Department of Energy
National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

SEP 1 5 2003

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Sandra Martin, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

Dear Ms. Martin:

Subject: Resource Conservation and Recovery Act (RCRA), Technical Area 55 (TA-55) Part B Permit Application Submittal – Los Alamos National Laboratory (LANL), EPA ID No. NM 890010515

The purpose of this letter is to submit and request approval for the most recent version of the RCRA permit application for TA-55, entitled, "Los Alamos National Laboratory, Technical Area 55 Part B Permit Application, Revision 2.0 (LA-UR-03-6303)." This application supports the renewal of the LANL hazardous waste facility permit. The original RCRA Hazardous Waste Facility Permit was issued to the U.S. Department of Energy (DOE) and the University of California (UC) by the New Mexico Environmental Improvement Division on November 8, 1989.

This submittal contains one permit application, one manila envelope, and one supporting document designed to aid final review of the application. The permit application has a Laboratory-issued unrestricted release (LA-UR) number. This means that it is acceptable to make the information contained within the binder available to those in the public that may wish to review it. The manila envelope within the front pocket of the binder is labeled UCNI (Unclassified Controlled Nuclear Information). Its contents consist of LA-CP-03-0680. This information, while not classified, is sensitive and is not to be distributed for review with the rest of the application. It is now the responsibility of the New Mexico Environment Department (NMED) to maintain control of that information and keep it secured during times when it is not being used. The supporting document is a table that outlines briefly the changes that have taken place since the last revision of the TA-55 application.

This revised permit application incorporates the text and information indicated in DOE/UC's response to NMED's, "Notice of Deficiency, TA-55 Part B RCRA Permit Application, January 2002, Revision 1.0, Los Alamos National Laboratory, EPA ID# NM0890010515, HWB-LANL-99-051." This revision was also modified to include additional information regarding various waste management programs or procedures that have changed since the response.

If you should have any questions or comments concerning this permit application submittal, please contact Gene Turner, DOE, of my staff at (505) 667-5794 or Jack Ellvinger, UC, at (505) 667-0633.

Sincerely,

Ralph E. Erickson
Manager

FO:8GT-004

Enclosure

cc w/enclosure:
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LA-UR-03-6303
September 2003

Los Alamos National Laboratory

Technical Area 55 Part B
Permit Application

Revision 2.0

Prepared by:

Los Alamos National Laboratory
Solid Waste Regulatory Compliance
Los Alamos, New Mexico 87545

Document: TA-55 Part B
Revision No.: 2.0
Date: September 2003

Los Alamos National Laboratory Technical Area 55 Part B Permit Application

Revision 2.0
LA-UR-03-6303

September 2003

Prepared by:

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LIST OF ACRONYMS/ABBREVIATIONS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
ALARA	as low as reasonably achievable
CFR	Code of Federal Regulations
CSU	container storage unit(s)
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ft	foot/feet
gal	gallon(s)
HEPA	high-efficiency particulate air
HRMB	Hazardous and Radioactive Materials Bureau
in.	inch(es)
L	liter(s)
LANL	Los Alamos National Laboratory
NMED	New Mexico Environment Department
NRC	Nuclear Regulatory Commission
SUP	Supply Chain Management Division
SWB	standard waste box
SWMU	solid waste management unit
TA	technical area

Los Alamos National Laboratory
Technical Area 55 Part B Permit Application, Revision 2.0
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1.0 INTRODUCTION

This "Los Alamos National Laboratory Technical Area 55 Part B Permit Application" is submitted to address the requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), revised June 14, 2000 [6-14-00], specific to hazardous and mixed waste operations at Los Alamos National Laboratory (LANL) Technical Area (TA) 55. Additional information is provided in this permit application beyond that necessary for regulatory compliance to demonstrate how LANL meets regulatory standards. This information is not intended for inclusion in LANL's hazardous waste permit. Waste management units to be permitted include seven container storage units (CSU), a storage tank system, and one Subpart X treatment unit (a cementation unit). This document serves as Revision 2.0 to "Technical Area 55 Part B Permit Application," Revisions 0.0 and 1.0, submitted to the New Mexico Environment Department (NMED) in June 1996 and January 2002, respectively.

This document has been formatted to meet the permitting strategy outlined by the NMED Hazardous and Radioactive Materials Bureau (HRMB) in correspondence dated February 5, 1998 (NMED, 1998a). As presented in the 1998 correspondence, TA-specific permit applications, permit modification requests, and permit renewal applications would include any details and/or requirements not addressed in the "Los Alamos National Laboratory General Part B Permit Application." The most recent version of that document, hereinafter referred to as the LANL General Part B, complements this permit application. Certain portions of the LANL General Part B will serve in the operating permit as an "umbrella" document, covering the requirements of the New Mexico Hazardous Waste Act and implementing regulations, specifically 20.4.1 NMAC [6-14-00], common to all waste management units. Together, information provided in this permit application and in the LANL General Part B will meet the applicable requirements specified in 20.4.1 NMAC, Subparts V and IX [6-14-00].

This revised document also addresses the following:

- Revisions agreed upon in the "Response to Notice of Deficiency; TA-55 Part B RCRA Permit Application, January 2002, Revision 1.0, May 16, 2002," LA-UR-02-5041 (LANL, 2002a).

- Permitting requirements for a modification to the existing storage tank system. The two storage tank systems identified in Revision 0.0 of the TA-55 Permit Application as the evaporator glovebox storage tank system and the cementation unit storage tank system have been combined and modified into a single storage tank system. The storage tank system, as presented in this document, is comprised of two existing components and one new component. The two existing components include the evaporator glovebox tank component (formerly identified as the evaporator glovebox storage tank system) and the cementation unit pencil tanks component (formerly identified as the cementation unit storage tank system). The one new component includes additional pencil tanks.

- Permitting requirements for a new CSU to be located at TA-55-185.

In accordance with HRMB's 1998 permitting strategy, LANL submitted the "Los Alamos National Laboratory General Part A Permit Application." The most recent version of this document, hereinafter referred to as the LANL General Part A, consolidates information from previous site-wide and TA-specific Part A submittals into one comprehensive document, identifying all hazardous and mixed waste treatment, storage, and disposal facilities at LANL subject to 20.4.1 NMAC, Subparts V, VI, and IX [6-14-00] at that time. The LANL General Part A serves as a companion document to the LANL General Part B and TA-specific permit applications, permit modification requests, and permit renewal applications, including this revised permit application.

In the LANL General Part A, the LANL General Part B, and this revised permit application, a unit to be permitted may sometimes be referred to as a facility. The term "facility," as it appears in this context, is used only to denote building or area names and does not imply the regulatory meaning of "facility" as defined in 20.4.1 NMAC §260.1 [6-14-00]. However, pursuant to 20.4.1 NMAC §260.1 [6-14-00], the "LANL facility" as a whole does meet the regulatory definition of a facility.

Table 1-1 provides a list of regulatory references and the corresponding location in this permit application, as appropriate. Where applicable, regulatory citations in this document reference 20.4.1 NMAC, which adopts, with a few exceptions, all of the Code of Federal Regulations, Title 40, Parts 260 to 266, Part 268, and Part 270.

Table 1-1
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§270.14(b)(1)	General facility description	Attachment A
§270.14(b)(2)	Chemical and physical analyses of hazardous waste	Attachment B[a]
§270.14(b)(3)	Waste analysis plan	Attachment B[a]
§264.13(b)	Development and implementation of a written waste analysis plan	Attachment B[a]
§264.13(c)	Off-site waste analysis requirements	Attachment B[a]
§270.14(b)(4)	Security procedures and equipment	Attachment J
§264.14	Security procedures and equipment	Attachment J
§270.14(b)(5)	General inspection schedule	Attachment C[a]
§264.15(b)	General inspection schedule	Attachment C[a]
§264.174	Inspections/containers	Attachment C[a]
§264.193(i)	Tank system inspections pending provision of adequate secondary containment	NA
§264.195	Overfill control inspections	Attachments C[a], H, and I
§264.226	Surface impoundment monitoring and inspection	NA
§264.254	Waste pile monitoring and inspection	NA
§264.273	Land treatment and operating requirements	NA
§264.303	Landfill monitoring and inspection	NA
§264.602	Miscellaneous units	Attachment I
§264.1033	Process vent standards	Attachments H and I
§264.1052	Equipment leak air emission standards	Attachments H and I
§264.1053	Compressor standards	NA

See footnotes at end of table.

Table 1-1 (continued)
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§264.1058	Standards for pumps, valves, pressure relief devices, flanges, and connections	Attachments H and I
§270.14(b)(6)	Request for waiver from preparedness and prevention requirements of 264 Subpart C	NA
§264.30-37	Preparedness and prevention: applicability, design and operation, required equipment, testing and maintenance of equipment, access to communications or alarm systems, required aisle space, and arrangements with local authorities	NA
§264.227	Surface impoundment emergency repairs	NA
§270.14(b)(7)	Contingency Plan	Attachment E[a]
§264.50-56	Contingency plan and emergency procedures: applicability, purpose/implementation of contingency plan, content of contingency plan, copies of contingency plan, amendment to contingency, emergency coordinator, and emergency procedures	Attachment E[a]
§270.14(b)(8)	Description of preparedness and prevention	Attachment J
§270.14(b)(8)(i)	Hazard prevention in unloading operations	Attachment J
§270.14(b)(8)(ii)	Runoff prevention	Attachment J
§270.14(b)(8)(iii)	Contamination prevention of water supplies	Attachment J
§270.14(b)(8)(iv)	Mitigation of equipment failure and power outages	Attachment J
§270.14(b)(8)(v)	Prevention of undue exposure of personnel to hazardous waste	Attachment J
§270.14(b)(8)(vi)	Prevention of releases to the atmosphere	Attachment J
§270.14(b)(9)	Prevention of accidental ignition or reaction of ignitable, reactive, or incompatible wastes	Attachments G, H and I
§264.17	Procedures to prevent accidental ignition, reaction of ignitables, reaction of reactives, reaction of incompatibles, and documentation of compliance with 264.17 (general requirements for ignitable, reactive, or incompatible wastes)	Attachments G, H and I

Table 1-1 (continued)
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§270.14(b)(10)	Traffic pattern: volume, controls, and access	Attachment A
264.18(a)	Seismic considerations	
§270.14(b)(11)	Facility/unit identification and location information	Attachment A
§270.14(b)(11)(i)	Seismic standard applicability [264.18(a)]	Attachment A
§270.14(b)(11)(ii)	Seismic standard requirements	Attachment A
§270.14(b)(11)(ii)(A)	No fault within 3,000 feet (ft) with displacement in Holocene time	Attachment A
§270.14(b)(11)(ii)(B)	If faults which have displacement in Holocene time are present within 3,000 ft, no faults pass within 200 ft of portions of the facility where treatment, storage, or disposal will be conducted	NA
§270.14(b)(11)(iii)	100-year floodplain standard	Attachment A[a]
§270.14(b)(11)(iv)(A-C)	Facilities located within the 100-year floodplain	NA
§270.14(b)(11)(v)	Compliance schedule for 264.18(b)	NA
§270.14(b)(12)	Personnel training program	Attachment D[a]
§270.14(b)(13)	Closure and post-closure plans	Attachments F.1, F.2, and F.3
§264, Subpart G	Closure and post-closure	Attachments F.1, F.2, and F.3
§264.178	Closure/containers	Attachment F.1
§264.197	Closure and post-closure care/tanks	Attachment F.2
§264.228	Surface impoundments	NA
§264.258	Waste piles	NA
§264.280	Land treatment	NA

See footnotes at end of table

Table 1-1 (continued)
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§264.310	Landfills	NA
§264.351	Incinerators	NA
§264.601	Closure/miscellaneous units	Attachment F.3
§264.603	Requirements by the Secretary	Attachment F.3
§270.14(b)(14)	Deed restrictions/post-closure notices (264.119)	Attachments F.1, F.2, and F.3
§270.14(b)(15)	Closure cost estimate (264.142)	Attachments F.1, F.2, and F.3
§270.14(b)(16)	Post-closure cost estimate (264.144)	Attachments F.1, F.2, and F.3
§270.14(b)(17)	Liability insurance (264.147)	Attachments F.1, F.2, and F.3
§270.14(b)(18)	Proof of financial coverage (264.149-150)	Attachments F.1, F.2, and F.3
§270.14(b)(19)	Topographic map requirements	Attachment A[b]
§270.14(b)(19)(i)	Map scale and date	Attachment A[b]
§270.14(b)(19)(ii)	100-year floodplain area	Attachment A[b]
§270.14(b)(19)(iii)	Surface waters	Attachment A
§270.14(b)(19)(iv)	Surrounding land uses	Attachment A
§270.14(b)(19)(v)	Wind rose	Attachment A
§270.14(b)(19)(vi)	Map orientation	Attachment A[b]
§270.14(b)(19)(vii)	Legal boundaries	Attachment A[b]

See footnotes at end of table.

Table 1-1 (continued)
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§270.14(b)(19)(viii)	Access control	Attachment A
§270.14(b)(19)(ix)	Wells	Attachment A
§270.14(b)(19)(x)	Buildings	Attachment A
§270.14(b)(19)(xi)	Drainage barriers or flood control	Attachment A
§270.14(b)(19)(xii)	Location of operational units	Attachment A
§270.3(b)(20)	Other federal laws	3.0[a]
§270.3(a)	Wild and Scenic Rivers Act	3.0[a]
§270.3(b)	National Historic Preservation Act	3.0[a]
§270.3(c)	Endangered Species Act	3.0[a]
§270.3(d)	Coastal Zone Management	3.0[a]
§270.3(e)	Fish and Wildlife Coordination Act	3.0[a]
§270.3(f)	Executive Orders	3.0[a]
§270.14(b)(21)	Notice of extension approval for land disposal facilities	NA
§270.14(c)	Groundwater monitoring requirements	Attachment A[a]
§270.14(c)(3)	Topographic map with points of compliance	NA
§270.14(c)(3)	Proposed location of groundwater monitoring wells	NA
§270.14(c)(4)	Description of plume of contamination that has entered the groundwater from a regulated unit at the time the application was submitted	NA
§270.14(c)(4)(i)	Extent of plume indicated on topographic map	NA
§270.14(c)(4)(ii)	Identification of constituents and concentration	NA
§270.14(c)(5)	Detailed plan and engineering report describing proposed groundwater monitoring program	

See footnotes at end of table.

Table 1-1 (continued)
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§270.14(c)(6)	If no release detected at date of submitted, then submit following	
§270.14(c)(6)(i)	List of proposed indicator parameters, waste constituents, and reaction products	NA
§270.14(c)(16)(ii)	Proposed groundwater monitoring system	NA
§270.14(c)(16)(iii)	Background values for each proposed monitoring parameter	NA
§270.14(c)(16)(iv)	Description of proposed sampling, analysis, and statistic comparisons to be used	NA
§270.14(c)(7)	If a release is detected at the point of compliance, then corrective actions	NA
§270.14(d)	Information requirements for solid waste management units (SWMU)	4.0
§270.14(d)(1)(i)	Location of SWMUs on topographic map	4.0
§270.14(d)(1)(ii)	Types of SWMUs	4.0
§270.14(d)(1)(iii)	Dimensions and descriptions of SWMUs	4.0
§270.14(d)(1)(iv)	Dates of SWMU operations	4.0
§270.14(d)(1)(v)	Waste types managed at SWMUs	4.0
§270.14(d)(2)	Information on releases from SWMUs	4.0
§270.14(d)(3)	RCRA Facility Assessment sampling and analysis results	NA
§270.15	Information requirements for containers	Attachment G
§270.16	Information requirements for tank systems	Attachment H
§270.16(a)	Written assessment of tank, structural integrity and suitability submitted by an independent, certified, registered professional engineer	Attachment H

See footnotes at end of table.

Table 1-1 (continued)
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§270.16(b)	Dimensions and capacity of each tank	Attachment H
§270.16(c)	Feed system description	Attachment H
§270.16(d)	Piping diagram	Attachment H
§270.16(e)	External corrosion protection description	Attachment H
§270.16(f)	New tank installation	NA
§270.16(g)	Detailed description of secondary containment	Attachment H
§270.16(h)	Request for variance	Attachment H
§270.16(i)	Description of procedures and controls to prevent spills and overflows	Attachment H
§270.23	Information requirements for miscellaneous units	Attachment I

a Requirement or information is also addressed in the most recent version of the "Los Alamos National Laboratory General Part B Permit Application," as appropriate.
b Some of the topographic map requirements are addressed in the most recent version of the "Los Alamos National Laboratory General Part A Permit Application," as appropriate.

ft = feet
NA = not applicable
SWMU = Solid Waste Management Unit

2.0 WASTE MANAGEMENT UNITS

The waste management units described in this permit application are located at Technical Area (TA) 55 in the central portion of the Los Alamos National Laboratory (LANL) as shown in Attachment A on Figure A-1. These units include:

- Seven Container Storage Units (CSU) - B45, B40, B05, K13, and the Vault located at TA-55-4; a container storage pad located northwest of TA-55-4; and TA-55-185.
- One Storage Tank System – consisting of 3 tank components, a total of 16 tanks located in Room 401 at TA-55-4.
- One Cementation Unit – including a pH column, vacuum trap, two motor-driven mixers, four impellers, piping and a glovebox, located in Room 401 at TA-55-4.

The general location of the each waste management unit is shown in Attachment A of this permit application on Figure A-2. Detailed information on and design drawings for each are presented in Attachments G, H and I, respectively. Attachment J of this permit application contains detailed information on general facility operations and management practices.

2.1 CONTAINER STORAGE

The information provided in this section is submitted to address the applicable container storage requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.15, and 20.4.1 NMAC §264, Subpart I, revised June 14, 2000 [6-14-00]. Container storage at TA-55 consists of seven CSUs that provide storage for hazardous and mixed wastes. Table 2-1 identifies each of the CSUs to be permitted, including the location and maximum storage capacity.

Table 2-1
Container Storage Unit Locations and Maximum Capacities at Technical Area 55

CSU Name	Location	Capacity[a] (gallons)
B40	TA-55-4, Basement	21,500
B05	TA-55-4, Basement	3,600
K13	TA-55-4, Basement	2,500
B45	TA-55-4. Basement	11,000
Vault	TA-55-4, Basement	4,000
Storage Pad	Northwest of TA-55-4	135,000
TA-55-185	West of TA-55-4	30,000

a Reflects the calculation of maximum capacities with a minimum aisle space of 2 feet.

TA = Technical Area
CSU = container storage unit

The following sections provide a brief description of the waste management practices associated with the TA-55 CSUs. General dimensions, containment features, and materials of construction for each CSU are provided in Attachment G of this permit application to satisfy the requirements of 20.4.1 NMAC §270.15(a)(1) and (2) [6-14-00].

2.1.1 Storage Containers

Waste containers stored in the TA-55 CSUs include: 0.25, 0.5, 0.75, 1, 2, 4, and 6 liter (L)/quart containers; 5, 10, 12, and 15 gallon (gal) containers, 30-, 55-, and 85-gal drums; special order waste boxes; large waste boxes; and standard waste boxes (SWB). Additional information regarding typical storage containers utilized at the TA-55 CSUs is provided in Tables 2-2 and 2-3. These tables do not contain information on all of the possible containers to be used and each container is identified by size without limiting the materials of construction.

Table 2-2
Typical Storage Containers Used at the Technical Area 55 Container Storage Units

Container Type	Description	Requirements
Non-Bulk Performance-Oriented Packaging [a]	Steel drums	• 49 CFR §178.504. • Maximum capacity not to exceed 119 gal. • Maximum net mass not to exceed 882 lbs.
	Aluminum drums	• 49 CFR §178.505. • Maximum capacity will not exceed 119 gal. • Maximum net mass will not exceed 882 lbs.
	Metal drums other than steel or aluminum	• 49 CFR §178.506. • Maximum capacity will not exceed 119 gal. • Maximum net mass will not exceed 882 lbs.
	Fiber drums	• 49 CFR §178.508. • Maximum capacity will not exceed 119 gal. • Maximum net mass will not exceed 882 lbs.
	Plastic drums	• 49 CFR §178.509. • Maximum capacity will not exceed 119 gal. • Maximum net mass will not exceed 882 lbs.
	Plastic Jerricans	• 49 CFR §178.509. • Maximum capacity will not exceed 16 gal. • Maximum net mass will not exceed 265 lbs.
	Steel or aluminum boxes	• 49 CFR §178.512. • Maximum net mass will not exceed 882 lbs.
	Aluminum or steel Jerricans	• 49 CFR §178.511. • Maximum capacity will not exceed 16 gal. • Maximum net mass will not exceed 265 lbs.
	Plywood boxes	• 49 CFR §178.514. • Maximum net mass will not exceed 882 lbs.
	Fiberboard boxes	• 49 CFR §178.516. • Maximum net mass will not exceed 882 lbs.
	Composite packaging with inner receptacles	• 49 CFR §178.522. • Maximum capacity will not exceed 66 gallons. • Maximum net mass will not exceed 882 lbs.

Table 2-2 (continued)
Typical Storage Containers Used at the Technical Area 55 Container Storage Units

Container Type	Description	Requirements
Non-Bulk Performance-Oriented Packaging [a] (continued)	Composite packaging with inner glass, porcelain, or stone receptacles	• 49 CFR §178.523. • Maximum net capacity for liquids is 16 gal. • Maximum net mass for solids is 165 lbs.
Intermediate Bulk Performance-Oriented Packaging [b]	Metal intermediate bulk containers	49 CFR §178.705.
	Rigid plastic intermediate bulk containers	49 CFR §178.706.
	Composite intermediate bulk containers	49 CFR §178.707.
	Fiberboard intermediate bulk containers	49 CFR §178.708.
	Wooden intermediate bulk containers	49 CFR §178.709.
	Flexible intermediate bulk containers	49 CFR §178.710.
Cylinders [c]	Seamless steel cylinders	DOT Specification 3A, 3AX, 3AA, 3AAX, 3B, 3E, or 3T in 49 CFR, Part 178, Subpart C.
	Welded or brazed steel cylinders	DOT Specification 4B, 4BA, 4B240ET, 4AA480, 4L, or 4BW in 49 CFR, Part 178, Subpart C.
	Seamless or welded aluminum cylinders	DOT Specification 3AL or 4E in 49 CFR, Part 178, Subpart C.
	Seamless nickel cylinders	DOT Specification 3BN in 49 CFR, Part 178, Subpart C.
Containers Used for Transport of Radioactive Materials	DOT Containers	DOT Specification 7A in 49 CFR §178.350.
	IP Containers	Industrial Packaging IP-1, IP-2, or IP-3 in 49 CFR §173.411.
	Exceptions	49 CFR §173.410.

a Manufacturer has provided the required UN marking in accordance with 49 CFR §178.503.
b Marked by the manufacturer in accordance with 49 CFR §178.703.
c Marked with the applicable DOT specification number in accordance with 49 CFR §178.35.

CFR = Code of Federal Regulations
DOT = U.S. Department of Transportation
IP = Industrial Packaging
gal = gallons
lbs = pounds

Table 2-3
Storage Containers Used at Technical Area 55 for Mixed Transuranic Waste

Container Type	Description	Requirements	Filter Vents [a]
Standard 55-gallon Drum	• Gross internal volume of 7.3 ft^3 (0.21 m^3). • Constructed of mild steel. • May also contain ridge, molded polyethylene (or other compatible material) liner.	DOT Specification 7A in 49 CFR §178.350.	One or more filter vents installed on top of the container.
Standard Waste Box	Gross internal volume of 66 ft^3 (1.88 m^3).	DOT Specification 7A in 49 CFR §178.350.	
Standard 85-gallon Drum Over Pack	• Gross internal volume of 11.3 ft^3 (0.32 m^3). • Used for overpacking contaminated 55-gallon drums.	Not Applicable	
Oversized Waste Box	• Gross internal volume greater than 11.3 ft^3 (0.32 m^3). • Used for oversized waste.	Not Applicable	Two or more filter vents installed on sides of container.

a Vents are high-efficiency particulate air grade filters to preclude container pressurization caused by gas generation and to prevent particulate material from escaping. Vents have an orifice approximately 0.375 inches (9.53 millimeters [mm]) in diameter through which internally generated gas may pass. Filter media can be any material (e.g., composite carbon, sintered metal).

CFR = Code of Federal Regulations
DOT = U.S. Department of Transportation
ft^3 = cubic feet
m^3 = cubic meters

2.1.2 Minimum Aisle Space and Storage Configuration

Waste containers at the TA-55 CSUs are arranged in rows with a minimum aisle space of 24 inches (in.). Storage configuration within a row depends upon the type of container, its size, and its weight restrictions. Containers will be stacked to a maximum of two high unless they are too large or heavy to be supported by the container(s) to be located underneath and/or maneuvered with available forklift/crane/hoist. Fifty-five-gal drums, SWBs, and large waste boxes are arranged in rows and can be stacked to a maximum of 10 feet (ft) high, based on the Code of Federal Regulations (CFR) requirements in 49 CFR 178.606(c), “Performance-Oriented Stack Test”.

2.1.3 Authorized Waste

The TA-55 CSUs are used to store hazardous and mixed waste containers bearing one or more of the U.S. Environmental Protection Agency (EPA) Hazardous Waste Numbers presented in the most recent version of the “Los Alamos National Laboratory General Part A,“ hereinafter referred to as the General Part A.

2.1.4 Condition of Containers [20.4.1 NMAC §264.171]

Any container at the TA-55 CSUs that is not in good condition either during or prior to storage (e.g., severe rusting, apparent structural defects) is overpacked or the wastes are repackaged in containers that are in good condition. Containers must be without severe rust, dents, deep scratches, bulges, or other structural defects. Any waste container that is not in good condition (e.g., severe rusting, apparent structural defects) is overpacked, or the waste is repackaged in a container that is in good condition and is compatible with the waste materials, packaging materials, and/or other container. Overpacked and/or new containers must also be compatible with and resistant to environmental conditions. This meets the requirements of 20.4.1 NMAC §264.171 [6-14-00].

TA-55 uses the LANL procurement system, administered by the Supply Chain Management Division (SUP), for procurement of waste container components. Suppliers of waste container components are audited by SUP for qualification prior to conducting business transactions. SUP also uses approved procurement product specifications that include quality assurance requirements and ensure that container package specifications meet U.S. Department of Transportation (DOT) (49 CFR 173.410) requirements for Type A/7A packages.

Containers procured by SUP include liners if required for the container to pass the manufacturer's tests for Type A/7A compliance. When liners are procured individually a representative sample of the purchased liners is inspected for compliance with appropriate specifications using an approved inspection procedure. It is the generator's responsibility to ensure the container and pedigree is inspected for compliance with the specification provided to the supplier. Containers that do not pass inspection are segregated from those that are acceptable to prevent inadvertent use.

2.1.5 Compatibility of Waste with Containers [20.4.1 NMAC §264.172]

The TA-55 CSUs will only store containers made of or lined with materials that will not react with and are otherwise compatible with the wastes stored in them. Prior to filling the container with waste, all container components (e.g., lid, liner, and interior/exterior surface) are inspected to ensure container integrity as well as compatibility with the type of waste to be placed into the container. The "Los Alamos National Laboratory Waste Acceptance Criteria" (LANL, 2003a) requires that compatibility of the waste container, including liners, and the waste to be containerized is ensured. Information regarding the liner's compatibility with the waste components can be obtained from the container/liner manufacturer. This fulfills the requirements of 20.4.1 NMAC §264.172 [6-14-00].

2.1.6 Management of Containers [20.4.1 NMAC §264.173(a) and (b)]

Waste containers stored at the TA-55 CSUs are handled in a manner that will not cause them to rupture or leak, as required in 20.4.1 NMAC §264.173(b) [6-14-00]. All containers are kept closed during storage in accordance with 20.4.1 NMAC §264.173(a) [6-14-00], except when waste is added to or removed from the container or when a container's contents need to be repackaged. In addition to the containers being closed, the closing devices will be secured in a manner that provides no visible holes, gaps, or other open spaces into the interior of the container, in accordance with 20.4.1 NMAC §264.1086(c)(1)(iii)[6-14-00].

Five of the CSUs are provided with ventilation from the TA-55-4 facility ventilation system. This ventilation system is designed to monitor air pressure and ambient air for personnel working in areas where hazardous or mixed waste is managed. It creates zones within TA-55-4 that are at a lower pressure than the outside air (negative pressure) to prevent the movement of contaminants from the building. Air flows from the zones of highest pressure to those of lowest pressure (i.e., highest potential contamination areas). The airflow through the different zones is carefully balanced and controlled to provide the greatest protection to personnel as well as to the environment. If negative air pressure exceeds designed limits, a ventilation alarm (a slow, repeating chime sound) is activated.

Detailed information on general facility operations and container management practices are contained in Attachments G and J of this permit application.

2.1.6.1 Packaging and Overpacking

Waste packaging/repackaging at TA-55 is conducted at the K13 and B40 CSUs. It includes the addition of waste received from generators into secondary containers or movement of waste from one secondary container to another. Waste received into the K13 CSU consists of small waste items that are eventually packed into secondary containers to maximize storage and shipping efficiency. The B40 CSU receives large waste items that need to be packaged into an SWB or ST45/ST90 shipping container. The following procedures are used to package and repackage waste:

- "Packing TRU Waste Containers," NMT7-WI3-SOP-TA55-013 (LANL, 2002b).
- "Managing Solid Low-Level Waste at TA-55," NMT7-HCP-TA55-DP-02L (LANL, 2002c).
- "Certification and Disposal of Low-Level, Oversize Waste," NMT7-WI3-TA55-HCP-DP-02L (LANL, 1999).

Overpacking will occur at all of the TA-55 CSUs when a primary container fails to provide adequate containment. The overpack container will then be considered the primary container.

2.1.6.2 Labeling

Each container of waste will be labeled with a "Hazardous Waste" label bearing the following information:

- Generator name and address
- EPA Identification Number
- The accumulation start date
- The applicable EPA Hazardous Waste Number(s)

A "Radioactive Material/Radioactive Waste" label is applied, if appropriate. LANL will follow all applicable U.S. Department of Energy (DOE) and Nuclear Regulatory Commission (NRC) procedures, requirements and guidelines as they apply to storage, treatment, and radioactive decontamination of the TA-55 waste management units. The DOE and NRC regulations are not preempted by federal or state regulations governing the handling of hazardous waste. Compliance with all available DOE and NRC requirements is protective of human health and the environment.

2.1.6.3 Transportation of Containers

Flatbed trucks, trailers, and/or forklifts may be used to transport waste containers to and from the waste management units at TA-55. Forklift operations may use a boom, if necessary, to improve handling capabilities. Small containers may be handled manually or with a dolly. The use of proper handling equipment, appropriate to a container's size and weight, helps to prevent hazards while moving containers.

2.1.7 Containment Systems [20.4.1 NMAC §270.15(a)(1-5) and 270.15(b)(1-2)]

In accordance with 20.4.1 NMAC §270.15(b)(1) [6-14-00], information contained in LANL's waste databases or waste characterization records can be used initially to verify the absence of free liquids in containers. In addition to records, visual examination can be used to verify the absence of free liquids. Potential liquids that might accumulate at the TA-55 CSUs are contained within containment systems (e.g., self-containment pallets) at each storage location until the liquid is removed. All secondary containment systems are designed to contain at least 10 percent of the volume of potential liquid-bearing containers or the volume of the largest container, whichever is greater, pursuant to the requirements of 20.4.1 NMAC §264.175(b)(3) [6-14-00]. Table 2-4 summarizes the capacity associated with the containment systems provided for each CSU at TA-55.

Table 2-4
Containment System Capacities for Container Storage at Technical Area 55

Container Storage Unit	Location	Waste Types	Maximum Capacity (gallons)	Containment System(s)	Containment Capacity (gallons)
B40	TA-55-4, Basement	Solid and Liquid	21,500	Self-Containment Pallets Covered Self-Containment Pallets Single-drum Containment Pallets Cabinets Basement	112[a] 112[a] 55 10 46,258
K13		Solid and Liquid	2,500		
Vault	TA-55-4, Basement	Solid and Liquid	4,000	Self-Containment Pallets Basement	112[a] 46,258
B05	TA-55-4, Basement	Solid	3,600	NA	NA
B45	TA-55-4, Basement	Solid	11,000	NA	NA
TA-55-185	West of TA-55-4	Solid	30,000	NA	NA
Storage Pad	Northwest of TA-55-4	Solid and Liquid	135,000	Covered Self-Containment Pallets	112[a]

a No more than 110 gallons (i.e., two 55-gal drums) of free liquids will be stored on an individual self-containment pallet.

TA = technical area
NA = not applicable because this CSU stores waste that is in the solid form only.

Any accumulated liquids are removed in a timely manner to prevent overflow of the containment system. The collected liquids are then transferred to appropriate containers and sampled, as necessary. If the accumulated liquids are from an identifiable source, or from water generated during fire-suppression activities, the resulting material may be characterized as a newly-generated waste and analyzed for constituents known to be components of the source. If the accumulated liquids are from other than an identifiable source, the resulting material will be analyzed for the appropriate potential parameters listed in Appendix E of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application," hereinafter referred to as the LANL General Part B. Containers of collected liquids are stored with secondary containment, pending analytical results, which determine how the waste liquids will be managed. This method of removal and analysis of accumulated liquids fulfills the requirements of 20.4.1 NMAC §270.15(a)(5) [6-14-00], for prevention of overflow.

2.1.8 Inspection Schedules and Procedures

The purpose of inspections is to identify leaking containers, deterioration of containers, and/or loss of integrity of the containment system, as required by 20.4.1 NMAC §264.174 [6-14-00]. The inspections include checking the structural integrity of the containers (e.g., for bulging or warping). Inspections will follow the Inspection Plan in Attachment C of this permit application.

Inspections of the containers while they are in storage will be used to verify that there are no visible holes, gaps, or other open spaces into the interior of containers while they are in storage. These inspections will be conducted in accordance with "Storage Area Inspections," NMT7-WI1S–HCP-TA-55-011 (LANL, 2001).

All containers are regularly inspected for evidence (e.g., corrosion, visible staining, bulges, rupture, dents, and leaks) that may indicate surface contamination. If any evidence of surface contamination is detected, the waste container is either overpacked in an appropriate container or the waste is repackaged in a new container as discussed in Section 2.1.4.

2.1.9 Special Requirements for Ignitable, Reactive, and Incompatible Wastes [20.4.1 NMAC §264.17 and 20.4.1 NMAC §§270.15(c) and 270.15(d)]

Ignitable or reactive waste is stored at the K13 and B40 CSUs and on the container storage pad. Pursuant to 20.4.1 NMAC §264.17 [6-14-00], LANL will adhere to the following specific waste management procedures for ignitable and reactive waste. Containers with ignitable or reactive wastes are located at least 50 ft from the facility property line (Figure A-5) at all times and are protected from sources of ignition or reaction. Waste management practices at the TA-55 CSUs minimize the possibility of accidental ignition. There are no sources of open flames allowed at the CSUs, and smoking is prohibited. Cutting and welding activities are never conducted in the vicinity of waste containers without proper controls and only non-sparking tools are used to handle waste containers, and lightning rods are located on all storage structures. "No Smoking" signs are conspicuously placed wherever there is a potential hazard from ignitable or reactive waste.

Precautions are taken to prevent reactions that may produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment or produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions. These precautions include keeping containers closed during storage and venting containers of mixed transuranic waste. Together, these measures meet the requirements of 20.4.1 NMAC §§264.17(a) and (b) and 264.176[6-14-00].

Incompatible wastes are separated and segregated from other wastes and materials by means of berm, dike, wall, or other specific means (e.g., secondary containment pallets, cabinets, distance). Incompatible waste is also stored at TA-55 in accordance with the following DOT compatibility groups:

- Flammables (Class 3)
- Oxidizers (Class 5.1)
- Combustible/Noncombustible Miscellaneous Hazardous Material (Class 9)
- Corrosives (Class 8)
- Poisons (Class 6)
- Radioactive (Class 7)
- Acids (Class 8)
- Reactive (Class 4)
- Non-regulated materials.

In addition, no incompatible wastes will be mixed, and no waste will be placed in a container that previously held an incompatible waste, as required by 20.4.1 NMAC §264.177(a) and (b), and 20.4.1 NMAC §270.15(d).

Ignitable, reactive, and incompatible wastes will not be stored at the B05, B45, Vault, and TA-55-185 CSUs; therefore, the requirements of 20.4.1 NMAC §264.17, and 20.4.1 NMAC §270.15(c) and (d) [6-14-00] do not apply.

2.1.10 Closure

Closure will consist of partial closure of one or more of the CSUs at TA-55 while leaving the other hazardous and mixed waste management units in service. Partial closure activities will be accomplished by removal of hazardous wastes and residues from the surfaces and/or equipment associated with the CSU to be closed and that may have come into contact with the waste. Detailed closure procedures for the TA-55 CSUs are addressed in Attachment F.1 of this permit application. This information is provided to meet the requirements of 20.4.1 NMAC §§264.111 and 264.178 [6-14-00].

2.1.11 Control of Run-On/Runoff

Run-on into the CSUs at TA-55-4 and TA-55-185 will not occur due to their location inside buildings. The slopes surrounding these buildings direct potential run-on away from each building. The container storage pad is located above grade, has positive surface drainage, and has a culvert beneath it that will direct potential run-on away from this storage location. In addition, containers stored on the pad are covered. Special order waste boxes, large waste boxes, and SWBs will not be covered. Figures A-5 and A-9 in Attachment A of this permit application show the contours and surface drainage around the storage pad, TA-55-4, and TA-55-185. This information is provided to meet the requirements of 20.4.1 NMAC §264.175(b)(4), and 20.4.1 NMAC §270.14(b)(8)(ii) [6-14-00].

Runoff to the environment of liquids resulting from precipitation, fire-suppression activities, leaks, and/or spills is controlled at each of the TA-55 CSUs by secondary containment. Potential liquids that might accumulate are contained within secondary containment (e.g., self-containment pallets) until the liquid is removed using a portable pump, a high-efficiency particulate air (HEPA) vacuum, and/or sorbents, depending on the volume. In the event of a hazardous and/or mixed waste spill that results in the accumulation of free liquids in the secondary containment system, all free liquids will be removed within 24 hours of discovery, unless "as low as reasonably achievable" (ALARA) concerns prevent accessibility. This information is provided to meet the requirements of 20.4.1 NMAC §270.14(b)(8)(ii) [6-14-00].

2.2 STORAGE TANK SYSTEM

The information provided in this section is submitted to address the applicable tank storage requirements of 20.4.1 NMAC §270.16, and 20.4.1 NMAC, Subpart V, Part 264, Subpart J [6-14-00]. There is one storage tank system at TA-55. This tank system is comprised of 3 tank components and consists of a total of 16 tanks with a maximum storage capacity of 1,020 L or approximately 266 gal. Table 2-5 identifies each tank component, its location, the number of tanks, and capacity of each tank.

Table 2-5
Storage Tank System at Technical Area 55[a]

Tank Component	Location	Number of Tanks	Tank Capacity[b,c] (liters)	Tank Capacity[b,c] (gallons)
Evaporator Glovebox Tank	TA-55-4, Room 401	1	270	71
Cementation Unit Pencil Tanks	TA-55-4, Room 401	5	50	13
Pencil Tanks	TA-55-4, Room 401	10	50	13

a The storage tank system consists of 3 components that store the same type of waste and share a common piping network.
b The overall capacity of the unit is 1,020 liters [~266 gallons].
c The tank capacity listed is for each individual tank associated with that component.

TA = technical area

The following sections provide a brief description of the waste management practices associated with the TA-55 storage tank system. Detailed descriptions of each tank component are proved in Attachment H of this permit application.

2.2.1 Authorized Waste

The TA-55 storage tank system is used to store mixed waste solutions bearing one or more of the EPA Hazardous Waste Numbers presented in the most recent version of the LANL General Part A.

2.2.2 Containment Systems [20.4.1 NMAC §270.16(g) and 20.4.1 NMAC §264.193 (a-d) and (e)(1)]

The storage tank system is located at TA-55-4 inside Room 401. This room has a floor and walls that completely surround the tank system (i.e., tanks, ancillary equipment, and piping) and serve as secondary containment, therefore, the secondary containment meets the requirements of 20.4.1 NMAC §264.193(e)(1) for an external liner system.

The walls and floor of Room 401 will prevent the migration of wastes or accumulated liquids to any soil, groundwater, or surface water and are capable of collecting releases and accumulated liquids until the material is removed. The concrete in Room 401 is sealed with an epoxy or similar coating to aid in decontamination should a spill occur. Secondary containment is primarily provided by the floor, which consists of 10 in. of concrete. In addition, tertiary containment is provided by the floor of the basement level of TA-55-4, which also consists of 10 in. of concrete. The construction joints in the floor slab and exterior walls of Room 401 are all constructed with chemical-resistant water stops in place. The conduit piping penetrating the floor of the room is secured with rubber boots, bushings, and flanges. All penetrations (e.g., holes for conduit) in the floor have been sealed to prevent liquids from entering the penetrations.

The secondary containment is sized to contain 100 percent of the volume of the largest tank, pursuant to the requirements of 20.4.1 NMAC §264.193(e)(1)(i) [6-14-00]. Table 2-6 identifies the secondary containment storage capacity as compared to the tank capacity for each component of the storage tank system.

Table 2-6
Secondary Containment Capacities for the Storage Tank System

Storage Tank System Component	No. of Tanks	Tank Capacity (gallons)[a]	Location	Secondary Containment	Secondary Containment Capacity (gallons)
Evaporator Glovebox Tank	1	71	TA-55-4, Room 401	TA-55-4, Room 401	10,773[b]
Cementation Unit Pencil Tanks	5	13			
Pencil Tanks	10	13			

a The tank capacity listed is for each individual tank associated with the component.
b Secondary containment capacity is based on Room 401 which is recessed 2.5 inches and has dimensions measuring 60 feet long by 75 feet wide.

TA = technical area

2.2.3 Inspection Schedules and Procedures

The purpose of inspections is to identify leaking, deteriorating, or corroding tanks, or components of the storage tank system and identify the loss of integrity of the containment system, as required by 20.4.1 NMAC §§264.15, and 264.195 [6-14-00]. Inspections of the storage tank system will follow the Inspection Plan in Attachment C of this permit application.

2.2.4 Special Requirements for Ignitable, Reactive, and Incompatible Wastes

No ignitable, reactive, or incompatible mixed wastes will be stored in the storage tank system.

2.2.5 Closure

Closure will consist of partial closure of the storage tank system at TA-55 while leaving the other waste management units in service. Partial closure will be accomplished by the removal of mixed wastes and residues from the surfaces and/or the equipment that may have come in contact with the wastes. Closure will include decontamination and disposal activities that will ensure removal of mixed wastes and residues to established cleanup levels. Detailed closure procedures for the storage tank system are addressed in Attachment F.2 of this permit application. This information is provided to meet the requirements of 20.4.1 NMAC §264.111 [6-14-00].

2.2.6 Control of Run-On/Runoff

The storage tank system is located inside a building that prevents it from exposure to precipitation and prevents contaminant mobility out of the containment system. The slope surrounding the building directs potential run-on away from the building and prevents flooding of the secondary containment area provided for the tanks.

Runoff to the environment of liquids resulting from fire-suppression activities, leaks, and/or spills is prevented by the secondary containment in Room 401, as described in Section 2.2.2. Potential liquids that might accumulate are contained within secondary containment (e.g., self-containment pallets) until the liquid is removed using a portable pump, a HEPA vacuum, and/or sorbents, depending on the volume. In the event of a hazardous and/or mixed waste spill that results in the accumulation of free liquids in the secondary containment system, all free liquids will be removed within 24 hours of discovery, unless ALARA concerns prevent accessibility. This information is provided to meet the requirements of 20.4.1 NMAC §270.14(b)(8)(ii) [6-14-00].

2.3 MISCELLANEOUS UNIT – CEMENTATION UNIT

The information provided in this section is submitted to address the applicable miscellaneous unit requirements of 20.4.1 NMAC §270.23, and 20.4.1 NMAC, Subpart V, Part 264, Subpart X [6-14-00].

The cementation unit is located in glovebox GB-454 along the west wall of TA-55-4, Room 401. The unit has been in operation since 1987 and has a maximum capacity of 568 L (approximately 150 gal). It consists of a pH adjustment column, vacuum trap, two motor-driven mixers, four impellers, associated support structures, a glovebox, and piping.

2.3.1 Authorized Waste

The TA-55 cementation unit is used to treat solid and liquid mixed wastes bearing one or more of the EPA Hazardous Waste Numbers presented in the most recent version of the LANL General Part A.

2.3.2 Containment Systems

The cementation unit shares secondary containment with the storage tank system. Room 401 has a floor and walls that completely surrounds the unit and serve as secondary containment, therefore, the secondary containment requirements of 20.4.1 NMAC §264.193 (1)(iv) are met. A detailed description of the containment features for Room 401 is provided in Section 2.2.2.

Table 2-7 identifies the secondary containment storage capacity for Room 401 as compared to the total capacity of the cementation unit and storage tank system.

Table 2-7
Containment System Capacity Compared to the Capacity of the Storage Tank System and Cementation Unit

Location	Containment System Capacity (gallons)	Waste Management Units	
		Unit	Total Capacity (gallons)
TA-55-4, Room 401	10,773[a]	Storage Tank System *(Evaporator Storage Tanks, Cementation Unit Pencil Tanks, Pencil Tanks)*	266
		Cementation Unit	150

a Containment capacity is based on Room 401, which is recessed 2.5 inches and has dimensions measuring 60 feet long by 75 feet wide.

TA = technical area

Secondary containment for the cementation unit will easily contain 100 percent of the volume of the cementation unit and the largest tank of the storage tank system (Section 2.2.2) pursuant to the requirements of 20.4.1 NMAC §246.193(1)(iv).

2.3.3 Inspection Schedules and Procedures

The purpose of inspections is to identify leaking, deteriorating, or corroding components of the cementation unit and identify the loss of integrity of the containment system, as required by 20.4.1

NMAC §§264.15 and 264.602 [6-14-00]. Inspections of the cementation unit will follow the Inspection Plan in Attachment C of this permit application.

2.3.4 Special Requirements for Ignitable, Reactive, and Incompatible Wastes

No ignitable, reactive, or incompatible mixed wastes will be treated in the cementation unit.

2.3.5 Closure

Closure will consist of partial closure of the cementation unit while leaving the other regulated hazardous and mixed waste management units at TA-55 in service. Partial closure will be accomplished by the removal of mixed wastes and residues from the surfaces and/or the equipment associated with the cementation unit that may have come in contact with the wastes. Closure will include decontamination and disposal activities that will ensure removal of mixed wastes and residues to established cleanup levels. Detailed closure procedures for the cementation unit are addressed in Attachment F.3 of this permit application. This information is provided to meet the requirements of 20.4.1 NMAC §264.111 [6-14-00].

2.3.6 Control of Run-On/Runoff

The cementation unit is located inside a building that prevents them from exposure to precipitation and prevents contaminant mobility out of the containment system. The slope surrounding the building directs potential run-on away from the building and prevents flooding of the secondary containment area provided for the unit.

Runoff to the environment of liquids resulting from fire-suppression activities, leaks, and/or spills is prevented by the secondary containment in Room 401, as described in Section 2.3.2. Potential liquids that might accumulate are contained within secondary containment (e.g., self-containment pallets) until the liquid is removed using a portable pump, a HEPA vacuum, and/or sorbents, depending on the volume. In the event of a hazardous and/or mixed waste spill that results in the accumulation of free liquids in the secondary containment system, all free liquids will be removed within 24 hours of discovery, unless ALARA concerns prevent accessibility. This information is provided to meet the requirements of 20.4.1 NMAC §270.14(b)(8)(ii) [6-14-00].

3.0 OTHER FEDERAL LAWS

A discussion of federal laws, as required by the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, §§270.3 and 270.14(b)(20), revised June 14, 2000, is provided in Section 3.0 of the most recent version of the LANL General Part B.

4.0 CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS

The information provided in this section is submitted to address the requirements for solid waste management units (SWMU) in accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 §270.14(d), revised June 14, 2000 [6-14-00]. This section provides the SWMUs identified for Technical Area (TA) 55 at the Los Alamos National Laboratory (LANL).

LANL uses the definition of a SWMU presented in "Module VIII: Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments to RCRA for Los Alamos National Laboratory, EPA I.D. NM0890010515" (U.S. Environmental Protection Agency, 1994), hereinafter referred to as Module VIII. This definition states that SWMUs are "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at or around a facility at which solid wastes have been routinely and systematically released."

Table 4-1 lists the SWMUs at TA-55. Supplement 4-1, which has been extracted from the 2003 “Solid Waste Management Unit Report” (LANL, 2003b) provides descriptions of the SWMUs listed in Table 4-1. These descriptions include, to the extent available, the unit type, general dimensions and structural descriptions, the dates of operation, and the waste managed at the unit. Supplement 4-1 also includes the most current information available pertaining to releases of hazardous wastes or hazardous constituents from the units and results of sampling analyses conducted to date. In addition, the location of each SWMU is presented on topographic maps included with Supplement 4-1.

Table 4-1
Technical Area (TA) 55 Solid Waste Management Units

SWMU No./Former SWMU No.	Consolidated SWMU No.	Location	Description	Status
42-001(a)	42-001(a)-99	Site of former TA-42-1 within TA-55	Incinerator	Inactive; to undergo corrective action.
42-001(b-c)			Holding Tanks	
42-002(b)			Decontamination Area	
42-003			Septic System	
55-008	55-008	TA-55-4, Basement	Sumps, Pumps and Tanks	Active; recommended for no further action (NFA). To be permitted.
55-009	55-009	TA-55-263	Concrete Enclosure	Inactive; recommended for NFA

SWMU = Solid Waste Management Unit
TA = technical area

Supplement 4.1

Solid Waste Management Units at Technical Area 55
[Information Extracted from the 2003 "Solid Waste Management Unit Report"]

The 2003 “Solid Waste Management Unit Report” has been reviewed by an ADC and S-7 to be assigned its own unique LA-UR number.

It will not be provided for security review with this permit application.

TA-42, Operations and Environmental Setting

Former TA-42 was designed and built in 1951 as an incinerator site for radionuclide-contaminated waste. It was never fully operational, and all buildings were removed in 1978. In the interim, the area was used for storage and decontamination work. The former site of TA-42 lies within the current boundaries of TA-55, on the narrow mesa formed between Mortandad Canyon on the north and Twomile Canyon, a branch of Pajarito Canyon, on the south. The former site is near the north edge of the mesa.

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SWMU 42-001(a)-99 — Aboveground storage tanks - facility/equipment - incinerators/thermal treatment units - outfall/effluent discharge

Administrative Authority	NMED	**Former Operable Unit**	N/A
Technical Area	TA-42	**Dates of Operation**	1951-1970
Has ER Sampled the Site?	Yes	**ER Remedial Action Conducted?**	No
Structure Number	42-1, 42-2, 42-3, 42-4	**Other Remedial Action Conducted?**	Yes

Unit Description

Consolidated SWMU 42-001(a)-99 consists of former SWMUs 42-001(a), 42-001(b), 42-001(c), 42-002(b), and 42-003 and former AOC 42-002(a). TA-42 was the site of a radioactive waste incinerator that operated in 1951 and 1952. The incinerator facility was used to store and decontaminate radioactively contaminated equipment from 1957 to 1969. In 1969, an unsuccessful attempt was made to reactivate the incinerator so it could burn uncontaminated classified wastes. By 1970, all operations were discontinued, and all combustibles were removed from the building. The facilities were decommissioned in 1977, and the site was decontaminated in 1978. Contamination remaining after the 1978 D&D of this consolidated SWMU is believed to be associated with radionuclide decontamination operations from 1957 to 1969. Former TA-42 is located within the boundaries of TA-55.

Former SWMU 42-001(a) is the historical location of the incinerator and control building (Building 42-1). The complex was built to reduce the amount of radionuclide-contaminated waste produced at LANL. The incinerator, which was never fully operational and was shut down about a year after it was built, was a steel-frame structure covered with corrugated metal. The facility consisted of a 2000-sq-ft floor area control building, incinerator, cyclone dust collector, spray cooler, Venturi scrubber, filter bank, and ash separator. Combustion products passed through an off-gas cleanup system before discharge through an exhaust stack. The off-gas system consisted of a Venturi scrubber, a filter bank, and an ash separator. Ash trapped in the off-gas system and incinerator was transported by underground drainlines to two holding tanks [former SWMUs 42-001(b) and 42-001(c)] located immediately north of the incinerator.

Former SWMUs 42-001(b) and 42-001(c) are the locations of two former ash holding tanks (structures 42-2 and 42-3) at the incinerator complex. They were each 22 ft in diameter and approximately 13 ft high, with a volume of 37,000 gal. The tanks were built in 1951 and removed in 1978. Some ash from the incinerator reportedly was discharged to Mortandad Canyon in 1952; the contaminant was thought to be lanthanum-140. Samples taken in the canyon downstream from TA-42 after the discharge showed radioactive contamination. When the tanks were decommissioned in 1978, the contents were assayed and measured for plutonium. Contaminated sludge was removed, mixed with cement, and taken to MDA G for storage. The tanks were excavated and taken to TA-54 for disposal. The drainlines were filled with hot asphalt to contain radioactive contamination. It is not known if the drainlines were removed.

Former AOC 42-002(a) is the historical location of an indoor storage and decontamination area, and SWMU 42-002(b) is the location of a historical outdoor decontamination area. Between 1956 and 1969, the main floor of Building 42-1 was used to store and decontaminate equipment. During decontamination, a “vacublaster” removed radionuclides and other contaminants from various pieces of equipment. The process generated wastes that are believed to have been discharged to the building’s septic system (former SWMU 42-003). It is believed that fine solid residues were bagged and disposed of at an MDA. Objects that were too large to take inside the building (such as vehicles) were cleaned at the end of the asphalt driveway located west and north of Building 42-1. Wash water flowed down an embankment on the northwest side of the parking lot. Contaminated soils in that area were not sampled or removed during the 1978 D&D activities.

Former SWMU 42-003 is the historical location of a septic system that served the incinerator complex. The system was composed of a 565-gal. septic tank (structure 42-4), a drainline from Building 42-1 to the tank, a filter trench, a tile leach field, and an outfall to Mortandad Canyon. The septic tank received radioactive liquid wastes from Building 42-1. According to the OU 1129 work plan, the system probably also received solvents, acids, and grease. Radioactively contaminated liquids periodically were removed from the septic tank and disposed of at pit 4 at MDA L. Samples taken downstream from TA-42 in Mortandad Canyon in 1952 showed radioactive contamination in the canyon. The septic tank was observed to contain water and possibly to have overflowed in 1973. At that time, the tank slurry was sampled and was found to be radioactively contaminated. The system was installed in 1951 and the system and associated contaminated soils were removed as part of the 1978 D&D activities. When it was decommissioned, liquid in the tank was pumped and treated at Building 50-1, the radioactive liquid waste treatment facility [SWMU 50-001(a)]. The tank sludge was solidified by adding cement, and the tank and sludge were taken to MDA G. Contaminated soils around the tank also were taken to MDA G, and the excavated area was backfilled. Contaminated soils in the drainfield were excavated.

In 1978, following D&D, the Environmental Surveillance Group collected soil samples and analyzed them for radionuclides. Low levels of contamination were found but were considered to meet ALARA standards. After concurrence from DOE-LAAO, the area was contoured and revegetated to minimize erosion. In 1991, LANL's Environmental Protection Group performed a reconnaissance survey. Soil samples were collected and analyzed for radionuclides, PCBs, organic chemicals, and inorganic chemicals. Results from the analyses, which showed elevated concentrations of plutonium and lead, were used by the ER Project to design its SAP for the 1992 RFI.

ER Project Activities

Information presented in this section was derived from previously published documents. RFI activities conducted at this site are described in detail in the documents listed in the reference section below.

In 1992, the ER Project conducted an RFI at the former sites that make up consolidated SWMU 42-001(a)-99. The purpose of the RFI was to determine whether potential contamination at the site would be exposed during construction of a new facility. Sampling was conducted to detect and to quantify contaminants and to estimate the extent of contamination at former TA-42. The DOE-Albuquerque Operations Office used the RFI results for construction validation of the NSTL that was to be constructed at the site of former TA-42. Sample locations were selected to bound the extent of contaminants detected during the 1991 reconnaissance study and to include locations where construction activities might adversely affect residual contamination around the NSTL structures or utility lines. Fifty-one surface and subsurface soil samples were collected from 19 locations around the location of the former incinerator complex. Samples were field-screened for organic chemicals and radionuclides. No elevated chemical concentrations were detected during field-screening. Samples were analyzed for radionuclides and lead because the analytical suite was based on the results of the 1991 reconnaissance study. Elevated levels of plutonium-238, plutonium-239/-240, and uranium-235 were found. Data indicated that the levels of radionuclides did not pose an unacceptable risk to human health. The RFI report recommended NFA at the former sites in this consolidated unit. NMED determined the report to be insufficient in the characterization of the site, and LANL formally withdrew the RFI report in 1997.

ER Project Sampling Summary

The following table shows the number of analytes that exceeded BVs, FVs, and SALs that were in use in calendar year 2002. These data reflect site conditions before any remedial activities may have occurred, as discussed in the ER Project activities section above. BVs are naturally occurring concentrations of inorganic chemicals and radionuclides in soil, sediment, or tuff before any influence from LANL operations. FVs are concentrations of radionuclides in soil, sediment, or tuff that resulted from global atmospheric deposition unrelated to LANL releases. SALs are concentrations of chemicals or radionuclides based on a residential exposure, below which there is no potential unacceptable risk to human health.

Analytical Suite Sampled	No. of Chemicals Detected	No. of Chemicals >CY2002 BV/FV (If Applicable)	No. of Chemicals >CY2002 SAL (Residential)
Inorganic chemicals	1	1	0
Radionuclides	6	4	1

The following table provides the maximum concentrations of analytes that exceeded CY2002 SALs.

Analytical Suite	Analyte	Maximum Concentration	CY2002 SAL (Residential)
Radionuclides	Thorium-228	2.59 pCi/g	2 pCi/g

References

RFI Report for TA-42: PRSs 42-001(a,b,c), 42-002(a,b), 42-003 — LA-UR Number: 95-2881

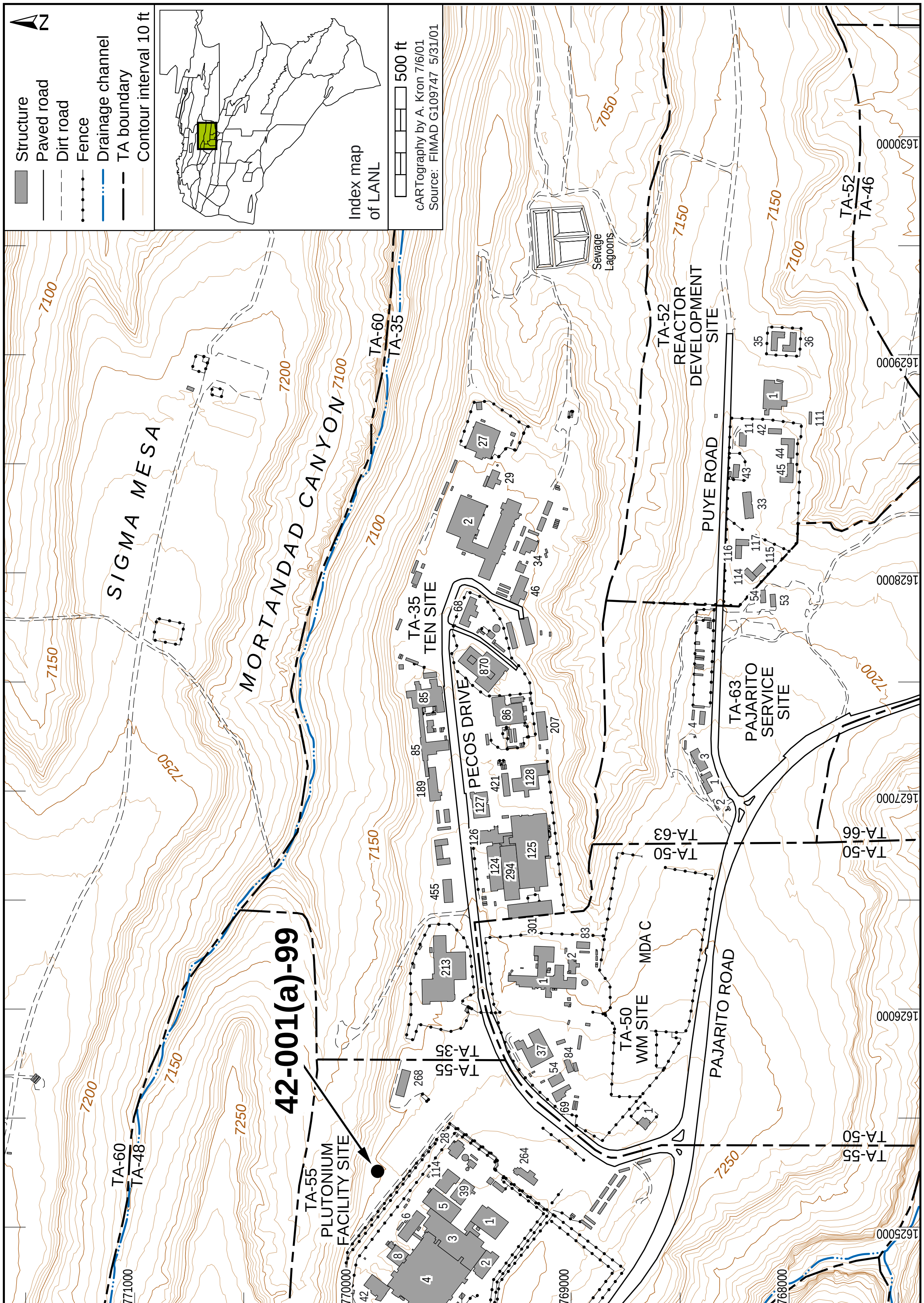
Preliminary Draft of OU 1129 Accelerated Characterization at Former TA-42 in Support of Construction Validation Project at Los Alamos National Laboratory (LANL) — LA-UR Number: N/A

Revised Sampling and Analysis Plan for OU 1129 Aggregate J — LA-UR Number: 92-2120

RFI Work Plan for Operable Unit 1129 — LA-UR Number: 92-0800

View of SWMU 42-001(a)-99

View of SWMU 42-001(a)-99



Structure
Paved road
Dirt road
Fence
Drainage channel
TA boundary
Contour interval 10 ft
Index map of LANL
500 ft
cARTography by A. Kron 7/6/01
Source: FIMAD G109747 5/31/01
42-001(a)-99
SIGMA MESA
MORTANDAD CANYON
TA-35 TEN SITE
PECOS DRIVE
TA-52 REACTOR DEVELOPMENT SITE
PUYE ROAD
TA-63 PAJARITO SERVICE SITE
PAJARITO ROAD
TA-50 WM SITE
MDA C
TA-55 PLUTONIUM FACILITY SITE
Sewage Lagoons
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AOC 42-004 — Surface disposal

Administrative Authority	DOE	**Former Operable Unit**	OU 1129
Technical Area	TA-42	**Dates of Operation**	1950s
Has ER Sampled the Site?	No	**ER Remedial Action Conducted?**	No
Structure Number	N/A	**Other Remedial Action Conducted?**	No

Unit Description

AOC 42-004 is the location where building debris was discarded over the canyon edge north of former TA-42, which is located within the boundaries of TA-55. It is not known if the debris contained hazardous or radioactive constituents. Sampling conducted in 1991 during a reconnaissance study indicated background radioactivity levels and no organic or inorganic chemicals or PCBs.

ER Project Activities

RFI activities conducted at this site are described in detail in the documents listed in the reference section below. No additional RFI activities have been conducted at this site.

The results of the 1991 sampling were used to propose AOC 42-004 for NFA, because contaminants were not present in concentrations that would pose a threat to human health or the environment.

ER Project Sampling Summary

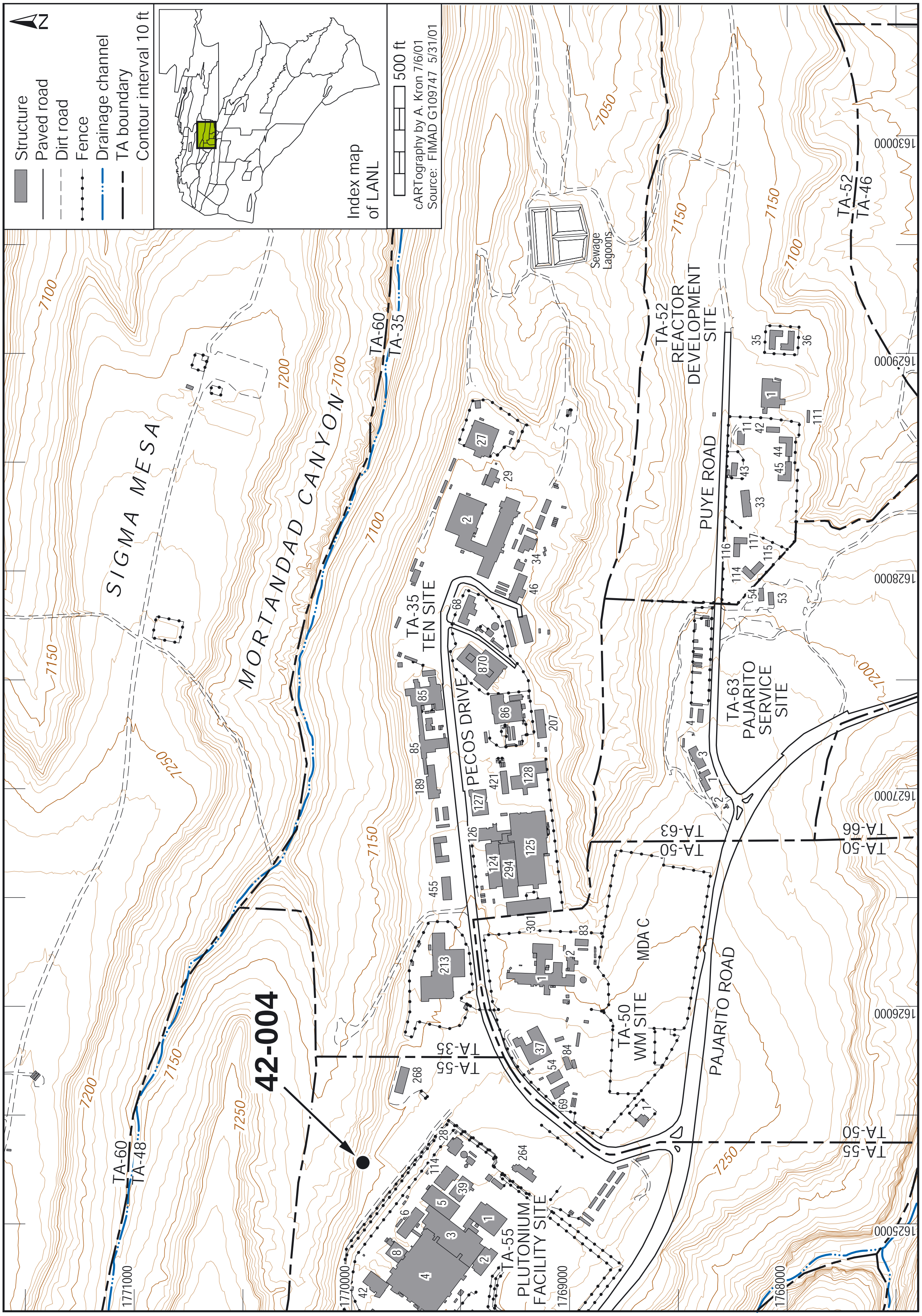
No analytical samples were collected at this site.

References

Request for Permit Modification, Units Proposed for NFA, March 1995	LA-UR Number: 95-0767
Addendum to RFI Work Plan for Operable Unit 1129	LA-UR Number: 92-0800
Preliminary Draft of OU 1129 Accelerated Characterization at Former TA-42 in Support of Construction Validation Project at Los Alamos National Laboratory (LANL)	LA-UR Number: N/A
Revised Sampling and Analysis Plan for OU 1129 Aggregate J	LA-UR Number: 92-2120
RFI Work Plan for Operable Unit 1129	LA-UR Number: 92-0800

View of AOC 42-004

View of AOC 42-004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Dirt road
Fence
Drainage channel
TA boundary
Contour interval 10 ft
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Index map of LANL
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cARTography by A. Kron 7/6/01
Source: FIMAD G109747 5/31/01
42-004
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MORTANDAD CANYON
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Sewage Lagoons
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TA-55, Plutonium Facility Site

The Plutonium Facility at TA-55 occupies about 40 acres of the total 90 acres at TA-55 approximately 1 mi southeast of the central technical area (TA-03). The Plutonium Facility is situated inside a restricted zone surrounded by a double security fence. The main complex has five connected buildings: the Administration Building (Building 1), the Support Office Building (Building 2), the Support Building (Building 3), the Plutonium Building (Building 4), and the Warehouse (Building 5). The Nuclear Materials Storage Facility (Building 41) is separate from the main complex but shares an underground transfer tunnel with Building 4. Various support, storage, security, and training structures are located throughout the main complex.

To meet the varied needs of research and development and plutonium-processing programs at the Laboratory, TA-55 provides chemical and metallurgical processes for recovering, purifying, and converting plutonium and other actinides into many compounds and forms. Additional capabilities include the means to safely and securely ship, receive, handle, and store nuclear materials, as well as manage the wastes and residues produced by TA-55 operations. A core capability is basic and applied research in plutonium and actinide chemistry.

Core competencies are maintained in the Plutonium Facility for each type of plutonium processing activity. Extensive plutonium recovery processes are maintained, as well as the ability to convert the recovered material into plutonium metal. A separate portion of the facility is dedicated to fabricating ceramic-based reactor fuels and to processing plutonium-238 used to produce radioisotope heat sources. In addition, analytical capabilities, materials control and accountability techniques, and a substantial research and development base are available to support these core capabilities.

