~~TA-22~~

File LANL and FYI

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JACOBS ENGINEERING GROUP INC.

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TA-03

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December 23, 1986

TA-16
TA-40
TA-22
TA-3
TA-14
TA-15
TA-36
TA-39
TA-50
TA-54
TA-24

Mr. Marcus Siding (6H-CP)
EPA Region VI
Interfirst Two Bldg.
1201 Elm Street
Dallas, TX 75270

Dear Mr. Siding,

At Beth Koesterer's request, I am sending to you a copy of Jacobs "Summary Report," Closure and Post-Closure Plan Review, Los Alamos National Laboratory (NMO 890010515). Keep in mind that this plan has not yet recieved PRC's QA review and is subject to revision base on PRC's comments.

If you have any questions, please feel free to contact me.

Gene Czyzewski

Gene Czyzewski
Project Manager

GC/KK

CC: Dan Chow, (letter only)
PRC

5014

JACOBS ENGINEERING GROUP INC.

12600 WEST COLFAX AVENUE, B140, LAKEWOOD, COLORADO 80215
TELEPHONE (303) 232-7093

December 23, 1986

Dan Chow
PRC
303 E. Wacker Drive
Suite 600
Chicago, IL 60601

Dear Dan,

Enclosed for your initial QA review are the following closure plan reviews prepared under WA 542.

Los Alamos National Loboratory, NMO 890010515
Los Alamos, NM

Oliver Treated Products LAD 008182537
Hammond, LA

As we discussed, a copy of the Los Alamos report has been sent simultaneously to EPA because of pending state approval of the closure plan.

If you have any questions, please feel free to contact me.

Gene Czyzewski

Gene Czyzewski

Project Manager

GC/KK

CC: Beth Koesterer (letter only)
EPA, Region VI

SUMMARY REPORT
CLOSURE AND POST-CLOSURE PLAN REVIEW

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS AREA OFFICE
LOS ALAMOS, NEW MEXICO 87544

EPA I.D. NO. NM0890010515

PREPARED DECEMBER 15, 1986

1.0 INTRODUCTION

This review has been prepared for the U.S. Environmental Protection Agency (EPA) Region VI by Jacobs Engineering Group Inc. (JEG) under subcontract to PRC Engineering, the prime contractor on the Technical Enforcement Support Contract, No. 68-01-7037, Work Assignment No. 542. The review is based solely on the following documents which were provided by EPA:

- General Information Form 1 (EPA Form 3510-1 (6-80)) signed 10-16-85
- Hazardous Waste Permit Application Form 3 (EPA Form 3510-3 (6-80)) signed 10-16-85 (page 5 missing)
- Closure Plan for [Technical Area-3] TA-3 Building 102, Container Storage Area for Lithium Hydride, September, 1985; amended December, 1985
- Closure Plan for [Technical Area-22, Building 24] TA-22-24 Magazine, Container Storage Area for High Explosive Contaminated Wastes, September, 1985; amended December, 1985
- Closure Plan for [Technical Area-40, Building 2] TA-40-2 Magazine, Container Storage Area for High Explosive Contaminated Wastes, September, 1985; amended December, 1985
- 9.0 Closure and Post-Closure Plan, Section 9 of Part B Permit application, 40 p., plus tables and figures. Received as correspondence from H. Valencia, LANL to D. Fort, NMEID, February 21, 1986
- Closure Plan for TA-16 Area P Landfill, November, 1985
- Correspondence to D. Fort, Director, NMEID from H. Valencia, Area Manager, LANL-Amendments for Part B Closure Plan, November, 1985

Reference material utilized in reviewing these materials included 40 CFR 265 and 264.

This evaluation is a review of closure plans for the following twelve hazardous waste management facilities located within the facility boundary of Los Alamos National Laboratories (LANL), Los Alamos, New Mexico:

- Technical Area 3, Building 102 (TA-3-102) High Explosive Storage Unit
- Technical Area 22, Building 24 (TA-22-24) High Explosive Storage Unit
- Technical Area 40, Building 2 (TA-40-2) High Explosive Storage Unit
- Technical Area 14, (TA-14) Thermal Treatment Area
- Technical Area 15, (TA-15) Thermal Treatment Area
- Technical Area 36, (TA-36) Thermal Treatment Area
- Technical Area 39, (TA-39) Thermal Treatment Area
- Technical Area 50, (TA-50) Storage and Batch Treatment Areas
- Technical Area 50, (TA-50) Incinerator
- Technical Area 54, Area L (TA-54 Area L) Treatment, Storage, and Disposal Area
- Technical Area 16, (TA-16) Thermal Treatment Area
- Technical Area 16, Area P (TA-16 Area P) Landfill.

The documents provided by Los Alamos National Laboratories have been reviewed for compliance with the general requirements regarding closure and post-closure. Specific requirements as applicable to each separate facility have been evaluated, and are included in this report.

2.0 LOCATION AND DESCRIPTION

The Los Alamos National Laboratory site covers 27,500 acres in and adjacent to Los Alamos County, north-central New Mexico. According to data included in the closure plans, the site includes 32 active technical areas involved in research and development of advanced technology. The mission of LANL is the application of science and technology to solve national problems including weapons development, energy, supply, and conservation programs. Basic scientific research complements and strengthens LANL's fundamental technical capabilities. LANL is owned by the

U.S. Department of Energy and is operated under contract to the University of California.

Specific discussion of each hazardous waste management facility submitted for closure is addressed separately in this review.

TA-3-102 Storage. This 10 foot by 10 foot storage area is located within the northeast part of Section 118-A, in Building SM-102 of Technical Area-3. Building SM-102 is a laboratory machine shop. Activities at Section 118-A are limited to the machining of lithium hydride (LiH). LiH wastes are the only hazardous wastes generated and stored at this facility. LiH wastes include waste LiH that is contaminated with mineral oil, waste from cleaning equipment, and sawdust. The collected wastes are double-bagged and stored at the facility in steel drums of various sizes.

