Permit

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

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

SEP 27 1985

Ms. Denise Fort, Director
N.M. Environmental Improvement Division
P. O. Box 968
Santa Fe, New Mexico 87504-0968

Dear Ms. Fort:

RE: Notice of Violation (NOV) letter dated August 26, 1985

The enclosed information is the Department of Energy's (DOE) official response to your Division's NOV letter dated August 26, 1985. This submittal includes amendments to the May 1, 1985 Part B hazardous waste permit application and amended Part A application. Part B amendments will be labelled and can be inserted into the Division's official Part B Permit application.

In direct response to findings 1 and 2, the following actions have been taken: (1) the accumulation tag on the tank for plate shop hazardous wastes has the accumulation date readily available and in place, and (2) the container in question at TA-54 Area L has been replaced.

The enclosures are specific to the other findings (violations) noted in the NOV and provide the required documentation in compliance with Section 74-4-10 of the New Mexico Hazardous Waste Act. Where appropriate, a brief explanatory narrative accompanies the enclosure.

o Enclosure 1 - A revised Part B Table of Contents.

o Enclosure 2 - Documentation and policies that assure less than 90 day storage and a quality assurance program for maintaining container integrity.

o Enclosure 3 - A Certification Document certifying that warning signs in English and Spanish are posted at the entrance to the active portions of all hazardous waste facilities.

o Enclosure 4 - A Certification Document certifying to the date that the personnel training program was implemented at the Laboratory.

o Enclosure 5 - Closure Plans for Technical Areas (TA):

TA 40-2 Magazine Container Storage Area
TA 40 Scrap Detonation Site
TA 3-102 Container Storage Area
TA 22-24 Magazine Storage Area

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HAZARDOUS WASTE SECTION

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o Enclosure 6 - Closure and Post-Closure Plans for Technical Areas (TA):

TA-54 Area G

o Enclosure 7 - Closure and Post-Closure Plans for TA 54 Area L that supersedes Section 9.4 in the Laboratory 's Part B permit application.

o Enclosure 8 - A revised Contingency Plan that supersedes Section 7.1 thru 7.11 and tables in 7-6 in the existing Laboratory's Part B permit application.

o Enclosure 9 - A revised Waste Analysis Plan that supersedes Section 3.2 thru 3.3 in the existing Laboratory's Part B permit application.

o Enclosure 10 - Revised Closure Plans for: TA 14, 15, 36, and 39 - Detonation Sites; TA 16 Burn Pads; and TA 50-1 - Batch Treatment Plant that supersedes Section 9.2 thru 9.3.1.3 in the existing Laboratory's Part B permit application.

o Enclosure 11 - A revised Part A reflecting TA 16 Area P. This new Part A supersedes Section 1.2 in the Laboratory's Part B application.

o Enclosure 12 - Closure Plan and schedule for TA 16 Area P to prepare a complete and adequate Closure Plan to the Environmental Improvement Division. As stated in DOE's November 1, 1984 letter, Area P was scheduled to be characterized starting July 1985, and lasting through September 1986.

If you have any questions concerning these responses, please feel free to contact Avedon Gallegos at 667-5288.

Sincerely,

Original signed by
Harold E. Valencia

Harold E. Valencia
Area Manager
U.S. Department of Energy
Albuquerque Operations
Owner

cc:
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CRM-4 (2), LANL, MS A150

R-00009A

ENCLOSURE 1

Revised Part B

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ENCLOSURE 2

Documentation and

Policies

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POLICY STATEMENT
ACCUMULATION OF WASTE AND DETERIORATED CONTAINERS

The policy regarding the accumulation of wastes and procedures to follow when detecting deteriorated containers is addressed in two separate documents--a Laboratory policy statement, and Administrative Requirement (AR) 10-3 of the Health and Safety Manual.

The policy statement is posted at all storage facilities and treatment and disposal facilities where wastes are handled in containers. This statement addresses accumulation rates requiring less than 90 days storage, accumulation tags and "Hazardous Waste" labels. If the container integrity is questionable the contents must be transferred to a good container. Containers must be kept closed except when wastes are being added or taken out, and must be inspected weekly. A copy of this document is enclosed.

The Health and Safety Manual reflects current policies and requirements that must be followed to ensure health and safety at the Laboratory. Administrative Requirement (AR) 10-3 is the nonradioactive chemical waste portion of the manual. This AR will be rewritten to address handling containers including inspection and corrective action when deterioration is observed.

SEP. 27 1980

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

memorandum

TO Distribution

DATE September 13, 1985

FROM C. S. Adams Jr., ADTS

MAIL STOP/TELEPHONE A120/667-9390

SYMBOL ADTS-85-317

SUBJECT **HAZARDOUS WASTE PROCEDURES**

To comply with New Mexico's Hazardous Waste Management Regulations (HWMR-2) for proper storage of hazardous waste at generation sites, please post the attached procedures in a prominent location at your hazardous waste treatment, storage and/or disposal facility and follow them.

Distribution:

F. Jackson, M-DO, MS P915
J. Parkinson, WX-3, MS C930
K. Balo, HSE-7, MS J592

Info Cy:

T. Gunderson (HSE8-85-1079.1), HSE-8, MS K490
A. Drypolcher, HSE-8, MS K490
CRM-4 (2), MS A150
File

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POST September 13, 1985

HAZARDOUS WASTE MANAGEMENT PROCEDURES

Accumulation Rates

The purpose of these procedures is to insure that hazardous wastes are stored for less than 90 days at the temporary storage areas. (Areas where hazardous wastes are stored for more than 90 days must obtain a state hazardous waste permit.)

1. While hazardous waste (as defined by HWMR-2) is being stored on-site, each storage container must have attached to it a yellow (6" X 6") HAZARDOUS WASTE label.

2. Hazardous waste must not be accumulated/stored at the storage facilities (i.e., in the container) for greater than 90 days. [Facilities that have a state hazardous waste permit such as TA-54 (Area L) and TA-50 are exempt from this requirement.]

3. The calendar date (month/day/year) when hazardous waste is first placed in the container must be recorded on the yellow HAZARDOUS WASTE label. The label must be attached to the container and clearly visible.

4. On the 80th day of accumulation (as denoted by the date on the label), make arrangements to transfer, treat, or dispose of the hazardous waste. Contact the Waste Management Group (HSE-7) to pick up non-high explosive hazardous waste.

5. As prescribed by your site specific Inspection Form, inspect the yellow HAZARDOUS WASTE labels weekly for accumulation dates to assure less-than-90 day storage.

Container Integrity

The purpose of these procedures is to insure that containers for hazardous waste materials are inspected at least weekly so that containers of questionable integrity can be detected and immediately removed from service.

1. A container holding hazardous waste must always be kept closed, except when adding or removing waste.

2. If the integrity of a container is questionable or begins to leak, the hazardous waste must be transferred immediately to a good container or placed in an over pack drum.

3. As presribed by your Inspection Forms, inspect weekly for leaks and signs of container deterioration. Write your findings, whether positive or negative, on the Inspection Forms.

Note: Contact the Environmental Surveillance Group (HSE-8) at 7-5021 if you have any questions concerning these procedures.

Approved by:

for Christopher S. Adams, Jr.
Associate Director
for Technical Support

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ROUGH DRAFT

NONRADIOACTIVE CHEMICAL WASTE

Introduction

This administrative requirement specifies the rules and general procedures for disposal of nonradioactive liquid and solid chemical wastes at the Laboratory, thus ensuring the protection of Laboratory personnel, the public, and the environment, as well as compliance with Federal and state regulations.

Chemical wastes commonly generated at the Laboratory include all types of laboratory research chemicals, oils, solvents, beryllium, asbestos, carcinogens, compressed gases, and other nonradioactive solid or liquid wastes contaminated with hazardous chemicals. NOTE: High explosive wastes are a special case and are not included in this document.

Definitions

Hazardous Chemical Waste - any chemical or mixture of chemicals that is intended for disposal and is corrosive to living tissue; is toxic, flammable, carcinogenic, teratogenic, mutagenic, or infectious; or in any way poses a present or potential hazard to human health or the environment.

Identification of Hazardous Wastes

Group leaders must ensure that the potentially hazardous waste materials in their work areas are identified and that the Industrial Hygiene Group (HSE-5) is contacted if workers could be exposed while handling, treating, or disposing of such materials.

Guidance in identifying hazardous chemicals is provided by the health physics staff (HSE-1, -10, and -11), Industrial Hygiene, and the Waste Management Group (HSE-7), as well as by the following sources:

- 40 CFR 712 (as proposed), which defines toxic substances under the terms of the Toxic Substances Control Act,
- 40 CFR 261, which defines the characteristics and provides a listing of hazardous wastes under the terms of the Resource Conservation and Recovery Act,

- 40 CFR 116, which defines hazardous substances under the terms of the clean Water Act, and
- 40 CFR 117, which defines reportable quantities for hazardous substances under the Clean Water Act.

Determination of Appropriate Disposal Methods

Before initiating an operation that will either generate a new hazardous waste or increase the volume of existing wastes, the originating group should discuss available treatment/disposal options with Waste Management staff. In most cases, the existing waste-management facilities, technology, and manpower at the Laboratory will be able to handle the wastes. If not, Waste Management staff will help identify disposal options including the use of offsite treatment facilities. The originating group however, may need to allocate the appropriate personnel, funding, and facilities.

Training

Group leaders must ensure that their operating personnel are trained in and follow Waste Management policies and procedures appropriate to their work.

Chemical Waste Coordinator

A Chemical Waste Coordinator must be identified for each waste-generating group or site, as applicable, to serve as the primary contact with Waste Management staff. The Chemical Waste Coordinator must ensure the safe use of chemical waste collection areas or cabinets and the pre-disposal treatment of the wastes, as determined appropriate by Waste Management. NOTE: The Chemical Waste Coordinator may be the same person as the Spill Coordinator identified in Administrative Requirement 9-4, "Oil, Chemical, and Airborne Releases."

Waste Reduction

Generation of chemical waste must be kept as low as reasonably achievable. The groups generating the wastes can reduce the volume by obtaining only the minimum amount needed to perform a specific task. Whenever possible, unopened containers of chemicals should be returned to Chemical Stock (VWR) rather than disposed of. Waste Management staff are available to help the originating groups determine waste-reduction procedures.

Standard Operating Procedures

Operations involving the handling and disposal of beryllium, carcinogens, and suspected carcinogens require a standard operating procedure (SOP). (See Administrative Requirement 1-3, "Standard Operating Procedures and Special Work Permits.") In addition, an SOP may be required for operations involving significant quantities of other particularly toxic or hazardous materials, as determined by Waste Management. If an SOP is required, Waste Management review of the SOP must precede initial implementation and occur annually thereafter.

The SOPs must include procedures for segregating, treating, packaging, and shipping the wastes, as well as special problems involved. Waste Management staff are available to help the originating office prepare these SOPs.

Storage Procedures

Accumulation Rates - The purpose of these procedures is to insure that hazardous wastes are stored for less than 90 days at the temporary storage areas. (Areas where hazardous wastes are stored for more than 90 days must obtain a state hazardous waste permit.)

1. While hazardous waste (as defined by HWMR-2) is being stored on-site, each storage container must have attached to it a yellow (6" X 6") HAZARDOUS WASTE label.

2. Hazardous waste must not be accumulated/stored at the storage facilities (i.e., in the container) for greater than 90 days. [Facilities that have a state hazardous waste permit such as TA-54 (Areas L) and TA-50 are exempt from this requirement.]

3. The calendar date (month/day/year) when hazardous waste is first placed in the container must be recorded on the yellow HAZARDOUS WASTE label. The label must be attached to the container and clearly visible.