A sophisticated nuclear materials measurement and accountability system is used at TA-55. The system includes nuclear materials accounting, nuclear materials management and modeling, a measurement support operation, operation of a nondestructive assay laboratory, nuclear materials packaging and transfer, and nuclear materials storage. All nuclear materials that are in process or are stored on-site are monitored to ensure that material balances are properly maintained and inventoried on a real-time basis. The nuclear materials packaging and transfer operation receives nuclear material into the facility and transfers shipments out of the facility. The nuclear materials storage operation provides a safe storage location for the actinide materials at the Plutonium Facility.

The Plutonium Facility has extensive capabilities for treating, packaging, storing, and transporting the radioactive waste produced by TA-55 operations. Liquid wastes are converted to solids or are piped to the RLWTF at TA-50. Some solid transuranic wastes are immobilized in cement in 55-gal. drums. Other transuranic waste is consolidated in 15-gal. or 30-gal. drums or is packaged in waste boxes. Low-level wastes are also packaged at this facility. Solid wastes of all types are stored at TA-55 until they are shipped to Laboratory waste storage or disposal locations, primarily at TA-54.

TA-55 — Plutonium Facility Site

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SWMU 55-008 — Aboveground storage tanks

Administrative Authority	NMED	**Former Operable Unit**	OU 1129
Technical Area	TA-55	**Dates of Operation**	1973-Present
Has ER Sampled the Site?	No	**ER Remedial Action Conducted?**	No
Structure Number	N/A	**Other Remedial Action Conducted?**	No

Unit Description

SWMU 55-008 consists of sumps, tanks, and pumps in the basement of the plutonium building (Building 55-4), which is the primary site for plutonium processing, fabrication, and research at LANL. Six sumps/pumps collect spills and mop-water generated in the building; the sump/pump capacity of each is 3 cubic feet. Four 8-in.-diameter x 4-ft-long condensate tank pumps receive condensate from cooling coils. Eight 8-in.-diameter x 4-ft-long blowdown tanks receive condensate from cooling coils. The liquids discharged to these units may have contained small amounts of hazardous and/or radioactive constituents. All liquids collected and contained within these units are transferred via direct pipeline to the radioactive liquid waste treatment facility at TA-50, and none of these units release liquids to the environment.

ER Project Activities

RFI activities conducted at this site are described in detail in the documents listed in the reference section below. No additional RFI activities have been conducted at this site.

SWMU 55-008 was recommended for NFA in the RFI work plan. The site design of Building 55-4 precludes contaminant migration. Any contamination that may exist beneath the building is considered to be under institutional control and will be addressed when Building 55-4 undergoes decontamination and decommissioning.

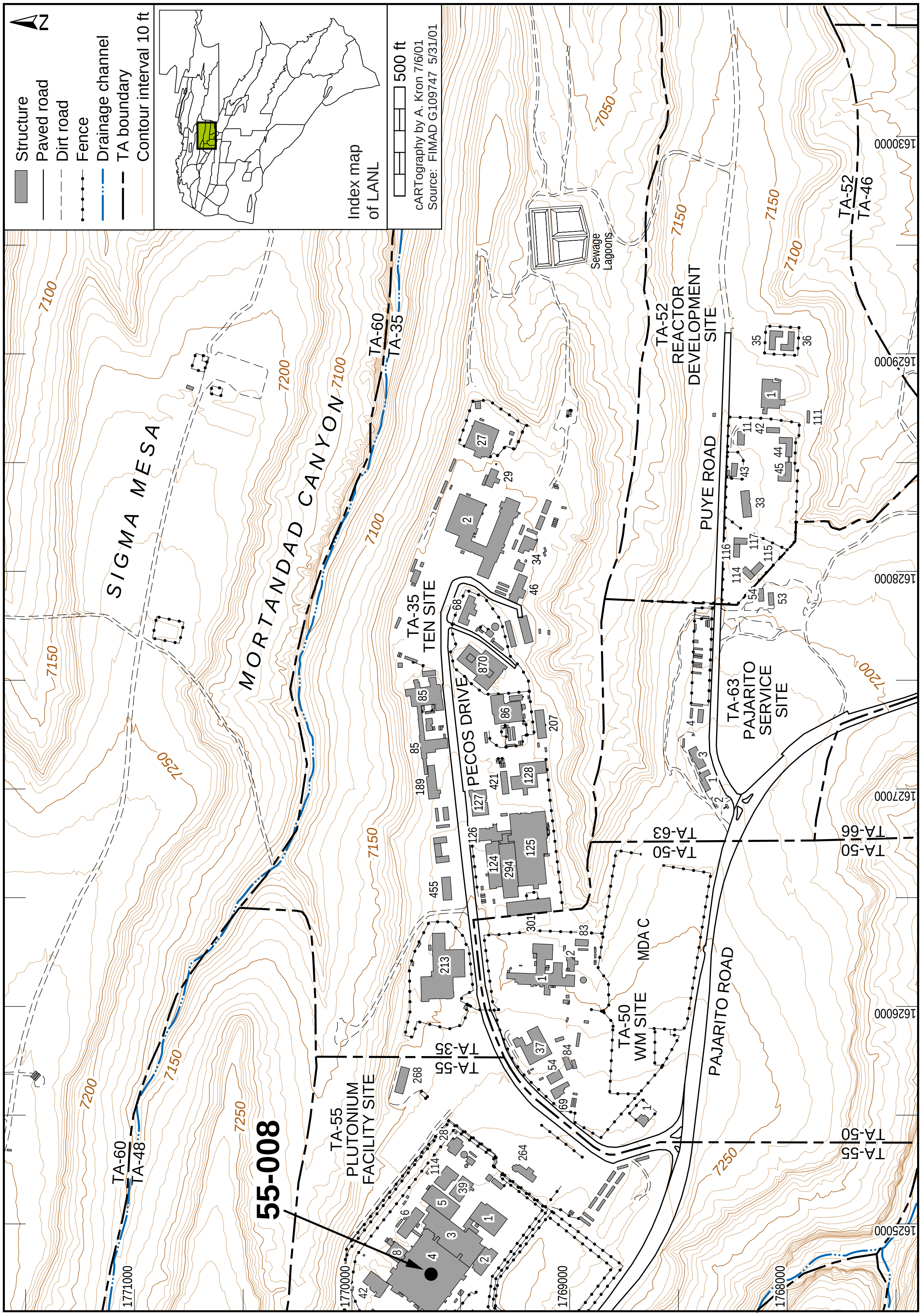
ER Project Sampling Summary

No analytical samples were collected at this site.

References

Withdrawal of [51] Solid Waste Management Units (SWMUs) from the March 1995, September 1995, and September 1996 Requests for Permit Modification (LA-UR-95-767, LA-UR-95-3319, and LA-UR-96-3357, respectively)	LA-UR Number: N/A
Request for Permit Modification, Units Proposed for NFA, March 1995	LA-UR Number: 95-0767
Class III Permit Modification for Removal of 90 Solid Waste Management Units (SWMUs)	LA-UR Number: N/A
Addendum to RFI Work Plan for Operable Unit 1129	LA-UR Number: 92-0800
RFI Work Plan for Operable Unit 1129	LA-UR Number: 92-0800

View of SWMU 55-008


Structure
Paved road
Dirt road
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500 ft
cARTography by A. Kron 7/6/01
Source: FIMAD G109747 5/31/01
55-008
TA-55
PLUTONIUM
FACILITY SITE
TA-35
TEN SITE
TA-52
REACTOR
DEVELOPMENT
SITE
TA-63
PAJARITO
SERVICE
SITE
TA-50
WM SITE
MDA C
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MORTANDAD CANYON
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SWMU 55-009 — Wastewater treatment plant/waste lines

Administrative Authority	NMED	**Former Operable Unit**	OU 1129
Technical Area	TA-55	**Dates of Operation**	1973-Unknown
Has ER Sampled the Site?	Yes	**ER Remedial Action Conducted?**	No
Structure Number	55-263	**Other Remedial Action Conducted?**	No

Unit Description

SWMU 55-009 is an inactive sanitary sewer monitoring station (structure 55-263) consisting of a concrete-lined pit (9 ft x 9 ft x 6 ft deep) located in the LANL high-security, highly access-controlled TA-55 plutonium complex. The walls and floor of the monitoring station consist of 6-in.-thick reinforced concrete. The TA-55 sanitary waste line runs through this structure and carries sanitary wastewater from Buildings 55-3 and 55-4 to the LANL sanitary wastewater treatment facility located at TA-46. The TA-55 Operations Center (Building 55-3) functions as a general support facility and contains a chemical laboratory. Building 55-4 is the main plutonium-processing facility at TA-55. The 1990 SWMU report identified SWMU 55-009 as an inactive monitoring "sump." The term "sump" denotes an engineered, below-ground-level containment reservoir that receives liquid before it is pumped (or drained) to another location. However, this unit not only has never contained a drain, it has never served as a reservoir to manage liquids of any type; therefore, the SWMU report's identification of this unit as a sump is incorrect. In actuality, this unit was designed and installed solely as a station to house radiological monitoring equipment and to shield the equipment from adverse weather conditions. The monitoring equipment and surrounding concrete structure were installed in approximately 1975, when the TA-55 complex was originally constructed. The monitoring equipment was installed at this portion of the sanitary waste line solely as a security measure to prevent the theft of valuable radioactive materials (such as plutonium) from the TA-55 complex. This equipment was intended to detect any stolen radioactive materials covertly targeted to leave the TA-55 complex by flushing them down sanitary drains such as sinks or toilets. Should any stolen radiological materials be detected in the sewer pipe, the monitoring device was designed to activate a compressor (housed within the concrete structure) that controlled a cut-off valve within the pipe. The activated valve was intended to immediately block passage of the stolen materials further through the pipe, thus thwarting the attempted theft. However, the monitoring equipment never functioned as originally intended. It failed because of high humidity caused by moisture condensation in the concrete structure in which it was housed. After several failed attempts to make the detection equipment perform properly, in May 1983, DOE and TA-55 personnel agreed to discontinue further attempts to monitor the waste line. The monitoring equipment was removed later that year, but the concrete-lined pit was left in place. The structure was used solely for security monitoring purposes and it is not known or thought to have received contaminants or released contaminants to the environment.

ER Project Activities

Information presented in this section was derived from previously published documents. Any discussion of BVs, FVs, and SALs is taken from the referenced documents and reflects the values in use at the time the documents were written. RFI activities conducted at this site are described in detail in the documents listed in the reference section below.

In 1997, 13 soil samples were collected from six locations in the vicinity of PRS 55-009 and submitted to an off-site laboratory for analysis for inorganic chemicals, organic chemicals, and radionuclides. Analytical results were used to provide supplemental information to support FSS-6 construction activities.

After a site visit by the NMED in 2001 and review of the radiological screening data collected at this site, this SWMU was recommended for NFA. Hazardous wastes were not generated, treated, stored, or disposed at the site, and radioactivity was never detected in the waste stream. In 2002, NMED concurred with NFA determination.

ER Project Sampling Summary

The following table shows the number of analytes that exceeded BVs, FVs, and SALs that were in use in calendar year 2002. These data reflect site conditions before any remedial activities may have occurred, as discussed in the ER Project activities section above. BVs are naturally occurring concentrations of inorganic chemicals and radionuclides in soil, sediment, or tuff before any influence from LANL operations. FVs are concentrations of radionuclides in soil, sediment, or tuff that resulted from global atmospheric deposition unrelated to LANL releases. SALs are concentrations of chemicals or radionuclides based on a residential exposure, below which there is no potential unacceptable risk to human health.

Analytical Suite Sampled	No. of Chemicals Detected	No. of Chemicals >CY2002 BV/FV (If Applicable)	No. of Chemicals >CY2002 SAL (Residential)
Inorganic chemicals	19	0	1
Radionuclides	4	1	0
SVOCs	0	N/A	0
VOCs	2	N/A	0

The following table provides the maximum concentrations of analytes that exceeded CY2002 SALs.

Analytical Suite	Analyte	Maximum Concentration	CY2002 SAL (Residential)
Inorganic chemicals	Arsenic	4.1 mg/kg	0.39 mg/kg

References

Withdrawal of [51] Solid Waste Management Units (SWMUs) from the March 1995, September 1995, and September 1996 Requests for Permit Modification (LA-UR-95-767, LA-UR-95-3319, and LA-UR-96-3357, respectively) LA-UR Number: N/A

Request for Permit Modification, Units Proposed for NFA, March 1995 LA-UR Number: 95-0767

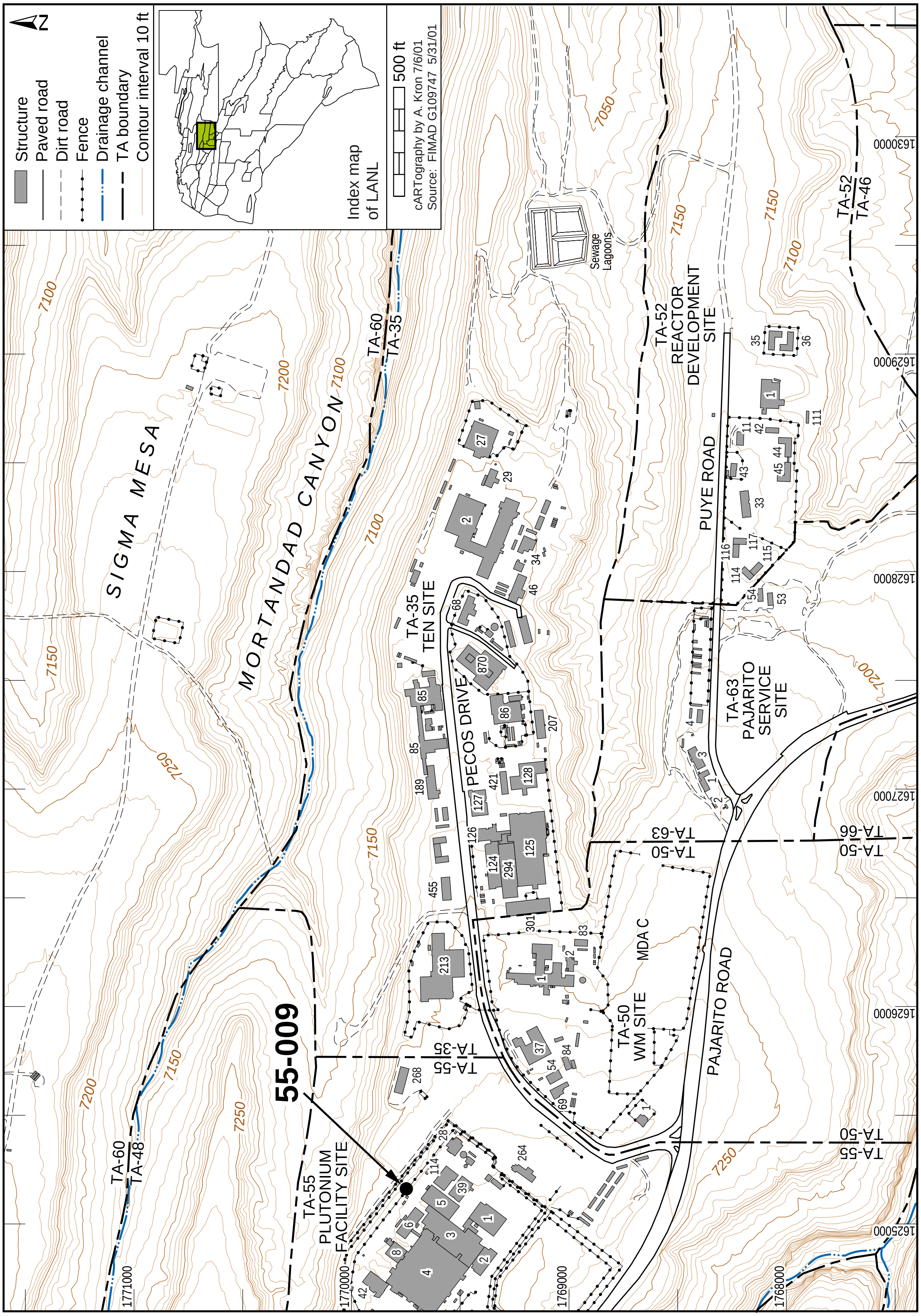
Class III Permit Modification for Removal of 90 Solid Waste Management Units (SWMUs) LA-UR Number: N/A

Addendum to RFI Work Plan for Operable Unit 1129 LA-UR Number: 92-0800

RFI Work Plan for Operable Unit 1129 LA-UR Number: 92-0800

Monitoring station with cover removed (SWMU 55-009)

Valve (SWMU 55-009)



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Source: FIMAD G109747 5/31/01
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5.0 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.

9/10/03

James L. Holt
Associate Director, Operations
Los Alamos National Laboratory
University of California Operator

Date Signed

9/15/03

Ralph E. Erickson
Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

Date Signed

6.0 REFERENCES

EPA, 1994, “Module VIII: Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments to RCRA for Los Alamos National Laboratory, EPA I.D. NM0890010515,” effective date May 19, 1994, U.S. Environmental Protection Agency, Region 6, Hazardous Waste Management Division, Dallas, Texas.

LANL, 2003a and all recent revisions, “Los Alamos National Laboratory Waste Acceptance Criteria,” PLAN-WASTEMGMT-002, Revision 3.8, Los Alamos National Laboratory, Los Alamos, New México, February 5, 2003.

LANL, 2003b and all recent revisions, “Solid Waste Management Unit Report,” LA-UR-03-6000, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2002a, “Response to Notice of Deficiency; TA-55 Part B RCRA Permit Application January 2002, Revision 1.0, May 16, 2002,” LA-UR-02-5041, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2002b and all recent revisions, “Packing TRU Waste Containers,” NMT7-WI3-SOP-TA55-013, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2002c and all recent revisions, “Managing Solid Low-Level Waste at TA-55,” NMT7-HCP-TA55-DP-02L, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2001 and all recent revisions, “Storage Area Inspections,” NMT 7-WI1S-HCP-TA-55-011 Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1999 and all recent revisions, “Certification and Disposal of Low-Level, Oversize Waste,” NMT7-WI3-TA55-HCP-DP-02L, Los Alamos National Laboratory, Los Alamos, New Mexico.

NMED, 1998a, Dinwiddie, Robert S. (Stu), New Mexico Environment Department, Letter to T. Taylor and J. Browne, February 5, 1998.

ATTACHMENT A

FACILITY DESCRIPTION

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
AASHTO	American Association of State Highway and Transportation Officials
ft	feet/foot
in.	inch(es)
LANL	Los Alamos National Laboratory
TA	technical area

ATTACHMENT A
FACILITY DESCRIPTION

The information provided in this section is submitted in accordance with the applicable requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), revised June 14, 2000 [6-14-00]. The following subject areas are addressed:

- A general description of Technical Area (TA) 55 at Los Alamos National Laboratory (LANL) [20.4.1 NMAC §270.14(b)(1)];
- Site-specific traffic patterns, volume, and control [20.4.1 NMAC §270.14(b)(10)];
- Site-specific location information for compliance with the seismic standard and floodplain requirements [20.4.1 NMAC §270.14(b)(11) and 20.4.1 NMAC §264.18(a) and (b)];
- Site-specific topographic map requirements [20.4.1 NMAC §270.14(b)(19)]; and
- Site-specific groundwater monitoring and protection information [20.4.1 NMAC §270.14(c) and 20.4.1 NMAC §264.90(a)].

A LANL-wide facility description addressing additional regulatory requirements is provided in Appendix A of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application," hereinafter referred to as the LANL General Part B.

A.1 TA-55 GENERAL DESCRIPTION [20.4.1 NMAC §270.14(b)(1)]

TA-55 is located in the north central portion of LANL (Figure A-1) on a mesa between a branch of Mortandad Canyon on the north and Two Mile Canyon on the south. Mesa-top elevations at TA-55 range from approximately 7,100 to 7,300 feet (ft) above mean sea level. The locations of the waste management units at TA-55 are shown on Figure A-2.

TA-55 began operating in 1978 and is the location of research and development activities, including a plutonium-processing facility. The waste management units addressed in this permit application include seven container storage units, a storage tank system, and a cementation unit. Detailed descriptions of the waste management units at TA-55 are provided in Attachments G, H and I, respectively.

A.2 TRAFFIC PATTERNS [20.4.1 NMAC §270.14(b)(10)]

General traffic pattern information, traffic volumes, and traffic control signals for the LANL-wide facility are provided in Appendix A of the LANL General Part B.

A.2.1 Routes of Travel

Hazardous and/or mixed waste stored and treated at TA-55 is generated at TA-3 and TA-55. Hazardous and/or mixed waste is occasionally transported from TA-55 to other areas at LANL (e.g., TA-54). The primary traffic routes that may be used to transport hazardous and mixed waste to and from TA-55 include Diamond Drive, Pajarito Road, and Pecos Drive as shown on Figure A-3.

A.2.2 Traffic Volumes

The buildings at TA-55 are located northwest of the intersection of Pajarito Road and Pecos Drive, as shown on Figure A-4. According to a traffic study conducted by Johnson Controls World Services, Inc. (JCI) (JCI, 1999), Pajarito Road has an average daily traffic volume of 12,000 vehicles. This includes vehicles traveling both northwest and southeast. Pecos Drive has an average daily traffic volume of 5,000 vehicles per day. This includes vehicles traveling both north and south. These values are based on a 24-hour period. Vehicle types include cars, light- and medium-duty trucks, and vans.

A.2.3 Traffic Control Signals

Traffic control signals surrounding and within TA-55 include stop signs, posted speed limits, a traffic light, and other traffic and pedestrian control signs. The locations of existing traffic control signals at TA-55 are shown on Figure A-4.

A.2.4 Road Load-Bearing Capacity

Roads within TA-55 are generally two lane roads with asphaltic-concrete surfaces. Load-bearing capacity for these roads is 32,000 pounds per axle. These roads are typically constructed with a 6-inch (in.)-thick base with a 3-in.-thick asphaltic-concrete surface. These roads were designed and constructed to meet the American Association of State Highway and Transportation Officials (AASHTO) specification HS-20 (AASHTO, 1996).

A.3 LOCATION INFORMATION [20.4.1 NMAC §270.14(b)(11)]

A.3.1 Seismic Standard [20.4.1 NMAC §270.14(b)(11)(i - ii) and 20.4.1 NMAC §264.18(a)]

General seismic information for the LANL-wide facility is provided in Appendix A of the LANL General Part B. TA-55 is in compliance with the seismic standards of 20.4.1 NMAC §270.14(b)(11) and 20.4.1

NMAC §264.18(a) [6-14-00]. A geologic field investigation, which consisted of exploratory trenching, was conducted within 3,000 ft of TA-55-4 and TA-55-185 during the fall of 1992 and summer of 1993. Based on trench stratigraphy, no evidence of Holocene faulting was observed (Woodward-Clyde Federal Services, 1995).

A.3.2 Floodplain Standard [20.4.1 NMAC §270.14(b)(11)(iii - v) and 270.14(b)(19)(ii); 20.4.1 NMAC §264.18(b)]

The hazardous and mixed waste management units at TA-55 are located on a mesa top. In accordance with 20.4.1 NMAC §270.14(b)(11)(iii) [6-14-00], the hazardous and mixed waste management units addressed in this permit application are not located within the 100-year floodplain boundary. Additional floodplain information is provided in Appendix A of the LANL General Part B.

A.4 TOPOGRAPHIC MAPS [20.4.1 NMAC §270.14(b)(19)]

Topographic maps and figures are provided herein or referenced to meet the requirements of 20.4.1 NMAC §270.14(b)(19) [6-14-00]. All maps clearly show the map scale, the date of preparation, and a north arrow. The maps and figures used to fulfill these regulatory requirements include the following:

- LANL-wide 100-year floodplain maps are provided as Appendix C of the "Response to Request for Supplemental Information: Technical Adequacy Review, RCRA Permit Application; General Part A," April 1998, Revision 0.0; and "Los Alamos National Laboratory General Part B," October 1998, Revision 1.0; Los Alamos National Laboratory, EPA ID No. NM 0890010515" (LANL, 2001).

- A map showing surface waters, including intermittent streams, near TA-55 is included as Figure A-5.

- Surrounding land uses are shown on Figure A-1.

- Wind roses for TA-6, the TA directly west of TA-55, are shown on Figures A-6 and A-7.

- A map showing the boundaries of LANL (including TA-55) is provided as Figure A-2 in the LANL General Part B.

- Access control features at TA-55 (e.g., fences, gates) are shown on Figure A-8.

- A map showing supply wells, monitoring wells, test wells, springs, and surface-water sampling stations near TA-55 is included as Figure A-5.

- The locations of buildings, hazardous and/or mixed waste management units, and loading and unloading areas at TA-55 are shown on Figure A-5.

- A map showing National Pollutant Discharge Elimination System discharge structure locations is included in the most recent version of the "Los Alamos National Laboratory General Part A Permit Application," herein after referred to as the LANL General Part A.
- Storm, sanitary, and process sewer systems at LANL are shown on Map A-1 of the LANL General Part B.
- Drainage control features (e.g., run-on/runoff) are shown on Figure A-9.
- Fire stations serving LANL and the County of Los Alamos are shown on Figure E-2 of Appendix E in the LANL General Part B.
- The equipment cleanup area for LANL is located at TA-50-1. The location of TA-50-1 is shown on Figure 50-1 in the LANL General Part A.

Contour lines on the topographic map (Figure A-5) are in intervals sufficient to detail natural drainage at LANL and in the vicinity of the waste management units at TA-55. As provided in 20.4.1 NMAC §270.14(b)(19) [6-14-00], LANL has submitted the maps to the New Mexico Environment Department at these scales and contour intervals due to the size of the waste management units, the extent of the LANL facility, and the topographic relief in the area.

A.5 GROUNDWATER MONITORING [20.4.1 NMAC, Subpart IX, 270.14(c) and 20.4.1 NMAC, Subpart V, 264.90(a)]

Groundwater monitoring information is provided in Appendix A of the LANL General Part B.

A.6 OTHER PERMIT ACTIVITIES

Other types of Resource Conservation and Recovery Act permits include, but are not limited to, the following:

- Permits by Rule
- Emergency Permits
- Hazardous Waste Incinerator Permits
- Permits for Land Treatment Demonstrations Using Field Test or Laboratory Analyses
- Interim Permits for Underground Injection Control Program Wells
- Research, Development, and Demonstration Permits
- Permits for Boilers and Industrial Furnaces Burning Hazardous Waste

Currently, none of these permit types are in effect for operations at TA-55.

A.7 REFERENCES

AASHTO, 1996 and all approved updates, "Standard Specifications for Highway Bridges," 16th Edition, American Association of State Highway and Transportation Officials.

JCI, 1999, Telecon from John Bradley, Johnson Controls World Services, Inc. to Jessica Moseley, IT Corporation, on February 10, 1999, Los Alamos, New Mexico.

LANL, 2001, “Response to Request for Supplemental Information: Technical Adequacy Review, RCRA Permit Application; General Part A,” April 1998, Revision 0.0; “Los Alamos National Laboratory General Part B,” October 1998, Revision 1.0, Los Alamos National Laboratory, EPA ID No. NM0890010515,” Los Alamos National Laboratory, Los Alamos, New Mexico.

Woodward-Clyde Federal Services, 1995, “Evaluation of the Potential for Surface Faulting at TA-63,” prepared for Los Alamos National Laboratory, Los Alamos, New Mexico.

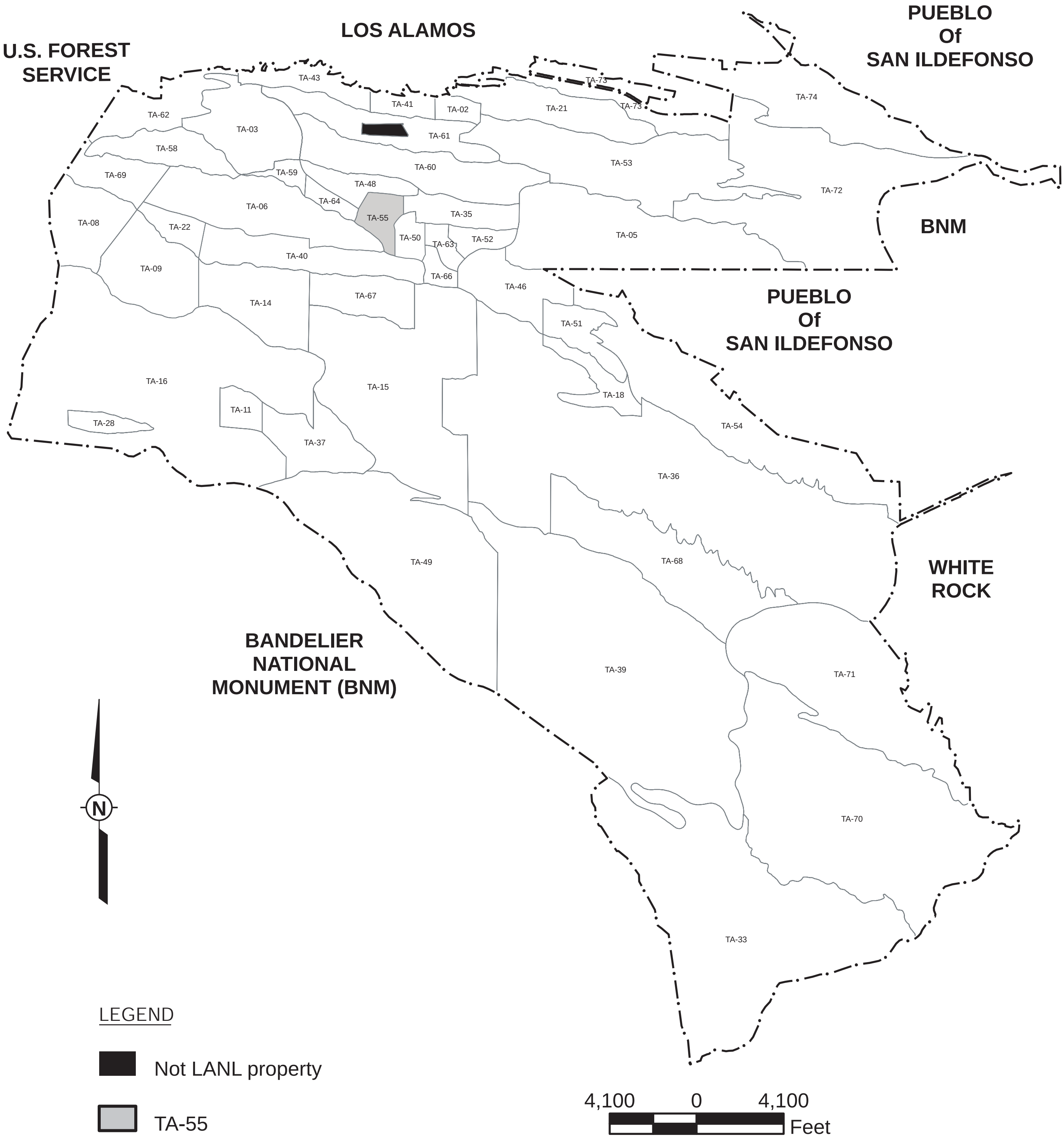


Figure A-1
Location Map of Technical Area (TA) 55 at Los Alamos National Laboratory (LANL)

State Plane Coordinate System New Mexico Central Zone North American Datum 1983 (ft)

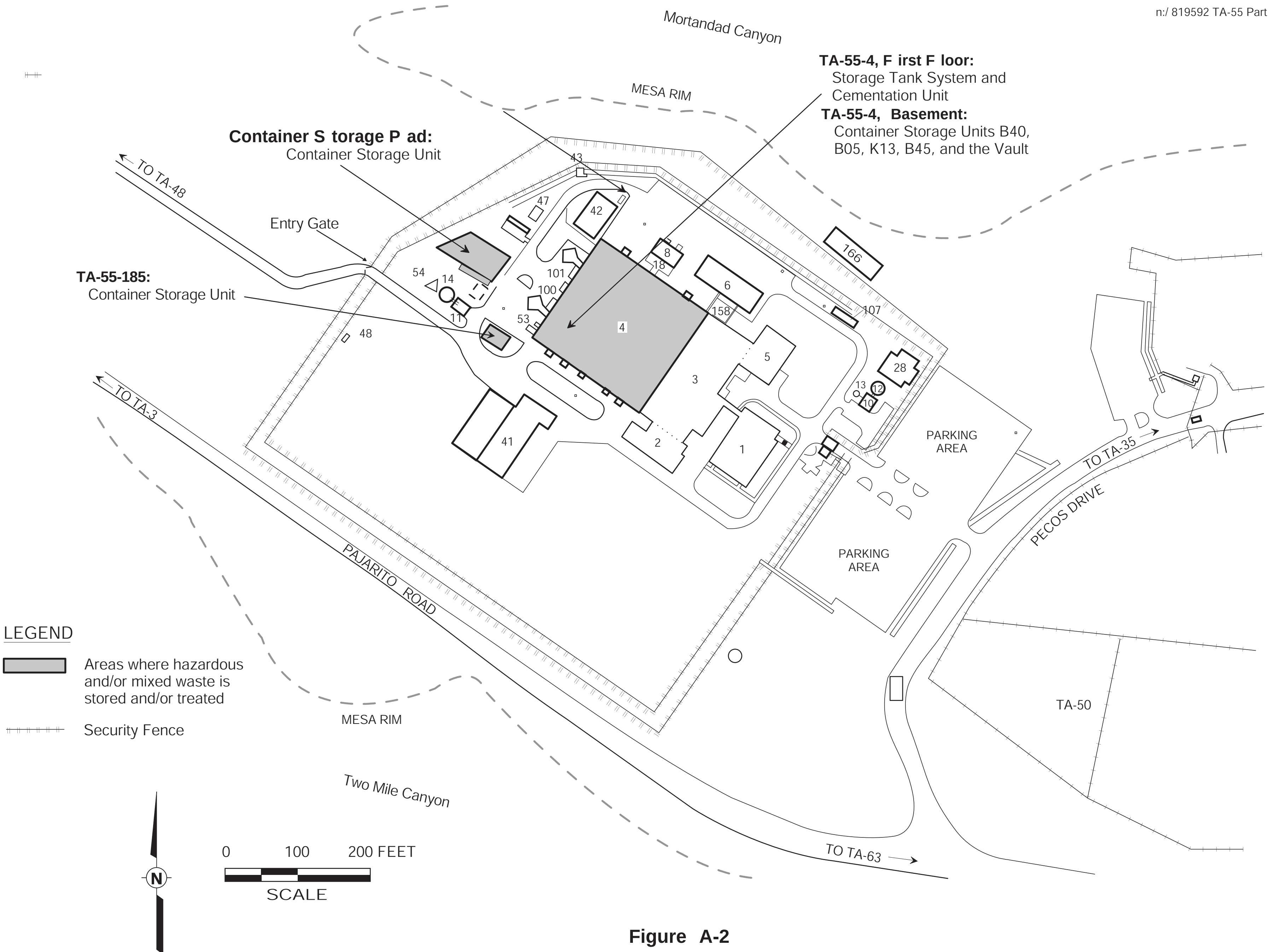


Figure A-2
Location of Waste Management Units at Technical Area (TA) 55

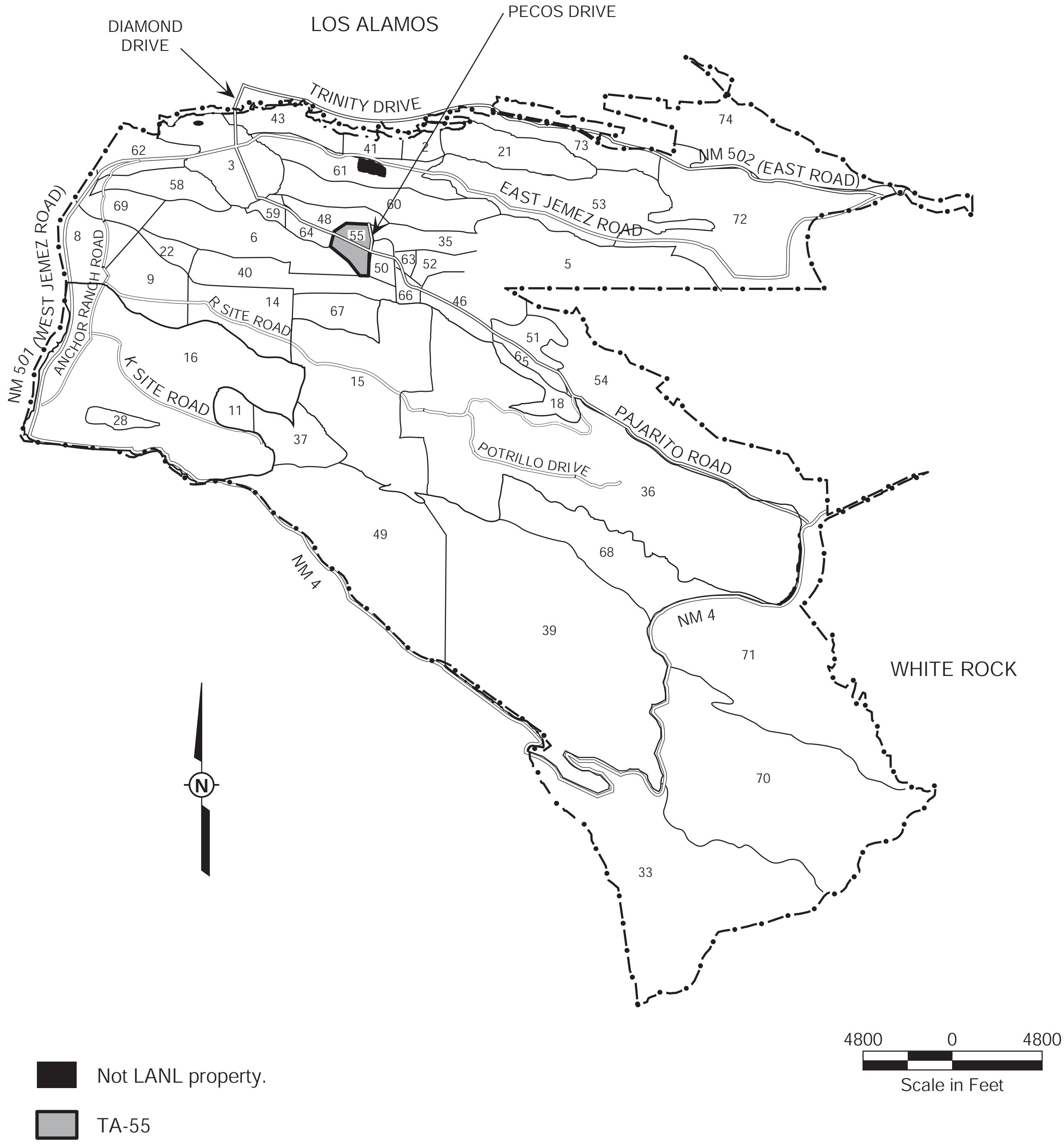


Figure A-3
Major Roads and Primary Traffic Routes at Los Alamos National Laboratory (LANL)

Document: TA-55 Part B
Revision No.: 2.0
Date: September 2003

n:/ 819592 TA-55 Part B

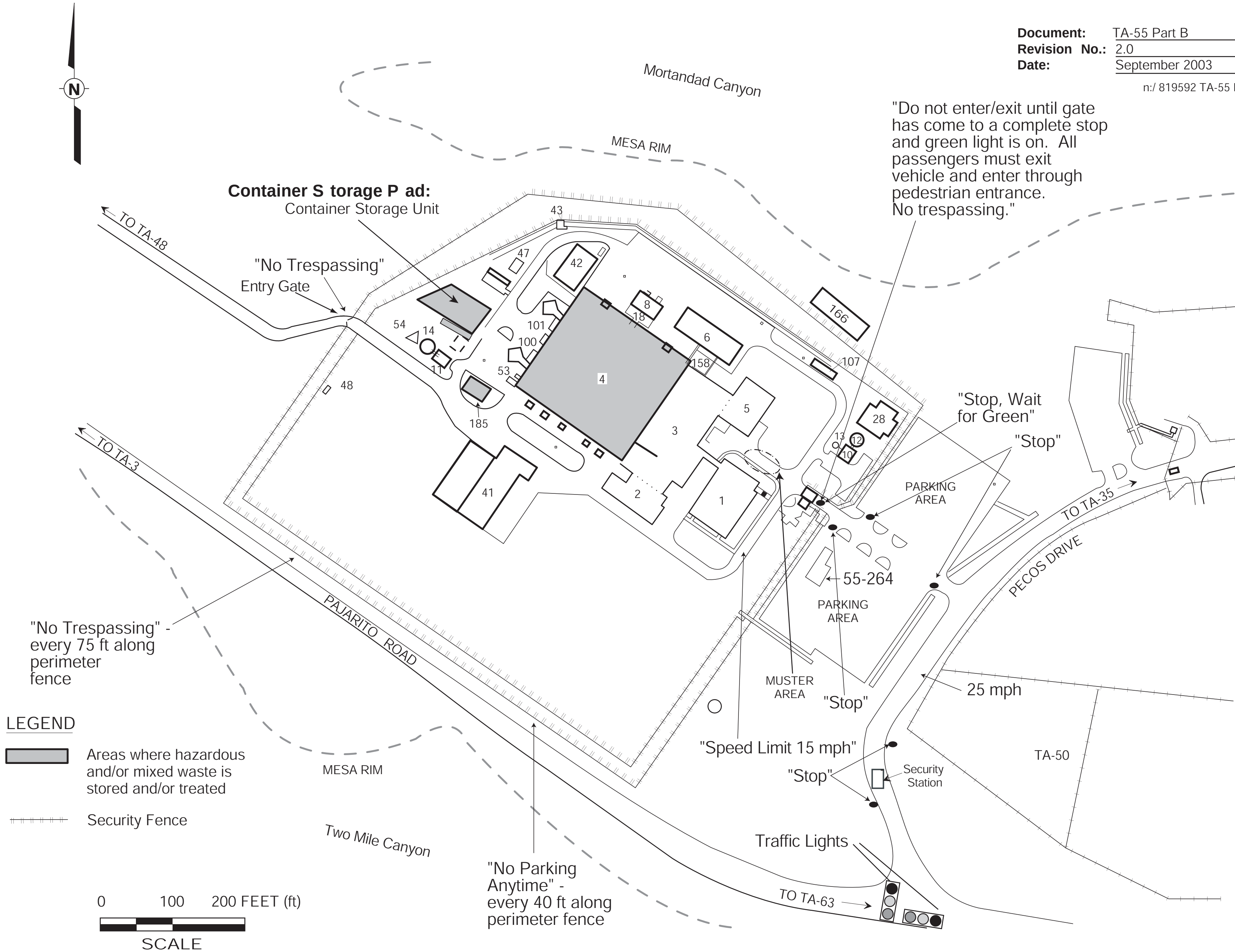
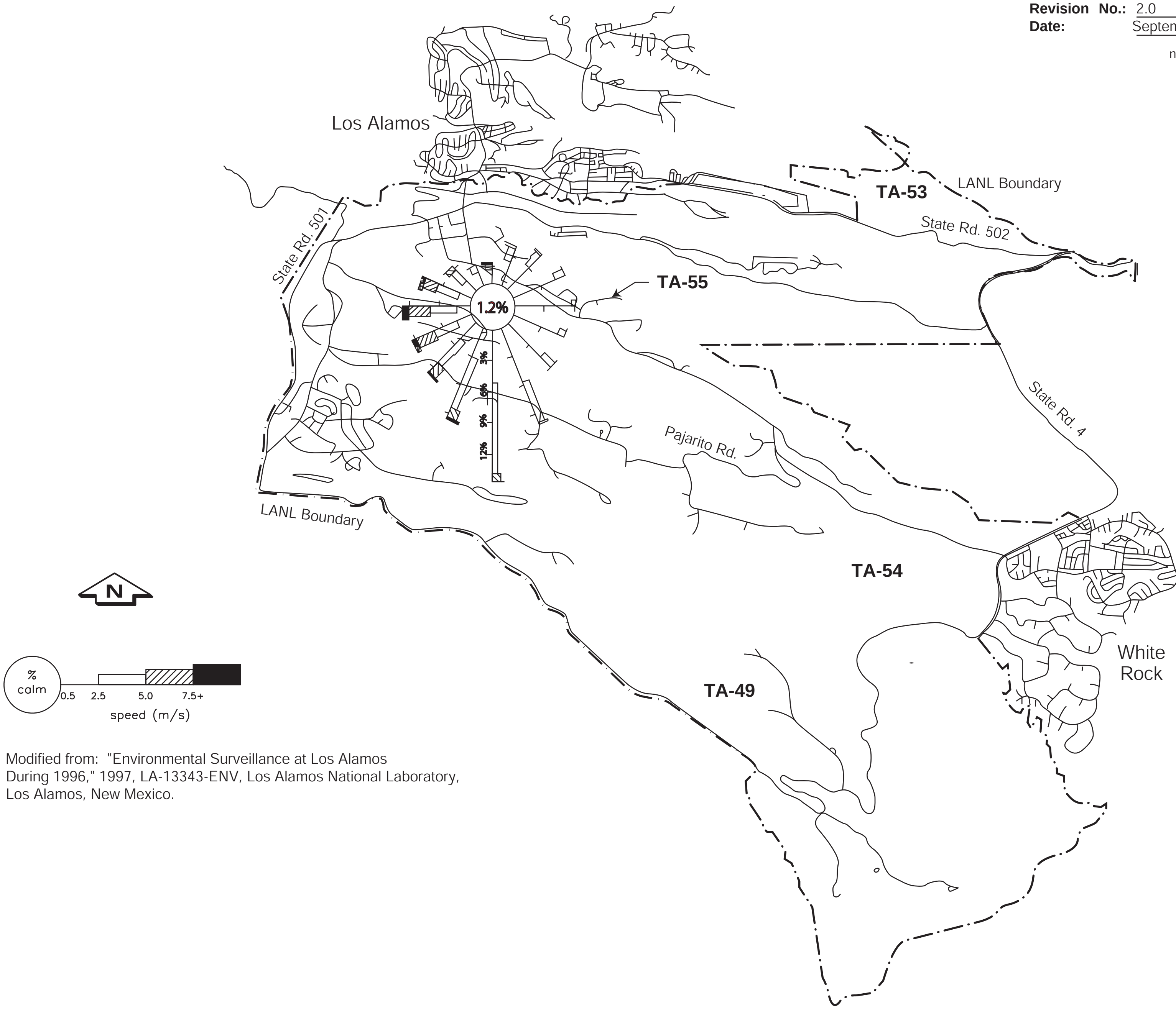


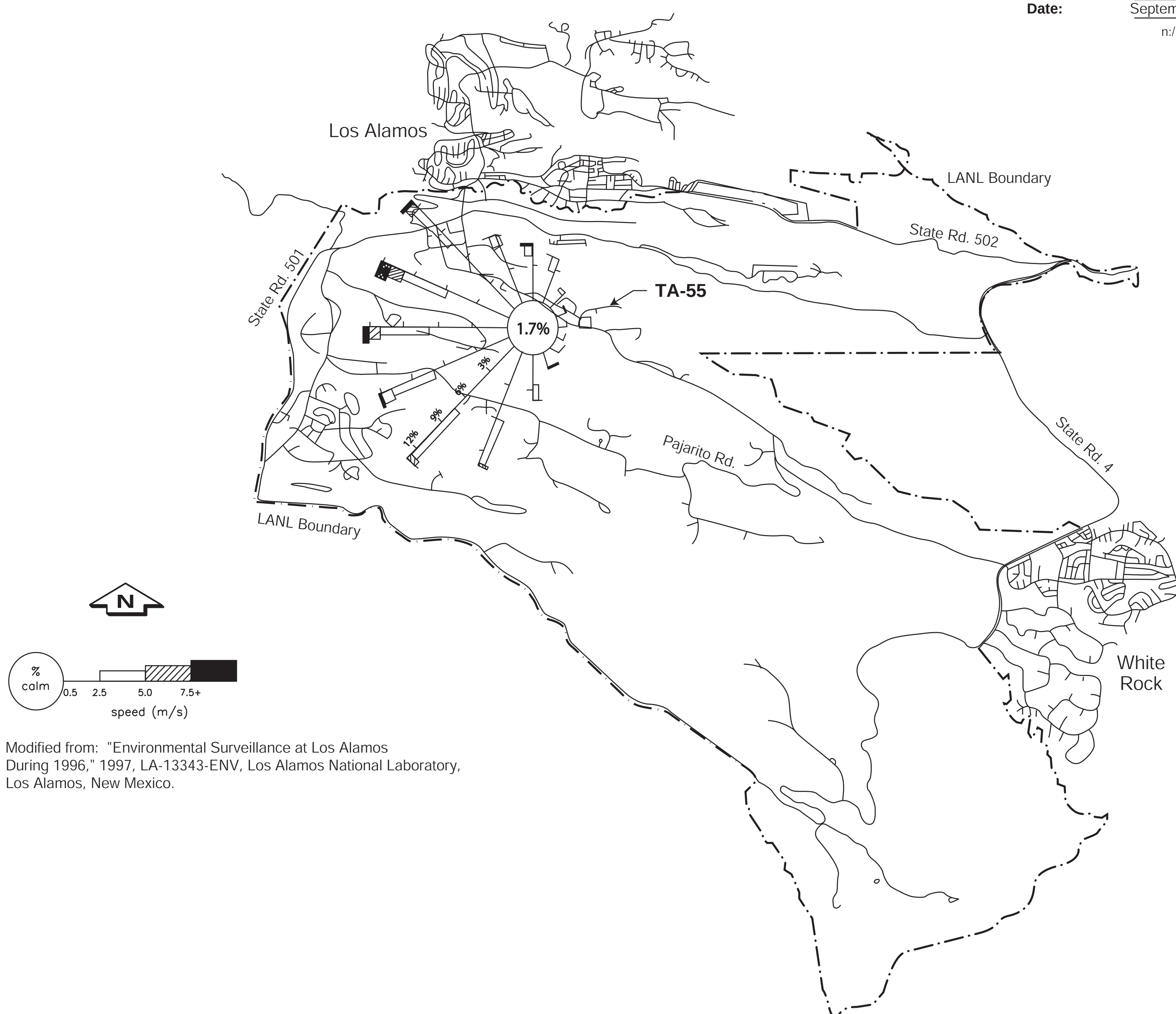
Figure A-4
Location Map of Access Roads and Traffic Control Signs in the Vicinity of Technical Area (TA) 55



Modified from: "Environmental Surveillance at Los Alamos During 1996," 1997, LA-13343-ENV, Los Alamos National Laboratory, Los Alamos, New Mexico.

Figure A-6

Annual Wind Roses for Technical Area (TA) 6 at Los Alamos National Laboratory (LANL)—Day



Modified from: "Environmental Surveillance at Los Alamos During 1996," 1997, LA-13343-ENV, Los Alamos National Laboratory, Los Alamos, New Mexico.

Figure A-7

Annual Wind Roses for Technical Area (TA) 6 at Los Alamos National Laboratory (LANL)—Night

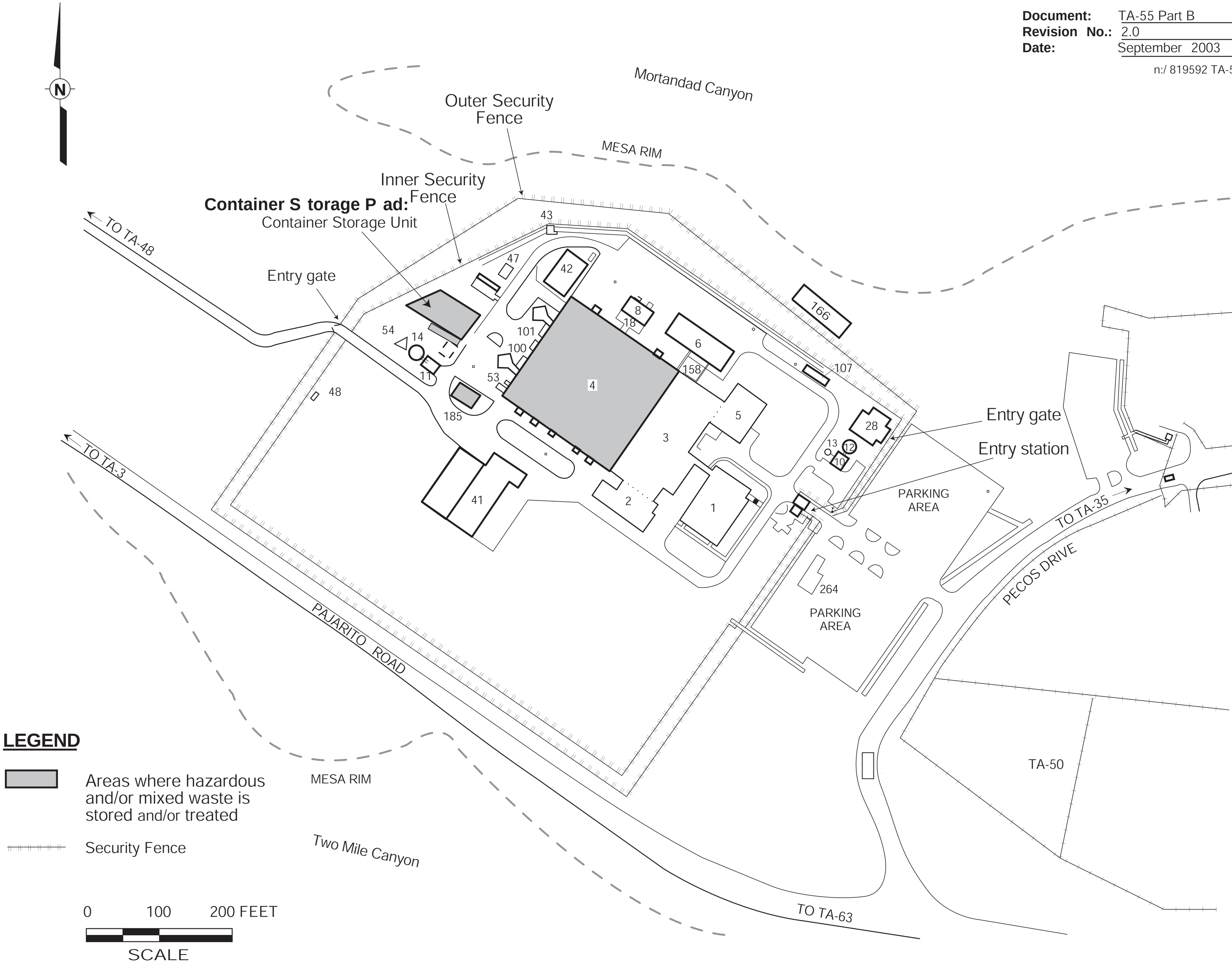


Figure A-8

Location Map Showing Security Fences, Entry Gates, and Entry Station at Technical Area (TA) 55

ATTACHMENT B

WASTE ANALYSIS PLAN

ATTACHMENT B
WASTE ANALYSIS PLAN

Waste analysis requirements are specified in New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.14(b)(2), 20.4.1 NMAC §264.13, and 20.4.1 NMAC §268.7, revised June 14, 2000 [6-14-00]. The waste analysis requirements for the Technical Area 55 container storage units, storage tank system, and cementation unit at Los Alamos National Laboratory are described in the facility-wide Waste Analysis Plan in Appendix B of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application."

ATTACHMENT C

INSPECTION PLAN

TABLE OF CONTENTS

LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
CAM	continuous air monitor
CFR	Code of Federal Regulations
CSU	container storage unit(s)
FMU-7	Facility and Waste Operations Division
IRF	Inspection Record Form
LANL	Los Alamos National Laboratory
m^3	cubic meters
ppmw	parts per million by weight
rem	Roentgen equivalent man
TA	technical area

ATTACHMENT C
INSPECTION PLAN

In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.14(b)(5) and 20.4.1 NMAC §264.15, revised June 14, 2000 [6-14-00], inspection requirements for all hazardous and/or mixed waste management units at Los Alamos National Laboratory (LANL) are addressed in Appendix C of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application," hereinafter referred to as the LANL General Part B. This attachment presents additional inspection requirements applicable to the waste management units at Technical Area (TA) 55. These requirements have been developed to identify equipment malfunctions and deterioration, operator errors, and discharges that might cause or lead to a release of hazardous or mixed waste to the environment or a threat to human health. Inspections will be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

C.1 TA-55 VAULT [20.4.1 NMAC §264.15(b) and 264.174]

The Vault is a container storage unit (CSU) located in the basement at TA-55-4. The CSU consists of a completely enclosed area consisting of 13 rooms located along a central corridor. Because of high levels of radioactivity, the Vault must have specialized inspection procedures to adhere to "as low as reasonably achievable" principles established by the Atomic Energy Act. Performance of a weekly inspection of the storage rooms pursuant to the requirements of 20.4.1 NMAC §264.174 [6-14-00], would result in an annual employee exposure of 2.7 Roentgen equivalent man (rem) of neutron radiation. This exceeds the annual allowable employee exposure rate of 2 rems. Therefore, the following alternative inspection procedures have been implemented. These inspection requirements are applicable only to those rooms in the Vault that store mixed waste regulated pursuant to 20.4.1 NMAC Subpart V, Part 264 [6-14-00].

C.1.1 Non-Intrusive Inspection Systems

Continuous air monitors (CAM) are located in each individual storage room within the Vault to continuously monitor airborne radioactivity levels. If the concentration of an airborne material reaches a preset level, an alarm will sound. All of the containers in the Vault contain radioactive material. If container integrity is compromised and the material inside the container becomes airborne, the CAM will detect the release and sound an alarm. CAM air intakes have been placed near the negative air exhaust vent for each room. Placing CAM air intakes near room-exhaust points provides the most beneficial location within the room to detect a release because air vented from each room must pass by the CAM intake prior to exhausting from the room. Each room has a single exhaust vent. If a problem with a container is identified, it is removed from the Vault and inspected in an open-front hood.

Information obtained during inspections and all container transfers are noted on the Vault Traffic Log Book maintained at TA-55. The Vault Traffic Log Book will be inspected weekly by Nuclear Materials Technology staff as a quality assurance measure to verify receipt or transfer of mixed waste from the Vault. If mixed waste is not currently being stored in the Vault and the weekly inspection indicates that no mixed waste has been received, the Inspection Record Form (IRF) will be marked “No Use” and completed according to the IRF instructions.

The Vault has extremely strict security and safeguards. Therefore, there is no significant potential for container breaches through inadvertent and uncontrolled access to the Vault.

C.1.2 Intrusive Inspection Procedures

The central hallway of the Vault will be inspected weekly when mixed waste is in storage and will address the following items:

- Vault Traffic Log Book inspected for receipt or transfer of waste
- Communications equipment
- Warning signs
- Security
- Work surfaces/floors in central corridor
- Spill/fire equipment
- Secondary containment
- (Un)loading area
- Visual inspection of storage rooms from hallway
- Nuclear Materials Custodian contacted to verify no alarms or problems

When containers are placed into or removed from a storage room within the Vault, the following items will be inspected in that storage room, as appropriate:

- Vault Traffic Log Book inspected for receipt or transfer of waste
- Communication equipment
- Warning signs
- Security
- Work surfaces/floors
- Spill/fire equipment
- Secondary containment
- (Un)loading area
- Nuclear Materials Custodian contacted to verify no alarms or problems

- Emergency equipment/lighting
- Covers/lids of containers
- Labels
- Accumulation start date
- Compatibility
- Structural integrity of containers
- Aisle spacing/stacking
- Pallets/raised containers

Inspection results are recorded on the IRF maintained at TA-55.

C.2 STORAGE TANK SYSTEM [20.4.1 NMAC §264.15(b), 264.193(i), and 264.195]

The storage tank system components located at TA-55-4, Room 401, are inspected according to the schedule provided below. The inspection frequency is based on the deterioration rate of equipment/systems and the probability of adverse impact to human health or the environment if failure of the equipment/systems or any operator error goes undetected between inspections.

C.2.1 Daily (During Operation)

The storage tank system components (including ancillary equipment) will be inspected at least once each operating day. An operating day includes when mixed waste is added to or emptied from a tank. For daily inspections, the following items will be inspected, as appropriate, and recorded on the IRF:

- Work surfaces/floors
- Secondary containment structure
- Structural integrity of tanks and ancillary equipment
- Labels
- (Un)loading areas
- All portions of tank systems to detect corrosion or releases of waste and to detect any possible malfunctions to overfill/spill control equipment, tank monitoring, and leak detection systems and data from these systems
- Proper operating condition of tank

C.2.2 Weekly

Weekly inspection of the storage tank system components will be conducted and will include the following items, as appropriate, and recorded on the IRF:

- Warning signs
- Work surfaces/floors
- Secondary containment structures
- Covers/lids of tanks

- Labels
- Structural integrity of tanks and ancillary equipment
- (Un)loading areas
- All portions of tank systems to detect corrosion or releases of waste and to detect any possible malfunctions to overfill/spill control equipment, tank monitoring, and leak detection systems and data from these systems
- Proper operating condition of tank

C.2.3 Annually

An annual assessment, as required by 20.4.1 NMAC §264.193 (i) [6-14-00], is not necessary for the TA-55 storage tank system and ancillary equipment because the storage tank system and the ancillary equipment have secondary containment.

C.3 CEMENTATION UNIT [20.4.1 NMAC §§264.15(b) and 264.602]

The cementation unit is located at TA-55-4, Room 401, and is inspected according to the schedule provided below. The inspection frequency is based on the deterioration rate of equipment/systems and the probability of adverse impact to human health or the environment if failure of the equipment/systems or any operator error goes undetected between inspections.

C.3.1 Daily (During Operation)

The cementation unit is inspected each operating day (i.e., when mixed waste is treated in the unit). For the daily inspection of the cementation unit, the following items will be inspected, as appropriate, and recorded on the IRF:

- Work surfaces/floors
- Secondary containment structures
- Labels
- Structural integrity of cementation unit
- (Un)loading area

C.3.2 Weekly

Weekly inspection of the cementation unit will be conducted and will address the following items, as appropriate and recorded on the IRF:

- Warning signs
- Work surfaces/floors
- Secondary containment structure
- Labels
- Structural integrity of cementation unit
- (Un)loading area

C.4 ADDITIONAL INSPECTION ITEMS

The items listed below are inspected monthly and documented by the Facility and Waste Operations Division (FMU-7) on a separate form:

- Evacuation alarms
- Ventilation alarms
- Fire alarms
- Fire pumps
- Fire extinguishers
- Communication equipment
- Eyewashes/safety showers

These inspection items may be changed at the discretion of FMU-7 to ensure consistency with the inspection items and frequencies specified in the most current version of the "TA-55 Final Safety Analysis Report" (LANL, 1996) and the "TA-55 Technical Safety Requirements" (LANL, 2000).

Additionally, security inspections of the fences and TA-55 access controls are conducted daily.

C.5 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPARTS AA AND BB REQUIREMENTS [20.4.1 NMAC, Subpart V, Part 264, Subparts AA and BB]

The TA-55 CSUs are not subject to the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subparts AA and BB because they do not operate applicable process vents or equipment.

C.6 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART CC REQUIREMENTS [20.4.1 NMAC, Subpart V, Part 264, Subpart CC]

The hazardous wastes stored in containers at the TA-55 CSUs may be subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart CC (incorporating the Code of Federal Regulations [CFR], Title 40, Part 264, Subpart CC, "Air Emission Standards for Tanks, Surface Impoundments, and Containers") based on the applicability criteria specified in 40 CFR §264.1080. Subpart CC standards for containers, as currently set forth by the U.S. Environmental Protection Agency, require that containers of hazardous waste be covered so that there are no detectable emissions of volatile organic compounds to the air. Inspection and monitoring requirements are also specified.

As indicated in 40 CFR §264.1080(b)(6), these standards are not currently applicable to containers that are used solely for management of radioactive mixed waste in accordance with all regulations under the authority of the Atomic Energy Act and the Nuclear Waste Policy Act. The standards are also not applicable to containers of hazardous waste with less than 500 parts per million by weight (ppmw) volatile organics, containers of less than 0.1 cubic meters (m^3) (approximately 26 gallons) capacity, or that have received waste prior to the effective date of the regulation (December 6, 1996). The following management standards apply for hazardous waste managed at LANL that do not meet any of the exemption listed in 40 CFR §264.1080(b).

LANL requires that Subpart CC requirements be evaluated by the generator as part of the waste characterization process. Generator information is used to determine whether the concentration of volatile organics in a waste stream at the point of generation is less than 500 ppmw or is equal to or greater than 500 ppmw, which is the threshold concentration for Subpart CC requirements. The generator documents this determination for that waste stream. In the event that this information is not available, the waste will be characterized in accordance with Appendix B of the most recent version of the LANL General Part B. Any hazardous waste that is newly-generated through the treatment or re-characterization of mixed waste at TA-55 will be characterized for the volatile organic content in accordance with Appendix B.

Three levels of air emission controls based on container design capacity are established in 40 CFR §264.1086(b). TA-55 hazardous waste storage procedures require Level 1 controls based upon container design capacities. Containers of greater than 0.1 m^3 and less than 0.46 m^3 (approximately 119 gallons) capacity and that meet U.S. Department of Transportation specifications under 49 CFR, Part 178, are kept closed during storage pursuant to 40 CFR §264.1086 (c)(3). Containers undergoing waste characterization activities may be opened for access for the purposes described in 40 CFR §264.1086(c)(3). As required by 40 CFR §264.1086(c)(4), these containers are subject to a visual inspection and monitoring program. On or before acceptance of the waste container, the container is inspected to check for visible cracks, holes, gaps, or other open spaces into the interior of the container when the cover and closure devices are secured in the closed position, in accordance with 40 CFR §264.1086(c)(1)(ii). This inspection is documented in uniform hazardous waste manifests. Pursuant to the Inspection Plan in Appendix C of the most recent version of the LANL General Part B, containers are inspected weekly at TA-55 to ensure that the containers remain closed during storage, thereby exceeding the requirements of 40 CFR §264.1086(c)(4)(ii).

C.7 REFERENCES

LANL, 2000 and all recent revisions, “TA-55 Technical Safety Requirements,” Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1996 and all recent revisions, "TA-55 Final Safety Analysis Report," Los Alamos National Laboratory, Los Alamos, New Mexico.

ATTACHMENT D

PERSONNEL TRAINING PLAN

ATTACHMENT D

PERSONNEL TRAINING PLAN

In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.14(b)(12) and 20.4.1 NMAC Subpart V, Part 264.16, revised June 14, 2000 [6-14-00], training requirements for workers who manage hazardous and/or mixed waste at Technical Area 55 are addressed in Appendix D of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application."

ATTACHMENT E

CONTINGENCY PLAN

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
LANL	Los Alamos National Laboratory
TA	technical area

ATTACHMENT E
CONTINGENCY PLAN

In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) Subpart V, Part 264, Subpart D and 20.4.1 NMAC §270.14(b)(7), revised June 14, 2000, contingency measures applicable to the hazardous and mixed waste management units at Technical Area (TA) 55 are provided in Appendix E of the most recent version of the "Los Alamos National Laboratory General Part B," hereinafter referred to as the LANL General Part B.

Figure E-1 shows evacuation routes and muster areas that may be used at TA-55 in the event of an emergency. In addition, lists of emergency equipment currently available for use at TA-55 are included as Tables E-1 through E-4. A list of emergency equipment (including spill control equipment) available from the Hazardous Materials Response Group is presented in Table E-2 of Appendix E in the most recent version of the LANL General Part B. Evacuation routes, muster area locations, and emergency equipment are subject to change. Emergency equipment discussed in this plan may be replaced and/or upgraded with functionally equivalent components and equipment as necessary for routine maintenance and repairs.

Hazardous waste spills are managed by type and severity of the incident. If a hazardous waste spill occurs, the Incident Command evaluates the type and severity of the spill and determines if assistance from LANL's Emergency Management and Response Group is required. If not, the spill is managed internally by TA-55 personnel.

Table E-1 [a]
Emergency Equipment at
Technical Area (TA) 55, Building 4 (TA-55-4), First Floor

FIRE CONTROL EQUIPMENT:

Dry-chemical fire extinguishers are located in Room 401.
Description of General Capabilities:
The fire extinguishers are portable, manually-operated units and can be used by any employee in case of fire. The fire extinguishers in Room 401 are for use only in case of fire outside the gloveboxes.

Fire alarm pull boxes and push button stations are available in Room 401.
Description of General Capabilities:
Fire alarms can be activated by any employee in the event of fire to notify the Central Alarm Station.

An automatic fire suppression sprinkler system is located in Room 401.

Automatic thermal alarms are located in the gloveboxes in Room 401.

Fire hydrants are located outdoors on the north, south, and west sides of TA-55-4.

SPILL CONTROL EQUIPMENT:

Room 401 provides secondary containment for the storage tank system and cementation unit.

COMMUNICATION EQUIPMENT:

Telephones are located in Room 401. The telephones are capable of handling incoming/outgoing calls and paging.

A telephone is located at each of the two west exit doors of TA-55-4.

Two-way radios are available from the Nuclear Materials Technology Facility Incident Command located at TA-55-3, Room 179, for personnel working in Room 401.

Alarms at TA-55-4:
The fire alarm is a zone-wide whooping sound.

If a drop-box pushbutton station is used, a zone-wide, high-pitched constant tone will be activated and then switch to the standard whooping sound.

Refer to footnote at end of table.

Table E-1 [a] (continued)
Emergency Equipment at
Technical Area (TA) 55, Building 4 (TA-55-4), First Floor

COMMUNICATION EQUIPMENT, continued:

The evacuation alarm is a facility-wide mid-range pulsating tone.

The continuous air monitor alarm is a local high-pitched pulsating tone.

The ventilation alarm is a local slow, repeating chime tone.

The public address system may also be used to announce an evacuation.

DECONTAMINATION EQUIPMENT:

Safety showers and eyewash stations are located in Room 401.

Description of General Capabilities:

Safety showers and eyewashes are available for decontamination of personnel who receive a chemical splash to the skin or eyes.

Material Safety Data Sheets (MSDS) are available in Room 401 and at TA-55-4.

Specific MSDSs may be obtained prior to working with any hazardous waste to determine if the application of water is indicated for decontamination.

PERSONAL PROTECTIVE EQUIPMENT:

Self-contained breathing apparatus (SCBA) are located in the southside hallway outside of Room 401, in the northside hallway of TA-55-4, and in TA-55-3, Room 179. The SCBAs are available for personnel working in or near Room 401.