TA-3-102 has operated as a container storage area under interim status (Part A permit). LANL has not submitted a Part B permit application for this facility.

At TA-3-102, hazardous waste drums are stored on a painted concrete floor. According to the closure plan, the floor has no cracks or seams, and the joint between walls and floor at the facility is tight.

TA-22-24 Storage. Activities at TA-22-24 consist of storage of high explosive (HE) wastes and HE-contaminated wastes. Wastes consist of small scraps of HE, as well as HE-contaminated rags, paper, tape, cotton swabs, and other trash. The HE wastes will be discussed in the wastes and quantities section.

The magazine is 6 feet by 6 feet by 7 feet high. It is a concrete storage facility that is earth-bermed on three sides. The fourth side is a steel entrance door. The magazine reportedly has a crack- and seam-free, smooth concrete floor and has concrete walls, although Figure 2-1 of the closure plan for this facility shows a "conductive, asphalt tile" floor.

According to the closure plan, wastes are no longer stored at the TA-22-24 facility. This facility has been replaced by a magazette (small magazine) located at building TA-24-96 within LANL. TA-24-96 is used as a less than 90-day storage area for the HE-wastes and HE-contaminated wastes.

TA-40-2 Storage. The LANL Technical Area 40 Building 2 (TA-40-2) is constructed similarly to the TA-22-24 HE magazine. TA-40-2 has a small storage area (magazette) constructed into the east wing of the magazine. The magazette is 2 feet by 2 feet by 3 feet high. Both storage areas (magazine and magazette) are used for the storage of HE-wastes and HE-contaminated wastes.

TA-40-2 is an active storage site within LANL and is used for the storage of both high explosives and HE-wastes. The facility is operated under interim status, a Part B application for this facility has not been applied for.

TA-14, TA-15, TA-36, TA-39 Thermal Treatment. High explosive (HE) detonation sites are located at Technical Areas 14, 15, 36 and 39. These facilities are used routinely to detonate scrap HE, failed experimental detonations, unneeded classified explosives, and other HE and reactive wastes.

The sites consist of firing pads and bunkers that are located within a small canyon. The bunkers are used by technical personnel during detonations.

TA-14. The TA-14 waste detonation site consists of a three-sided blast shield that directs the impact of detonations away from the control building. At the base of the shield is a 2-feet thick by 6-feet square concrete pad, overlain by a neoprene shock pad, a 4.5-inch steel plate and several inches of sand. Wastes are placed on the pad and detonated from the control building.

TA-15. The TA-15 waste detonation site is underlain by two massive steel plates with dimensions 5 by 20 by 0.5 feet thick. The steel plates are laid lengthwise end-to-end. Small housings and control buildings are protected with sand bags.

TA-36. This site is a flat area that is covered with sand.

TA-39. This site consists of a sand pad located at the bottom of a narrow canyon.

TA-50 Storage and Batch Treatment. The batch treatment system consists of a totally enclosed, vented, 500-gallon pressure vessel that is equipped with a filtering system, condenser, and vacuum transfer lines. The system is designed for total wash-downs between batches. Therefore, the facility can treat incompatible waste streams.

The storage facility consists of a small area at the batch treatment unit. The area is designed for the storage of up to four 55 gallon drums of waste.

TA-50 Incinerator. The incinerator in Building 37 at Technical Area 50 is identified in the Part B Permit application as a "highly modified, controlled air incinerator," that is rated at 45 kilograms per hour waste feed. The incinerator is currently permitted to burn PCB-contaminated liquid materials. Particular attention has been given to engineering for waste containment; the incinerator is reportedly safe for evaluating the

incineration of hazardous chemicals and certain radioactive wastes.

TA-54 Area L. TA-54 Area L is a complex facility that consists of two waste transfer, packaging, and storage facilities, a liquid "treatment in tanks" unit, and numerous land disposal shafts. The closure plan for TA-54 Area L does not specifically define the regulatory status of the disposal shaft area. For the purposes of this review, the disposal shaft area will be evaluated for completeness with respect to the closure requirements of a landfill (Subpart N), as no other regulated unit (Subpart I through R) directly applies to this facility. A landfill is defined under 40 CFR 260.10 as a "disposal facility ...where hazardous waste is placed in or on land and which is not a land treatment facility, a surface impoundment, or an injection well."

The waste transfer, packaging and storage facilities consist of two separate units within Area L. One is a single-story metal building (196 square feet), the other a roofed concrete storage pad (1,595 square feet). These facilities are used in the accumulation, packaging, and storage of wastes that are generated throughout LANL. Here, wastes are segregated according to their compatibility. Small containers of wastes are consolidated into labpacks. Recyclable wastes are consolidated into drums. Leaking or damaged drums are overpacked into larger drums at these facilities.

The tank treatment area consists of four 1,665 gallon, 10 gauge steel tanks. The tanks are lined with plastic and are primarily used to oxidize lithium hydride (reactive) wastes to lithium hydroxide (non-hazardous, non-regulated) and to evaporate aqueous ammonium bifluoride wastes (non-hazardous).

As of August, 1985 there were 34 land disposal shafts located in Area L. These shafts vary in diameter from 3 to 8 feet, and are approximately 60 feet deep. The bottom three feet of the shafts are backfilled with compacted, crushed tuff. Disposal from this horizon to within 3 feet of the surface consists of alternating lifts of drums and 6-inch lifts of crushed, compacted tuff. The disposal shafts are not lined. Closure of a shaft consists of capping the upper 3 feet of the shaft with uncontaminated concrete. According to the closure plan for this facility, prior to the opening of shaft 23 in April 1982, free liquids were disposed in drums without adding absorbent material.

According to the closure plan and correspondence between H. Valencia and D. Fort (November 1985), the most recent shaft was opened and closed in early 1985. As stated previously, closure of the disposal shaft area constitutes partial closure of TA-54 Area L.