4. On the 80th day of accumulation (as denoted by the date on the label), make arrangements to transfer, treat, or dispose of the hazardous waste. Contact the Waste Management Group (HSE-7) to pick up non-high explosive hazardous waste.

5. As prescribed by your site specific Inspection Form, inspect the yellow HAZARDOUS WASTE labels weekly for accumulation dates to assure less-than-90 day storage.

Container Integrity - The purpose of these procedures is to insure that containers for hazardous waste materials are inspected at least weekly so that containers of questionable integrity can be detected and immediately removed from service.

1. A container holding hazardous waste must always be kept closed, except when adding or removing waste.

2. If the integrity of a container is questionable or begins to leak, the hazardous waste must be transferred immediately to a good container or placed in an over pack drum.

3. As prescribed by your Inspection Forms, inspect weekly for leaks and signs of container deterioration. Write your findings, whether positive or negative, on the Inspection forms.

NOTE: Contact the Environmental Surveillance Group (HSE-8) at 7-5021 if you have any questions concerning these procedures.

Initiating the Disposal Operations

When chemical wastes are ready for disposal, the originating group shall complete a Chemical Waste Disposal Request (HS Form 10-3A) and send the form to Waste Management. Upon receipt of the form, Waste Management determines the packaging, handling, treatment, transportation, and disposal requirements, based on the type and quantity of the waste involved. The originating group may be required to complete some pre-disposal treatment/chemical analysis of the wastes before Waste Management will take over the disposal operations.

Packaging

Hazardous waste must be packaged in Waste Management-approved, leakproof containers to ensure its safe handling, transportation, and disposal.

Liquids Exceeding 1 Gallon. Containerized liquid exceeding 1 gallon must not be disposed

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of until it has been solidified; absorption on vermiculite is an acceptable pre-disposal treatment method in this case.

Small Quantities of Liquids/Solids. Liquids less than 1 gallon or solids generally will be packaged by Waste Management for disposal.

Leaks and Spills

See Administrative Requirement 9-4, "Accidental Oil, Chemical and Airborne Releases."

Special Disposal Considerations

Drains. Never pour chemical waste down a drain without prior approval from Waste Management.

Gases. Never vent gases without prior approval from Waste Management.

Cyanides, Chromates, and Corrosive Substances. Before cyanides, chromates, and corrosive substances are disposed of, they must be treated by Waste Management to remove the hazardous properties.

Reactive Chemicals. Reactive chemicals (for example, pyrophoric or water-reactive substances) must be rendered nonreactive before disposal. This treatment must be performed with the prior approval of Waste Management. If it is determined that neither the originating group nor Waste Management can safely perform this pre-disposal treatment, Waste Management will help the operating group determine alternate disposal methods.

Oils. Waste Management must be notified before draining oil from any electrical or hydraulic system because polychlorinated biphenyls (PCBs) may be present. (See Administrative Requirement 10-4, "Polychlorinated Biphenyls.") The operating group must determine whether such oils have been contaminated with PCBs or radioactive substances. Contact Waste Management if PCB contamination is possible; contact the health physics staff if radioactive contamination is suspected. Unless the oils will be recycled, they must be packaged as described above.

Recyclable Materials

Where feasible, chemical wastes should be recycled or salvaged according to the appropriate Laboratory procedues. Those materials listed below are prime recycling candidates.

Elemental Mercury. Generally, elemental mercury must be recovered rather than disposed of. Contact the Decontamination Section (7-5420) of the Radiation Protection Group (HSE-1) for collection.

Gas Cylinders. All gas cylinders must be returned to the Liquid and Compressed Gas Processing Center (MAT-1) for retesting and refilling. To facilitate recycling operations, cylinders must remain labeled at all times. If a cylinder cannot be reused, notify Waste Management for assistance in disposing of it.

Batteries. Paper or other nonconducting material must be used to package batteries individually before the batteries are sent to Laboratory Salvage (MAT-14).

Oil or Solvents. Bulk quantities of oil or solvents should be recycled rather than disposed of. Contact Waste Management for specific guidance.

References

"Accidental Oil, Chemical, and Airborne Releases," Administrative Requirement 9-4 in Health and Safety, Los Alamos National Laboratory Manual, Chapter 1 (August 1984).

"Chemical Information Rules," 40 CFR 712 (most recent).

"Designation of Hazardous Substances," 40 CFR 116 (most recent).

Determination of Reportable Quantities for Hazardous Substances," 40 CFR 117 (most recent).

Hazardous and Radioactive Mixed Waste Management," Department of Energy Order 5480.2 (most recent).

"Hazardous Waste Act," New Mexico Laws 1977, Chapter 313 (most recent).

"Identification and Listing of Hazardous Waste," 40 CFR 261 (most recent).

SEP 27 1986

"Identification, Classification, and Proposed Regulation of Toxic Substances Posing a Potential Occupational Carcinogenic Risk," 29 CFR 1980 (most recent).

"Occupational Safety and Health Standards," (OSHA Regulations), 29 CFR 1910 (most recent).

"Polychlorinated Biphenyls," Administrative Requirement 10-4, in Health and Safety, Los Alamos National Laboratory Manual, Chapter 1 (August 1984).

"Radioactive Solid Waste," Administrative Requirement 10-2, in Health and Safety, Los Alamos National Laboratory Manual, Chapter 1 (August 1984).

"Resource Conservation and Recovery Act, Subtitle C," 90 US Statutes at Large, p. 2795 (1976).

"Standard Operating Procedures and Special Work Permits," Administrative Requirement 1-3, in Health and Safety, Los Alamos National Laboratory Manual, Chapter 1 (August 1984).

Referrals

Radiation Protection Group (HSE-1), 7-5296

Decontamination Section of HSE-1, 7-5420

Industrial Hygiene Group (HSE-5), 7-5231

Waste Management Group (HSE-7), 7-4301

Liquid Waste Section of HSE-7, 7-5834

Solid Waste Section of HSE-7, 7-5397

Regulatory Affairs Section of HSE-7, 7-7957

Chemistry Health Protection Group (HSE-10), 7-7218

Accelerator Health Protection Group (HSE-11), 7-5890

Forms

HS Form 10-3A, Chemical Waste Disposal Request

SEP. 27 1985

ENCLOSURE 3
Certification Document
Certifying Warning Signs in
English and Spanish

#3

CERTIFICATION DOCUMENT

I certify to the best of my knowledge and belief that appropriate warning signs, worded in accordance with New Mexico Hazardous Waste Management Regulation Section 206.B.4.c, were posted on or before September 26, 1985, at the entrance to all Laboratory areas where hazardous wastes may be stored. My knowledge and belief in this matter are based upon my inquiry of and representations by the person or persons responsible for posting such signage. I am aware of the penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Christopher S. Adams
Associate Director
for Technical Suppor
Los Alamos National
Operator

9-27-85
Date Signed

Harold E. Valencia
Area Manager, Los A
U.S. Department of
Albuquerque Operati
Owner

ed

SEP. 27 1985

SEP. 27 1985

ENCLOSURE 4
Certification Document
for
Personnel Training Program

SEP. 27 1985

CERTIFICATION DOCUMENT

I certify to the best of my knowledge and belief that a personnel training program that meets the requirements of New Mexico Hazardous Waste Management Regulation Section 206.B.6 was implemented at the Laboratory on or before September 26, 1985. My knowledge and belief in this matter are based upon inquiry of and representations by the person or persons responsible for implementation of the training program. I am aware of the penalties for submitting false information, including the possibility for fine and imprisonment for knowing violations.

Christopher S. Adams, Jr.
Associate Director
for Technical Support
Los Alamos National Laboratory
Operator

9-27-85
Date Signed

Harold E. Valencia
Area Manager, Los Alamos Area Office
U.S. Department of Energy
Albuquerque Operations
Owner

9-27-85
Date Signed

SEP. 27 1985

ENCLOSURE 5

Closure Plans

TA-40-2	TA-40
TA-3-102	TA-22-24

CLOSURE PLAN FOR

TA 40-2 MAGAZINE

CONTAINER STORAGE AREA

FOR

HIGH EXPLOSIVE CONTAMINATED WASTES

Facility ID No.: NM0890010515
Facility Name: Los Alamos National Laboratory
Legal Owner: United States Department of Energy
Address: Los Alamos AreaOffhce
City, State: Los Alamos, New Mexico 87545
Phone: (505)667-5288

SEPTEMBER 1985

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1.0 INTRODUCTION

The Los Alamos National Laboratory's Technical Area 40 Building 2 (TA 40-2) is a magazine used for the storage of high explosives (HE) and HE-contaminated wastes. HE wastes are hazardous and regulated under New Mexico Waste Management Regulations (HWMR) because they are reactive (D003) and ignitable (D001). TA 40-2 is a container storage area operated under a Resource Conservation and Recovery Act (RCRA) Part A permit; a Part B permit is not being sought for this facility. TA 40-2 will be closed under interim authority, then put back into service for HE storage and for short-term (less than 90 days) HE waste storage. The operation of TA 40-2 for less than 90-day waste storage does not require a Part B Permit (HWMR 204 B.1.).

This document is the closure plan required by HWMR 206 C.2. Closure consists of removing the remaining wastes from and decontaminating the storage area. Testing will be conducted to verify adequate decontamination.

2.0 TA 40-2 CONTAINER STORAGE DESCRIPTION

TA 40-2 is a 1.8 m (6 ft) wide by 1.8 m (6 ft) long by 2 m (7 ft) high concrete magazine bunkered on three sides with earth (Figure 2-1). The fourth side has a steel door that opens to the south, and is locked except when the magazine is entered. The entrance side of the magazine has two concrete wings, which extend out from the magazine and hold back the bunkered earth. A small 0.6 m (2 ft) wide by 0.6 m (2 ft) deep by 1 m (3 ft) high magazette is located in the east wing and is also used for HE waste storage.

Within the magazine, wastes are stored on the bottom shelves against the north wall. TA 40-2 has a smooth crack- and seam-free concrete floor and rough concrete walls. The magazette is constructed of sheet steel set in concrete, and has metal shelves.

3.0 WASTE DESCRIPTION

HE wastes and HE-contaminated wastes are the only hazardous wastes stored at TA 40-2. Wastes consist of small scraps of HE resulting from assembly of test shots, as well as rags, paper, tape, cotton swabs, and other trash items that have contacted HE and are suspected of being contaminated. HE handled at the Laboratory includes HMX, RDX (cyclonite), TNT (2, 4, 6 trinitrotoluene), PETN (pentaerythritol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine and various plastic binders. Barium nitrate is also categorized as an EP toxic waste. The wastes are placed in plastic bags, which are placed either in cardboard boxes that are sealed shut, or in 5-gallon plastic pails with tight fitting covers. Boxes, pails, and plastic bags are not opened in the magazine or the magazette.

The maximum HE or HE-contaminated waste stored here at any one time is 180 kg (400 lbs). The maximum allowed storage is limited by administratively controlled standard operating procedures (SOP). From TA 40-2, waste is taken to burn pads at S-Site where it is ignited. Wastes containing metal pieces, chips, and powder are burned at a permitted detonation site.

TA 40-2 is an active storage site for both HE and HE wastes. HE waste currently in storage consists of a metal tube approximately 1 m (3 ft) long by 1.9 cm (3/4 in) in diameter. The tube is

sealed with plastic at both ends and is thought to be contaminated. The maximum HE wastes in storage at the start of closure will not exceed 2 kg (4 lbs).