Change/decontamination rooms with protective clothing available are located on the first floor of TA-55-4 and in TA-55-3. Protective clothing is also available in a locker located in the hallway near Room 401 for use by personnel working in or near Room 401.

Respirators located in TA-55-3 (Room 107) and in TA-55-4 (Room 515) are available for all personnel working in or near TA-55-4. Respirators are re-issued on a regular basis to TA-55-4 personnel for radiation work. These respirators are stored in the personnel's individual lockers. Combination gas canisters (particulate, organic, and acid) are available in TA-55-4 (Room 515).

OTHER:

If transportation is needed for evacuation, vehicles may be obtained through the Emergency Management and Response Group.

[a] Equipment types and locations are subject to change.

Table E-2 [a]
Emergency Equipment at
Technical Area (TA) 55, Building 4 (TA-55-4), Basement

FIRE CONTROL EQUIPMENT:

Halon, dry chemical, and/or carbon dioxide fire extinguishers are available near B40, B05, K13, B45, and the Vault.
Description of General Capabilities:
The fire extinguishers are portable, manually-operated units and can be used by any employee in case of fire.

Fire alarm pull boxes are located at B05, K13, B45, the Vault, and on each side of the fire door.
Description of General Capabilities:
Fire alarms can be activated by any employee in the event of fire to notify the Central Alarm System.

An automatic fire suppression sprinkler system is located throughout the basement at TA-55-4, including the Vault and the office and corridor associated with the Vault.

Fire hydrants are located outdoors on the north, south, and west sides of TA-55-4.

SPILL CONTROL EQUIPMENT:

Self-containment pallets or cabinets are provided for containers of liquid and/or potentially liquid-bearing wastes stored at B40, K13, and the Vault.

COMMUNICATION EQUIPMENT:

Telephones and intercom stations are located throughout the basement of TA-55-4. The telephones are capable of handling both incoming and outgoing calls. The intercom system is connected to the TA-55-3 Operations Center and allows the Operations Center to easily mobilize emergency response support.

Two-way radios are available from the Nuclear Materials Technology Facility Incident Command located at TA-55-3, Room 179, for personnel working in the basement at TA-55-4.

Personal pagers are issued to and carried by assigned personnel working in the basement of TA-55-4. These pagers are accessed by telephone.

Alarms at TA-55-4:
The fire alarm is an area-wide whooping sound.
The evacuation alarm is a facility-wide mid-range pulsating tone.

Refer to footnote at end of table.

Table E-2 [a] (continued)
Emergency Equipment at
Technical Area (TA) 55, Building 4 (TA-55-4), Basement

COMMUNICATION EQUIPMENT, continued:

The continuous air monitor alarm is a local high-pitched pulsating tone.
The ventilation alarm is a local slow, repeating chime tone.

The public address system activated from the TA-55-3 Operations Center may be used to announce an evacuation.

A site-wide paging system activated from the TA-55-3 Operations Center can be heard throughout TA-55-4.

DECONTAMINATION EQUIPMENT:

Eyewashes are located throughout the basement of TA-55-4.
Description of General Capabilities:
The eyewash stations are available for decontamination of personnel who receive a chemical splash to the eyes.

Safety showers are located near B40, K13 and in the office for the Vault.
Description of General Capabilities:
The safety showers are available for decontamination of personnel who receive a chemical splash to the skin.

Material Safety Data Sheets (MSDSs) are available at TA-55-41. Specific MSDSs may be obtained prior to working with any hazardous waste to determine if the application of water is indicated for decontamination.

PERSONAL PROTECTIVE EQUIPMENT:

Change/decontamination rooms with protective clothing available are located on the first floor of TA-55-4 and in TA-55-3.

Respirators located in TA-55-4 and in TA-55-3 are available for all personnel working in or near TA-55-4. Particulate and toxic gas canisters are available in TA-55-4.

Self-contained breathing apparatus are located in the TA-55, Basement.

OTHER:

If transportation is needed for evacuation, vehicles may be obtained through the Emergency Management and Response Group.

Forklifts stored in the basement are available for use in the basement and are stored near the north basement doorway.

[a] Equipment types and locations are subject to change.

Table E-3 [a]
Emergency Equipment at Technical Area (TA) 55 Container Storage Pad

FIRE CONTROL EQUIPMENT:

A dry chemical fire extinguisher is located on the Container Storage Pad.

Description of General Capabilities:

The fire extinguishers are portable, manually-operated units and can be used by any employee in case of fire.

Fire hydrants are located along the north, south, and west sides of TA-55-4.

One fire hydrant is located just south of the Container Storage Pad.

Fire alarm pull boxes are located in TA-55-42 at the northwest corner of TA-55-4.

One fire alarm pull box is located outside on the south side of TA-55-4.

COMMUNICATION EQUIPMENT:

A telephone is located on the east side of TA-55-11, and additional phones are located in TA-55-185 and on the south side of TA-55-4.

Two-way radios are available from the Nuclear Materials Technology (NMT) Facility Incident Command located at TA-55-3, Room 179, for personnel working at the Container Storage Pad.

Personal pagers are issued to and carried by assigned personnel working at the Container Storage Pad. These pagers are accessed by telephone.

Alarms at TA-55:

The fire alarm is an area-wide whooping sound.

The evacuation alarm is a facility-wide mid-range pulsating tone.

The public address (PA) system activated from the TA-55-3 Operations Center may be used to announce an evacuation. PA speakers are located on the west side of TA-55-4.

Two intercom systems to the TA-55-3 Operations Center are located on the south and north sides of TA-55-4.

DECONTAMINATION EQUIPMENT:

A safety shower and eyewash station are located outdoors on the Container Storage Pad.

Refer to footnote at end of table.

Table E-3 [a] (continued)
Emergency Equipment at
Technical Area (TA) 55 Container Storage Pad

DECONTAMINATION EQUIPMENT, continued:

Description of General Capabilities:
The safety shower and eyewash are available for personnel who receive a chemical splash to the skin or eyes.

Material Safety Data Sheets (MSDSs) are available at TA-55-2. Specific MSDSs may be obtained prior to working with any hazardous waste to determine if the application of water is indicated for decontamination.

PERSONAL PROTECTIVE EQUIPMENT:

Change rooms with protective clothing available are located on the first floor of TA-55-4 and in TA-55-3.

Respirators are located in TA-55-4 and in TA-55-3 for all personnel working in or near TA-55-4.

OTHER:

If transportation is needed for evacuation, vehicles may be obtained through the Emergency Management and Response Group.

Two forklifts are available for NMT-7 use.

[a] Equipment types and locations are subject to change.

Table E-4 [a]
Emergency Equipment at
Technical Area (TA) 55, Building 185 (TA-55-185)

FIRE CONTROL EQUIPMENT:

Fire hydrants are located along the north, south, and west sides of TA-55, Building 4 (TA-55-4).

One fire alarm pull box is located inside TA-55-185.

Fire alarm pull boxes are located in TA-55, Building 42, at the northwest corner of TA-55-4.

One fire alarm pull box is located outside on the south side of TA-55-4.

COMMUNICATION EQUIPMENT:

One telephone is located inside TA-55-185.

A telephone is located on the east side of TA-55-11 and additional phones are located in TA-55-185 and on the south side of TA-55-4.

Two-way radios are available from the Nuclear Materials Technology (NMT) Facility Incident Command located at TA-55-3, Room 179, for personnel working at TA-55-185.

Personal pagers are issued to and carried by assigned personnel working at TA-55-185. These pagers are accessed by telephone.

Alarms at TA-55-4:
The fire alarm is an area-wide whooping sound.
The evacuation alarm is a facility-wide mid-range pulsating tone.

The pubic address (PA) system activated from the TA-55-3 Operations Center may be used to announce an evacuation.

PA speakers are located on the west side of TA-55-4 near TA-55-185. Intercom systems to the TA-55-3 Operations Center are located on the south and north sides of TA-55-4.

DECONTAMINATION EQUIPMENT:

TA-55-185 will be equipped with a portable safety shower and eyewash station before wastes are managed there.

Refer to footnote at end of table.

Table E-4 [a] (continued)
Emergency Equipment at
Technical Area (TA) 55, Building 185 (TA-55-185)

PERSONAL PROTECTIVE EQUIPMENT:

Change rooms with protective clothing available are located in TA-55-3.

Respirators located in TA-55-4 and in TA-55-3 are available for all personnel working in or near TA-55-185.

OTHER:

If transportation is needed for evacuation, vehicles may be obtained through the Emergency Management and Response Group.

A forklift is available inside of TA-55-185.

Two forklifts are available to NMT-7.

[a] Equipment types and locations are subject to change.

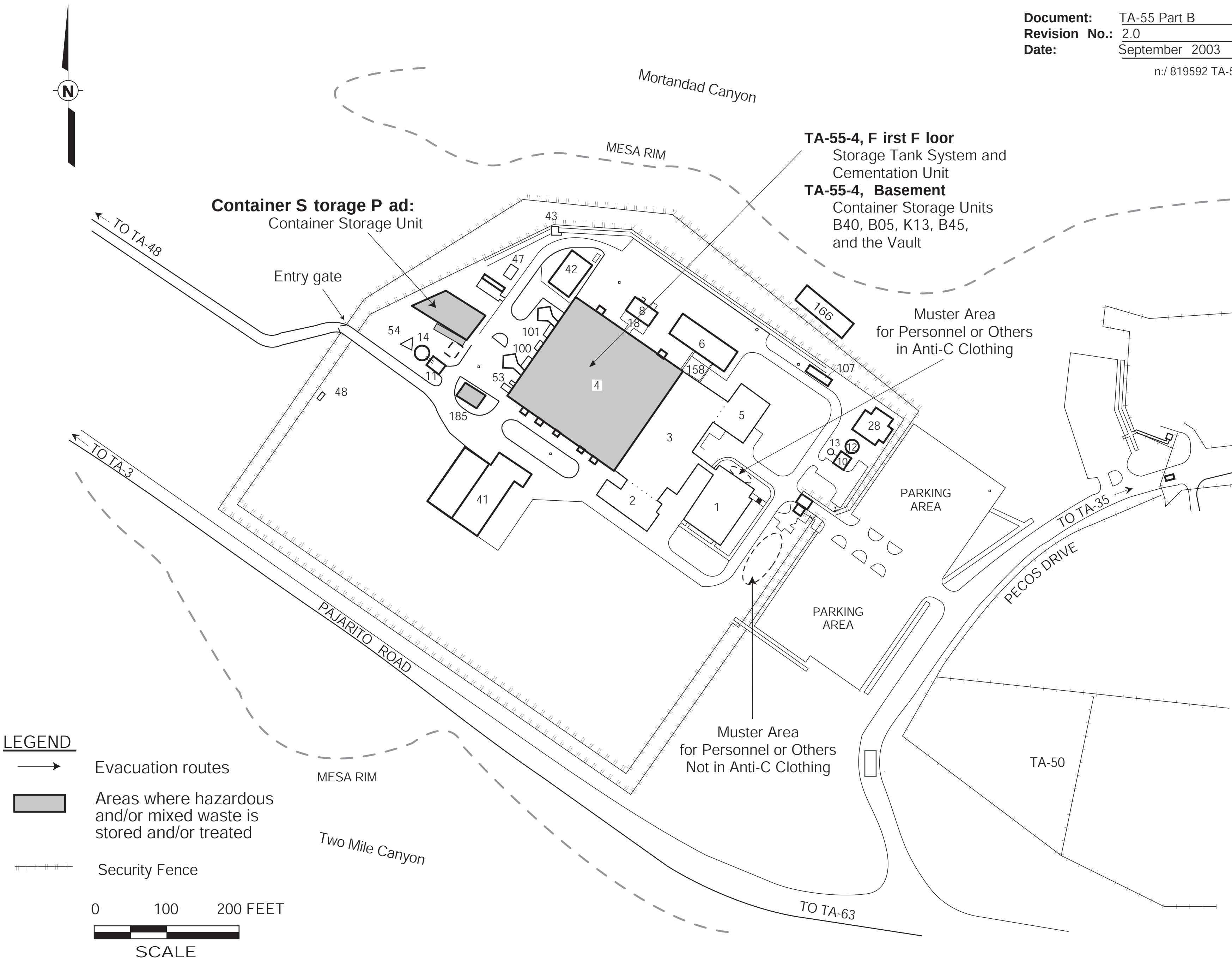

Figure E -1

Evacuation Routes and Muster Areas at Technical Area (TA) 55

ATTACHMENT F.1

CLOSURE PLAN FOR THE TECHNICAL AREA 55 CONTAINER STORAGE UNITS

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
ALARA	as low as reasonably achievable
COPC	constituents of potential concern
CSU	container storage unit(s)
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
PPE	personal protective equipment
QA	quality assurance
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
SWRC	Solid Waste Regulatory Compliance Group
TA	technical area

ATTACHMENT F.1
CLOSURE PLAN FOR THE TECHNICAL AREA 55 CONTAINER STORAGE UNITS

The information provided in this closure plan is submitted to address the applicable closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.14(b)(13), and 20.4.1 NMAC, Subpart V, Part 264, Subparts G and I, revised June 14, 2000 [6-14-00]. This closure plan describes the activities necessary to perform Resource Conservation and Recovery Act (RCRA) closure for the container storage units (CSU) at Los Alamos National Laboratory (LANL) Technical Area (TA) 55. Closure will include removal of any remaining waste, decontamination or removal of contaminated equipment/structures, and verification that all residues have been removed. Closure activities will minimize the need for further maintenance, preclude the release of hazardous waste or hazardous constituents to environmental media, and be protective of human health in accordance with the closure performance standards in 20.4.1 NMAC § 264.111 [6-14-00].

Container storage at TA-55 consists of seven CSUs including B40, B05, K13, B45, and the Vault located at TA-55-4; a container storage pad located northwest of TA-55-4; and TA-55-185 (Figure F.1-1). This closure plan will be used to provide guidance and permit conditions for the partial closure of these TA-55 CSUs. Closure will occur separately and over the active life of the TA-55 facility, which is not anticipated to end before 2050.

This closure plan describes general closure activities and establishes the procedure of submitting a separate detailed CSU-specific sampling and analysis plan (SAP) to the New Mexico Environment Department (NMED) for approval at the time of closure. The CSU-specific SAPs will alleviate the need for future closure plan and permit modifications until the actual closure activities for each CSU are scheduled. Each SAP will provide the required level of detail to assure that closure performance standards are met and will be consistent with the appropriate decontamination and verification requirements existing at the time of closure.

This plan is organized as follows:

- Section F.1.1 - General Closure Information
- Section F.1.2 - Description of the TA-55 CSUs
- Section F.1.3 - Closure Procedures
- Section F.1.4 - Sampling and Analysis Plan

- Section F.1.5 - References

Until closure is complete and has been certified in accordance with 20.4.1 NMAC §264.115 [6-14-00], as discussed in Section F.1.1.6, a copy of the approved closure plan and any approved revisions will be on file with the Risk Reduction and Environmental Stewardship Division Solid Waste Regulatory Compliance Group (SWRC) and at the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) Los Alamos Site Office (LASO).

F.1.1 GENERAL CLOSURE INFORMATION

F.1.1.1 Closure Performance Standard [20.4.1 NMAC §264.111]

The CSUs addressed in this closure plan will be closed to meet the following performance standards:

- Minimize the need for further maintenance,
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or atmosphere, and
- Comply with the closure and post-closure requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart G and I [6-14-00].

This will be accomplished by removal of waste from each TA-55 CSU and decontamination, if necessary, of the areas that may have come into contact with wastes. Decontamination activities will ensure the removal of hazardous waste residues from each TA-55 CSU to established cleanup levels.

F.1.1.2 Partial and Final Closure Activities [20.4.1 NMAC §264.112(d)]

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial RCRA closure is the closure of a hazardous waste management unit at a facility that contains other active hazardous waste management units. Partial closure at TA-55 will consist of closing one or more of the CSUs, while leaving the other units at LANL in operation. Partial closure (hereinafter referred to as closure) will be deemed complete when the waste has been removed from the CSU; the CSU all related surfaces and equipment have been decontaminated, if necessary, or otherwise properly disposed; closure has been verified; and the closure certification has been submitted to and approved by the NMED.

Final RCRA closure of the LANL hazardous waste management facility will occur when all of LANL's hazardous/mixed waste management units are closed. Final closure will consist of assembling documentation on the closure status of each waste management unit, including all pervious closures as well as land-based units where closures have been or are being addressed via alternative closure requirements. Final closure will be deemed complete when the closure certification has been submitted to the NMED, and the NMED has approved the final closure.

F.1.1.3 General Closure Schedule [20.4.1 NMAC §§264.112(b)(6), 264.112(e), and 264.113]

Written notification will be provided to the NMED 45 days before the start of closure activities at any TA-55 CSU. However, pursuant to 20.4.1 NMAC §264.112(e) [6-14-00], removing hazardous and/or mixed wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Closure activities will begin according to the requirements of 20.4.1 NMAC §264.112(d)(2) [6-14-00]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the approved closure plan, as required by 20.4.1 NMAC §264.113(a) [6-14-00], within 90 days after final receipt of waste at the CSU to be closed. This timeframe will be met as long as facilities are available for treatment or disposal of these wastes. In the event that closure activities cannot begin within 90 days, LANL will notify the Secretary of the NMED in accordance with the extension requirements in 20.4.1 NMAC §264.113(a) [6-14-00]. Closure activities and reporting requirements will then be completed within 180 days of the receipt of the final volume of waste at the CSU to be closed. Closure will be conducted in accordance with the schedule presented in Table F.1-1 of this closure plan.

Table F.1-1

Closure Schedule

Activity	Maximum Time Required [a]
Submit CSU-specific SAP	-90 Days
Notify the NMED of intent to close.	-45 Days
Final receipt of waste.	Day 0
Remove waste.	Day 5
Decontaminate surfaces and equipment.	Day 20
Sample excess used decontamination water for disposal.	Day 20
Perform verification sampling.	Day 30
Evaluate analytical data from verification sampling.	Day 50
Perform additional decontamination, if necessary.	Day 55
Perform additional verification sampling, if necessary.	Day 60
Evaluate additional analytical data.	Day 75
Perform final cleanup and disposal (i.e., removal of decontaminated equipment and decontamination waste).	Day 140
Certify closure.	Day 175
Submit closure certification to NMED.	Day 180

a The schedule above indicates calendar days from the beginning by which activities will be completed. Some activities may be conducted simultaneously and/or may not require the maximum time listed. Extensions to this schedule may be requested, as needed.

NMED = New Mexico Environment Department

SAP = Sampling and Analysis Plan

Further details regarding the schedule of closure activities on a CSU-specific basis will be included with the CSU-specific SAP as discussed in Section F.1.4 of this closure plan. In the event that closure is prevented from proceeding according to schedule, LANL will notify the Secretary of the NMED in accordance with extension request requirements in 20.4.1 NMAC §264.113(b) [6-14-00]. In addition, the demonstrations in 20.4.1 NMAC §264.113(a)(1) and (b)(1) [6-14-00], will be made in accordance with 20.4.1 NMAC §264.113(c) [6-14-00].

F.1.1.4 Amendment of the Closure Plan [20.4.1 NMAC §264.112(c)]

In accordance with 20.4.1 NMAC §264.112(c) [6-14-00], LANL will submit a written notification or request for a permit modification to authorize a change in the approved closure plan whenever:

- There are changes in operating plans or facility design that affect the closure plan.
- There is a change in the expected year of closure.
- Unexpected events occur during closure that requires modification of the approved closure plan.
- The owner or operator requests the Secretary of the NMED to apply alternative requirements to a regulated unit under 20.4.1 NMAC §§ 264.90(f) and/or 264.110(c).

The written notification or request will include a copy of the amended closure plan for approval by the NMED.

LANL will submit a written request for a permit modification with a copy of the amended closure plan at least 60 days prior to the proposed change in unit design or operation or no later than 60 days after an occurrence of an unexpected event that affects the closure plan. If the unexpected event occurs during closure, the permit modification will be requested within 30 days of the occurrence. The Secretary of the NMED may request a modification of the closure plan under the conditions presented in the bulleted items above. LANL will submit the modified plan in accordance with the request within 60 days of notification, or within 30 days of notification if a change in facility condition occurs during the closure process.

F.1.1.5 Closure Cost Estimate, Financial Assurance, and Liability Requirements [20.4.1 NMAC §264.140(c)]

In accordance with 20.4.1 NMAC §264.140(c) [6-14-00], LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart H [6-14-00], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

F.1.1.6 Closure Certification [20.4.1 NMAC §264.115]

Within 60 days after completion of closure activities at any TA-55 CSU or final closure of the facility, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit or facility has been closed in accordance with the approved closure plan. The certification will be signed by the appropriate DOE/NNSA and LANL officials and by an independent, registered professional engineer, in accordance with 20.4.1 NMAC §264.115 [6-14-00]. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED upon request, as specified in 20.4.1 NMAC §264.115 [6-14-00]. A copy of the certification and supporting documentation will be maintained by both DOE/NNSA LASO and SWRC.

F.1.1.7 Security

Because of the ongoing nature of waste management operations at TA-55, security and administrative controls at the TA-55 waste management units will be maintained by the DOE/NNSA or another authorized federal agency for as long as necessary to prohibit public access. The security fence at TA-55 will be maintained to ensure that public access into TA-55 is prevented.

F.1.1.8 Closure Reports

Upon completion of the RCRA closure activities at any TA-55 CSU, a closure report will be prepared and submitted to the Secretary of the NMED. The report will document the closure and contain, for example, the following:

- A copy of the certification described in Section F.1.1.6 of this closure plan.
- A general summary of closure activities.
- Any significant variance from the approved activities and the reason for the variance.
- A summary of any sampling data associated with the closure
- Storage or disposal location of hazardous/mixed waste resulting from closure activities.
- A certification of accuracy of the report.

F.1.1.9 Survey Plat and Post-Closure Requirements [20.4.1 NMAC §264.116 and 264.117 through 264.120]

LANL intends to remove hazardous/mixed waste and associated constituents from the CSU to be closed and decontaminate all surfaces and equipment to established cleanup levels or, if the cleanup levels approved in the CSU-specific closure SAP cannot be achieved, to dispose of the contaminated surfaces and equipment. If decontamination to established cleanup levels approved in the CSU-specific closure SAP cannot be achieved, LANL may propose an alternate demonstration of decontamination, as circumstances indicate.

If a CSU cannot be closed as described above, LANL will conduct post-closure or equivalent activities in accordance with Appendix G in the most recent version of the “Los Alamos National Laboratory General Part B Permit Application,” hereinafter referred to as the LANL General Part B. A survey plat prepared in accordance with 20.4.1 NMAC §264.116 [6-14-00] will be filed with the appropriate authorities at certification of closure, as described in that regulation. A survey plat indicating the location and dimensions of the CSU with respect to permanently surveyed benchmarks will be submitted to the local zoning authority (i.e., Los Alamos County) and to the NMED at the time of submission of the certification of closure. The plat filed with the local zoning authority will contain a prominently displayed note, which states the obligation of LANL and DOE/NNSA to restrict disturbance of the unit in accordance with the applicable regulations in 20.4.1 NMAC, Subpart V, Part 264, Subpart G. Post-closure notices will be filed with appropriate authorities, as described in 20.4.1 NMAC §264.119 [6-14-00]. To meet that requirement, DOE/NNSA will file a “Land Use Restriction Notice” or equivalent document with the County of Los Alamos and other authorized agencies. Within 60 days after completions of the established post-closure care period for the unit, LANL will submit to the Secretary of the NMED, via certified mail, a certification of completion of post-closure care in accordance with the requirements of 20.4.1 NMAC §264.120 [6-14-00].

F.1.2 DESCRIPTION OF THE TA-55 CSUs

TA-55 is located on a mesa between a branch of Mortandad Canyon to the north and Two Mile Canyon to the south. Mesa-top elevations at TA-55 range from approximately 7,100 to 7,300 feet above mean sea level. TA-55 began operating in 1978 and is the location of research and development activities including a plutonium processing facility. Container storage at TA-55 consists of seven CSUs including B40, B05, K13, B45, and the Vault located at TA-55-4; a container storage pad located northwest of TA-55-4; and TA-55-185. Table F.1-2 provides the location and dimensions of each CSU.

Table F.1-2
Container Storage Units at Technical Area 55

Container Storage Unit	Location	Dimensions
B40	TA-55-4, Basement	L-shaped, long dimensions of 61.5 ft x 55 ft
B05	TA-55-4, Basement	26 ft x10 ft
K13	TA-55-4, Basement	16 ft x 13 ft
B45	TA-55-4, Basement	45 ft x 17.5 ft
Vault	TA-55-4, Basement	79.5 ft x 50.5 ft
Storage Pad	Northwest of TA-55-4	Trapezoid that is 102 ft x 86 ft x 156 ft x 105 ft and a 70 ft x 10 ft rectangle on the side.
TA-55-185	West of TA-55-4	60 ft x 40 ft

TA = Technical Area
ft = feet/foot

LANL does not currently intend to reduce the design capacities of the CSUs at TA-55 during the active life of the units. Estimated annual quantities for the CSUs at TA-55 are provided in the most recent version of the “Los Alamos National Laboratory General Part A Permit Application,” hereinafter referred to as the LANL General Part A.

F.1.2.1 Estimate of Maximum Waste in Storage

The maximum total inventory of waste that can be in storage at any time in the TA-55 CSUs is provided in Table F.1-3.

Table F.1-3
Maximum Container Storage Unit Capacities at Technical Area 55

CSU	Capacity[a] (gallons)
B40	21,500
B05	3,600
K13	2,500
B45	11,000
Vault	4,000
Storage Pad	135,000
TA-55-185	30,000

a Reflects the calculation of maximum capacities with a minimum aisle space of 2 feet.

TA = Technical Area
CSU = container storage unit

Table F.1-4 provides the date storage began at each CSU and estimates the maximum amount of hazardous and/or mixed waste in storage over the life of the unit.

Table F.1-4
Estimated Total Storage Capacity at the Technical Area 55 Container Storage Units

CSU	Approximate Storage Dates	Estimated Total Storage Capacity[a] (gallons)
B40	1980 - 2050	3,010,000
B05	1980 - 2050	504,000
K13	1980 - 2050	350,000
B45	1980 - 2050	1,540,000
Vault	1980 - 2050	560,000
Storage Pad	1980 - 2050	18,900,000
TA-55-185[b]	2005 - 2050	2,700,000

[a] Calculated based upon turn over of the maximum storage capacity twice a year
[b] Assumed that 2005 is the year storage at the unit will begin

F.1.2.2 Description of Stored Waste

The hazardous waste that may be stored at TA-55 is generated during research and development (R&D) activities, decontamination and decommissioning (D&D) projects, and general facility operations. A waste is considered hazardous if it meets the definition of a solid waste described in 20.4.1 NMAC §261.2 [6-14-00]; is not exempt from regulation as a hazardous waste under 20.4.1 NMAC §261.2 [6-14-00]; and exhibits any of the characteristics of hazardous waste identified in 20.4.1 NMAC, Subpart II, Part 261, Subpart C, or is listed in 20.4.1 NMAC, Subpart II, Part 261, Subpart D [6-14-00]. Mixed wastes currently stored at TA-55 are generated during R&D activities, processing and recovery operations, D&D projects, and general facility operations. Mixed waste is any solid waste that has both a hazardous component (as defined by 20.4.1 NMAC, Subpart II, Part 261) and a radioactive component. Information on the hazardous components of all wastes that can be stored at the TA-55 CSUs is provided in the most recent version of the LANL General Part A. Additional information on waste generating activities at LANL is available in the waste analysis plan in Appendix B of the most recent version of the LANL General Part B.

The estimated annual quantities of waste in storage at the TA-55 CSUs are provided in the most recent version of the LANL General Part A.

F.1.3 CLOSURE PROCEDURES

Closure will be conducted in accordance with the schedule presented in Table F.1-1, as amended by the CSU-specific SAPs submitted at the time of closure. Closure will generally be conducted as follows:

- **Removal of Waste** - Includes the transportation of all waste containers remaining in storage at the time of closure.
- **Preliminary Closure** – Determination of safety precautions and background contaminant

levels for the CSU to be closed. Includes the inspection of the CSU by the engineer observing the closure to ensure adequate containment and conditions for closure.

- **Decontamination** – Includes the removal of potential hazardous and/or mixed waste constituents from equipment used during waste management activities (e.g., pallets, drum dollies) and all structures, surfaces, walls, and secondary containment features (e.g., surfaces, sumps, berms, and/or recessed drains). Removal can include sweeping, vacuuming, moping, and/or wiping as appropriate at the time of closure and will be based upon the contaminant levels determined by the operating record of the unit.
- **Verification** – Sampling to verify that residual hazardous waste constituents have been decontaminated to appropriate levels. Sample media can include swipes, solutions, and/or soil as appropriate to the CSU being closed and will be determined at the time of closure based upon the operating record of the unit.
- **Closure Certification –** Certification by a professional engineer that the procedures and requirements provided in this closure plan and the CSU-specific SAPs were followed.

The following sections provide additional information for the closure procedures described above. The CSU-specific SAPs provided at the time of closure will provide detailed information regarding the preliminary closure procedures, decontamination methods, and verifications procedures as applicable at the time of closure.

F.1.3.1 Removal of Waste

Prior to initiation of closure activities, all wastes will be removed from the CSU scheduled for closure. Containers may be removed from each location with forklifts. Small containers may be handled manually or with dollies. Containers will be placed onto flatbed trucks, or trailers, or other appropriate vehicles for transport. Appropriate shipping papers will accompany the wastes during transport. Containers holding hazardous or mixed wastes will be moved to an approved on-site CSU or permitted off-site treatment, storage, or disposal facility.

F.1.3.2 Preliminary Closure Procedures

F.1.3.2.1 Safety Precautions

Job hazards associated with closure activities will be identified, controls developed, and workers briefed before closure activities are conducted, in accordance with LANL safety procedures. Personnel involved in closure activities will wear appropriate personal protective equipment (PPE), specified by the Health Physics Group and the Industrial Hygiene and Safety Group, and will follow good hygiene practices to protect themselves from exposure to hazardous and/or mixed waste. The level of PPE that will be required will depend upon the physical hazards present and the levels of contamination that are detected, if any. All workers involved in closure activities will be required to have appropriate training (as identified in Attachment D of this permit application and Appendix D in the most recent version of the LANL General Part B. Contaminated PPE will either be decontaminated or managed in compliance with appropriate waste management regulations.

F.1.3.2.2 Background Determination

Prior to the commencement of decontamination, the operating record of the CSU to be closed will be evaluated to determine the constituents of potential concern (COPCs) during closure. In addition, background samples and/or concentrations derived from LANL studies developed under the LANL corrective action or other programs can be used to determine COPC background/baseline levels applicable at the time of closure. The COPCs, appropriate background levels, and/or necessary sample collection techniques will be determined at the time of closure and included in the CSU-specific SAP at the time of closure, as discussed in Section F.1.4 of this closure plan.

F.1.3.2.3 Structural Assessment

Prior to beginning decontamination activities, the CSU to be closed will be inspected for any cracks or conditions that would potentially lead to the loss of decontamination wash water containment, as applicable. Preventative maintenance inspections are conducted routinely (i.e., weekly) at each CSU. If any defects, deterioration, damage, or hazards affecting containment are discovered during inspection, appropriate remedial actions (including repairs, maintenance, or replacement) will be completed before decontamination activities begin. If a crack or gap is present, a swipe sample or a representative sample of the media will be taken (e.g., asphalt or concrete) to determine the presence of contamination. The sample will be analyzed for the COPCs identified based upon the operating history of the unit, as discussed in Section F.1.3.2.2. If contamination is detected, the surface flaw will be decontaminated prior to repairing the crack/gap. Complete or partial removal (e.g., cold milling) of the material may be performed until contamination is no longer detected. If partial removal is successful in eliminating the contamination, it will be assumed that the remaining material, including the underlying soil, is clean.

F.1.3.3 Decontamination Procedures

To the extent possible, all contaminated surfaces and equipment (if present) will be decontaminated. Surfaces, items, materials, and equipment that cannot be decontaminated will be containerized and managed in compliance with appropriate waste management regulations.

An appropriate surfactant/solvent to be used in wash water solutions will be determined based upon the COPCs identified in the CSU-specific SAP. Alconox®, a surfactant, will be used to decontaminate the CSUs. Specialized solvents will be used for more focused decontamination/removal purposes, as appropriate.

F.1.3.3.1 Equipment Located in the CSUs

The TA-55 CSUs have a variety of equipment that will be removed, decontaminated, and/or disposed of prior to decontamination of the surfaces associated with the unit. This includes all portable equipment such as grating/supports, pallets, drum dollies, and carts that are used to manage waste at the CSU. This equipment will be removed, decontaminated and/or disposed based upon the level of contamination and future use.

F.1.3.3.2 Indoor Storage Locations

Decontamination will be conducted using mops, cloths, and/or other absorbent materials to remove any potential hazardous constituents. These materials will be submerged in a wash water solution (e.g., Alconox, water) and used to wipe down the surfaces associated with the CSU being closed. After decontamination of the surfaces, the containment system (e.g., recessed areas, sumps, berms) will be wiped down. Used wash water will be collected, removed, and transferred to an appropriate container for storage pending the results of analysis and disposal.

Verification of decontamination will be conducted as indicated in Section F.1.3.4. If the analysis from the verification sampling indicates that hazardous constituents are present, decontamination wash cycles and analyses will continue until the structure and surfaces have been decontaminated or the decision is made to manage it appropriately as contaminated waste. Upon determination that it is contaminated waste, the material/structure/surface may be removed, transported to, and stored at other CSUs to facilitate the closure process.

F.1.3.3.3 Vault

It is anticipated that the Vault will remain an active mixed waste management unit until the LANL facility closure and that the area will be decontaminated in the manner described above. If "as low as reasonably achievable" (ALARA) considerations preclude decontaminating the area in the aforementioned manner, alternative measures will be initiated, as necessary, to ensure that the area is closed in a manner consistent with ALARA requirements and the intent of the closure regulations contained herein.

F.1.3.3.4 Container Storage Pad

Closure activities at the outdoor asphaltic-concrete container storage pad will include decontamination, and/or removal. To decontaminate the surface of the container storage pad, procedures similar to those described in Section F.1.3.3.2 of this closure plan can be used. If the decision is made to decontaminate, portable berms or other devices designed to collect and provide containment for used wash water will be used to control runoff from the CSU.

Used wash water samples from the container storage pad may exhibit contamination due to leaching of the asphalt during washdown. If this is the case, record reviews (e.g. manufacturer's specifications, Material Safety Data Sheets) and additional analyses may be performed to determine if leaching from the asphalt contributed to the contaminant concentration in the used wash water. If this additional evaluation confirms the asphalt as the source of contamination, baseline concentrations for clean wash water will be adjusted accordingly.

If decontamination verification, as discussed in Section F.1.3.4 cannot be demonstrated after two wash cycles, the asphaltic-concrete pad will be removed from the site and managed as appropriate for the waste type.

F.1.3.3.5 Soil Sampling

At the TA-55 container storage pad CSU soil removal can also be used to meet the closure performance standards if the operating records for the unit indicate that a release of hazardous waste to the surrounding soil has occurred. If records indicate that no release of hazardous waste to soils has occurred, soil sampling will not be conducted.

If collection of soil samples is determined to be necessary to demonstrate decontamination, appropriate background sample and/or concentrations derived from LANL studies (Section F.1.3.2.2) will be used to determine background/baseline levels for decontamination verification. Sampling locations to determine the extent of contamination will be based upon a biased random sampling approach, including historical evidence or releases, physical evidence of distressed vegetation or visual staining, and any other information that indicates a potential contamination pathway. The number of samples, locations, depths, and sampling will be determined before closure and will be included in the TA-55 CSU-specific closure SAP, as discussed in Section F.1.4. Results from sampling will be compared to the background samples and/or baseline concentration levels included in the closure SAP. If analysis shows that the soil at the outdoor container storage pad is contaminated, soil sampling results that are above the background/baseline levels will be used to identify the extent of soil contamination. Contaminated soils will either be treated in place or removed in layers and sampling conducted following removal of each layer. This procedure will be used to minimize the amount of soil removed.

F.1.3.3.6 Equipment Used During Closure

Reusable protective clothing, tools, and equipment used during decontamination activities at the CSU will be cleaned with a wash water solution. If reusable sampling equipment is used, sampling equipment rinsate blanks will be collected and analyzed in accordance with the quality assurance (QA)/quality control (QC) procedures to be described in the closure SAP. Reusable decontamination equipment, including protective clothing and tools used during closure activities will be scraped as necessary to remove any residue and cleaned with a wash water solution. Residue, disposable equipment and reusable equipment that cannot be decontaminated will be containerized and managed as waste in accordance with LANL waste management procedures, depending on the regulated constituents present.

F.1.3.4 Verification of Decontamination

Verification of decontamination will be conducted using sampling and analysis to demonstrate that hazardous and/or mixed waste residues are not present on the surfaces of the CSU. Sample media can include wash water solutions, swipes, and/or solid media samples (e.g., soil, concrete) as determined in the CSU-specific SAP at the time of closure and the operating record of the unit. The sampling methodology will be based on factors such as COPCs and the CSU materials of construction. All sampling conducted during closure will be done in accordance with the QA/QC procedures defined by “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” (U.S. Environmental Protection Agency [EPA], 1986). The CSU-specific SAP will establish the minimum number of verification samples to be collected for the CSU being closed. The sample number will be based on the total surface area associated with the unit. Verification sampling will use a biased random approach for the determination of sample locations for the equipment, structures, and/or surfaces of the CSU and will include known or likely areas of contamination (e.g., low areas, sumps, and known spill locations) as determined by the operating record of the unit at the time of closure.

Decontamination will be verified if the analytical data from the collected samples meets at least one of the decontamination criteria listed in Section F.1.3.5 of this closure plan. If the data cannot meet at least one of the criteria, additional sampling can be performed to establish the boundaries of the contamination. Decontamination, as discussed in Section F.1.3.3, will be repeated within those boundaries, using portable berms or other appropriate materials to limit the potential for runoff from the affected area. An additional round of verification sampling will be performed for all of the areas previously determined to be contaminated. After each decontamination/verification sequence, a decision will be made to repeat or remove the contaminated materials and dispose of them properly.

F.1.3.5 Decontamination Criteria

Successful decontamination will consist of sampling as specified in the TA-55 CSU-specific SAP and meet one of the following four criteria:

- No detectable hazardous waste or hazardous waste constituents from container storage activities are identified in the verification sample.
- Detectable hazardous waste or hazardous waste constituents from container storage activities in the verification solution sample are removed to statistically significant levels based on baseline concentrations in the clean verification sample.
- Detectable hazardous waste or hazardous waste constituents from container storage activities in the verification solution sample are at or below levels agreed upon with the NMED.
- Detectable hazardous waste or hazardous waste constituent concentrations from container storage activities do not significantly decrease after several wash downs. In such an event, hazardous constituents that pose an acceptable risk will be allowed to remain, as mutually agreed upon with the NMED.

An alternative demonstration of decontamination may be proposed and justified at the time of closure as circumstances dictate. The NMED will evaluate the proposed alternative in accordance with the standards and guidance then in effect and, if approved, LANL will incorporate the alternative into the SAP at the time of closure.

F.1.4 SAMPLING AND ANALYSIS PLAN

Sampling and analysis will be performed using standard approved methods (e.g., *SW-846*, American Society for Technology and Materials), as appropriate, for making closure decontamination verification determinations. LANL will submit a TA-55 CSU-specific closure SAP to the NMED at the time of each CSU closure notification for review and approval. Each SAP will provide a detailed description of the CSU to be closed and propose a closure methodology that assures the closure performance standards in Section F.1.1.1 are met.

The TA-55 CSU-specific SAPs will include the following information:

- A detailed discussion of site characteristics.
- The CSU operational history, to include descriptions of known spills, releases, and/or evidence of potential problems (e.g., visual stains, dead vegetation, solid waste management units).

- Chemical properties of the waste stored at the CSU.
- Determination of applicable COPCs.
- A hazard control plan, including a review of chemical hazards present at the site, control and monitoring methods and procedures, and required PPE.
- Determination of wash water solution composition, if necessary.
- Detailed procedures describing decontamination methods for equipment , structures, and media.
- Discussion of background levels determined through sampling or use of published data and their relevance to the specific CSU.
- Methods for sampling and analysis of contaminated media.
- Removal procedures for contaminated media, if necessary.
- Sampling methods for decontamination media and hazardous waste determination. The discussion should include the rationale for using wash water samples, swipe samples, soil samples, and/or other sampling methodology.
- Sampling methods for decontamination verification procedures. The discussion should include the statistical or judgmental basis for determining the number of verification samples needed and the constituents to be analyzed.
- Sampling equipment decontamination and disposition procedures.
- Sample handling and documentation procedures.
- Analytical methods (including detection limits) and the rationale for their determination.
- Disposition of removed waste, decontamination media, or contaminated soils. This discussion should include an identification of proposed on- or off-site hazardous waste management facilities that may be used for final disposition and the types of wastes anticipated to be shipped.
- Decontamination criteria.
- Statistical basis for verification of decontamination, if applicable. The discussion should include information on determination of statistical increases in analytical parameters and numerical values for significant increases.
- Risk assessment procedures to be used, if necessary.
- Field and laboratory QA/QC procedures.
- Schedule of closure activities, including decontamination, sampling, analysis, potential removal of soils, and closure certification submittal.
- Identification of contact person or office.

F.1.5 REFERENCES

EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *EPA-SW-846*, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

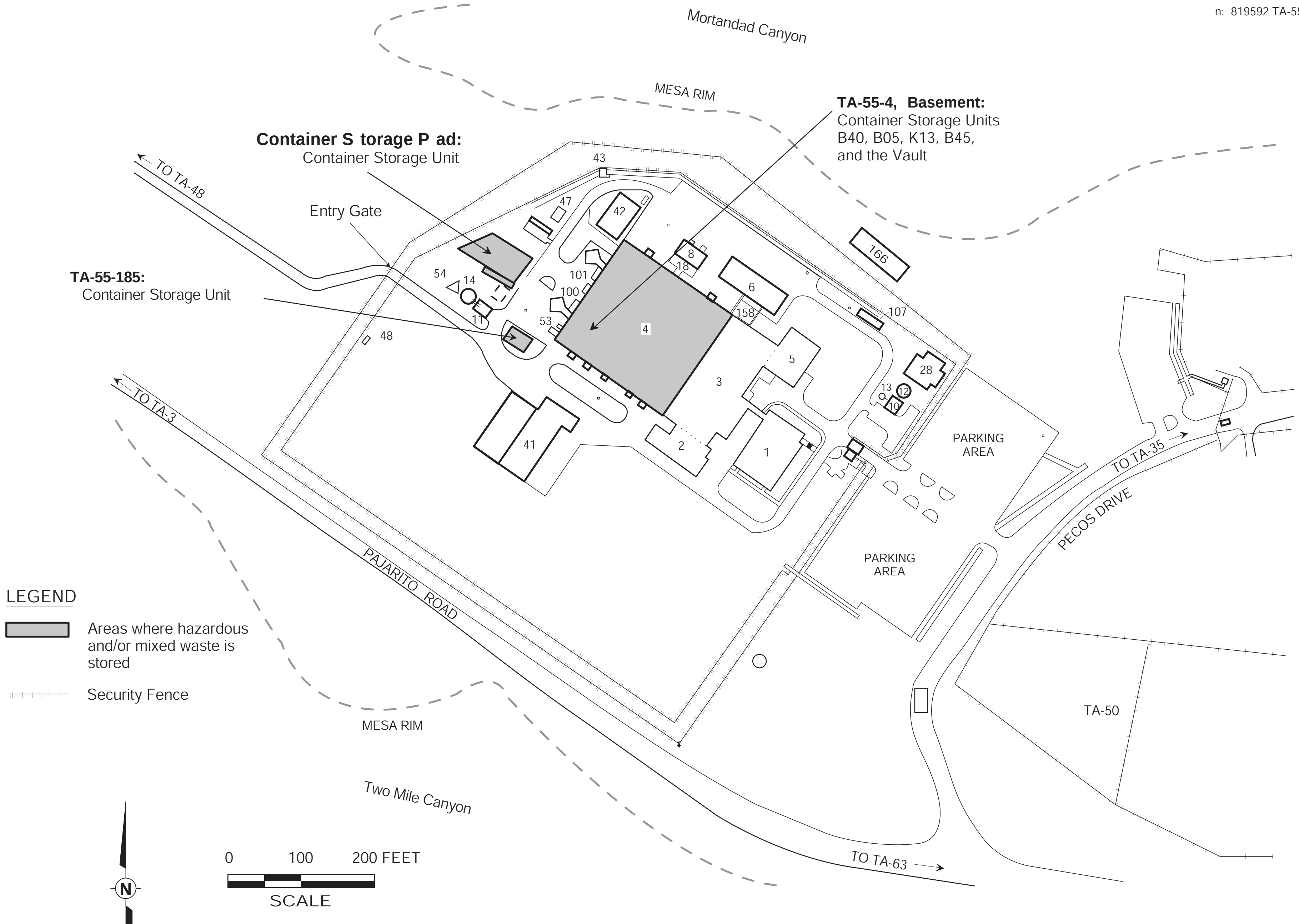

Figure F. 1-1
Location Map-Technical Area (TA) 55 Container Storage Units

ATTACHMENT F.2

CLOSURE PLAN FOR THE TECHNICAL AREA 55 STORAGE TANK SYSTEM

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
COPC	constituents of potential concern
CSU	container storage unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
SWRC	Solid Waste Regulatory Compliance
TA	technical area

ATTACHMENT F.2
CLOSURE PLAN FOR THE TECHNICAL AREA 55
STORAGE TANK SYSTEM

The information provided in this closure plan is submitted to address the applicable closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.14(b)(13), and 20.4.1 NMAC, Subpart V, Part 264, Subparts G and J, revised June 14, 2000 [6-14-00]. This closure plan describes the activities necessary to perform Resource Conservation and Recovery Act (RCRA) closure for the storage tank system located at Los Alamos National Laboratory (LANL) Technical Area (TA) 55. Closure activities will include removal of any remaining waste, decontamination or removal of contaminated equipment/structures, and verification that all residues have been removed. Closure will minimize the need for further maintenance, preclude the release of hazardous waste or hazardous constituents to environmental media, and be protective of human health in accordance with the closure performance standards specified in 20.4.1 NMAC §264.111 [6-14-00].

There is one storage tank system at TA-55. This tank system is composed of 3 tank components and consists of a total of 16 tanks located at TA-55-4, Room 401 (Figure F.2-1). This closure plan will be used to provide guidance and permit conditions for the partial closure of the storage tank system at TA-55. Closure will occur separately from the other waste management units at TA-55 and over the active life of the TA-55 facility, which is not anticipated to end before 2050.

This closure plan describes general closure and establishes the procedure of submitting a separate detailed sampling and analysis plan (SAP) to the New Mexico Environment Department (NMED) for approval at the time of closure. The SAP will alleviate the need for future closure plan and permit modifications until the actual closure activities for the storage tank system are scheduled. The SAP will provide the required level of detail to assure that closure performance standards are met, consistent with the appropriate decontamination and verification requirements existing at the time of closure.

This plan is organized as follows:

- Section F.2.1 - General Closure Information.
- Section F.2.2 - Description of the Storage Tank System.
- Section F.2.3 - Closure Procedures.
- Section F.2.4 - Sampling and Analysis Plan.
- Section F.2.5 – References.

Until closure is complete and has been certified in accordance with 20.4.1 NMAC §264.115 [6-14-00], as discussed in Section F.2.1.6, a copy of the approved closure plan and any approved revisions will be on file with the Risk Reduction and Environmental Stewardship Division Solid Waste Regulatory Compliance Group (SWRC) and at the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) Los Alamos Site Office (LASO).

F.2.1 GENERAL CLOSURE INFORMATION

F.2.1.1 Closure Performance Standard [20.4.1 NMAC §264.111]

The storage tank system addressed in this closure plan will be closed to meet the following performance standards:

- Minimize the need for further maintenance.
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or atmosphere.
- Comply with the closure and post closure requirements of 20.4.1 NMAC, Subpart V, Part 264, Subparts G and J [6-14-00].

This will be accomplished by removal of waste from the storage tank system and decontamination, if necessary, of the areas that may have come into contact with wastes. Decontamination activities will ensure the removal of hazardous waste residues to established cleanup levels.

F.2.1.2 Partial and Final Closure Activities [20.4.1 NMAC §264.112(d)]

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial RCRA closure is the closure of a hazardous waste management unit at a facility that contains other active hazardous waste management units. Partial closure at TA-55 can consist of closing the storage tank system, while leaving the other units in operation. Partial closure (hereinafter referred to as closure) will be deemed complete when the waste has been removed from the storage tank system; all related secondary containment surfaces and equipment have been decontaminated, if necessary, or otherwise properly disposed; closure has been verified; and the closure certification has been submitted to and approved by the NMED.

Final RCRA closure of the LANL hazardous waste management facility will occur when all of LANL's hazardous/mixed waste management units are closed. Final closure will consist of assembling documentation on the closure status of each waste management unit, including all pervious closures as well as land-based units where closures have been or are being addressed via alternative closure requirements. Final closure will be deemed complete when the closure certification has been submitted to the NMED, and the NMED has approved the final closure.

F.2.1.3 General Closure Schedule [20.4.1 NMAC §§264.112(b)(6), 264.112(e), and 264.113]

Written notification will be provided to the NMED 45 days before the start of closure activities for the TA-55 storage tank system. However, pursuant to 20.4.1 NMAC §264.112(e) [6-14-00], removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Closure activities will begin according to the requirements of 20.4.1 NMAC §264.112(d)(2) [6-14-00]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the approved closure plan, as required by 20.4.1 NMAC §264.113(a) [6-14-00], within 90 days after final receipt of waste at the storage tank system. In the event that closure activities cannot begin within 90 days, LANL will notify the Secretary of the NMED in accordance with the extension requirements in 20.4.1 NMAC §264.113(a) [6-14-00]. Closure activities and reporting requirements will then be completed within 180 days of the receipt of the final volume of waste at the storage tank system. Closure will be conducted in accordance with the schedule presented in Table F.2-1 of this closure plan.

Table F.2-1
Closure Schedule

Activity	Maximum Time Required [a]
Submit SAP.	-90 Days
Notify the NMED of intent to close.	-45 Days
Final receipt of waste.	Day 0
Remove waste.	Day 5
Decontaminate surfaces and equipment.	Day 20
Sample excess used decontamination water for disposal.	Day 20
Perform verification sampling.	Day 30
Evaluate analytical data from verification sampling.	Day 50
Perform additional decontamination, if necessary.	Day 55
Perform additional verification sampling, if necessary.	Day 60
Evaluate additional analytical data.	Day 75
Perform final clean up and disposal (i.e., removal of decontaminated equipment and decontamination waste).	Day 140
Certify closure.	Day 175
Submit closure certification to NMED.	Day 180

a The schedule above indicates calendar days from the beginning by which activities will be completed. Some activities may be conducted simultaneously and/or may not require the maximum time listed.

NMED = New Mexico Environment Department
SAP = sampling and analysis plan

Further details regarding the schedule of closure activities will be included with the SAP as discussed in Section F.2.4 of this closure plan. In the event that closure is prevented from proceeding according to schedule, LANL will notify the Secretary of the NMED in accordance with extension request requirements in 20.4.1 NMAC §264.113(b) [6-14-00]. In addition, the demonstrations in 20.4.1 NMAC §264.113(a)(1) and (b)(1) [6-14-00], will be made in accordance with 20.4.1 NMAC §264.113(c) [6-14-00].

F.2.1.4 Amendment of the Closure Plan [20.4.1 NMAC §264.112(c)]

In accordance with 20.4.1 NMAC §264.112(c) [6-14-00], LANL will submit a written notification of or request for a permit modification to authorize a change in the approved closure plan whenever:

- There are changes in operating plans or facility design that affect the closure plan.
- There is a change in the expected year of closure.
- Unexpected events occur during closure that require modification of the approved closure plan.

The written notification or request will include a copy of the amended closure plan for approval by the NMED.

LANL will submit a written request for a permit modification with a copy of the amended closure plan at least 60 days prior to the proposed change in unit design or operation or no later than 60 days after an occurrence of an unexpected event that affects the closure plan. If the unexpected event occurs during closure, the permit modification will be requested within 30 days of the occurrence. The Secretary of the NMED may request a modification of the closure plan under the conditions presented in the bulleted items above. LANL will submit the modified plan in accordance with the request within 60 days of notification, or within 30 days of notification if a change in facility condition occurs during the closure process.

F.2.1.5 Closure Cost Estimate, Financial Assurance, and Liability Requirements [20.4.1 NMAC §264.140(c)]

In accordance with 20.4.1 NMAC §264.140(c) [6-14-00], LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart H [6-14-00], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

F.2.1.6 Closure Certification [20.4.1 NMAC §264.115]

Within 60 days after completion of closure activities for the storage tank systemor final closure of the facility, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit or facility has been closed in accordance with the approved closure plan. The certification will be signed by the appropriate DOE/NNSA and LANL officials and by an independent, registered professional engineer, in accordance with 20.4.1 NMAC §264.115 [6-14-00]. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED upon request, as specified in 20.4.1 NMAC §264.115 [6-14-00]. A copy of the certification and supporting documentation will be maintained by both the DOE/NNSA LASO and SWRC.

F.2.1.7 Security

Because of the ongoing nature of waste management operations at TA-55, site security and administrative controls at the TA-55 waste management units will be maintained by the DOE/NNSA or another authorized federal agency for as long as necessary to prohibit public access. The security fence at TA-55 will be maintained to ensure that public access into TA-55 is prevented.

F.2.1.8 Closure Report

Upon completion of RCRA closure activities at the storage tank system , a closure report will be prepared and submitted to the Secretary of the NMED. The report will document the closure and contain, for example, the following:

- A copy of the certification described in Section F.2.1.6 of this closure plan.
- A general summary of closure activities.
- Any significant variance from the approved activities and the reason for the variance.
- A summary of any sampling data associated with the closure.
- The location of the file of supporting documentation (e.g., memos, logbooks, laboratory data).
- Storage or disposal location of regulated hazardous/mixed waste resulting from closure activities.
- A certification of accuracy of the report.

F.2.1.9 Survey Plat and Post-Closure Requirements [20.4.1 NMAC §264.116 and 264.117 through 264.120]

LANL intends to remove hazardous/mixed waste and associated constituents from the storage tank system and decontaminate all surfaces and equipment to established cleanup levels or, if the cleanup levels cannot be achieved, to dispose of the contaminated surfaces and equipment. LANL will amend this closure plan, as necessary, to address changes to closure procedures or post-closure care pursuant to 20.4.1 NMAC §§264.117 through 264.120 [6-14-00]. A survey plat, post-closure certification, and post-closure notices will not be required for the permitted unit because all wastes will be removed, the storage tank system components will be disposed, and any surfaces and equipment will be decontaminated at closure, or closure equivalency will be demonstrated. Therefore, these requirements are not applicable.

F.2.2 DESCRIPTION OF THE STORAGE TANK SYSTEM

TA-55 is located on a mesa between a branch of Mortandad Canyon to the north and Two Mile Canyon to the south. Mesa-top elevations at TA-55 range from approximately 7,100 to 7,300 feet above mean sea level. TA-55 began operating in 1978 and is the location of research and development activities including a plutonium processing facility. The storage tank system is composed of 3 tank components and consists of a total of 16 tanks located at TA-55-4, Room 401. Table F.2-2 identifies each tank component, its location, and the number of tanks.

Table F.2-2
Storage Tank System at Technical Area 55[a]

Tank Component	Location	Number of Tanks
Evaporator Glovebox Tank	TA-55-4, Room 401	1
Cementation Unit Pencil Tanks	TA-55-4, Room 401	5
Pencil Tanks	TA-55-4, Room 401	10

a. The storage tank system consists of 3 components that store the same waste type and share a common piping network.

TA = technical area

LANL does not currently intend to reduce the design capacities of the storage tank system at TA-55 during the active life of the unit. Estimated annual quantities for the storage tank system at TA-55 are provided in the most recent version of the “Los Alamos National Laboratory General Part A Permit Application,” hereinafter referred to as the LANL General Part A.

F.2.2.1 Estimate of Maximum Waste in Storage

The storage tank system has a maximum storage capacity of 1,020 liters or approximately 266 gallons. Table F.2-3 identifies each tank component, the number of tanks, and capacity of each tank.

Table F.2-3
Storage Tank System Component Capacities

Tank Component	Number of Tanks	Tank capacity (gallons)	Maximum Capacity (gallons)
Evaporator Glovebox Tank	1	71	71
Cementation Unit Pencil Tanks	5	13	65

Pencil Tanks	10	13	130

Table F.1-4 provides the date storage began at the storage tank system and estimates the maximum amount of hazardous and/or mixed waste in storage over the life of the unit.

Table F.2-4
Estimated Total Lifetime Storage Capacity at the Storage Tank System

Storage Tank System Component	Approximate Operation Dates	Estimated Lifetime Storage Capacity (gallons) [a]
Evaporator Glovebox Tank	1987-2050	107,352
Cementation Unit Pencil Tanks	1987-2050	98,280
Pencil Tanks [b]	2005-2050	140,400

a Calculated based upon turn over of the maximum storage capacity twice every month.
b Assumed that 2005 would be the date that storage would begin in this unit.

F.2.2.2 Description of Waste

The storage tank system is used to store evaporator bottoms solutions, a mixed transuranic waste, generated primarily from research and development activities and processing and recovery operations at TA-55 and at the Chemistry and Metallurgy Research Building at TA-3. These waste solutions generally consist of concentrated nitric acid saturated with salts and metals. Evaporator bottoms solution waste is classified as mixed waste. Mixed waste has both a hazardous component (as defined by 20.4.1 NMAC, Subpart II, Part 261) and a radioactive component. Information on the hazardous components of the wastes that can be stored in the TA-55 storage tank system is provided in the most recent version of the LANL General Part A. Additional information on waste generating activities at LANL is available in the waste analysis plan in Appendix B of the most recent version of the LANL General Part B.

The estimated annual quantities of waste in storage at the storage tank system are provided in the most recent version of the LANL General Part A.

F.2.3 CLOSURE PROCEDURES [20.4.1 NMAC §264.112(b)(4) and (5), and 264.114]

Closure will be conducted in accordance with the schedule presented in Table F.2-1, as amended by the SAP submitted at the time of closure. Closure will generally be conducted as follows:

- **Removal of Waste** - Pumping of any remaining solutions in storage at the time of closure.
- **Preliminary Closure** - Safety precautions and background contaminant levels for the storage tank system will be assessed. Inspection of the secondary containment surfaces by the engineer observing the closure to ensure adequate containment and conditions for closure.

- **Decontamination** – Removal of potential hazardous waste constituents from equipment used during waste management activities; and all surfaces, walls, and secondary containment features (e.g., surfaces, sumps, berms, and/or recessed drains). Removal can include dismantling, sweeping, vacuuming, moping, and/or wiping as appropriate at the time of closure and based upon the contaminant levels determined by the operating record of the unit.
- **Verification** – Sampling to verify that residual hazardous waste constituents have been decontaminated to appropriate levels. Sample media can include swipes, solutions, and/or solid samples as appropriate and will be determined at the time of closure based upon the operating record of the unit.
- **Closure Certification** – Certification by a professional engineer that the procedures and requirements provided in this closure plan and the SAP were followed.

The following sections provide additional information for the closure procedures described above. The SAP provided at the time of closure will provide detailed information regarding the preliminary closure procedures, decontamination methods, and verifications procedures as applicable at the time of closure.

F.2.3.1 Removal of Waste

Prior to the initiation of closure activities, any waste remaining in the storage tank system (or portion thereof) will be discharged for storage in an appropriate container or treatment in the cementation unit according to current waste-specific standard operating procedures.

F.2.3.2 Preliminary Closure Procedures

F.2.3.2.1 Safety Precautions

Job hazards associated with closure activities will be identified, controls developed, and workers briefed before closure activities are conducted, in accordance with LANL safety procedures. Personnel involved in closure activities will wear appropriate personal protective equipment (PPE), specified by the Health Physics Group and the Industrial Hygiene and Safety Group, and will follow good hygiene practices to protect themselves from exposure to mixed waste. The level of PPE that will be required will depend upon the physical hazards present and the levels of contamination that are detected, if any. All workers involved in closure activities will be required to have appropriate training (as identified in Attachment D of this permit application and Appendix D in the most recent version of the LANL General Part B. Contaminated PPE will either be decontaminated or managed in compliance with appropriate waste management regulations.

F.2.3.2.2 Background Determination

Prior to the commencement of decontamination, the operating record will be evaluated to determine the constituents of potential concern (COPCs) during closure. In addition, background samples and/or concentrations derived from LANL studies developed under the LANL corrective action or other programs can be used to determine COPC background/baseline levels applicable at the time of closure. The COPCs, appropriate background levels, and/or necessary sample collection techniques will be determined at the time of closure and included in the SAP at the time of closure, as discussed in Section F.1.4 of this closure plan.

F.2.3.2.3 Structural Assessment

Prior to beginning decontamination activities, the secondary containment associated with the storage tank system will be inspected for any cracks or conditions that would potentially lead to the loss of decontamination wash water containment. Preventative maintenance inspections are conducted routinely (i.e., weekly) at each storage tank location. If any defects, deterioration, damage, or hazards affecting containment are discovered during inspection, appropriate remedial actions (including repairs, maintenance, or replacement) will be completed before decontamination activities begin. If a crack or gap is present, a swipe sample or a representative sample of the media will be taken (e.g., concrete) to determine the presence of contamination. The sample will be analyzed for the COPCs identified based upon the operating history of the unit, as discussed in Section F.2.3.2.2. If contamination is detected, the surface flaw will be decontaminated prior to repairing the crack/gap. Complete or partial removal (e.g., cold milling) of the material may be performed until contamination is no longer detected. If partial removal is successful in eliminating the contamination, it will be assumed that the remaining material, including the underlying soil, is clean.

F.2.3.3 Decontamination Procedures

To the extent possible, all contaminated surfaces and equipment (if present) will be decontaminated. Surfaces, items, materials, and equipment that cannot be decontaminated will be containerized and managed in compliance with appropriate waste management regulations.

An appropriate surfactant/solvent to be used in wash water solutions will be determined based upon the COPCs identified in the SAP. Alconox®, a surfactant, will be used to decontaminate the cementation unit. Specialized solvents will be used for more focused decontamination/removal purposes, as appropriate.

F.2.3.3.1 Storage Tank System Components

Storage tank system components will be decommissioned at closure. Due to the design of the storage tank components, decontamination is not possible. The decommissioned storage tank system components will be containerized and managed in compliance with appropriate regulations.

F.2.3.3.2 Ancillary Equipment

The storage tank system ancillary equipment (e.g., piping, pumps) will either be decontaminated, decommissioned, or dismantled, depending on the extent of contamination and anticipated disposition or use after closure. Closure of the will include removal of all of the tank components and ancillary equipment, including the shared portions of the piping system. The facility headers for ventilation, the wet vacuum system, and the radioactive liquid waste collection system will be left in place for other uses. If any of the ancillary equipment is to be decommissioned or dismantled, the resulting components will be containerized and managed in compliance with appropriate regulations. If the ancillary equipment is to be decontaminated, the following procedures will be used.

The interior surfaces of the ancillary equipment will be flushed with a decontamination solution to be specified in the SAP at the time of closure. The exterior surfaces will be decontaminated using mops, cloths, and/or other absorbent materials to remove any potential hazardous constituents. These materials will be rinsed in the decontamination solution (e.g., Alconox and water) and used to wipe down the exterior surfaces of the component being closed. Used wash water will be collected, removed, and transferred to an appropriate container for storage pending the results of analysis and disposal.

Verification of decontamination will be conducted as indicated in Section F.2.3.4. If the analysis from the verification indicates that mixed waste constituents are present, decontamination wash cycles and analyses will continue until the ancillary equipment has been decontaminated or the decision is made to manage it appropriately as contaminated waste. Upon determination that it is contaminated waste, the material/structure/surface may be removed, transported to, and stored at an appropriate container storage unit (CSU) to facilitate the closure process.

F.2.3.3.3 Areas Adjacent to the Storage Tank System

Random swipe samples from the areas adjacent to the storage tank system (e.g., walls, floors, sumps, and drains) will be collected and analyzed for the COPCs expected to be present, based on the operating record. If decontamination measures are deemed necessary based on the analytical results, the following procedures will be used.

Decontamination will be conducted using mops, cloths, and/or other absorbent materials to remove any potential mixed waste constituents. These materials will be submerged in a wash water solution (e.g., Alconox, water) and used to wipe down the surfaces associated with the storage tank system.

After decontamination of the surfaces, the containment system (e.g., recessed areas, sumps, berms) will be wiped down. Used wash water will be collected, removed, and transferred to an appropriate container for storage pending the results of analysis and disposal.

Verification of decontamination will be conducted as indicated in Section F.2.3.4. If the analysis from the verification indicates that mixed waste constituents are present, decontamination wash cycles and analyses will continue until the structure and surfaces have been decontaminated or the decision is made to manage it appropriately as contaminated waste. Upon determination that it is contaminated waste, the material/structure/surface may be removed, transported to, and stored at an appropriate CSU to facilitate the closure process.

F.2.3.3.4 Equipment Used During Closure

Reusable protective clothing, tools, and equipment used during decontamination activities at the storage tank system will be cleaned with a wash water solution. If reusable sampling equipment is used, sampling equipment rinsate blanks will be collected and analyzed in accordance with the quality assurance (QA)/quality control (QC) procedures described in the closure SAP. Reusable decontamination equipment, including protective clothing and tools used during closure activities will be scraped as necessary to remove any residue and cleaned with a wash water solution (the closure SAP will include a discussion of wash water solutions). Residue, disposable equipment and reusable equipment that cannot be decontaminated will be containerized and managed as waste in accordance with LANL waste management procedures, depending on the regulated constituents present.

F.2.3.4 Verification of Decontamination

Verification of decontamination will be conducted using sampling and analysis to demonstrate that mixed waste residues are not present on the equipment and/or surfaces associated with the storage tank system (as applicable). Sample media can include wash water solutions, swipes, and/or solid media samples (e.g., soil, concrete) as determined in the SAP at the time of closure and the operating record of the unit. The sampling methodology will be based on factors such as COPCs and the materials of construction. All sampling conducted during closure will be done in accordance with the QA/QC procedures defined by "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (U.S. Environmental Protection Agency [EPA], 1986). The SAP will establish the minimum number of verification samples to be collected based on the total surface area associated with the unit. Verification sampling will use a biased random approach for the determination of sample locations for the equipment, structures, and/or surfaces and will include known or likely areas of contamination (e.g., low areas, sumps, and known spill locations) as determined by the operating record of the unit at the time of closure.

Decontamination will be verified if the analytical data from the collected samples meets at least one of the decontamination criteria listed in Section F.2.3.5 of this closure plan. If the data cannot meet at least one of the criteria, additional sampling can be performed to establish the boundaries of the contamination. Decontamination, as discussed in Section F.2.3.3, will be repeated within those boundaries, using portable berms or other appropriate materials to limit the potential for runoff from the affected area. An additional round of verification sampling will be performed for all of the areas previously determined to be contaminated. After each decontamination/verification sequence, a decision will be made to repeat or remove the contaminated materials and dispose of them properly.

F.2.3.5 Decontamination Criteria

Successful decontamination will consist of sampling as specified in the component-specific SAP and meet one of the following criteria:

- No detectable hazardous waste or hazardous waste constituents from storage tank system activities are identified in the verification sample.
- Detectable hazardous waste or hazardous waste constituents from storage tank system activities in the verification sample are removed to statistically significant levels based on concentrations in the background/baseline samples.
- Detectable hazardous waste or hazardous waste constituents from storage tank system activities in the verification sample are at or below levels agreed upon with the NMED.
- Detectable hazardous waste or hazardous waste constituent concentrations from storage tank system activities do not significantly decrease after several wash downs. In such an event, hazardous constituents that pose an acceptable risk will be allowed to remain, as mutually agreed upon with the NMED.

An alternative demonstration of decontamination may be proposed and justified at the time of closure as circumstances dictate. The NMED will evaluate the proposed alternative in accordance with the standards and guidance then in effect and, if approved, LANL will incorporate the alternative into the SAP at the time of closure.

F.2.4 SAMPLING AND ANALYTICAL PLAN [20.4.1 NMAC §264.112(b)(4)]

Sampling and analysis will be performed using standard approved methods (e.g., *SW-846*, American Society for Technology and Materials), as appropriate, for making closure decontamination verification determinations. LANL will submit a SAP to the NMED at the time of closure notification for review and approval. The SAP will provide a detailed description of the storage tank system and propose a closure methodology that assures the closure performance standards in Section F.2.1.1 are met.

The SAP will include the following information:

- A detailed discussion of site characteristics.
- Operational history, including descriptions of known spills, releases, and/or evidence of potential problems (e.g., visual stains, dead vegetation, solid waste management units).
- Chemical properties of the waste stored.
- List of COPCs.
- A hazard control plan, including a review of chemical hazards present at the site, control and monitoring methods and procedures, and required PPE.
- Determination of wash water solution composition, if necessary.
- Detailed procedures describing decontamination methods for equipment, structures, and media.
- Discussion of background levels determined through sampling or use of published data and their relevance to the specific storage tank system.
- Methods for sampling and analysis of contaminated media.
- Removal procedures for contaminated media, if necessary.
- Sampling methods for decontamination media and hazardous waste determination. The discussion should include the rationale for using wash water samples, swipe samples, soil samples, and/or other sampling methodology.
- Sampling methods for decontamination verification procedures. The discussion should include the statistical or judgmental basis for determining the number of verification samples needed and the constituents to be analyzed.
- Sampling equipment decontamination and disposition procedures.
- Sample handling and documentation procedures.
- Analytical methods (including detection limits) and the rationale for their determination.
- Disposition of removed waste, decontamination media, or contaminated soils. This discussion should include an identification of proposed on- or off-site hazardous waste management facilities that may be used for final disposition and the types of wastes anticipated to be shipped.
- Decontamination criteria.
- Statistical basis for verification of decontamination, if applicable. The discussion should include information on determination of statistical increases in analytical parameters and numerical values for significant increases.
- Risk assessment procedures to be used, if necessary.
- Field and laboratory QA/QC procedures.