TA-16 Thermal Treatment. The thermal treatment facilities at TA-16 consist of three main types. The first is a sand pit which is used for remote burning of explosives and explosive contaminated equipment. The burn pad is a 30 by 30 feet concrete pad, covered with two inches of sand. This facility is dedicated for wastes that burn without detonation, although unplanned detonations reportedly occur.

The second facility is a 12 by 12 feet sand filled metal pan, on which smaller pans that are lined with fire bricks are placed. Waste HE-contaminated fluids are introduced to the smaller pans and ignited. This facility reportedly treats about 55 gallons of waste fluid per month by this method.

The third facility consists of a steel cone that is partially buried in the ground and filled with sand and gravel. This unit is used to burn sludges that contain HE. Sludge HE is gravity fed into the top of the cone. Fluids are removed from the sludge both by gravity drainage and air circulation. The effluent is regulated and is treated at a waste water treatment system prior to discharge under a NPDES permit. The NPDES discharge point is not identified in the closure plans. The remaining sludge is ignited. LANL has two treatment units of this type, both located at TA-16. Approximately 750 pounds of waste explosive sludge is burned at each treatment unit each week.

TA-16 Area P Landfill. According to the closure plan, this site has been active since the 1950's as an industrial waste landfill. Activities included disposal of residues that resulted from the burning of high explosives and HE-contaminated equipment and refuse. According to the closure plan, residues from HE-contaminated wastes at the site exceed the EP-toxic limits for barium (D005). In addition to HE-wastes and waste residues, the TA-16 Area P landfill contains concrete rubble, structural steel, burn pad sand, burned equipment and empty solvent cans.

The landfill area is approximately 400 feet (east-west) by 170 feet (north-south). There are two landfill areas within the facility: "active" (eastern portion) and "retired" (western portion). The western portion was "retired" by leveling and covering with dirt (date not presented). This portion of the site has been revegetated. Landfilling at the active (eastern portion) has progressed from south to north. Wastes on the north face are exposed.

Geologically, the Area P landfill is located on the western margin of the Pajarito Plateau. The Bandelier Tuff forms the upper (approximate) 800 feet of the plateau, and is therefore, the predominant geologic formation in the landfill vicinity. Surface water runoff from Area P is toward Canon de Valle, a

small intermittent drainage. According to the closure plan for this facility, the uppermost aquifer in the area is about 1200 feet below ground surface. Site specific aquifer or Bandelier Tuff characteristics are not provided in the plan.

3.0 WASTES AND QUANTITIES

LANL generates hazardous wastes at many technical areas, scientific laboratories, treatment and storage facilities, incinerators, and by many different chemical processes. The hazardous waste permit application identifies the following EPA hazardous waste numbers generated at LANL.

D001-D012	F001-F009	K004	P001-P018	U001-U012
D016	F027	K047	P020-P024	U014-U039
	F028		P026-P031	U041-U053
			P033	U055-U064
			P034	U066-U099
			P036-P051	U101-U103
			P054	U105-U174
			P056-P060	U176-U194
			P062-P078	U196
			P081	U197
			P082	U200-U223
			P084	U225-U228
			P085	U230-U240
			P087-P089	U242-U244
			P092-P099	U246
			P101-P116	U247
			P118-P123	

The hazardous waste permit application identifies 341 different hazardous wastes that are generated in labpack quantities (volumes not defined) at LANL facilities. The final disposition of all wastes generated at LANL is not presented in the closure plans that were submitted for review and approval to the New Mexico Environmental Improvement Division (NMEID).

TA-3-102 Storage. LiH scraps may be contaminated with mineral oil, wastes from cleaning equipment, and sawdust. Wastes are double-bagged and placed in steel drums of various sizes that are used for different waste mixtures.

The maximum storage capacity at TA-3-102 is ten 55 gallon drums (administratively controlled storage capacity). The volume of waste at closure of this facility is estimated in the closure plan as follows:

Drum Inventory	Contents
One 55 gallon	mineral oil, contaminated chips and dust
Two 30 gallon	LiH pieces
One 20 gallon	LiH pieces
One 10 gallon	chips and dust
Three 5 gallon	chips and dust

TA-22-24, TA-40-2 Storage. High explosive (HE) wastes and HE-contaminated wastes are the only wastes generated and stored at these two facilities. These wastes include HMX (cyclotetramethylenetetramine), RDX (cyclonite), TNT (2,4,6-trinitrotoluene), PETN (pentaerythritol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine, and various plastic binders. In addition to its characteristic of explosivity, barium nitrate is also EP-toxic (D005). Wastes are packaged in plastic bags which are placed in plastic pails with lids (both facilities) or sealed into cardboard boxes (TA-40-2 only).

The maximum inventory of HE-wastes (administratively controlled limit) is 550 pounds at TA-22-24 and 400 pounds at TA-40-2. Wastes from both facilities are transported to burn pads at TA-16 where the wastes are ignited and destroyed.

Facility TA-22-24 no longer contains any HE-wastes in storage. Facility TA-40-2 is an active storage site for HE-wastes. The maximum inventory of HE-waste at closure is estimated at 4.5 pounds.

TA-14, TA-15, TA-36, TA-39 Thermal Treatment. These Technical Areas are used solely for the thermal destruction of high explosive (HE) and HE-wastes by detonation. Wastes are not stored at these facilities, but rather, are stored at their respective points of generation at LANL. The maximum inventory of wastes at a thermal treatment site is reportedly limited to 100 pounds.

All detonation sites have been used to detonate waste HE, some of the sites have been used to burn paper, tape, and other trash items assumed to be contaminated with HE. The HE wastes that have been detonated at the sites include HMX (cyclotetramethylenetetramine), RDX (cyclonite), TNT (2,4,6-trinitrotoluene), PETN (pentaerythritol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine, and plastic binders.

TA-50 Storage and Treatment. Waste streams at the facility include acid/base wastes containing copper, chromate plating wastes, and waste cyanide plating solutions. Treatment at the facility includes neutralization of acids and bases, decomposition of cyanides, and precipitation of heavy metals. After treatment, the fluids are filtered, the effluent discharged via NPDES permit through the waste water treatment system. The metal sludges are recovered from the filters and reportedly disposed at a permitted landfill.