4.0 CLOSURE PLAN

4.1 Waste Removal

HE wastes in storage at the start of closure will be taken to either the burn pads at TA 16 or to a permitted detonation site. The wastes are packaged in small sealed packages and will be taken out of the magazine or magazette by hand and placed in a pickup truck for delivery to the burn or detonation site. Pickup trucks used to move HE at the Laboratory are specially equipped to prevent ignition.

HE in TA 40-2 that are not wastes, such as empty containers, will not be removed from the magazine. The highest risk to personnel occurs when HE is handled. Removing the non-waste from the magazine would serve no purpose and would expose operating personnel to an unnecessary risk.

4.2 Decontamination

Following the removal of the HE wastes, if any, the shelves will be dusted and the floor swept with a broom. The accumulated dust and the rags used to wipe the shelves will be placed in plastic bags, affixed with dated tags, and transferred to a short-term storage magazine to be burned with other wastes at S-Site. Following the dusting and sweeping procedure, the area supervisor will inspect the magazine to ensure that all HE wastes have been removed. Should any remaining materials be found, they will be removed in a plastic bag and placed in short-term storage, to be burned with other HE wastes. Following the inspection

verifying that TA 40-2 is free of HE wastes, the shelf and floors will be washed with a warm Liquinox or Alconox solution in water. The excess water will be picked up with rags and wrung into a plastic bucket. The wash water will be sampled and analyzed to ensure adequate decontamination. Sampling and analytical procedures are defined in Section 4.3. The recovered dirty water will be poured into an HE-contaminated water sump. This water is picked up with a dedicated vacuum truck and hauled to the burn pad area at S-Site where the water is filtered in sand filters and the residue burned. Filtered water is discharged under a NPDES permit. The facility will be put into short-term HE waste storage service following decontamination. At this time, all wastes will be kept in closed containers and affixed with dated tags specifying their contents as hazardous waste.

4.3 Sampling and Analytical Procedures

4.3.1 General Considerations

The following sections define procedures and methods for sampling analysis and documentation applicable to closure. While specific procedure are defined, alternate methods given in Test Methods for Evaluating Solid Wastes, USEPA, SW 846, most current edition (SW 846) may be used if sampling conditions or experience indicate another method is preferable. The following methods are from SW 846.

4.3.2 Sampler

The Coliwasa sampler will be used to sample the clean water for background parameters before washing the area, and to sample the wash water after cleaning the area. The simple design makes the sampler easy to use and allows rapid collection of samples, thus minimizing the exposure of the sample collector to potential hazards from the waste. The recommended model of the Coliwasa is shown in Figure 4-1, the main parts consisting of the sampling tube, the closure-locking mechanism, and the closure system.

4.3.3 Cleaning and Storage of Sampler

The sampler must be clean before use. The used sampler must be washed with a warm detergent solution (Liquinox or Alconox), rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. A necessary piece of equipment for cleaning the tube of the Coliwasa is a bottle brush that fits tightly inside the diameter of the tube. The brush is connected to a rod of sufficient length to reach the entire length of the sampler tube. Using this ramrod and fiber-reinforced paper towels, the Coliwasa tube may be quickly cleaned. Improper cleaning of sample equipment will cause cross contamination of samples. The contamination is of particular importance in these samples, because they will be taken for regulatory purposes. Clean samples should be stored in polyethlene plastic tubes or bags in a clean and protected area.

4.3.4 Sampling Procedures

- Assemble the glass Coliwasa sampler according to Figure 4-1.
- Make sure that the glass Coliwasa sampler is clean.
- Check to make sure the sampler is functioning properly. Adjust the locking mechanism if necessary to make sure the neoprene rubber stopper provides a tight closure.
- Wear necessary protective clothing and gear and observe required sampling precautions.
- Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.
- Slowly lower the Coliwasa sampler into the liquid at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.
- When the sampler stopper hits the bottom of the liquid container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.
- Slowly withdraw the sampler from the container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.
- Carefully discharge the sample into a glass container by slowly opening the sampler. This is done by slowly pulling

the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in the glass container.

- Cap the glass container, attach a label and seal, record in field log book, and complete the sample analysis request sheet and chain of custody record.
- Unscrew the T-handle of the sampler and disengage the locking block. Clean the sampler on site or store the contaminated parts of the sampler in a plastic storage tube or bag for subsequent cleaning. Store used rags in plastic bags for subsequent disposal.
- Deliver the sample to the laboratory for analysis.

4.3.5 Sample Handling

After a sample is transferred into the glass container, the container must be tightly capped as quickly as possible to prevent the loss of volatile components and to exclude possible oxidation from the air. The sample should be refrigerated or treated with preservatives as required for the analysis and defined in SW 846. To split or withdraw an aliquot of a sample, considerable mixing, homogenization, or quartering is required to ensure that representative or identical portions are obtained. When transfering a sample aliquot, open the glass container as briefly as possible.

Each sample must be properly labeled and sealed immediately after collection.

4.3.5.1 Sample Labels

Sample labels (Figure 4-2) are necessary to prevent misidentification of samples. Gummed paper labels or tags are adequate. The label must include at least the following information:

- Name of collector
- Date and time of collection
- Place of collection
- Collector's sample number, which uniquely identifies the sample.

4.3.5.2 Sample Seals

Sample seals are used to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory. Gummed paper seals can be used as official sample seals. The paper seal must carry information such as:

- Collector's name
- Date and time of sampling
- Collector's sample number. This number must be identical with the number on the sample label.

The seal must be attached in such a way that it is necessary to break it in order to open the glass sample container. An example of a sample seal is shown in Figure 4-3.

4.3.5.3 Field Log Book

All information pertinent to a field survey and/or sampling must be recorded in a log book, which must be a bound book, preferably with consecutively numbered pages that are 8 1/2 by 11 in. Entries in the log book must include at least the following:

- Purpose of sample
- Location of sampling and address
- Name and address of field contact
- Producer of waste and address
- Type of process producing waste
- Type of waste
- Declared waste components and concentrations
- Description of sampling point
- Date and time of collection
- Collector's sample identification number(s)
- Sample distribution
- References such as maps or photographs of the sampling site
- Field observations
- Any field measurements made such as pH, flammability, explosibility.

Because sampling situations vary widely, no general rule can be given about the extent of information that must be entered in the log book. A good rule, however, is to record sufficient infor-

mation so that someone can reconstruct the sampling situation without relying on the collector's memory. The log book must be protected and kept in a safe place.

4.3.5.4 Chain of Custody Record

To establish the documentation necessary to trace sample possession from the time of collection, a completed chain of custody record must accompany every sample. This record becomes especially important when the sample is to be introduced as evidence in a court litigation. An example of a chain of custody record is illustrated in Figure 4-4. The record must contain the following minimum information:

- Collector's sample number
- Signature of collector
- Date and time of collection
- Place and address of collection
- Waste type
- Signatures of persons involved in the chain of possession
- Inclusive dates of possession.

4.3.5.5 Sample Analysis Request Sheet

The sample analysis request sheet (figure 4-5) is intended to accompany the sample upon delivery to the laboratory. The field portion of this form must be completed by the person collecting the sample and should include most of the pertinent information

noted in the log book. The laboratory portion of this form is intended to be completed by the laboratory personnel and to include:

- o Name of person receiving the sample
- o Laboratory sample number
- o Date of sample receipt
- o Analyses to be performed

4.3.5.6 Sample Delivery to the Laboratory

The sample should be delivered to the laboratory for analyses as soon as practicable, usually the same day as the sampling. The sample must be accompanied by the chain of custody record and by a sample analysis request sheet. The sample must be delivered to the person in the laboratory authorized to receive samples.

4.3.5.7 Shipping of Samples

When a sample is shipped to the laboratory it must be packaged in a proper container to avoid leakage and/or breakage. Acceptable packing materials include sawdust, crumpled newspapers, vermiculite, polyurethane chips, etc. Other samples that required refrigeration must be packed with reusable plastic packs or cans of frozen gels in molded polyurethene boxes with a sturdy fiberboard protective case. The boxes must be taped closed with masking tape or fiber plastic tape. All packages must be accompanied by a sample analysis request sheet and chain of custody record. Complete address of the sender and the receiving laboratory must legibly appear on each package.

4.3.6 Sampling Parameters

Each sample will be analyzed for pH, cyanides, toxicity metals, and organics, as shown in Table 4-1. A minimum of two background samples will be collected form the clean Alconox or Liquinox-water solution before it is used to wash the area. If repeated washings occur, a minimum of two clean wash solutions samples will be taken to add to the background data base. The background samples will be analyzed for pH, EP toxic metals, organics, and cyanides and then compared with, the results from the wash water. The statistical methods described in Test Methods for Evaluation Solid Waste, USEPA SW 846, will be used to compare the background sample results to the wash water results. If the comparison indicates no contamination, then further cleaning need not to be done. If comparison of the analytical results indicates contamination, the area will be cleaned until it is confirmed, by testing, that the contamination has been removed.

4.4 Rationale for Closure Plan

The only hazardous wastes handled at TA 40-2 are HE and HE-contaminated wastes. These materials are handled in closed containers, which are not opened in the magazine. There is no reason to believe that HE has contaminated the room. Dusting the shelves and sweeping the floor are the standard housekeeping procedures used to maintain cleanliness of the area. Water washing provides an acceptable mechanism within the confines

ofSW 846 for analysis to demonstrate adequate decontamination. The magazine will be used in the future to store HE. A more rigorous decontamination procedure would serve no purpose.

The standard procedure for handling suspected HE-contaminated equipment involves a thorough cleaning, followed by burning to destroy any residual HE. This treatment would destroy the equipment and is therefore only done at the end of the equipment's useful life. General housekeeping measures prevent contamination, should it occur, from presenting a hazard to the operating personnel. The closure plan is consistent with these measures and allows continued use of the magazine and shelves for HE storage. Sampling and analysis for metals and organics are performed to demonstrate that the area has not been contaminated by metals and solvents used in other locations at the Laboratory. Analysis for cyanides is conducted to demonstrate that nitrogen-based organics have not decomposed to cyanides, contaminating the area.

4.5 Closure Schedule

The closure plan for TA 40-2 will be submitted to the NMEID on September 30, 1985. Upon written approval of the plan by the NMEID, no additional wastes will be admitted to the area, and closure will begin within 60 days. Four weeks are required to schedule a waste burn at TA 16 and/or TA 40-DFB or DF15, and to remove the wastes from the magazine and transport them to the burn site. Clean-up will take six weeks, including scheduling, cleaning, removing of the rags and accumulated dust, and perform-

ing analyses to verify decontamination. Four weeks will be allocated for the supervisor's inspection and further cleaning, if necessary. Total duration of closure is 98 days and the year of closure is 1986.

The DOE will keep a copy of the closure plan at the facility until closure is complete, and is responsible for amending the plan if a change occurs to merit it, as per [HWMR 206.C.2.c.(2).].

4.6 Closure Certification

The owner of the facility (DOE), as well as an independent registered professional engineer, shall witness the closure and ensure that closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the container storage area has been closed in accordance with this plan, which is to be dated and signed by both, and stamped by the registered engineer. The original copy will be submitted by the DOE to the Director of NMEID with one copy maintained at the TA 40 Group Office and one copy maintained by the HSE-8 Regulatory Compliance Group.