- Schedule of closure activities, including decontamination, sampling, analysis, potential removal of soils, and closure certification submittal.
- Identification of contact person or office.

F.2.5 REFERENCES

EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *EPA-SW-846*, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

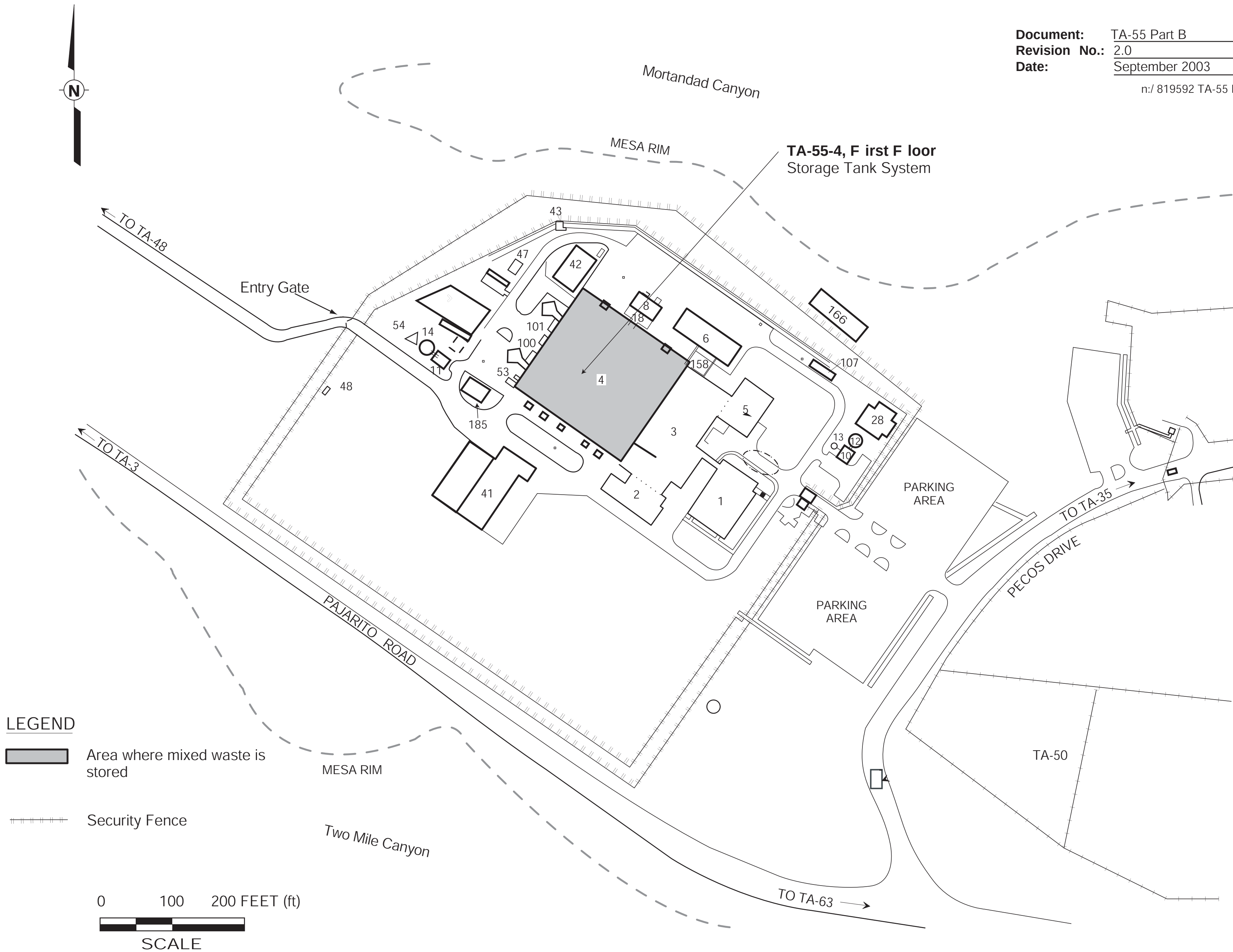

Figure F. 2-1
Storage Tank System at Technical Area (TA) 55

ATTACHMENT F.3

CLOSURE PLAN FOR THE TECHNICAL AREA 55 CEMENTATION UNIT

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
COPC	constituents of potential concern
CSU	container storage unit
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
NMED	New Mexico Environment Department
NMT	Nuclear Materials Technology
NNSA	National Nuclear Security Administration
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
SWRC	Solid Waste Regulatory Compliance
TA	technical area

ATTACHMENT F.3
CLOSURE PLAN FOR THE TECHNICAL AREA 55
CEMENTATION UNIT

The information provided in this closure plan is submitted to address the applicable closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.14(b)(13), and 20.4.1 NMAC, Subpart V, Part 264, Subparts G and X, revised June 14, 2000. This closure plan describes the activities necessary to perform Resource Conservation and Recovery Act (RCRA) closure for the cementation unit at Los Alamos National Laboratory (LANL) Technical Area (TA) 55. Closure activities will include removal of any remaining waste, decontamination or removal of contaminated equipment/structures, and verification that all residues have been removed. Closure will minimize the need for further maintenance, preclude the release of hazardous constituents to environmental medial, and be protective of human health in accordance with the closure performance standards specified in 20.4.1 NMAC §264.111 [6-14-00].

The cementation unit is located at TA-55-4, Room 401. It consists of a pH column, vacuum trap, two motor-driven mixers, four impellers, and piping inside of a glove box. Figure F.3-1 shows the location of the cementation unit. This closure plan will be used to provide guidance and permit conditions for the partial closure of the cementation unit. Closure will occur separately from the other waste management units at TA-55 and over the active life of the TA-55 facility, which is not anticipated to end before 2050.

This closure plan describes general closure and establishes the procedure of submitting a separate detailed sampling and analysis plan (SAP) to the New Mexico Environment Department (NMED) for approval at the time of closure. The SAP will alleviate the need for future closure plan and permit modification until the actual closure activities for the cementation unit are scheduled. The SAP will provide the required level of detail to assure that closure performance standards are met, consistent with the appropriate decontamination and verification requirements existing at the time of closure.

This plan is organized as follows:

- Section F.3.1 - General Closure Information.
- Section F.3.2 - Description of the Cementation Unit.
- Section F.3.3 - Closure Procedures.
- Section F.3.4 - Sampling and Analysis Plan.
- Section F.3.5 – References.

Until closure is complete and has been certified in accordance with 20.4.1 NMAC §264.115 [6-14-00], as discussed in Section F.3.1.6, a copy of the approved closure plan and any approved revisions will be on file at with Risk Reduction and Environmental Stewardship Division Solid Waste Regulatory Compliance Group (SWRC) and at the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) Los Alamos Site Office (LASO).

F.3.1 GENERAL CLOSURE INFORMATION

F.3.1.1 Closure Performance Standard [20.4.1 NMAC §264.111]

The cementation unit addressed in this closure plan will be closed to meet the following performance standards:

- Minimize the need for further maintenance.
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or atmosphere.
- Comply with the closure and post closure requirements of 20.4.1 NMAC, Subpart V, Part 264, Subparts G and X [6-14-00].

This will be accomplished by removal of waste from the cementation unit and decontamination, if necessary, of the areas that may have come into contact with wastes. Decontamination activities will ensure the removal of hazardous waste residues from the cementation unit to established cleanup levels.

F.3.1.2 Partial and Final Closure Activities [20.4.1 NMAC §§264.112 (b)(2) and 264.112(d)]

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial RCRA closure is the closure of a hazardous waste management unit at a facility that contains other active hazardous waste management units. Partial closure at TA-55 can consist of closing the cementation unit, while leaving the other units in operation. Partial closure (hereinafter referred to as closure) will be deemed complete when the waste has been removed from the cementation unit; all related secondary containment surfaces and equipment have been decontaminated, if necessary, or otherwise properly disposed; closure has been verified; and the closure certification has been submitted to and approved by the NMED.

Final RCRA closure of the LANL hazardous waste management facility will occur when all of LANL's hazardous/mixed waste management units are closed. Final closure will consist of assembling documentation on the closure status of each waste management unit, including all pervious closures as well as land-based units where closures have been or are being addressed via alternative closure requirements. Final closure will be deemed complete when the closure certification has been submitted to the NMED, and the NMED has approved the final closure.

F.3.1.3 General Closure Schedule [20.4.1 NMAC §§264.112(b)(6), 264.112(e), and 264.113]

Written notification will be provided to the NMED 45 days before the start of closure activities for the TA-55 cementation unit. However, pursuant to 20.4.1 NMAC §264.112(e) [6-14-00], removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Closure activities will begin according to the requirements of 20.4.1 NMAC §264.112(d)(2) [6-14-00]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the approved closure plan, as required by 20.4.1 NMAC §264.113(a) [6-14-00], within 90 days after final receipt of waste at the cementation unit. In the event that closure activities cannot begin within 90 days, LANL will notify the Secretary of the NMED in accordance with the extension requirements in 20.4.1 NMAC §264.113(a) [6-14-00]. Closure activities and reporting requirements will then be completed within 180 days of the receipt of the final volume of waste at the cementation unit. Closure will be conducted in accordance with the schedule presented in Table F.3-1 of this closure plan.

Table F.3-1
Closure Schedule

Activity	Maximum Time Required [a]
Submit SAP.	-90 Days
Notify the NMED of intent to close.	-45 Days
Final receipt of waste.	Day 0
Remove waste.	Day 5
Decontaminate surfaces and equipment.	Day 20
Sample excess used decontamination water for disposal.	Day 20
Perform verification sampling.	Day 30
Evaluate analytical data from verification sampling.	Day 50
Perform additional decontamination, if necessary.	Day 55
Perform additional verification sampling, if necessary.	Day 60
Evaluate additional analytical data.	Day 75
Perform final clean up and disposal (i.e., removal of decontaminated equipment and decontamination waste).	Day 140
Certify closure.	Day 175
Submit closure certification to NMED.	Day 180

a The schedule above indicates calendar days from the beginning by which activities will be completed. Some activities may be conducted simultaneously and/or may not require the maximum time listed.

NMED = New Mexico Environment Department
SAP = sampling and analysis plan

Further details regarding the schedule of closure activities will be included with the SAP as discussed in Section F.3.4 of this closure plan. In the event that closure is prevented from proceeding according to schedule, LANL will notify the Secretary of the NMED in accordance with extension request requirements in 20.4.1 NMAC §264.113(b) [6-14-00]. In addition, the demonstrations in 20.4.1 NMAC §264.113(a)(1) and (b)(1) [6-14-00], will be made in accordance with 20.4.1 NMAC §264.113(c) [6-14-00].

F.3.1.4 Amendment of the Closure Plan [20.4.1 NMAC §264.112(c)]

In accordance with 20.4.1 NMAC §264.112(c) [6-14-00], LANL will submit a written notification of or request for a permit modification to authorize a change in the approved closure plan whenever:

- There are changes in operating plans or facility design that affect the closure plan.
- There is a change in the expected year of closure.
- Unexpected events occur during closure that require modification of the approved closure plan.

The written notification or request will include a copy of the amended closure plan for approval by the NMED.

LANL will submit a written request for a permit modification with a copy of the amended closure plan at least 60 days prior to the proposed change in unit design or operation or no later than 60 days after an occurrence of an unexpected event that affects the closure plan. If the unexpected event occurs during closure, the permit modification will be requested within 30 days of the occurrence. The Secretary of the NMED may request a modification of the closure plan under the conditions presented in the bulleted items above. LANL will submit a modified plan in accordance with the request within 60 days of notification, or within 30 days of notification if a change in facility condition occurs during the closure process.

F.3.1.5 Closure Cost Estimate, Financial Assurance, and Liability Requirements [20.4.1 NMAC §264.140(c)]

In accordance with 20.4.1 NMAC §264.140(c) [6-14-00], LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart H [6-14-00], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

F.3.1.6 Closure Certification [20.4.1 NMAC §264.115]

Within 60 days after completion of closure activities for the cementation unit or final closure of the facility, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit or facility has been closed in accordance with the approved closure plan. The certification will be signed by the appropriate DOE/NNSA and LANL officials and by an independent, registered professional engineer, in accordance with 20.4.1 NMAC §264.115 [6-14-00]. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED upon request, as specified in 20.4.1 NMAC §264.115 [6-14-00]. A copy of the certification and supporting documentation will be maintained by both the DOE/NNSA LASO and SWRC.

F.3.1.7 Security

Because of the ongoing nature of waste management operations at TA-55, site security and administrative controls at the TA-55 waste management units will be maintained by the DOE/NNSA or another authorized federal agency for as long as necessary to prohibit public access. The security fence at TA-55 will be maintained to ensure that public access into TA-55 is prevented.

F.3.1.8 Closure Report

Upon completion of RCRA closure activities at the cementation unit, a closure report will be prepared and provided to the Secretary of the NMED. The report will document the closure and contain, for example, the following:

- A copy of the certification described in Section F.3.1.6 of this closure plan.
- A general summary of closure activities.
- Any variance from the approved activities and the reason for the variance.
- A summary of any sampling data associated with the closure.
- The location of the file of supporting documentation (e.g., memos, logbooks, laboratory data).
- Storage or disposal location of regulated hazardous/mixed waste resulting from closure activities.
- A certification of accuracy of the report.

F.3.1.9 Survey Plat and Post-Closure Requirements [20.4.1 NMAC §§264.116 and 264.117 through 264.120]

LANL intends to remove the /mixed waste and associated constituents from the cementation unit and decontaminate all surfaces and equipment to established cleanup levels or, if the cleanup levels cannot be achieved, to dispose of the contaminated surfaces and equipment. If decontamination to established cleanup levels is not achievable, LANL may propose an alternate demonstration of decontamination, as circumstances indicate. A survey plat, post-closure certification, and post-closure notices will not be required because all wastes will be removed and any surfaces and equipment will be decontaminated or disposed of at closure. Therefore, these requirements are not applicable for clean-closed units.

F.3.2 DESCRIPTION OF THE CEMENTATION UNIT

TA-55 is located on a mesa between a branch of Mortandad Canyon to the north and Two Mile Canyon to the south. Mesa-top elevations at TA-55 range from approximately 7,100 to 7,300 feet above mean sea level. TA-55 began operating in 1978 and is the location of research and development activities including a plutonium processing facility. The cementation unit is located at TA-55 in glovebox GB-454 along the west wall of TA-55-4, Room 401. The unit is used to stabilize mixed waste solutions into a cement matrix. It consists of a pH column, vacuum trap, two motor-driven mixers, four impellers, piping and glovebox.

LANL does not currently intend to reduce the design capacity of the cementation unit at TA-55 during the active life of the unit. Estimated annual quantities for the cementation unit at TA-55 are provided in the most recent version of the "Los Alamos National Laboratory General Part A Permit Application," hereinafter referred to as the LANL General Part A.

F.3.2.1 Estimate of Maximum Waste Treated

The maximum total volume of mixed waste that may be in inventory in the cementation unit at any time is estimated at 150 gallons. Treatment at TA-55 using the cementation unit commenced in 1987 and is projected to continue until the facility is decommissioned in 2050. The estimated lifetime treatment capacity for the unit is approximately 226,800 gallons.

F.3.2.2 Description of Stored Waste

The cementation unit is used to treat liquid and solid mixed waste generated primarily from research and development activities and processing and recovery operations at TA-55 and at the Chemistry and Metallurgy Research Building at TA-3. The liquid wastes consist of evaporator bottoms solutions and laboratory solutions that exhibit the hazardous characteristics of corrosivity and toxicity (for metals) as defined in 20.4.1 NMAC §261.22 and 261.24 [6-14-00], respectively. The solid process wastes consist of process residue from the evaporator, process leached solids, and filter cake. These waste streams exhibit the hazardous characteristics of toxicity (for metals) and corrosivity and are classified as mixed waste. Mixed waste has both a hazardous component (as defined by 20.4.1 NMAC, Subpart II, Part 261) and a radioactive component. Information on the hazardous components of the wastes that can be treated by cementation unit is provided in the most recent version of the LANL General Part A. Additional information on waste generating activities at LANL is available in the waste analysis plan in Appendix B of the most recent version of the LANL General Part B.

The estimated annual quantities of waste treated in the cementation unit are provided in the most recent version of the LANL General Part A.

F.3.3 CLOSURE PROCEDURES [20.4.1 NMAC §264.112(b)(4) and (5), and 264.114]

Closure will be conducted in accordance with the schedule presented in Table F.2-1, as amended by the SAP submitted at the time of closure. Closure will generally be conducted as follows:

- **Removal of Waste** – Treatment of any remaining solutions in the unit at the time of closure.
- **Preliminary Closure** - Safety precautions and background contaminant levels for the cementation unit will be assessed. Inspection of the secondary containment surfaces by the engineer observing the closure to ensure adequate containment and conditions for closure.
- **Decontamination** – Removal of potential hazardous waste constituents from equipment used during waste management activities; and all surfaces, walls, and secondary containment features (e.g., surfaces, sumps, berms, and/or recessed drains). Removal can include dismantling, sweeping, vacuuming, moping, and/or wiping as appropriate at the time of closure and based upon the contaminant levels determined by the operating record of the unit.
- **Verification** – Sampling to verify that residual hazardous waste constituents have been decontaminated to appropriate levels. Sample media can include swipes, solutions, and/or solid samples as appropriate and will be determined at the time of closure based upon the operating record of the unit.
- **Closure Certification** – Certification by a professional engineer that the procedures and requirements provided in this closure plan and the SAP were followed.

The following sections provide additional information for the closure procedures described above. The SAP provided at the time of closure will provide detailed information regarding the preliminary closure procedures, decontamination methods, and verifications procedures as applicable at the time of closure.

F.3.3.1 Removal of Waste

Prior to the initiation of closure activities, any waste remaining in the cementation unit will be removed or treated according to current waste-specific standard operating procedures. Once the waste has been removed or treated, the drum(s) of solidified waste will be removed and transported to an approved on-site facility or a permitted off-site treatment, storage, and disposal facility.

F.3.3.2 Preliminary Closure Procedures

F.3.3.2.1 Safety Precautions

Job hazards associated with closure activities will be identified, controls developed, and workers briefed before closure activities are conducted, in accordance with LANL safety procedures. Personnel involved in closure activities will wear appropriate personal protective equipment (PPE), specified by the Health Physics Group and the Industrial Hygiene and Safety Group, and will follow good hygiene practices to protect themselves from exposure to mixed waste. The level of PPE that will be required will depend upon the physical hazards present and the levels of contamination that are detected, if any. All workers involved in closure activities will be required to have appropriate training (as identified in Attachment D of this permit application and Appendix D in the most recent version of the LANL General Part B. Contaminated PPE will either be decontaminated or managed in compliance with appropriate waste management regulations.

F.3.3.2.2 Background Determination

Prior to the commencement of decontamination, the operating record will be evaluated to determine the constituents of potential concern (COPCs) during closure. In addition, background samples and/or concentrations derived from LANL studies developed under the LANL corrective action or other programs can be used to determine COPC background/baseline levels applicable at the time of closure. The COPCs, appropriate background levels, and/or necessary sample collection techniques will be determined at the time of closure and included in the SAP at the time of closure, as discussed in Section F.3.4 of this closure plan.

F.3.3.2.3 Structural Assessment

Prior to beginning decontamination activities, the glovebox and secondary containment associated with the cementation unit will be inspected for any cracks or conditions that would potentially lead to the loss of decontamination-liquid containment. Preventative maintenance inspections are conducted routinely (i.e., weekly). If any defects, deterioration, damage, or hazards affecting containment are discovered during inspection, appropriate remedial actions (including repairs, maintenance, or replacement) will be completed before decontamination activities begin. If a crack or gap is present, a swipe sample or a representative sample of the media will be taken (e.g., concrete) to determine the presence of contamination. The sample will be analyzed for the COPCs identified based upon the operating history of the unit, as discussed in Section F.3.3.2.2. If contamination is detected, the surface flaw will be decontaminated prior to repairing the crack/gap. Complete or partial removal (e.g., cold milling) of the material may be performed until contamination is no longer detected. If partial removal is successful in eliminating the contamination, it will be assumed that the remaining material, including the underlying soil, is clean.

F.3.3.3 Decontamination Procedures

To the extent possible, all contaminated surfaces and equipment (if present) will be decontaminated. Surfaces, items, materials, and equipment that cannot be decontaminated will be containerized and managed in compliance with appropriate waste management regulations.

An appropriate surfactant/solvent to be used in wash water solutions will be determined based upon the COPCs identified in the SAP. Alconox®, a surfactant, will be used to decontaminate the cementation unit. Specialized solvents will be used for more focused decontamination/removal purposes, as appropriate.

F.3.3.3.1 Cementation Unit and Glovebox

The cementation unit equipment (e.g., pH column, vacuum trap, motor-driven mixers, impellers) and glovebox will either be decontaminated, decommissioned, or dismantled, depending on the extent of contamination and anticipated disposition or use after closure. If the cementation unit equipment and/or the glovebox is to be decommissioned or dismantled, the resulting components will be containerized and managed appropriately at an approved on-site facility, depending on the regulated constituents present. If the cementation unit equipment and/or the glovebox is to be decontaminated, Nuclear Materials Technology (NMT) personnel will use the following procedures.

Prior to decontamination of any of the cementation unit equipment, any visible material located inside the glovebox will be removed to the extent possible and managed in compliance with appropriate regulations. The cementation unit equipment (while located inside the glovebox) and interior surfaces of the glovebox will be rinsed or flushed with wash water or wiped down with cloths and/or other absorbent materials. Used wash water will be collected, removed, and transferred to an appropriate container for storage pending the results of analysis and disposal.

Verification of decontamination will be conducted as indicated in Section F.3.3.4. If the analysis from the verification indicates that mixed waste constituents are present, decontamination wash cycles and analyses will continue until the ancillary equipment has been decontaminated or the decision is made to manage it appropriately as contaminated waste. Upon determination that it is contaminated waste, the material/structure/surface may be removed, transported to, and stored at an appropriate container storage unit (CSU) to facilitate the closure process.

F.3.3.3.2 Ancillary Equipment

The cementation unit ancillary equipment located inside Room 401 (outside the glovebox) will either be decontaminated, decommissioned, or dismantled, depending on the extent of contamination and anticipated disposition or use after closure. If any of the cementation unit ancillary equipment is to be decommissioned or dismantled, the resulting components will be containerized and managed appropriately at an approved on-site facility, depending on the regulated constituents present. If decontamination measures are deemed appropriate, NMT personnel will use the following procedures for surface decontamination of the cementation unit ancillary equipment.

Random swipe samples from the areas adjacent to the cementation unit ancillary equipment (e.g., walls, floors, sumps, and drains) will be collected and analyzed for the COPCs expected to be present, based on the operating record. If decontamination measures are deemed necessary based on the analytical results, the following procedures will be used.

Decontamination will be conducted using mops, cloths, and/or other absorbent materials to remove any potential mixed waste constituents. These materials will be submerged in a wash water solution (e.g., Alconox, water) and used to wipe down the surfaces associated with the cementation unit. After decontamination of the surfaces, the containment system (e.g., recessed areas, sumps, berms) will be wiped down. Used wash water will be collected, removed, and transferred to an appropriate container for storage pending the results of analysis and disposal.

Verification of decontamination will be conducted as indicated in Section F.3.3.4. If the analysis from the verification indicates that mixed waste constituents are present, decontamination wash cycles and analyses will continue until the structure and surfaces have been decontaminated or the decision is made to manage it appropriately as contaminated waste. Upon determination that it is contaminated waste, the material/structure/surface may be removed, transported to, and stored at an appropriate CSU to facilitate the closure process.

F.3.3.3.3 Areas Adjacent to the Cementation Unit Glovebox

Random swipe samples from the areas adjacent to the cementation unit glovebox (e.g., walls, floors, sumps, and drains) will be collected and analyzed for the COPCs expected to be present, based on the operating record. If decontamination measures are deemed necessary based on the analytical results, the following procedures will be used.

Decontamination will be conducted using mops, cloths, and/or other absorbent materials to remove any potential mixed waste constituents. These materials will be submerged in a wash water solution (e.g., Alconox, water) and used to wipe down the surfaces associated with the areas adjacent to the cementation unit glovebox. After decontamination of the surfaces, the containment system (e.g., recessed areas, sumps, berms) will be wiped down. Used wash water will be collected, removed, and transferred to an appropriate container for storage pending the results of analysis and disposal.

Verification of decontamination will be conducted as indicated in Section F.3.3.4. If the analysis from the verification indicates that mixed waste constituents are present, decontamination wash cycles and analyses will continue until the structure and surfaces have been decontaminated or the decision is made to manage it appropriately as contaminated waste. Upon determination that it is contaminated waste, the material/structure/surface may be removed, transported to, and stored at an appropriate CSU to facilitate the closure process.

F.3.3.3.4 Equipment Used During Closure

Reusable protective clothing, tools, and equipment used during decontamination activities will be cleaned with a wash water solution. If reusable sampling equipment is used, sampling equipment rinsate blanks will be collected and analyzed in accordance with the quality assurance (QA)/quality control (QC) procedures to be described in the closure SAP. Reusable decontamination equipment, including protective clothing and tools used during closure activities will be scraped as necessary to remove any residue and cleaned with a wash water solution. Residue, disposable equipment and reusable equipment that cannot be decontaminated will be containerized and managed as waste in accordance with LANL waste management procedures, depending on the regulated constituents present.

F.3.3.4 Verification of Decontamination

Verification of decontamination will be conducted using sampling and analysis to demonstrate that hazardous waste residues are not present on the equipment and/or surfaces associated with the cementation unit (as applicable). Sample media can include wash water solutions, swipes, and/or solid media samples (e.g., soil, concrete) as determined in the SAP at the time of closure and the operating record of the unit. The sampling methodology will be based on factors such as COPCs and the materials of construction. All sampling conducted during closure will be done in accordance with QA/QC procedures defined by "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (*SW-846)* (U.S. Environmental Protection Agency [EPA], 1986). The SAP will establish the minimum number of verification samples to be collected based on the total surface area associated with the unit. Verification sampling will use a biased random approach for the determination of sample locations for the equipment, structures, and/or surfaces and will include known or likely areas of contamination (e.g., low areas, sumps, and known spill locations) as determined by the operating record of the unit at the time of closure.

Decontamination will be verified if the analytical data from the collected samples meets at least one of the decontamination criteria listed in Section F.3.3.5 of this closure plan. If the data cannot meet at least one of the criteria, additional sampling can be performed to establish the boundaries of the contamination. Decontamination, as discussed in Section F.3.3.3, will be repeated within those boundaries, using portable berms or other appropriate materials to limit the potential for runoff from the affected area. An additional round of verification sampling will be performed for all of the areas previously determined to be contaminated. After each decontamination/verification sequence, a decision will be made to repeat or remove the contaminated materials and dispose of them properly.

F.3.3.5 Decontamination Criteria

Successful decontamination will consist of sampling as specified in the component-specific SAP and meet one of the following criteria:

- No detectable hazardous waste or hazardous waste constituents from cementation unit activities are identified in the verification sample.
- Detectable hazardous waste or hazardous waste constituents from cementation unit in the verification sample are removed to statistically significant levels based on concentrations in the background/baseline samples.
- Detectable hazardous waste or hazardous waste constituents from cementation unit in the verification sample are at or below levels agreed upon with the NMED.
- Detectable hazardous waste or hazardous waste constituent concentrations from cementation unit activities do not significantly decrease after several wash downs. In such an event, hazardous constituents that pose an acceptable risk will be allowed to remain, as mutually agreed upon with the NMED.

An alternative demonstration of decontamination may be proposed and justified at the time of closure as circumstances dictate. The NMED will evaluate the proposed alternative in accordance with the standards and guidance then in effect and, if approved, LANL will incorporate the alternative into the SAP at the time of closure.

F.3.4 SAMPLING AND ANALYTICAL PROCEDURES [20.4.1 NMAC §264.112(b)(4)]

Sampling and analysis will be performed using standard approved methods (e.g., *SW-846*, American Society for Technology and Materials), as appropriate, for making closure decontamination verification determinations. LANL will submit a SAP to the NMED at the time of closure notification for review and approval. The SAP will provide a detailed description of the cementation unit and propose a closure methodology that assures the closure performance standards in Section F.3.1.1 are met.

The SAP will include at a minimum the following information:

- A detailed discussion of site characteristics.
- The cementation unit, ancillary equipment and/or associated glovebox operational history, to include descriptions of known spills, releases, and/or evidence of potential problems (e.g., visual stains, dead vegetation, solid waste management units).
- Chemical properties of the waste stored and processed at the unit and/or glovebox.
- Determination of applicable COPCs.
- A hazard control plan, including a review of chemical hazards present at the site, control and monitoring methods and procedures, and required PPE.
- Determination of wash water solution composition, if necessary.
- Detailed procedures describing decontamination methods for equipment, structures, and media.
- Discussion of background levels determined through sampling or use of published data and their relevance to the unit and/or glovebox.
- Methods for sampling and analysis of contaminated media.
- Removal procedures for contaminated media, if necessary.
- Sampling methods for decontamination media and hazardous waste determination. The discussion should include the rationale for using wash water samples, swipe samples, soil samples, and/or other sampling methodology.
- Sampling methods for decontamination verification procedures. The discussion should include the statistical or judgmental basis for determining the number of verification samples needed and the constituents to be analyzed.
- Sampling equipment decontamination and disposition procedures.
- Sample handling and documentation procedures.
- Analytical methods (including detection limits) and the rationale for their determination.
- Disposition of removed waste, decontamination media, or contaminated soils. This discussion should include an identification of proposed on- or off-site hazardous waste management

facilities that may be used for final disposition and the types of wastes anticipated to be shipped.

- Decontamination criteria.
- Statistical basis for verification of decontamination, if applicable. The discussion should include information on determination of statistical increases in analytical parameters and numerical values for significant increases.
- Risk assessment procedures to be used, if necessary.
- Field and laboratory QA/QC procedures.
- Schedule of closure activities, including decontamination, sampling, analysis, potential removal of soils, and closure certification submittal.
- Identification of contact person or office.

F.3.5 REFERENCES

EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *EPA-SW-846*, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

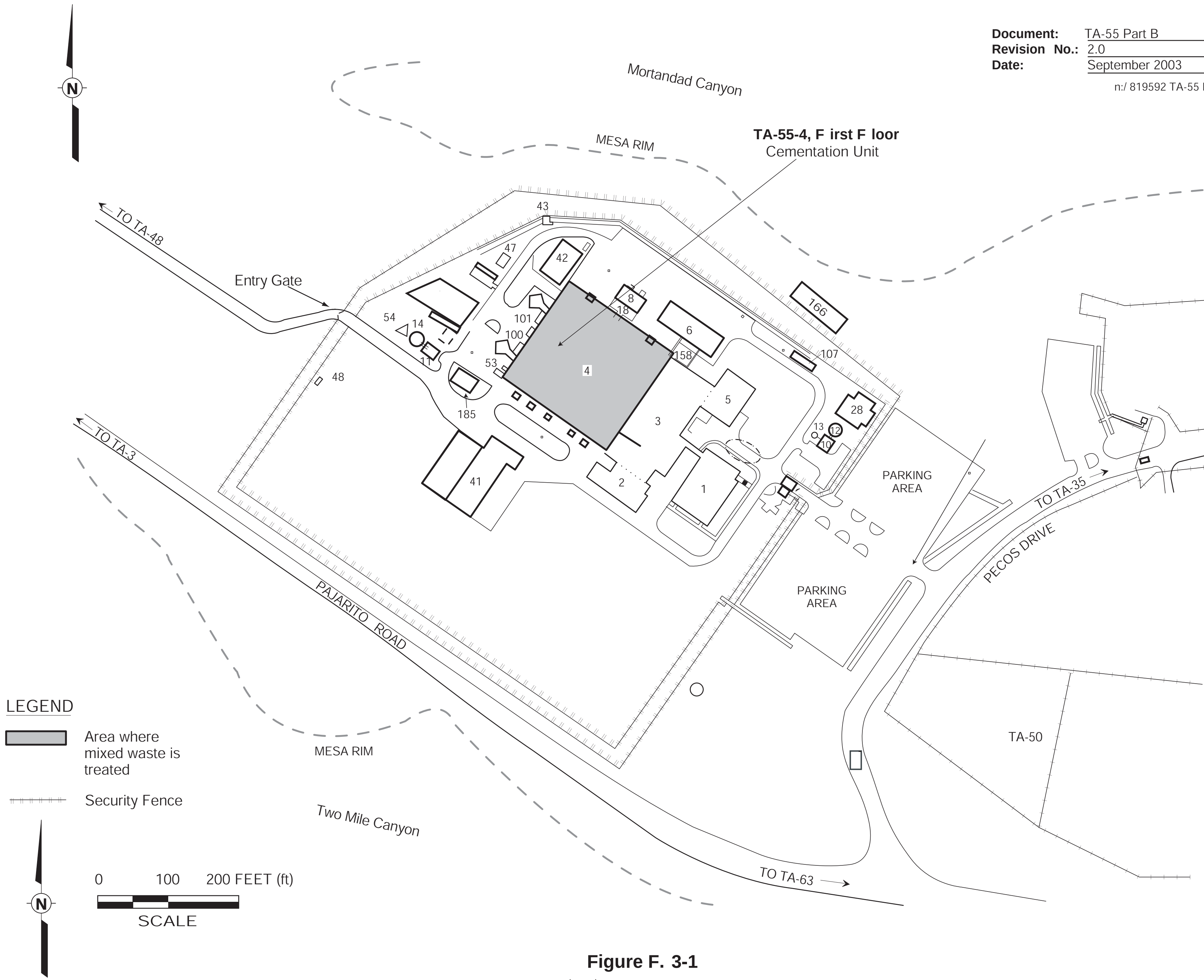

Figure F. 3-1
Technical Area (TA) 55 Cementation Unit Location

ATTACHMENT G

CONTAINER STORAGE

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
CSU	container storage unit(s)
DOT	U.S. Department of Transportation
ft	feet/foot
gal	gallon
in.	inches
LANL	Los Alamos National Laboratory
m^3	cubic meters
ppmw	parts per million by weight
SWB	standard waste box
TA	technical area

ATTACHMENT G
CONTAINER STORAGE

The information provided in this section is submitted to address the applicable container storage requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.15 and 20.4.1 NMAC, Subpart V, Part 264, Subpart I, revised June 14, 2000 [6-14-00]. This section provides detailed descriptions of the seven container storage units (CSU) located at Technical Area (TA) 55. Detailed engineering drawings are provided as Figures G-1 through G-3 and are provided for informational purposes only. Table G-1 summarizes applicable regulatory references for container storage and the corresponding location where the requirement is addressed in this document.

G.1 CONTAINER STORAGE AT TA-55

TA-55 is located in the north central portion of Los Alamos National Laboratory on a mesa between a branch of Mortandad Canyon on the north and Two Mile Canyon on the south. TA-55 is a plutonium processing facility, which began operating in 1978. Hazardous and mixed waste container storage at TA-55 is conducted at seven CSUs. These CSUs are identified as B40, B05, K13, B45, the Vault, the Container Storage Pad, and TA-55-185. The following sections provide general dimensions, containment features, and materials of construction for each CSU to satisfy the requirements of 20.4.1 NMAC §270.15(a)(1) and (2) [6-14-00].

G.1.1 B40

The B40 CSU is used to store containers of hazardous and mixed waste that may contain liquids. (B40 was described as Area 1 in previous permitting applications.) B40 is located in the southwest section of the TA-55-4 basement, as shown on Figure G-1. The CSU is L-shaped and has long dimensions of 61.5 by 55 feet (ft). The maximum storage capacity of this unit is 21,500 gallons (gal), the equivalent of 391 55-gal drums. The types of waste containers holding hazardous or mixed waste that are stored in B40 include 5-, 10-, 12-, 15-, 30-, 55-, and 85-gal drums; large waste boxes; special order waste boxes; and standard waste boxes (SWB).

G.1.2 B05

The B05 CSU is used to store containers of hazardous and mixed waste that do not contain liquids. (B05 was described as Area 3 in previous permitting applications.) B05 is located in the southwest section of the TA-55-4 basement, as shown in Figure G-1. The CSU is rectangular shaped and is 26 ft long by 10 ft wide. The maximum storage capacity of this unit is 3,600 gal, the equivalent of 66

55-gal drums. The types of waste containers holding hazardous or mixed waste that will be stored in B05 include 30-, 55-, and 85-gal drums, large waste boxes; and SWBs.

G.1.3 K13

The K13 CSU is used to store containers of hazardous and mixed waste that may contain liquids. (K13 was described as Area 4 in previous permitting applications.) K13 is located in the northwest section of the TA-55-4 basement, as shown on Figure G-1. The CSU is rectangular shaped and is 16 ft long by 13 ft wide. The maximum storage capacity of this unit is 2,500 gal, the equivalent of 46 55-gal drums. The types of waste containers holding hazardous or mixed waste that will be stored in K13 include 0.25-, 0.5-, 0.75-, 1-, 2-, 4-, and 6-liter/quart containers; 5-, 10-, 12-, and 15-gal containers; 30-, 55-, and 85-gal drums; and large waste boxes.

G.1.4 B45

The B45 CSU is used to store containers of hazardous and mixed waste that do not contain liquids. (B45 was described as Area 5 in previous permitting applications.) B45 is located in the northeast section of the TA-55-4 basement, as shown on Figure G-1. The CSU is rectangular shaped and is 45 ft long by 17.5 ft wide. The maximum storage capacity of this unit is 11,000 gal, the equivalent of 200 55-gal drums. The types of waste containers holding hazardous or mixed waste that will be stored in B45 include 5-, 10-, 12-, and 15-gal containers; 55- and 85-gal drums; large waste boxes; and SWBs.

G.1.5 Vault

The Vault CSU is used to store containers of mixed waste that may contain liquids. (The Vault was described as Area 6 in previous permitting applications.) The Vault is located along the eastern wall of the basement at TA-55-4, as shown on Figure G-1, and is approximately 79.5 ft long by 50.5 ft wide. The maximum storage capacity of this unit is 4,000 gal, the equivalent of approximately 73 55-gal drums. The types of waste containers holding mixed waste that will be stored in the Vault include 0.25-, 0.5-, 0.75-, 1-, 2-, 4-, and 6-liter/quart containers; and 5-, 10-, 12-, 15-, 30- and 55-gal drums.

G.1.6 Container Storage Pad

The Container Storage Pad is used to store containers of hazardous and mixed waste that may contain liquids. The pad is located outside and northwest of TA-55-4, as shown on Figure G-2. It was installed in the mid-1980s and is constructed of asphaltic-concrete with a variable thickness of 4 to 6 inches (in.). The Container Storage Pad CSU is shaped like a trapezoid and measures 102 ft, 86 ft, 156 ft, and 105 ft. It also includes a rectangular strip measuring 70 ft by 10 ft on the southeast side. The pad is sloped, is elevated 2 to 4 in. above ground level, and has a culvert beneath the pad running from the northwest side to the southeast corner to minimize run-on of precipitation. The storage capacity of this area is 135,000 gal, the equivalent of approximately 2,455 55-gal drums. The types of waste containers holding hazardous or mixed waste that will be stored on the container storage pad include 0.25-, 0.5-, 0.75-, 1-, 2-, 4-, and 6-liter/quart containers; 30-, 55-, and 85-gal drums; SWBs; large waste boxes; and 5-, 10-, 12-, and 15-gal containers.

G.1.7 TA-55-185

TA-55-185 will be used to store containers of hazardous and mixed waste that do not contain liquids. TA-55-185 is located west of TA-55-4, as shown on Figure G-3. The building was constructed in 1991 and consists of a steel frame with fiberglass insulation, metal walls, and a concrete floor. The TA-55-185 CSU will be approximately 60 ft long by 40 ft wide, and will have a maximum storage capacity of 30,000 gal, the equivalent of 546 55-gal drums. The types of waste containers holding hazardous or mixed waste that will be stored at TA-55-185 include 30-, 55-, and 85-gal drums; large waste boxes; and SWBs.

G.2 CONTAINMENT SYSTEMS [20.4.1 NMAC §§270.15(a)(1-5) and 270.15(b)(1-2)]

The B40, K13, Vault, and Container Storage Pad CSUs will be used to store liquid and/or potentially liquid-bearing wastes; therefore, the requirements of 20.4.1 NMAC §264.175(b) [6-14-00] are applicable for these CSUs. Table G-2 provides the secondary capacity associated with each of these CSUs.

Secondary containment at B40, K13, and the Vault CSUs is primarily provided by self-containment pallets, covered self-containment pallet, single-drum pallets, or storage cabinets. Secondary containment at the Container Storage Pad CSU is provided by covered self-containment pallets. Each containment system is described below.

- Self-Containment Pallet: Molded high-density polyethylene base with a fiberglass grating that elevates the containers over a reservoir that is capable of containing leaks and spills from the containers.

- Covered Self-Containment Pallet: Molded, chemical-resistant, high density polyethylene with a removable polyethylene grating and a hinged two-part cover, which is impervious to precipitation. Supplement G-1 provides detailed information on the covered self-containment pallets.

- Single-Drum Containment Pallet: An 85-gal container made of heavy-duty polyethylene designed to hold one 55-gal drum.

- Cabinet: An epoxy-enamel-coated steel frame with a base that has a raised, leakproof sill. Each shelf is lined with a high-density polyethylene tray that is capable of containing leaks and spills from containers.

The B40, K13, and Vault CSUs are located in the basement of TA-55-4. This basement has a recessed floor that provides another level of containment for the liquid wastes stored there. The floor consists of a 10-in.-thick reinforced concrete slab that is free of cracks and gaps, is compatible with the wastes stored in the area, will effectively prevent the migration of waste to the environment, and is capable of collecting releases and accumulated liquids until the material is removed. Each of these containment systems will hold, at a minimum, 10 percent of the volume of the potential liquid-bearing containers or the volume of the largest potential liquid-bearing container stored, whichever is greater, pursuant to the requirements of 20.4.1 NMAC §264.175(b)(3) [6-14-00]. Containers holding hazardous or mixed waste in each CSU will be protected from potential contact with accumulated liquids by either being elevated or stored in an area that is designed and operated to remove accumulated liquids.

The B05, B45, and TA-55-185 CSUs will be used to store containers with only non-liquid bearing waste (i.e., solid form). These CSUs all reside in a building; therefore, run-on and run-off from storm events are not applicable. In the event of a water leak from facility systems, the TA-55-4 basement has sumps to contain the liquid. Drummed waste containers are placed on pallets or stored in self-containment structures. SWBs will be placed on pallets. Large waste boxes are elevated by design. All waste items in TA-55-185 will either be placed on pallets or are elevated by design.

G.3 SPECIAL REQUIREMENTS FOR IGNITIBLE, REACTIVE, AND INCOMPATIBLE WASTES [20.4.1 NMAC §270.14(b)(9), §270.15(c) and (d) and 20.4.1 NMAC §§264.17, 264.176, and 264.177]

Ignitable or reactive waste is stored at the K13 and B40 CSUs and on the Container Storage Pad. Pursuant to 20.4.1 NMAC §264.17 [6-14-00], LANL will follow specific waste management procedures for ignitable and reactive waste as discussed in Section 2.1.9 of this permit application.

Ignitable, reactive, and incompatible wastes will not be stored at B05, B45, and the Vault or at TA-55-185; therefore, the requirements of 20.4.1 NMAC §264.17, and 20.4.1 NMAC §270.15(c) and (d) [6-14-00] do not apply at these CSUs.

G.4 AIR EMISSION STANDARDS FOR CONTAINERS

This section addresses potential applicability of 20.4.1 NMAC, Subpart V, Part 264, Subpart CC [6-14-00], "Air Emission Standards for Tanks, Surface Impoundments, and Containers" to containers at TA-55, based on applicability criteria specified in 20.4.1 NMAC §264.1080 [6-14-00]. Subpart CC standards for containers require that containers of hazardous waste be covered or controlled so that there are no detectable emissions. These standards are not applicable to containers of radioactive mixed waste. The standards are also not applicable to containers of hazardous waste with less than 500 parts per million by weight (ppmw) volatile organics, containers that have received waste prior to the effective date of regulation (December 6, 1996), or containers of less than 0.1 cubic meters (m^3) (approximately 26 gal) capacity. LANL requires that Subpart CC requirements be met by the generator as part of the waste characterization process. The generator determines the concentration of volatile organics in a waste stream at the point of generation. The generator documents this determination for that waste stream, as described in Appendix B of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application."

Containers of less than 0.46 m^3 (approximately 119 gal) capacity and that meet U.S. Department of Transportation (DOT) specifications under the Code of Federal Regulations, Title 49, Part 178, will be kept closed during storage pursuant to 20.4.1 NMAC §264.1086(b)(1)(ii) [6-14-00]. Containers undergoing waste characterization activities may be open for access for the purposes described in 20.4.1 NMAC §264.1086(c) [6-14-00]. Containers of greater than 0.46 m^3 capacity that contain waste with greater than 500 ppmw volatile organics or those that are greater than 0.1 m^3 capacity, do not meet DOT specifications, and contain wastes of greater than 500 ppmw volatile organics will be subject to a visual inspection and monitoring program as required by 20.4.1 NMAC §264.1088(b) [6-14-00].

Table G-1
Use and Management of Containers
Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§270.15	Specific information requirements for containers:	G.0
§270.15(a)	A description of the containment system to demonstrate compliance with §264.175 including at a minimum:	G.2
§270.15(a)(1)	Basic design parameters, dimensions, and materials of construction	G.1
§270.15(a)(2)	How the design promotes drainage or how containers are kept from contact with standing liquids in the containment system	G.2
§270.15(a)(3)	Capacity of the containment system relative to the number and volume of containers to be stored	G.2
§270.15(a)(4)	Provisions for preventing or managing run-on	G.2
§270.15(a)(5)	How accumulated liquids can be analyzed and removed to prevent overflow	G.2
§270.15(b)	For storage areas that store containers holding wastes that do not contain free liquids, a demonstration of compliance with §264.175(c) including:	G.2
§270.15(b)(1)	Test procedures and results or other documentation or information to show that the wastes do not contain free liquids	G.2
§270.15(b)(2)	A description of how the storage area is designed or operated to drain and remove liquids or how containers are kept from contact with standing liquids	G.2
§270.15(c)	Sketches, drawings, or data demonstrating compliance with §264.176 (location of buffer zone and containers holding ignitable or reactive wastes) and §264.177(c) (location of incompatible wastes), where applicable	G.3
§270.15(d)	Where incompatible wastes are stored or otherwise managed in containers, a description of the procedures used to ensure compliance with §264.177(a) and (b) and §264.17(b) and (c)	G.3
§270.15(e)	Information on air emission control equipment as required in §270.27	G.4
§270.27(a)	Specific information requirements for air emission controls	G.4
§270.27(a)(2)	Identification of each container area subject to the requirements of §264, Subpart CC and certification by the owner or operator that the requirements are met	G.4
§270.27(a)(3)	Documentation that each enclosure used to control air emissions from containers are in accordance with the requirements of §264.1086(b)(2)(I) includes information prepared by the owner or operator or manufacturer or vendor describing the enclosure design and certification that the enclosure meets the specifications listed in §265.1087(b)(2)(ii)	NA[a]
§270.27(a)(5)	Documentation for each closed-vent system and control device installed in accordance with the requirements of §264.1087 that includes design and performance information as specified in §270.24 (c) and (d)	NA
§270.27(a)(6)	An emission monitoring plan for both Method 21 and control device monitoring methods. The plan must include:	NA
§270.27(a)(7)	Implementation schedule	NA

a NA = not applicable

Table G-2
Container Storage Unit Maximum Storage and Containment Capacities

Container Storage Unit	Maximum Capacity (gallons)	Containment Systems	Containment Capacity (gallons)
B40	21,500	Self-Containment Pallets	112 [a]
		Single-drum Containment Pallets	55
		TA-55-4, Basement	46,258
		Covered Self-Containment Pallets	112[a]
K13	3,400	Self-Containment Pallets	112 [a]
		Single-drum Containment Pallets	55
		TA-55-4, Basement	46,258
		Cabinets	20
		Covered Self-Containment Pallets	112[a]
Vault	4,000	Self-Containment Pallets	112 [a]
		TA-55-4, Basement	46,258
B05	3,600	NA	NA
B45	11,000	NA	NA
TA-55-185	30,000	NA	NA
Container Storage Pad	135,000	Covered Self-Containment Pallets	112[a]

[a] No more than 110 gallons (i.e., two 55-gallon drums) of free liquid will be stored on an individual containment pallet.

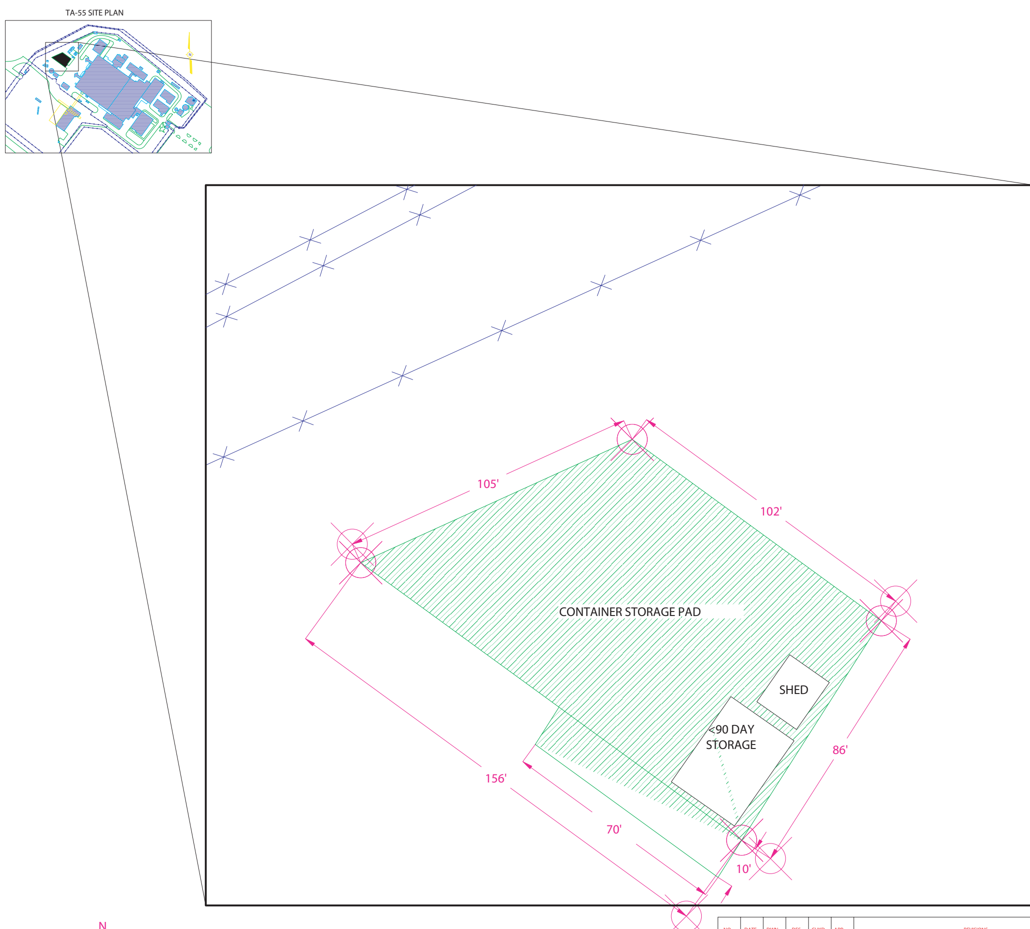
NA = Not Applicable because this CSU is used to store solid waste only.

Table G-3
Capacity Calculations for Containment Systems

Containment System	Length (feet)	Width (feet)	Depth (inches)	Capacity (cubic feet)	Capacity (gallons)
Self-Containment Pallet and Covered Self-Containment Pallet	4.3	2.1	20	15	112[a]
TA-55-4, Basement	280	265	1	6,183	46,258
Cabinet	1.5	3.6	6	2.7	20

[a] No more than 110 gallons (i.e., two 55-gallon drums) of free liquid will be stored on an individual containment pallet.

Figure G-1 has been provided confidentially under separate cover.



N

TECHNICAL AREA 55, CONTAINER STORAGE PAD

SCALE: 1/16"=1'-0"

0 2' 4' 8' 16'

1/16"=1'-0"

GENERAL NOTES

1. DIMENSIONS SHOWN ARE ROUNDED TO THE NEAREST FOOT.
2. TA-55-4 LOCATED APPROXIMATELY 140 FEET EAST OF CONTAINER STORAGE PAD.
3. SEE THE TABLE BELOW FOR DETAILS ABOUT THE MAXIMUM CAPACITY, WASTE TYPES AND CONTAINER TYPES FOR THE CSU.

CSU	MAXIMUM CAPACITY	WASTE TYPES	CONTAINER TYPE
CONTAINER STORAGE PAD	135,000	SOLID/LIQUID HAZARDOUS AND MIXED	0.25-, 0.50-, 0.75-, 1-, 2-, 4-, 6-LITER/QUART CONTAINERS; 5-, 10-, 12-, AND 15-GALLON CONTAINERS; 30-, 55-, AND 85-GALLON DRUMS; LARGE WASTE BOXES; AND STANDARD WASTE BOXES

LEGEND

CONTAINER STORAGE UNIT

CHAIN LINK SECURITY FENCE

Figure G-2

Technical Area 55
Container Storage Pad

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

Shaw™ Environmental & Infrastructure, Inc.

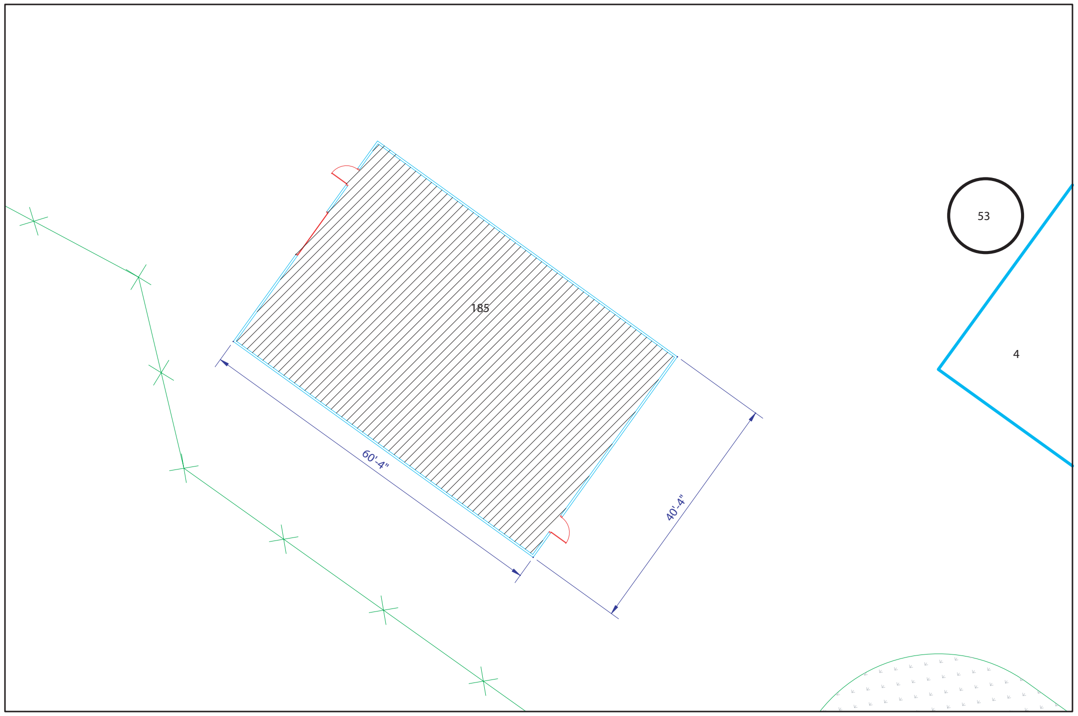
LOS ALAMOS — LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO 87545

TECHNICAL AREA 55
CONTAINER STORAGE UNITS

TECHNICAL AREA 55
CONTAINER STORAGE PAD

BLDG. TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. G-2	2 OF 3	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					



GENERAL NOTES:

1. DIMENSIONS SHOWN ARE ROUNDED TO THE NEAREST INCH.
2. SEE TABLE BELOW FOR THE MAXIMUM CAPACITY, WASTE TYPES, AND CONTAINER TYPES FOR THE CSU.

CSU	MAXIMUM CAPACITY	WASTE TYPES	CONTAINER TYPES
TA-55-185	30,000	SOLID HAZARDOUS AND MIXED	30-, 55-, AND 85-GALLON DRUMS; LARGE WASTE BOXES; AND STANDARD WASTE BOXES

LEGEND

CONTAINER STORAGE UNIT

CHAIN LINK SECURITY FENCE

N

TECHNICAL AREA 55, BUILDING 185, CONTAINER STORAGE UNIT

SCALE: 1/16"=1'-0"

0 4' 8' 16' 32'

1/16"=1'-0"

Figure G-3

Technical Area 55, Building 185, Container Storage Unit

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

Shaw™ Environmental & Infrastructure, Inc.

LOS ALAMOS

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO 87545

TECHNICAL AREA 55
CONTAINER STORAGE UNITS

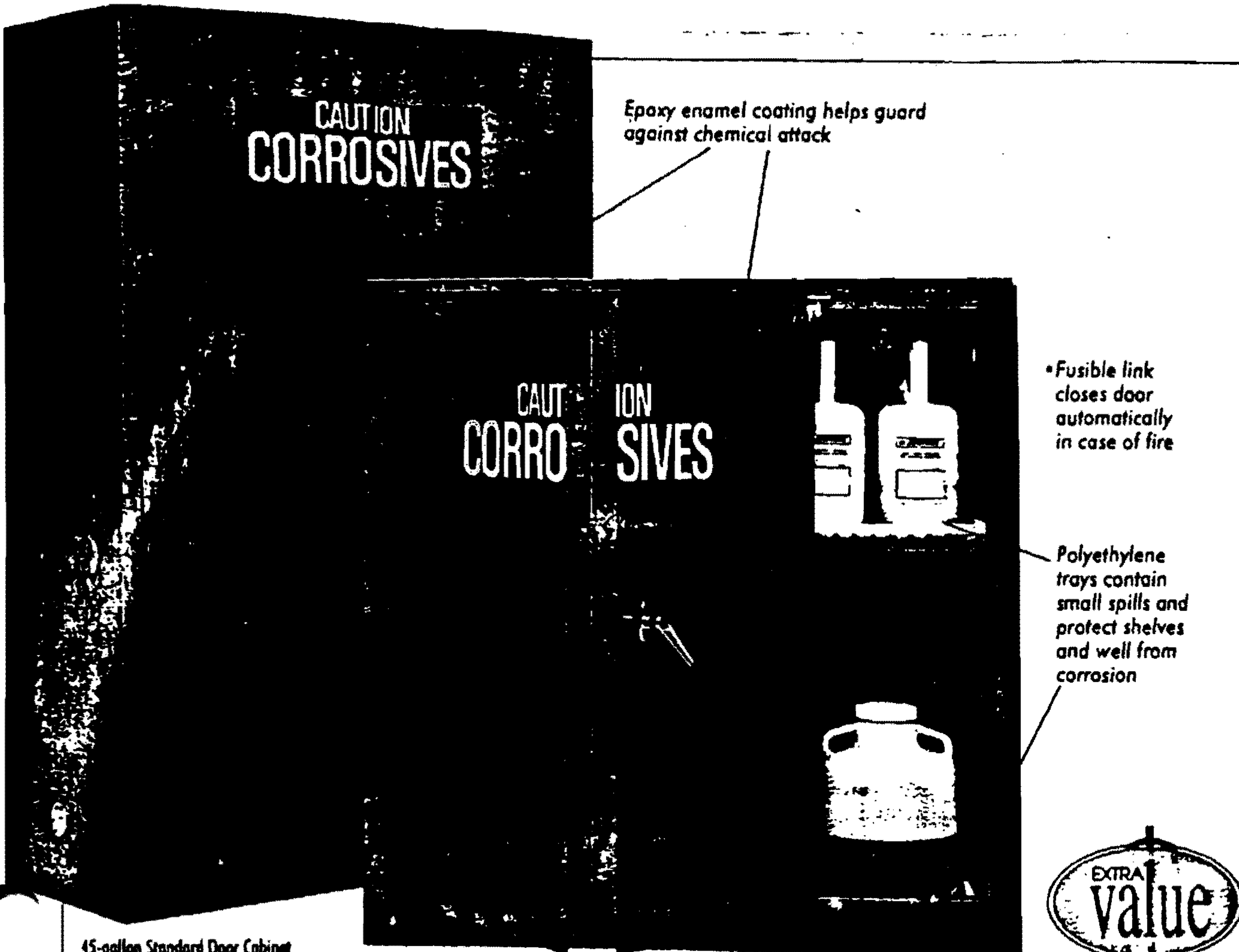
TECHNICAL AREA 55, BUILDING 185
CONTAINER STORAGE UNIT

BLDG. 185 TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. G-3	3 OF 3	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

Supplement G.1

Manufacturer's Information on Waste Containers and Containment Units



45-gallon Standard Door Cabinet

30-gallon Sliding Door Cabinet

Optional Extra Value Polyethylene Tray Package includes two shelf trays and one bottom tray for 30- or 45-gallon cabinets.

Eagle® Acid Storage Cabinets

Now Offering Our Extra Value Polyethylene Tray Package—Save More Than $50.00!

Tough epoxy enamel coating on the inside and outside of cabinet protects against chemical attack so cabinet lasts longer. Available as a ***Standard Two-Door Cabinet*** (manual door operation), or as a ***Sliding Self-Closing Door Cabinet*** with a fusible link that automatically closes the door at 165°F. Choose from 30-, 45- or 60-gallon storage capacities.

Specifications: Double-wall 18-gauge steel frame. Features a 1½" airspace between walls, upper and lower vents, a three-point latch with keylock, and a 2" raised, leakproof sill. For additional protection, each cabinet includes high-density polyethylene trays for each shelf and for the bottom. Each tray resists rust and corrosion while containing up to one gallon of spill. Locking tabs secure trays on shelves. Additional trays available separately. ***Extra Value Tray Package*** includes two shelf trays and one bottom tray for 30- or 45-gallon cabinets.

Note: Not suggested for use with nitric and sulfuric acids.

Acid Storage Cabinets

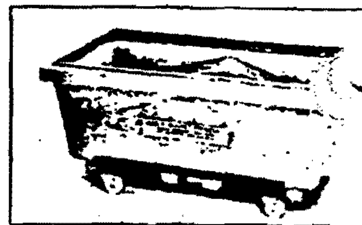
No.	Capacity (gal.)	Door Style	No. of Shelves	O.D. (in.) H	x W	x D	Shipping Wt. (lbs.)	Each 1	2
YB-2150	30	Standard	1	44	43	18	265	506.15	455.55
YB-2150-3	30	Sliding	1	44	43	18	265	527.65	474.90
YB-2151	45	Standard	2	65	43	18	334	591.15	532.35
YB-2151-2	45	Sliding	2	65	43	18	367	655.20	621.60
YB-10837	60	Standard	2	65	31	31	380	843.45	759.15
YB-10836	60	Sliding	2	65	31	31	380	912.85	821.60

Additional Polyethylene Trays and Metal Shelves

No.	Description	Each 1	2
YB-23531	Extra Value Tray Package (30 or 45 gal.)	58.60	52.80
YB-7905	Bottom Tray (30 or 45 gal.)	40.05	36.05
YB-7906	Shelf Tray (30 or 45 gal.)	40.05	36.05
YB-10838	Bottom Tray (60 gal.)	51.45	46.40
YB-10839	Shelf Tray (60 gal.)	51.45	46.40
YB-7907	Metal Shelf (30 or 45 gal.)	42.30	38.10
YB-10840	Metal Shelf (60 gal.)	72.90	65.65

• 100% polyethylene construction provides great chemical compatibility

Poly-Funnel™ sold separately *on page 408*



Caster/Frame Assembly and Poly-Safetypack™ Base available separately.

Poly-Safetypack™ Plus allows pumps to remain in drum during storage.

Poly-Safetypack™ and Poly-Safetypack™ Plus Secondary Containment Systems

Large storage facilities hold two 55-gallon drums. Protect your drums from weather while keeping drips and leaks contained.
Specifications: 100% polyethylene construction resists chemicals and adverse conditions. 6" supports enable safe handling by forklift or pallet jack. Includes removable polyethylene grating, drain fitting and security lock. Available with or without lids. ***Poly-Safetypack*** has a 135-gallon sump capacity. Hinged two-part cover keeps your contents dry. ***Poly-Safetypack Plus*** has a 240-gallon sump capacity. Hinged lids can be closed with pumps in place—no need to remove pumps for storage. Optional ***Caster/Frame Assembly*** offers easy mobility and fits both models.
Compliance: EPA Container Storage Regulation 40 CFR 264.175 and Uniform Fire Code Article 80.
Please Specify Color: GR (gray), Y (yellow).

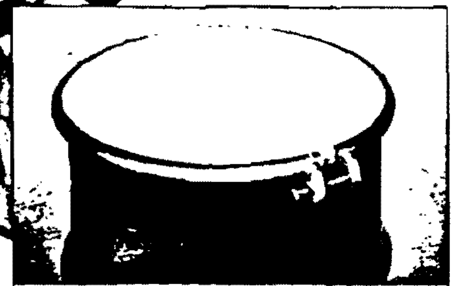
No.	Description	O.D. (in.) H	x W	x L	Each
YB-11243	Poly-Safetypack with Lids	46¾	33¾	60¼	723.75
YB-11243-2	Poly-Safetypack, Base Only	27	33½	58½	376.80
YB-11243-3	Caster/Frame Assembly	—	—	—	289.10
YB-23377	Poly-Safetypack Plus with Lids	64¾	33¾	60¼	854.70

Eagle® Single-Drum Containment Unit

upports the entire weight of the drum during transport, making this an ideal collection or dispensing center. To move, use *No. 2132 Drum Dolly* or position forklift blades beneath the octagonal lip edge, and raise.
Specifications: 85-gallon container features heavy-duty polyethylene construction for strength and chemical resistance. Tough, durable, and ready for years of service. Unique design provides extra room at the top (32" OD) to make inserting a drum a simple operation. Body diameter is a standard 25½". Overall height: 34". Empty units nest together for maximum use of space.
Compliance: EPA requirement for secondary containment of hazardous materials.

No.	Description	Each
25726	Containment Unit	150.90
2132	Drum Dolly	75.50

Sheet F.O.F. Requirem
r for *HM-181 Compliance*



Open-Head Drums have removable tops and come with all fastening hardware.

8Closed-Head Drums feature a standard 2" and ¾" NPT opening.

Lined Drum	Unlined Drum

DOT Reg.	Gauge Body/Top/Bottom	Type	Wt. (lbs.)	Unlined No.	UN Marking	Each 1	Each 10	Each 20	Lined No.	UN Marking	Each 1	Each 10	Each 20
17C	16/16/16	Open	55	YB-2707	1A2/Y1.2/150	61.00	54.90	49.45	YB-14669	1A2/Y1.2/150	62.70	56.45	50.80
17H	18/16/18	Open	55	YB-4389†	1A2/Y1.5/150	64.95	58.50	52.65	YB-14670	1A2/Y1.2/150	65.30	58.80	52.90
17E	20/18/18	Closed	50	YB-4390†	1A1/Y1.8/300	52.40	47.20	42.45	YB-14671	1A1/Y1.4/200	52.90	47.65	42.85
17H	18/16/18	Open	35	YB-4391†	1A2/Y1.2/150	55.55	50.00	45.00	YB-14672	1A2/Y115/S	56.35	50.75	45.65
17E	20/20/20	Closed	25	YB-4392†	1A1/Y1.4/300	47.55	42.80	38.55	YB-14673	1A1/X1.3/250	48.25	43.45	39.10
17C	18/18/18	Open	35	YB-4393	1A2/Y1.2/100	50.45	45.45	40.90	YB-14674	1A2/Y1.2/100	51.90	46.75	42.05
17C	18/18/16	Open	20	YB-4394	1A2/Y90/S	44.20	39.80	35.80	YB-14675	1A2/Y80/S	47.20	42.50	38.25
17E	20/20/20	Closed	18	YB-4401†	1A1/Y1.5/300	35.40	31.90	28.70	YB-14676	1A1/X1.2/300	36.20	32.60	29.35
17C	20/20/20	Open	12	YB-4395*	1A2/Y42/S	42.85	38.60	34.75	–	–	–	–	–
17C	20/20/20	Open	12	YB-4402	1A2/Y42/S	40.55	36.50	32.85	–	–	–	–	–

2" plug in top bead. †Available in Blue, Black or Gray.

