CLOSURE PLAN

TECHNICAL AREA 54
MATERIAL DISPOSAL AREA G
STORAGE SHAFTS 145 AND 146

Los Alamos, New Mexico 87545

CONTENTS

FIGURES

ACRONYMS AND ABBREVIATIONS

20 NMAC 4.1	*New Mexico Administrative Code*, Title 20, Chapter 4, Part 1
DOT	U.S. Department of Transportation
ESH-1	Health Physics Operations Group
LANL	Los Alamos National Laboratory
MDA	Material Disposal Area
MLLW	mixed low-level waste
NMED	New Mexico Environment Department
RCRA	Resource Conservation and Recovery Act
TA	Technical Area

1.0 GENERAL CLOSURE INTRODUCTION
[20 NMAC 4.1, Subpart VI, Subpart G]

This closure plan is submitted to accomplish closure of Storage Shafts 145 and 146, located at Los Alamos National Laboratory (LANL) Technical Area (TA) 54, Material Disposal Area (MDA) G. Storage Shafts 145 and 146 have interim status under the Resource Conservation and Recovery Act (RCRA) for storage of mixed wastes, but have been used only minimally since their construction in 1990. Mixed waste contains a hazardous waste, as defined by and regulated under RCRA, and a radioactive waste. Because of their limited use and changes in LANL=s waste management operations, Storage Shafts 145 and 146 will be "clean-closed" in accordance with *New Mexico Administrative Code,* Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart VI, Part 265, Subpart G, revised January 1, 1997 [1-1-97].

1.1 Closure Performance Standard [20 NMAC 4.1, Subpart VI, Section 265.111]

This closure plan has been written for implementation of a "partial closure" as defined in 20 NMAC 4.1 Subpart I, 40 CFR §260.10 [1-1-97] (i.e., closure of one or more units), rather than final closure of the LANL facility. This closure plan will ensure compliance with 20 NMAC 4.1, Subpart VI, §§265.111 through 265.115 [1-1-97] to achieve "clean-closure" of the storage shafts. Clean closure will be demonstrated through administrative record confirmation, absence of detectable radioactivity, and visual examination that hazardous waste contamination of the shafts did not occur.

1.2 Facility Description [20 NMAC 4.1, Subpart VI, Section 265.111]

LANL is located in north-central New Mexico, approximately 60 miles north-northeast of Albuquerque, and 25 miles northwest of Santa Fe. LANL, which occupies an area of 43 square miles, and associated residential areas of Los Alamos and White Rock, are situated on the Pajarito Plateau. The plateau consists of a series of finger-like mesas separated by deep east-west trending canyons; intermittent streams lie at the bottoms of all of the canyons. The mesa tops range in elevation from approximately 7,800 ft at the flank of the Jemez Mountains, located west of Los Alamos, to about 6,200 ft at their eastern extent, where they terminate above the Rio Grande Valley.

LANL is divided into 51 TAs; 34 of these TAs are developed. Hazardous and mixed waste are managed at a number of TAs throughout LANL. Storage Shafts 145 and 146 are located at TA-54, MDA-G (Figures 1 and 2), hereafter referred to as Area G.

TA-54 is located on the eastern reach of Mesita del Buey, one of the many mesas that make up the Pajarito Plateau. Area G has been designated for storage and disposal of solid radioactive wastes since 1957. Encompassing approximately 63 acres, Area G consists of 36 low-level waste pits, 4 low-level waste disposal trenches, 192 low-level waste disposal shafts, 55 transuranic waste storage shafts, and 14 solid-PCB-contaminated waste disposal shafts, as well as other shafts and storage units under construction.

Mesita del Buey is bounded on the south by Pajarito Canyon, and Cañada del Buey canyon to the north. These canyons are erosional, with 30 to 40 m of relief. The waste management units at Area G are located in the Tshirege Member of the Bandelier Tuff, with approximately 250 m of tuff, basalt, and sedimentary rocks separating the disposal areas from the main aquifer.

Storage Shafts 145 and 146 at TA-54, Area G were constructed in 1990 to serve as containment systems for containerized, solid, tritium-contaminated mixed low-level waste (MLLW). Storage Shafts 145 and 146 are identical in construction, consisting of six-ft diameter shafts augured to a depth of 60 ft. The shafts are lined with galvanized steel conduit. The bottom of the shafts are formed of approximately 9 in. of asphaltic concrete poured into place and leveled after the shafts were augured and lined. The design incorporates a nominal 18-in. thickness of concrete above the natural grade that ensures runoff away from the shafts. The shafts, when in use (1991), had metal shaft covers and removable guard railings above surface grade. Currently, each operational cap on Storage Shafts 145 and 146 consists of a metal shaft cover, and a reinforced concrete collar. Figures 3 through 9 show the Storage Shafts 145 and 146 surface view, operational cap, interior steel lining, and graded concrete collar. Storage Shafts 145 and 146 served as containment systems for the containerized mixed waste stored in each shaft.