4.7 Closure Schedule Summary

Activity	Duration
Submit Closure Plan to NMEID	September 28, 1985

Terminate acceptance of waste	Upon written approval of plan.
Begin closure activities	Within 60 days of plan approval.
Schedule waste burn and move stored waste to appropriate site	4 weeks
Schedule and complete clean-up and verification	6 weeks
Supervisor inspects and recommends possible further clean-up	4 week

5.0 GENERAL CONSIDERATIONS

5.1 Contact Person

Upon approval of this closure plan, the NMEID and LANL will coordinate in writing the respective contact person(s) for organization of activities and communications between the parties under the plan. The parties will provide timely written notification of any changes in the designation of contact persons during the term of this plan. LANL will provide a minimum of ten days advance notice to the NMEID through the NMEID contact person(s), of any construction, sampling, or activities conducted under this closure plan.

5.2 Quality Assurance

Effectiveness of the programs contained in this plan is specifically dependent on the proper sampling and analytical methods. LANL will use sampling, quality assurance, quality control, and chain of custody procedures that are consistent with the USEPA Regulations throughout all activities contemplated under this plan. All analytical testing will be performed in a laboratory using appropriate USEPA procedures with QA/QC in conformance with USEPA requirements.

LANL will submit the following information for NMEID approval before any soil sampling in the closure plan:

- The name and the Quality Assurance and Control procedures of the laboratory doing the analysis of the samples. This will include appropriate USEPA procedures for analytical methodology, sample preservation, and detection limits of constituents.

- Detailed chain of custody and sampling methods indicating a step-by-step procedure for taking samples.

5.3 Split Samples

Upon request by authorized representatives of the NMEID, LANL will provide split samples of any samples collected pursuant to this plan. If any analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to LANL. This includes all relevant technical data generated by the NMEID representatives, their agents or contractors.

5.4 Facility Access

Upon request, LANL will provide reasonable access to its facility to authorized representatives of the NMEID for the purpose of monitoring, sampling, and observing activities carried out under this plan. NMEID representatives shall comply with established LANL safety and security practices.

5.5 Cooperation

LANL and the EID's representatives will cooperate to the fullest extent possible in the reporting and exchange of data developed pursuant to this plan. Copies within LANL's possession of results of all sampling and analyses, and other relevant technical data generated by the parties or their agents or contractors under this plan, including raw data, field notes, and laboratory bench sheets and reports will be exchanged as soon as practicable. In the event LANL contracts with a laboratory to perform work, and the NMEID requests from the laboratory copies of raw data, field notes or laboratory bench sheets generated for LANL, LANL shall indicate to the laboratory that it has no objection to such documents being provided to the State of New Mexico.

TABLE 4-1
SOIL SAMPLE ANALYSIS
CONSTITUENTS

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA* Analytical Method
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
-	Nickel	-	6010

<u>Organics</u>

GC/MS for volatiles	8240
GC/MS for semivolatiles	8250

<u>Other</u>

Cyanide	9010

*Analytical methods may include any applicable methods found in USEPA SW 846

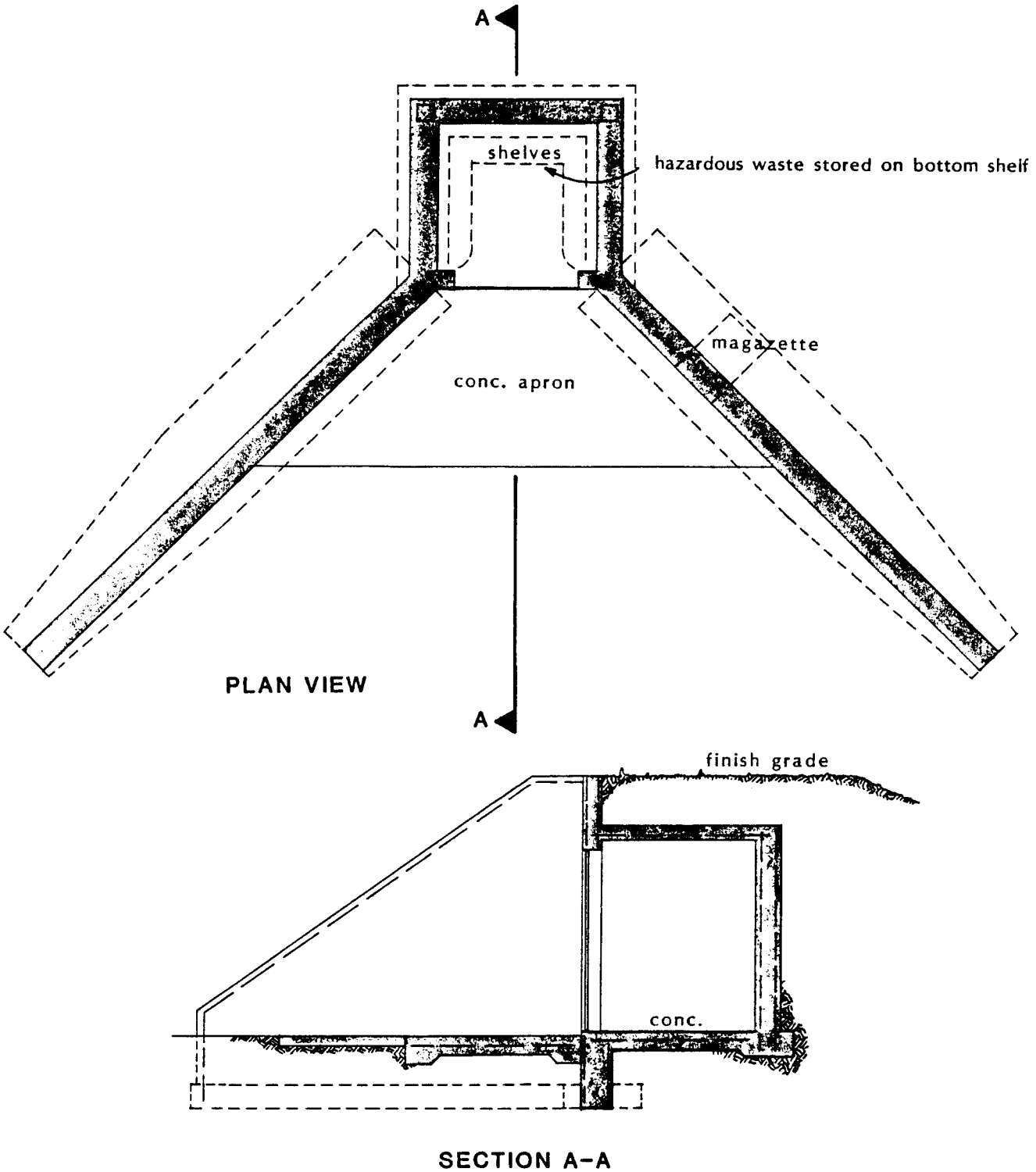

FIGURE 2-1

TA 40-2 MAGAZINE STORAGE FACILITY

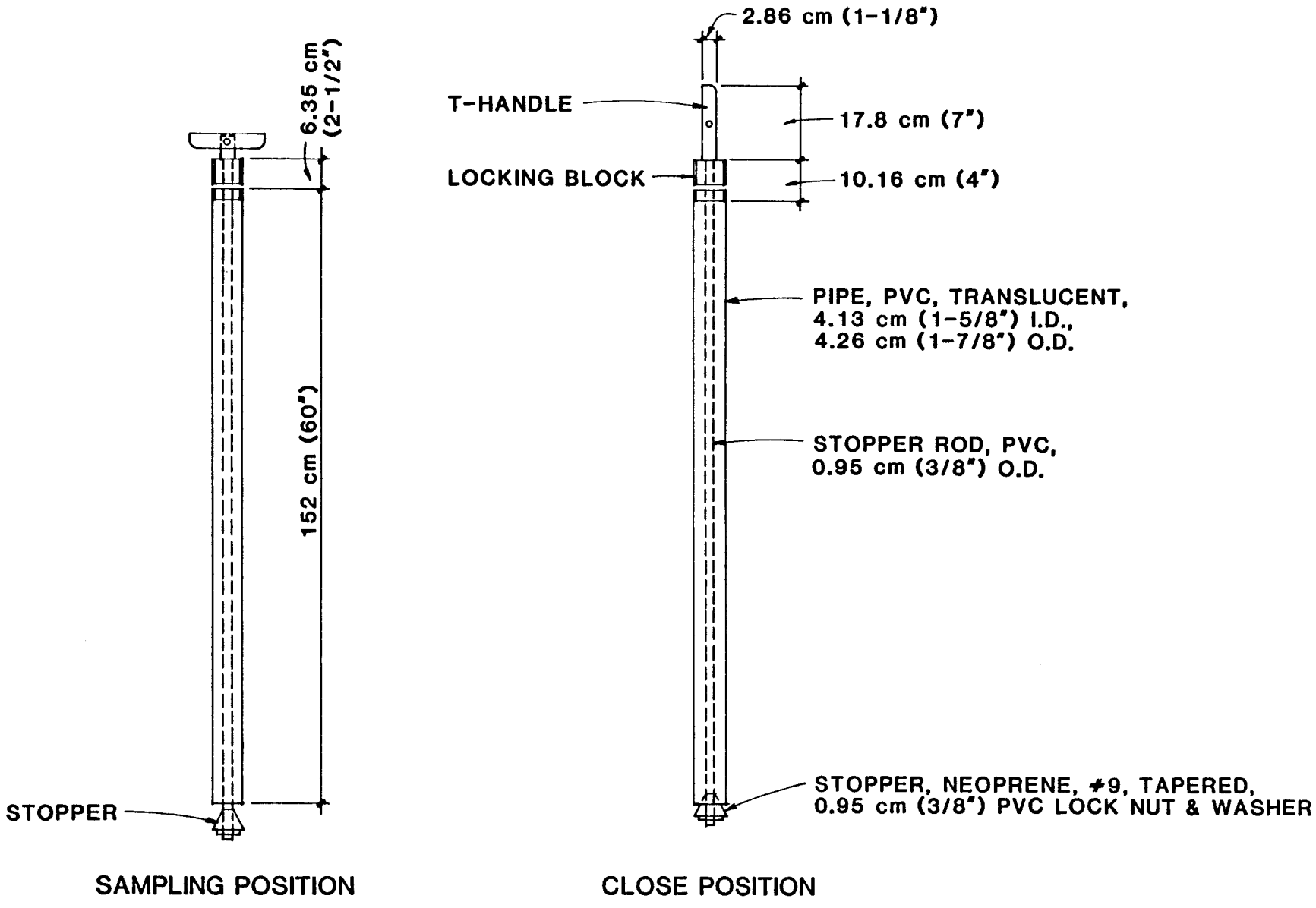

FIGURE 4-1

COMPOSITE LIQUID WASTE SAMPLER (COLIWASA)

FIGURE 4-2
EXAMPLES OF SAMPLE LABELS

OFFICIAL SAMPLE LABEL

Collector_____ Collector's Sample No._____

Place of Collection_____

_____

Date Sampled_____ Time Sampled_____

Field Information_____

_____

_____

ALTERNATE SAMPLE LABEL

DATE TIME SAMPLE NO. ORIGIN

LOCATION SAMPLED

_____

DESCRIPTION

_____

REMARKS

_____

REQUESTED ANALYSIS

_____

SAMPLED BY: (PRINT AND SIGN) LOG REFERENCE

TAG NO.____OF____

_____

FIGURE 4-3
EXAMPLE OF SAMPLE SEAL

OFFICIAL SAMPLE SEAL

Collected by_____ Collector's Sample No._____
(Signature)

Date Collected_____ Time Collected_____

Place Collected_____

_____

_____

FIGURE 4-4
CHAIN OF CUSTODY RECORD
Hazardous Materials
Collectors Sample No.____

Location of Sampling: __Producer __Hauler __Disposal Site

__Other:_____

Company's Name_____Telephone (___)_____

Address_____
number street city state zip

Collector's Name_____Telephone (___)_____
signature

Date Sampled_____ Time Sampled_____hours

Type of Process Producing Waste_____

Waste Type Code_____ Other_____

Field Information_____

_____

_____

Sample Allocation:

1. _____
name of organization

2. _____
name of organization

3. _____
name of orgainzation

Chain of Possession

1. _____ _____ _____ _____
signature title Inclusive dates

2. _____ _____ _____ _____
signature title Inclusive dates

3. _____ _____ _____ _____
signature title Inclusive dates

FIGURE 4-5
HAZARDOUS MATERIALS SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector_____ Date Sampled_____ Time_____hours

Location of Sampling_____
name of company, disposal site, etc.