TRUPACT II STANDARD WASTE CONTAINER

APPROVED BY THE DOE FOR USE WITH THE WASTE ISOLATION PILOT PROJECT

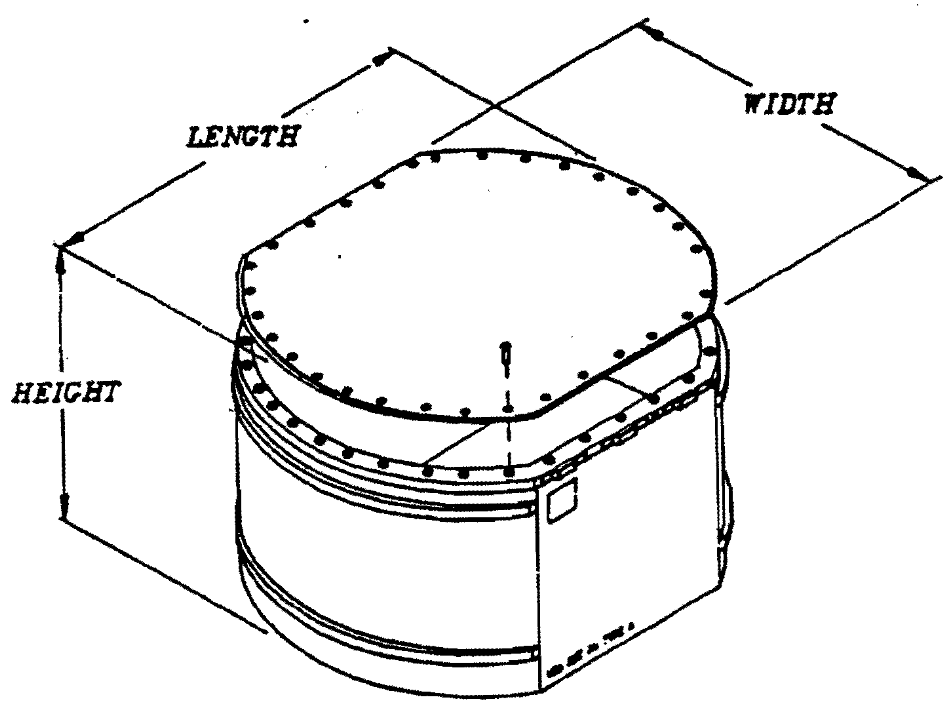
DIMENSIONS (INCHES)	INTERIOR	EXTERIOR
HEIGHT	36"	37"
WIDTH	52"	54 1/4"
LENGTH	68 11/16"	71"

DESCRIPTION

CLASSIFICATION	LSA WASTE CONTAINER
PACKAGE TYPE	CFR SPECIFICATION 7A TYPE A
CAPACITY	72 CUBIC FEET
MATERIAL	ASTM A-569 LOW CARBON HOT ROLLED STEEL
GROSS WEIGHT (EMPTY)	748 POUNDS
PAYLOAD	4,000 POUNDS
MAX. LOADED WEIGHT	4,748 POUNDS

ADDITIONAL INFORMATION

FULLY TESTED AND CERTIFIED FOR ALL CONTENT FORMS 1 THRU 5.
BOLTED CLOSURE ALLOWS QUICK AND EASY SECUREMENT OF THE LID.
COMPLETELY COMPATIBLE WITH WIPP TRUPACT OVERPACK TRANSPORT CONTAINERS.
OPTIONAL SHIELDING AVAILABLE TO MEET USER REQUIREMENTS.
FINAL PROTECTIVE FINISH TO MEET USER REQUIREMENTS.
OPTIONAL WELDED LID UNIT AVAILABLE.

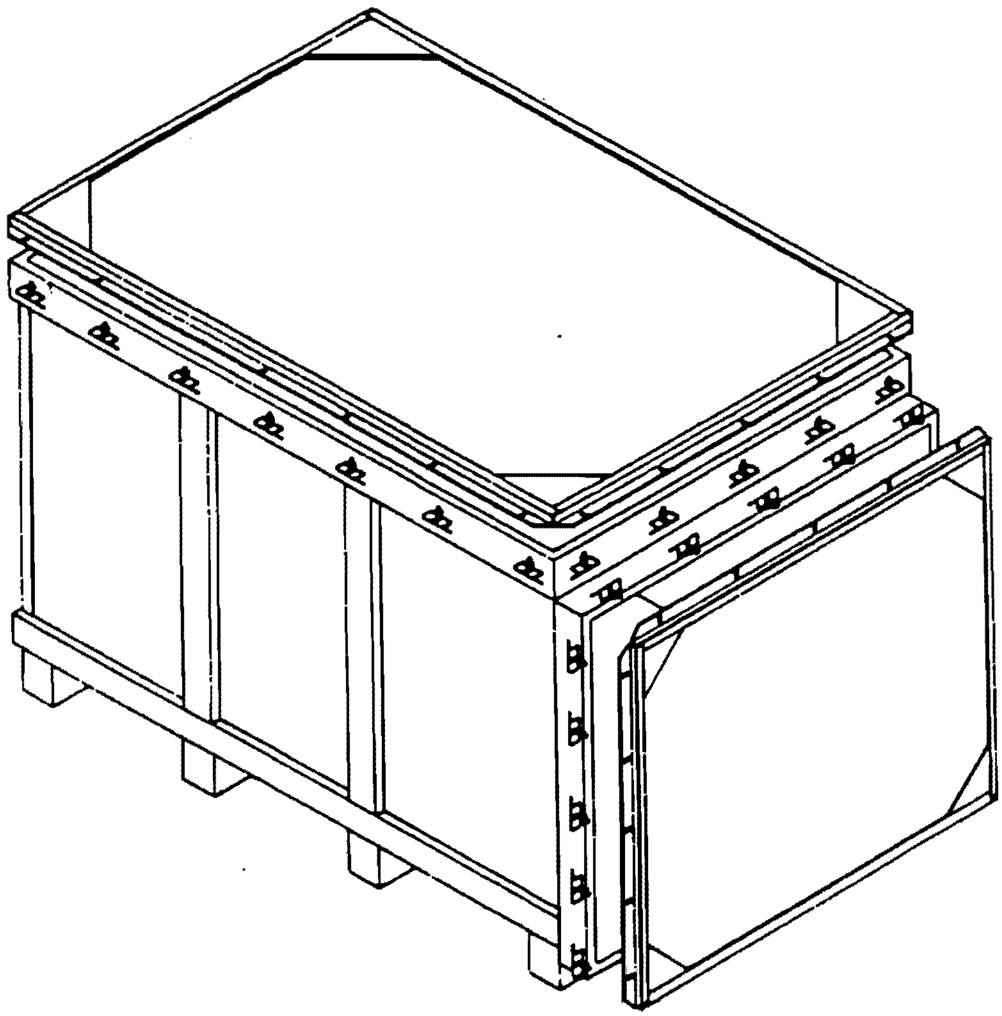


U.S. PATENT NUMBERS 4371092 AND 4426927

CONTAINER PRODUCTS CORPORATION
P.O. BOX 3767 112 NORTH COLLEGE ROAD
WILMINGTON, NORTH CAROLINA 28405
(919)392-6100 FAX (919)392-6778

MULTI-AXIS ACCESS TYPE A AND STRONG-TIGHT CONTAINERS

MULTI-ACCESS CONTAINERS, UNITS WHICH CAN BE LOADED AND UNLOADED FROM THE TOP AS WELL AS THE SIDE AND/OR END, DESIGNED TO YOUR SPECIFIC NEEDS ARE AVAILABLE AND ARE DESIGNED TO COMPLY WITH LSA, TYPE A AND-OR IAEA SPECIFICATIONS. UNITS CAN BE MANUFACTURED FROM AS SMALL AS 1 CUBIC FOOT TO IN EXCESS OF 3,000 CUBIC FEET WITH PAYLOAD CAPACITIES IN EXCESS OF 40 TONS.



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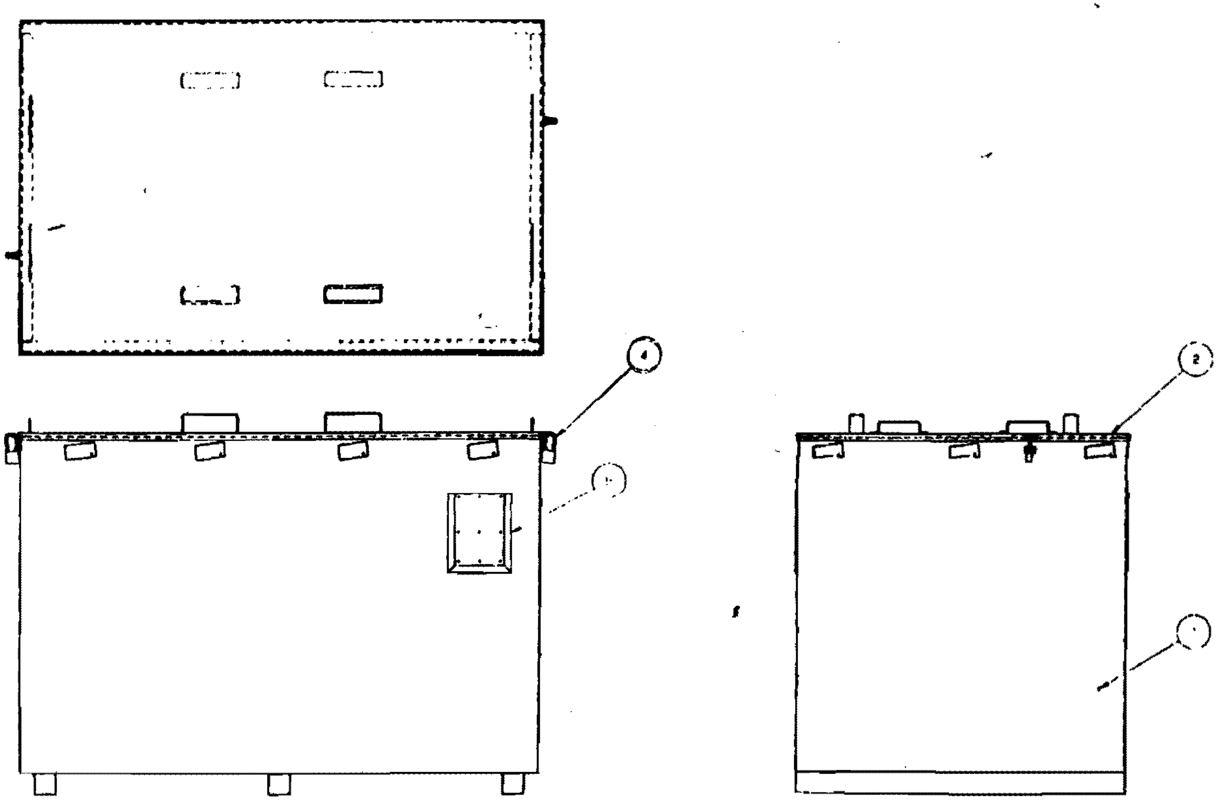
(919)392-6100 FAX (919)392-6778

BILL OF MATERIAL

ITEM	QTY		DESCRIPTION
1			[illegible]
2	1		[illegible]
3	4	16	[illegible]
4	2		[illegible]
5	2	32	[illegible]



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		ORIGINAL ISSUE		
		REVISIONS		

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

AUTOCAD FILE NAME: 3079D01B

Classification of drawing: UNCL

TITLE: ASSEMBLY
WASTE BOX
MODIFICATION

TA-55

SCALE: 1/8 | SHEETS: 3 | DRAWING NO: 26Y-203079 | D01

ATTACHMENT H

STORAGE TANK SYSTEM

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LIST OF SUPPLEMENTS

LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
ACI	American Concrete Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BPVC	Boiler and Pressure Vessel Code
CAM	continuous air monitor
ft	feet/foot
gal	gallon(s)
in.	inch(es)
L	liter(s)
LANL	Los Alamos National Laboratory
TA	technical area

ATTACHMENT H
STORAGE TANK SYSTEM

The information provided in this section is submitted to address the applicable tank system requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §270.16, and 20.4.1 NMAC, Subpart V, Part 264, Subpart J, revised June 14, 2000 [6-14-00]. This section provides a description of the storage tank system that is used to store mixed waste solutions at Los Alamos National Laboratory (LANL) Technical Area (TA) 55. It includes detailed descriptions of the storage tank system components and associated ancillary equipment.

There is one storage tank system at TA-55 that is comprised of 3 tank components that share a common piping and pumping system. The storage tank system consists of both new and existing components as summarized in Table H-1.

The evaporator glovebox tank was constructed in 1986 and is an existing tank; therefore, this component of the tank system is addressed in this permit application in accordance with the requirements of 20.4.1 NMAC §264.191 [6-14-00]. The cementation unit pencil tanks were constructed in 1985 and were considered existing tanks until new components were installed in 1996. These new components were determined to be a major, non-routine modification; therefore, the cementation unit pencil tanks are subject to the new tank system regulations and are addressed in this permit application as new tanks in accordance with the requirements of 20.4.1 NMAC §264.192 [6-14-00]. The pencil tanks will be constructed and, thus, are subject to new tank system regulations in accordance with the requirements of 20.4.1 NMAC §264.192 [6-14-00].

The written engineering assessments and certifications for the tanks, as required by 20.4.1 NMAC §§264.191 and 264.192(a) [6-14-00], are provided in Supplements H.1, H.2A, H.2B, H.2C, and H.3, respectively. Detailed drawings and information are provided as Figures H-1 through H-13 and are provided for informational purposes only. Table H-2 summarizes applicable regulatory references for tank systems and the corresponding location where the requirement is addressed in this permit renewal application.

H.1 DESIGN, CONSTRUCTION, MATERIALS, AND OPERATION [20.4.1 NMAC §270.16(b), (c), (d) and (l); 20.4.1 NMAC §§264.191(b)(1) and (3), and 264.192(a)(1)]

The TA-55 storage tank system is located at TA-55, Building 4, in Room 401 (Figure H-1) and has a maximum capacity of 1,270 Liters (L) (336 gallons [gal]). The storage tank system consists of 3 components, with 16 tanks, that are used to store evaporator bottoms solutions prior to stabilization in the cementation unit.

The evaporator bottoms solutions are initially stored in the evaporator glovebox tank component, where they are sampled for radionuclides, oxides, and metals. They remain in the evaporator glovebox tank component until the radionuclide content is known. If the sampling results show radionuclide concentrations below the discard limit, the solutions are transferred to the cementation unit pencil tanks component or the pencil tanks component for storage pending the remaining analytical results. Upon completion of the remaining analyses, the solutions are transferred directly to the cementation unit for treatment. If the sampling results show concentrations above the discard limit, the solutions are recirculated. Figures H-1 and H-2 provide a general arrangement diagram and a process flow diagram for the TA-55 storage tank system.

The storage tank system is connected to three main piping systems, which include the solution feed, ventilation, and vacuum piping systems. Each tank component has a separate header that connects to each of the piping systems. The wet-vacuum piping system is used for all transfers; and the vent-piping system is used to break vacuum. The wet-vacuum and vent-piping systems use vacuum traps to capture carryover liquid and prevent contamination of the lines downstream. One vacuum pump serves the storage tank system for liquid transfers and for vacuum sparging. The following sections provide descriptions of each of the tank system components and associated ancillary equipment. The information meets the requirements of 20.4.1 NMAC §270.16(b), (c), (d) and (l); 20.4.1 NMAC §§264.191(b)(1) and (3); and 264.192(a)(1) [6-14-00].

H.1.1 Evaporator Glovebox Tank Component

The evaporator glovebox tank component is located in the northwest corner of TA-55-4, Room 401, as shown in Figure H-1. It is approximately 8 feet (ft) high, 4-ft wide, and 13-ft long and consists of two welded-steel trays, eight glass columns, and associated ancillary equipment. The overall capacity of the evaporator glovebox tank component is approximately 270 L (71 gal). The evaporator glovebox tank component is fabricated from 0.1875-inch (in.), 316 stainless steel with a 2B finish conforming to the American Society for Testing and Materials (ASTM) “A240-Standard Specification for Heat-

Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels," hereinafter referred to as ASTM A240 (ASTM, 1998). The lower half of the tank is fabricated with additional layers of materials welded to the outside of the 0.1875-in.-thick stainless-steel enclosure. These materials consist of 0.25-in.-thick lead shielding, conforming to ASTM "B29-Standard Specification for Refined Lead" (ASTM, 1997a), and an outer layer of 0.0625-in. 316 stainless steel cladding. The tank component is of welded construction with all welds blended, ground, and polished to blend with adjacent material. All joints are vacuum tight.

The support frame and legs of the evaporator glovebox tank component are constructed of carbon steel and conform to ASTM "A36-Standard Specification for Structural Steel for Welding" (ASTM, 1987). The support frame is bolted to the base of the tank component for stabilization. In addition, the legs of the tank component are bolted to the support frame and secured to the 10-in.-thick concrete floor of Room 401 with anchor bolts. The 10-in.-thick concrete floor was constructed to conform to the reinforced concrete building code requirements of the American Concrete Institute (ACI) "318-71-Building Code Requirements for Structural Concrete and Commentary," hereinafter referred to as ACI 318-71 (ACI, 1995). The reinforcing steel was detailed and fabricated in accordance with ACI "315-Details and Detailing of Concrete Reinforcement," hereinafter referred to as ACI 315 (ACI, 1992). The design construction and tolerance of the framework around the concrete is in accordance with ACI "347-Guide to Formwork for Concrete," hereinafter referred to as ACI 347 (ACI, 1994). Figure H-3 shows the dimensions of the evaporator glovebox tank component and its support structure.

The window portions of the evaporator glovebox tank component are constructed of 0.25-in. leaded glass, laminated on both sides with 0.125-in. clear glass, and installed with a neoprene gasket. Additionally, each window is backed with 0.25-in. safety glass installed with a neoprene gasket/seal that provides airtight containment. The dual glass configuration is secured to the tank component with a welded frame consisting of a 0.25-in.-thick lead shielding and a 0.0625-in. 316 stainless steel cladding similar to the additional layers of materials welded to the outside of the lower half of the tank component. The welded window frames are bolted to the tank component. Replacement windows and gaskets, if and when needed, will be made of the same or similar materials.

The glove portions of the evaporator glovebox tank component are constructed of neoprene and Hypalon®. Each glove is tested for material continuity by the manufacturer before acceptance and installation in the evaporator glovebox tank component. Each glove is selected for its resistance to nitric acid. Replacement gloves, when needed, will be made of the same or similar materials.

The evaporator bottoms solutions are vacuum-transferred from the steel trays to the glass columns. Each glass column is individually filled and visually monitored during transfer from the steel trays to a glass column. To prevent overfill, the evaporator bottoms are automatically directed to a vacuum trap when the maximum capacity of a column is reached. The maximum capacity of the vacuum trap is approximately 5.5 L. The glass columns and the vacuum trap are constructed of PYREX® glass, manufactured by Corning, with stainless steel end plates. Replacement parts for the columns and vacuum trap will be of the same or similar materials. The glass columns are equipped with an air-sparging system designed to homogeneously mix the evaporator bottoms prior to sampling or transfer.

The piping associated with the evaporator glovebox tank component includes the transfer line from the evaporator, the wet-vacuum line, the lean-residue transfer line, and the ventilation lines entering and exiting the evaporator glovebox tank component. Figures H-4 and H-5 provide a legend and a piping and instrumentation diagram for the evaporator glovebox tank component. All piping and associated valves are constructed of single-walled, 316 stainless steel. The transfer line from the evaporator is 1.0-in. pipe, the wet-vacuum line and the lean-residue transfer line are 0.75-in. pipe, and the ventilation lines are 2.0-in. pipe. Pipe diameters may change in the event that a portion of the piping requires replacement. The evaporator glovebox tank component's ancillary equipment is supported by a steel channel Uni-strut® support frame. The Uni-strut® support frame is secured to the concrete ceiling with anchor bolts and provides the component's ancillary equipment with support and protection against physical damage and excessive stress that could potentially result from settlement, vibration, expansion, or contraction. Replacement supports will be made of the same or similar materials.

The evaporator glovebox tank component does not operate under pressure; therefore, excessive stress due to expansion and contraction is not anticipated. The evaporation glovebox component is not located within a saturated zone or seismic fault zone; therefore, floatation or dislodgment is unlikely. The component is located within a building, so frost effects are not expected.

All of the materials within the evaporator glovebox tank component are corrosion-resistant and are compatible with the evaporator bottoms stored in the tank component. No external portions of the tank component are in contact with soil or water.

H.1.2 Cementation Unit Pencil Tanks Component

The cementation unit pencil tanks component consists of five vertical tanks located perpendicular to the west wall of TA-55-4 in Room 401, as shown on Figure H-1. Each of the pencil tanks has a working capacity of 50 L (13 gal), an outside diameter of 6.625 in., a straight side height of 10 ft, a wall thickness of 0.28 in., and a conical bottom, as shown on Figure H-6. The pencil tanks are constructed of 316 stainless steel. The stainless steel materials are corrosion-resistant and are compatible with the liquid waste stored in the tanks, as confirmed by corrosion testing conducted in 1993 by TA-55 facility engineers. The vent trap and the vacuum trap operating within the cementation unit pencil tanks component have an outside diameter of 6.625 in. The vent trap has a straight side height of 9 in. and a maximum capacity of approximately 4 L. The vacuum trap has a straight side height of 37 in., a conical bottom, and a maximum capacity of approximately 17 L. The vent trap and the vacuum trap are constructed of 316 stainless steel for corrosion resistance and materials compatibility with the waste. All of the pencil tanks were designed in accordance with the latest applicable standards, including American Society of Mechanical Engineers (ASME) "Boiler and Pressure Vessel Code" (BPVC) (ASME, 1998), hereinafter referred to as ASME BPVC, Section VIII, Division 1. The pencil tanks are installed such that, if necessary, they can be replaced.

H.1.2.1 Piping and Ancillary Equipment

The piping associated with the cementation unit pencil tanks component includes the header/manifold, vacuum manifold, and lower manifold for the cementation unit pencil tanks component; the vent trap, vent line, and drain line; the transfer line from the evaporator glovebox tank component to the cementation unit pencil tanks component header/manifold; and the transfer line from the lower manifold to the cementation unit. Figures H-4 and H-7 provide a legend and piping and instrumentation diagram for the cementation unit pencil tanks component. All intertank piping and transfer piping is single-walled 0.75-in., Schedule 40, stainless steel pipe. Pipe diameters may change in the event that a portion of the piping requires replacement. All tank-to-piping connections are flanged.

The cementation unit pencil tanks component is equipped with a vacuum trap that is designed to collect any mists or carryover liquid that might accumulate in the vacuum or vent lines. The vacuum trap is equipped with a sight glass for local level indication and is normally empty. Each cementation unit pencil tank is equipped with three sight glasses located on the side of each tank for overfill protection.

H.1.2.2 Foundation and Support

The cementation unit pencil tanks component is erected upon a 10-in.-thick concrete floor in TA-55-4, Room 401. The 10-in.-thick concrete floor provides a foundation that will maintain the load of the tank component when full. The concrete floor and ceiling were constructed to conform to the building code requirements of ACI 318-71 for reinforced concrete (ACI, 1995). The reinforcing steel was detailed and fabricated in accordance with ACI 315 (ACI, 1992). The design, construction and tolerance of the framework around the concrete is in accordance with ACI 347 (ACI, 1994). The cementation unit pencil tanks component and its ancillary equipment are elevated and supported by a steel channel, Uni-strut® support frame. The Uni-strut® support frame is secured to the concrete floor with anchor bolts and provides the ancillary equipment with support and protection against physical damage and excessive stress due to settlement and vibration.

The cementation unit pencil tanks component does not operate under pressure; therefore, physical damage and excessive stress due to expansion and contraction is not anticipated. Furthermore, the cementation unit pencil tanks component is not within a saturated zone or seismic fault zone; therefore, flotation or dislodgment is not likely. The component is located within a building, so frost heave effects are not expected.

H.1.3 Pencil Tanks Component

The following information for the pencil tanks component is based upon a completed drawing package prepared by Johnson Controls of Northern New Mexico, dated July 2001. The pencil tanks component will consist of ten vertical tanks located perpendicular to the west wall of TA-55-4, Room 401, as shown on Figure H-1. Each pencil tank will have a capacity of 50 L (13 gal), a 6.625-in. outer diameter, a straight side height of 10 ft, a wall thickness of 0.28 in., and a conical bottom, as shown on Figure H-8. The pencil tanks will be constructed of seamless Schedule 40, 316 stainless steel pipe. These materials meet the chemical and physical characteristics given in ASTM "A312-Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes," hereinafter referred to as ASTM A312 (ASTM, 1995). The tanks will be corrosion-resistant and compatible with the liquid waste to be stored in them. Each tank will be equipped with three sight glasses for local level indication and will have a high-level switch for prevention of spills or overfilling. The primary containment welds for each tank will be vacuum tight in accordance with the ASME BPVC Section VIII, Division 1, Subsection B, Part UW (ASME, 1998). All penetrations into the shells of the tanks will be designed and fabricated to ensure vacuum tightness and will comply with ASME BPVC Section VIII, Division 1 (ASME, 1998). However, an ASME stamp will not be required for the pencil tanks component because they will not be operated as pressure vessels. Each pencil tank will be installed such that, if necessary, they can be replaced.

H.1.3.1 Piping and Ancillary Equipment

The pencil tanks component will be connected to system headers (for feed, ventilation, and vacuum) by a manifold that will be constructed of seamless stainless steel and that meets the chemical and physical characteristics given in ASTM A312 (ASTM, 1995). Figure H-9 provides a piping and instrumentation diagram for the pencil tanks component. The piping will be connected to the existing tank system intertank and transfer piping of 0.75 in., Schedule 40 pipe. It will meet the requirements of ASME “B31.3-Process Piping,” hereinafter referred to as ASME B31.3 (ASME, 1996a), for normal fluid service, with a maximum design pressure of 15 pounds per square inch and design temperature of 10 degrees Fahrenheit. All piping connections will be via flanged and gasketed connections and will be provided in accordance with ASME “B16.5-Pipe Flanges and Flanged Fittings,” hereinafter referred to as ASME B16.5 (ASME, 1996b). The flanges will be forged from stainless steel and will meet the Grade F316L requirements of ASTM “A182-Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves, and Parts for High-Temperature Service,” hereinafter referred to as ASTM A182 (ASTM, 1997b).

The pencil tanks component will be equipped with a vacuum trap that will be designed to collect any mists or carryover liquid that might accumulate in the vacuum or vent lines. The vacuum trap will be constructed of 6.25-in. outer diameter, Schedule 40, 316 seamless stainless steel. The vacuum trap will be equipped with a sight glass for local level indication will have a high-level switch for prevention of spills or overflowing and will normally be empty.

H.1.3.2 Foundation and Tank Support

The pencil tanks component and associated ancillary equipment will be integrated within a support stand assembly. The support stand assembly will be approximately 3-ft, 10-in. wide by 7-ft, 8-in. long, as shown on Figures H-10 and H-11, and will be bolted to the 10-in.-thick concrete floor of TA-55-4, Room 401. The floor provides a foundation that will maintain the load of the pencil tanks component when full. The concrete floor and ceiling were constructed to conform to the building code requirements of ACI 318-71 for reinforced concrete (ACI, 1995). The reinforcing steel was detailed and fabricated in accordance with ACI 315 (ACI, 1992). The design construction and tolerance of the framework around the concrete is in accordance with ACI 347 (ACI, 1994).

The support stand assembly superstructure will consist of braced frames that extend approximately 9 ft, 11 in. from the floor. The superstructure will be fabricated entirely from carbon steel. Connections will be welded, except where bolting is required for erection of subassemblies within Room 401. All carbon steel used for the superstructure will be painted in accordance with the Steel Structures Painting Council with a high build-up epoxy primer and finish coat.

The pencil tanks component will not operate under pressure; therefore, excessive stress due to expansion and contraction is not anticipated. The pencil tanks component will not be located within a saturated zone or seismic fault zone; therefore, floatation or dislodgment is unlikely. The component will be located within a building, so frost heave effects are not expected.

H.2 INSTALLATION, TESTING, AND CERTIFICATION [20.4.1 NMAC §270.16(a) and (f); 20.4.1 NMAC §264.191(b); §264.192(a),(b), and (d); and §264.193(I)]

H.2.1 Evaporator Glovebox Tank Component

The evaporator glovebox tank component is considered an existing tank component in accordance with 20.4.1 NMAC §264.191 [6-14-00], and has secondary containment that meets the requirements of 20.4.1 NMAC §264.193 [6-14-00]. Therefore, pursuant to 20.4.1 NMAC §264.191(a) [6-14-00], the requirement that the owner or operator of the tank determine that the tank is not leaking or is unfit for use is not applicable. In addition, the requirement that the owner or operator obtain and keep on file a written assessment attesting to the tank's integrity is also not applicable. However, for the purpose of demonstrating that the evaporator glovebox tank component will function as a completely leak-proof system and would meet the assessment requirements if they were applicable, a written assessment has been prepared in accordance with 20.4.1 NMAC §264.191(b), and 20.4.1 NMAC §270.16(a) [6-14-00], attesting that the tank component is adequately designed and has sufficient structural integrity and compatibility with the waste stored to ensure that it will not collapse, rupture, or fail. The written assessment, reviewed and certified by an independent, qualified, registered professional engineer, is included as Supplement H.1 of this permit application.

A helium leak-test using a mass spectrometer was performed on the evaporator glovebox tank component upon fabrication at Silver Engineering and again after it was installed and made operational at its present location in TA-55-4, Room 401. Because secondary containment (see Section H.3) is provided for this tank, the requirements in 20.4.1 NMAC §264.193(i) [6-14-00], are not applicable.

H.2.2 Cementation Unit Pencil Tanks Component

In accordance with 20.4.1 NMAC §264.192(a) [6-14-00], a written assessment has been prepared attesting that the cementation unit pencil tanks component has sufficient structural integrity and is acceptable for handling mixed waste. The written assessment, reviewed and certified by an independent, qualified, registered professional engineer, is included as Supplement H.2A of this permit application.

In accordance with 20.4.1 NMAC §264.192(d) [6-14-00], owners or operators of new tanks and ancillary equipment must ensure that the system is tested for tightness. The cementation unit pencil tanks component was tightness tested on May 30, 1996, at operating pressure (i.e., under a vacuum of 10 to 20 in. of mercury) and determined to be tight. The signed certification attesting to the tank's tightness, the detailed tightness-testing procedure adhered to during the tightness tests, and the results of the tightness tests are included as Supplement H.2B of this permit application.

In accordance with 20.4.1 NMAC §264.192(b) [6-14-00], owners or operators of new tank systems or tank components must ensure that proper handling procedures are adhered to during installation in order to prevent damage to the system. The new portions of this component (i.e., the transfer line from the evaporator glovebox tank component to the cementation unit pencil tanks component header/manifold and the cementation unit header/manifold) have been inspected by a qualified inspector for weld breaks, punctures, scrapes of protective coatings, cracks, corrosion, and other structural damage or inadequate construction or installation. The signed certification attesting to the proper installation of the new components and a copy of the inspection checklist is included as Supplement H.2C of this permit application. Secondary containment (see Section H.3) for the cementation unit pencil tanks component is provided by Room 401; therefore, the requirements in 20.4.1 NMAC §264.193(i) [6-14-00], are not applicable.

H.2.3 Pencil Tanks Component

In accordance with 20.4.1 NMAC §264.192(a) [6-14-00], a written assessment has been prepared attesting that the pencil tanks component is designed to have sufficient structural integrity and is acceptable for handling mixed waste. The written assessment, reviewed and certified by an independent, qualified, registered professional engineer, is included as Supplement H.3 of this permit application.

In accordance with 20.4.1 NMAC §264.192(d) [6-14-00], owners or operators of new tanks and ancillary equipment must ensure that the system is tested for tightness. The pencil tanks component will be tightness tested at operating pressure (i.e., under a vacuum of 10 to 20 in. of mercury) upon completion of installation and prior to use. A signed certification will be prepared and will include the tightness-testing procedures adhered to during the tightness tests and the results of the tightness tests.

In accordance with 20.4.1 NMAC §264.192(b) [6-14-00], owners or operators of new tank systems or components must ensure that proper handling procedures are adhered to during installation in order to prevent damage to the system. To ensure proper installation, the pencil tanks component and ancillary equipment (i.e., transfer piping, manifolds) will be inspected by a qualified inspector for weld breaks, punctures, scratches in the protective coatings, cracks, corrosion, and other structural damage or inadequate construction or installation. A signed certification attesting to the proper installation of the pencil tanks component and a copy of the inspection checklist will be prepared. Secondary containment (see Section H.3) for the pencil tanks component will be provided by Room 401; therefore, the requirements in 20.4.1 NMAC §264.193(i) [6-14-00], are not applicable.

H.3 SECONDARY CONTAINMENT [20.4.1 NMAC §270.16(g), 20.4.1 NMAC §264.193]

The following provides a detailed description of the secondary containment provided for the storage tank system in accordance with 20.4.1 NMAC §270.16(g), and 20.4.1 NMAC §264.193(a), (b), (c), (d), and (e)(1) [6-14-00]. The storage tank system is located at TA-55-4, inside Room 401. This room has a floor and walls that completely surround the tank system and serve as secondary containment, therefore, the secondary containment meets the requirements of 20.4.1 NMAC §264.193(1)(iv) for an external liner system. The walls and floor of Room 401 will prevent the migration of wastes or accumulated liquids to any soil, groundwater, or surface water and are capable of collecting releases and accumulated liquids until the material is removed. Because the storage tank system and secondary containment are inside a building, run-on or precipitation will not affect the containment capacity. The capacity of the containment area is sufficient to contain 100 percent of the capacity of the largest liquid-bearing tank within its boundary. The secondary containment capacity for the storage tank system is identified in Table H-3.

The floor of Room 401 consists of 10-in.-thick reinforced concrete slab that is compatible with the wastes stored in the storage tank system and will effectively prevent migration of waste. The concrete in Room 401 is sealed with an epoxy or similar coating to aid in decontamination should a spill occur. In addition, tertiary containment is provided by the floor of the basement level of TA-55-4, which also consists of 10 in. of concrete. The construction joints in the floor slab and exterior walls are all constructed with chemical-resistant water stops in place. The conduit piping penetrating the floor of the room is secured with rubber boots, bushings, and flanges. All penetrations (i.e., holes for conduit) in the floor have been sealed to prevent liquids from entering the penetrations. Figures H-12 and H-13 provide structural drawings illustrating the first floor construction and the locations of floor penetrations.

The storage tank system components and the secondary containment will be inspected daily (during operation) to detect leaks, in accordance with 20.4.1 NMAC §264.195(b) [6-14-00]. Additional leak detection will be provided by continuous air monitors (CAM) at various locations throughout Room 401. CAMs will detect any airborne alpha contamination that would be present if a leak were to occur at any point in the system. Additionally, radiological control technicians periodically monitor for radioactive contamination and would detect any leaks during monitoring. Leaks or spills would be detected within 24 hours, as required by 20.4.1 NMAC §264.193(c)(3) [6-14-00]. The secondary containment will be operated to remove leaks and spills. In the event of a leak or spill into the secondary containment system, the liquids will be removed as quickly as possible with sorbents or vacuum-transferred, using the existing wet vacuum, into an available storage tank component. The collected materials will then be sampled as necessary. If the accumulated liquids are from an identifiable source, the resulting material can be characterized as a newly-generated waste using acceptable knowledge or may be analyzed, as applicable, for the hazardous waste constituents known to be components of the source. If the accumulated liquids are from other than an identifiable source, the resulting material will be analyzed for the appropriate potential parameters listed in Table E-3 of Appendix E in the most recent version of the "Los Alamos National Laboratory General Part B Permit Application." Containers of collected liquids will be stored with secondary containment, pending analytical results, which determine how the waste liquids will be managed. This method of removal and analysis of accumulated liquids fulfills the requirements of 20.4.1 NMAC §270.15(a)(5) [6-14-00], for responses to leaks or spills.

If it is determined that there has been a leak or spill from any of the storage tank components into the secondary containment, all free liquids will be removed within 24 hours unless "as low as reasonably achievable" concerns prevent accessibility. The affected component or portion thereof will be removed from service immediately and the requirements of 20.4.1 NMAC §264.196 [6-14-00], will be initiated.

H.4 SPECIAL REQUIREMENTS FOR IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES [20.4.1 NMAC §270.16 (j); 20.4.1 NMAC §§264.17, 264.198, and 264.199(a)]

No ignitable, reactive, or incompatible mixed wastes will be stored in the storage tank system.

H.5 AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS [20.4.1 NMAC §264.1064(k), and 20.4.1 NMAC, Subpart V, Part 264, Subpart BB]

The storage tank system is not subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart BB [6-14-00], "Air Emission Standards for Equipment Leaks," with the exception of the reporting requirements specified in 20.4.1 NMAC §264.1064(k) [6-14-00]. None of the components or ancillary equipment associated with the storage tank system will contain or contact mixed waste with organic concentrations of at least 10 percent by weight.

In accordance with 20.4.1 NMAC §264.1064(k) [6-14-00], TA-55 personnel will use knowledge of the nature of the mixed waste stream(s) or knowledge of the process by which the mixed waste was produced to document exemptions to these standards. Production process information documenting that no organic compounds are contained or contacted by the components and ancillary equipment associated with the storage tank system will be recorded in TA-55's facility operating record.

A new determination will be made whenever there is a change in a process at TA-55 that produces mixed waste that could result in an increase in the total organic content of waste contained in or contacted by equipment currently determined not to be subject to these requirements.

H.6 ORGANIC AIR EMISSION STANDARDS [20.4.1 NMAC, Subpart V, Part 264, Subpart CC]

Tanks which store only mixed waste are not subject to the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart CC [6-14-00], "Air Emission Standards for Tanks, Surface Impoundments, and Containers." Only mixed waste will be managed in the storage tank system; therefore, the storage tank system is not subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart CC [6-14-00].

H.7 REFERENCES

ACI, 1995 and all approved updates, "318-71-Building Code Requirements for Structural Concrete and Commentary," American Concrete Institute, Detroit, Michigan.

ACI, 1994 and all approved updates, "347-Guide to Formwork for Concrete," American Concrete Institute, Detroit, Michigan.

ACI, 1992 and all approved updates, "315-Details and Detailing of Concrete Reinforcement," American Concrete Institute, Detroit, Michigan.

ASME, 1998 and all approved updates, "Boiler and Pressure Vessel Codes, Section VIII," American Society of Mechanical Engineers, New York, New York.

ASME, 1996a and all approved updates, “B31.3-Process Piping,” American Society of Mechanical Engineers, New York, New York.

ASME, 1996b and all approved updates, “B16.5-Pipe Flanges and Flanged Fittings,” American Society of Mechanical Engineers, New York, New York.

ASTM, 1998 and all approved updates, “A240-Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels,“ American Society for Testing and Materials, Philadelphia, Pennsylvania.

ASTM, 1997a and all approved updates, “B29-Standard Specification for Refined Lead,” American Society for Testing and Materials, Philadelphia, Pennsylvania.

ASTM, 1997b and all approved updates, “A182-Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves, and Parts for High-Temperature Service,” American Society for Testing and Materials, Philadelphia, Pennsylvania.

ASTM, 1995 and all approved updates, “A312-Standard Specification for Seamless and Welded Austentic Stainless Steel Pipes,” American Society for Testing and Materials, Philadelphia, Pennsylvania.

ASTM, 1987 and all approved updates, “A36-Standard Specification for Structural Steel for Welding,” American Society for Testing and Materials, Philadelphia, Pennsylvania.

Table H-1
Storage Tank System Components at Technical Area 55[a]

Tank Component	Location	Number of Tanks	Tank Capacity[b] (liters)	Tank Capacity[b] (gallons)	Tank Component Status
Evaporator Glovebox Tank	TA-55-4, Room 401	1	270	71	Constructed in 1986. Existing tank component.
Cementation Unit Pencil Tanks	TA-55-4, Room 401	5	50	13	Constructed in 1985. New tank component due to an equipment modification in 1996.
Pencil Tanks	TA-55-4, Room 401	10	50	13	To be constructed. New tank component.

a The storage tank system consists of 3 components that store the same waste matrix and share a common piping network. The overall capacity of the unit is 1,020 liters [~266 gallons].
b The tank capacity listed is for each individual tank associated with the component.

TA = technical area

Table H-2
Tank System Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§270.16	Information requirements for tank systems	Attachment H
§264.13	General waste analysis	Attachment B[a]
§264.191	Assessment of existing tank system's integrity	H.1.1, H.2.1
§270.16	Tank systems	Attachment H
§270.16(a)	Written assessment and certification	Supplements H.1, H.2A, H.2B, H.2C, and H.3
§270.16(b)	Dimensions and capacity	H.1
§270.16(c)	Feed systems, safety cutoff, bypass systems, and pressure controls	H.1
§270.16(d)	Piping, instrumentation, and process flow diagrams	Attachment H
§270.16(e)	External corrosion protection	Supplements H.1, H.2A, H.3, and H.4
§270.16(f)	Installation of new tank systems	H.2.2 and H.2.3
§264.191(a)	Existing tank system w/o secondary containment	NA[a]
§264.191(b)	Written assessment of structural integrity	H.2.1, Supplement H.1
§264.191(b)(1)	Design standards	Supplement H.1
§264.191(b)(2)	Hazardous characteristics of waste	Supplement H.1
§264.191(b)(3)	Existing corrosion protection measures	Supplement H.1
§264.191(b)(4)	Documentation of tank age	Supplement H.1
§264.191(b)(5)	Results of leak test, internal inspection, or other tank integrity exam	Supplement H.1
§264.192	Design and installation of new tank systems or components	H.2.2 and H.2.3
§264.191(d)	Assessment reveals leaking	NA
§264.192(a)	Written assessment of structural integrity	Supplements H.2A, H.3, and H.4
§264.192(a)(1)	Design standards	Supplements H.2A, H.3, and H.4
§264.192(a)(2)	Hazardous characteristics of waste	Supplements H.2A, H.3, and H.4
§264.192(a)(3)(i)	Factors affecting the potential for corrosion	Supplements H.2A, H.3, and H.4
§264.192(a)(3)(ii)	Corrosion protection measures	Supplements H.2A, H.3, and H.4
§264.192(a)(4)	Determination of protection measures for underground tank system components	Supplements H.2A, H.3, and H.4
§264.192(a)(5)	Design considerations	H.1.2 and H.1.3
§264.192(b)	Precautions to prevent damage during installation	H.2.2 and H.2.3 Supplement H.2C
§264.192(c)	Backfill requirements	NA

See footnotes at end of table.

Table H-2 (continued)
Tank System Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§264.192(d)	Tightness testing	H.2.2 and H.2.3 Supplement H.2B
§264.192(e)	Protection of ancillary equipment	H.1, Supplement H.2A and H.3
§264.192(f)	Independent corrosion expert recommendations	NA
§264.192(g)	Certification of proper design and installation	H.2, Supplement H.2C
§270.16(g)	Secondary containment systems	H.3
§264.193	Containment and detection of releases	H.3
§264.193(a)	Preventing the release of hazardous constituents to the environment	H.3
§264.193(a)(1)	Secondary containment of new tank systems	H.3
§264.193(a)(2)	Tank systems used to store or treat EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027, within two years after January 12, 1987	NA
§264.193(a)(3)	Existing tank systems of known and documented age, within two years after January 12, 1987 or when the tank system has reached 15 years of age	H.3
§264.193(a)(4)	Existing tank systems for which the age cannot be documented, within eight years of January 12, 1987	NA
§264.193(b)	Secondary containment system requirements	H.3
§264.193(b)(1)	Design, installation, and operation to prevent migration of waste or accumulated liquid out of system to the environment	H.3
§264.193(b)(2)	Detection and collection of releases and accumulated liquids	H.3
§264.193©	Secondary containment construction requirements	H.3
§264.193©(1)	Compatible construction materials of sufficient strength and thickness	H.3
§264.193©(2)	Foundation	H.1
§264.193©(3)	Leak detection system	H.3
§264.193©(4)	Sloped or designed to remove liquids from leaks, spills, or precipitation	H.3
§264.193(d)	Secondary containment devices	H.3
§264.193(e)	Additional construction requirements	H.3
§264.193(e)(1)	External liner	H.3
§264.193(e)(2)	Vault systems	NA
§264.193(e)(3)	Double-walled tanks	NA
§264.193(f)	Ancillary equipment	H.3
§270.16(h)	Tank systems with a variance	NA
§264.193(g)	Variance from the requirements of §264.193	NA
§264.193(h)	Secondary containment variance request procedures	NA

See footnotes at end of table.

Table H-2 (continued)
Tank System Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§264.193(i)	Requirements pending provision of adequate secondary containment	NA
§264.194	General operating requirements	H.1, H.3
§264.194(a)	Prohibition of hazardous waste that could cause the tank or equipment to rupture, leak, corrode, or otherwise fail	H.1, Supplements H.1, H.2A and H.3
§270.16(i)	Description of controls and practices to prevent spills and overflows	H.1
§264.194(b)	Controls and practices to prevent spills and overflows	H.1
§264.194(b)(1)	Spill prevention controls	H.1
§264.194(b)(2)	Overfill prevention controls	H.1
§264.194(b)(3)	Maintenance of sufficient freeboard	NA
§264.195	Inspections	Attachment C[a]
§264.195(a)	Overfill control inspection schedule	Attachment C[a]
§264.195(b)	Inspection of tank system for corrosion or releases, data from monitoring and leak detection equipment, construction materials, and immediately surrounding area	Attachment C[a]
§264.195(c)	Inspection of cathodic protection system	NA
§264.196	Response to leaks or spills and disposition of leaking or unfit-for-use tank systems	H.3
§264.197	Closure and post-closure care	Attachment F.2
§264.197(a)	Removal and decontamination of all hazardous waste residues, contaminated containment system components (liners, etc.), contaminated soils, and structures and equipment	Attachment F.2
§264.197(b)	Demonstration that not all contaminated soils can be practicably removed or decontaminated	Attachment F.2
§264.197(c)	Tank system not having secondary containment that meets the requirements of §264.193(b) through (f) and has not been granted a variance from the secondary containment requirements	NA
§264.197(c)(1)	Plan for complying with removal and decontamination requirements	Attachment F.2
§264.197(c)(2)	A contingent post-closure plan	Attachment F.2
§264.197(c)(3)	Cost estimates calculated for closure and post-closure care	Attachment F.2
§264.197(c)(4)	Financial assurance based on cost estimates	Attachment F.2
§264.197(c)(5)	Contingent closure and post-closure plans must meet all of the closure, post-closure, and financial responsibility requirements for landfills	Attachment F.2
§270.16(j)	Special requirements for ignitable, reactive, or incompatible wastes	H.4
§264.198	Special requirements for ignitable or reactive wastes.	H.4

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application

See footnotes at end of table.

Table H-2 (continued)
Tank System Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§264.198(a)	Circumstances allowing ignitable or reactive waste in tanks	NA
§264.198(a)(1)	The waste is treated, rendered, or mixed before or immediately after placement in the tank system	NA
§264.198(a)(1)(I)	The resulting waste, mixture, or dissolved material no longer meets the definition of ignitable or reactive waste	NA
§264.198(a)(1)(ii)	Compliance with §264.17(b)	NA
§264.198(a)(2)	The waste is stored or treated in such a way that it is protected from any material or conditions that may cause the waste to ignite or react	H.4
§264.198(a)(3)	The tank system is used solely for emergencies	NA
§264.198(b)	Compliance with the requirements for the maintenance of protective distances between the waste management area and any public ways, streets, alleys, or an adjoining property line	H.4[a]
§264.199	Special requirements for incompatible wastes	H.4[a]
§264.199(a)	Incompatible wastes, or incompatible wastes and materials, must not be placed in the same tank system, unless §264.17(b) is complied with	H.4[a]
§264.199(b)	Hazardous waste must not be placed in a tank system that has not been decontaminated and that previously held an incompatible waste or material, unless §264.17(b) is complied with	H.4[a]
§270.16(k)	Air emission control equipment	H.6
§270.27	Information requirements for air emission controls	H.6
§264.200	Air emission standards	H.5, H.6

[a] Requirement or information is also addressed in the most recent version of the "Los Alamos National Laboratory General Part B Permit Application."

NA = not applicable.
EPA = U.S. Environmental Protection Agency

Table H-3
Secondary Containment Capacities for the Storage Tank System

Storage Tank System Component	No. of Tanks	Tank Capacity (gallons)	Location	Secondary Containment	Capacity of Secondary Containment (gallons)
Evaporator Glovebox Tank	1	71	TA-55-4, Room 401	TA-55-4, Room 401	10,773[b]
Cementation Unit Pencil Tanks	5	13			
Pencil Tanks	10	13			

a The tank capacity listed is for each individual tank associated with the component.
b Secondary containment capacity based on Room 401, which is recessed 2.5 inches and has dimensions of 60-ft-long by 75-ft-wide

TA = technical area

Figure H-1 has been provided confidentially under separate cover.

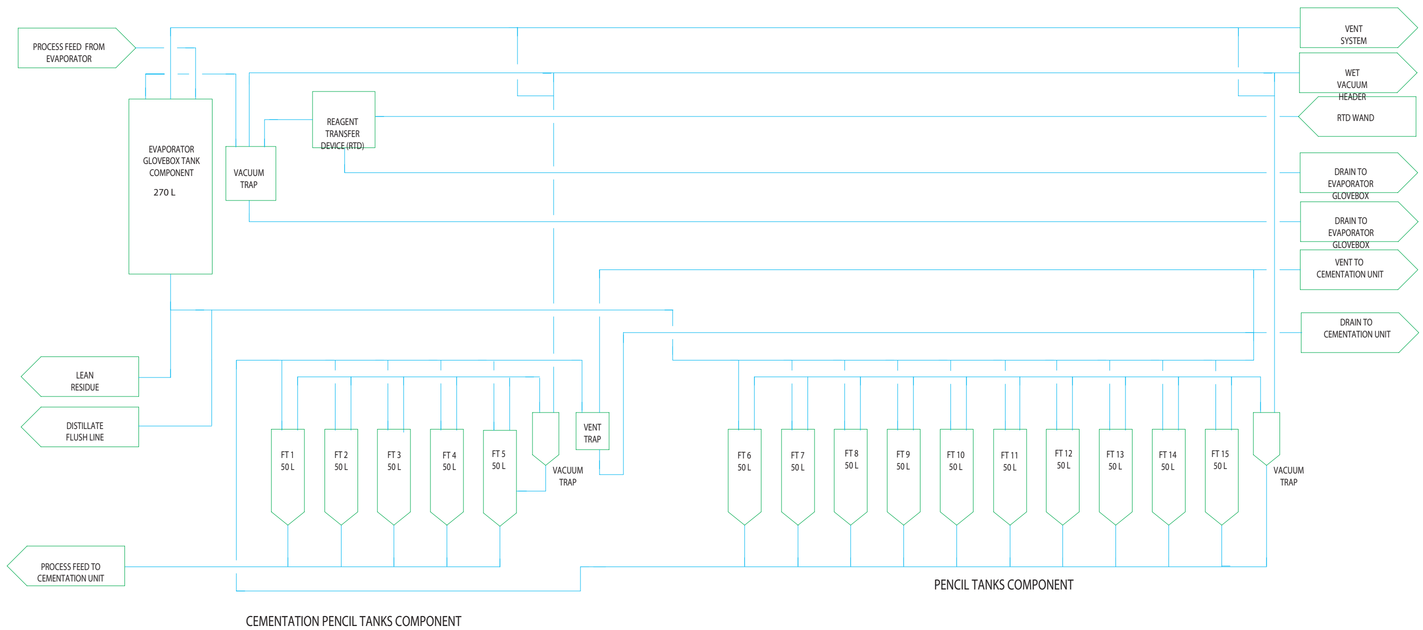


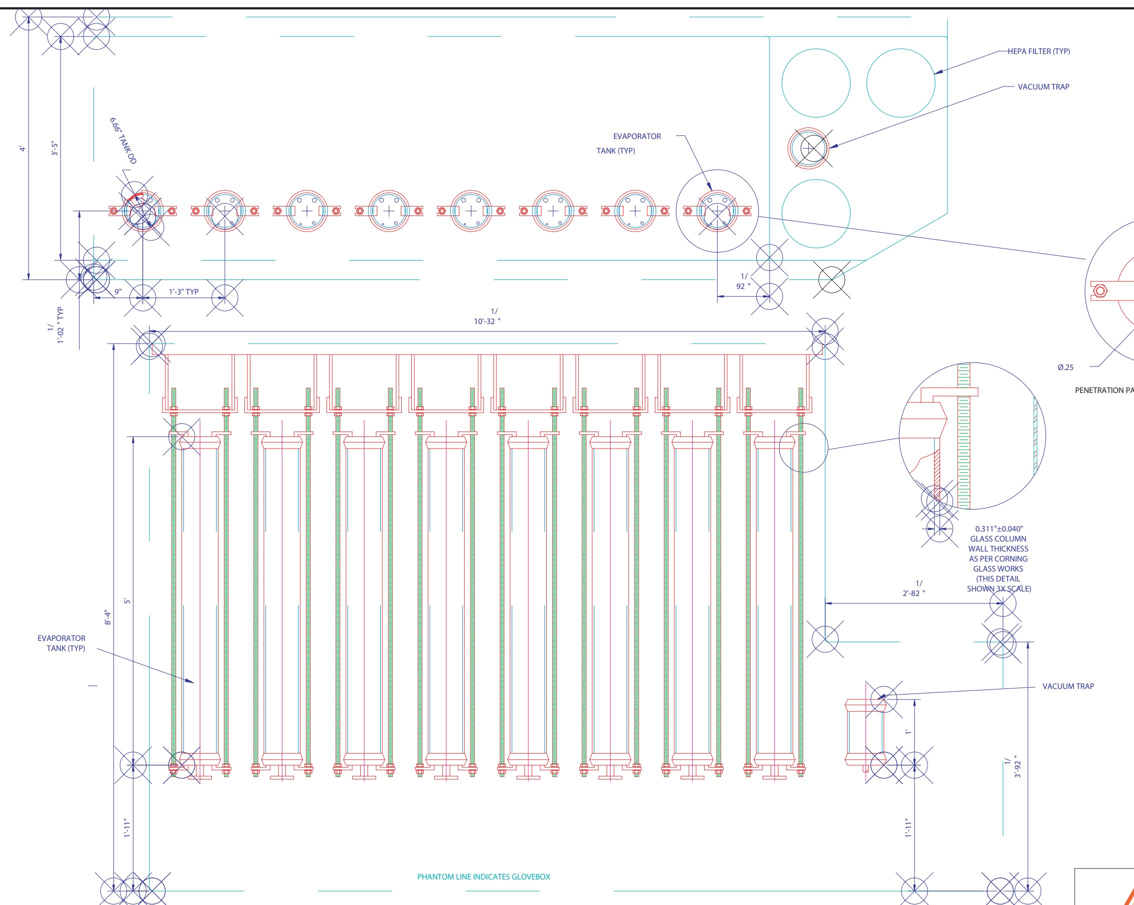
Figure H-2

Storage Tank System
Process Flow Diagram

NOT FOR CONSTRUCTION

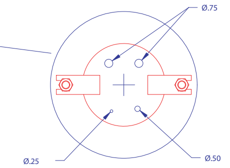
STORAGE TANK SYSTEM - PROCESS FLOW DIAGRAM

SCALE: NONE



NOTES:

1. ALL SUPPORT STRUCTURE DIMENSIONS, NOZZLE AND VESSEL LOCATIONS ARE APPROXIMATE DUE TO LIMITED ACCESS TO THE GLOVEBOX INTERIOR.
2. DIMENSIONS SHOWN ARE ROUNDED TO THE NEAREST INCH EXCEPT FOR TANK DIAMETER AND WALL THICKNESS.
3. ALL SUPPORT STRUCTURES ARE OMITTED IN THE PLAN VIEW FOR CLARITY.



PENETRATION PATTERN FOR PIPING TYP 8X (THIS DETAIL SHOWN 2X SCALE)

Figure H-3

Evaporator Glovebox Tank Component Support Structure

EVAPORATOR GLOVEBOX TANK COMPONENT - PLAN VIEW AND FRONT ELEVATION

SCALE: 1" = 18"

1" = 18"

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

Shaw™ Environmental & Infrastructure, Inc.

LOS ALAMOS — LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO 87545

TA-55 STORAGE TANK SYSTEM

EVAPORATOR GLOVEBOX TANK COMPONENT
PLAN VIEW AND FRONT ELEVATION

BLDG. PF-4 — TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. H-3	3 OF 7	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

MECHANICAL SYMBOLS (NOT ALL SYMBOLS WILL APPLY TO THIS PROJECT)

VALVES	DESCRIPTION
	BALL VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	CONTROL VALVE, TWO WAY
	CONTROL VALVE, 3-WAY
	DIAPHRAGM VALVE
	GATE VALVE
	GATE VALVE, ANGLE
	GATE VALVE, OS&Y
	GLOBE VALVE
	GLOBE VALVE, ANGLE
	HOSE BIBB W/VAC. BREAKER
	NEEDLE VALVE
	PLUG VALVE
	PRESSURE REDUCING VALVE
	PRESSURE RELIEF VALVE
	RELIEF OR SAFETY VALVE
	SOLENOID VALVE

	KEYED NOTE SYMBOL
1	MECHANICAL DESIGNATION
1200	NAMEPLATE DESIGNATION
CS	CARBON STEEL
FI	FLOW INDICATOR
FT	FEED TANK
GB	GLOVEBOX
LA	LEVEL ALARM
LI	LEVEL INDICATOR
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
OD	OUTSIDE DIAMETER
PI	PRESSURE INDICATOR
RTD	REAGENT TRANSFER DEVICE
SS	STAINLESS STEEL
TK	TANK
TYP	TYPICAL
VAC	VACUUM

FITTINGS	DESCRIPTION
	CAP OR PLUG
	FLEXIBLE MECHANICAL COUPLING
	RIGID MECHANICAL COUPLING
	ELBOW, TURNED UP
	ELBOW, TURNED DOWN
	FLANGE CONNECTION
	REDUCER, CONCENTRIC
	REDUCER, ECCENTRIC BOTTOM OF PIPE LEVEL
	REDUCER, ECCENTRIC TOP OF PIPE LEVEL
	TEE, OUTLET UP
	TEE, OUTLET DOWN
	PIPE UNION
	END OF PIPE
	DIRECTION OF FLOW
	PITCH PIPING DOWN

PIPING SPECIALTIES	DESCRIPTION
	AUTOMATIC AIR VENT
	MANUAL AIR VENT
BFP	BACKFLOW PREVENTER
FCO	FLOOR CLEANOUT
WCO	WALL CLEANOUT
CO	END OF PIPE CLEANOUT
	EXPANSION JOINT
	EXPANSION LOOP
	FLEXIBLE CONNECTOR
	PIPE ANCHOR
	PRESSURE GAUGE WITH VALVE
	STEAM TRAP
	STRAINER
	STRAINER WITH BLOW-OFF VALVE
	THERMOMETER OR TEMPERATURE GAUGE
	TYGON CONNECTION

Figure H-4
Storage Tank System
Mechanical Legend

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

Shaw™ Environmental & Infrastructure, Inc.

LOS ALAMOS — LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO 87545

TA-55 STORAGE TANK SYSTEM

MECHANICAL LEGEND

BLDG. PF-4 TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. H-4	4 OF 7	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

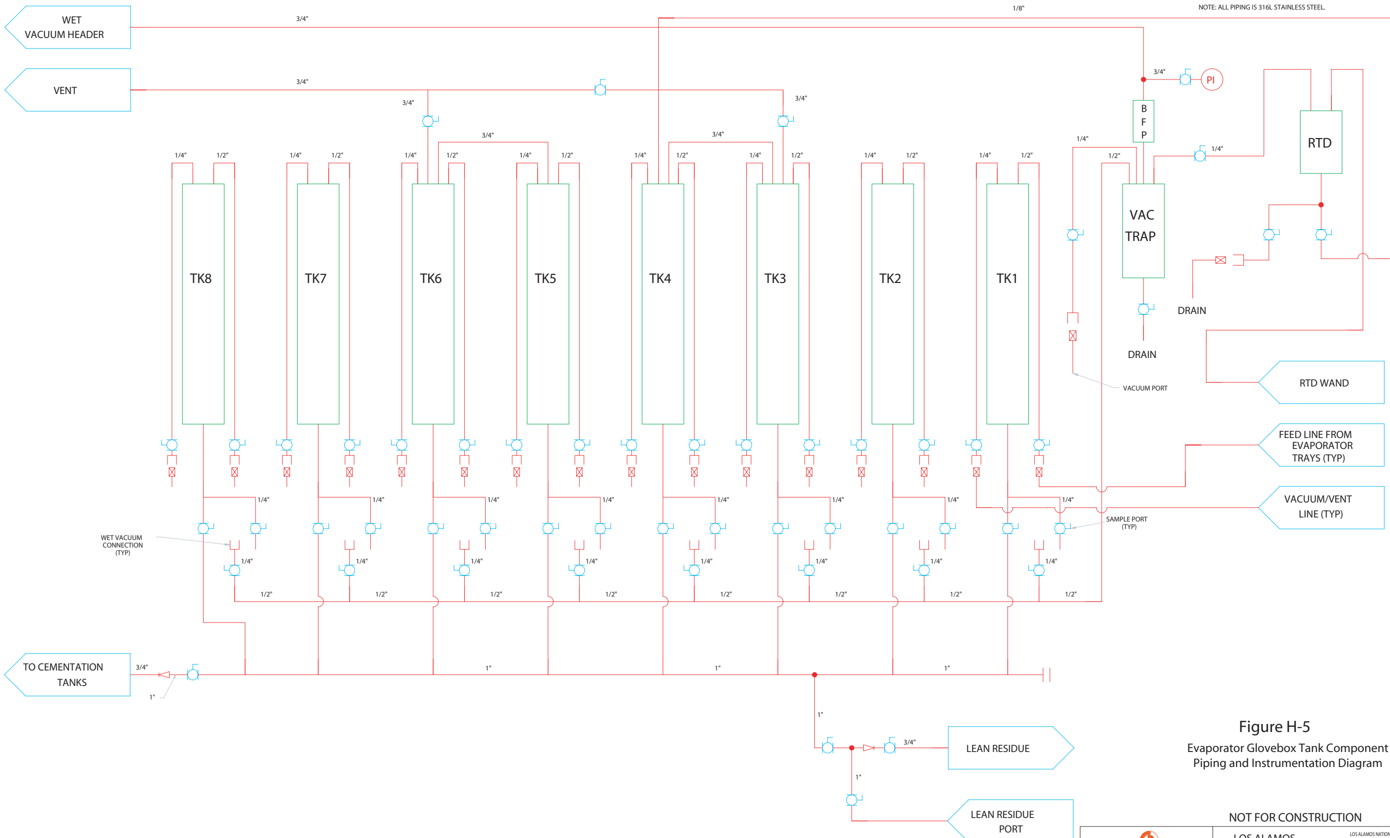


Figure H-5
Evaporator Glovebox Tank Component
Piping and Instrumentation Diagram

EVAPORATOR GLOVEBOX TANK COMPONENT - PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NONE

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

NOT FOR CONSTRUCTION

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TA-55 STORAGE TANK SYSTEM

EVAPORATOR GLOVEBOX TANK COMPONENT
PIPING AND INSTRUMENTATION DIAGRAM

BLDG. PF-4 TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. H-5	5 OF 7	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

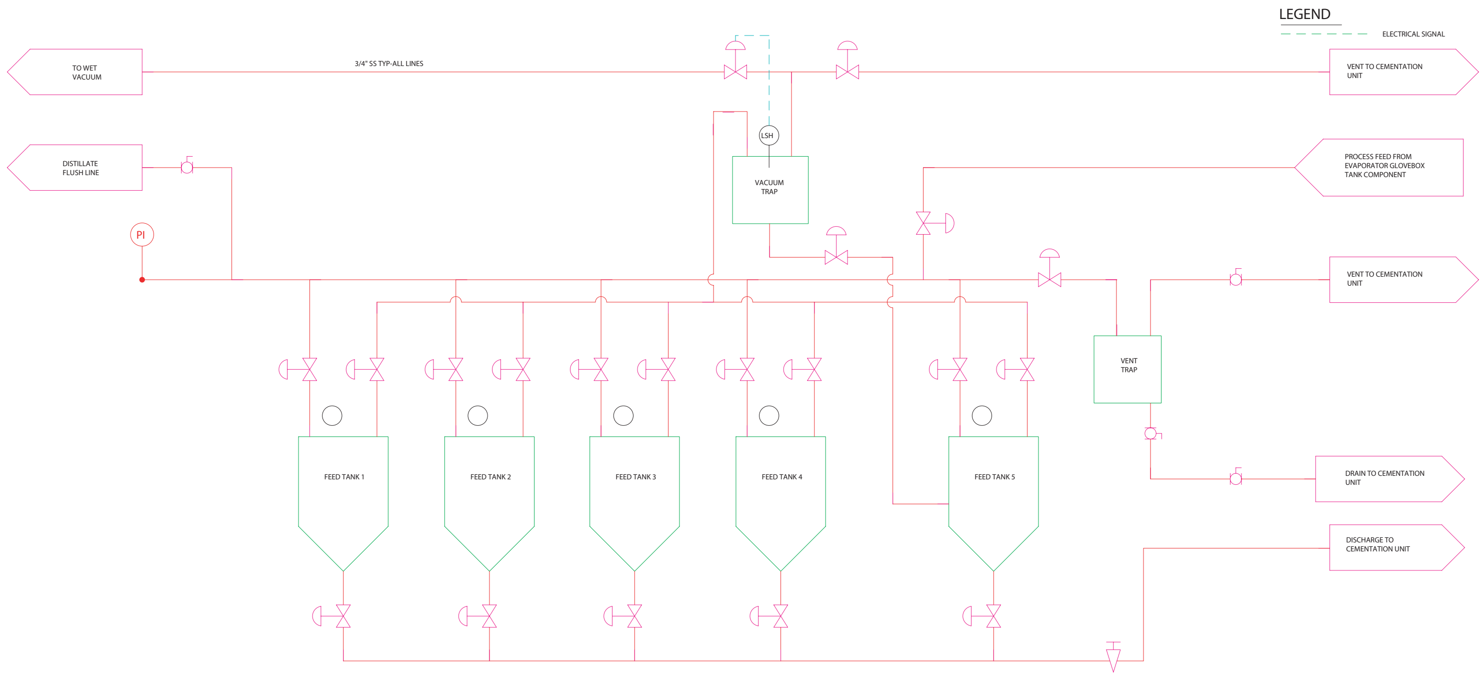


Figure H-7

Cementation Unit Pencil Tanks Component
Piping and Instrumentation Diagram

CEMENTATION UNIT PENCIL TANKS COMPONENT - PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NONE

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

Shaw™ Environmental & Infrastructure, Inc.