1.3 Description of Waste Managed [20 NMAC 4.1, Subpart VI, Section 265.112(b)]

For a several month period spanning 1990 and 1991, Storage Shafts 145 and 146 were employed to develop and demonstrate storage operational protocols. During this period, one 30-gal. drum containing solid, tritium-contaminated MLLW was suspended from the top of each shaft. Tritium-contaminated mixed waste in concentrations greater than 20 mCi/m^3 but less than 100 Ci/m^3 was considered nonroutine waste that required special packaging in asphalt-lined U.S. Department of Transportation (DOT) 17C or 17H, 30-gal. drums with locking rings. The lids of the 30-gal. drum were also sealed with asphalt. The wastes used in these tests contained various solid waste materials (rags, tools, and similar equipment) from glovebox operations at LANL, which were contaminated with tritium as the radioactive component, and any RCRA-regulated waste listed in the *LANL Hazardous Waste Permit Application Part A for Mixed Waste*, January 25, 1991 (Appendix A). No wastes containing free liquids were placed in the drums.

Once suspended in the shaft, each container remained closed throughout the storage period (20 NMAC 4.1 Subpart VI, §265.173 [1-1-97]). The containers placed in Storage Shafts 145 and 146 were moved from a nearby mixed waste tritium storage shed using forklifts and drum carriers. Nylon ropes were attached to the drums, and the drums were suspended approximately 2 to 3 ft from the top of each shaft. Regular weekly visual inspections of the shafts and the drums were conducted while the drums were in the shafts, in accordance with 20 NMAC 4.1 Subpart VI, §265.174 [1-1-97]. The drums were not opened while in the vicinity of the shafts and no sign of leakage was observed during this demonstration. At the end of the demonstration, the drums were removed from the shafts and returned to the mixed waste tritium storage shed in accordance with Area G on-site transportation requirements.

1.4 Waste Inventory [20 NMAC 4.1, Subpart VI, Section 265.112(b)]

The maximum inventory of waste managed in Storage Shafts 145 and 146 consisted of one 30-gal. drum each. The wastes were considered mixed wastes because of the presence of a hazardous waste plus tritium contamination. The wastes were solid (no liquids present), and packaged in 30-gal. drums. Storage Shafts 145 and 146 have not been used since the end of the 1991 demonstration.

2.0 CLOSURE PROCEDURE
[20 NMAC 4.1, Subpart VI, Section 265.112]

Storage Shafts 145 and 146 were used to store small quantities of specially containerized waste. This closure plan describes the steps that have been taken to confirm that Storage Shafts 145 and 146 are closed in accordance with 20 NMAC 4.1, Subpart VI, Sections 111 through 115. The waste management procedures employed during the active period for Storage Shafts 145 and 146, as well as inspection records and waste containerization protocols, indicate that contamination of the shafts from waste management activities is unlikely. Visual inspection records confirm there were no leaks from the drums during the storage demonstration. The waste and handling equipment used in the operation of Storage Shafts 145 and 146 are being properly managed at Area G.

2.1 Preclosure Activities [20 NMAC 4.1, Subpart VI, Section 265.112]

The two waste containers stored in the shafts during the storage demonstration were removed in 1991 and are being properly managed at TA-54, Area G. No RCRA-regulated or non-RCRA-regulated waste has been stored in either storage shaft since that time. Storage Shafts 145 and 146 have been surveyed for radiological contamination using standard procedures developed by LANL's Health Physics Operations Group (ESH-1). Survey results are addressed in Section 2.2.

2.2 Closure [20 NMAC 4.1, Subpart VI, Section 265.112(b)]

After RCRA closure, the storage shafts will be left in place and reused for storage of low-level waste. No hazardous waste remains to be removed; the drums of waste and drum handling equipment (i.e., ropes) used in the demonstration were removed from the storage shafts in 1991. The waste management procedures followed during the storage demonstration prevented contamination to the shafts and the surrounding areas:

- The waste drum lids were closed and sealed with asphalt.
- The drums were not opened while in the vicinity of the storage shafts.
- The drums did not contain any liquid waste.
- The drums were suspended using nylon ropes and did not come in contact with the storage shaft surfaces.
- The drums were stored for a short period of time.
- The storage shafts and drums were inspected weekly; inspection records confirm there were no signs of leaks or waste releases.

- The RCRA permit contingency plan was never implemented.
- When the two drums were removed from the storage shafts (at the end of the storage demonstration), visual inspection confirmed there were no leaks or waste releases.

The storage shafts were designed (See Section 1.2) to divert runoff away from the shafts and the shaft covers prevented storm water seepage into the shafts, precluding migration of tritium or hazardous constituents out of the drums.

Radiological surveys performed in January 1999 confirm that no radiological contamination is present in either storage shaft. Based on the concept of co-detection, hazardous waste constituents from the previously stored containers are not present in the storage shafts. Because radiological surveys of the storage shafts confirm no radioactivity was released, it follows that there was no hazardous waste release; therefore, no hazardous waste contamination. To support this premise, a discussion of the concept of co-detection is provided in Appendix B. Following radiological surveys, a video camera was used to scan the interior of the shafts. Examination of the videotape confirmed the shaft walls and bottom are in good condition and no debris is present. This videotape has been provided to NMED. Because the administrative record demonstrates that the storage shafts are not contaminated, the radiological surveys confirm that no radiological contamination is present in either storage shaft, and video examination confirms no debris is present, the storage shafts can be closed being protective of human health and the environment without the need for further RCRA maintenance

A New Mexico-registered, independent professional engineer (PE) will review the administrative record, including radiological surveys, to determine if the records support that the storage shafts have not been contaminated.