Address_____
number street city state zip

Telephone (___)_____ Company Contact_____

HML NO. (Lab only)	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Analysis Requested_____

_____

_____

Special Handling and/or Storage_____

_____

PART II: LABORATORY SECTION

Received by_____Title_____Date_____

Sample Allocation: __HML __LBL __LABL __SRL Date_____

Analysis Required_____

_____

_____

*Indicate whether sample is sludge, soil, etc.; **Use back of page for additional information.

CLOSURE PLAN FOR

TA 40 SCRAP DETONATION SITE

FOR

HIGH EXPLOSIVE WASTES

Facility ID No:	NM0890010515
Facility Name :	Los Alamos National Laboratory
Legal Owner :	United States Department of Energy
Address :	Los Alamos Area Office
City, State :	Los Alamos, New Mexico 87545
Phone :	(505)667-5288

SEPTEMBER 1985

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1.0 INTRODUCTION

The Los Alamos National Laboratory's (LANL) Technical Area 40 scrap detonation site, (TA 40-SDS), also referred to as a destruct pit, is used to detonate high explosive (HE) wastes and to burn HE contaminated wastes. HE wastes are hazardous and regulated under New Mexico Environmental Improvement Division's (NMEID) Hazardous Waste Management Regulations (HWMR) because they are reactive (D003) or ignitable (D001). Residues resulting from the detonation of some HE contain heavy metals and may be EP toxic. TA 40-SDS is a thermal treatment facility operated under a Resource Conservation and Recovery Act (RCRA) Part A Permit. A Part B Permit is not being sought for this facility. TA 40-SDS will be put back into service after closure as a detonation site for HE tests. The operation of TA 40-SDS as an HE test detonation site does not require a Part B Permit.

This document is the closure plan required by HWMR 206.C.2. Closure consists of ceasing the detonation and burning of waste, conducting a site analytical survey to determine the nature and extent of hazardous constituent contamination, and removing and disposing of contaminated soil and equipment.

The TA 40-SDS will be closed all at one time. Partial closure of the detonation site has not occurred nor will it occur.

2.0 TA 40-SDS DETONATION SITE DESCRIPTION

TA 40-SDS detonation site is located on a south mesa rim shelf (NMSP coordinates E 481, 920, N 1, 767,000) overlooking Pajarito Canyon (Figure 2-1). The shelf elevation is 2,222 m (7290 ft). The detonation site is a 20 m (60 ft) in diameter circular area. Repeated detonations have formed an amphitheater in the mesa wall, which opens to the south. The north side of the site is a cliff that rises 10 m (30 ft) from the site floor. The top of the amphitheater area rim drops in elevation to the south, where it opens onto the mesa shelf. The shelf is approximately 60 m (200 ft) wide and slopes gently down from the detonation site to the canyon rim. The canyon floor at the detonation site is at an elevation of 2,165 m (7100 ft).

Following past detonations, the rubble formed was pushed out from the amphitheater and spread toward the canyon rim, stopping approximately 6 m (20 ft) short of the rim. The maximum thickness of the spread rubble is 1 m (3 ft) at the rim end, thinning back toward the detonation site. The topography of the site is shown on Figure 2-2.

Approximately 30 m (100 ft) east of the detonation site is a 3 m (10 ft) by 3 m (10 ft) burn pit where HE-contaminated wastes are burned. The pit is enclosed by a wire cage to prevent wastes from being wind-blown before and during burning.

Detonations are remotely controlled from the firing point TA 40-15 located on the mesa shelf 396 m (1300 ft) west of the detonation site. An access road runs from TA 40-15 along the shelf, ending at the burn pit. Surface drainage from the detonation site and the burn pit flows across the spread rubble to the southeast and into Pajarito Canyon.

TA 40 is a weapons research facility and is not open to the public. Access to the area offices is limited to personnel with security clearances. Access to detonation sites is limited to personnel working in the area, and all other visitors must be escorted by TA 40 personnel.

The detonation site is not continually manned. Personnel are at the site only for the time needed to set up a detonation.

3.0 WASTE DESCRIPTION

HE wastes and HE-contaminated wastes are the only hazardous materials thermally treated at TA 40-SDS. Wastes that are detonated are scrap HE pieces, chips, and powder. Rags, paper, tape, cotton swabs, and other trash items that have contacted HE and are suspected of being HE-contaminated are burned at the burn pit. HE wastes handled include HMX, RDX (cyclonite), TNT (2,4,6 trinitrotoluene), PETN (pentoerythritol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobezene), nitrocellulose, tetryl, nitroguanidine, and various plastic binders. In addition, lead compounds have been used in detonation. Barium and lead residues may remain after detonation, both of which are EP toxic (D005 and D008, respectively).

The method used to detonate waste HE varies with the type of HE. Sensitive HE is placed in a plastic trash can, which is set on the detonation site. A second plastic pail filled with nitromethane is mounted above the trash can, with a plastic drain tube running from the pail to the trash can. A drain valve in the tube is opened and all personnel leave the site. After the nitromethane drains from the pail into the trash can, the trash can is detonated. Nitromethane is added to the can to ensure complete detonation of the waste HE.

Less sensitive HE is simply stacked with other HE and detonated. The trash suspected of HE contamination is stacked and burned in the wire cage. Kerosene is poured over the waste to ensure ignition. The detonation of waste HE and the burning of the contaminated waste is remotely controlled from TA 40-15.

Waste HE and contaminated wastes are delivered just before detonation or burning from other storage facilities. No wastes are on hand at the start of closure nor does the facility have any storage capacity. Nothing is stored at TA 40-SDS. The maximum HE wastes in treatment at any time is 45.4 kg (100 pounds).

Several of the detonations, as well as test shots, have been viewed from across Pajarito Canyon. Debris from the detonation was observed to be thrown one to two hundred yards from the area.

4.0 CLOSURE PLAN

Because no waste will be on site, closure will consist of decontamination of the site and equipment, followed by analysis to demonstrate adequate decontamination.

Closure activities include:

- an analytical survey to determine the nature and extent of possible site contamination,
- removal and proper disposal of contaminated soil,
- an analytical survey to determine if decontamination is complete, and
- decontamination of equipment.

4.1 Analytical Survey

An analytical survey will be conducted to determine the nature and extent of site contamination. The survey addresses possible contaminant transport methods, including dispersion by detonation, leaching, surface drainage, and soil movement caused by activities associated with removal of rubble from the detonation amphitheater.

The area is divided into an imaginary grid on 23 m (75 ft) centers near the detonation site expanded to 46 m (150 ft) centers at a distance of 46 m (150 ft) or greater from the center (Figure 2-2). The grid extends over the area affected based on observations of past detonations. Composite soil samples will be

taken representing the intersection of grid lines. For this site, the grid has been extended farther to the south than to the north because the ampitheater wall limits the detonation dispersion to the north. One additional composite sediment sample will be taken in the shelf drainage channel. The approximate location of the composite sediment sample is shown on Figure 2-2. Two composite samples of sediment will be taken in the drainage channel of Pajarito Canyon, the first upstream of the detonation site, and the second downstream of the site just below the point where the site drainage joins the Canyon channel. One additional composite soil sample will be taken at the burn pit center.

Four background composite samples will be taken: one to the north, east, south, and west of the site at a distance greater than 500 yards from the detonation site. Exact sites for background samples will be field selected based on similar geologic features to the detonation site and the lack of possible interference from other operating Laboratory sites.

The initial grid serves as a first exploration for contamination. If threshold contamination, as determined in Section 4.2.4 of this document, is found at the outside grid samples, the limits of the grid will be expanded on 46 m (150 ft) centers to determine the outside parameter of the contamination. If threshold contamination is found within the grid, additional samples will be taken by reducing grid distances within the contaminated area

by one half and by locating sampling points based on initial survey results and terrain characteristics until the surface and depth of contamination is defined.

Field relocation of grid points may be required by topographic features. In such a case, the sample will be taken as closely as possible to the grid point and the new location will be documented.

If channel sediment samples show threshold contamination of regulated constituents as determined in Section 4.2.4, additional samples will be taken along the channel at 10 yard intervals.

4.2 Sampling and Analytical Procedures

4.2.1 Sampling

Sampling methods, composite preparation, container preparation, and sample preservation will follow methods defined in Test Methods for Evaluating Hazardous Solid Wastes, USEPA SW 846 (most current edition) (SW 846). While a specific sampling method is recommended in the following text, alternate methods defined in SW 846 may be used if warranted by field conditions or sampling experience.

Each grid point will be represented by a composite sample made up of four core samples taken 3 m (10 ft) along each grid line from the grid intersection. Background soil samples will be a composite of four cores with the same orientation as grid samples.

Sediment samples will be a composite of four sediment samples taken from the channel and evenly spaced over a 3 m (10 ft) line following the channel. The burn pit center composite sample will be made up of four core samples taken from the center of each quarter of the pit.

Vertical soil sampling will be done at the topsoil, then at 1-foot intervals to bedrock or to a maximum depth of 3-feet for the initial survey. Core samples shall include soil depth segments from 0.5-foot to 1-foot, 1.5-feet to 2-feet and 2.5-feet to 3-feet. If the initial grid sample analysis indicates contamination at the maximum sample depth as defined in this section, additional sampling at 1-foot intervals will be performed to determine the depth of contamination.

Surface soil samples will be collected with a trowel or scoop. To sample below 8 cm (3 in), samples will be collected with a Veihmeyer soil sampler. After each site is sampled, the samplers will be washed with a warm Liquinox or Alconox solution, rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. One-quart glass containers will be used for the samples, because they are compatible with the waste. Sampling will be conducted in accordance with procedures given in Samplers and Sampling Procedures for Hazardous Waste Streams, EPA 600/2-80-018 and SW 846.

Samples will be taken, placed in bottles, tagged, and immediately packed with ice in an insulated container. One sample for every ten samples will be either duplicated or split. The duplicated or split sample will be identified by a code so that its source is not available to the analytical laboratory, but analytical results can be compared to its twin.

4.2.2 Sample Documentation

Samples will be analyzed either internally or at a commercial laboratory. In either case each sample will be tagged, sealed, and accompanied by a chain of custody and a sample analysis request form as described in SW 846. Typical forms are shown in Figures 4-1 through 4-4. The sample container must be sealed with a gummed paper seal attached to the container so that the seal must be broken in order to open the container. The seal and sample tag must be completed with a waterproof pen.

The sample tag "place of collection" shall include the grid number referenced to positions staked on the site perimeter. The "field information" will include observations such as the soil texture and surface appearance, ambient temperature and cloud cover at time of sampling, and precipitation conditions 24 hours before sampling. The chain of custody form includes: sample number, signature of collector, date and time of collection, place and address of collection, sample type, signature of per-

sons involved in chain of possession, and dates of possession. This is a two-page record with the original accompanying shipment and the "copy" being retained by the Laboratory.

The sample shipment and chain-of-custody record is accompanied by a sample analysis request sheet. The request sheet has two parts: field and laboratory. Part II is used by the analytical laboratory when the samples are received.