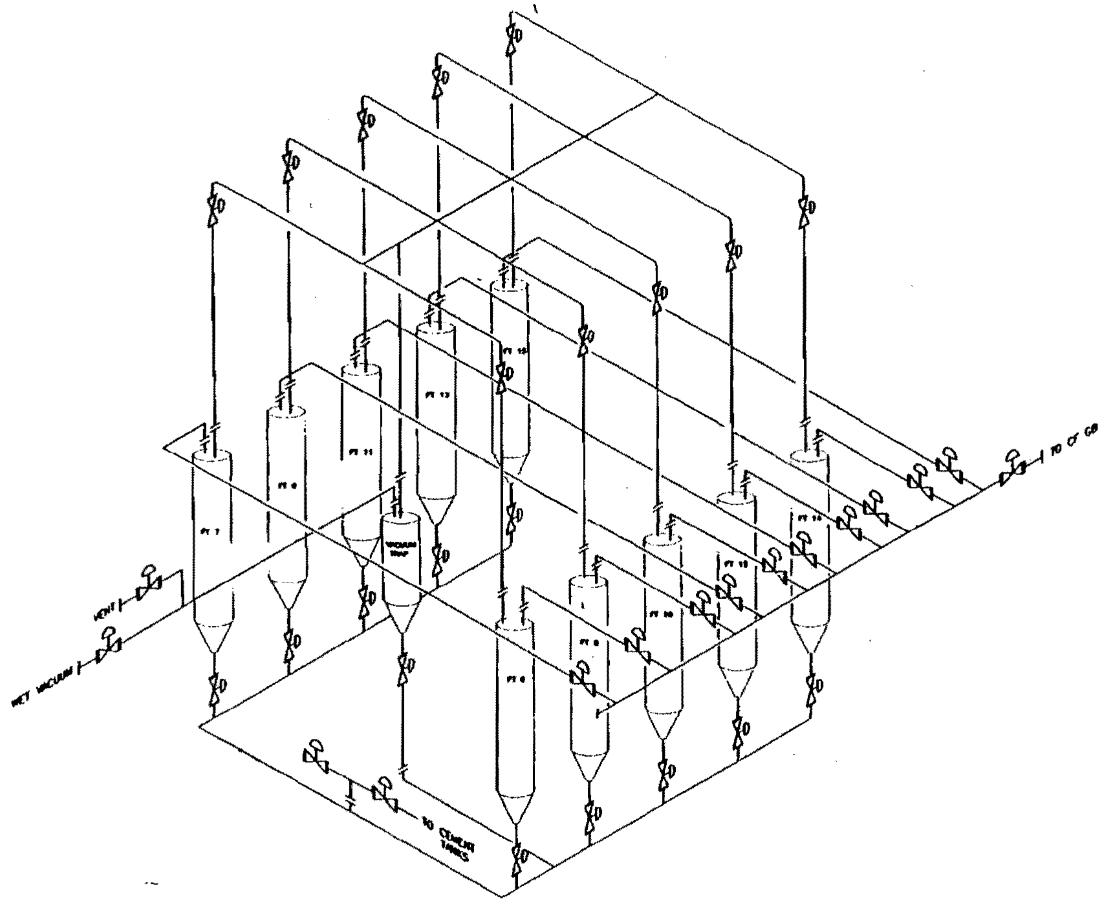
LOS ALAMOS — LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO 87545

TA-55 STORAGE TANK SYSTEM

CEMENTATION UNIT PENCIL TANKS COMPONENT
PIPING AND INSTRUMENTATION DIAGRAM

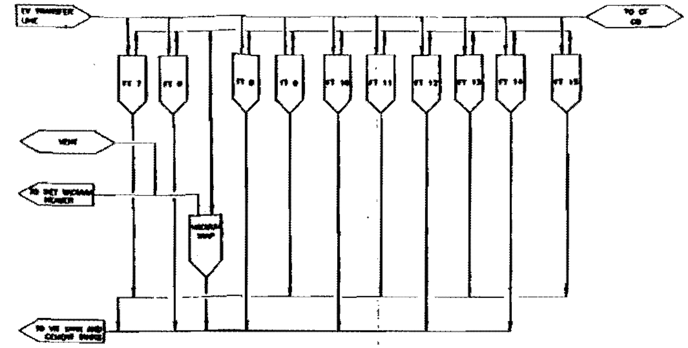
BLDG. PF-4 TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. H-7	7 OF 7	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					



PENCIL TANKS ISOMETRIC DIAGRAM

SCALE: NONE



PENCIL TANKS FLOW DIAGRAM

SCALE: NONE

Figure H-8
Pencil Tanks Component
Isometric and Flow Diagram

Johnson Controls	
PENCIL TANKS	
ISOMETRIC DIAGRAM AND FLOW DIAGRAM	
BLDG. PF-4	TA-55
Los Alamos	Los Alamos National Laboratory, Los Alamos, New Mexico 87545
SHEET M1	3 of 4
PROJECT N/A	DRAWING NO 55Y-001787

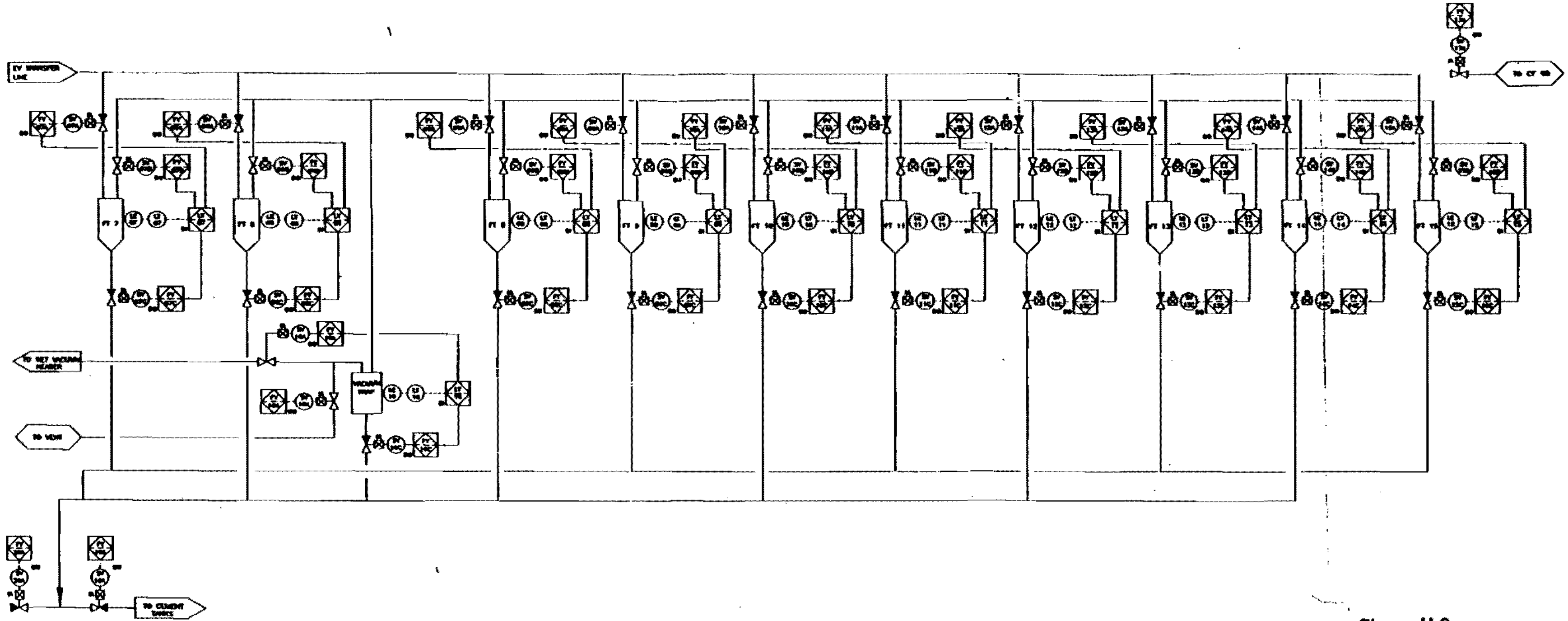
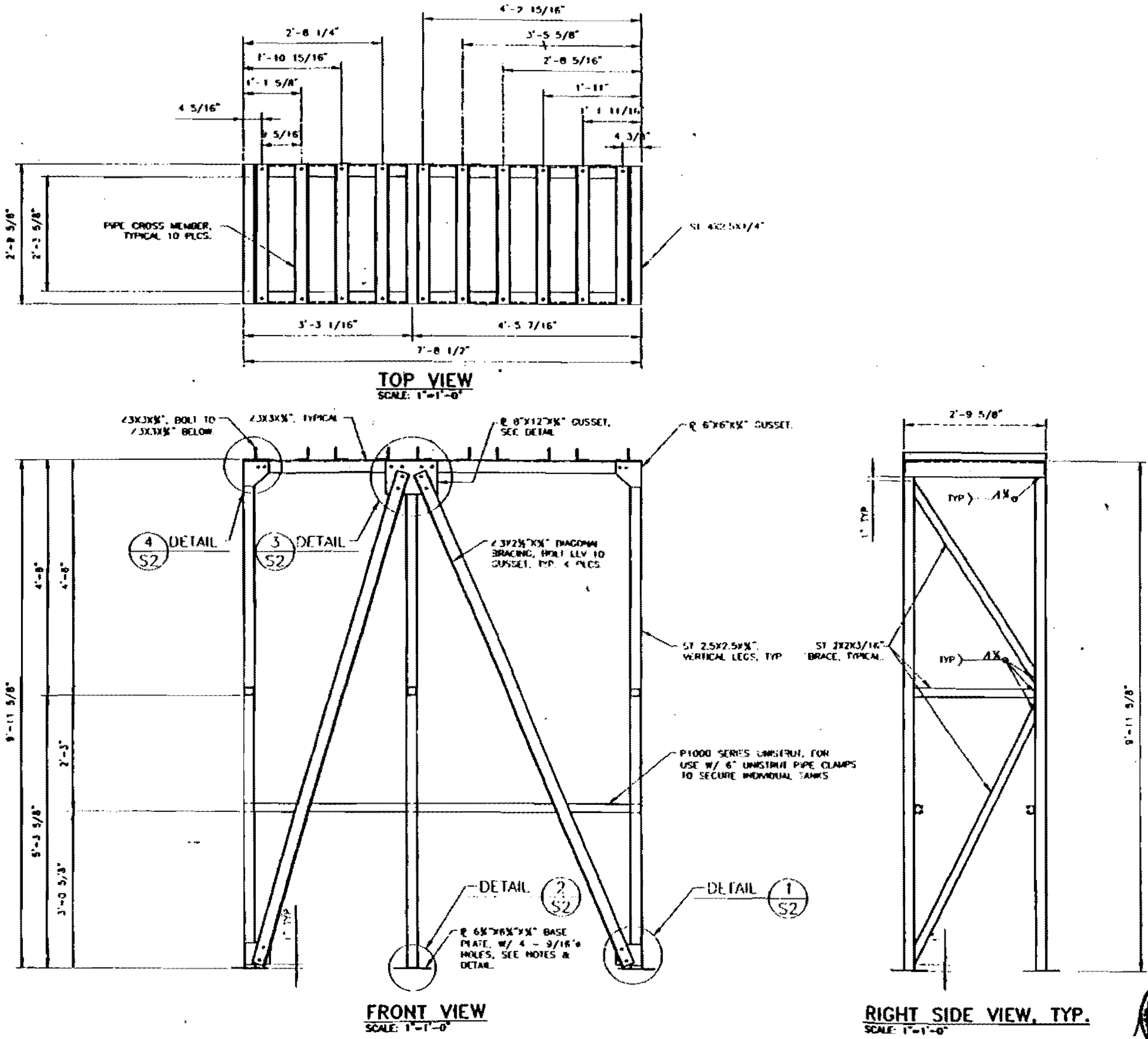


Figure H-9
Pencil Tanks Component
Piping and Instrumentation Diagram

Johnson Controls	
PENCIL TANKS DIAGRAM	DRAWN A. REYES DESIGN S. COX CHECKED
BLDG. PF-4	TA-55
SUBMITTED STEVE COX	APPROVED FOR RELEASE
Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545	SHEET E1
CLASSIFICATION UNC	
PROJECT ID N/A	DRAWING NO 55Y-001787



STRUCTURAL NOTES

1. STEEL SHAPES & PLATE: ASTM A36
2. STEEL TUBE: ASTM A500, GRADE B
3. WELD METAL: 70KSI FILLER METAL IN ACCORDANCE WITH AWS D1.1-92. IF SMAW PROCESS IS USED, USE E7018 ELECTRODES PER AWS A5.1 OR A5.5.
4. CONFORM TO AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, AISC CODE OF STANDARD PRACTICE, AND AWS D1.1-92 STRUCTURAL WELDING CODE – STEEL.
5. PAINTED SURFACE PREPARATION: SSPC-SP2 OR SSPC-SP3.
6. FASTENERS: ASTM A325 HIGH STRENGTH (H.S.) BOLTS, ALL BOLT DIAMETERS ARE 1/2" DIAMETER UNLESS NOTED.
7. PIPE CROSS MEMBER SUPPORTS: FIELD VERIFY PIPE FLANGE MOUNTING HOLES AND DRILL MATCHING HOLES IN CROSS MEMBER SUPPORTS.
8. CONCRETE ANCHORS: USE HILTI HVA ADHESIVE ANCHOR SYSTEM. ANCHORS SHALL BE 1/2" DIAMETER WITH 6-3/8" MINIMUM EMBEDMENT. INSTALL/TIGHTEN AS PER MANUFACTURER'S SPECS.
9. CONCRETE DRILLING: CONSULT APPROPRIATE AUTHORITIES FOR LOCATION OF ANY EXISTING ELECTRICAL, MECHANICAL, AND/OR STRUCTURAL STEEL PRIOR TO DRILLING.
10. ASSEMBLY: ALL BRACING MUST BE STAMPED TO ALLOW REQUESTER TO DISASSEMBLE AND REASSEMBLE SUPPORT STAND IN PERMANENT LOCATION. END AND MIDDLE FRAMES TO BE WELDED AND FITTED WITH SHOWN GUSSETS PRIOR TO ASSEMBLY AT PERMANENT LOCATION. BRACING LENGTHS TO BE FIELD ACQUIRED BASED ON HORIZONTAL FRAME SPACING.
11. ALL EXPOSED ENDS OF SQUARE TUBE SHALL BE CAPPED AND WELDED.
12. ALL SHARP EDGES SHALL BE FILED.

Figure H-10
Pencil Tanks Component Support Structure

GRAPHIC SCALE

PARAGON STRUCTURAL ENGINEERING, L.L.P.

PENCIL TANKS

TA-03 BLDG. PF-4

SUBMITTED K. FELLER

APPROVED FOR RELEASE RON NAKAOKA

Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545

SHEET S1 1 of 4

PROJECT ID N/A

DRAWING NO. 55Y-001787

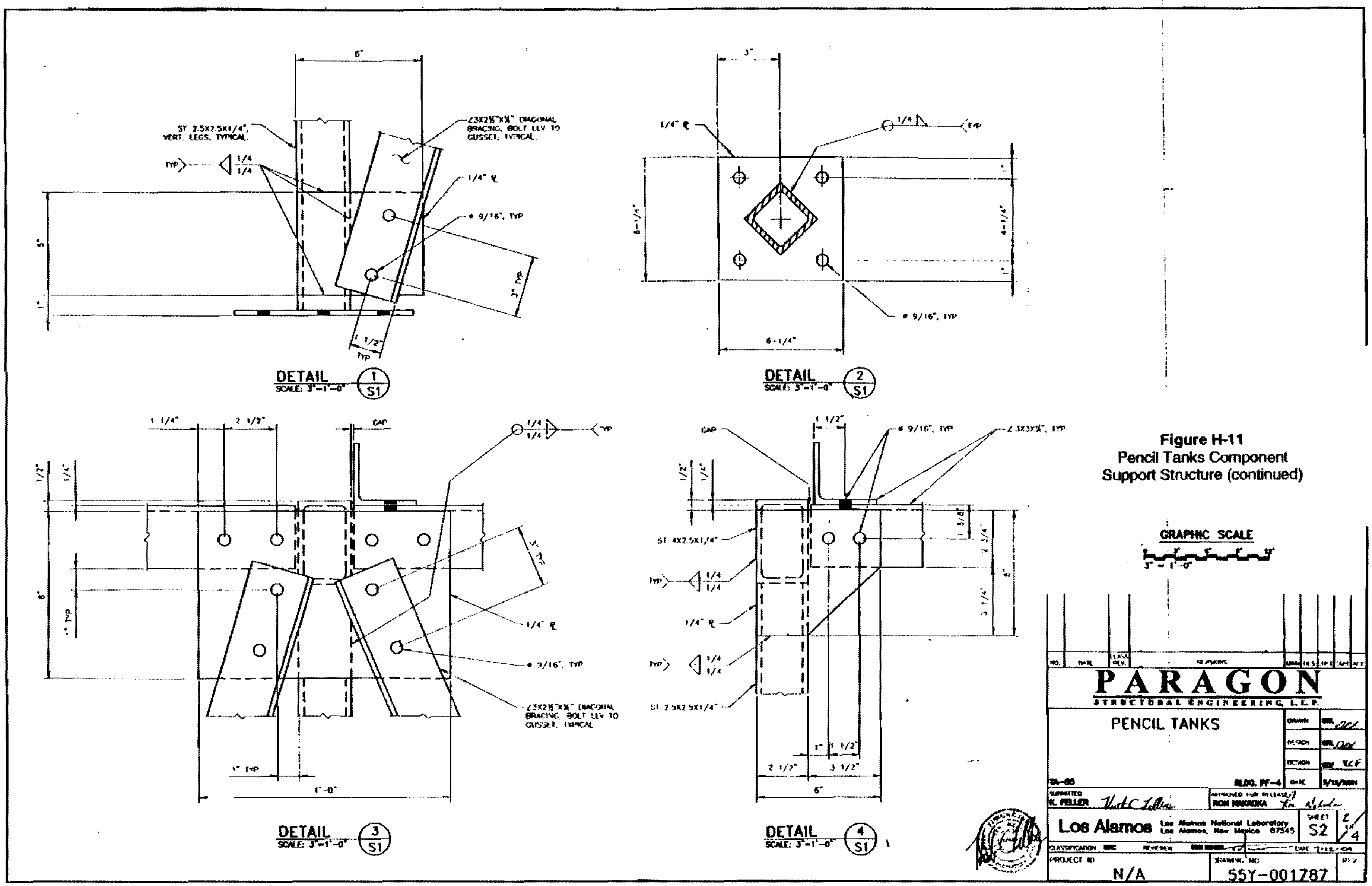


Figure H-11
Pencil Tanks Component
Support Structure (continued)

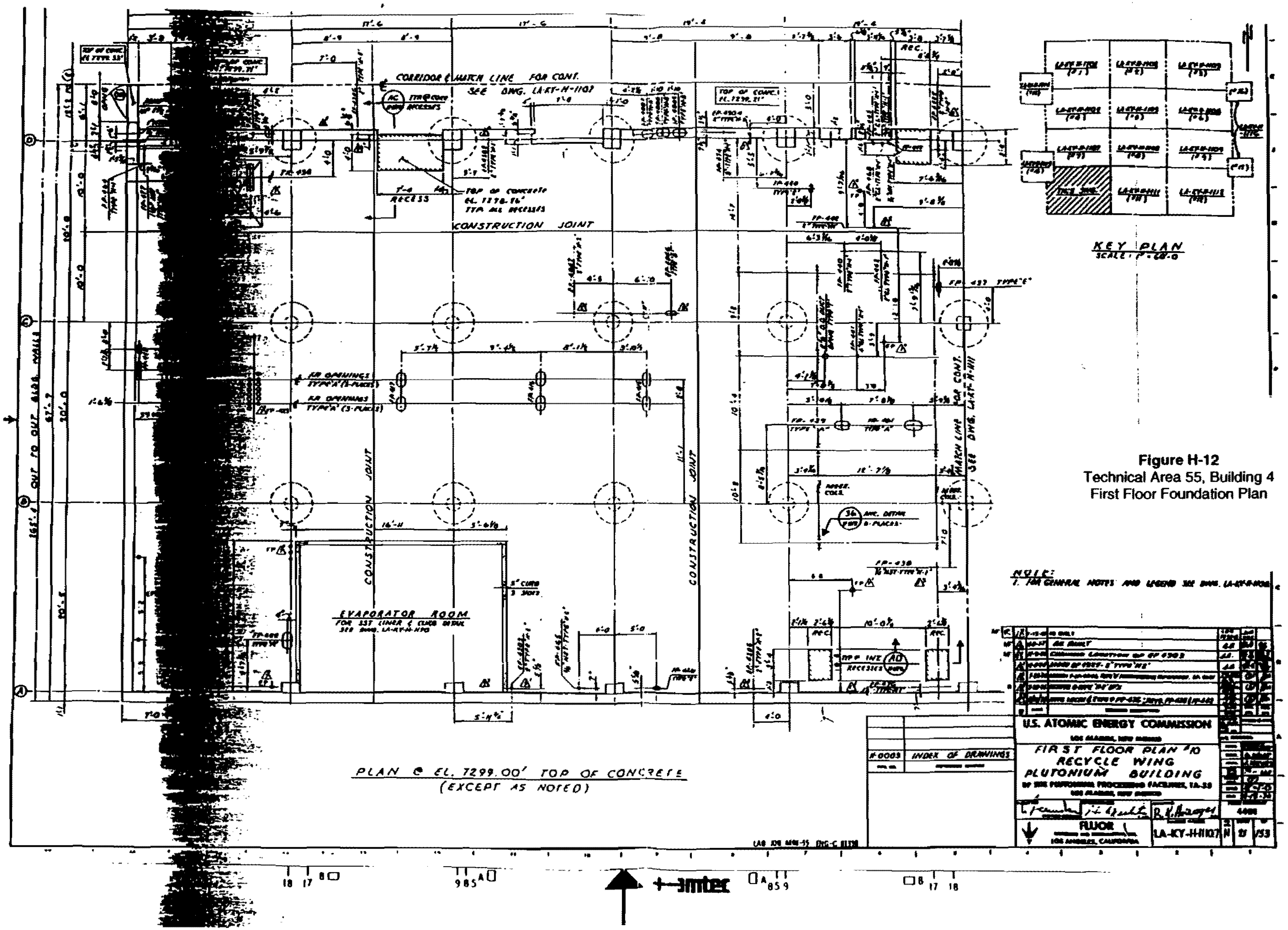


Figure H-12
Technical Area 55, Building 4
First Floor Foundation Plan

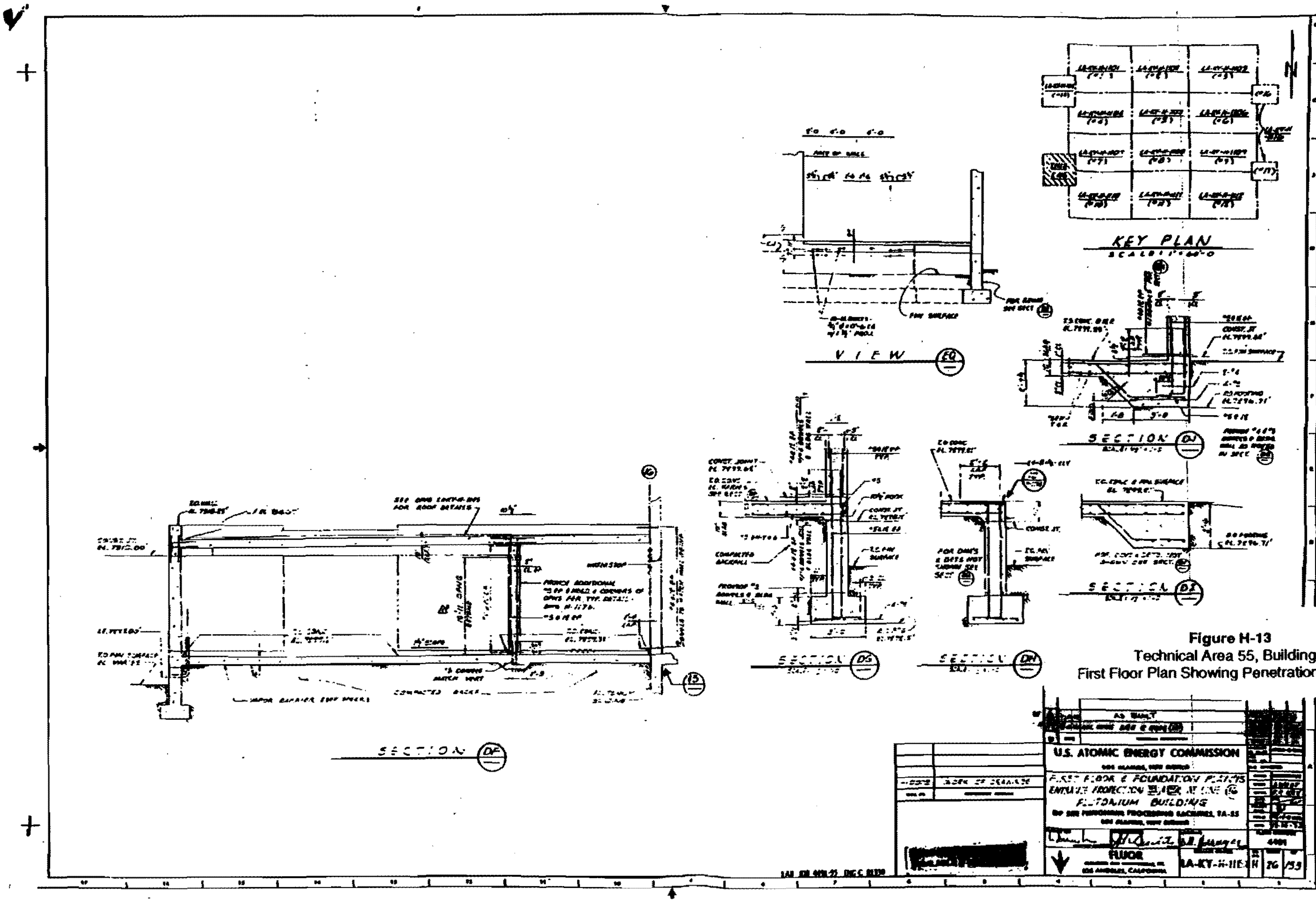


Figure H-13
Technical Area 55, Building 4
First Floor Plan Showing Penetration Locations

Supplement H.1

Written Engineering Assessment/Certification for the Evaporator Glovebox Tank Component

ADDENDUM TO THE REGISTERED PROFESSIONAL ENGINEER WRITTEN ASSESSMENT/CERTIFICATION

EVAPORATOR GLOVEBOX STORAGE TANK SYSTEM TECHNICAL AREA 55 LOS ALAMOS NATIONAL LABORATORY

The purpose of this addendum is to provide updated information for the "Los Alamos National Laboratory Technical Area 55 Part B Permit Application," Revision 2.0. The changes are not related to the design or construction of the tank system for which the assessment was written. They are a result of reformatting and nomenclature revisions and, therefore, recertification is not required.

The evaporator glovebox storage tank system has been renamed "the evaporator glovebox tank component." It is now considered a tank component affiliated with the storage tank system located at Technical Area 55, Building 4.

The certification page of this engineering assessment (page 4 of 9) references the location of the assessment as Attachment 4-2 of the "Los Alamos National Laboratory Technical Area 55 Part B Permit Application," Revision 0.0 submitted to the New Mexico Environment Department in June 1996. This information has changed to Supplement H.1 of this permit application.

REGISTERED PROFESSIONAL ENGINEER
WRITTEN ASSESSMENT/CERTIFICATION

EVAPORATOR GLOVEBOX STORAGE TANK SYSTEM
TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

The evaporator glovebox storage tank system (i.e., glovebox GB-438 and ancillary equipment) located at Los Alamos National Laboratory (LANL), Technical Area 55, Building 4, Room 401 (TA-55-4-401) is considered an existing tank system in accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart VI, 265.191. The system was constructed in 1986 and installed at its present location in TA-55-4-401 in 1988 [20 NMAC 4.1, Subpart VI, 265.191(b)(4)]. The evaporator glovebox storage tank system has secondary containment that meets the requirements of 20 NMAC 4.1, Subpart VI, 265.193; therefore, the requirement that the owner or operator of the tank system determine that the tank system is not leaking or is unfit for use is not applicable. In addition, the requirement that the owner or operator obtain and keep on file a written assessment, reviewed and certified by an independent, qualified, registered professional engineer, attesting to the tank system's integrity is also not applicable [20 NMAC 4.1, Subpart VI, 265.191(a)]. However, for the purpose of demonstrating that the evaporator glovebox storage tank system will function as a completely leak-proof system and would meet the assessment requirements if they were applicable, the following written assessment has been prepared in accordance with 20 NMAC 4.1, Subpart VI, 265.191(b), attesting that the tank system is adequately designed and has sufficient structural integrity and compatibility with the waste stored to ensure that it will not collapse, rupture, or fail.

The evaporator glovebox storage tank is fabricated from 3/16-inch, 316 stainless steel with a 2B finish conforming to the American Society for Testing and Materials (ASTM) A240. The lower half of the tank is fabricated with additional layers of materials welded to the outside of the 3/16-inch-thick stainless steel enclosure. These materials consist of 1/4-inch-thick lead shielding, conforming to ASTM B29, and an outer layer of 1/16-inch, 316 stainless steel cladding. The tank system is of welded construction with all welds blended, ground, and polished to blend with adjacent material. Welding procedure qualifications and welder's performance qualifications conform to the requirements of either the American Welding Society B3.0-41 or the American Society of Mechanical Engineers (ASME) Section IX for welding and brazing qualifications. Questionable welds, if any, are liquid penetrant inspected according to ASME Section VIII [20 NMAC 4.1, Subpart VI, 265.191(b)(1)]. All joints are vacuum tight.

The support frame and legs of the evaporator glovebox storage tank are constructed of carbon steel and conform to ASTM A36. The support frame is bolted to the base of the tank for stabilization. In addition, the legs of the tank are bolted to the support frame and secured to the

10-inch-thick concrete floor with anchor bolts. The 10-inch-thick concrete floor was constructed to conform to the building code requirements of the American Concrete Institute (ACI) 318-71 for reinforced concrete. The reinforcing steel was detailed and fabricated in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures," ACI 315. The design construction and tolerance of the framework around the concrete is in accordance with ACI 347.

The window components of the evaporator glovebox storage tank are constructed of 1/4-inch leaded glass, laminated on both sides with 1/8-inch clear glass, and installed with a neoprene gasket. Additionally, each window is backed with 1/4-inch safety glass installed with a neoprene gasket/seal that provides air-tight containment. The dual glass configuration is secured to the tank with a welded frame consisting of a 1/4-inch-thick lead shielding and a 1/16-inch, 316 stainless steel cladding similar to the additional layers of materials welded to the outside of the lower half of the tank. The welded window frames are bolted to the tank system.

The glove components of the evaporator glovebox storage tank are constructed of neoprene and Hypalon. Each glove is tested for material continuity by the manufacturer before acceptance and installation within the evaporator glovebox storage tank. Each glove is selected for its resistance to nitric acid as well as its lead equivalent shielding power to gamma radiation.

All of the components within the tank system are corrosion resistant and are compatible with the waste stored in the tank system. No external component of the tank system is in contact with soil or water [20 NMAC 4.1, Subpart VI, 265.191(b)(3)].

The stored waste consists of nitrate-based aqueous mixed waste solutions and waste salts generated from these solutions. The potential hazardous characteristics of the waste include corrosivity and toxicity for cadmium, chromium, and lead (i.e., EPA Hazardous Waste Numbers D002, D006, D007, and D008). Currently, no ignitable, reactive, or incompatible mixed wastes are stored or are anticipated to be stored in this tank system [20 NMAC 4.1, Subpart VI, 265.191(b)(2)].

A helium leak test using a mass spectrometer was performed on the evaporator glovebox storage tank upon fabrication at Silver Engineering and again after the tank was installed and made operational at its present location in TA-55-4-401. During leak testing, in accordance with the standard helium leak testing procedure for gloveboxes, any detectable leak at welds, gasket sealed joints, or any other part of the glovebox is unacceptable. In the event a leak is detected during initial testing of any glovebox to be utilized at LANL, the glovebox is repaired and retested. Gloveboxes that have been repaired and fail retesting are not accepted for use by LANL. In addition to the initial leak tests performed on the evaporator glovebox storage tank, continuous leak detection is mandatory operating procedure for TA-55-4-401 and thus provides continuous leak detection for the tank system. Eight continuous air monitoring units are installed at various locations throughout TA-55-4-401 to detect any airborne alpha contamination (i.e., the radioactive constituent of the solutions stored in the tank system). Additionally, fixed head air monitors are installed on the outside of the tank system and filter the air as it is pulled through the vacuum vent lines at TA-55-4-401. The filters from these monitors are changed and analyzed weekly for the presence of the radioactive constituent of the stored waste. The above continuous leak detection devices are capable of rapidly detecting leaks in volumes less than 0.03 ounce, far exceeding conventional tank system leak detection devices [20 NMAC 4.1, Subpart VI, 265.191(b)(5)].

(The procedure adhered to during the helium leak test is included in this attachment following the certification. The procedure is referenced from the "Technical Specifications for Glove Boxes, Drop Boxes, Introductory Boxes and Conveyor Tunnels," Specification No. MST-8-S184-R00, Los Alamos National Laboratory, Los Alamos, New Mexico, July 27, 1988. A copy of the checklist documenting operability tests and equipment verification for proper operation of the evaporator glovebox storage tank system is also included in this attachment following the certification.)

CERTIFICATION - JOHN M. PIETZ, P.E.

I, John M. Pietz, have reviewed the design of the evaporator glovebox storage tank system located at LANL, TA-55-4-401. My duties were to assess the structural integrity of the glovebox storage tank system and its compatibility with the waste stored in this system to ensure that it will not collapse, rupture, or fail.

I certify under penalty of law that this document (i.e., Attachment 4-2 of the TA-55 Part B Permit Application) was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted for this assessment and certification. 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.

John M. Pietz, P.E.
Consulting Engineer
IT Corporation
New Mexico Registered Professional Engineer No. 12833
Expires: December 31, 1997

6/24/96
Date

HELIUM LEAK TEST FOR GLOVE BOXES, DROP BOXES, AND TUNNEL SECTIONS

1.0 Equipment

1.1 Leak Detector: Helium Mass Spectrometer Leak Detector, with Sniffer Probe, University Approved.

1.2 Helium: U.S.B.M. Grade A.

1.3 Calibrated Helium Leak: 10^{-7} - 10^{-8} atm cc/sec leak rate.

1.4 Manometer: water filled, open-ended J tube 1/2" i.d. min., max. pressure head 6" water, operating range 4" water.

1.5 Helium pressure regulating valve: 2,000 psi/0-15 psi, with pressure relief valve set at 1–2 psig.

1.6 Helium flowmeter, range 0–15 $ft.^3/min$.

2.0 Procedure

2.1 Seal glove box openings. Method of sealing of glove box openings shall be at the discretion of the seller.

2.2 Attach helium fill tubing with shut off valve, to a port in the glove box on one end, or preferably on upper corner.

2.3 Attach helium vent with shut off valve on opposite side of the box preferably lower corner diagonally opposite fill port.

2.4 Attach manometer to convenient opening and fill with water.

2.5 Calibrate He leak detector to minimum sensitivity with calibrated leak and determine sensitivity (S) as follows:

$$S = \frac{L_s}{\text{Meter Divisions}} \text{ atm - cc/sec/div}$$

L_s = standard He leak rate (atm - cc/sec)

2.6 Attach helium bottle, regulator, and flow meter to helium inlet on glove box.

2.7 Flush He through box at a convenient rate (Q) so that the internal pressure of the box is always less than 6" H_2O, and determine the rate and pressure to be used.

2.8 Calculate the time required for the He flush as follows: Calculate the volume ($V\ ft.^3$) of the box to $\pm$ 10%. Using the flow rate Q ($ft.^3/min.$) determined above, the flushing time for 90% helium atmosphere will be (assuming completely mixed flow),

$$T_{min.} = 2.3\ V/Q$$

2.9 Close the helium supply valve and close the helium vent valve. Adjust the helium inlet to get 4" water on the manometer.

2.10 Ventilate the room to eliminate helium contamination in the room, then stop ventilation.

2.11 A 1/8-inch leak test probe will be moved along all joined surfaces (welded or gasketed), with probe not more than 1/4" from area to be checked, and moving probe about 2 ft./min.

2.12 Record location and intensity of all leaks: The leak rate (L) will be determined from meter reading (R_L) from a particular leak and the instrument sensitivity (S) as determined in 2.5.

$$L = S\ (R_L - R_B)$$

Note at 5,000' MSL (Mean Sea Level) the above procedure will give a minimum leak detection capability of about 8×10^{-7} atm cc/sec.

Evaporator Project
Operability Tests and Equipment Verification

Checklist for equipment and instrumentation verified as operating properly and calibrated appropriately.

ITEM VERIFIED	DATE	INITIALS
<u>Evaporator Enclosure</u>		
Control loops		
• EV A Steam		
- Foxboro 761 PID controller	10-4-89	[illegible]
- Control valve		
• EV A Level		
- Foxboro 761 PID controller	10-4-89	[illegible]
- Control valve		
• EV B Steam		
- Foxboro 761 PID controller	10/4/89	dQd
- Control valve		
• EV B Level		
- Foxboro 761 PID controller	10/4/89	dQd
- Control valve		
Pneumatic valves		
• Feed		
- EV A, #6 and #7	10/2/89	dQd
- EV B, #18 and #19	10/2/89	dQd
• Distillate		
- EV A to hot tanks, #23	10/2/89	dQd
- EV A to cold tanks, #21	10/2/89	dQd
- EV B to hot tanks, #24	10/2/89	dQd
- EV B to cold tanks, #22	10/2/89	dQd
Flowmeters (Micromotion)		
- EV A feed	10/3/89	SLY
- EV B feed	10/3/89	SLY
- EV A distillate	10/3/89	SLY
- EV B distillate	10/3/89	SLY
Feed pumps (Wilden diaphragm with air to 25 psig)		
- EV A	10/2/89	dQd
- EV B	10/2/89	dQd
Magnetic level meters		
- EV A	10/2/89	dQd
- EV B	10/2/89	dQd

ITEM VERIFIED	DATE	INITIALS
Visual sightglasses		
- EV A	10/2/89	dsd
- EV B	10/2/89	dsd
Density meters (0.9 to 1.5 SpG)		
- EV A	10/4/89	dsd
- EV B	10/4/89	dsd
Feed storage tanks and vent/vac traps leak tested	1/24/89	dsd
Industrial water lines		
- EV A demistor, sightglass, reboiler	10-4-89	[illegible]
- EV B demistor, sightglass, reboiler	10-4-89	[illegible]
Temperature thermohms and gauge readouts		
- EV A bottoms	10/4/89	dsd
- EV A steam	10/4/89	dsd
- EV B bottoms	10/4/89	dsd
- EV B steam	10/4/89	dsd
Backup pneumatic valve control panel	10/2/89	dsd
Steam systems		
• PRV set to 35 psig		
- Saltbox and steam candles	10-4-89	[illegible]
- Evaporators	10-4-89	[illegible]
• SRV set to 50 psig		
- Saltbox and steam candles	10-4-89	[illegible]
- Evaporators	10-4-89	[illegible]
• Traps on supply lines		
- Saltbox and steam candles	10-4-89	[illegible]
- Evaporators	10-4-89	[illegible]
• Condensate traps		
- EV A	10-4-89	[illegible]
- EV B	10-4-89	[illegible]
Zone 2 exhaust HEPA, DOP tested	10-3-89	JPO [illegible]
Zone 2 inlet HEPAs		
- South inlet	10/2/89	dsd
- West inlet	10/2/89	dsd
Overhead 1 ton craneS with limit switches. Load tested to 125% of capacity (X2)	12/5/88	DAO by dsd*

* Reference crane test packages.

ITEM VERIFIED	DATE	INITIALS
Saltbox		
Configured glass columns		
- steam candles	10/2/89	dGd
- vent/vac inlets (X2)	10/2/89	dGd
- overhead hoist setup for column replacement	10/2/89	dGd
- (two with thermocouples and wire screen cages)	10/2/89	dGd
Offgas condenser	10/2/89	dGd
Vent/vac trap with drain to feed tanks		
- EV A feed	10/3/89	SLY
- EV B feed	10/3/89	SLY
Heat tape on transfer line	10/3/89	SLY
RTD	10/3/89	SLY
Acid metering valves (X2)	10/3/89	SLY
Shielded salt trays with NPCCW supply/return (X2)	10/3/89	SLY
Filter boats, stainless steel (X2)	10/3/89	SLY
Glovebox services		
- compressed air (X~~2~~) 4 dGd	10-4-89	[illegible]
- industrial water (X4)	10-4-89	[illegible]
- 110/120V outlets (X2)	10-4-89	[illegible]
- NPCCW supply and return (X2)	10-4-89	[illegible]
- house vacuum with trap	10-4-89	[illegible]
12" HEPA filters stacks (X3)	6/22/89	JPO by dGd *
8" inlet filters (X2)	10-4-89	[illegible]
Sample port	10/3/89	SLY * **

* REFERENCE MEMO HSE-5-89-818

** He leaked checked by LANL MACHINE SHOP

* AND IN PLACE

Supplement H.2A

Written Engineering Assessment/Certification for the Cementation Unit Pencil Tanks Component

ADDENDUM TO THE REGISTERED PROFESSIONAL ENGINEER WRITTEN ASSESSMENT/CERTIFICATION

CEMENTATION UNIT STORAGE TANK SYSTEM TECHNICAL AREA 55 LOS ALAMOS NATIONAL LABORATORY

The purpose of this addendum is to provide updated information for the "Los Alamos National Laboratory Technical Area 55 Part B Permit Application," Revision 2.0. The changes are not related to the design or construction of the tank system for which the assessment was written. They are a result of reformatting, clarification, and nomenclature revisions and, therefore, recertification is not required.

The cementation unit storage tank system has been renamed "the cementation unit pencil tanks component." It is now considered a tank component affiliated with the storage tank system located at Technical Area 55, Building 4.

The discussion of the Uni-strut support system for the cementation pencil tanks includes the following statement:

> " The entire tank system, including ancillary equipment, is elevated and supported by a steel channel, Uni-strut support system. The Uni-strut support system is secured to the concrete floor and ceiling with anchor bolts and provides the system's ancillary equipment with support and protection against physical damage and excessive stress due to settlement and vibration."

To clarify, the Uni-strut support system to which the tanks are attached is bolted only to the floor. The ancillary equipment (i.e., piping) is also attached to a Uni-strut support system, which is bolted to the ceiling.

The certification page of this engineering assessment (page 4 of 4) references the location of the assessment as Attachment 4-3 of the "Los Alamos National Laboratory Technical Area 55 Part B Permit Application," Revision 0.0, submitted to the New Mexico Environment Department in June 1996. This information has changed to Supplement H.1 of this permit application. The location of this information has changed to Supplement H.2A of this permit application.

REGISTERED PROFESSIONAL ENGINEER
WRITTEN ASSESSMENT/CERTIFICATION

CEMENTATION UNIT STORAGE TANK SYSTEM
TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

The cementation unit storage tank system located at Los Alamos National Laboratory (LANL), Technical Area 55, Building 4, Room 401 (TA-55-4-401) was constructed and installed prior to January 1991 and was considered an existing tank system in accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart VI, 265.191. New components (i.e., the header/manifold and the transfer line from glovebox GB-438 to the cementation unit storage tank system header/manifold) have recently been installed within the cementation unit storage tank system and may be considered major, nonroutine modifications. In accordance with 20 NMAC 4.1, Subpart VI, 265.192(a), owners or operators of new tank systems or components must obtain and submit to the New Mexico Environment Department a written assessment, reviewed and certified by an independent, qualified, registered professional engineer, attesting that the tank system has sufficient structural integrity and is acceptable for handling hazardous waste.

The cementation tank system consists of:

- Five vertical, 55-liter storage tanks
- Vacuum trap
- Vent trap
- Vent trap vent line and drain line
- Header/manifold
- Vacuum manifold
- Lower manifold
- Transfer line from glovebox GB-438 to the cementation unit storage tank system header/manifold
- Transfer line from the lower manifold to the cementation unit.

In accordance with 20 NMAC 4.1, Subpart VI, 265.192(b), an independent, qualified installation inspector has inspected the new components installed within the cementation unit storage tank system (see Attachment 4-5). These components were constructed and installed to the American National Standards Institute (ANSI) B31.3 standard for chemical plant and petroleum refinery piping [20 NMAC 4.1, Subpart VI, 265.192(a)(1) and 265.192(e)]. This standard prescribes requirements for the materials, design, fabrication, assembly, erection, examination, inspection, and testing of all piping within the property limits of the facility engaged in the processing activities. The new header/manifold and transfer line were inspected for weld breaks, punctures, scrapes of protective coatings, cracks, corrosion, and other structural damage or inadequate construction or installation. These inspections were performed on February 28, 1996. No weld breaks, punctures, scrapes of protective coatings, cracks, corrosion, or other structural damage or inadequate construction or installation were observed.

All of the components comprising the cementation unit storage tank system are constructed of 316 stainless steel for corrosion resistance and are compatible with the waste stored in the tanks. The stored waste consists of nitrate-based aqueous mixed waste solutions. The potential hazardous characteristics of the waste include corrosivity and toxicity for cadmium, chromium, and lead (i.e., EPA Hazardous Waste Numbers D002, D006, D007, and D008). Currently, no ignitable, reactive, or incompatible mixed wastes are stored or are anticipated to be stored in this tank system [20 NMAC 4.1, Subpart VI, 265.192(a)(2)].

No external component of the cementation unit storage tank system is in contact with soil or water [20 NMAC 4.1, Subpart VI, 265.192(a)(3) and 265.192(f)] and no part of the tank system is underground [20 NMAC 4.1, Subpart VI, 265.192(a)(4) and 265.192(c)].

The cementation unit storage tank system is erected upon a 10-inch-thick concrete floor within TA-55-4-401. The 10-inch-thick concrete floor provides a foundation that will maintain the load of the tank system when full. The concrete floor and ceiling were constructed to conform to the building code requirements of the American Concrete Institute (ACI) 318-71 for reinforced concrete. The reinforcing steel was detailed and fabricated in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures," ACI 315. The design construction and tolerance of the framework around the concrete is in accordance with ACI 347 [20 NMAC 4.1, Subpart VI, 265.192(5)(i)]. The entire tank system, including ancillary equipment, is elevated and supported by a steel channel, Uni-strut® support system. The Uni-strut® support system is secured to the concrete floor and ceiling with anchor bolts and provides the system's ancillary equipment with support and protection against physical damage and excessive stress due to settlement and vibration [20 NMAC 4.1, Subpart VI, 265.192(e)]. The system stores only solutions that have been previously cooled to room temperature, and the solutions are transferred utilizing a slight vacuum (i.e., 10 to 20 inches of mercury). The system does not operate under pressure. Because of the moderate operating parameters (i.e., temperature and pressure) of the system, physical damage and excessive stress due to expansion and contraction are not anticipated. Furthermore, the cementation tank system is not within a saturated zone or seismic fault zone [20 NMAC 4.1, Subpart VI, 265.192(a)(5)(ii)], and is within a building so that frost heave effects are not expected [20 NMAC 4.1, Subpart VI, 265.192(a)(5)(iii)].

In accordance with 20 NMAC 4.1, Subpart VI, 265.192(d), all new tanks and ancillary equipment must be tested for tightness. To further ensure that the structural integrity of the cementation unit storage tank system was not jeopardized during the installation of the new components, the entire system was tightness tested on May 30, 1996, at operating pressure (i.e., under vacuum at 10 to 20 inches of mercury), and determined to be tight (see Attachment 4-4).

CERTIFICATION - JOHN M. PIETZ, P.E.

I, John M. Pietz, have reviewed a portion of the design of the new components installed on the cementation unit storage tank system located at LANL, TA-55-4-401. The new components include the cementation unit storage tank system header/manifold and the transfer line from glovebox GB-438 to the cementation unit storage tank system header/manifold. My duties were to assess possible affects the modifications may have had on the system and to ensure that the structural integrity of the system and its ability to handle hazardous waste was not compromised as a result of the modifications.

I certify under penalty of law that this document (i.e., Attachment 4-3 of the TA-55 Part B Permit Application) was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted for this assessment and certification. 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.

JOHN M. PIETZ
NEW MEXICO
12833
REGISTERED PROFESSIONAL ENGINEER

John M. Pietz, P.E.
Consulting Engineer
IT Corporation
New Mexico Registered Professional Engineer No. 12833
Expires: December 31, 1997

6/24/96
Date

Supplement H.2B

Tightness Testing Certification
for the
Cementation Unit Pencil Tanks Component

ADDENDUM TO THE TIGHTNESS TESTING CERTIFICATION

CEMENTATION UNIT STORAGE TANK SYSTEM
TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

The purpose of this addendum is to provide updated information for the "Los Alamos National Laboratory Technical Area 55 Part B Permit Application," Revision 2.0. The changes are not related to the design or construction of the tank system for which the tightness testing certification was written. They are a result of reformatting and nomenclature revisions and, therefore, recertification is not required.

The cementation storage tank system has been renamed "the cementation unit pencil tanks component." It is now considered a tank component affiliated with the storage tank system located at Technical Area 55, Building 4.

The certification page of this tightness testing certification (page 2 of 6) references the location of the assessment as Attachment 4-4, of the "Los Alamos National Laboratory Technical Area 55 Part B Permit Application," Revision 0.0 submitted to the New Mexico Environment Department in June 1996. This information has changed to Supplement H.1 of this permit application. This information has changed to Supplement H.2B of this permit application.

TIGHTNESS TESTING CERTIFICATION

CEMENTATION UNIT STORAGE TANK SYSTEM
TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

New components (i.e., the cementation unit storage tank system header/manifold and the transfer line from glovebox GB-438 to the cementation unit storage tank system header/manifold) have been installed within the cementation unit storage tank system located at Los Alamos National Laboratory (LANL), Technical Area 55, Building 4, Room 401 (TA-55-4-401) and may be considered major, nonroutine modifications. In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart VI, 265.192(d), owners or operators of new tanks and ancillary equipment must ensure that the system is tested for tightness. The cementation unit storage tank system was tightness tested on May 30, 1996, at operating pressure (i.e., under a vacuum of 10 to 20 inches of mercury), and determined to be tight. Testing was conducted such that pressure changes caused by temperature variances during testing, tank inflection due to increased vacuum in the tank, or trapped air or vapor pockets within the system were accounted for. (The detailed tightness testing procedure adhered to during the tightness tests and the results of the tightness tests are included in this attachment following the certification.)

TIGHTNESS TESTING CERTIFICATION

CERTIFICATION • JOHN M. PIETZ, P.E.

I, John M. Pietz, have supervised the tightness testing of the cementation unit storage tank system located at LANL, TA-55-4-401. The tightness testing was performed on May 30, 1996. My duties were to direct and witness the testing for tightness for the following tank system components:

- Five vertical, 55-liter storage tanks
- Vacuum trap
- Vent trap
- Vent trap vent line and drain line
- Header/manifold
- Vacuum manifold
- Lower manifold
- Transfer line from glovebox GB-438 to the cementation unit storage tank system header/manifold
- Transfer line from the lower manifold to the cementation unit.

as required by 20 NMAC 4.1, Subpart VI, 265.192(d).

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document (i.e., Attachment 4-4 of the TA-55 Part B Permit Application). 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.

JOHN M. PIETZ
NEW MEXICO
12833
REGISTERED PROFESSIONAL ENGINEER

John M. Pietz, P.E.
Consulting Engineer
IT Corporation
New Mexico Registered Professional Engineer No. 12833
Expires: December 31, 1997

6/24/96
Date

TIGHTNESS TESTING PROCEDURE

CEMENTATION UNIT STORAGE TANK SYSTEM
TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

The following tightness testing procedure has been developed for the cementation unit storage tank system located at Los Alamos National Laboratory, Technical Area 55, Building 4, Room 401.

PART 2 - MATERIALS AND EQUIPMENT

2.01 MATERIALS AND EQUIPMENT

A. Vacuum Pump: The existing house vacuum pump, located in Room 407, shall be used as the vacuum source to establish and maintain the specified vacuum during each test.

B. Vacuum Gauge: The vacuum gauge shall be an ANSI Grade 2A vacuum gauge with an accuracy of 0.5 percent. The gauge shall have a face diameter of 6 inches and graduated in 0.2-inch mercury increments. The gauge shall be calibrated and installed within one month prior to testing the system.

PART 3 - EXECUTION

3.01 TESTING PROCEDURES

The cementation unit storage tank system consists of:

- Five vertical, 55-liter storage tanks (i.e., feed tanks 1 through 5)
- Vacuum trap
- Vent trap
- Vent trap vent line and drain line
- Header/manifold
- Vacuum manifold
- Lower manifold
- Transfer line from glovebox GB-438 to the cementation unit storage tank system header/manifold

- Transfer line from the lower manifold to the cementation unit.

The entire system will be tightness tested by systematically blanking off sections of the tank system. Each section to be tested shall have the solutions emptied prior to testing. The valve on the wet vacuum line between the vacuum pump and the vacuum trap will be closed for the duration of each test to isolate a vacuum within the components being tested. In order to determine the presence of leaks, each tested section will be held under a vacuum of 10 to 20 inches of mercury for 30 minutes.

The following information specifies the sequence of events to be adhered to during the tightness testing:

A. The vacuum gauge shall be installed on the end of the header/manifold near feed tank 1.

B. All tests will include the following piping sections to facilitate the use of the existing vacuum pump and a single vacuum gauge connection:

   - the wet vacuum line,
   - the vacuum trap,
   - the vacuum manifold, and
   - the header/manifold.

C. The first test (Test 1) shall be run through the components listed in item B in addition to the following:

   - the line from feed tank 1 to the vacuum manifold, feed tank 1, and the inlet line off of the header/manifold into feed tank 1,
   - the line from feed tank 2 to the vacuum manifold, feed tank 2, and the inlet line off of the header/manifold into feed tank 2,
   - the line from feed tank 3 to the vacuum manifold, feed tank 3, and the inlet line off of the header/manifold into feed tank 3,
   - the line from feed tank 4 to the vacuum manifold, feed tank 4, and the inlet line off of header/manifold into feed tank 4,
   - the transfer line from glovebox GB-438 to the header/manifold,
   - the lower manifold, and
   - the transfer line from the lower manifold to the cementation unit.

D. The second test (Test 2) shall be run through the components listed in item B in addition to the following:

- the vacuum trap drain line,
- the line from feed tank 5 to the vacuum manifold,
- feed tank 5, and
- the inlet line off of the header/manifold into feed tank 5.

E. The third test (Test 3) shall be run through the components listed in item D in addition to the following:

- the vent trap inlet line,
- the vent trap,
- the vent line to the cementation unit, and
- the vent trap drain line to the cementation unit.

3.02 <u>FAILED TEST PROCEDURES</u>

A change in vacuum greater than 2 percent of the test vacuum of a given test indicates a failed test. In the event that a test fails, the appropriate repairs shall be made and the failing component(s) retested. No component that has failed the tightness test shall be placed into use until repairs are made and a passing test is achieved.

TIGHTNESS TESTING RESULTS

CEMENTATION UNIT STORAGE TANK SYSTEM
TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

CEMENTATION UNIT STORAGE TANK SYSTEM TIGHTNESS TESTS[1]			
		TIMES	GAUGE READINGS
TEST 1[2]	Start	9:07 A.M.	17.8 inches of mercury
	End	9:37 A.M.	17.8 inches of mercury
TEST 2[2]	Start	9:47 A.M.	17.8 inches of mercury
	End	10:17 A.M.	18.1 inches of mercury
TEST 3[2]	Start	10:30 A.M.	18.0 inches of mercury
	End	11:00 A.M.	18.0 inches of mercury

Note:

(1) Tightness tests were completed on May 30, 1996.
(2) Components tested are as described in the tightness testing procedure for the cementation unit storage tank system.

Supplement H.2C

Installation Inspection Certification
for the
Cementation Unit Pencil Tanks Component

ADDENDUM TO THE INSTALLATION INSPECTION CERTIFICATION

CEMENTATION UNIT STORAGE TANK SYSTEM
TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

The purpose of this addendum is to provide updated information for the "Los Alamos National Laboratory Technical Area 55 Part B Permit Application", Revision 2.0. The changes are not related to the design or construction of the tank system for which the installation inspection certification was written. They are a result of reformatting and nomenclature revisions and, therefore, recertification is not required.

The cementation storage tank system has been renamed "the cementation unit pencil tanks component." It is now considered a tank component affiliated with the storage tank system located at Technical Area 55, Building 4.

Supplement H.3

Written Engineering Assessment/Certification for the Pencil Tanks Component

WRITTEN ENGINEERING ASSESSMENT/CERTIFICATION
FOR THE PENCIL TANKS

TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

ASSESSMENT CERTIFICATION

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed 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 for penalties submitting false information, including the possibility of fine and imprisonment for knowing violations.

1/24/02
Date

Tyson Lansford
IT Corporation
New Mexico Registered Professional Engineer No.: 9755
Expires: December 31, 2003

WRITTEN ENGINEERING ASSESSMENT/CERTIFICATION FOR THE PENCIL TANKS

**TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY**

The information in this engineering assessment is provided to meet the requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart V, 264.192(a) revised June 14, 2000 [6-14-00], attesting that the pencil tanks of the Technical Area (TA) 55 storage tank system is adequately designed and has sufficient structural integrity and compatibility with the waste to be stored to ensure that it will not collapse, rupture, or fail.

This written assessment and certification addresses the following requirements as they pertain to the pencil tanks, and includes the standards which must be complied with by the tank fabricator. These requirements include design standards to which the pencil tanks will be constructed, hazardous characteristics of the waste to be stored, corrosion protection provided, excessive load protection provided to underground tank components, and adequacy of the foundation and support design.

The information for this assessment is based upon a completed drawing package prepared by Johnson Controls of Northern New Mexico and dated July 2001. The drawings provide detailed information regarding the design and construction of the pencil tanks to be installed at TA-55, Building 4 (TA-55-4), Room 401, as a part of the storage tank system. It includes the physical dimensions of the pencil tanks, the materials of construction, the location of ancillary equipment, and definition of the support system.

Pencil Tanks Design Standards

The pencil tanks will consist of ten vertical tanks located on a Uni-strut rack, perpendicular to the west wall of Room 401 at TA-55-4. Each pencil tank will have a capacity of 50 liters, a 6.625-inch (in) outer diameter (O.D.), a straight-side height of 10 feet (ft), a wall thickness of 0.28 in, and a conical bottom. The tanks will be constructed of seamless Schedule 40, 316 stainless steel piping that will meet the chemical and physical characteristics given in American Society for Testing and Materials (ASTM) “A312-Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes,” hereinafter referred to as ASTM A312 (ASTM, 1995). Each tank will be equipped with three sight glasses for local level indication and will have a high-level switch for spill and overfill protection. The primary containment welds for each tank will be vacuum tight in accordance with the American Society of Mechanical Engineers (ASME) "Boiler and Pressure Vessel Code" (ASME, 1998), hereinafter referred to as ASME BPVC, Section VIII, Division 1, Subsection B, UW . All penetrations into the shells of the tanks will be designed and fabricated to ensure vacuum tightness and will comply with ASME BPVC Section VIII, Division 1 (ASME, 1998). An ASME stamp will not be required for the pencil tanks. Each pencil tanks will be installed such that, if necessary, they can be replaced.

<u>Piping and Ancillary Equipment Design Standards</u>

The pencil tanks will be connected to system headers (for feed, ventilation, and vacuum) by a manifold constructed of seamless stainless steel and that meets the chemical and physical characteristics given in ASTM A312. This piping will match the existing tank system intertank and transfer piping of 0.75-in, Schedule 40 pipe. It will meet the requirements of ASME "B31.3-Process Piping" (ASME, 1996a) for Normal Fluid Service for a maximum design pressure of 15 pounds per square inch and design temperature of 10 degrees Fahrenheit. All piping connections will be via flanged and gasketed connections and will be provided in accordance with ASME "B16.5-Pipe Flanges and Flanged Fittings" (ASME, 1996b). The flanges will be forged from stainless steel and will meet the requirements of ASTM "A182-Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves, and Parts for High-Temperature Service" (ASTM, 1997) for Grade F316L.

The pencil tanks will be equipped with a vacuum trap that will be designed to collect any mists or carryover liquid that might accumulate in the vacuum or vent lines. The vacuum trap will be constructed of 6.25-in O.D., Schedule 40, 316L seamless stainless steel pipe. The vacuum trap will be equipped with a sight glass for local level indication; will have a high-level switch for prevention of spills or overflowing; and will normally be empty.

<u>Hazardous Characteristics of the Waste</u>

The pencil tanks will be used to store mixed waste solutions while awaiting analytical results for waste characterization. The solutions are generated as evaporator bottoms and typically consist of concentrated nitric acid saturated with salts and metals. These solutions typically exhibit the hazardous characteristics of toxicity (for metals) and corrosivity.

Corrosion Protection Measures

The pencil tanks and its associated ancillary equipment will not be subject to the requirements of 20.4.1 NMAC, Subpart V, 264.192(a)(3) [6-14-00], for new tank components for which the external metal shell will be in contact with soil or water. The pencil tanks and associated ancillary equipment will be located inside TA-55-4 and will not be in contact with soil or water. The pencil tanks and its associated ancillary equipment will be constructed of 316 stainless steel and will meet the chemical and physical characteristics given in ASTM A312 (ASTM, 1995). The tanks will be corrosion-resistant and compatible with the liquid waste to be stored in them.

Underground Storage Tank Requirements

The pencil tanks will not be subject to the requirements of 20.4.1 NMAC, Subpart V, 264.192(a)(4) [6-14-00], which require a determination of the design or operational measures that will protect underground storage tanks from potential damage by vehicular traffic. The pencil tanks and ancillary equipment will be aboveground and located inside TA-55-4 mounted to the concrete floor.

Foundation and Tank Support Design Standards

The pencil tanks and associated ancillary equipment will be integrated within a support stand assembly. The support stand assembly will be approximately 3 ft, 10 in wide by 7 ft, 8 in long and will be bolted to the 10-in-thick concrete floor of TA-55-4, Room 401. The floor provides a foundation that will maintain the load of the pencil tanks when full. The concrete floor and ceiling were constructed to conform to the building code requirements of American Concrete Institute (ACI) “318-71-Building Code Requirements for Structural Concrete and Commentary” (ACI,1995) for reinforced concrete. The reinforcing steel was detailed and fabricated in accordance with the ACI “315-Details and Detailing of Concrete Reinforcement” (ACI, 1992). The design construction and tolerance of the framework around the concrete is in accordance with ACI “347-Guide to Formwork for Concrete” (ACI, 1994).

The support stand assembly superstructure will consist of braced frames that extend approximately 9 ft, 11 in from the floor. The superstructure will be fabricated entirely from carbon steel. Connections will be welded except where bolting is required for erection of subassemblies within Room 401. All carbon steel used for the superstructure will be painted, in accordance with Steel Structures Painting Council, with a high build-up epoxy primer and finish coat.

The pencil tanks will not operate under pressure; therefore, excessive stress due to expansion and contraction is not anticipated. The pencil tanks will not be located within a saturated zone or seismic fault zone; therefore, flotation or dislodgment is unlikely. The pencil tanks will be within a building, so frost heave effects are not expected.

References

ACI, 1995 and all approved updates, “318-Building Code Requirements for Structural Concrete and Commentary,” American Concrete Institute, Detroit, Michigan.

ACI, 1994 and all approved updates, “347-Guide to Formwork for Concrete,” American Concrete Institute, Detroit, Michigan.

ACI, 1992 and all approved updates, “315-Details and Detailing of Concrete Reinforcement,” American Concrete Institute, Detroit, Michigan.

ASME, 1998 and all approved updates, " Boiler and Pressure Vessel Code, Section VIII," American Society of Mechanical Engineers, New York, New York

ASME, 1996a and all approved updates, “B31.3-Process Piping,” American Society of Mechanical Engineers, New York, New York.

ASME, 1996b and all approved updates, “B16.5-Pipe Flanges and Flanged Fittings,” American Society of Mechanical Engineers, New York, New York.

ASTM, 1997 and all approved updates, “A182-Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings and Valves, and Parts for High-Temperature Service,” American Society for Testing and Materials, Philadelphia, Pennsylvania.

ASTM, 1995 and all approved updates, “A312-Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes,” American Society for Testing and Materials, Philadelphia, Pennsylvania.

WRITTEN ENGINEERING ASSESSMENT/CERTIFICATION FOR THE PENCIL TANKS

TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

TANK DESIGN CERTIFICATION

STATEMENT OF TANK DESIGN ADEQUACY:

I reviewed the design for the pencil tanks to be constructed at TA-55, Building 4, Room 401, and found the design to be adequate and to have sufficient structural integrity and compatibility with the waste to be stored to ensure that the pencil tanks will not collapse, rupture, or fail.

CERTIFICATION:

I certify under penalty of law that I examined and am familiar with the information submitted in the sections entitled "Pencil Tanks Design Standards" and "Piping and Ancillary Equipment Design Standards" of the Written Engineering Assessment/Certification for the Pencil Tanks. 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.

Name: STEPHEN L. YARBRO
Occupation: ENGINEER
Company: LOS ALAMOS NATIONAL LABORATORY
New Mexico Registered Professional Engineer No.: 10525
Expires: 12/03

1/28/02
Date

STEPHEN L. YARBRO
NEW MEXICO
10525
REGISTERED PROFESSIONAL ENGINEER

WRITTEN ENGINEERING ASSESSMENT/CERTIFICATION FOR THE PENCIL TANKS

TECHNICAL AREA 55
LOS ALAMOS NATIONAL LABORATORY

FOUNDATION SUPPORT DESIGN CERTIFICATION

STATEMENT OF TANK SUPPORT DESIGN ADEQUACY:

I reviewed the design of the tank supports for the pencil tanks to be constructed at TA-55, Building 4, Room 401, and found the design to be adequate and to have sufficient structural integrity to ensure that the tanks supports will not collapse or fail.

CERTIFICATION:

I certify under penalty of law that I examined and am familiar with the information submitted in the section entitled "Foundation and Tank Support Design Standards" of the Written Engineering Assessment/Certification for the Pencil Tanks. 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.

KENNETH C. FELLER
NEW MEXICO
12415
REGISTERED PROFESSIONAL ENGINEER

1-24-02

Kenneth C. Feller, P.E.
Structural Engineer
Paragon Structural Engineering
New Mexico Registered Professional Engineer No.: 12415
Expires: December 31, 2003

Date

ATTACHMENT I

CEMENTATION UNIT

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
DOE	U.S. Department of Energy
ft	feet/foot
gal	gallon(s)
in.	inch(es)
L	liter(s)
LANL	Los Alamos National Laboratory
TA	technical area
TC	toxicity characteristic
TCLP	Toxicity Characteristic Leaching Procedure
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant

ATTACHMENT I
CEMENTATION UNIT

The information provided in this attachment is submitted to address the applicable miscellaneous unit requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subparts X and BB, revised June 14, 2000 [6-14-00], for the cementation unit. The attachment provides a description of the cementation unit that is used to cement or stabilize mixed waste generated at Technical Area (TA) 55 and the Chemistry and Metallurgy Research Building at TA-3. It includes detailed descriptions of the cementation unit and associated ancillary equipment. Detailed drawings are provided as Figures I-1 through I-7 and are provided for informational purposes only. Table I-1 summarizes applicable Subpart X miscellaneous unit regulatory references and the corresponding location where the requirement is addressed in this document.

I.1 DESIGN, CONSTRUCTION, MATERIALS, AND OPERATION [20.4.1 NMAC §270.23(a) and 20.4.1 NMAC §264.601]

The cementation unit is located in Glovebox GB-454 along the west wall of TA-55-4, Room 401 (Figure I-1). The unit has been in operation since 1991 and has a maximum capacity of 568 liters (L) (approximately 150 gallons [gal]). It consists of a pH adjustment column, a vacuum trap, two motor-driven mixers, four impellers, associated support structures, a glovebox, and piping (Figure I-2).

The pH column has a straight side height of 5 feet (ft) and an outside diameter of 6.66 inches (in.). The maximum capacity of the column is approximately 27 L. The column is raised above the glovebox floor approximately 3 in. by three steel legs and is secured to one wall of the glovebox with a steel bracket that binds the column approximately 3 ft up from the base of the column. The vacuum trap associated with the column has a straight side height of 2 ft and an inside diameter of 6 in. The maximum capacity of the vacuum trap is approximately 11 L. Both the pH column and the vacuum trap are constructed of PYREX® glass with stainless steel end plates similar to the glass columns in the evaporator glovebox tank component described in Attachment H. The glass and stainless steel materials are corrosion-resistant and compatible with the waste received in the column. The pH column is used to adjust the pH of approximately 5 L of waste to ensure compatibility with the cement used for solidification. A compressed-air line enters the glovebox and is connected to two pressurized air tanks outside of the glovebox. The compressed-air line is used for remote valve operation.

The two mixers within the unit are high-flow, gear-driven, fixed-mount mixers. (Manufacturer's information on the fixed-mount mixers is included in this attachment as Supplement I.1.) All couplings, shafts, and impellers are constructed of 316 stainless steel. The shafts are 5 ft long. Two impellers are mounted to each shaft. Each impeller has a diameter of approximately 11 in. The mixers are driven by 3.5-horsepower motors encased within the mixer housing. The mixer housing is approximately 2.5 ft long. The maximum weight of each mixer is 225 pounds. Each mixer is mounted on steel plates and supported by two steel guides on either side of each mixer. Each guide is bolted to a 6-in. steel flange at either end and is secured to the glovebox floor and ceiling. Each motor is mounted to a center screw drive that allows the mixers to be independently raised and lowered within the glovebox (Figures I-3 and I-4).

The glovebox is constructed of a section of 0.75 in. lead between two sections of approximately 0.188-in.-thick low-carbon grade, 316 stainless steel. The floor of the glovebox contains two circular openings with removable covers that allow the shafts and impellers of each mixer to be lowered into drums attached beneath the glovebox.

During cementation operations, two 55-gal steel drums are positioned under the glovebox directly under the openings in the floor of the glovebox. A “bag-out” bag extends from the glovebox into each drum between the drum and the drum liner. This liner is fastened at the bottom of the glovebox with an elastic cord and clamped into place to prevent hazardous constituents from escaping the confinement of the glovebox and the drums during treatment operations. The cement and the waste to be solidified are transferred into the drums and homogeneously mixed inside the drums. Each drum is positioned on a steel platform/scale that is secured in a steel track. The platform allows the drums to be safely and easily removed from the unit after the cement has hardened.

The majority of the piping associated with the cementation unit is 316 stainless steel. Tygon® tubing is used to transfer sodium hydroxide and the contents of the pH column to the drums. The cement is transferred into the glovebox and drums from a hopper/screw feeder through rubber tubing. Figures I-5 and I-6 present a legend and piping and instrumentation diagram for the cementation unit.

Waste analysis and inspection procedures for the cementation unit are provided in Attachments B and C of this permit application, respectively. The closure plan for the cementation unit is provided in Attachment F.3 of this permit application. Section 4.0 provides information on corrective actions.

I.2 CEMENTATION UNIT DEMONSTRATION OF TREATMENT EFFECTIVENESS [20.4.1 NMAC §270.23(d)]

The cementation unit at TA-55, Building 4 (TA-55-4), Room 401 is considered a Subpart X miscellaneous unit and, as such, is subject to the miscellaneous unit requirements in 20.4.1 NMAC §270.23(d) [6-14-00] for "a report on the demonstration of treatment effectiveness of the treatment based on laboratory or field data." Supplement I.2 provides a technical paper entitled “Waste Form Development for Conversion to Portland Cement at Los Alamos National Laboratory (LANL) Technical Area 55 (TA-55)” (Veazey et. al., 1996). This technical paper contains detailed information that demonstrates that the cementation unit at TA-55 effectively treats the mixed waste based on the treatment objectives described below:

- Stabilize mixed waste solutions that contain various radionuclides and toxicity characteristic (TC) metals in a cement matrix so that the metals are not leachable as determined by the Toxicity Characteristic Leaching Procedure (TCLP) and thus no longer exhibit the TC following treatment. The TC metals of primary concern are chromium, arsenic, cadmium, mercury, and lead.

- Stabilize mixed waste solids that contain various radionuclides and TC metals in a cement matrix so that metals are not leachable as determined by TCLP.

- Produce solidified cement monoliths that meet Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC), which prohibit free liquids (U.S. Department of Energy [DOE], 1999).

The technical paper in Supplement I.2 describes bench- and full-scale testing that was performed to evaluate the effectiveness of using Portland cement in the cementation unit to stabilize mixed waste. The goal of the project was to develop a Portland cement-based waste form that meets the WIPP WAC and reliably passes TCLP. The results discussed in this technical paper demonstrate that the use of Portland cement in the TA-55 cementation unit under the prescribed conditions produces a cement monolith that meets all of the performance standards devised for the project. These performance standards include no free liquids, passing TCLP, and meeting minimum compressive strength criteria. The use of these results in demonstrating the treatment effectiveness of the cementation unit is appropriate for the following reasons:

- The waste streams used in the testing are very similar or the same as those actually treated in the cementation unit;

- TA-55 uses Portland cement in their cementation process, as was done in the testing; and

- The testing conditions described in the technical paper were modeled to the actual cementation process at TA-55, to the extent practicable.

Additional constituents, in addition to those described in Supplement I.2, may be treated in the cementation unit to meet the physical criteria discussed above.

I.3 ENVIRONMENTAL PERFORMANCE STANDARDS [20.4.1 NMAC, Subpart V, Part 264, Subpart X]

The following information is provided to address the applicable hydrologic, geologic, and meteorological requirements of 20.4.1 NMAC §270.23(b) and (c) and 20.4.1 NMAC §264.601 [6-14-00] for the cementation unit at TA-55. The cementation unit is located within glovebox GB-454 in TA-55-4, Room 401. The location of the unit, the waste management practices outlined in Attachment J of this permit application, and the containment features described in the following sections prevent the deposition or migration of hazardous constituents into the groundwater, surface water, soil surface, or the atmosphere and ensure that the cementation unit is in compliance with the environmental performance standards of 20.4.1 NMAC §264.601 [6-14-00]. Waste analysis requirements for the cementation unit are addressed in Appendix B of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application," hereinafter referred to as the LANL General Part B. Contingency measures applicable to the cementation unit are addressed in Appendix E of the LANL General Part B. Attachment F.3 provides closure information for the cementation unit.