Maximum inventory at the TA-50 storage and batch treatment unit is reported to be 800 gallons, which includes a 500 gallon pressure vessel, pipage, and four 55-gallon drums.

TA-50 Incinerator. The maximum inventory of wastes at the TA-50 incinerator is 13 cubic yards. Excluding PCB-contaminated liquid material, and possible radionuclides, the specific wastes and types of waste streams are not identified in the portions of the Part B Permit application that were provided for this review.

TA-54 Area L. A wide variety of wastes handled throughout the Los Alamos National Laboratory facility are brought to the treatment, storage, and disposal facilities at Area L for consolidation, treatment, packaging, transfer, storage and disposal. The waste streams include wastes from basic and applied chemistry research and development programs (small quantities of different acids, bases, organics, inorganics, and reactive metals), as well as processing wastes (waste sludges generated during treatment activities). Additional wastes include chemically contaminated equipment for landfill disposal.

At the tank treatment area, wastes include lithium hydroxide and aqueous ammonium bifluoride.

Wastes at the Area L disposal shafts are not discussed in detail in the closure plan. Each individual shaft reportedly contains compatible wastes. These wastes are generated as lab-packs from the various wastes that are received for disposal at the Area L treatment, storage and disposal facilities.

From the data presented in the closure plan, the disposal shafts contain the following:

Shaft Number	Types of Waste
1, 4, 17, 22, 26, 29-34	organics
2	acids and bases
3, 13, 20, 25	inorganics
5, 10, 18, 19, 23	waste oils
6, 7, 8, 14, 15	reactives
9, 16, 21	gas cylinders
11, 12	waste oils/solvents
24	organic and waste oil
27, 28	special

Wastes disposed prior to the opening of shaft 23 (shaft opened: April, 1982) reportedly contain free liquids. Disposal shafts containing "special" wastes are miscellaneous wastes that reportedly require greater isolation. Section 9.1.7 of the Part B Permit application states that "low-level radioactive wastes have been handled and buried at TA-54".

Maximum volumes or maximum inventory for the wastes in the disposal shaft area are not addressed in the closure plan.

TA-16 Thermal Treatment. The TA-16 thermal treatment area is used for the thermal destruction of HE and HE-contaminated wastes. HE-wastes are not stored at these facilities, but rather, are stored at their respective points of generation. The maximum inventory of wastes at a TA-16 thermal treatment site is reportedly limited to 750 pounds. Barium contaminated sand may be stored at this facility. A maximum volume of sand is reported at "two cubic meters (550 gallons)."

All detonation sites have been used to detonate waste HE, some of the sites have been used to burn paper, tape, and other trash items assumed to be contaminated with HE. The HE wastes that have been detonated at the sites include HMX (cyclotetramethylene tetramine), RDX (cyclonite), TNT (2,4,6-trinitrotoluene), PETN (pentaerythritol tetranitrate), ammonium nitrate, TATB (triamino trinitrobenzene), nitrocellulose, tetryl, nitroguanidine, and plastic binders.

TA-16 Area P Landfill. According to the closure plan, there is very little documentation of the types and quantities of wastes that were landfilled into TA-16 Area P. In addition to concrete rubble, steel, burned trucks and equipment, the following wastes have been identified as disposed into the Area P landfill:

- Wastes that exceed the EP-toxic limits for barium (closure plan identifies sample concentrations as great as 1450 mg/l Ba at the site, the EP-toxic extraction limit for barium is 100 mg/l).

- Barium, present as barium nitrate and barium oxide; identified in closure plan as water soluble
- Acetone and methanol in cans, jars, and drums
- Beryllium, from propellants; is not expected in appreciable quantities (not defined or otherwise addressed)
- Lead azide, present in commercial detonators; may be included on wastes burned on burn pads (not otherwise addressed)
- Lead, elemental lead or solder; found in parts and equipment that were burned and disposed (not otherwise addressed)
- Thallium azide, used in experimental high explosives; were used and discontinued 25 years ago (not otherwise addressed).

The closure plan also identifies numerous inorganic and organic components of high explosives or components that may have been used in the high explosive area. Of these, only burned residues of the organic and inorganic components may have been disposed at the TA-16 Area P landfill.

The actual size and extent of the landfill area is unknown. An estimated volume of wastes in the landfill, as presented in the closure plan, is 13,000 cubic yards. This volume was estimated from comparisons of a recent land survey to a "pre-landfill" survey of the area.

4.0 SUMMARY OF CLOSURE PLANS

Ground water monitoring is not applicable to container or tank storage areas, and/or thermal treatment facilities and incinerators, and therefore is not addressed in the closure plans for these three types of facilities. The financial requirements of Subpart H of the regulations are not applicable to federal facilities [40 CFR 265.140(c)].

TA-3-102, TA-22-24, TA-40-2 Storage. The closure plans for these facilities have been developed to meet or exceed any applicable regulations for closure of a container storage area under 40 CFR 265. Closure of these facilities consist of four phases: 1) waste removal, 2) decontamination of facility, 3) sampling and analysis, and 4) certification of closure. After closure, these facilities will operate as less than 90-day generator storage areas.

Any hazardous waste stored at these facilities shall be removed

at closure. LiH waste at TA-3 Building 102 will be stored temporarily near the facility until the completion of closure activities. The temporary storage facility for TA-3-102 is not otherwise addressed in the closure plan. The waste will then be returned to TA-3 Building 102 for less than 90-day generator storage after certification of closure. HE-waste and HE-contaminated material will be removed from TA-40-2 to the burn pads at TA-16 for detonation. Currently there are no wastes stored at TA-22-24. TA-22-24 will begin closure with the second phase, decontamination.