A separate field log book for closure sampling will be kept and will contain all information pertinent to field surveys and sampling. The log book will have bound and consecutively numbered pages in an 8-1/2 by 11-inch format. Minimum entries include:

a. Purpose of entry (routine sampling, special sampling)
b. Location of sampling (coordinates referenced to staked field points)
c. Name and address of person making log entry
d. Number and volume of sample taken
e. Description of each sampling location, sampling methodology, equipment used, etc.
f. Date and time of sample collection or waste application
g. Sample destination and transporter's name (name of laboratory, UPS, etc.)
h. Map or photographic reference, if any
i. Field observations (ambient temperature, sky conditions, past 24-hour precipitation, etc.)

j. Field measurements, if any (pH, etc.)

k. Signature of person responsible for the log entry.

4.2.3 Analysis

Soil and sediment samples will be analyzed for toxic metals, organics, cyanide and nitrates as defined in Table 4-1. Barium and lead are possible contaminants because they are in several HE mixtures. The other toxic metals are included to ensure that these materials were not included in past detonations. A scan for volatile and semi-volatile organics is conducted to ensure that residual from solvents used in HE preparation or other regulated organic constituents are not present. None of the major HE constituents are hazardous constituents listed in Appendix III of HWMR 201. The organic scans will analyze for the presence of 199 of the 227 listed hazardous organic constituents for which there are analytical methods in SW 846. Of the remaining 28 listed organic constituents, eight are included in the metals and cyanide and analysis. None of the remaining 20 listed organic constituents are used in HE manufacture. Both cyanides and nitrates are included in the analysis survey. Nitrates occur in HE as ammonia nitrate and barium nitrate. Cyanides and nitrates could conceivably be products of detonation since the HE materials include organic nitrogen compounds. Sulfides are not included in the analysis since sulfur and sulfur compounds are not components of the HE used at the site.

Analysis will use the ICAP scan or atomic adsorption for metals and the Gas Chromatograph/Mass Spectrometer scans for organics, as well as quality assurance methods defined in SW 846. A complete analysis will be conducted for the initial background, grid, or sediment samples. Additional samples will be taken in areas where levels of specific contaminants are above standard limitations or are significantly higher than surrounding areas. These additional samples will be tested for the specific contaminant only.

4.2.4 Contamination Criteria

The closure regulation HWMR 206.C.2.e requires that all facility equipment and structures must have been properly disposed of, or decontaminated by removing all hazardous waste and residues. The closure regulation specific to thermal treatment (HWMR 206.C.11.e) states that the owner or operator must remove all hazardous waste and hazardous waste residues from the thermal treatment process or equipment. The above regulations both relate decontamination to equipment and the term residue is not defined. The regulation HWMR 201 A.2.c.(2) states that any solid waste generated from the treatment of solid waste is a hazardous waste except as provided in HWMR 201.A.2.c.(3) which states that solid waste described in HWMR 201 A.2.c.(2) is not a hazardous waste if, in the case of any solid waste, it does not exhibit any of the characteristics of a hazardous waste identified in HWMR 201B. Those characteristics include ignitability, corrosivity, reactivity and EP tox-

icity. The intent of these closure regulations is to guarantee that a closed area poses no risk to human health or the environment.

The definition as to what constitutes contamination of the detonation site based on the above sited regulations is not clear. Barium is the most probable regulated constituent expected to be found at a detonation site. According to HWMR 201.A.2.c.(3), the residue would not be a regulated waste for barium or other metals unless the concentration exceeded the EP toxicity limit. There are no limiting concentrations for hazardous constituents other than those listed as EP toxic.

If a significant increase of hazardous constituents over background is used to determine the residue which must be removed, then it is conceivable the large quantities of soil around the detonation site would have to be removed even though the concentration of hazardous constituents would not pose a risk to human health or the environment. The comparison against background samples is further complicated by validity of the background samples. The detonation site is located on a mesa rim and the area survey includes both the mesa's surface and the canyon floor. Developing background constituent concentrations levels which account for rapid changes in geology as well as the effects of errosion and deposition is not practical.

Should contamination removal be based solely on a significant increase of a hazardous constituent, the soil may not be a regulated waste per HWMR 201.A.2.c.(3) and may be handled and disposed of as an unregulated waste. The cost of removing the contamination may not afford any additional protection to human health or the environment.

Basing the determination of contamination of total metals on EP toxicity limits is not valid. As shown in Table 4-2, the mean ambient concentration for total metals for soils exceeds the EP toxicity limit for several metals. It is possible that background concentrations of EP toxic metals may exceed the EP toxicity limit.

As a result of these considerations, the following contamination criteria is selected. On completion of the analytical survey, the Laboratory will prepare a risk assesment for each constituent showing significiant increase over background concentrations. A signification increase will be determined using statistical methods described in SW 846. The risk assesment will determine the threshold concentration for each constituent that represents a significant risk to human health and the environment and will take into account all possible pathways. Soils containing regulated constituent levels above the threshold concentration will be considered contaminated.

A copy of the completed risk assesment along with pertinent backup data will be provided to the NMEID for review and approval of the threshold values. Should NMEID find the threshold contamination levels inadequate, the Laboratory will negotiate threshold values agreeable to both parties.

4.3 Decontamination

The approach to decontamination is a function of the extent of contamination as determined by the sampling survey. If the sampling survey indicates that there are no contaminated areas, no further action will be taken at the site except that the burn cage will be hauled to Area L for storage and ultimate landfill disposal.

Should a small soil area be affected, the contaminated soil will be removed with hand shovels or a backhoe, loaded into drums, and transferred in a truck to Area L for storage and ultimate landfill disposal.

Large volumes of contaminated soil will dictate the use of sealed and covered dump trucks. The Laboratory therefore reserves the option of shipping the contaminated soil for offsite disposal because Area L is not equipped to handle large volumes. In this event, the Laboratory will contract with a permitted disposal site contractor who will provide sealed gondola trucks and provide for decontamination of those trucks at the disposal site.

Personnel involved in sampling and decontamination will wear rubber gloves, rubber boots, safety glasses and coveralls. Personnel involved in dust generating activities such as digging and filling drums will wear dust masks to prevent inhalation of contaminated dust. The Laboratory's Industrial Hygiene Group, HSE-5, will review the site survey analytical data and recommend additional protective clothing.

Small equipment used to pick up soil will be scraped and brushed clean and the accumulated dust will be placed in drums for transport to Area L. The equipment will be wrapped in sheet plastic and sealed with tape, then transported to the HE decontamination slab at TA 16-400. The backhoe will be scraped and brush-cleaned, the shovel wrapped in plastic and sealed with tape, then transported to TA 16-400.

The decontamination pad at TA 16-400 is used to wash down equipment used to handle HE. The cleaning water is collected in a sump and then hauled to the TA-16 burn pad area with a vacuum truck. At the burn pads, the water is filtered in two sand filters, the filter residual is burned, and the filtered water discharged under a NPDES permit. The equipment will be decontaminated by washing with detergent and water at TA 16-400. No testing for decontamination of equipment will be conducted because the regulated substances expected to be present are not acutely toxic and washing with detergent is adequate to allow the equipment to be safely handled.

The Laboratory recognizes that should extensive contamination have occurred, the closure plan presented here may be impractical. Should the site analytical survey prove this to be true, the Laboratory will provide the survey data to the Director of NMEID within 30 days of the completion of the analytical work. Within 60 days of submission of the survey data, the Laboratory will provide an amended closure plan. The plan may also be amended under other circumstances as per [HWMR 206.C.2.C.(2)].

4.4 Decontamination Verification

Decontamination of the site will be demonstrated by additional sampling. Removal of contaminated soil will leave an exposed surface. The disturbed surface will be resampled on the same grid used to define the contaminated area. Analysis and the determination of contamination is as previously discussed, and an analysis will be conducted only for those constituents that caused the area to be contaminated.

4.5 Closure Schedule

The closure plan for TA 40-SDS will be submitted to the NMEID on September 30, 1985. Upon receipt of written approval of the plan all wastes will be re-routed to the burn pad at TA 16, or to waste detonation sites at TA 14, 15, 36 or 39. At this time, acceptance of waste at TA 40-SDS will be discontinued.

The year of closure is 1986. Closure activities will begin within 20 days of plan approval and will observe the following schedule:

ACTIVITY	MAXIMUM TIME REQUIRED
Contract for sampling and/or analytical services	90 days
Layout sampling grid	15 days
Conduct the first sampling survey if needed	30 days
Analyze the first samples if needed	60 days
Prepare risk assesment	60 days
NMEID risk assesment review	60 days
Conduct the second sampling survey	30 days
Analyze the second samples	60 days
Determine contaminated areas	30 days
Contract for decontamination	90 days
Remove soil	180 days
Decontaminate Equipment	7 days
Weather delay contingency	90 days
Conduct verification sampling	30 days
Analyze samples	60 days
Total	892 days

Contracts for analytical work and soil removal are expected to exceed $100,000. Because the Laboratory policy requires the work to be put out to bid, ninety days are required to solicit and process the bids.

The location of the site is prone to snow cover in the winter months. Depending on the date NMEID approves the closure plan, the sampling survey may be delayed until the site is free of snow and the ground is thawed adequately to allow the core sampling. The schedule includes a weather contingency to allow for weather delays.

Because of the extensive sampling survey required and the projected decontamination time, approval of a closure time greater than 180 days [HWMR 206.C.2.d. (2)] is requested per [HWMR 206.C.2.d. (2) (b)(i)].

A copy of this closure plan is to be kept at the DOE office until closure is complete and certified.

4.6 Closure Certification

An independent registered professional engineer and the owner of the facility shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the site area has been closed in accordance with this plan. The letter shall be dated and signed by each party and stamped by the registered engineer, and the original copy submitted by the DOE

to the Director of the NMEID. One copy shall be maintained at the DOE office and one copy maintained by the HSE-8 Regulatory Compliance Group.

4.7 Closure Schedule Summary

ACTIVITY	DURATION
Submit Closure Plan to NMEID	September 30, 1985
Cease operations, re-route all wastes	Upon written approval of plan
Begin analytical survey	Within 20 days of plan
Begin decontamination	Within 225 days ensuing
Verify decontamination	Within 337 days ensuing
Certify Closure	Within 50 days ensuing

5.0 GENERAL CONSIDERATIONS

5.1 Contact Person

Upon approval of this closure plan, the NMEID and LANL will coordinate in writing the respective contact person(s) for organization of activities and communications between the parties under the plan. The parties will provide timely written notification of any changes in the designation of contact persons during the term of this plan. LANL will provide a minimum of ten days advance notice to the NMEID through the NMEID contact person(s), of any construction, sampling, or activities conducted under this closure plan.

5.2 Quality Assurance

Effectiveness of the programs contained in this plan is specifically dependent on the proper sampling and analytical methods. LANL will use sampling, quality assurance, quality control, and chain of custody procedures that are consistent with the USEPA Regulations throughout all activities contemplated under this plan. All analytical testing will be performed in a laboratory using appropriate USEPA procedures with QA/QC in conformance with USEPA requirements.

LANL will submit the following information for NMEID approval before any soil sampling in the closure plan:

- The name and the Quality Assurance and Control procedures of the laboratory doing the analysis of the samples. This will include appropriate USEPA procedures for analytical methodology, sample preservation, and detection limits of constituents.

- Detailed chain of custody and sampling methods indicating a step-by-step procedure for taking samples.

5.3 Split Samples

Upon request by authorized representatives of the NMEID, LANL will provide split samples of any samples collected pursuant to this plan. If any analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to LANL. This includes all relevant technical data generated by the NMEID representatives, their agents or contractors.