3.0 CLOSURE SCHEDULE
[20 NMAC 4.1, Subpart VI, Section 265.113]

An estimated 180 days will be required to accomplish closure procedures and reporting requirements. The year of closure of Storage Shafts 145 and 146 is 2000. Closure will follow the schedule listed below:

Closure Schedule

ACTIVITY	TIME REQUIRED
Preclosure Activities	– 45 Days
Submit Closure Plan	Day 1
Receive Approved Closure Plan	Day 90
Document Review	Day 100
Professional Engineer Site Visit	Day 120
NMED Site Visit	Day 130
Obtain Certification of Closure	Day 170
Submit final closure report to NMED	Day 180

Note: Activities will be completed within the number of calendar days indicated. The PE and NMED site visits may occur simultaneously.

4.0 CLOSURE CERTIFICATION
[20 NMAC 4.1, Subpart VI, Section 265.115]

An independent, New Mexico-registered PE and a LANL representative will ensure that closure follows this plan. Upon completion of closure, the PE and a LANL representative will prepare a letter certifying that the storage shafts have been closed in accordance with this plan. The letter will be dated and signed by each party and stamped by the PE. The original copy will be maintained by ESH-19. The closure report supporting the PE=s certification will be furnished to the Secretary of the NMED with the original certification. Closure certification will be submitted to the Secretary of the NMED in accordance with 20 NMAC 4.1, Subpart VI, §265.115
[1-1-97].

5.0 FINANCIAL REQUIREMENTS [20 NMAC 4.1, Subpart VI, Section 265.114(c)]

In accordance with 20 NMAC 4.1, Subpart VI, §265.140(c) [1-1-97], LANL, as a federal facility, is exempt from the requirements of 20 NMAC 4.1, Subpart VI, Part 265, Subpart H [1-1-97], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

6.0 FINAL CLOSURE REPORT
[20 NMAC 4.1, Subpart VI, Section 265.115]

Upon completion of closure activities, a final closure report will be prepared and submitted to the Secretary of the NMED. The report will document the final closure and contain, at a minimum, the following:

A. The certification described in Section 6.0.

B. Any variance from the approved activities and the reason for the variance.

C. A certification of accuracy of the report.

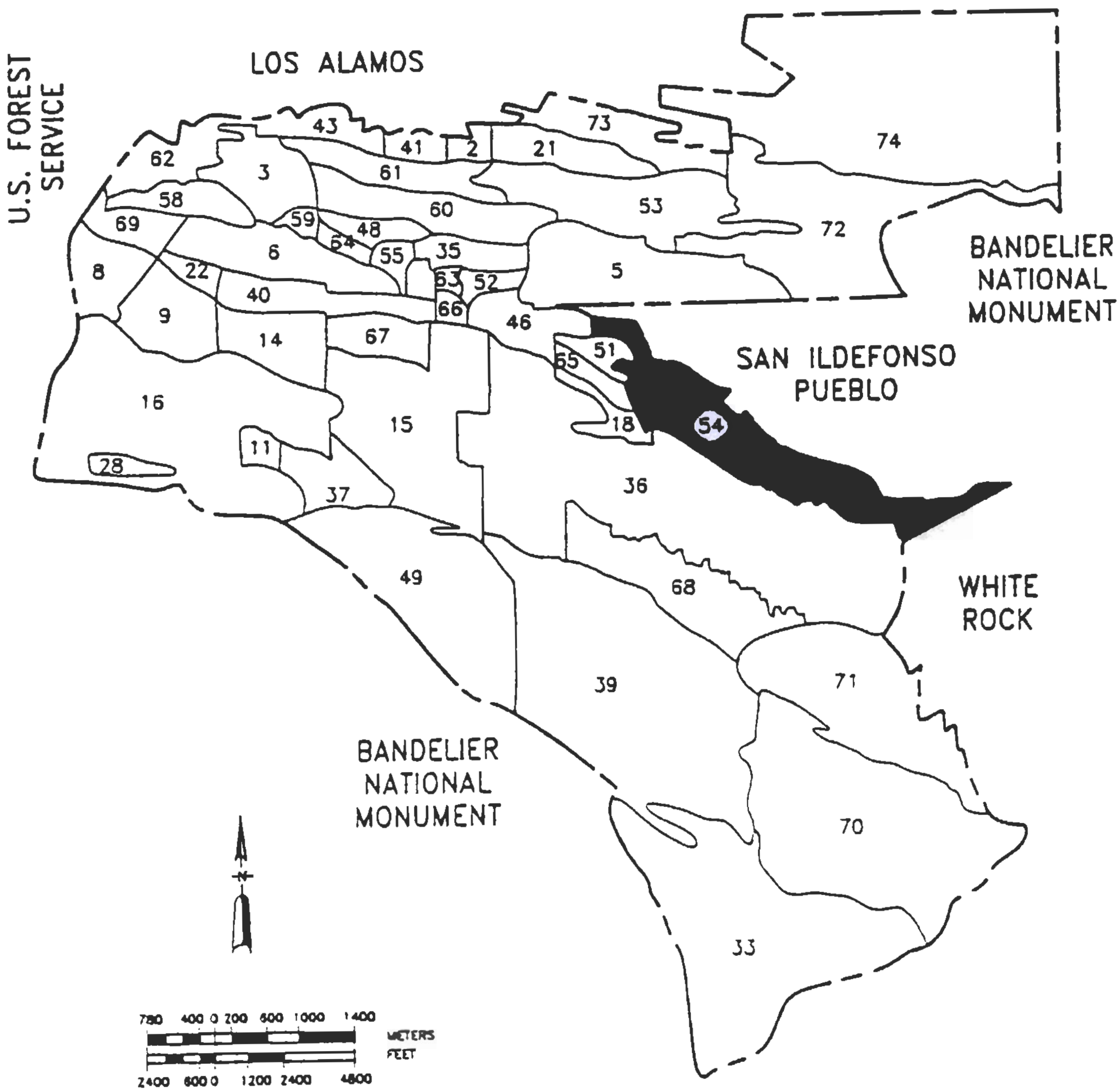

Figure 1. Location of TA-54, Area G in Relation to Other Laboratory TAs

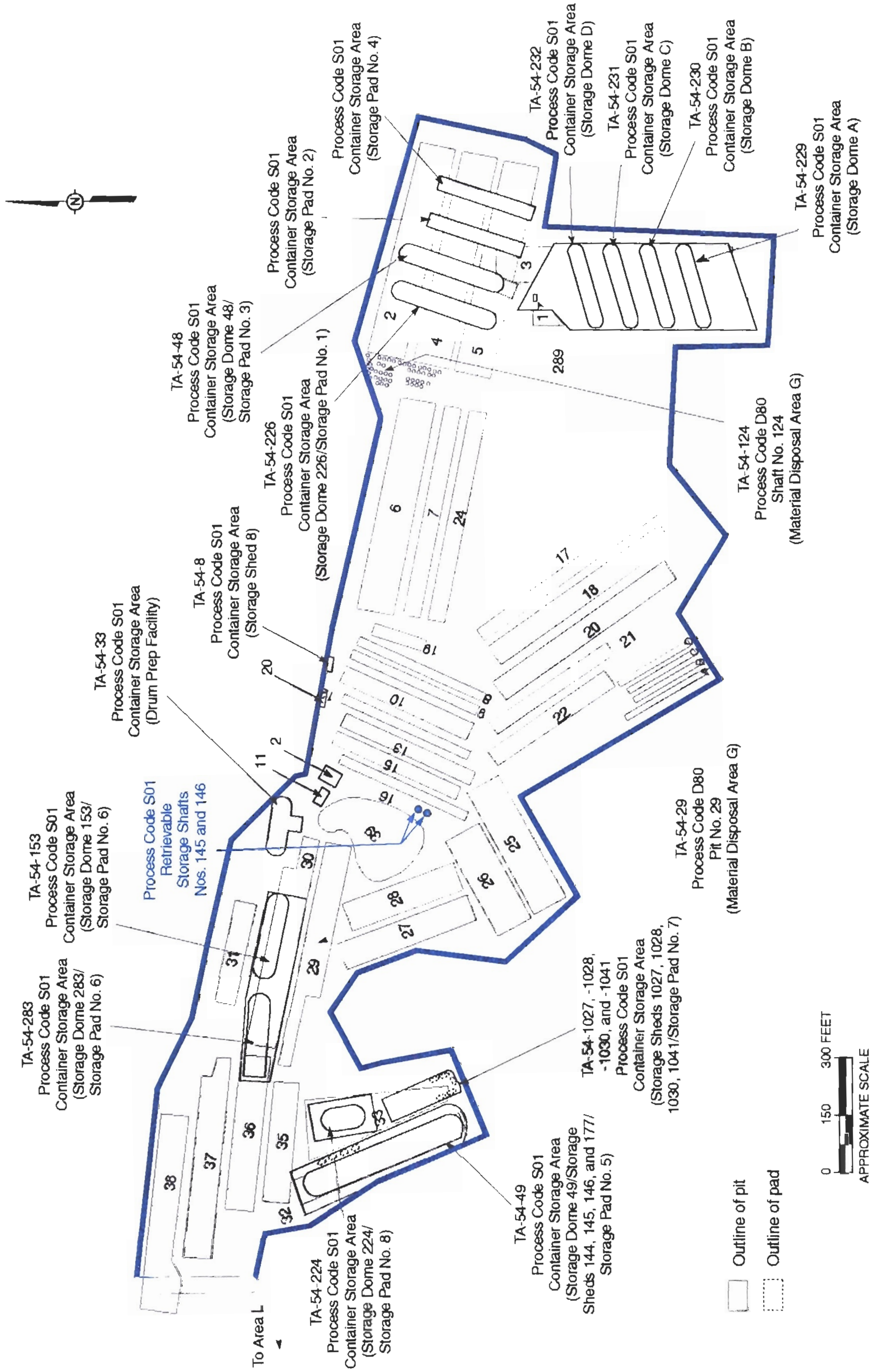

Figure 2. TA-54, Area G

Figure 3. Storage Shafts 145 and 146

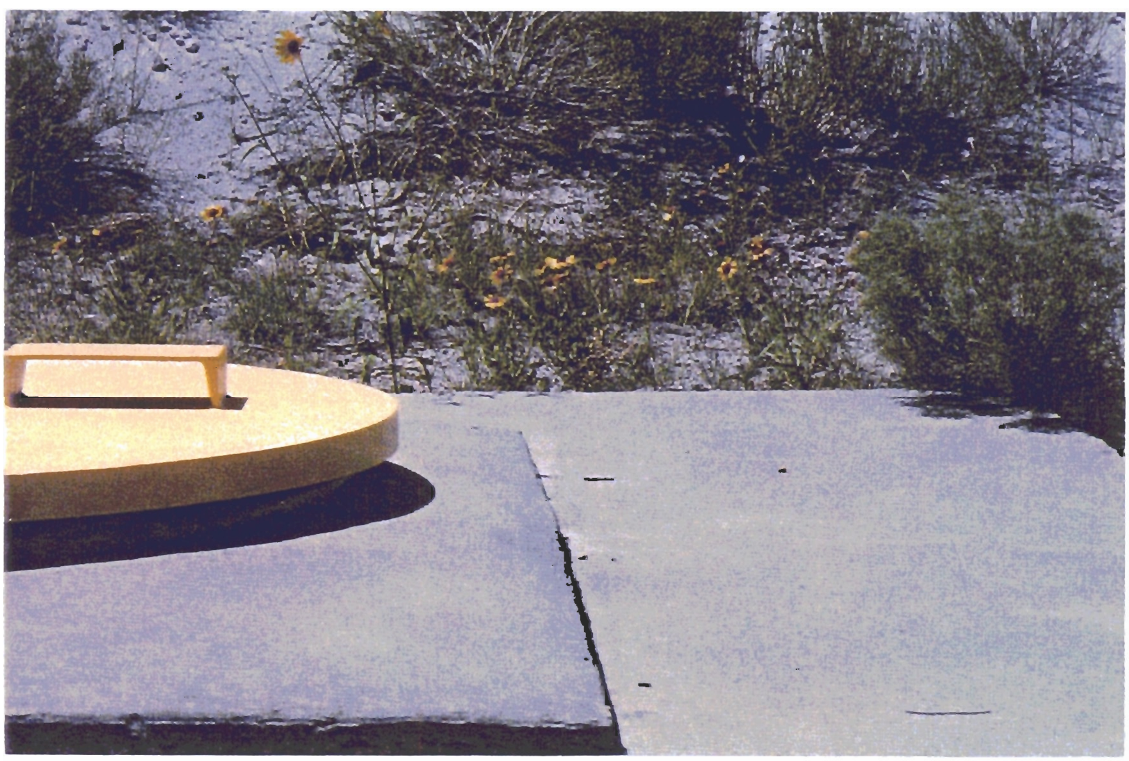

Figure 4. Graded Concrete Collar, Storage Shaft 145

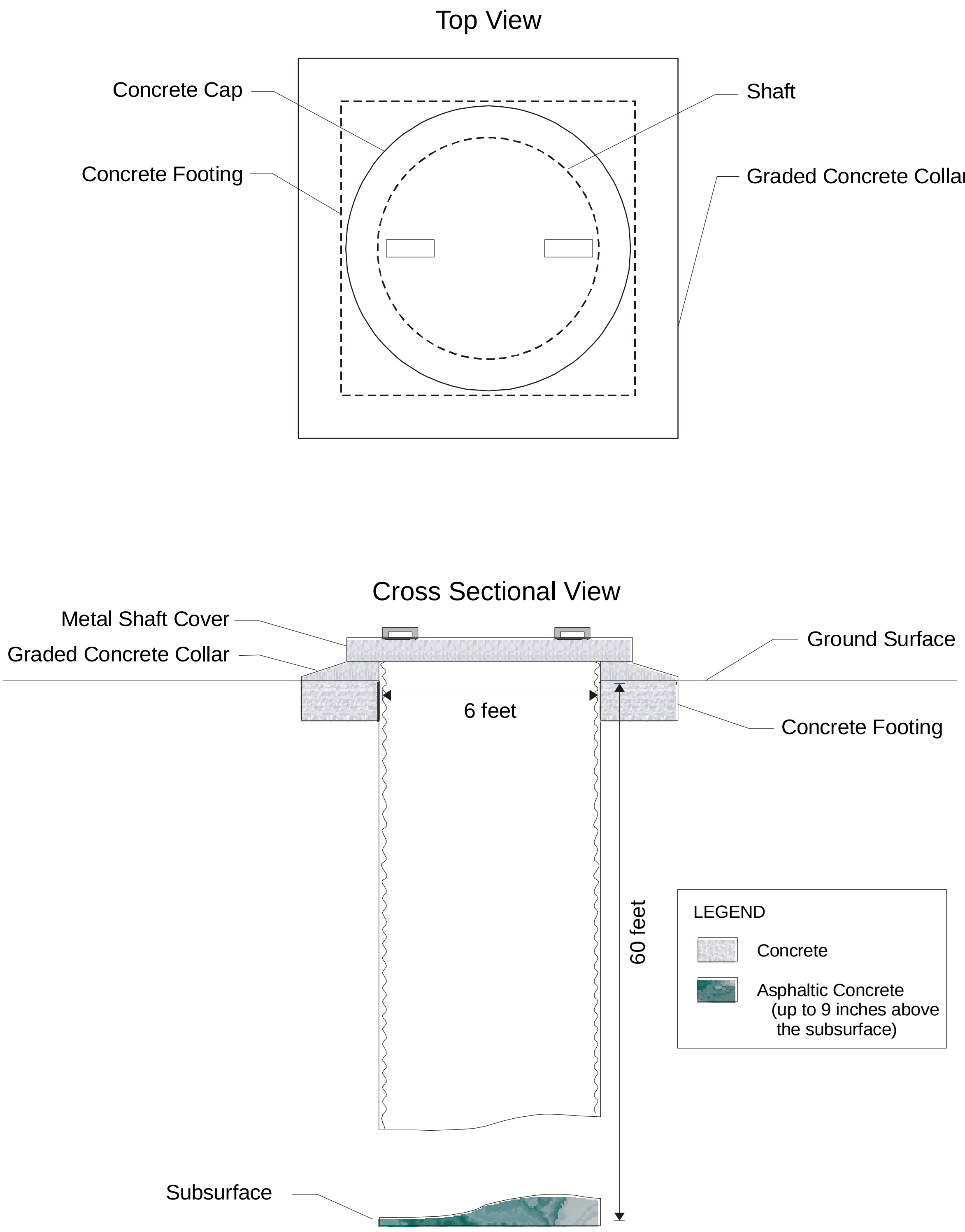

Figure 5. Illustration B Shaft and Cap

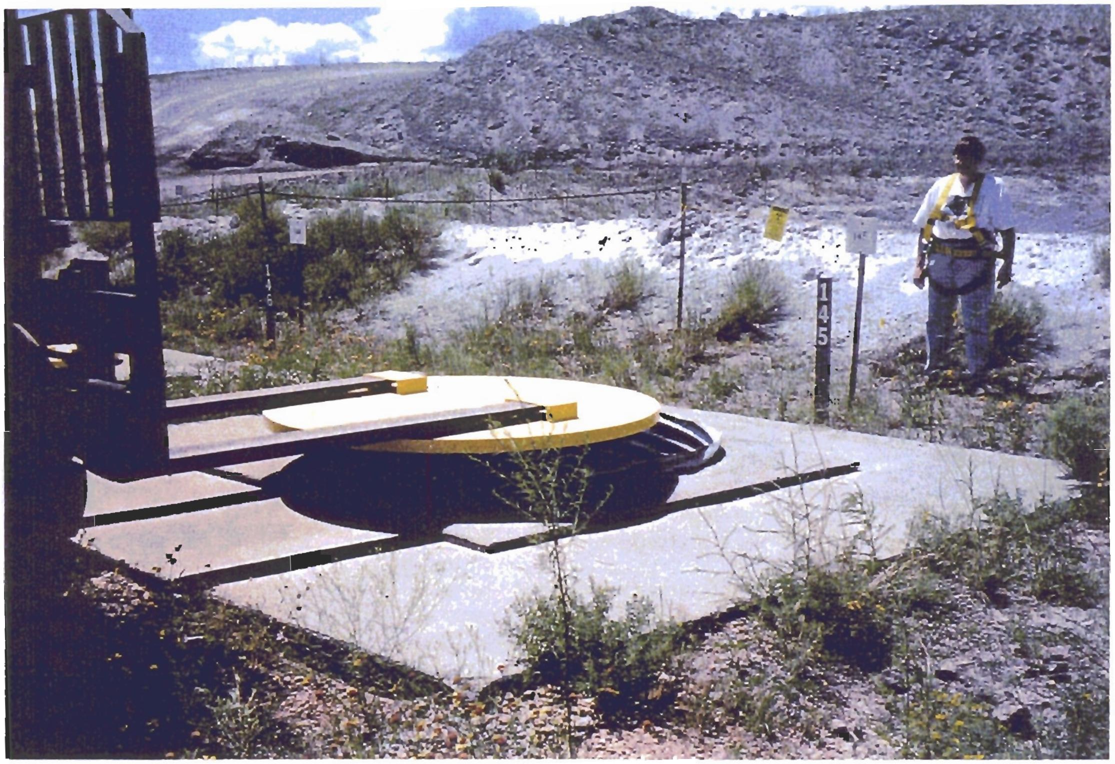

Figure 6. Operational Cap Removed for Inspection, Storage Shaft 145

Figure 7. Visual Exam of Galvanized Steel Conduit, Storage Shaft 145

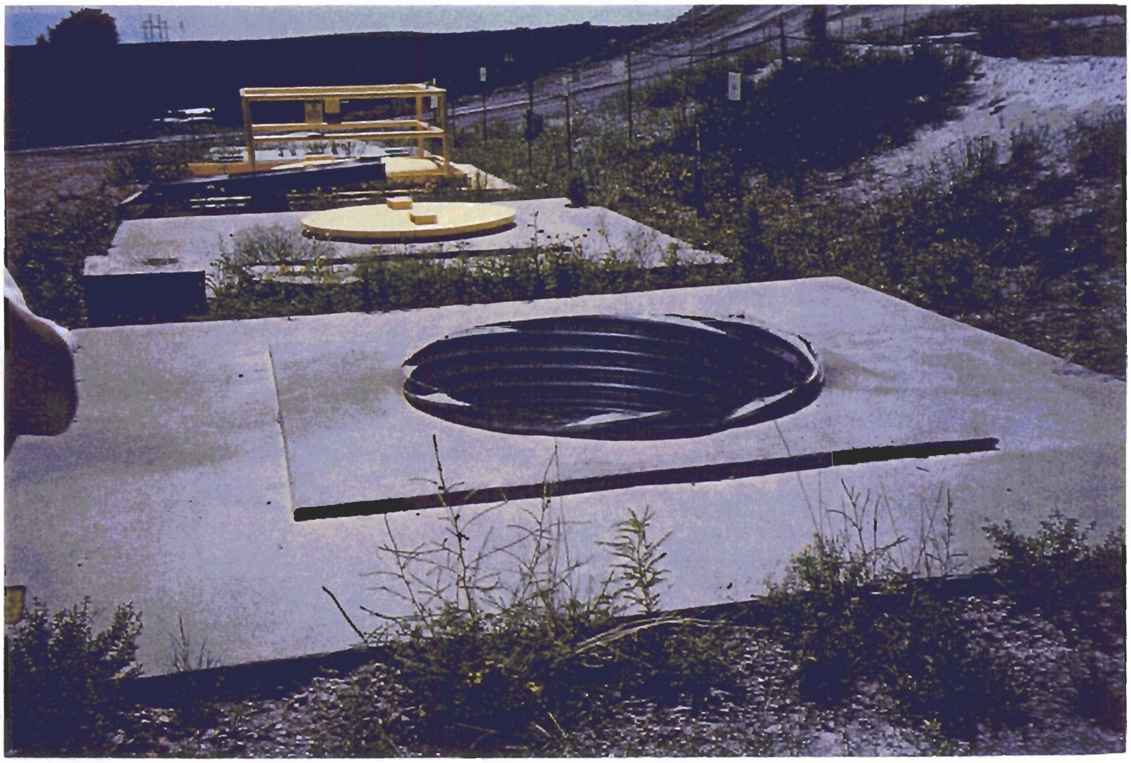

Figure 8. Surface View with Operational Cap Removed, Storage Shaft 145

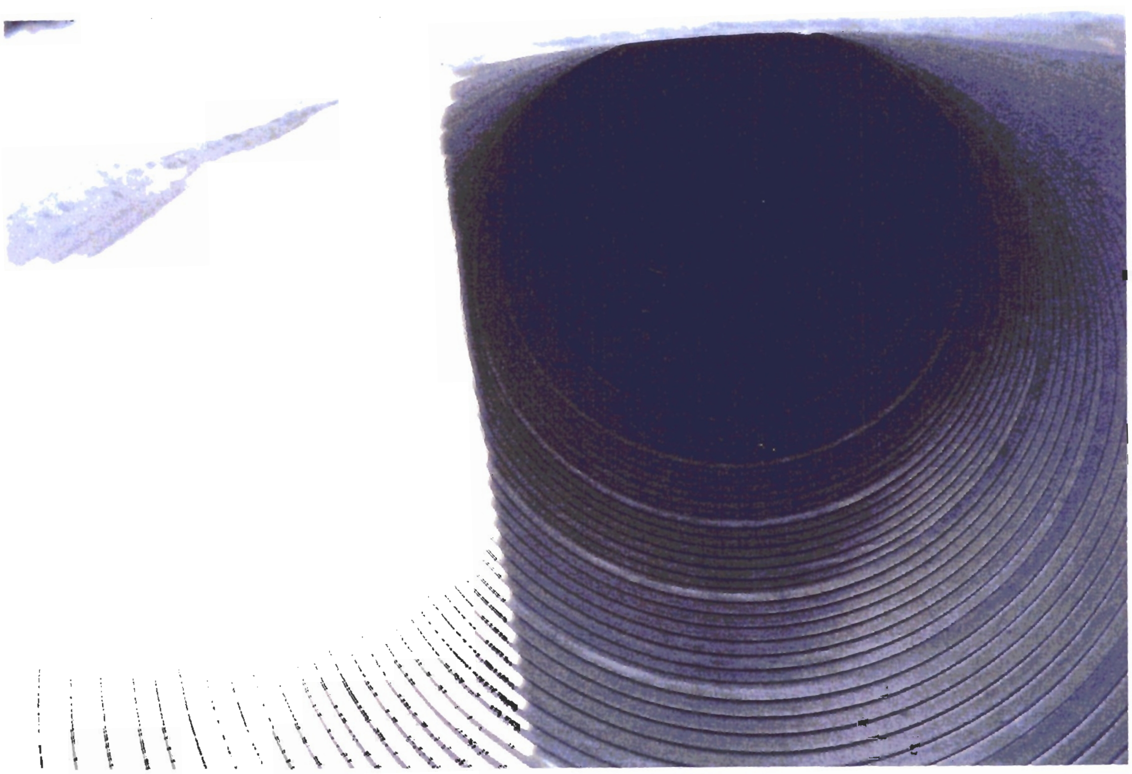

Figure 9. Internal View – Galvanized Steel Conduit, Storage Shaft 145

APPENDIX A

Excerpt from
LANL Hazardous Waste Permit Application Part A for Mixed Waste

January 25, 1991

HAZARDOUS WASTE PERMIT APPLICATION
PART A
FOR MIXED WASTE

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO 87545