All three facilities will be decontaminated. The floors, walls, and shelving of the storage areas will be swept and vacuumed. Any waste collected during this activity will be handled similarly to the waste removal and disposal practices previously discussed. All three facilities will be washed with water (Liquinox or Alconox solution at TA-22-24 and TA-40-2). Because LiH reacts with water to form a non-hazardous by-product (LiOH), the resulting wash water from TA-3, Building 102 will be discharged under the existing NPDES permit at LANL (discharge limits not specified). Waste waters from TA-22-24 and TA-40-2 will be transported to the burn pad area at TA-16, where waste water is filtered and any remaining residues are burned. The waste water is then discharged under the NPDES permit. Because of the continued use of these three facilities as less than 90-day storage areas, LANL suggests that a more extensive decontamination procedure is unwarranted.

Waste waters collected from decontamination activities at TA-3-102 will be analyzed for "EP-toxic metals, and selected hydrocarbon constituents...", and pH. These hydrocarbon constituents are not specified in the closure plan. Determination of pH is to ensure that the waste waters are not defined as a corrosive waste according to 40 CFR 261 Subpart C.

TA-22-24 and TA-40-2 will be sampled for "metals and organics", as well as cyanide. This will be to ensure that these facilities have not been contaminated by metals and solvents from other facilities at LANL and to demonstrate that "nitrogen-based organics have not decomposed to cyanide."

Closure of these facilities will be witnessed by the owner/operator or representative of the Department of Energy and an independent, registered professional engineer. Upon completion of closure, a letter certifying closure will be submitted to the New Mexico Environmental Improvement Division (NMEID).

A schedule of closure for each of the container storage areas is provided below.

TA-3 Building 102
Lithium Hydride Storage Area

Time	Activity
Upon approval of closure plan	discontinue LiH generation and storage
0-15 days	begin closure
16th day	remove waste from area
17-58 days	complete clean-up and analyses
59-65 days	allow area to dry
66th day	replace drums, site becomes 90-day storage area

TA-22-24
HE Waste Storage Area

Time	Activity
Upon approval of closure plan	terminate acceptance of wastes
0 - 90 days	begin closure activities
90-118 days	schedule waste burn, remove wastes
118-153 days	schedule and complete clean-up, verification
153-181 days	supervisor inspection, possible further clean-up

TA-40-2
HE Waste Storage Area

Time	Activity
Upon approval of closure plan	terminate acceptance of waste
0 - 60 days after approval	begin closure activities
60-88 days	schedule waste burn, remove wastes
88-123 days	schedule and complete clean-up and analysis of samples

123-151 days	schedule supervisor inspection, further clean-up and analysis of samples, if needed
151-180 days	schedule supervisor inspection, further cleaning if needed and verification of decontamination

TA-14, TA-15, TA-36, TA-39 Thermal Treatment. The 40 CFR 265.381 requires that all hazardous waste and hazardous waste residues (including, but not limited to, ash) are removed from the thermal treatment process or equipment.

Closure of the above facilities will be accomplished by sampling on a grid pattern to identify the extent of contamination, decontamination by removal of contaminated soils and residues, and certification of clean closure. Post-closure care and activities are not required for thermal treatment areas under the applicable regulations.

Composite samples will be collected at 40 foot centers for TA-14 and at 75 foot centers for all other thermal treatment units. Each sample will be a composite of four samples that will be located 10 feet from the grid node, along each grid line.

Analyses of the samples will not be conducted for their HE-constituents because detonation reportedly renders them non-reactive, and because none of the HE compounds are listed Appendix VIII constituents. Samples from all thermal treatment units will be analyzed for the following chemical constituents, and by SW-846 analytical methods. The plan states that As, Ba, Cd, Cr, Pb, Hg, Se, and Ag will be analyzed by SW-846 method 6010 [inductively coupled plasma (ICP)]. The results of the ICP analyses will be compared to the maximum concentration of contaminants for characteristic of EP-toxicity (40 CFR 261.24). The SW-846 EP-toxicity test method number 1310 requires that the inorganic species are identified and quantified using the SW-846 7000 series methods. Inductively Coupled Plasma is not an approved analytical method for EP-toxicity comparisons.

Upon completion of the sampling and analyses, the thermal treatment facilities will be decontaminated by excavation of the contaminated sediments and soils. If analyses indicate that the thermal treatment areas are not contaminated, the no-action alternative will be exercised [40 CFR 265.381], and the facilities will be certified as clean. If excavation is required, verification of decontamination will be by collection and analyses of additional samples.

According to the closure plan, these facilities are scheduled for closure in the year 2100. The facilities will be closed in a

consecutive manner. For example, sampling and analysis of the first facility will be completed before sampling and analysis is initiated at the second facility, etc. All four facilities will be closed together but will be at different stages of closure because of this phased closure approach. Pre-closure activities are anticipated to take 570 cumulative days for the four facilities (460 days pre-closure, 110 days to prevent overlap of closure activities at the four sites). Closure activities are anticipated to take 177 days per site. A summary of pre-closure and closure activities is shown below:

TA-14, TA-15, TA-36, TA-39
Thermal Treatment

Maximum Time Required Pre-Closure	Activity
90 days	Contracting
30 days	Sampling Survey
60 days	Analysis
20 days	Identify contaminated areas
30 days	Additional sampling
60 days	Analysis
60 days	Weather contingency
20 days	Identify contaminated areas
90 days	Contract for decontamination

Maximum Time Required Closure	Activity
90 days	Remove soil
7 days	Decontaminate equipment
30 days	Weather contingency
20 days	Conduct sampling
30 days	Analysis

Upon completion of closure, the owner/operator and an independent

registered engineer will certify closure for the sites.

TA-54 Area L. Closure of TA-54 Area L will be performed in sequential order beginning with capping and closure of the disposal shaft area (partial closure) and ending with closure of the tank treatment area. According to correspondence between H. Valencia and D. Fort (November, 1985), closure of the shaft disposal area will constitute partial closure of this facility and is scheduled for 1986. Therefore, this disposal shaft area will be closed according to the interim status regulations. Open shafts will be closed by capping with concrete.