5.4 Facility Access

Upon request, LANL will provide reasonable access to its facility to authorized representatives of the NMEID for the purpose of monitoring, sampling, and observing activities carried out under this plan. NMEID representatives shall comply with established LANL safety and security practices.

5.5 Cooperation

LANL and the EID's representatives will cooperate to the fullest extent possible in the reporting and exchange of data developed pursuant to this plan. Copies within LANL's possession of results of all sampling and analyses, and other relevant technical data generated by the parties or their agents or contractors under this plan, including raw data, field notes, and laboratory bench sheets and reports will be exchanged as soon as practicable. In the event LANL contracts with a laboratory to perform work, and the NMEID requests from the laboratory copies of raw data, field notes or laboratory bench sheets generated for LANL, LANL shall indicate to the laboratory that it has no objection to such documents being provided to the State of New Mexico.

TABLE 4-1

TA 40-SDS SOIL SAMPLE ANALYSIS

CONSTITUENTS

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA* Analytical Method
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
-	Nickel	-	6010
-	Beryllium	-	6010

<u>Organics</u>

GC/MS for volatiles	8240
GC/MS for semivolatiles	8250

<u>Other</u>

Cyanide	9010
Nitrate	9200

*Analytical methods may include any applicable methods found in USEPA SW 846.

TABLE 4-2
AMBIENT SOIL TOTAL METALS CONCENTRATIONS

PARAMETER	Mean Ambient Background 1. Western U.S.	Eastern U.S.
Matrix Type	Soil	Soil
Aluminum	5.4	3.3
Chromium	38	36
Barium	560	500
Beryllium	0.6	0.6
Cobalt	8	7
Copper	21	14
Iron	20,000	15,000
Nickel	16	13
Manganese	390	290
Zinc	51	36
Boron	22	32
Vanadium	66	46
Silver	-	-
Arsenic	6.1	5.4
Antimony	150	-
Selenium	150	-
Thallium	-	-
Mercury	0.055	0.096
Tin	10	10
Cadmium	1	1
Lead	18	14
Ammonia	-	-
Cyanide	-	-
Sulfide	-	-

1. Ambient background concentrations apply only to soil matrix samples. Values obtained from "Geochemistry of Some Rocks, Soils, Plant and Vegetables in the Conterminous United States" United States Geological Survey Professional Paper 574 F, 1975.

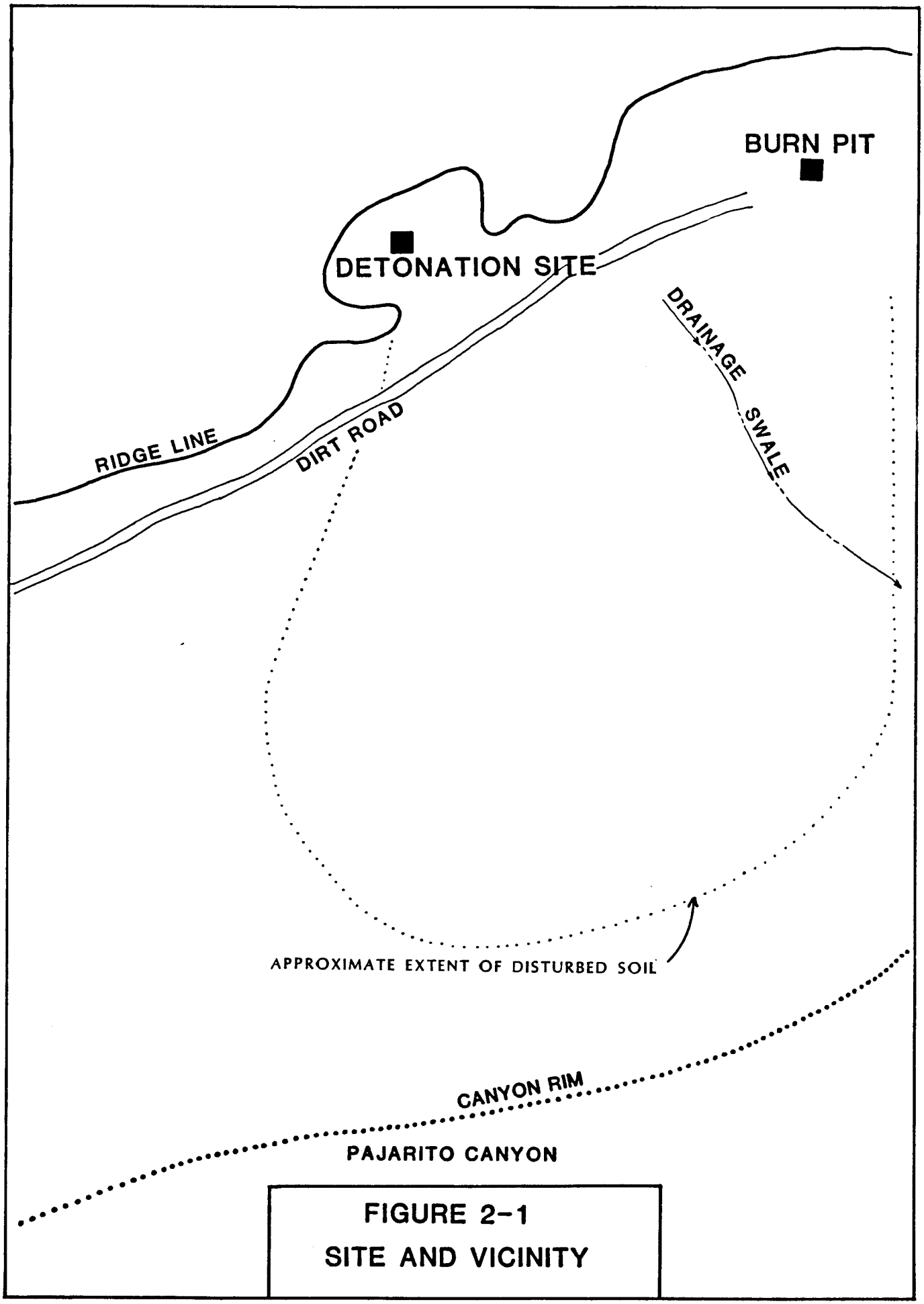
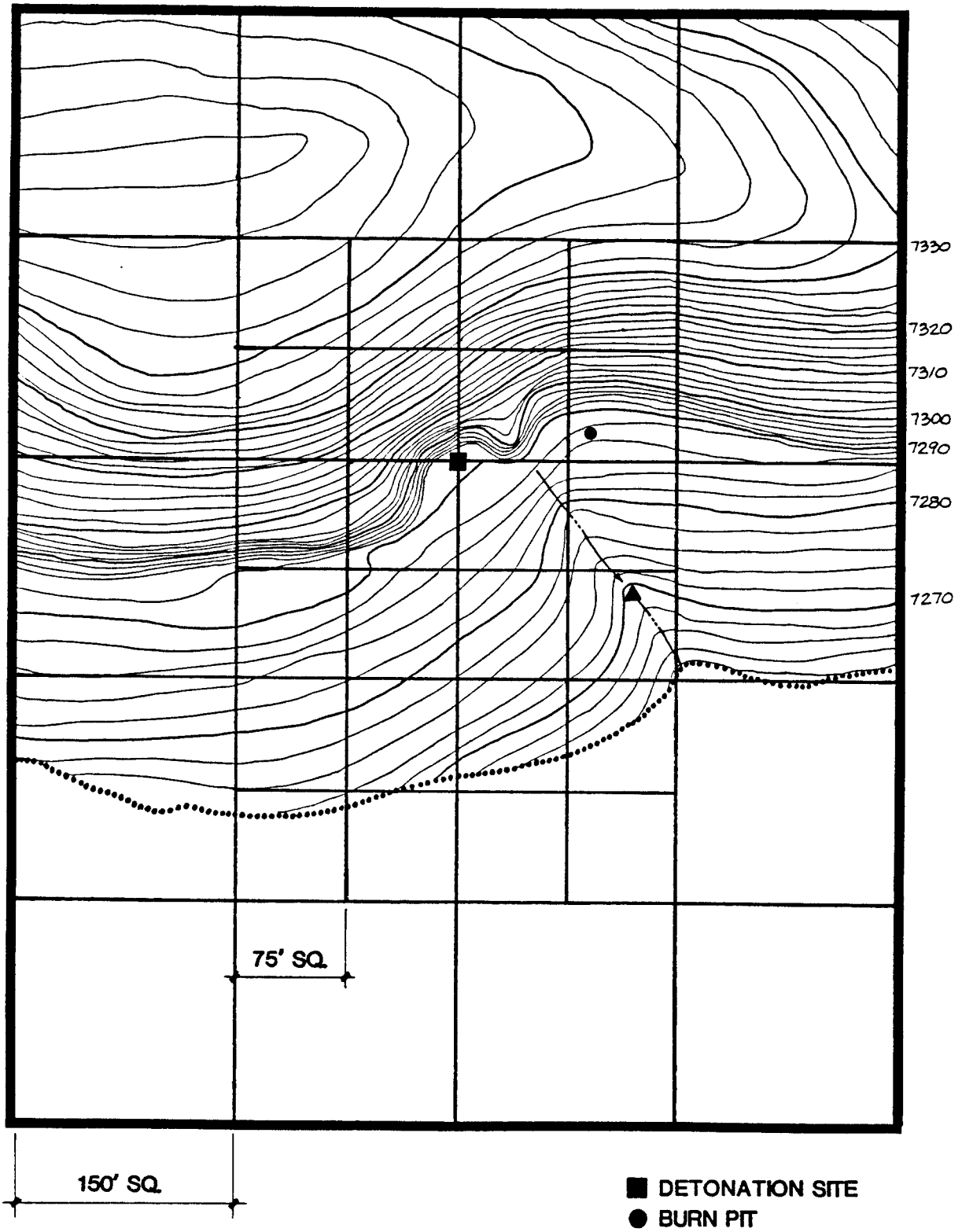


FIGURE 2-1
SITE AND VICINITY



NOTE: SOIL SAMPLES TO BE TAKEN AT THE INTERSECTION OF GRID LINES

■ DETONATION SITE
● BURN PIT
•••••••• RIDGE LINE
—··→ DRAINAGE CHANNEL
▲ SEDIMENT SAMPLE
7300 CONTOUR ELEVATIONS

FIGURE 2-2

TA 40-SDS TOPOGRAPHY & GRID SCHEME

FIGURE 4-1
EXAMPLES OF SAMPLE LABELS

OFFICIAL SAMPLE LABEL

Collector_____ Collector's Sample No._____

Place of Collection_____

_____

Date Sampled_____ Time Sampled_____

Field Information_____

_____

_____

ALTERNATE SAMPLE LABEL

DATE_____ TIME_____ SAMPLE NO._____ ORIGIN_____

LOCATION SAMPLED

_____

DESCRIPTION

_____

REMARKS

_____

REQUESTED ANALYSIS

_____

SAMPLED BY: (PRINT AND SIGN) LOG REFERENCE

TAG NO.____OF____

_____

FIGURE 4-2
EXAMPLE OF SAMPLE SEAL

OFFICIAL SAMPLE SEAL

Collected by_____ Collector's Sample No._____
(Signature)

Date Collected_____ Time Collected_____

Place Collected_____

_____

_____

FIGURE 4-3
HAZARDOUS MATERIALS SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector_____ Date Sampled_____ Time_____hours

Location of Sampling_____
name of company, disposal site, etc.