January 25, 1991

NM0890010515

D001	120,000	P	S01	S02	T03	Low-level Mixed Waste (LLMW
D002	10,000	P	S01	S02	T03	LLMW
D003	80,000	P	S01	T03	T04	LLMW
D004	500	P	S01	T04		LLMW
D005	7,000	P	S01	T04		LLMW
D006	3,000	P	S01	T04		LLMW
D007	1,000	P	S01	T04		LLMW
D008	250,000	P	S01	T04		LLMW
D009	150,000	P	S01	S02	T03	LLMW
D010	500	P	S01			LLMW
D011	500	P	S01			LLMW
D018	5,000	P	S01			LLMW
D019	1,000	P	S01			LLMW
D021	1,000	P	S01			LLMW
D022	1,000	P	S01			LLMW
D027	1,000	P	S01			LLMW
D028	1,000	P	S01			LLMW
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D034	1,000	P	S01			LLMW
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D040	1,000	P	S01			LLMW
F001	50,000	P	S01	S02	T03	LLMW
F002	250,000	P	S01	S02	T03	LLMW
F003	50,000	P	S01	S02	T03	LLMW
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F008	500	P	S01			LLMW
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NM0890010515

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U227	500	P	S01			LLMW
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Form Approved. OMB No. 2050-0034 Expires 12-31-91
GSA No. 0248-EPA-OT

EPA I.D. Number (enter from page 1): N M 0 8 9 0 0 1 0 5 1 5