I.3.1 Protection of the Groundwater/Vadose Zone [20.4.1 NMAC §264.601(a)]

In accordance with 20.4.1 NMAC §264.601(a) [6-14-00], the cementation unit is operated in a manner that prevents releases that may have adverse effects on human health or the environment due to migration of hazardous waste or hazardous constituents through the vadose zone to the groundwater. The cementation unit is located in a vacuum-pressurized glovebox at TA-55-4 inside Room 401. Room 401 provides secondary containment for the cementation unit. The floor of the room is recessed approximately 2.5 in. The room itself is approximately 60 ft long by 75 ft wide. The capacity of the secondary containment area is greater than 100 percent of the volume of waste that is treated in the cementation unit at any one time. The entire floor is constructed of a 10-in.-thick reinforced concrete slab. Certified operators inspect the cementation unit each working day to detect leaks. Eight continuous air monitors installed at various locations throughout TA-55-4, Room 401 detect any airborne alpha contamination that would be present if a leak were to occur resulting in a release outside of glovebox GB-454. In the event of a release, the materials in question are removed as quickly as possible and are packaged in an appropriate container.

The cementation unit is located, designed, constructed, operated, and maintained, and will be closed in a manner that ensures protection of human health and the environment. The conditions outlined in 20.4.1 NMAC §264.601(a) [6-14-00] were considered and there is little or no potential for deposition or migration of waste constituents into the groundwater or subsurface environment. The cementation unit is located inside a building, provided with secondary containment, designed and constructed as described in Section I.1, operated and maintained in accordance with waste management procedures described in Attachment J of this document, and will be closed in accordance with the procedures described in Attachment F.3; therefore, adverse effects on human health or the environment due to the treatment operations conducted in the cementation unit are unlikely.

I.3.2 Protection of Surface Water/Wetlands/Soil Surface [20.4.1 NMAC §264.601(b)]

In accordance with 20.4.1 NMAC §264.601(b) [6-14-00], the cementation unit is operated in a manner that prevents releases that may have adverse effects on human health or the environment due to the deposition or migration of waste constituents into surface water, wetlands, or onto the soil surface. Section I.3.1 provides a detailed description of the effectiveness and reliability of the containment features to be utilized by the cementation unit to prevent releases.

The cementation unit is located, designed, constructed, operated, and maintained, and will be closed in a manner that will ensure protection of human health and the environment. The conditions outlined in 20.4.1 NMAC §264.601(b) [6-14-00] were considered and there is little or no potential for deposition or migration of waste constituents into surface water, wetlands, or soil surface. The cementation unit is located inside a building, provided with secondary containment, designed and constructed as described in Section I.1, operated and maintained in accordance with waste management procedures described in Attachment J of this document, and will be closed in accordance with the procedures described in Attachment F.3.

I.3.3 Protection of the Atmosphere [20.4.1 NMAC §264.601(c)]

In accordance with 20.4.1 NMAC §264.601(c) [6-14-00], the cementation unit is operated in a manner that prevents releases that may have adverse effects on human health or the environment due to the deposition or migration of waste constituents into the atmosphere. The cementation unit is located within a negative pressure glovebox that is connected to the TA-55-4 facility ventilation system. The high-efficiency particulate air filters on the glovebox are on the air intake side of the ventilation and are designed to prevent escape of contamination from the glovebox in the event of a power failure. TA-55-4 is equipped with a backup generator that re-establishes power to all vital systems, providing exhaust to the glovebox. The unit is a batch waste treatment system. If a power failure occurs, all operations cease inside the glovebox until power is restored. In addition, the glovebox is located within three succeedingly greater pressure zones. These zones are (in order of increasing pressure) the glovebox, Room 401, and the main corridor outside of Room 401. These pressure zones are designed to create an airflow into Room 401 and the glovebox and limit the potential for hazardous constituents to migrate to the atmosphere.

Operation of the cementation unit does not impact air quality at LANL. The cementation unit is operated within a negative pressure environment and, therefore, adverse affects on human health or the environment due to migration of hazardous constituents to the atmosphere as a result of treatment operations conducted in the cementation unit are unlikely. The conditions outlined in 20.4.1 NMAC §264.601(c) [6-14-00] were considered and there is little or no potential for health risks caused by human exposure to waste constituents or for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents.

I.4 SPECIAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE [20.4.1 NMAC §270.14(b)(9) and §264.19]

No ignitable, reactive, or incompatible mixed wastes are treated in the cementation unit.

I.5 AIR EMISSIONS STANDARDS FOR EQUIPMENT LEAKS [20.4.1 NMAC, Subpart V, Part 264, Subpart BB]

The cementation unit addressed in this permit application is not subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart BB [6-14-00], "Air Emission Standards for Equipment Leaks," with the exception of the reporting requirements specified in 20.4.1 NMAC §264.1064(k) [6-14-00]. None of the equipment associated with the cementation unit at TA-55 contains or contacts mixed waste with organic concentrations of at least 10 percent by weight.

In accordance with 20.4.1 NMAC §264.1064(k) [6-14-00], TA-55 uses knowledge of the nature of the mixed waste stream(s) or knowledge of the process by which the mixed waste was produced to document their exemptions to these standards. Production process information documenting that no organic compounds are contained in or contacted by equipment associated with the cementation unit is recorded in TA-55's facility operating record.

I.6 REFERENCES

Veazey, G.W., Schake, A.R., Shalek, P.D., Romero, D.A., Smith, C.A., 1996, “Waste Form Development for Conversion to Portland Cement at Los Alamos National Laboratory (LANL) Technical Area 55 (TA-55),” Los Alamos National Laboratory, Los Alamos, New Mexico.

DOE, 1999, “Waste Acceptance Criteria for the Waste Isolation Pilot Plant,” DOE/WIPP-069, REV 7, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, New Mexico.

Table I-1
Subpart X Miscellaneous Unit Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§264.601	Environmental performance standards	I.3
§264.601(a)	Prevention of release of contaminants to groundwater	I.3.1
§264.601(a)(1)	Volume and characteristics of waste considering potential for migration through containing structures	I.3.1
§264.601(a)(2)	Hydrologic/geologic characteristics	I.3.1
§264.601(a)(3)	Quality of groundwater including other sources of contamination and their cumulative impact on groundwater	I.3.1
§264.601(a)(4)	Quantity and direction of groundwater flow	I.3.1
§264.601(a)(5)	Proximity to and withdrawal rates of potential groundwater users	I.3.1
§264.601(a)(6)	Regional patterns of land use	I.3.1
§264.601(a)(7)	Potential for deposition and migration of waste constituents	I.3.1
§264.601(a)(8)	Potential for health risks caused by human exposure to waste constituents	I.3.1
§264.601(a)(9)	Potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents	I.3.1
§264.601(b)	Prevention of release of contaminants to surface water	I.3.2
§264.601(b)(1)	Volume and characteristics of the waste	I.3.2
§264.601(b)(2)	Effectiveness and reliability of containment, confinement, and collection systems and structures	I.3.2
§264.601(b)(3)	Hydrologic characteristics of the unit and local area	I.3.2
§264.601(b)(4)	Regional precipitation patterns	I.3.2
§264.601(b)(5)	Quantity, quality, and direction of groundwater flow	I.3.1
§264.601(b)(6)	Proximity of the unit to surface water	I.3.2
§264.601(b)(7)	Current and potential uses of nearby surface waters and water quality standards for those waters	I.3.2
§264.601(b)(8)	Quality of surface waters and soils including other sources of contamination and their cumulative impact on surface waters and soils	I.3.2
§264.601(b)(9)	Regional patterns of land use	Attachment A
§264.601(b)(10)	Potential for health risks caused by human exposure to waste constituents	I.3.2
§264.601(b)(11)	Potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents	I.3.2

See footnotes at end of table.

Table I-1 (continued)
Subpart X Miscellaneous Unit Regulatory References and Corresponding Permit Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Permit Application
§264.601(c)	Prevention of release of contaminants to air	I.3.3
§264.601(c)(1)	Volume and characteristics of waste including its potential for emission	I.3.3
§264.601(c)(2)	Effectiveness and reliability of systems/structures to reduce/prevent emissions of hazardous constituents to the air	I.3.3
§264.601(c)(3)	Operating characteristics of the unit	I.3.3
§264.601(c)(4)	Characteristics of the unit and the surrounding area	I.3.3
§264.601(c)(5)	Existing quality of the air including other sources of contaminants and their cumulative impact on the air	I.3.3
§264.601(c)(6)	Potential health risks caused by human exposure to waste constituents	I.3.3
§264.601(c)(7)	Potential for damage to domestic animals, wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents	I.3.3
§264.602	Monitoring, analysis, inspection, response, reporting, and corrective action	Attachment C[a], D[a], J, and I
§264.603	Post-closure care	Attachment F.3
§264.15	General inspection requirements	Attachment C[a]
§264.33	Testing and maintenance of equipment	
§264.75	Biennial report	Attachment J
§264.76	Unmanifested waste report	Attachment J
§264.77	Additional reports	Attachment J
§264.101	Corrective action for solid waste management units	4.0

a Requirement or information is also addressed in the most recent version of the "Los Alamos National Laboratory General Part B Permit Application."

Figure I-1 has been provided confidentially under separate cover.

Supplement I.1
Manufacturer's Information on Mixers

Supplement I.2

"Waste-Form Development for Conversion to Portland Cement at Los Alamos National Laboratory (LANL) Technical Area 55 (TA-55)"

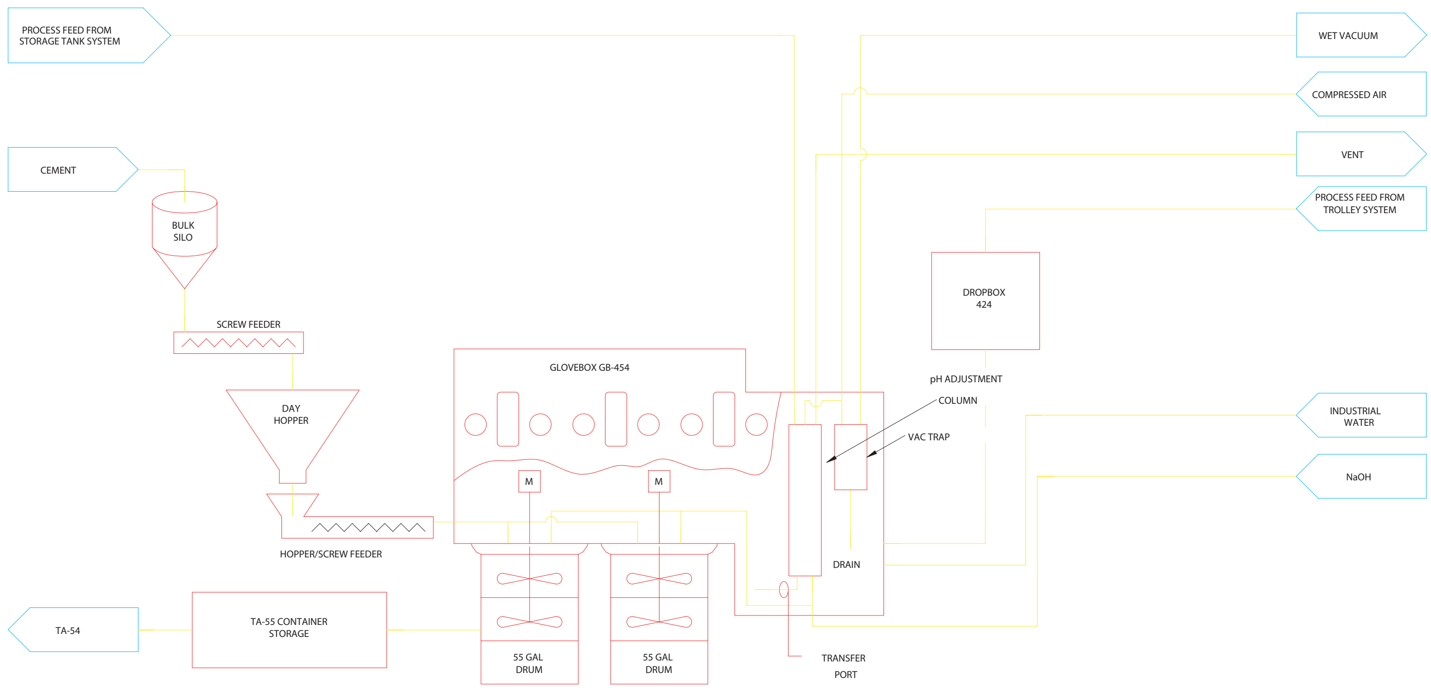


Figure I-2

Cementation Unit
Process Flow Diagram

CEMENTATION UNIT - PROCESS FLOW DIAGRAM

SCALE: NONE

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

Shaw™ Environmental & Infrastructure, Inc.

LOS ALAMOS — LOS ALAMOS NATIONAL LABORATORY, LOS ALAMOS, NEW MEXICO 87545

TA-55 CEMENTATION UNIT

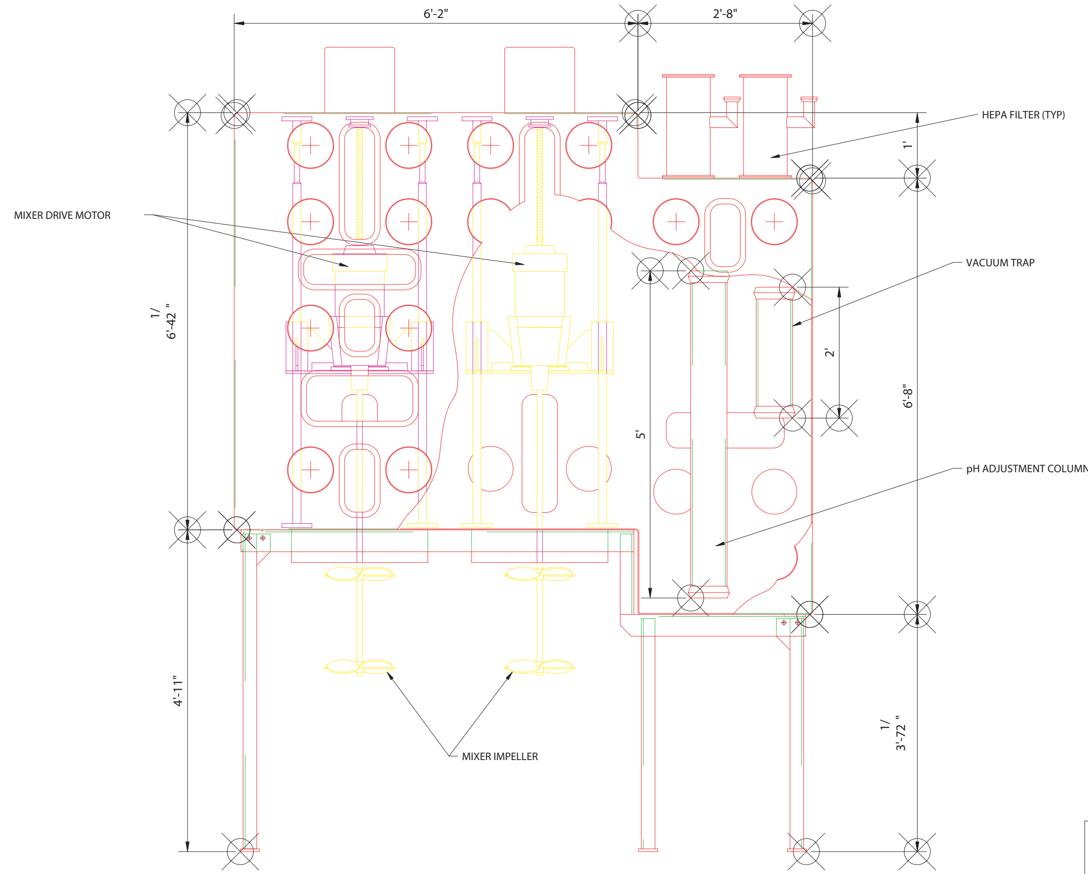
CEMENTATION UNIT
PROCESS FLOW DIAGRAM

BLDG. PF-4 TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. I-2	2 OF 6	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

NOTE:

1. DIMENSIONS SHOWN ARE ROUNDED TO THE NEAREST INCH.



CEMENTATION UNIT - FRONT ELEVATION

SCALE: 1" = 18"

1" = 18"

Figure I-3
Cementation Unit
Front Elevation

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

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TA-55 CEMENTATION UNIT

CEMENTATION UNIT
FRONT ELEVATION

BLDG. PF-4 TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. I-3	3 OF 6	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

NOTE:

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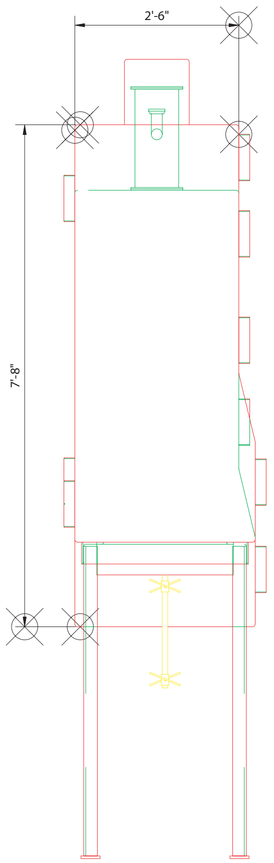
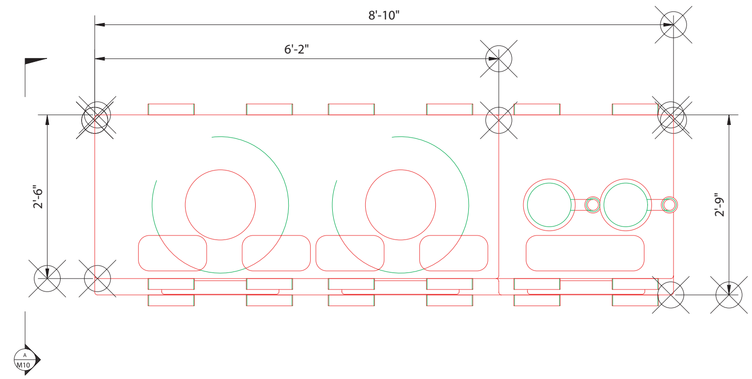


ELEVATION

SCALE: 1" = 18"



CEMENTATION UNIT - PLAN VIEW

SCALE: 1" = 18"

Figure I-4

Cementation Unit
Elevation and Plan View

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

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TA-55 CEMENTATION UNIT

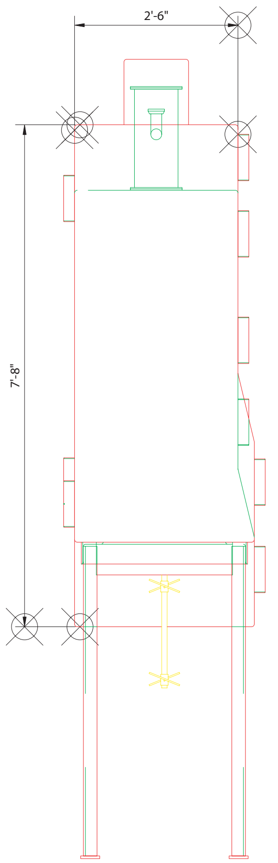
CEMENTATION UNIT
ELEVATION AND PLAN VIEW

BLDG. PF-4 TA- 55

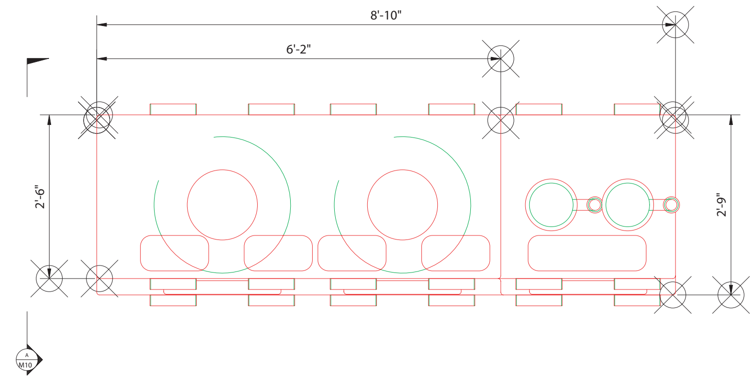
DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. I-4	4 OF 6	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

NOTE:

1. DIMENSIONS SHOWN ARE ROUNDED TO THE NEAREST INCH.



ELEVATION
SCALE: 1" = 18"



CEMENTATION UNIT - PLAN VIEW
SCALE: 1" = 18"

1" = 18"

Figure I-4
Cementation Unit
Elevation and Plan View

NOT FOR CONSTRUCTION

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

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TA-55 CEMENTATION UNIT

CEMENTATION UNIT
ELEVATION AND PLAN VIEW

BLDG. PF-4 TA- 55

DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. I-4	4 OF 6	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

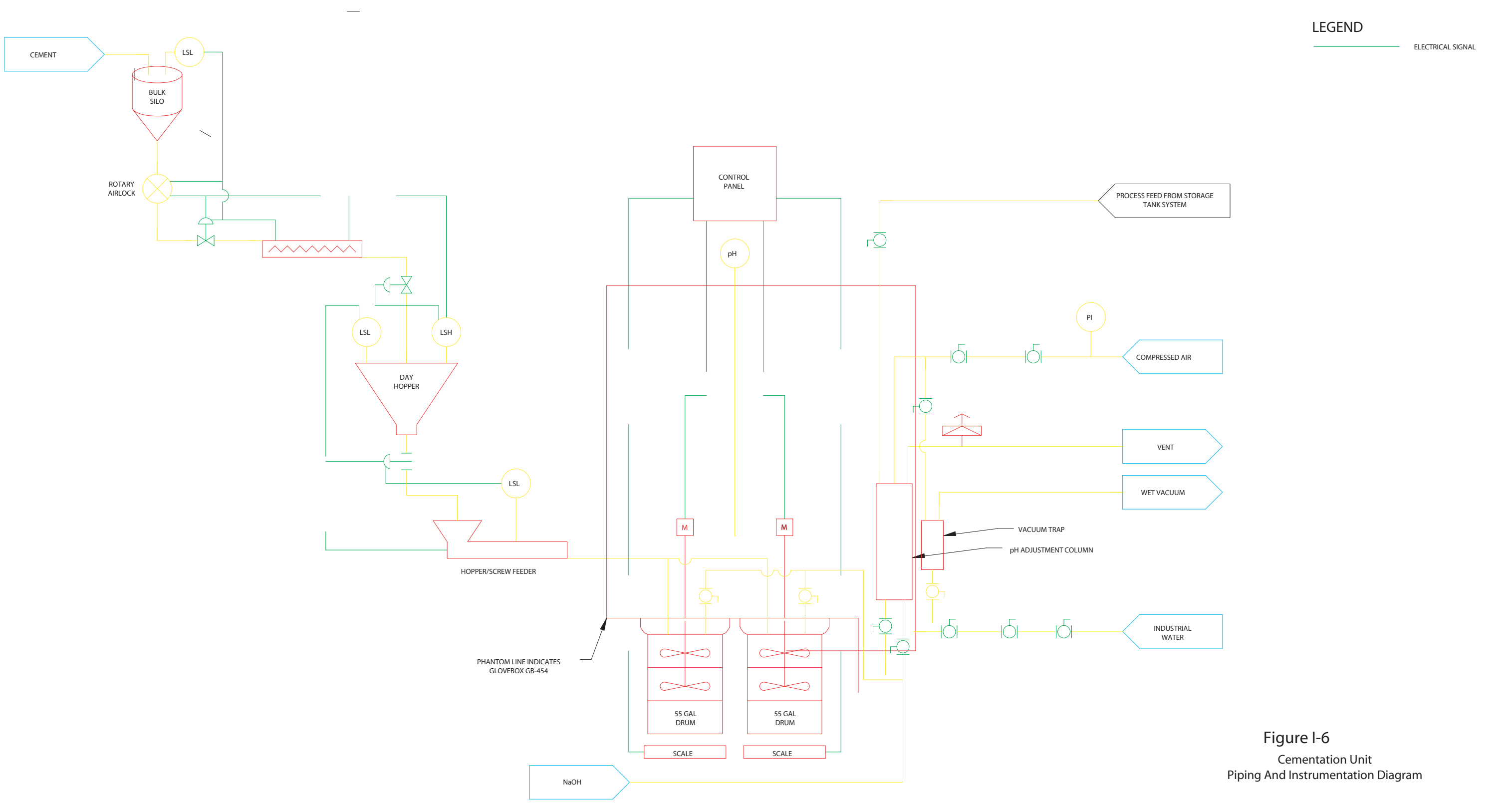

Figure I-6

Cementation Unit
Piping And Instrumentation Diagram

NOT FOR CONSTRUCTION

CEMENTATION UNIT - PIPING & INSTRUMENTATION DIAGRAM

SCALE: NONE

NO.	DATE	DWN	DES	CHKD	APP	REVISIONS

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TA-55 CEMENTATION UNIT

CEMENTATION UNIT
PIPING AND INSTRUMENTATION DIAGRAM

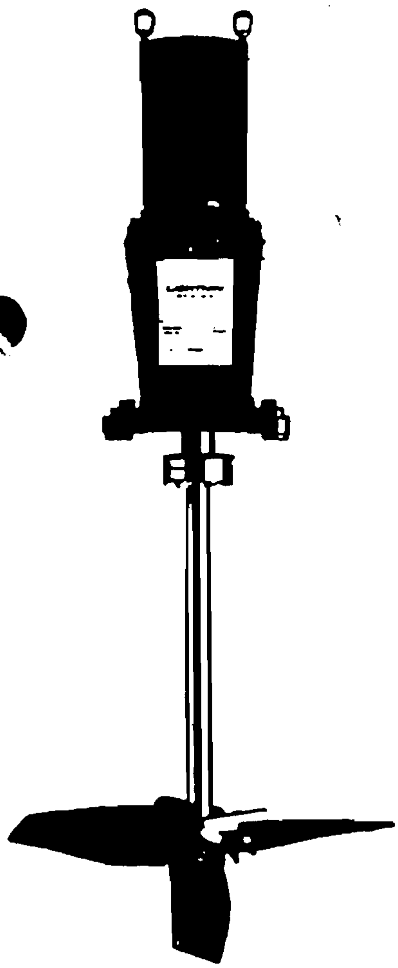
BLDG. PF-4 TA- 55

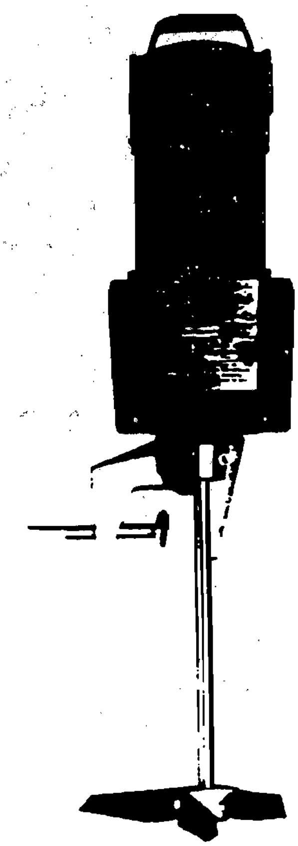
DESIGNED	J. GRIFFIN	4/28/00	CHECKED	J. GRIFFIN	7/24/03	APPROVED	J. GRIFFIN	7/24/03
DRAWN	A. MARTINEZ	7/23/03	SUBMITTED	J. GRIFFIN	7/24/03	SHEET NO. I-6	6 OF 6	REVISION NO. 2
PROJECT ID 819592.29			DRAWING NO.					

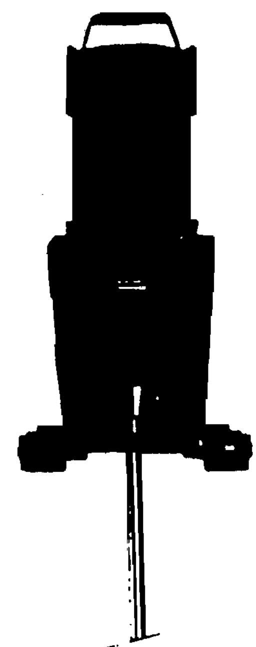
Supplement I.1
Manufacturer's Information on Mixers

[illegible] Value

Portable, Fixed Mount and Inliner® Mixers







A UNIT OF GENERAL SIGNAL GS
LIGHTNIN

Mike Byrnes

(303) 757-49
Tlx. 45-7

D.W. DAIGLER COMPANY
5777 E. Evans Avenue-Suite 4
Denver, Colorado 80222

A UNIT OF GENERAL SIGNAL GS

LIGHTNIN

Catalog B-610

Lightnin heavy duty, high flow mixers

XJ Series

EASY POSITIONING.
The handle helps you aim the mixer for best results, move it on or off the tank.

BUILT-IN DAMPENER.
Pad between housing ball and clamp socket minimizes vibration.

EASY SET-UP.

Figure 20.
Standard clamp securely mounts to tank rim or other support. Mixer adjusts 90° vertically, 360° horizontally for optimal positioning and re-positioning. Indexed ball and socket let you repeat settings exactly.

ONE WRENCH.
Comes with mixer and fits both clamp and chuck. Stores conveniently in the hollow clamp screw.

CUP MOUNT OPTION.

Figure 21.
Lets you permanently mount mixer, yet retain vertical and horizontal movement with indexing feature.

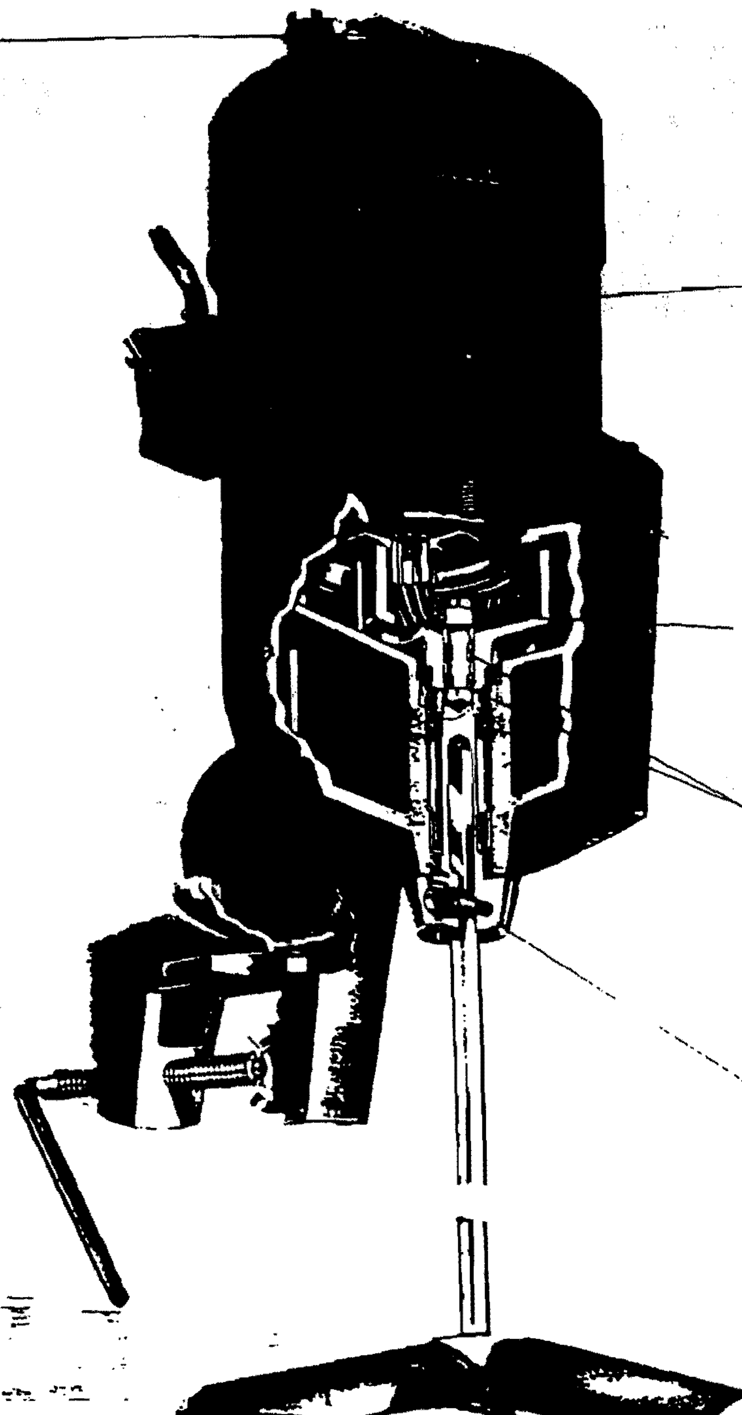


Figure 22.

A310 HIGH EFFICIENCY IMPELLER

PROTECTION AGAINST DUST, FUMES AND MOISTURE.
Standard DURA-MIX motor is totally enclosed or explosion-proof. See page 24.

HIGH TORQUE.
Single reduction, internal helical gears are exceptionally compact and quiet and can handle high loading.

GRIP SPRINGS.
These provide a keyless friction clutch to protect the gears against shock loads.

POSITIVE CHUCK.
A twist of the wrench forces chuck to grip the flat on the mixer shaft. The flat is tapered to prevent the shaft from dropping out unless intentionally released. Chuck also acts as a slinger baffle to keep splash away from the drive shaft seal and bearing. Optional rigid shaft coupling also available for extra long shafts, severe operating conditions.

LIFETIME LUBRICATED.
Shaft, motor bearings and gears are lifetime lubricated for non-stop service. No need to change lubricant.

Our most popular portables

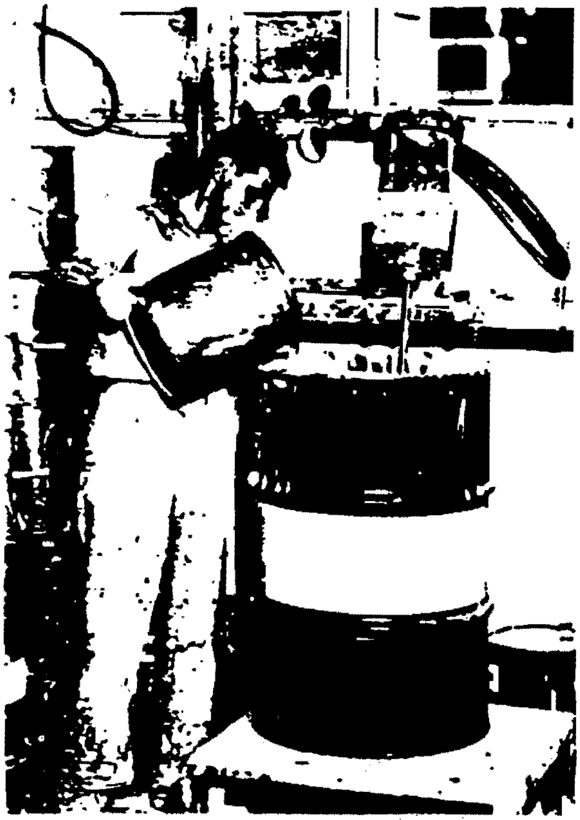


Figure 23.
For mixing ceramic slips and plaster, for preparing sand for foundry cores and molds, for all manner of slurry and high viscosity mixing.

Tens of thousands of these green Lightnin mixers are at work, delivering guaranteed results around the world. Many are original units, first built in 1960.

Gear drive, high flow Lightnin mixers with A310 Impellers produce a powerful action which sweeps the tank bottom and produces rapid top to bottom turnover.

For more jobs than not, the result is lower cost and less horsepower to do the job.

HIGH VISCOSITY.

The high torque delivered by internal gearing is essential for mixing heavy liquids like mayonnaise and molasses and fluids in the 15,000 to 100,000 centipoise range.

Figure 24.
High flow units mix soup and spaghetti sauce, cake and cookie batter, relish and catsup, and the list goes on and on.

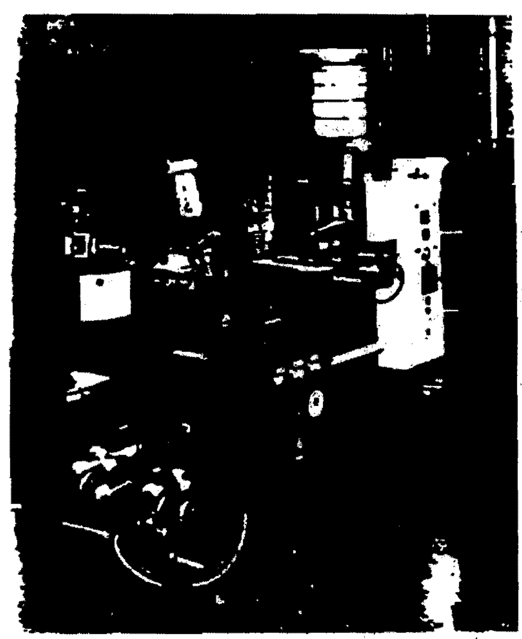


Figure 25.
Manufacturers make Lightnin gear drives a part of packaged unit processes, as in this polymer make-up system.

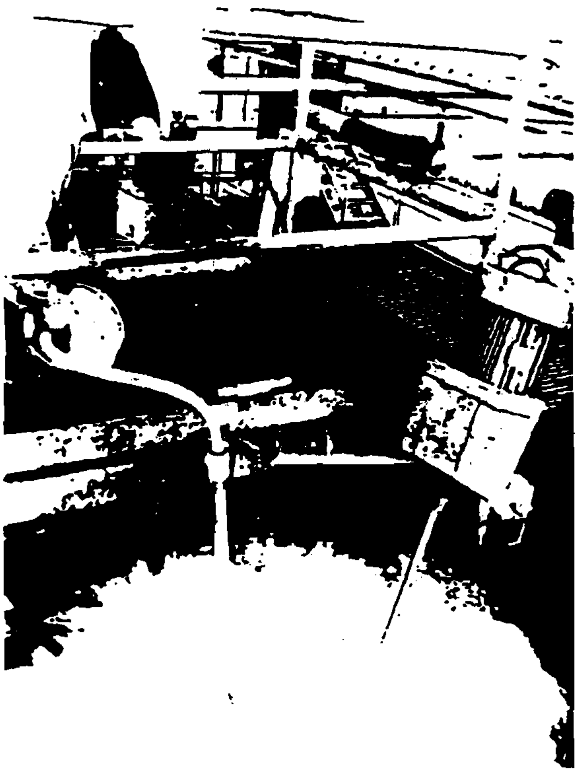


Figure 26.
High flow mixers provide non-stop services in the slurries of mineral processing and other industries.

Figure 27.
You'll find Lightnin portables making up solutions as diverse as auto wax and chemicals for wastewater treatment.

LARGE BATCHES.

The high torque is very effective in handling low-viscosity fluids in large batches that are beyond the range of direct drive units. Soft drink bottlers, for example, use Lightnin mixers widely for making up syrup in batches ranging from 300 to 6000 gallons.

FOUNDRIES.

These heavy-duty workhorses prepare sand for cores and molds. They mix various washes. They assist circulation of fluids in metal quenching. You'll even find them working in molten metal to help fluxes remove impurities.

DAIRIES.

Lightnin high flow portables prevent rising of cream in storage tanks. They maintain circulation in pasteurizers. They achieve uniformity in ice cream mix and chocolate drinks, and do all manner of other work in the dairy. Your Lightnin sales representative has a selection table covering both high flow and high shear mixers, especially for dairies. Call for a specification for your tank, your volume and your process.

HIGH TEMPERATURES.

You'll find Lightnin mixers at work in molten metal and in tanks for quenching and heat-treating metal as well as in other high temperature applications.

A variety of modifications is available to suit operating temperatures in the tank, and around the mixer motor and housing.

Among them are special grease and bearings, special coupling construction, oversize shafts with impeller welded on, as well as special motor insulation and housing materials.

Call your Lightnin representative for specific recommendations to suit your application.

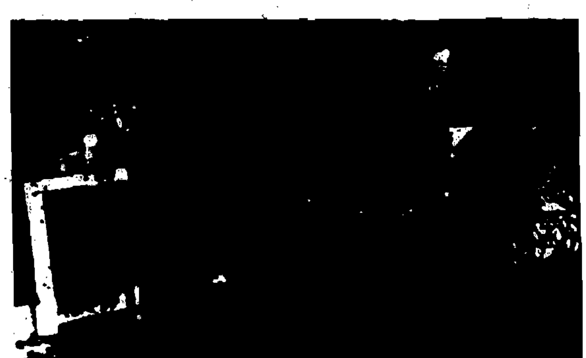
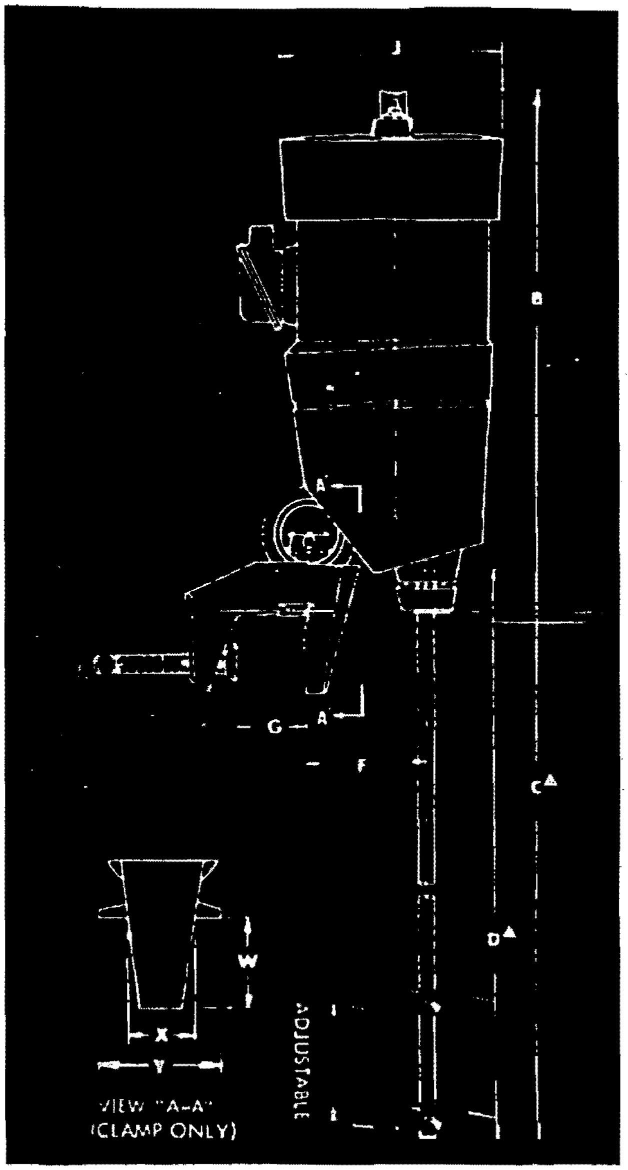


Figure 28.
Gear drive portables deliver high flow, high pumping action in wash and treatment tanks for metal parts.

Standard materials and equipment



XJ Series

Mixer Housing — Aluminum*

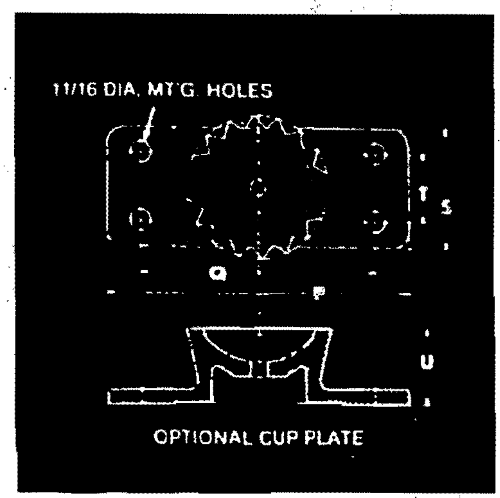
Chuck or Rigid Coupling — Electroless nickel plated steel or Type 316 stainless steel*

Clamp — Aluminum*

Shaft and Impellers — Steel, Type 304 and 316 stainless. Also available in any wrought commercial alloys and with coverings of such materials as rubber, PVC, polymers and fluorocarbons.

Paint — Styrenated alkyd enamel, 400 hours minimum salt spray resistance. Electroless nickel plated finish optional.

*Other materials available



HEAVY DUTY, HIGH FLOW GEAR DRIVES

[illegible]	[illegible]	[illegible]	[illegible]	C▲	D▲	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	.30	65	21⅝	32⅜	36	5	3	8¼	9	7	3⅜	2	2¾	3⅜	2⅞	5 9/16
[illegible]	.43	70														
[illegible]	.65	86	22¾	43¼	48	5⅛	3¾	8¼	10	8⅛	3⅜	2	2 7/16	3½	2⅞	5⅞
[illegible]	.87	94														
[illegible]	1.17	100														
[illegible]	1.74	125	27¼	55⅜	60	6⅛	3¾	10⅞	10	8½	4	2⅛	2 13/16	4 7/16	3¾	6⅞
[illegible]	2.30	135	28													

▲Dimensions C and D reflect standard lengths provided unless otherwise specified.
All dimensions in inches

Lightnin fixed-mounts for open tanks

XJQ & XDQ Series

FIXED MOUNT

DRIVES TO MATCH THE WORK.

Gear drive. For high viscosity mixing. For low viscosity work with large batches or where high flow with low shear is desirable. Single reduction helical gears are exceptionally compact, quiet running and carry high loads.

DIRECT DRIVE.

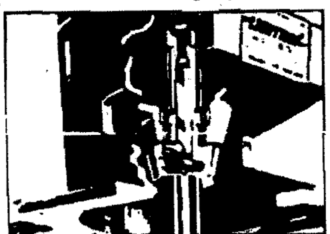


Figure 29.
For small batches or wherever high fluid motion and high shear are needed. Motor and shaft are coupled directly with pilot and keyway for accurate alignment and positive connection.

INTEGRAL ALIGNMENT.

One-piece housing and mixer support assures exact alignment; great mechanical strength.

VIBRATION DAMPENER.

Shock mounts protect drive against high fluid forces to prolong mixer life.

OPTIONAL RISERS.

Figure 30.
Spacers give the correct angular, off-center mixer position for most applications, achieving optimum mixing without need for tank baffles.

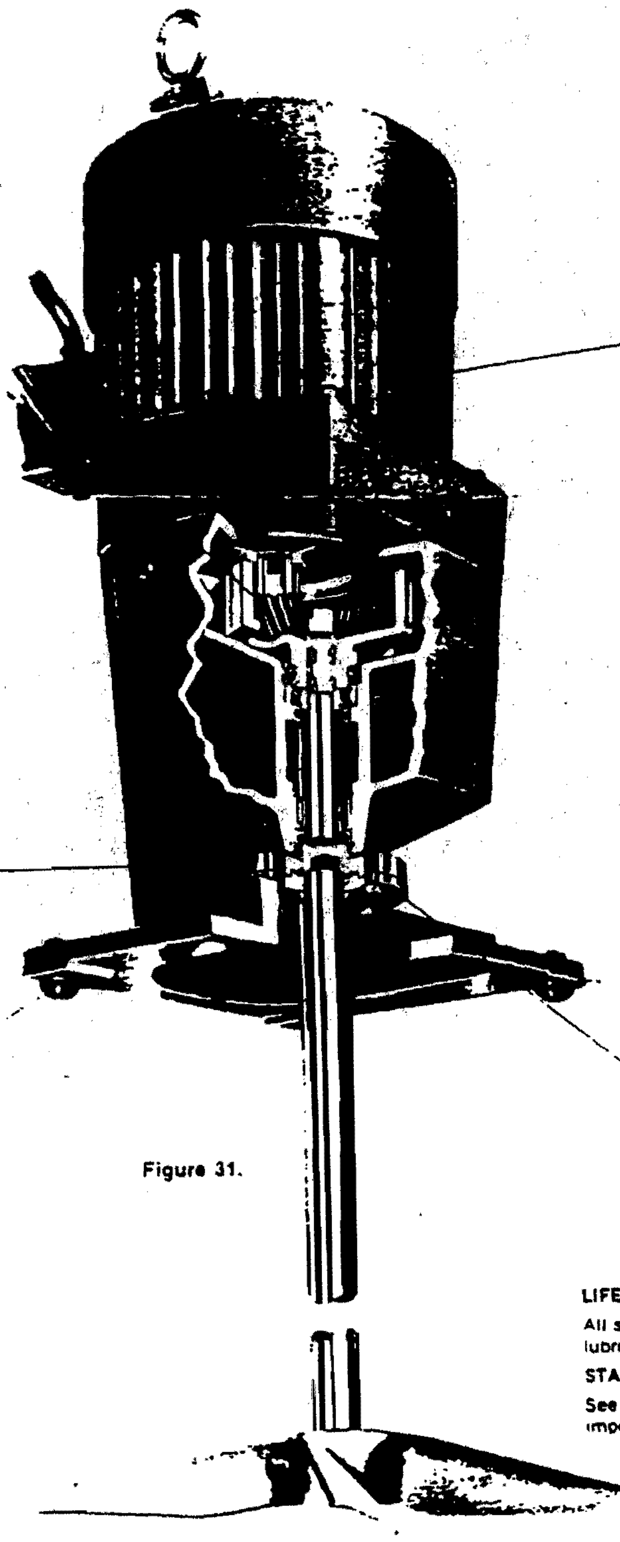


Figure 31.

PROTECTION AGAINST DUST, FUMES AND MOISTURE.

Standard DURA-MIX motor is totally enclosed or explosion-proof. See page 24

POSITIVE CHUCK.

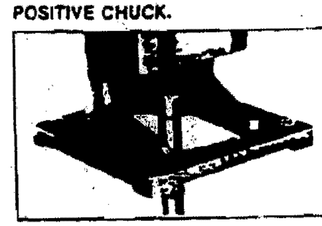


Figure 32.
Same as on clamp mount portables. Exclusive Lightnin reverse tapered flat assures that shaft cannot drop out unless intentionally released.

Rigid coupling. Adds stability for long shafts. Shaft comes with coupling welded on.

LIFETIME LUBRICATED.

All shaft, motor bearings and gears are lifetime lubricated. No need to change lubricant.

STANDARD A310 IMPELLER.

See page 25 for optional special purpose impellers.

Figure 33. In wastewater treatment, direct driven fixed mounts provide rapid chemical dispersion and dissolving, while gear drives with their low shear aid in polymer make-up and flocculation.

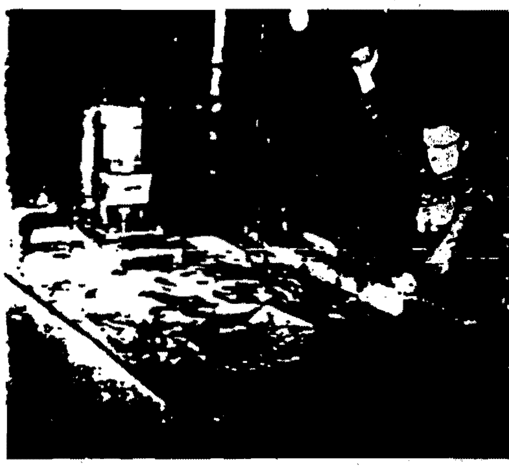


Figure 34. Gear driven fixed mounts deliver high flow for uniform quenching and to aid cleaning of metal parts.

HIGH CAPACITY MIXERS.

For large tanks and continuous processes, fixed mounted mixers provide extra long shafts and the stability of permanent installation.

Gear drives deliver high flow with low shear, and are preferred, for example, in such applications as food processing and milk pasteurization and storage. Direct drives provide high fluid motion and shear for such work as dissolving sugar and dispersing paint pigment.

Fixed mounts offer most of the same features as standard portables, and then some. Because of the wider options, you are invited to call your Lightnin sales engineer early to assure an optimum match of the mixer to the work.

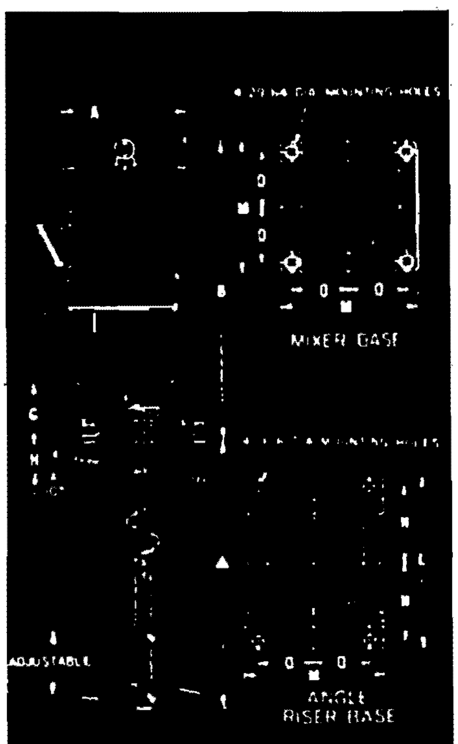
Mixer Housing — Aluminum*

Chuck or Rigid Coupling — Electroless nickel plated steel or Type 316 stainless steel*

Shaft and Impellers — Steel, Type 304 and 316 stainless. Also available in any wrought commercial alloys and with coverings of such materials as rubber, PVC, polymers and fluorocarbons.

Paint — Styrenated alkyd enamel, 400 hours minimum salt spray resistance.

*Other materials available



HIGH FLOW, GEAR DRIVEN FIXED MOUNTS FOR OPEN TANKS

.30	63	8½	24⅝	6¾	2¼	12¼	10	5⅞	4	10	4
.43	66	8½	24⅝	6¾	2¼	12¼	10	5⅞	4	10	4
.65	69	8½	25⅞	6¾	2¼	13¼	11	5⅞	4½	11	4½
.87	83	8½	25⅞	6¾	2¼	13¼	11	5⅞	4½	11	4½
1.17	89	8½	25⅞	6¾	2¼	13¼	11	5⅞	4½	11	4½
1.74	155	10⅞	28⅞	6½	3	16⅞	13½	7⅞	5½	13	5½
2.30	204	10⅞	29⅞	6½	3	16⅞	13½	7⅞	5½	13	5½
3.50	225	10⅞	30⅜	6½	3	16⅞	13½	7⅞	5½	13	5½

HIGH SHEAR, DIRECT DRIVEN FIXED MOUNTS FOR OPEN TANKS

.30	51	8½	22⅞	6¼	2¼	12¼	10	5⅞	4	10	4
.43	56	8½	22⅞	6¼	2¼	12¼	10	5⅞	4	10	4
.87	60	8½	22⅞	6¼	2¼	12¼	10	5⅞	4	10	4
1.17	70	8½	22⅞	6¼	2¼	12¼	10	5⅞	4	10	4
1.74	135	10⅞	24¾	6½	3	16¾	13½	7⅞	5½	13	5½
2.30	140	10⅞	25¾	6½	3	16¾	13½	7⅞	5½	13	5½
3.50	155	10⅞	26⅜	6½	3	16¾	13½	7⅞	5½	13	5½

▲Length of shaft depends upon the mixer you choose.
All dimensions in inches

Lightnin fixed mounts for closed tanks

XJC & XJDS Series

LIFETIME LUBRICATED.
All shaft, motor bearings and gears are lifetime lubricated. No need to change lubricant.

MOTORS AND DRIVES TO MATCH THE WORK.
Drive can be through single reduction helical gears as shown. Or it can be direct. Drive design and motors are the same proven performers used on other fixed mounts and standard portables.

POSITIVE CHUCK.
Grip bears against tapered flat on mixer shaft. Unless intentionally released, shaft cannot drop out.

REMOVABLE COUPLING.

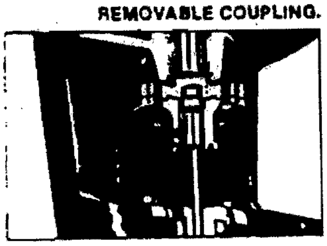


Figure 35.
Adds stability for long overhung shafts. Flange is rabbetted and keyed to assure positive alignment.

STANDARD OR SPECIAL FLANGES.
Standard ASA 150# series flanges are supplied in solid steel or in steel faced with 304 or 316 stainless for corrosion resistance. Other materials and special flanges can be furnished on request to mate with larger openings, or adaptors provided to fit smaller openings.

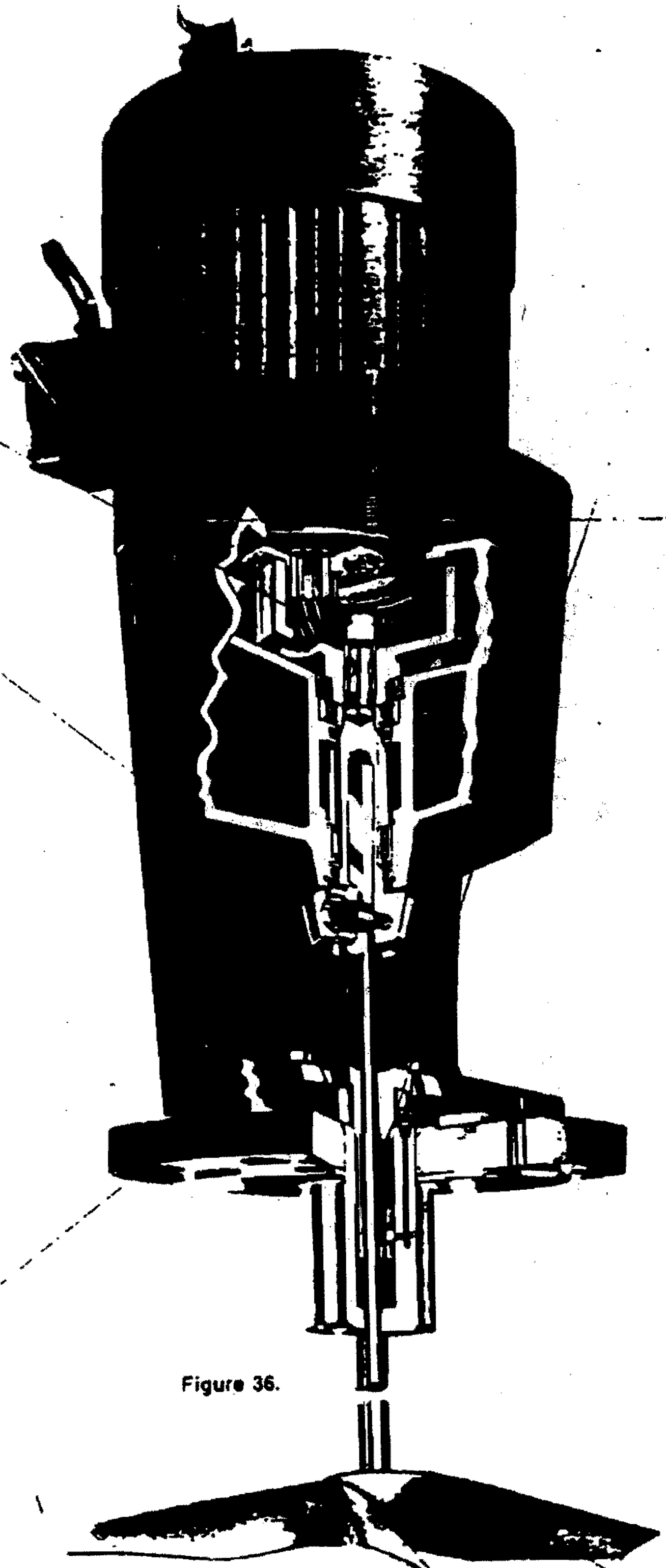


Figure 36.

SEAL OR STUFFING BOXES TO MATCH THE PROCESS.
Standard 150 psig stuffing box. Uses 7 rings of die-molded packing with separators, a lubricant distributing bronze* lantern ring, grease fitting, and adjustable bronze* packing gland. Where needed, we can adapt for pressures to 300 psig. Cooling or heating jacket, lubricant trap and leak detector available as accessories.

*Other materials available to suit process.

OPTIONAL 25 PSIG STUFFING BOX.

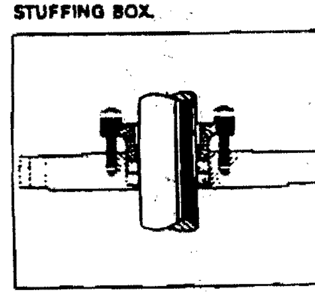


Figure 37.
A simpler design for lower pressures. Uses 2 rings of die-molded packing and a packing gland.

MECHANICAL SEAL.

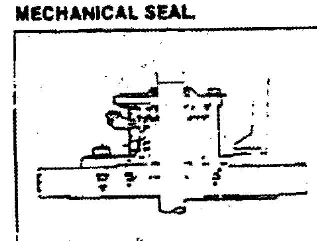


Figure 38.
Provides most positive sealing. Minimizes maintenance.

HIGH EFFICIENCY A310 IMPELLER.
See page 25 for optional, special purpose impellers.

.MATCHED TO YOUR TANK.

The tank and the process determine the mixer, and your Lightnin representative has all the ways to match our mixer to your pressurized vessel.

After all, we guarantee process results, so we'll make sure we specify the optimum fixed mount for your tank. Call us early.

HIGH FLOW, GEAR DRIVEN FIXED MOUNTS FOR CLOSED TANKS

Stuffing Box Model	Mechanical Seal Model	HP	Max. Wt. Lbs.	A Max.	B Max.	H	J Std. Mtg. Flange ASA**
XJC30	XJDS30	.30	105	8½	27¾	9½	5
XJC43	XJDS43	.43	120	8½	27¾	9½	5
XJC65	XJDS65	.65	170	8½	28¾	10¼	6
XJC87	XJDS87	.87	180	8½	28¾	10¼	6
XJC117	XJDS117	1.17	190	8½	28¾	10¼	6
XJC174	XJDS174	1.74	215	10⅞	32⅞	10¼	8
XJC230	XJDS230	2.30	225	10⅞	33⅞	10¼	8
XJC350	XJDS350	3.50	235	10⅞	34⅝	10¼	8

HIGH SHEAR, DIRECT DRIVE FIXED MOUNTS FOR CLOSED TANKS

Stuffing Box Model	Mechanical Seal Model	HP	Max. Wt. Lbs.	A Max.	B Max.	H	J Std. Mtg. Flange ASA**
XDC30	XDDS30	.30	102	8½	26	9¾	5
XDC43	XDDS43	.43	120	8½	26	9¾	5
XDC87	XDDS87	.87	130	8½	26	9¾	5
XDC117	XDDS117	1.17	135	8½	26	9¾	5
XDC174	XDDS174	1.74	180	10⅞	28½	10¼	8
XDC230	XDDS230	2.30	186	10⅞	29½	10¼	8
XDC350	XDDS350	3.50	216	10⅞	30¼	10¼	8

▲Length of shaft depends upon the mixer you choose.

***50# flange drilling. Bolt holes straddle centerline. Special flanges available.

All dimensions are in inches

Mixer Housing — Aluminum*

Chuck or Rigid Coupling — Electroless nickel plated steel or Type 316 stainless steel*

Shaft and Impellers — Steel. Type 304 and 316 stainless. Also available in any wrought commercial alloys and with coverings of such materials as rubber. PVC, polymers and fluorocarbons.

Paint — Styrenated alkyd enamel. 400 hours minimum salt spray resistance.

*Other materials available

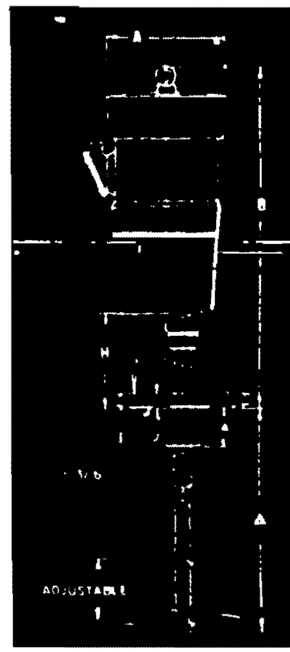
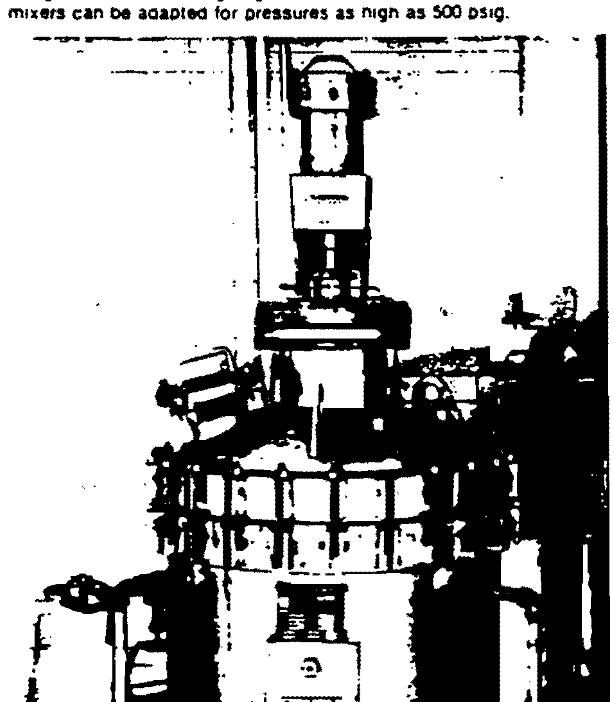


Figure 39.
Fixed mounts with stuffing boxes find wide use on the closed tanks of pharmaceutical processing.

Figure 40.
For gas-liquid contacting, Lightnin fixed-mount, mechanical seal mixers can be adapted for pressures as high as 500 psig.



Supplement I.2

"Waste-Form Development for Conversion to Portland Cement at Los Alamos National Laboratory (LANL) Technical Area 55 (TA-55)"

WASTE-FORM DEVELOPMENT FOR CONVERSION TO PORTLAND CEMENT AT LOS ALAMOS NATIONAL LABORATORY (LANL) TECHNICAL AREA 55 (TA-55)

by

G.W. Veazey, A.R. Schake, P.D. Shalek, D.A. Romero, and C.A. Smith

ABSTRACT

The process used at TA-55 to cement transuranic (TRU) waste has experienced several problems with the gypsum-based cement currently being used. Specifically, the waste form could not reliably pass the Waste Isolation Pilot Plant (WIPP) prohibition for free liquid and the Environmental Protection Agency (EPA)-Toxicity Characteristic Leaching Procedure (TCLP) standard for chromium. This report describes the project to develop a Portland cement-based waste form that ensures compliance to these standards, as well as other performance standards consisting of homogeneous mixing, moderate hydration temperature, initial set within 24 hours, and structural durability. Testing was conducted using the two most prevalent waste streams reporting to the cementation operation of lean residue (LR)- and oxalate filtrate (OX)-based evaporator bottoms (EV). A formulation with a minimum cement-to-liquid (C/L)* ratio of 0.80 kg/l for OX-based EV and 0.94 kg/l for LR-based EV and a pH of 10.3 to 12.1 was found to pass the required performance standards. The Portland process was also found to result in a yearly cost savings for raw materials of more than $30,000.

INTRODUCTION

TA-55 houses a variety of operations related to plutonium purification. The intended destination of the TRU wastes generated from these operations is WIPP, and accordingly, these wastes must be in compliance with the WIPP-Waste Acceptance Criteria (WAC).[1] The majority of the wastes meet the WIPP-WAC in their initial state. However, particulates[#] and free liquids (aqueous and nonpolar organic) require further treatment to meet the WIPP requirements designed to reduce dispersibility and respirability. The purpose of the TA-55 cementation operation is to convert these particulate and liquid wastes to a solid, cohesive form that meets the WIPP-WAC.

Initially, Portland cement was used as the fixation agent in the TA-55 process, but in 1983 a gypsum/polymer-based cement named Envirostone* was substituted. Envirostone's

*The cement-to-liquid ratio is used in this report to express the quantitative relationship between cement and liquid. The liquid includes the water and ionic components used to prepare the surrogate wastes and NaOH solution. This ratio is used instead of the dimensionless water-to-cement ratio commonly used in the cement industry in order to remain historically consistent with TA-55 operations.

#This work was performed under Revision 4 of the WIPP-WAC, which required the immobilization of particulates. Since this time, Revision 5 of the WIPP-WAC has been issued. Revision 5 does not require the immobilization of particulates, although it does not prohibit immobilization of particulates.

setting reaction involves the hydration of hemihydrated calcium sulfate ($CaSO_4 . 1/2H_2O$) to the dihydrated form ($CaSO_4 . 2H_2O$). There were three reasons for the conversion to Envirostone. First, Envirostone was more compatible with the nonpolar organic liquid waste. Second, while Portland's setting reaction required an alkaline pH, Envirostone's was compatible with an acidic pH. Since the EV waste is highly acidic, less caustic solution was needed with Envirostone for pH adjustment. Third, the lower pH required for Envirostone eliminated the visibility problem that had resulted from generation of ammonia-based fumes at the higher pH of the Portland operation.

Envirostone served TA-55's cementation needs well until the cementation operation came under the jurisdiction of the more stringent WIPP-WAC and the EPA-Resource Conservation and Recovery Act (RCRA) regulation concerning characteristic toxicity.[2] It then became apparent that Envirostone exhibited several deficiencies that outweighed the benefits of its use. These deficiencies related to free-liquid generation in violation of the WIPP-WAC restriction on such and inadequate RCRA-metal leaching resistance. Portland cement was found to be a superior performer in these areas.[3,4] This report will review the investigation into the performance of Portland cement and describe the development of a Portland cement waste form to address the problems associated with Envirostone.