At the treatment, storage, and transfer facilities, recyclable wastes will be reused internally at LANL or recycled at an off-site facility. Non-recyclable wastes will be handled in the following manner.

Organic wastes will be incinerated at TA-50-37, Controlled Air Incinerator. Any wastes compatible with treatment at TA-54 Area L will be treated. The remaining wastes will be disposed of on-site at a disposal facility (site not specified) or transported off site to a permitted facility. The storage areas will be decontaminated by washing with either an Alconox or Liquinox solution. The resulting wash solutions will be evaporated in the tank treatment area. When the wash water has evaporated, any residues and the plastic tank liners will be removed, placed in drums, and disposed (site not specified).

The tanks will then be decontaminated by washing, and the decontaminated tanks will be disposed as non-regulated waste.

Decontamination will be demonstrated by soil sampling and analysis. Soil samples will be analyzed for As, Ba, Cd, Cr, Pb, Se, Ag, Ni, Be, volatile and semi-volatile organics, cyanide, nitrate, sulfide, pH (liquids), and soil pH (by SW-846 methods).

Certification of closure will be by an independent registered engineer and the owner/operator of the facility.

Ground water monitoring is not presented in the closure plan as a closure activity and is needed for the disposal shaft area [landfill].

Closure of the disposal shaft area of TA-54 Area L facility is scheduled for 1986. According to the November 1985 correspondence between H. Valencia, LANL, and D. Fort, NMEID, a closure schedule for the disposal shaft area is as follows:

TA-54 Area L
Partial Closure

Maximum Time Required	Activity
7 days	Close final shaft
30 days	Add additional cap protection
14 days	Site grading, soil preparation
90 days	Weather contingency
14 days	Plant ground cover

According to Section 9.0 of the Pasrt B Permit application, closure of the remaining facility is anticipated to begin in the year 2100. Many of the closure activities listed below may be performed concurrently. Closure is anticipated by the facility to take 360 days.

TA-54 Area L
Final Closure

Maximum Time Required Pre-Closure	Activity
90 days	Contract for sampling and/or analytical services
30 days	Conduct first soil sampling survey
60 days	Analyze first soil sample set
30 days	Conduct second soil sampling survey, if needed
60 days	Analyze second soil sample set, if needed
90 days	Contract for soil decontamination

Maximum Time Required Closure	Activity
90 days	Treat or remove final wastes from transfer, packaging, and storage areas
30 days	Decontaminate waste packaging, transfer, and storage areas

180 days	Evaporate waste water from treatment tanks
60 days	Dispose of tanks and residue
30 days	Remove soil
30 days	Weather delay contingency
20 days	Collect verification samples
30 days	Analyze samples

TA-16 Thermal Treatment. Sand and fire bricks at the thermal treatment units will be disposed as a regulated hazardous waste, as will the sand and gravel in the cone filters.

Soil composite samples will be collected near the edge of the burn pads, and will be analyzed for contamination. Although barium is the only expected hazardous waste constituent contained in the burn residues or existing as contaminants, the soil samples will be analyzed for the following constituents:

EP-toxic metals
Volatile organic compounds
Semi-volatile organic compounds

Following removal of sands, gravels and fire bricks from the burn pads, burn pans, and/or cone filters, the pads, pans and cones will be scraped, swept and brushed clean. Any residues will be collected. The sands, gravels, fire bricks, and burn residues will be placed in drums for shipment to the TA-16 Area L Landfill for disposal. All remaining surfaces will be washed with a mild detergent, and the wash water collected and evaporated. Residues resulting from the evaporation of the wash water will be drummed and disposed at Area L.

Decontamination of the thermal treatment areas will be demonstrated by additional sampling and analyses. The samples will be analyzed for the same constituents and by the same analytical methods as discussed previously for TA-14, TA-15, TA-36 and TA-39.

Closure of these thermal treatment units is scheduled for the year 2100. Closure, including decontamination (soil removal) and verification of decontamination is scheduled to take 180 days. A breakdown of the schedule by closure activity is not provided in the closure plan.

An independent registered professional engineer and the owner/operator of the facility will supervise closure activities and certify closure of the thermal treatment facilities.

TA-50 Storage and Batch Treatment. Decontamination of the container storage and tank treatment facilities include the treatment of stored wastes, and decontamination of the storage area and treatment facility by washing with a mild detergent. All wash water will be sampled prior to shipment to the evaporation tanks at TA-54 Area L. Used filters will be transferred to drums and transported to Area L for storage prior to landfill disposal.

The collected wash waters will be collected and analyzed for the following hazardous wastes and waste constituents:

EP-toxic metals
Nickel
Zinc
Thallium
Volatile organic compounds
Semi-volatile organic compounds
Cyanide
pH
Nitrates

Closure of the batch treatment facility is scheduled for the year 2100. The closure schedule shown below will require 180 days for closure activities at this facility.

TA-50
Storage and Batch Treatment

Maximum Time Required	Activity
30 days	Final treatment of waste
14 days	Internal wash down
7 days	External wash down
100 days	Equipment disassembly
7 days	Floor wash down
22 days	Final clean
180 days	

An independent registered professional engineer and the owner/operator of the facility shall supervise closure and certify the facility was closed according to the closure plan.

TA-50 Incinerator. The manner of decontamination and disposal at closure reportedly depends on residual radionuclide types and quantities as well as hazardous waste contamination. Decontamination of the radioactive components will be to the extent practicable and the wastes will be disposed of "according to the applicable regulations."

The plan states that a detailed description of decontamination procedures are not provided because the level of radioactive contamination at closure cannot be estimated, and that decontamination procedures will differ depending upon the degree of contamination.

A detailed schedule of closure is not provided in the closure plan. Closure of the TA-50 incinerator reportedly will take as long as three years. The first year will entail determining the nature and level of contamination and the preparation of a "decommissioning document." Decommissioning and final disposal reportedly may take up to two years.

