697	2350027	PARKING BRAKE LEVER
01.550a	2344749	RADIATOR
01.570a	525318	CAP
01.577a	2351286	RADIATOR UPPER HOSE
01.600a	2340777	RADIATOR LOWER HOSE
39.719	995186	SEAT ASSEMBLY
39.721a	995188	BACK REST
39.720a	995187	CUSHION
11.020	992710	STARTER
11.043a	1810864	BRUSH SET
11.033a	991161	DRIVE ASSEMBLY
11.027a	884581	SOLENOID SWITCH
11.001a	215276	STARTER RELAY
26.000	1754228	STEERING CYLINDER
26.003a	885119	ROD SEAL KIT
25.001	2358453	STEERING GEAR
25.004a	1752863	STEERING HANDWHEEL
25.025	1751522	STEER WHEEL
29.738	2344074	SUMP FILTER
29.740a	1810889	ELEMENT
29.728a	2308783	SUMP FILLER CAP
01.596a	890380	THERMOSTAT
32.072a	1811179	TILT CYLINDER PACKING KIT
31.500	233471	TILT LOCK VALVE
10.105a	990937	TRANSMISSION OIL FILTER
05.000a	2342062	TORQUE CONVERTER
29.300a	896467	TORQUE CONVERTER PUMP
30.000	1625336	VALVE - LIFT & TILT
30.032a	892871	SEAL KIT - INLET SECTION
30.116a	892871	SEAL KIT - OUTLET SECTION
01.430	899845	WATER PUMP
14.114a	2340785	WIRING HARNESS

aNO SERVICEABLE PARTS

PU. HASE REQUEST/ORDER

REQUESTER: Retain Pink, Send Original, and Three (3) Copies (with interleaf carbon paper) To SP-D

RQT **017067**

For Group **H-8** Account Code _____ Program Code _____

Requested by **John Warren** Phone **5862** Date **1/14/74**

SHADED AREAS for Supply & Property use ONLY

INCLUDE WRITTEN EXPLANATION IF DELIVERY TIME IS CRITICAL AND/OR SOLE SOURCE IS REQUESTED.

PLEASE ANSWER THE FOLLOWING QUESTIONS:

HAVE YOU CHECKED LASL STOCK FOR THIS ITEM OR SUITABLE SUBSTITUTE? YES ____ NO ____

SHOULD SP CONSIDER STOCKING THE ITEM(S)? YES ____ NO ____

ESTIMATED ANNUAL USAGE? ____

WILL INSTALLATION COSTS BE INCURRED? YES ____ NO ____

ENG DEPT. EST. $ ____

E-DIV EST. $ ____

Realistic Date Required **3/10/74**

Deliver to Area **TA-54** Bldg. **Area G** Room ____ Person **John Warren**

KNOWN AVAILABLE EXCESS LISTS HAVE BEEN REVIEWED.

Purchase Approved By _____

Group Leader or Authorized Alternate (Date)

FOR SP DEPT. USE ONLY

(Buyer) (Date) Phone Ext.

INVOICE TERMS From Receipt of Goods or Invoice — whichever is later.	REQUIRED SHIPPING DATE	DATE OF ORDER	PURCHASE ORDER NO.
TO			BLANKET PURCHASE AGREEMENT

QUOTED BY PHONE DATE QUOTE NO.

F.O.B. SHIP VIA SHIP FROM

ITEM	DESCRIPTION OF REQUIREMENTS (SPECS)	QUANTITY	UNIT	UNIT PRICE	EXTENSION
1.	Forklift, gasoline driven, rough-terrain model, 5000 lb. capacity at 24" lead center, new current model, constant mesh transmission, 3 speed forward & reverse, oil clutch, must climb a 25% grade wet, with rated load, 12 volt electrical system, pressure cooling system, full time - full flow hydraulic filter, power steering, hour meter, auxiliary throttle to be operated from brake pedal, telescoping upright, 113" overall lowered height, 168" maximum fork, height (to top of forks), minimum tilt either direction 10%, load carriage not to exceed (CONTINUED ON PAGE 2)	1	ea.		
	SUGGESTED SOURCES:				
	Escon 4019 Broadway, S.E. Albuquerque, N.M. 87102				
	Empire Clarklift, Inc. 3411 Gerard N.E., Albuquerque, N.M. 87107				
	TOTAL EST. COST				

ITEMS	TOTAL COST	ACCOUNT	PROGRAM	LOC.	SOR.	EXP.	PAREN.	JOB ORDER	ORDER	PROC.	WORK	B BIDS REQ. M/S

BIDS RECD. M/S	M/S	BIDS REJ.	SURPLUS	SOURCE	ACCEPT	SELLERS NO.	EXPEDITE	DUE DATE	SHIP DATE

GROUP	SITE	BUILDING	ROOM	FOR	AO 1 USE ONLY

FORM 838 REV. 7/73

width of truck, side shift with 8" travel and to allow load arm to extend to outer edge of truck, to be furnished with load back-rest and overhead guard, 48" full taper load arms, flowtation tires, drive wheels 12.00 x 16.5, 10 ply, Off road tread, 11.00 x 15 6 ply steering tires. Drive wheels must have enough clearance for tire chains, turning radius must not exceed 10 ft. from center of drive axle to rear of truck, to be furnished with 5 lb. dry chemical fire extinguisher and protecto seal fuel cap.

ESTIMATED COST: $11,000.00