RATIONALE FOR PURSUING PORTLAND CONVERSION

Radiolytic Free-Liquid Generation: The first inadequacy with Envirostone became apparent in 1989 with the discovery that Envirostone cemented waste forms were generating free liquid several weeks after cementation.[5,6] This liquid generation resulted in the decertification of the TA-55 cementation process to produce waste forms acceptable for WIPP. A significant effort was subsequently initiated to find the cause of and arrest the phenomenon.[7,8,9] Several mechanisms capable of producing liquid were investigated and discarded. These included reversal of the calcium sulfate hydration reaction and delayed condensation-type polymerization.[6,10] Dehydration was eliminated when x-ray powder diffraction analysis found no change in the $CaSO_4$ molecule following free-liquid generation.[11] Delayed polymerization was eliminated when Envirostone without the polymerization precursors (plaster of Paris) was found to likewise generate free liquid.[6,11]

The free-liquid mechanism was ultimately shown to be irradiation-induced when it was found cemented surrogate-waste samples subjected to gamma irradiation produced free liquid, while unirradiated samples did not.[6] A mechanism that supported this scenario was radiolysis of the water in the pores of the cement structure.[12,13,14] In this mechanism, the H_2 and O_2 formed by disassociation of the water in the pores builds up sufficient internal pressure to force residual liquid to the surface. This mechanism was investigated at Hanford[15,16,17,18] and LANL for its potential to generate free liquid in cemented waste forms. Hanford workers showed that free-liquid generation is related to the waste form's compressive strength and permeabilty.[17] Work was also done at Hanford to develop a computer model to predict the occurrence of radiolytic free liquid based on a waste form's

*Envirostone is a trademark of the United States Gypsum Company.

permeability, gas generation rate, and internal pressurization.[18] Work at LANL with actual waste showed that increasing either the C/L ratio or mixing time reduced the occurrence and volume of free liquid,[6,8,10] presumably due to a resulting decrease in permeability. Best results were achieved in the full-scale operation at LANL by extending the mix time into the setting stage until the mixer began to lose its ability to generate a surface vortex.[3,6,7,10,19] Very few Envirostone waste forms produced with this technique generated free liquid. However, because some waste forms still generated free liquid,[3,19] the extended-mix technique was not considered to have entirely solved the problem.

To investigate the relative ability of the Portland cemented waste form to resist radiolytic free-liquid generation, surrogate EV waste forms made with Envirostone and Portland cements were subjected to gamma irradiation. Under irradiation by a 590 rad/min. Co^{60} source, the Envirostone sample produced liquid after 2.5×10^6 rads in 3 days. The test was concluded at 8.1×10^7 rads (95 days) without the Portland sample producing free liquid.[20] The superiority of Portland-type cement was further supported when bench-scale Portland samples prepared with actual waste were also found to produce no free liquid, while those prepared with Envirostone did.[21]

Leaching Resistance: The Envirostone waste form was discovered in 1992 to be unable to meet the nonhazardous limit for chromium as defined by the Toxicity Characteristic Leaching Procedure (TCLP). This discovery resulted in a shutdown of the operation during the DOE-imposed moratorium on the production of mixed waste. This inadequacy of Envirostone waste forms was first indicated in leaching studies using surrogate EV waste[22] and later confirmed with actual EV waste studies.[23] Both tests showed Portland waste forms had at least an order of magnitude higher leaching resistance for total chromium (Cr^{+3}/Cr^{+6}) in the TCLP. Portland cement also showed superior leaching resistance for cadmium and lead, two other metals found to have elevated concentrations in the EV waste. The graphical comparison of TCLP performance in the surrogate- and actual waste tests using Envirostone and Portland cement is shown in Figures 1 and 2.

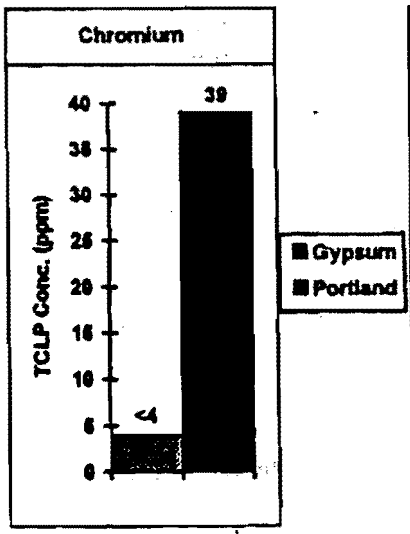


Fig. 1. TCLP performance with surrogate EV waste.

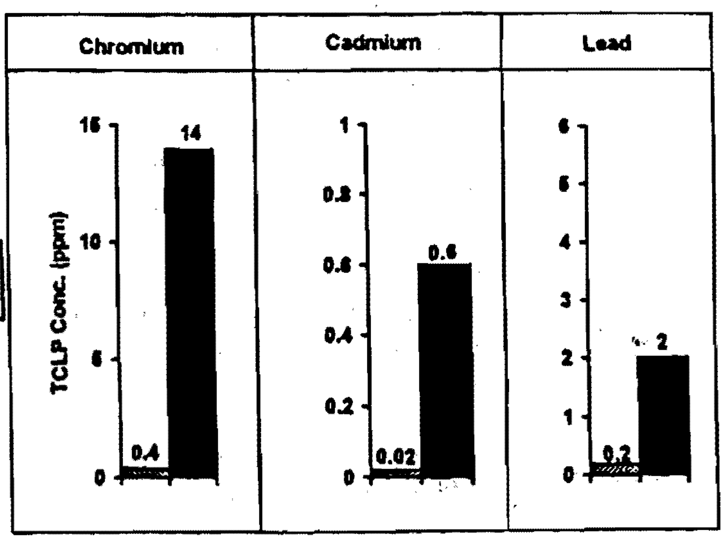


Fig. 2. TCLP performance with actual EV waste. TCLP limits: Cr = 5 ppm, Cd = 1 ppm, Pb = 5 ppm.

DEVELOPMENT OF THE PORTLAND WASTE FORM

Waste stream characterization: The surrogate waste used in this project consisted only of the EV waste stream because of its predominance in TA-55's waste streams requiring cementation. In order to prepare surrogate mixtures that accurately reflect current conditions, a characterization analysis of the EV waste stream was necessary.[24]

All EV wastes produced from April 1992 to February 1994 were analyzed for historically-present cations and anions, RCRA metals, and other components that can interfere with the setting reaction of Portland cement such as Cl^{-1}, SO_4^{-2}, and NO_3^{-1}. The results were sorted into the three major categories of EV waste: lean residue (LR)-based, oxalate filtrate (OX)-based, and hot distillate-based EV streams. The primary difference between the first two categories was the LR-based EV had a high concentration of calcium and magnesium, while the OX-based EV had a high concentration of sodium and oxalate. The composition of the hot distillate-based waste was similar to the LR-based waste composition. Due to this similarity, testing with hot distillate-based surrogate was not included in this project. The analytical data defining each of these waste streams is listed in Appendix 1.

Waste Form Performance Standards: The following standards were devised to define satisfactory performance of the final waste form. These include regulatory-based standards to meet the EPA TCLP limits (to produce a non-mixed waste form) and the WIPP-WAC restrictions on free liquid and particulates. Oerational-based standards were included to ensure homogeneous mixing, efficient throughput, and safe operating temperatures for the drum packaging.

1) Adequate mixability

To ensure that the recommendations of this work will provide consistent results, the mixing must be thorough enough to yield a homogeneous paste. Therefore, the viscosity of the cement paste must not be above the maximum viscosity at which the mixing equipment can provide thorough mixing. This limiting viscosity was defined as the maximum viscosity at which center-to-edge mixing of the cement paste could still occur.* Dilution was necessary for formulations with viscosities above this limit.

2) No free liquid at ≥24 hours following cementation

The requirement for absence of free liquid was necessary to meet the WIPP-WAC restriction on accessible free liquid.[25] The 24-hour limit was considered desirable to ensure a reasonable throughput efficiency. Free liquid could result from initial bleed water not reabsorbed or delayed generation of free liquid resulting from radiolysis. Adequate performance related to radiolysis would be defined by no generation of free liquid during gamma irradiation of 10^8 rads.

*Center-to-edge mixing is defined as rotational movement of the cement surface extending to the point of contact with the wall of the mixing container.

3) Moderate hydration temperature

The objective of this standard was to prevent the failure of the vinyl drum bag as a result of excessive heat from the hydration reaction of the cement. The conservative estimate bythe bag manufacturer for the failure temperature was 145 °F.[26] Since the temperature of the cement monolith reached during hydration in the drum-scale test would be higher than in the bench-scale test, an assumption had to be made on what temperature ceiling to select for the bench-scale tests. Using the industry standard of an increase of 15 °F per 100 lb of Portland cement,[27] the assumption was made that an increase of as much as 45 °F could be seen on scale-up to the drum scale. This led to the range of acceptable temperatures being set at ≤100 °F for the bench-scale experiments. All temperatures were taken at the center of the waste form. The actual full-scale temperature rise would be determined later in the full-scale test.

4) Penetration resistance of ≥500 psi at 24 hours following cementation

To ensure a reasonable throughput efficiency, it was considered desirable that indication of a successful setting reaction should be seen within 24 hours after the start of cement addition. The condition used to indicate a successful set was 500 psi penetration resistance. This indicator was adopted from the American Society for Testing and Materials (ASTM) standard for determining the initial set of a cement sample.[28]

5) Sustained compressive strength of ≥ 500 psi at 28 days following cementation

Minimum compressive strength was not needed to meet WIPP or EPA requirements. It was incorporated as a means to ensure the waste form was cohesive enough to resist breakdown to a particulate size prohibited by the WIPP-WAC. A minimum compressive strength of 500 psi was adopted for this study from the Nuclear Regulatory Commission's use of this level of strength as the best indicator of general physical durability for cemented waste.[29] The compressive strength data was collected according to the ASTM standard test method for compressive strength determination.[30] An additional requirement was included after the start of this work that there be no significant decline in compressive strength during the 28-day monitoring period. This was done after an expansive phase phenomenon was discovered that resulted in complete strength failure in a sample after satisfactory early development (*vide infra.*). The objective was to detect and discard any samples undergoing this phenomenon that still had a 28-day compressive strength value above 500 psi.

6) Pass EPA Leaching Standards for RCRA metals

The EPA has jurisdiction over the on-site storage of mixed waste. Since mixed waste is much more costly to store than nonhazardous TRU waste, it is advantageous for a waste form to pass the RCRA leaching standard for nonhazardous waste. This standard is defined by the EPA as passing the TCLP.[31] TCLP testing was performed at LANL according to EPA protocol.

EXPERIMENTAL EVALUATION

The goal of this project was to develop a simple cement formulation using only Type I/II Portland cement. Type I/II is the most readily available type of Portland cement, and its sole use would simplify the procurement of the raw materials. Another advantage to a one-component system would be the prevention of segregation problems that can occur in multicomponent systems in vibrating silos such as the one at TA-55. Other cement types and additives would be investigated only if required to address significant problems in areas such as slow setting, inadequate leaching resistance, or excessive temperature rise.

Surrogate preparation: The surrogates of the LR- and OX-based waste streams were prepared to approximate the median concentrations found in the waste stream characterization study listed in Appendix 1. The OX-based surrogate was prepared with the listed RCRA metals to evaluate the TCLP performance of the cemented waste form. The LR-based surrogate was prepared without RCRA metals. The concentrations of the LR- and OX-based surrogates are listed in Table 1.

Table 1: Composition of Surrogates
(in g/l except as noted)*

	LR-based	OX-based
Fe	9.03	8.56
Ca	58.39	16.88
K	18.51	6.38
Mg	54.77	21.40
Na	6.85	26.98
Al	4.75	1.75
NH_3	0.028	0.09
H+(molar)	1.40	4.55
Cl	1.02	0.27
NO_3	630	398
SO_4	1.55	1.00
C_2O_4	3.2	33.8
F	6.0	1.7
Cd	0	0.0028
Cr	0	2.45
Pb	0	0.056
Ag	0	0.0014
Ba	0	0.0355
Ni	0	1.205

*calculated from weight of dry chemicals

Equipment & Data Acquisition: The bench-scale equipment was assembled to match the design and proportions of the TA-55 full-scale process as much as possible. A programmable laboratory mixer (Lightnin Labmaster TSM2510) was used as the mixing device. The mixing profile was matched to those of the TA-55 process with the rpm being ramped up from 250 rpm to 400 rpm as paste viscosity dictated. The mixer power, mixer rpm, and mixing time were recorded for each test. For the full-scale test, the mixing container consisted of a 1/4-inch thick polyvinyl chloride rigid liner, inside a 12-mil vinyl bag, inside a 55-gal. drum (DOT 17-C). This was identical to the mixing container used in the TA-55 operations minus the lead between the bag and drum. The mixer (Lightnin XJ350), mixer shaft, and propellers (12.4-inch diameter A100) were identical to those used in the TA-55 process. The two propellers were separated on the shaft by one propeller diameter with the lower propeller being one-half diameter above the bottom of the liner. The full-scale test had a mixing rpm of 400 during the entire test. The mixing profile was not recorded during the full-scale test.

The following equipment was used for data acquisition in the bench- and full-scale tests. The bench-scale mixing profiles were recorded by a Compac Model M84 personal computer through an RS-232 interface with the mixer. Temperature was monitored using a Yokogawa Model LR4120 strip chart recorder and a type-K, Omega thermocouple (# 5TC-TT-K-24-36). The thermocouple was Teflon-coated to ease its removal from the hardened cement monoliths. The compressive strength of all waste forms was determined at 7, 14, and 28 days after cementation using a model C, 12-ton hydraulic press from the Carver Laboratory Press Company. The compressive strength data was taken on 2-inch cubes cast in H-2810 cube molds from the Humboldt Company. Penetration resistance was determined using a model H-3143 Acme hydraulic penetrometer from Humboldt. The gamma irradiation data for the bench-scale samples were collected with the use of a 380 rad/sec. gamma source located at Sandia National Laboratories (SNL).

Test Conditions: It was not the intention of this project to establish the failure boundary of all process parameters. Rather, it was to define a region of operability that will provide a confident expectancy for success. In this project, the process parameters of pH, C/L ratio, and dilution were varied to collect data on their influence on meeting the performance standards. Bench-scale testing was completed with LR-based surrogate before OX testing was begun. Conditions found to be unsatisfactory in the LR tests were not included in the OX tests. The pHs evaluated were 8.5, 9.6, 10.5, and 12.1 for the tests involving LR surrogate. The tests with OX-based surrogate were performed at a more limited range of 9.5, 10.5 and 11.5 as a result of pHs 8.5 and 12.1 being eliminated in the LR tests (*vide infra.*). All pH adjustment was accomplished using 10 molar NaOH solution. The C/L ratio was varied from 0.80 kg/l to 0.99 kg/l. The amount of water dilution was varied from 13.0% to 34.3% in the LR samples and 0% to 10% in the OX samples. The pH, C/L ratio, and dilution values used in the bench-scale tests are listed in Table 2.

A full-scale test was performed under conditions similar to a specific bench-scale sample to ascertain how scale-up would affect bench-scale results. A full-scale test was necessary because there are several areas in which bench-scale testing may not predict performance on the full scale. Bench-scale samples often do not show bleed water when full-scale samples would.[32] Also, larger-scale samples exhibit a higher temperature rise during hydration that can produce cracks in the monolith. This damage can compromise performance in compressive strength development and leaching resistance.[32] In our case, the temperature was also a concern because of its potential to cause thermal damage to the vinyl drum bag.

RESULTS AND DISCUSSION

All bench-scale samples were evaluated for performance in mixability, bleed-water generation, initial set time, setting-temperature characteristics, and compressive strength. Evaluations of TCLP performance and radiolytic free-liquid generation were conducted only on OX samples. The performance in each category is discussed below. The results of the full-scale test follow those of the bench-scale tests.

The LR samples were used for the mixability study in which the pH and dilution values were varied concurrently with each sample. Consequently, pH and dilution must be considered together (i.e., pH/dilution) when determining their influence on LR samples in the following performance categories. The OX tests were conducted with only one process parameter being altered at a time. Subsequently, they are more useful in determining the relative influence of each parameter.

Bench-Scale Experiments: ***Mixability.*** The mixability limit was defined as the paste viscosity above which the mixing equipment lost its ability to achieve center-to-edge mixing. It was found that all LR samples exceeded this limit after the addition of the cement required for a C/L ratio of 0.80 kg/l. Dilution of these samples was required to allow addition of all of the cement. The required amount of dilution of the pre-cement solution was defined by a 0.1-watt power demand by the mixer while mixing the pre-cement solution at 250 rpm. A study was conducted in which the amount of dilution required at each pH was determined. It was found that the final pH of the pre-cement solution had a large effect on viscosity. A higher pH required more dilution as a result of the precipitation of more salts. The pH-dependent dilution values ranged from 13.0% to 34.3% and are reported in Table 2.

The same type of comparison of dilution and pH was not conducted on OX samples. Instead, the dilutions in the OX samples were fixed at 0%, 5%, and 10%. Although, the viscosity of the OX samples with 0% dilution was considered excessive, no difficulty in mixing was observed in any sample at 5% or 10% dilution. This lower dilution requirement for the OX-based samples is due to the lower salt content of the OX-based surrogate. This lower salt content is reflected in the lower total dissolved solids (TDS) value of the OX waste stream reported in Appendix 1.

Free liquid from Bleed-Water Generation. Although several samples initially generated bleed water, all bleed water was reabsorbed prior to the 24-hour limit.

Initial Set Time. The LR tests showed a definite relationship between each sample's initial set time and the pH/dilution values. This can be seen in Figure 3a, which shows the initial set time decreasing as the pH/dilution values increase. The samples prepared at pH 8.5 and pH

9.6 had initial set times exceeding the 24-hour limit. Because the pH 8.5 sample greatly exceeded the 24-hour limit, it was eliminated from further study in the OX tests.

The OX samples presented in Figure 3b show a lesser effect of pH on initial set time. Nevertheless, the results were consistent with the LR tests in that no sample prepared at ≤pH 9.6 met the 24-hour standard. This finding removed pHs ≤9.6 from further consideration. Figure 3b also shows a definite relationship between C/L ratio and initial set time in that the set time increased as the C/L ratio decreased. This increase was enough to prevent all 0.80 kg/l OX samples from meeting the 24-hour standard. Figure 3c shows the relationship of dilution to initial set time. As the dilution increased, the initial set time decreased. This decrease is presumably due to the decrease in the concentrations of set-retarding constituents of the waste. This may indicate that the decrease in initial set time of the LR samples with higher pH/dilution values (Figure 3a) was due primarily to the influence of dilution.

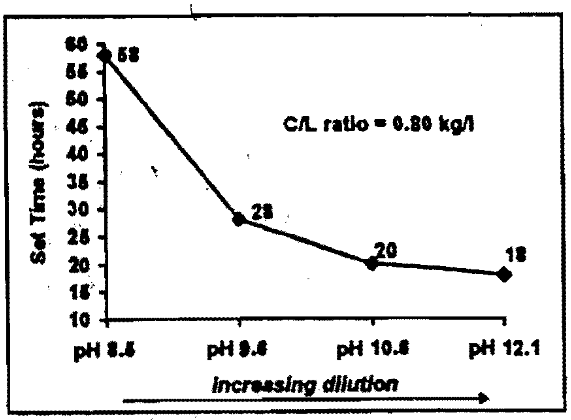


Fig. 3a. Effect of pH/dilution on initial set time for LR samples. (see Table 2 for dilution values).

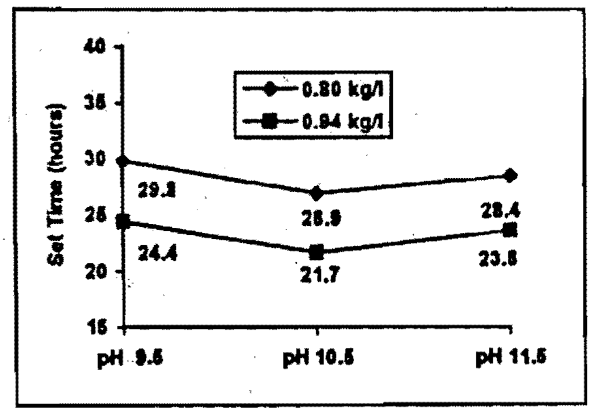


Fig. 3b. Effect of pH and C/L ratio on initial set time for OX samples. (avg. of samples w/ 10% dil.).

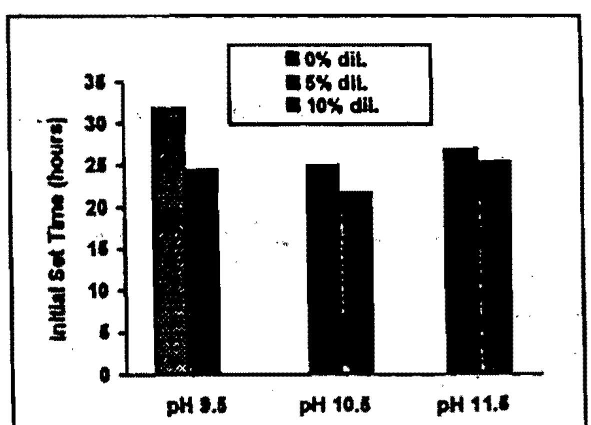


Fig. 3c. Effect of dilution on initial set time for OX samples (averages).

Temperature. The LR tests showed a definite relationship between each sample's pH/dilution values and the maximum hydration temperature and the elapsed time to maximum temperature. As the pH/dilution values increased, the maximum temperature increased and the elapsed time generally decreased. This can be seen in Figure 4a. The maximum temperature of 107 °F reached by the sample with pH 12.1 and 34.3% dilution exceeded the 100 °F temperature ceiling, thus causing a failure of this sample to meet the bench-scale temperature standard.

The OX samples presented in Figure 4b showed no significant change in temperature behavior as the pH was varied. The temperature profile of all OX pHs looked similar, with a peak temperature of approximately 86 °F at 24 hours. The dilution values for these samples were held constant at 10%. Since no effect was seen due to pH, this may indicate that the changing temperature profiles of the LR samples in Figure 4a were due to the effect of dilution.

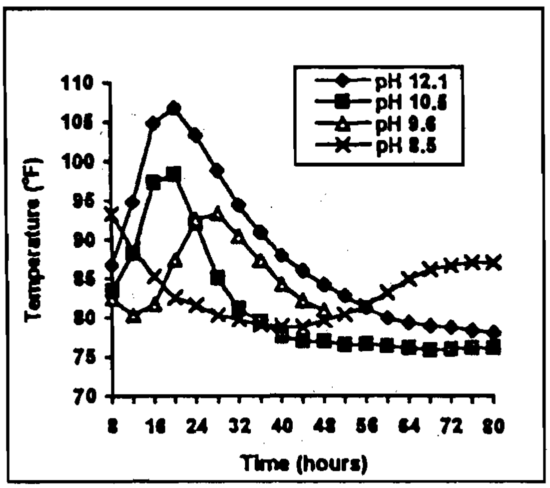


Fig. 4a. Temperature profile for LR samples LR14, LR15, LR16, & LR18. (C/L = 0.80 kg/l, see Table 2 for dilution values).

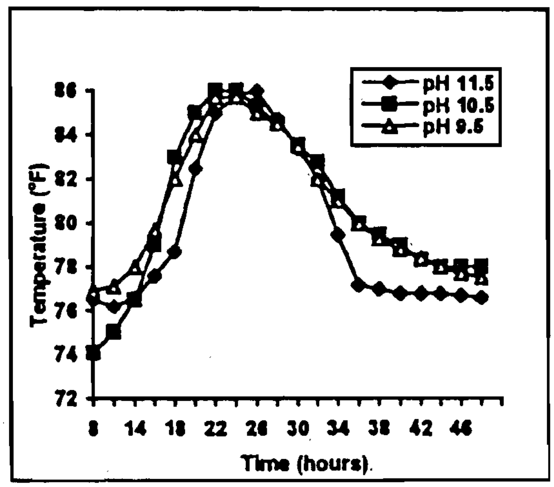


Fig. 4b. Temperature profile for OX samples OX4, OX8, & OX19. (C/L = 0.94 kg/l, dilution = 10%).

Table 2: Parameters and Results

Sample #	pH	C/L Ratio (kg/l)	Dilution[(1)] (vol%)	Initial Set Time (hr.)	Compressive Strength (psi) 7-day	14-day	28-day
LR15	8.5	0.80	13.0	58	450	0	0
LR11	9.6	0.94	ND[(2)]	26	1200	1550	1775
LR18	9.6	0.80	23.2	28	650	825	750
LR16	10.5	0.80	30.8	20	750	700	850
LR14	12.1	0.80	34.3	18	688	925	1075
OX1	9.5	0.94	0	30.6	687	775	975
OX2	9.5	0.94	0	33	650	825	950
OX9	9.5	0.94	5	ND[(2)]	875	1100	1250

OX12	9.5	0.94	10	24.6	1525	1000	1250
OX19	9.5	0.94	10	24.2	600	875	1000
OX16	9.5	0.80	10	29.8	375	450	650
OX3	10.5	0.84	0	<24	650	800	1100
OX14	10.5	0.80	10	26.9	300	500	700
OX5	10.5	0.99	0	ND(2)	975	1150	1325
OX6	10.5	0.94	5	23.1	800	2125	1300
OX17	10.5	0.94	5	26.7	700	825	1100
OX4	10.5	0.94	10	21.8	725	925	1150
OX10	10.5	0.94	10	25.4	750	850	1100
OX13	10.5	0.94	10	17.7	800	1000	1150
OX18	10.5	0.94	10	22	875	1000	1150
OX7	11.5	0.94	5	26.8	850	1100	1275
OX8	11.5	0.94	10	22.6	825	950	1275
OX11	11.5	0.94	10	24.6	950	1025	1150
OX15	11.5	0.80	10	28.4	375	525	675
OX20(3)	4	1.80	0	<24	1000	925	800
OX21(4)	4	1.80	0	<24	1200	1175	1000

(1)Dilution from water only (2)Not determined (3)Envirostone short mix (4)Envirostone long mix

Compressive Strength. As expected, the compressive strength increased as the C/L ratio was increased. This relationship is shown for selected LR and OX samples in Figures 5a and 5b, respectively. The effect of dilution on compressive strength was inconclusive as seen in the data presented in Table 2 for OX samples prepared at pH 9.6 and 0.94 kg/l. Although the 28-day compressive strength values for these samples at 5% dilution were greater than those at 10% dilution, the value for the sample at 0% dilution was less. The relationship of pH to compressive strength is shown for selected OX and LR samples in Figures 6a and 6b, respectively. This data shows the compressive strength increased with time and a higher pH produced a higher 28-day compressive strength.

An exception to the above trend occurred in the pH 8.5 LR sample (see Table 2 and Figure 6b). Here a phenomenon was observed that allowed satisfactory early strength development, but resulted in cube expansion and complete structural failure (strength = 0 psi) at the 14- and 28-day strength determinations. It is possible that the LR sample prepared at pH 9.6 and 0.80 kg/l (see Figure 5a) also exhibited some effects of this phenomenon. Although this sample did not technically fail because it had a strength above 500 psig at 28 days, the compressive strength at 28 days was lower than at 14 days. This may indicate that the waste form would have self destructed at a later time. The OX samples did not experience this delayed expansion phenomenon at the tested pHs of 9.5, 10.5, and 11.5. The explanation for this phenomenon in the LR samples is not certain. Since this occurred only in the LR samples with the lowest dilutions, the effect may be linked to a high concentration of one or more of the ions that are present in lower concentrations in the OX surrogate.

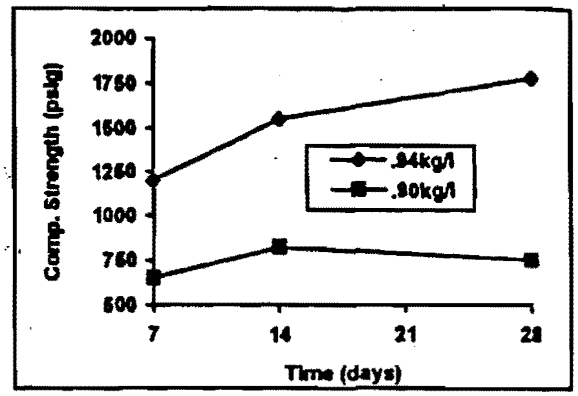


Fig. 5a. Effect of C/L ratio on compressive strength of LR samples LR11 & LR18. (pH = 9.6)

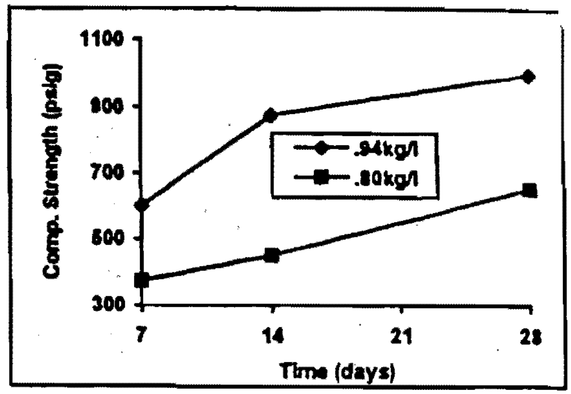


Fig. 5b. Effect of C/L ratio on compressive strength of OX samples OX16 & OX19. (pH = 9.5).

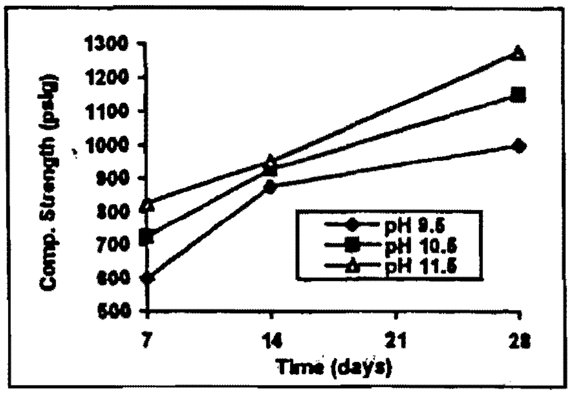


Fig. 6a. Compressive strength of OX samples OX4, OX8, & OX19. (C/L = 0.94 kg/l, dilution = 10%).

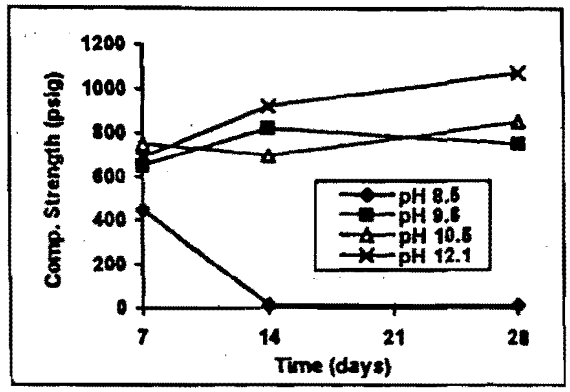


Fig. 6b. Compressive strength of LR samples LR14, LR15, LR16, & LR18. (C/L = 0.80 kg/l, see Table 2 for dilution values).

TCLP Results. TCLP testing was done only on OX samples. The OX samples were analyzed for the RCRA metals Cd, Cr, Pb, Ba, and Ni. The RCRA metals not included in the TCLP testing were present in concentrations that would be well below the TCLP limit even if 100% of each metal leached out in the TCLP extraction procedure. The samples for TCLP analysis were taken from the pH categories of 9.5, 10.5, and 11.5 and included the sample with the lowest compressive strength in each category. The sample with the lowest compressive strength was considered the worst-case condition for leaching resistance because of the connection of compressive strength to leaching resistance through a common dependency on permeability. The analytical results in Table 3 show that all samples passed the TCLP standards for nonhazardous waste.

Table 3: TCLP Results for Oxalate Surrogate Samples
(all concentrations in ppm)

Sample ID	Cd	Cr	Pb	Ba	Ni
TCLP limit	1	5	5	100	100
OX7	<0.003	0.11	<0.011	2.6	0.01
OX8	<0.003	0.12	<0.011	2.4	0.01
OX9	<0.003	0.12	<0.011	3.0	<0.01
OX14	<0.003	0.10	<0.011	2.7	0.01
OX15	<0.003	0.13	<0.011	2.6	<0.01
OX16	<0.003	0.11	<0.011	2.7	<0.01
OX17	<0.003	0.14	<0.011	2.7	0.01
OX18	<0.003	0.11	<0.011	2.9	0.01
OX19	<0.003	0.17	<0.011	2.8	0.05

Radiolytic Free-Liquid Generation. The testing for suppression of radiolytic free-liquid generation was conducted with OX samples. Gamma irradiation was used to simulate the radiolytic degradation caused by alpha irradiation in the actual wastes. It should be noted that gamma irradiation is less efficient than alpha irradiation due to the smaller size of the nuclear particle. To achieve 10^8 rads quickly, the test was conducted at SNL using a 380 rad/sec. gamma source. The samples were taken from the pH categories of 9.5, 10.5, and 11.5 and included the sample with the lowest compressive strength in each category. Compressive strength was again used as the worst-case indicator because of its connection to free-liquid generation through permeability. The test results, presented in Table 4, show that no Portland cement samples produced free liquid during the 10^8 rad irradiation test.

Two Envirostone-cemented samples were also included in this test, a short-mixed (OX20) and a long-mixed (OX21) sample. These were included to investigate a correlation found in previous work between longer mixes and suppression of radiolytic free-liquid generation in Envirostone cemented waste forms.[3,6,7,10,19] During the irradiation test, free liquid was found in both samples, the short-mix sample at 1.7×10^7 rads and the long-mix sample at 4.4×10^7 rads. The liquid generated by the long-mix sample was actually greater in volume than that by the short-mix sample. Based on these results, it can be concluded that the long-mix technique can not be consistently relied upon to suppress radiolytic free-liquid generation in Envirostone cemented waste forms.

Table 4: Gamma Irradiation

Cumulative Dose: (rad)	8.3×10^6	1.7×10^7	4.4×10^7	5.3×10^7	7.2×10^7	9.8×10^7
Sample ID	Liquid?	Liquid?	Liquid?	Liquid?	Liquid?	Liquid?
OX14	no	no	no	no	no	no
OX15	no	no	no	no	no	no

OX16	no	no	no	no	no	no
OX17	no	no	no	no	no	no
OX18	no	no	no	no	no	no
OX19	no	no	no	no	no	no
OX20 short-mix Envirostone	no	Yes (damp*)	Yes (1.55g)	Yes (3.35g)	no	no
OX21 long-mix Envirostone	no	no	Yes (3.59g)	Yes (4.91g)	no	no

*weights in parentheses are totals since start of free-liquid generation.

Full-Scale Testing: The full-scale test was conducted with LR-based surrogate and was designed to approximate the bench-scale sample LR16. The full-scale sample had a pre-cement pH of 10.3 and a C/L ratio of 0.80 kg/l, which corresponded to 220 lb of Portland cement. The EV, NaOH, and water volume percentages in the full-scale sample were 41%, 28%, and 31%, respectively. The full-scale test monitored all performance standards except RCRA-metal leaching resistance and radiolytic generation of free liquid. Compressive strength was used as an indicator of performance in these nonmonitored areas because of its common dependence with them on permeability. The results relative to each performance standard are reported below.

Mixability. The mixing equipment had no difficulty in providing center-to-edge mixing of the cement paste.

Free Liquid. No bleed water was present at any time after cementation.

Initial Set Time. Initial set occurred at 20.1 hours after cementation. This matched the 20-hour initial set time of LR16. The profile of the penetration resistance is shown in Figure 7.

Temperature. The full-scale test was especially useful in illuminating several areas of uncertainty concerning temperature behavior. The temperature was monitored at the center and edge (1 inch in) of the cement monolith and between the rigid liner and bag. The temperature reached a maximum of 163 °F at the center, 150 °F at the edge, and 103 °F at the bag. The full-scale temperature profile is shown in Figure 8.

The maximum center temperature of the full-scale sample was 66 °F higher than that of LR16. This corresponds to an increase of 30 °F per 100 lb of Portland cement ([66 °F/220 lb] x 100). This is twice as high as the industry standard of 15 °F per 100 lb used to establish the temperature ceiling for the bench-scale tests. This difference is likely due to the industry standard being based on concrete in which the aggregate would act as a heat sink. Another meaningful finding was that the temperature at the bag location was 60 °F lower than at the center of the monolith. This resulted in a temperature significantly below the 145 °F bag failure temperature. This data can now be used to back-calculate a revised temperature ceiling for the bench-scale tests. Starting with 145 °F, adding the 60 °F lower temperature at the bag and subtracting the 66 °F higher center temperature yields a revised ceiling of 13

°F. At this higher ceiling, the pH-12.1 LR sample, previously rejected as a result of having a maximum temperature of 107 °F, falls within in the acceptable temperature range.

Compressive strength. The compressive strength values of the full-scale sample equaled or exceeded that of LR16 at all times. This indicates no damage of the monolith occurred as a result of increased hydration temperature from scale-up. The compressive strength profiles of the full-scale sample and LR16 are shown in Figure 9. It can be seen that strength development occurred at a similar rate in both samples.

TCLP. TCLP analysis was not performed on the full-scale sample, but the several considerations indicate TCLP performance would be as good or better than that of the OX-based samples, which easily passed the TCLP standards. First, the higher compressive strength of the full-scale sample indicates the permeability should be less than that shown by the OX-based samples. Since leachability is dependent on permeability, the resistance to TCLP leaching should therefore be greater for the full-scale sample than for the OX-based samples. Second, because the dilution percentage of the full-scale sample was greater than the OX-based samples, the concentration of the RCRA metals would be less in the full-scale sample.

Radiolytic Free-Liquid Generation. Testing for radiolytic free-liquid generation was not performed on the full-scale sample, but a conclusion can be drawn from compressive strength data. The work at Hanford showed that the susceptibility of a waste form to radiolytic free-liquid generation decreased as the compressive strength increased, presumably as a result of a corresponding decrease in permeability.[17,18] Since the compressive strength of the full-scale sample was higher than the OX-based samples, resistance to radiolytic free-liquid generation should also be greater.

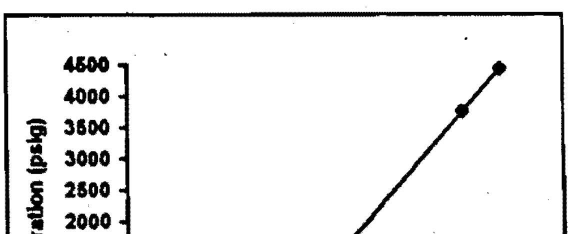


Fig. 7. Penetration resistance of full-scale test.

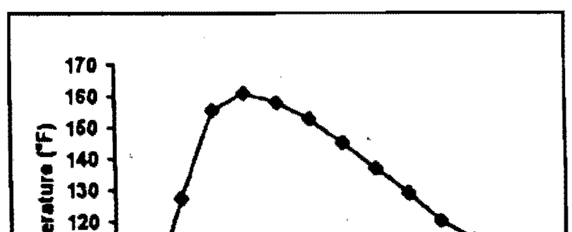


Fig. 8. Temperature profile of full-scale test (center).

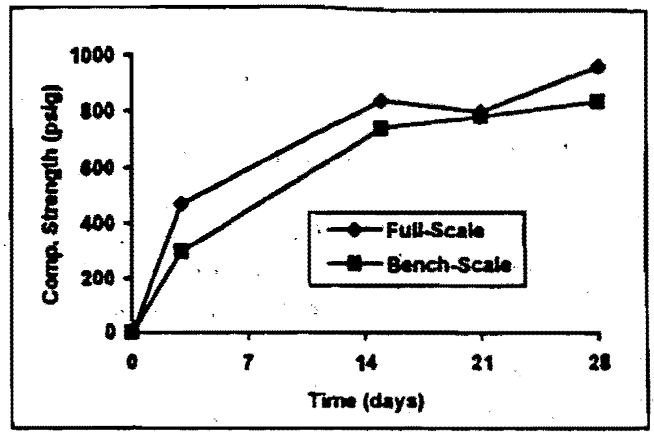


Fig. 9. Compressive strength comparison of full- and bench-scale (LR16) tests.

CONCLUSIONS

The above results define a range of operability that can be used to produce a Portland-based waste form meeting the performance standards identified in this project. The performance standards of principal importance were those addressing the inadequacies of Envirostone cement regarding free-liquid generation and failure to meet the TCLP limit for chromium. The Portland waste form was shown to be superior to both the short-mix and long-mix Envirostone waste forms in resisting gamma-induced free-liquid generation. The 9.8×10^7-rad dose at which the Portland sample still suppressed free liquid exceeds the dose at which the short-mix and long-mix Envirostone samples began to generate free liquid by 5.8 and 2.2 times, receptively (Table 4). The earlier work presented in Figures 1 and 2 had demonstrated that the Portland waste form was superior to Envirostone waste forms in chromium TCLP performance by at least an order of magnitude. The TCLP evaluation of the OX-based Portland samples in the present work showed TCLP performance similar to these earlier tests (see Table 3).

The bench-scale results established the minimum C/L ratio as 0.80 kg of Type I/II Portland cement per liter of liquid for LR-based EV surrogate and 0.94 kg/l for OX-based EV surrogate. The OX-based EV waste required a C/L ratio of 0.94 kg/l solely due to a failure to meet the 24-hour initial set standard at 0.80 kg/l. The bench-scale tests established the acceptable pH range for the liquid (EV, NaOH, and dilution water) at 10.5 to 11.5. The full-scale test, conducted with LR surrogate at pH 10.3 and 0.80 kg/l, served as a confirmation of bench-scale results and demonstrated the pH range could be lowered to 10.3. The full-scale test also provided revised temperature data that allowed inclusion of the pH 12.1 sample.

Actual operations will present some areas for flexibility. One, the C/L ratio may be increased to the limit of the mixing equipment's ability to achieve adequate mixability. An increased C/L ratio will improve performance in leaching resistance, set time, and compressive strength performance. However, no improvements in these areas should be necessary with EV wastes similar to those used as surrogates in this project. Two, to simplify operations, it is highly recommended that the dilution percentage not be based on the viscosity of each waste batch. Instead, a fixed dilution percentage should be chosen that will be adequate for the viscosity of all EV batches. If EV compositions remain similar to those in this project, this will result in the worst-case dilution being based on LR-based EV waste. Due to the effect of decreasing initial set time with increasing dilution (see Figure 3c), this may result in waste forms with OX-based EV waste meeting the 24-hour standard for initial set time at 0.80 kg/l. Additionally, 24 hours was established as a *desired* standard to achieve a reasonable process throughput and it may be extended without jeopardizing the physical integrity to the waste form.

Waste loading will depend on how much drum volume is required by the other components making up the final waste form. In actual operations, the highest waste loading will be achieved by operating at the lowest acceptable C/L ratio and pH. A waste loading of 33.5 vol% was achieved in this project's full-scale sample. This waste loading is approximately equivalent to that of the Envirostone-based operation. The lower C/L ratio of the Portland system did not result in a higher waste loading than for the Envirostone system because it was offset by the higher water and NaOH dilution required by Portland's higher pH. However, increased waste loading can be expected in actual operations if the EV waste contains less salts than the LR surrogate used in this project.

The cement addition rate should be as high as possible in the TA-55 operation. Mixing should be continuous during the time of addition and ramped up to maximum rpm as the paste viscosity requires to maintain adequate mixing. To prevent overmixing, the paste should be mixed for only 4 minutes after the end of cement addition. Overmixing is to be avoided because it is known to interfere with an initial stage of the setting reaction, causing delayed set, slow curing, and even loss of final physical properties.[32] The presence of bleed water after completion of mixing is acceptable as long as reabsorption occurs within a reasonable time frame. The 24-hour standard for free-liquid reabsorption was selected as a *desired* standard to ensure a reasonable throughput for the cementation operation. An occasional extension of this time limit should not significantly impact process throughput.

Quality Assurance: Some care must be taken in procuring the Type I/II cement for the TA-55 cementation operation. Type I/II Portland cement is defined by a range for each of its mineralogical and physical properties. The ranges are broad enough that variations in setting characteristics and sensitivity to chemical interferants are sometimes observed between Type I/II cements from different sources. It is recommended therefore that the QA program for this operation assure that procurement be from a source offering a Type I/II cement with similar composition to that used in this development project. The particular cement used in this project is a low-alkali Type I/II cement. The source of the cement was Rio Grande Portland Cement Corporation in Tijeras, New Mexico. The mineralogical composition and other pertinent physical characteristics for this cement are listed in Appendix 2. The composition from this source has been very consistent throughout the 2-year period presented in this appendix.

This work was performed according to the LANL/TA-55 Quality Management Plan: Documents and Records Control Section, procedure number SS-TA-55-110-0-03.1-1.

Costs: For a production rate of 3 cement drums per week, the Portland cement required for operating the TA-55 cement process will be approximately 20.6 tons per year.* The current delivered cost from Rio Grande Portland Cement Corporation is approximately $80 per bulk ton,[33] resulting in a yearly cost of $1,648. This compares to $1,300 per ton and $40,225 per year for Envirostone cement, which equates to an overall reduction in cement cost of $38,577 per year.[34] The cost for delivery from Rio Grande Portland Cement Corporation is for bulk powder cement. Bulk delivery is less costly and has the advantage of allowing pneumatic delivery into the TA-55 cement silo. Pneumatic delivery will also reduce the number of person-hours required to load the silo from approximately 20 hours to 1 hour per year. The increased volume of NaOH solution should result in an increased cost of less than $5,000 per year.

Other Wastes: The recommendations of this report should be compatible with the addition of dry, non-reactive particulate wastes. In the present TA-55 operation, this type of waste is added to a pre-established cement paste to prevent the solids from settling during mixing. Using this technique, the primary effect will be an increase in paste viscosity, which may require additional dilution to maintain adequate mixing. Slurries (wet particulates) with a pH outside the range recommended in this report should be pretreated to properly adjust the pH prior to addition to the cement paste. Low-density slurries that do not require addition to a pre-established paste can be combined and pH adjusted with the waste liquid prior to cement addition. Ion-exchange resins present an additional concern in that they have been reported to cause setting and free-liquid problems under certain conditions not related to pH.[35,36] Non-EV aqueous wastes may also cause chemical interferences with the Portland setting reaction. It is recommended additional studies be conducted before incorporation of ion-exchange resins or non-EV aqueous wastes into the cementation operation.

No testing was done with organic wastes in this development project. Portland cement is not as efficient as Envirostone in treating nonpolar organics, but methods exist that permit satisfactory treatment of some organics with Portland cement.[37] It generally is adequate for limited volumes of nonpolar organics if they are prepared in a well-dispersed oil-in-water emulsion. It does not perform well with inverse emulsions (water in oil) or pure solvents.[32] Organics with high solubility (polar) generally are not immobilized well by Portland cement.[32] It is recommended additional development be conducted before incorporation of organic wastes into the cementation operation.

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- NMT-7 Cement Process personnel for assistance in conducting the full-scale test.

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*Calculated at 150 drums per year at 275 lb of Portland cement per drum.

Appendix 1

Analysis of Evaporator Bottoms*
(in g/l except as noted)

	Lean Residue	Oxalate Filtrate	Hot Distillate
Fe	17.0	7.9	16.9
Ca	61	10.5	39.1
K	17.6	4.8	14.6
Mg	58.7	13.3	41.9
Na	7.4	23.9	9.4
Al	4.6	2.3	4.7
NH_3	.025	.090	.035
Cl	1.1	.265	1.35
NO_3	457	398	419
SO_4	1.6	<1	1.57
C_2O_4	3.3	33.8	11.3
F	5.4	1.7	5.1
H+ (molar)	1.0	4.6	1.75
TDS**	629	330	600
Ag	<.005	<.001	<.002
As	<.015	<.005	.010
Ba	.035	.018	.029
Cd	.014	.003	.014
Cr	3.0	1.94	2.35
Hg	<.025	<.005	.010
Ni	1.8	1.205	1.60
Pb	.19	.056	.125
Se	<.008	<.008	.009
Tl	<.060	<.020	<0.60

*median values of all analyzed EV samples
**total dissolved solids

Appendix 2

Composition of Type I/II Portland Cement Used in Tests
(in %, except where noted)

	#1 1/1/93 - 12/12/93 Average	(Std. Dev.)	#2 5/13/94 Bin 9 - Test 114	#3 7/1/94 - 10/3/94 Average	#4 9/1/94 - 1/18/95 Average
SiO_2	20.9	(0.22)	20.9	21.1	21.1
Al_2O_3	4.3	(0.087)	4.3	4.3	4.3
Fe_2O_3	3.1	(0.082)	3.1	3.0	3.1
CaO	63.3	(0.55)	63.3	63.6	63.6
MgO	2.8	(0.51)	2.4	2.5	2.6
SO_3	2.9	(0.08)	3.0	3.0	2.0
Na_2O	0.18	(0.023)	0.21	0.19	0.21
K_2O	0.52	(0.029)	052	0.55	.052
Loss On Ignition	1.5	(0.12)	1.2	1.4	1.40
Insoluble residue	0.24	(0.022)	0.22	0.23	0.24
C_3S*	57.8	(2.48)	57	57	57
C_2S*	16.3	(2.1)	17	17	18
C_3A*	6.1	(0.24)	6.3	6.3	6.0
C_4AF*	9.5	(0.24)	9	8	10
Alkalies (Na_2O equiv.)	0.52	(0.033)	0.57	0.55	0.55
Blaine, (sq. M / kg.)	353	(8.0)	349	359	361
-325 mesh fineness	93.3	(1.19)	92.7	93.3	95.2
Autoclave expansion	0.05		0.03	0.05	0.05
Air content	8.5		8.9	8.2	8.1

*C = CaO; S = SiO_2; A = Al_2O_3; F = Fe_2O_3

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ATTACHMENT J

GENERAL FACILITY OPERATIONS AND WASTE MANAGEMENT PRACTICES

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
CAM	continuous air monitor
CAS	Central Alarm Station
cm	centimeters
cm/hr	centimeters per hour
CSU	container storage unit
FMCS	facility motor/control system
ft	feet/foot
HEPA	high-efficiency particulate air
LACFD	Los Alamos County Fire Department
LANL	Los Alamos National Laboratory
MSDS	Material Safety Data Sheets
PA	public address
S-10	Hazardous Materials Response Group
TA	technical area

ATTACHMENT J
GENERAL FACILITY OPERATIONS AND WASTE MANAGEMENT PRACTICES

This attachment provides an overview of current facility operations and waste management practices for the hazardous and mixed waste management units at Los Alamos National Laboratory (LANL) Technical Area (TA) 55.

J.1 SECURITY AND ACCESS CONTROL [20.4.1 NMAC §270.14(b)(4) and §270.14(b)(19)(viii) and 20.4.1 NMAC §264.14]

Security at TA-55 is maintained with both manmade and natural barriers. These barriers prevent the unknowing entry and minimize the possibility for unauthorized entry of persons or livestock into TA-55, and thus satisfy the requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) §264.14, revised June 14, 2000 [6-14-00]. Two 12-foot (ft) high chain-link security fences with razor wire at the top surround the entire perimeter of TA-55, as shown on Figure J-1.

Three entry gates allow access to TA-55. One entry gate is located at the main entrance to TA-55 on the southeast side of the facility, one entry gate is located on the road to TA-48 at the northwest end of TA-55, and one entry gate is located at the northeast corner of TA-55 (for access to TA-55, Building 28 [TA-55-28] only). An entry station is located adjacent to the entry gate at the main entrance to the facility. The entry station is manned 24 hours a day by security personnel. Unescorted access to TA-55 is granted only to persons possessing appropriate security clearance and meeting specific training requirements.

TA-55 is patrolled by security personnel during both operational and nonoperational hours to ensure that the gates are locked and that unauthorized entry has not occurred. The entire length of both security fences is also inspected several times each day by on-site security personnel. In accordance with 20.4.1 NMAC §270.14(b)(19)(viii) [6-14-00], the locations of the security fences, entry gates, and entry stations are shown on Figure J-1. In addition to the fence and entry gates, cliffs and canyons surrounding TA-55 provide natural barriers to discourage unauthorized entry.

Warning signs are posted on the perimeter fences at approximately 40 to 110-ft intervals and can be seen from any approach to TA-55. Warning signs are also posted at each access to the waste management units in sufficient numbers to be seen from any approach. The legends on the signs are bilingual (i.e., English and Spanish) and indicate “No Trespassing By Order of the United States Department of Energy.” The signs are legible from a distance of 25 ft. The only exceptions are in confined areas where space is limited. Signs for confined areas may be reduced in size, but are legible to personnel who require access to these areas.

J.2 PREPAREDNESS AND PREVENTION [20.4.1 NMAC, Subpart V, Part 264, Subpart C]

The following sections present how operations at TA-55 comply with the preparedness and prevention requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart C [6-14-00]. Additional information on the communication and alarm equipment available at LANL is presented in Appendix E of the most recent version of the "Los Alamos National Laboratory General Part B Permit Application," hereinafter referred to as the LANL General Part B. A list of the emergency equipment available for use at the hazardous and mixed waste management units at TA-55 is provided in Tables E-1 through E-4 of Attachment E of this document and in Table E-2 of the LANL General Part B. A videotape explaining the alarms and evacuation procedures at TA-55 must be viewed by new visitors prior to entering TA-55.

J.2.1 Required Equipment [20.4.1 NMAC §264.32]

Buildings at TA-55 are equipped with multiple audible and visual safety-alarm systems to alert personnel in the event of an emergency and to evacuate the area. These alarm systems are located both inside and outside buildings at TA-55 and are monitored and controlled by the facility monitor/control system (FMCS). The FMCS is in operation 24 hours a day and is located in the Operations Center at TA-55-4 with access through TA-55-3. Specific FMCS alarm systems at TA-55 are discussed below.

A TA-55 computer system monitors the smoke and heat sensors, fire-alarm pull boxes, and drop box push-button alarms located throughout TA-55. Fire-alarm pull boxes and/or drop box push-button alarms are located in the vicinity of the waste management units addressed in this permit application. Fire-alarm pull boxes may be used by personnel to activate a local fire alarm when a fire or other emergency is discovered. Fire-alarm pull boxes are located in TA-55-4, Room 401, and throughout the basement in the vicinity of the container storage units (CSU), storage tank system, and cementation unit. A fire-alarm pull box is readily available at TA-55-185 and on the outer west side of TA-55-4 (for personnel working at the container storage pad). Once manually activated, an alarm (a steady high-pitched tone) sounds in the TA-55-4 Operations Center and at the Los Alamos County Fire Department (LACFD). Automatic thermal alarms are also located in active gloveboxes at TA-55-4.

Buildings at TA-55 are equipped with fire-suppression alarm systems and/or smoke detectors. The fire-suppression alarms are activated when water flow is detected in the sprinkler pipes of the fire-suppression system. The smoke detectors, once activated, also sound an alarm. Both types of alarms are area-specific and sound only in the affected area. Red lights are mounted both inside and outside of rooms and at strategic locations throughout TA-55. Upon activation of the fire-alarm system, the alarm sounds and the red lights flash to alert personnel of emergency conditions. All fire-alarm pull boxes, heat and smoke detection systems, and automatic fire-suppression systems at TA-55 are connected to the LACFD through LANL's Central Alarm Station (CAS).

A general evacuation alarm (a loud mid-range pulsating tone) is activated by gamma sensors on the ceilings of rooms on the first floor of TA-55-4 and in other areas of the basement. This evacuation alarm sounds throughout TA-55 and serves to alert personnel to evacuate. It may also be activated by the TA-55-4 Operations Center for other emergencies requiring evacuation.

Continuous air monitors (CAM) are located at various locations throughout TA-55. CAMs will be used as additional leak detection for the waste management units addressed in this permit application by detecting any airborne alpha contamination that would be present if a spill or leak of mixed waste were to occur.

TA-55-4 is also equipped with a ventilation alarm system designed to monitor air pressure and ambient air for personnel working in areas where hazardous or mixed waste is managed. The ventilation system creates zones within TA-55-4 which are at a lower pressure than the outside air. Air flows from the zones of highest pressure to the zones of lowest pressure (highest potential contamination areas). The airflow through the different zones is carefully balanced and controlled to provide the greatest protection to personnel as well as to the environment. If negative air pressure exceeds designated limits, a ventilation alarm (a slow, repeating chime sound) is activated.

In addition to the alarms described above, the public address (PA) system may also be used to announce an evacuation at TA-55. The PA system can be heard throughout TA-55 and is activated by the TA-55-4 Operations Center.

TA-55 is equipped with both local paging and conventional telephones to provide adequate communication and to summon external emergency assistance, if necessary. Local paging telephones and speakers and/or conventional telephones are located at or near the hazardous and mixed waste management units addressed in this permit application. Local paging telephones are used to page on-site personnel within the local paging area and may be used in the event of an emergency to communicate the location and nature of hazardous conditions to personnel in the area. The general evacuation alarm system at TA-55 is interrupted when the TA-55 PA system is activated through the

TA-55-4 Operations Center. Personnel working at any of the waste management units at TA-55 may also use conventional telephones to call the Operations Center to summon emergency assistance from the Hazardous Materials Response Group (S-10), local police and fire departments, and state emergency response teams, if necessary.

Fire control equipment is readily available for the waste management units addressed in this permit application. Depending on the size of the fire and the fuel source, portable fire extinguishers may be used by on-site personnel. However, LANL policy encourages immediate evacuation of the area and notification of appropriate emergency personnel. All buildings at TA-55 are equipped with heat and smoke detection systems and/or automatic, heat-activated fire-suppression systems to aid in the timely response in the event of fires in these buildings.

Fire hydrants are located on the north, south, and west sides of TA-55-4. Water is supplied to the fire hydrants by a municipal water system which provides adequate volume and pressure (i.e., greater than 1,000 gallons per minute and 90 pounds per square inch static pressure) to multiple water hoses in the event of a fire. The LACFD will supply all water hoses needed in the event of a fire at TA-55.

Spill control at TA-55-4, Room 401, and the Vault is provided by recessed floors. Self-containment pallets or cabinets provide spill control at the B40 and K13 CSUs. Additional spill control equipment is available, as needed, from S-10.

Decontamination equipment is available at TA-55 for personnel working at any of the waste management units included in this permit application. The equipment includes portable eyewash stations and safety showers. Eyewash stations and safety showers are located in Room 401 and throughout the basement of TA-55-4. Eyewash stations are also located on the Container Storage Pad and outside on the south side of TA-55-4 near TA-55-185. TA-55-185 will be equipped with an eyewash station prior to wastes being managed there. Safety showers are readily available in the following locations: TA-55-4, Room 401; in the basement of TA-55-4; on the Container Storage Pad; and outside on the south side of TA-55-4. TA-55-185 will be equipped with a portable safety shower prior to wastes being managed there. Additional decontamination equipment may be provided by S-10 personnel. Material Safety Data Sheets (MSDS) provide useful exposure information and are available in Room 401 and in the basement of TA-55-4. MSDSs will also be located in TA-55-185 prior to wastes being managed there.

J.2.2 Testing and Maintenance of Equipment [20.4.1 NMAC §264.33]

All TA-55 communications and alarm systems, fire protection, and decontamination equipment are inspected, tested, and/or maintained as provided in Attachment D of this document. The frequency of inspection is adequate to ensure proper operation in the event of an emergency. Repair and replacement of emergency equipment are performed as required.

J.2.3 Access to Communications or Alarm Systems [20.4.1 NMAC §264.34]

Whenever waste is being handled at any of the TA-55 waste management units addressed in this permit application, all personnel involved have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another individual. In the event of an emergency, communication equipment at TA-55 allows personnel to contact the TA-55-4 Operations Center, the operating group management, S-10, and/or the CAS operator. In addition to communications and alarm systems, TA-55 personnel may carry pagers so that they can be contacted by TA-55 and other LANL emergency support personnel at all times.

J.2.4 Aisle Space Requirements [20.4.1 NMAC §264.35]

Waste containers in the TA-55 CSUs are arranged in rows with a minimum aisle space of 24 inches. Storage configuration within a row depends upon the type of container, its size, and its weight restrictions. Fifty-five-gallon drums and standard waste boxes are arranged in rows and may be stacked to a maximum of ten ft high. The 85-gallon drums are not stacked. Large waste boxes may also be stacked to a maximum of two high, unless size and weight restrictions prohibit stacking due to safety concerns.

J.2.5 Support Agreements with Outside Agencies [20.4.1 NMAC §264.37(a)]

LANL maintains support agreements with outside agencies for emergency response assistance. Information regarding these support agreements is provided in Section 2.1.2.4 of the LANL General Part B.

J.3 HAZARDS PREVENTION [20.4.1 NMAC, Subpart V, Part 264, Subpart C; 20.4.1 NMAC §270.14(b)(8)]

A description of the preventive procedures, structures, and equipment at TA-55 is presented below. This information is provided in accordance with the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart C, and 20.4.1 NMAC §270.14(b)(8) [6-14-00]. Adherence to the procedures and proper use of the structures and equipment will help to prevent hazards, undue exposure of personnel to hazardous and mixed waste, and releases to the environment.

J.3.1 Preventing Hazards in Unloading [20.4.1 NMAC §270.14(b)(8)(i)]

Flatbed trucks, trailers, forklifts, or other appropriate vehicles may be used to transport waste containers to and from the waste management units at TA-55. Forklift operators may use a boom, if necessary, to improve handling capabilities. Small containers may be handled manually or with a dolly. The use of proper handling equipment, appropriate to a container's size and weight, helps to prevent hazards while moving containers.

J.3.2 Preventing Run-On/Runoff [20.4.1 NMAC §270.14(b)(8)(ii)]

Runoff from the waste management units at TA-55 to other areas of the facility or to the environment is and will be prevented. Secondary containment is provided at each waste management unit included in this permit application where potential liquid-bearing containers are stored. Self-containment systems will be utilized at each CSU, as needed, and will be sufficient to contain at least 10 percent of the volume of potential liquid-bearing containers or the volume of the largest container, whichever is greater, pursuant to the requirements of 20.4.1 NMAC §264.175(b)(3) [6-14-00]. TA-55-4, Room 401 serves as secondary containment for the storage tank system and the cementation unit. The storage tank system and the cementation unit will have adequate secondary containment as required in 20.4.1 NMAC §264.193 [6-14-00]. Runoff control of liquids resulting from fire-suppression activities and from leaks or spills will be accomplished by using a vacuum truck, a portable pump, a high-efficiency particulate air (HEPA) vacuum, and/or sorbents, depending on the volume and location of accumulated liquid. Accumulated liquids will be removed as soon as possible.

Run-on (e.g., sheet flooding) to any of the TA-55 waste management units addressed in this permit application is and will be prevented. With the exception of the Container Storage Pad, all of the CSUs are located indoors. The container storage pad is sloped, is elevated 2 to 4 inches above ground level, and has a culvert located beneath the pad running from the northwest side to the southeast corner to provide drainage and direct potential run-on away from the pad. In addition, containers stored on the pad are covered. Pursuant to the requirements of 20.4.1 NMAC §270.14(b)(19)(xi) [6-14-00], contours and surface drainage around the Container Storage Pad, TA-55-4, and TA-55-185 are shown on Figure A-9 in Attachment A of this document. These features will prevent run-on to the waste management units at TA-55.

J.3.3 Preventing Water Supply Contamination [20.4.1 NMAC §270.14(b)(8)(iii)]

The waste management units at TA-55 are located, designed, constructed, operated, and maintained in a manner that will ensure the prevention of water supply contamination. Each unit is either located inside a building or provided with secondary containment. In the event of a release, the materials in question will be removed as quickly as possible and packaged in an appropriate container. Given these conditions, there is little or no potential for deposition or migration of waste constituents into the groundwater or other water supplies as a result of waste-handling operations at TA-55. In addition, the depth to groundwater at TA-55 is approximately 1,200 ft (LANL, 1998) and the average annual precipitation in the Los Alamos area (including both rain and water equivalent or frozen precipitation) is 48 centimeters (cm). The evaporation of freestanding water exceeds the annual precipitation. Permeability rates for soils at TA-55 range from 1.5 to 5.0 cm per hour (cm/hr) in the top layers to 0.15 to 5.0 cm/hr in the lower layers. Available water-holding capacity ranges from 0.14 to 0.21 percent (Nyhan et al., 1978). Collectively, the depth to the regional aquifer and the annual moisture deficit significantly limit the potential for contaminants to migrate to the groundwater in the unlikely event that contaminants reach the ground surface surrounding TA-55. In addition, all water supply lines are under pressure and are equipped with backflow prevention devices. Pursuant to the requirements of 20.4.1 NMAC §270.14(b)(8)(iii) [6-14-00], no impact to water supplies is expected.

J.3.4 Mitigating Effects of Power Outages [20.4.1 NMAC §270.14(b)(8)(iv)]

Electrical power is supplied to operate ventilation systems, the PA system, various instruments, and other electrical equipment at TA-55. In the event of a power failure, portable generators are available from the Facility and Waste Operations Division support office and at TA-55-3. These generators may be used as temporary power sources at any of the waste management units within TA-55. Evacuation alarms located throughout TA-55 are equipped with a battery back up and will continue to operate for eight hours during a power failure. Operations at any of the waste management units would be discontinued temporarily if electrical power was not restored quickly or if container-handling equipment failed. Neither a power nor an equipment failure would affect containment at any of the waste management units at TA-55.

J.3.5 Preventing Undue Exposure [20.4.1 NMAC §270.14(b)(8)(v)]

To prevent undue exposure of personnel to hazardous or mixed waste, personal protective equipment appropriate for the waste being handled is worn by all on-site personnel at TA-55 involved in waste management activities at any of the waste management units. Workers involved in waste handling at TA-55 are required to wear protective work uniforms and steel-toed/composite-toed shoes, as appropriate. Hard hats and gloves may also be worn while equipment is being operated and when containers are being loaded or unloaded.

J.3.6 Preventing Releases to the Atmosphere [20.4.1 NMAC §270.14(b)(8)(vi)]

Releases to the atmosphere are not anticipated from any of the TA-55 waste management units addressed in this permit application. Containers are kept closed during handling and storage except when, upon inspection, it is determined that containers need to be overpacked or the contents repackaged in new containers or when it is necessary to add or remove waste. Inspections are conducted to ensure the integrity of all stored containers. The cementation unit, located in TA-55-4, Room 401, is operated within a vacuum-pressured glovebox equipped with HEPA filters. This system prevents the release of any airborne contaminants from TA-55. The ventilation alarm system and/or other air monitoring equipment are located in the vicinity of the waste management units located in TA-55-4. In the event of an unexpected release, all personnel working within or near the area would be notified immediately to evacuate.

J.4 RECORDKEEPING REQUIREMENTS

Recordkeeping requirements applicable to the TA-55 CSUs, the storage tank system, and the cementation unit consist of the biennial report, unmanifested waste report, and additional reports. These reports are discussed in Section 2.6 of the LANL General Part B.

J.5 REFERENCES

LANL, 1998, "Hydrogeologic Workplan," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

Nyhan, J.W., L.W. Hacker, T.E. Calhoun, and D.L. Young, 1978, "Soil Survey of Los Alamos County, New Mexico," LA-G779-MS, Los Alamos National Laboratory, Los Alamos, New Mexico.

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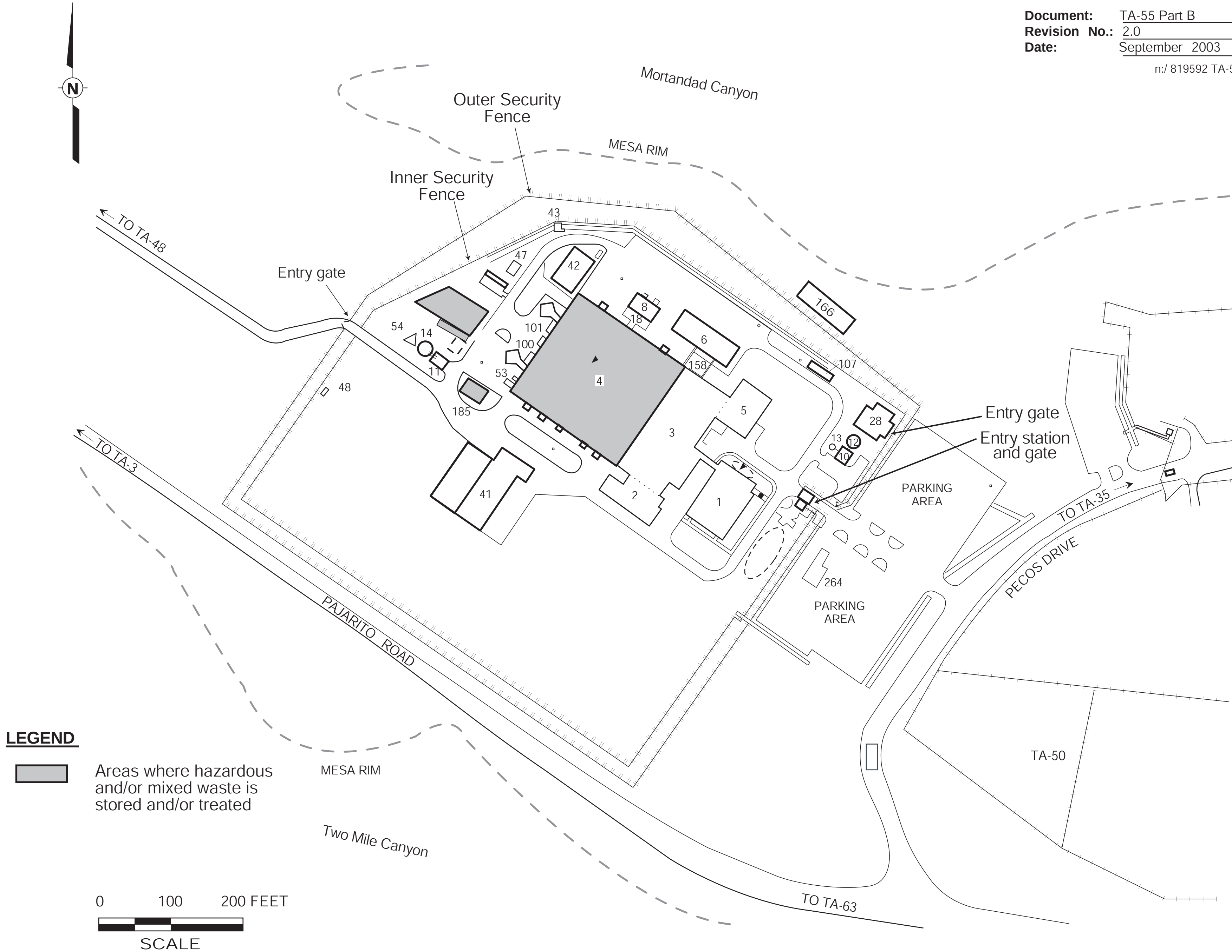

Figure J-1

Location Map Showing Security Fences, Entry Gates, and Entry Station at Technical Area (TA) 55