TA-16, Area P Landfill. The closure plan for this facility states that, "the landfill location and lack of a bottom liner excludes a closure plan that completely prohibits migration." The closure plan is designed to specifically minimize the migration of dissolved barium.

Because of the difference in the disposition of the two fill areas at TA-16 Area P, the two landfills will be closed separately. According to the closure plan, the primary components of closure for both fill areas are:

1. Run-on control to minimize erosion

2. Stabilization of active landfill

3. Capping of active landfill

4. Moisture measurement, leachate collection for landfill area

5. Ground water monitoring, surface water monitoring in the Canon de Valle area (due north, adjacent to landfill area).

Western Portion Closure. LANL has elected not to place additional cover at this area, but rather to install adequate monitoring to demonstrate that the western portion does not represent a threat to human health or the environment.

LANL states in their closure plan that a potential and immediate detonation risk exists with earth moving at the western Area P landfill. The plan states that installation of a retaining wall or cover would expose personnel to an unnecessary detonation risk. Monitoring will consist of a leachate collection system and the installation of neutron probe test holes. The neutron probes will be used for the detection of moisture, that may provide an indicator of contaminant migration. The closure plan for TA-16 Area P shows a cross section of the leachate collection system. The system consists of 300 feet of 4 inch perforated

drain pipe in an interception system orientated along the northern edge of the western landfill area. Depth of the drain pipe according to the plan is approximately 3 feet. There is no liner, impermeable layer or strata to control downward migration of the leachate or to direct leachate towards the collection system.

The neutron probe test holes at the site will be 100 feet deep, monitored quarterly the first year, then on an annual basis thereafter. Locations of the neutron test holes are shown in the closure plan. There are three neutron test holes associated with the west landfill area: one near the highest portion of the landfill and two topographically lower and near the base of the landfill. The plan also shows a proposed ground water monitoring well located approximately 30 feet topographically downgradient from the landfill area. The closure plan states that this well will be screened and completed in the uppermost aquifer - a perched water zone associated with alluvium of Canon de Valle. Analyses proposed are in accordance with 40 CFR 264.98.

Eastern Portion Closure. The eastern portion of the landfill is the active part of the site. The face of the landfill is exposed and unstable. It is reportedly subject to inflow of surface water, as indicated by the presence of sink holes in the waste and natural drainage through the fill. Closure of this portion of the landfill will include the installation of run-on control of surface waters, emplacement of a concrete cover on the face of the landfill, and a leachate collection system.

Surface drainage will be diverted from the landfill by the installation of a concrete interceptor channel, located topographically upgradient from the facility. The channel is reportedly designed to contain run-off from a 24-hour 100-year rainfall event.

The face of the landfill will be stabilized with earth moving equipment. Following stabilization, the face will be covered, first by 12 inches of select fill, second by 0.5 feet of crushed gravel for drainage. A 2-inch high-density polyethylene (HDPE) perforated drain pipe will be set in the gravel as a leachate collection system. The face will be finally covered by 16 inches of wire-reinforced concrete.

The cap of the landfill will consist of the following materials listed in ascending order:

- Additional compacted fill to level the surface
- 24-inches compacted clay layer

- 40-mil high density polyethylene (HDPE) liner as a bio-barrier
- HDPE drainage layer
- Geotextile filter fabric
- 12-inches clean sand for drainage
- Geotextile filter
- 36-inch soil cover for vegetation

Ground-water monitoring and leachate control will consist of a leachate collection sump system, leachate analysis, groundwater sampling and analysis, neutron probe moisture analysis, and surface water monitoring. Leachate analyses will be performed for total metals, volatile organics, semi-volatile organics, and cyanide. Groundwater samples will reportedly be analyzed in accordance with 40 CFR 264.98 (although analytical parameters have not been specified in accordance with 40 CFR 264.98 (a)). Neutron test holes will be analyzed for the presence of moisture, which may be indicative of contaminant migration. Surface water samples will be analyzed for their total metals, volatile organics and semi-volatile organic components.

Leachate collected in a sump will be sampled and analyzed on a quarterly basis for contamination. The closure plan states that four monitoring wells will be installed for the landfill area. The plan does not identify an upgradient well location, and the closest downgradient monitoring well to the eastern landfill facility is 160 feet from the northernmost (downgradient) edge of the landfill facility. Wells reportedly will be completed in the Canon de Valle alluvium. The plan does not state whether the upgradient well will be completed in the same geologic horizon as the downgradient wells. Neutron probe test holes will be installed topographically upgradient and downgradient from the site. The purpose of the probes is to identify moisture in the underlying strata that may indicate contaminant migration from the facility. Surface waters will be collected and analyzed upstream and downstream of the site every time the ground water is sampled.

According to the Area P Landfill Closure Plan, the closure activities at TA-16 Area P landfill will take 180 days following approval of the closure plan. Several of the closure activities reportedly will be performed in parallel or concurrently. A schedule for closure activities is presented below.

TA-16 Area P Landfill
Closure

Maximum Time Required	Activity
90 days	Contract for closure construction
14 days	Start up and site preparation
14 days	Earth work
30 days	Concrete blanket
30 days	Cap construction
14 days	Final survey
30 days	Weather and operations contingency

5.0 SUMMARY OF POST-CLOSURE PLAN

Two of the five facilities submitted for closure require a post-closure plan and post-closure care. These facilities are the disposal shaft (landfill) area of TA-54 Area L and the two fill areas of the TA-16 Area P landfill facility (these two fill areas are considered as one facility by LANL).

For facilities requiring post-closure care, a post-closure contact is identified as:

Area Manager
Los Alamos Area Office
U.S. Department of Energy
Los Alamos, New Mexico 87544
(505) 667-5288

TA-54 Area L, Disposal Shaft Area. Post-closure activities at the disposal shaft area include the following:

- Notification of hazardous waste activity to the survey land plat
- Notification of hazardous waste activity on the property deed
- Semi-annual maintenance inspection and survey with repairs to any identified problem areas.

These activities will be performed for 30 years as required by 40 CFR 264.117 (a)(1).