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Waste (continued)

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

Page Number 6(a) of 7 | Line Number/Page Number 6(d) of 7

Line Number	Additional Process Codes (enter)		
01	T04	01 (d)	T04
02	T04	02 (d)	T04
09	T04	03 (d)	T04
25	T04	04 (d)	T04
26	T04		
27	T04		
28	T03 T04		

XV. Map

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

XVI. Facility Drawing

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

XVII. Photographs

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

XVIII. Certification(s)

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

Owner Signature	Date Signed
Jerry L Bellows	1-24-91

Name and Official Title (type or print)
JERRY BELLOWS, AREA MANAGER, DOE-LAAO

Operator Signature	Date Signed
Allen J Tiedman / Jerry L Bellows	Jan 24, 1991

Name and Official Title (type or print)
JERRY BELLOWS, AREA MANAGER, LAAO/ALLEN J. TIEDMAN, ASSOC. DIRECT. FOR SUPPORT, LANL

XIX. Comments

*TA-54, Areas L and G have been counted as 2 units. Subunits within these areas have been described in Attachment 1 but not counted as individual units.

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

APPENDIX B

Co-detection

CO-DETECTION

The concept of co-detection is predicated on the commingling of hazardous and radioactive waste within a single container, resulting in the distribution of both types of contamination within the waste. Co-detection refers to the detection of hazardous waste from waste containers based on detection of radioactivity.

If radioactive contamination is found, a leak or release of hazardous constituents is assumed to have occurred; conversely, the absence of radioactive contamination is proof of the absence of hazardous constituents resulting from a leak or release from a container holding the mixed waste. This assumption that the hazardous and radioactive contaminants are released together (i.e., co-release) is appropriate because no reasonable release mechanism has been postulated that would separate the different types of contamination (i.e., would result in the preferential release of either type of contaminant).

At Los Alamos National Laboratory, TA-54, Area G, the co-detection concept is used to conservatively manage mixed waste. Containers are visually inspected on a regular basis to ensure container integrity. In addition, radiological surveys are conducted periodically to verify that leaks or spills from containers have not occurred. In the event that a spill or leak is discovered, a radiological survey is performed to identify the extent of the spill or leak, and the area is then decontaminated to remove not only the radioactivity, but to clean up any hazardous constituents in the waste that are also assumed to have been released. The concept of co-detection is also used in managing mixed waste at the TA-55 Vault Storage area. If radiological surveys reveal radiological contamination, hazardous waste contamination is assumed. Because radiation detection equipment is more sensitive than chemical detection methods, even small releases from a container can be detected.

During the periodic monitoring of the containers stored in Storage Shafts 145 and 146, no radioactivity releases were detected. In addition, radiological surveys of the empty storage shafts, performed in January 1999, indicate that no radioactivity remained in the shafts following removal of the containers. Based on the concept of co-detection, hazardous waste constituents were not released from the previously stored containers.