The plan states that ground water samples will be obtained from six observation wells, three in Canado del Buey and three in Pajarito Canyon. These wells reportedly were installed in response to a NMEID compliance order dated May 7, 1984. The locations of these canyons and monitoring wells relative to TA-54 Area L are not presented in the closure plan. The plan states that ground water monitoring will be performed quarterly for the first year. Subsequent sampling and analysis of the ground water are not addressed in the post-closure plan.

TA-16 Area P Landfills. Post-closure care for this facility is scheduled for 30 years. Post-closure activities for landfills at TA-16 Area P include the following:

- Notification of hazardous waste activity to land plat
- Notification of hazardous waste activity on property deed
- Site will be inspected semi-annually to evaluate the integrity of the cover, cap, and drainage system
- Site will be inspected monthly for proper operation of leachate collection system, tanks, switches, piping, etc.
- Site monitoring includes annual sampling of leachate, neutron probe, ground and surface water, and erosion measurement.

6.0 SUMMARY OF DEFICIENCIES

This section summarizes both technical and regulatory deficiencies grouped in the general categories to which they apply. For convenience, the regulatory deficiencies cite the applicable regulation.

General Requirements

- The maximum inventory of waste presented for TA-54 Area L is not adequate, as the volumes of waste and waste inventory are not addressed for the disposal shaft area. Waste quantities for TA-16 Area P landfills are not known, but are estimated by comparison of pre-fill topographic maps to present topographic maps [40 CFR 265.112 (a)(2)].
- The closure plan for TA-16 Area P was submitted 24 days after termination of interim status [40 CFR 265.112 (c) requires submittal within 15 days]. The dates of submittal

for other closure plans were not provided.

- The closure plan for TA-54 Area L states that closure activities will be completed in approximately 5 years after initiation [40 CFR 265.113 (b) requires 180 days].

- Final disposal or decontamination of facility equipment is not addressed for TA-16 Area P [40 CFR 265.114].

- Ground water monitoring for TA-54 Area L is planned for wells located in Pajarito Canyon and Canada Del Buey. The location of the wells relative to the waste management facility is not provided in the plan [40 CFR 265.118 (a)(1) and 265.91 (a)]. The frequency of ground water sampling and analysis is addressed for the first year. Ground water monitoring for the following years is not addressed [40 CFR 265.118 (a)(1) and 265.92 (d)].

- Ground water monitoring at TA-16 Area P is proposed on an annual basis after the first year. Monitoring is required on a semi-annual basis for every year following the first year [40 CFR 265.118 (a)(1), 265.117(a)(i) and 265.92 (d)(2)].

- Post-closure use of the property is not addressed for TA-54 Area L or TA-16 Area P [40 CFR 265.117 (c)].

TA-16 Area P Landfill (Western Portion). Previous site activities preclude the emplacement of a final cover [40 CFR 265.310 (a)]. This may not be considered a deficiency. The justification for not placing a final cover is the suspected explosive reactivity of the landfill. As stated in 40 CFR 265.312, "reactive wastes must not be placed in a landfill, unless the waste has been treated, rendered, or mixed before or immediately after placement in a landfill so that...the resulting waste, mixture...no longer meets the definition of...reactive waste under...40 CFR 261.23," and the reactive waste is protected against accidental reaction.

TA-16 Area P Landfill (Eastern Portion). Protection and maintenance of surveyed benchmarks are not addressed [40 CFR 265.310 (b)(4)].

Restriction of access during the post-closure care period at the site is not addressed [40 CFR 265.117 (b)].

TA-50 Incinerator. The closure requirements for the TA-50 incinerator are not adequately addressed [40 CFR 265.351]. If the decontamination activities for the facility are dictated by the nature and level of radioactive contamination, a discussion of the various radioactive levels, and their respective

decontamination and removal plans should be included in the plan.

Additional documentation regarding facility activities and closure activities are needed in order to justify a three-year decommissioning and final disposal time period.

7.0 RECOMMENDATIONS AND CONCLUSIONS

Closure plans submitted for TA-3 Building 102, TA-22-24 Magazine and TA-40-2 Magazine storage in containers and TA-50 storage facilities meet or exceed the closure requirements for storage in container facilities under 40 CFR Part 265. Closure plans submitted for TA-14, TA-15, TA-36, TA-39 and TA-16 thermal treatment units meet or exceed the closure requirements for thermal treatment facilities. The closure plan for TA-50 batch treatment unit meets or exceeds the closure requirements for storage and/or treatment in tanks.

According to data provided in the closure plan for TA-16 Area P, there is a significant risk of detonation of the waste landfill by the operation of heavy equipment on the landfill surface. For this reason, the closure plan states that a final cover will not be emplaced on this facility. Data are not provided to evaluate the severity or potential for detonation of the landfill. As stated in the TA-16 Area P landfill closure plan, the potential for contaminant migration at the site is predominantly from barium infiltration by rainwater percolating through the fill.

Other options exist for emplacement of a final cover without the use of heavy equipment and should be evaluated. Examples include concrete pumping, or emplacement of cover using "shotcrete".

The types and quantities of wastes that have been disposed at the TA-54 Area L shaft disposal area (landfill), as provided, are not adequate. Shafts are identified only by waste category (acid, base, etc.) and volumes of wastes are not provided. These data should be provided.

The closure plan for TA-54 Area L (landfill) indicates that reactive wastes were disposed in five shafts, and gas cylinders were disposed in three shafts at the disposal shaft area. According to the figure provided in the plan, two of the reactive waste shafts and one shaft containing gas cylinders were closed (filled) in 1982, and another gas cylinder shaft was still open at the time of closure plan submittal. The other four shafts were closed prior to 1980. The 40 CFR 265.312(a) forbids the disposal of reactive wastes in a landfill unless the wastes have been treated, rendered, or mixed so that the waste is no longer reactive. Because of this, the disposal shaft area of TA-54 Area L needs additional evaluation for adequate closure.