Address_____
number street city state zip

Telephone (___)_____ Company Contact_____

HML NO. (Lab only)	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION

Analysis Requested_____

_____

_____

Special Handling and/or Storage_____

_____

PART II: LABORATORY SECTION

Received by_____Title_____Date_____

Sample Allocation: __HML __LBL __LABL __SRL Date_____

Analysis Required_____

_____

_____

*Indicate whether sample is sludge, soil, etc.; **Use back of page for additional information.

FIGURE 4-4
CHAIN OF CUSTODY RECORD
Hazardous Materials
Collectors Sample No.____

Location of Sampling: __Producer __Hauler __Disposal Site

__Other:_____

Company's Name_____Telephone (___)_____

Address_____
number street city state zip

Collector's Name_____Telephone (___)_____
signature

Date Sampled_____ Time Sampled_____hours

Type of Process Producing Waste_____

Waste Type Code_____ Other_____

Field Information_____

_____

_____

Sample Allocation:

1. _____
name of organization

2. _____
name of organization

3. _____
name of orgainzation

Chain of Possession

1. _____ _____ _____ _____
signature title inclusive dates

2. _____ _____ _____ _____
signature title inclusive dates

3. _____ _____ _____ _____
signature title inclusive dates

CLOSURE PLAN FOR
TA 3 BUILDING 102
CONTAINER STORAGE AREA
FOR LITHIUM HYDRIDE

Facility ID No.:	NM0890010515
Facility Name:	Los Alamos National Laboratory
Legal Owner:	Unites States Department of Energy
Address:	Los Alamos Area Office
City, State:	Los Alamos, New Mexico 87545
Phone:	(505)667-5288

SEPTEMBER 1985

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4-2 Examples of Sample Labels

4-3 Example of Sample Seal

4-4 Chain of Custody Record

4-5 Hazardus Materials Sample Analysis Request

1.0 INTRODUCTION

A portion of the Los Alamos National Laboratory's Technical Area 3 Building 102 (TA 3-102) is used for the containerized storage of lithium hydride (LiH) waste, which is a reactive waste because it reacts violently with water (D003). The container storage area is operated under a Part A Resource Conservation and Recovery Act (RCRA) Permit; a Part B Permit is not being sought. The container storage area will be closed under interim authority, and then put back into service as a short-term (less than 90 days) storage area. The operation of TA 3-102 for short-term storage will not require a Part B Permit (HWMR-204.B.1.)

This document is the closure plan required by the New Mexico Environmental Improvement Division (NMEID) Hazardous Waste Management Regulations (HWMR) 206.C.2. Closure consists of removing the remaining LiH wastes from the storage area, decontaminating the area, and verifying decontamination. LiH waste will then be brought to the area for short-term storage.

2.0 TA 3-102 CONTAINERIZED STORAGE DESCRIPTION

The TA 3-102 container storage area is a 3 m (10 ft) wide by 3 m (10 ft) long section of floor space in the northeast corner of Section 118-A, in Building SM-102 (Figure 2-1). Building SM-102 is a major Laboratory machine shop located within the Laboratory's property boundaries. Section 118-A is dedicated to machining LIH. The milling equipment is enclosed in plexiglass boxes, and a dust collection system maintains negative pressure on the boxes during milling operations. The chips collected in the milling boxes and the dust from the collection system are placed in plastic bags, which are placed in drums for storage. The drums are stored on a painted concrete floor. Adjacent walls are sheet rock over cinder block, and the sheet rock is painted with a high gloss enamel. The floor has no cracks or seams and there is a tight finish between the wall and floor.

3.0 WASTE DESCRIPTION

LiH is the only hazardous waste that has been stored in TA 3-102. LiH scraps from milling operations may be contaminated with mineral oil, and waste from cleaning equipment and floors may contain saw dust. The wastes are double-bagged in plastic bags, which are sealed and placed in new steel drums of different sizes, including 55-gallon, 30-gallon, 10-gallon, and 5-gallon drums. The different drums are used to segregate the different contaminated and uncontaminated wastes. Ultimately, these wastes are transported to hazardous waste storage at TA 54-Area L, where they are then treated onsite or moved offsite.

The maximum storage capacity at any given time at TA 3-102 is ten 55-gallon drums (73 cu ft). The LiH waste on hand at closure is estimated as follows:

Drum Size	Number	Contents	%Full
55 gallon	1	Mineral Oil Contaminated Chips and Dust	20
30 gallon	2	LiH Pieces	50
20 gallon	1	LiH Pieces	50
10 gallon	1	Chips and Dust	50
5 gallon	3	Chips and Dust	50

4.0 CLOSURE PLANS

4.1 Waste Removal

Before removing the waste, Section 118-A will stop all milling operations. The waste drums in the area will then be sealed with drum covers and lid rings and moved out of the storage area with a drum hand truck. The drums will be placed along the north wall of Section 118-A of Building 102 at approximately the center of the room. Adequate room exists between milling equipment and the wall to allow a five feet access aisle.

Following closure, the drums will be moved back into the storage area, where they will be available to receive additional wastes. In order to document less than 90-day storage, and to designate their contents as hazardous waste, the drums will be affixed with dated tags. Inspections will be conducted as required by the existing Laboratory inspection schedule.

4.2 Decontamination

Following removal of the waste, the storage area will be decontaminated. The floor and walls will be vacuum cleaned 3 m (10 ft) in each direction from the corner to remove dust. Following vacuuming, the area supervisor will inspect the area to ensure that there are no visual accumulations of LiH dust or chips.

The dust accumulated by vacuuming will be picked up with a dust pan, then double-bagged in plastic bags and placed in a steel drum. The vacuum sweeper will be wiped clean inside and out with rags and then washed with water.

When the inspection fails to show visible evidence of LiH, the floor will be scrubbed and the walls wiped with water. Excess water will be picked up with an industrial vacuum sweeper, and the dirty water from cleaning will be poured into an industrial drain that flows to a Laboratory water treatment plant at TA 50-1. This treated water is discharged from the treatment plant under an NPDES permit. The dirty water will be sampled to determine adequate decontamination as defined in Section 4.3.6. Should testing of the wash water indicate that decontamination is incomplete, additional washings with water will be repeated until the area is fully decontaminated. After allowing the floor and walls to dry, the waste drums will be moved back in to the storage area with a drum hand truck.

The wastes are handled in double wrapped plastic bags, so there is no contact of wastes with the drum handling truck, and therefore no need to decontaminate the cart. The rags used for cleaning will be packed in plastic bags and placed in drums. The vacuum used for sweeping will be washed with water.

Workers involved in moving the drummed wastes or cleaning the area will wear coveralls, rubber gloves, safety glasses, and protective booties over their shoes. Coveralls and booties will be washed at the Laboratory's industrial laundry.

4.3 Sampling and Analytical Procedures

4.3.1 General Considerations

The following sections define procedures and methods for sampling, analysis and documentation applicable to closure. While specific procedures are defined, alternate methods given in Test Methods for Evaluating Solid Wastes, USEPA, SW 846 most current edition (SW 846) may be used if sampling conditions or experience indicate another method is preferable. The following methods are from SW 846.

4.3.2 Sampler

The Coliwasa sampler will be used to sample the clean water for background parameters, before washing the area, and the wash water after cleaning the area. The simple design makes the sampler easy to use and allows rapid collection of samples, thus minimizing the exposure of the sample collector to potential hazards from the waste. The recommended model of the Coliwasa is shown in Figure 4-1, the main parts consisting of the sampling tube, the closure-locking mechanism, and the closure system.

4.3.3 Cleaning and Storage of Sampler

The sampler must be clean before use. The used sampler must be washed with a warm detergent solution (Liquinox or Alconox), rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. A necessary piece of equipment for cleaning the tube of the Coliwasa is a bottle brush that fits tightly inside the diameter of the tube. The brush is connected to a rod of sufficient length to reach the entire length of the sampler tube. Using this ramrod and fiber-reinforced paper towels, the Coliwasa tube may be quickly cleaned. Improper cleaning of sample equipment will cause cross contamination of samples. The contamination is of particular importance in these samples, because they will be taken for regulatory purposes. Clean samplers should be stored in polyethlene plastic tubes or bags in a clean and protected area.

4.3.4 Sampling Procedures

- Assemble the glass Coliwasa sampler according to Figure 4-1.

- Make sure that the glass Coliwasa sampler is clean.

- Check to make sure the sampler is functioning properly. Adjust the locking mechanism if necessary to make sure the neoprene rubber stopper provides a tight closure.

- Wear necessary protective clothing and gear and observe required sampling precautions.

- Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.

- Slowly lower the Coliwasa sampler into the liquid. Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a nonrepresentative sample.

- When the sampler stopper hits the bottom of the liquid container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

- Slowly withdraw the sampler from the container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.

- Carefully discharge the sample into a glass container by slowly opening the sampler. This is done by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in the glass container.

- Cap the glass container, attach a label and seal record in field log book, and complete the sample analysis request sheet and chain of custody record.

- Unscrew the T-handle of the sampler and disengage the locking block. Clean the sampler on site or store the contaminated parts of the sampler in a plastic storage tube or bag for subsequent cleaning. Store used rags in plastic bags for subsequent disposal.

- Deliver the sample to the laboratory for analysis.

4.3.5 Sample Handling

After a sample is transferred into the glass container, the container must be tightly capped as quickly as possible to prevent the loss of volatile components and to exclude possible oxidation from the air. The sample should be refrigerated or treated with preservatives as required for the analysis and defined in SW 846. To split or withdraw an aliquot of a sample, considerable mixing, homogenization, or quartering is required to ensure that representative or identical portions are obtained. When transferring a sample aliquot, open the glass container as briefly as possible.

Each sample must be properly labeled and sealed immediately after collection.

4.3.5.1 Sample Labels

Sample labels (Figure 4-2) are necessary to prevent misidentification of samples. Gummed paper labels or tags are adequate. The label must include at least the following information:

- Name of collector
- Date and time of collection
- Place of collection
- Collector's sample number, which uniquely identifies the sample.

4.3.5.2 Sample Seals

Sample seals are used to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory. Gummed paper seals can be used as official sample seals. The paper seal must carry information such as:

- Collector's name
- Date and time of sampling
- Collector's sample number. This number must be identical with the number on the sample label.

The seal must be attached in such a way that it is necessary to break it in order to open the glass sample container. An example of a sample seal is shown in Figure 4-3.

4.3.5.3 Field Log Book

All information pertinent to a field survey and/or sampling must be recorded in a log book, which must be a bound book, preferably with consecutively numbered pages that are 8 1/2 by 11 in. Entries in the log book must include at least the following:

- Purpose of sample
- Location of sampling and address
- Name and address of field contact
- Producer of waste and address
- Type of process producing waste
- Type of waste
- Declared waste components and concentrations
- Description of sampling point
- Date and time of collection
- Collector's sample identification number(s)
- Sample distribution
- References such as maps or photographs of the sampling site
- Field observations
- Any field measurements made such as pH, flammability, explosibility

Sampling situations vary widely. No general rule can be given about to the extent of information that must be entered in the log book. A good rule, however, is to record sufficient information

so that someone can reconstruct the sampling situation without relying on the collector's memory. The log book must be protected and kept in a safe place.

4.3.5.4 Chain of Custody Record

To establish the documentation necessary to trace sample possession from the time of collection, a completed chain of custody record must accompany every sample. This record becomes especially important when the sample is to be introduced as evidence in a court litigation. An example of a chain of custody record is illustrated in Figure 4-4. The record must contain the following minimum information:

- Collector's sample number
- Signature of collector
- Date and time of collection
- Place and address of collection
- Waste type
- Signatures of persons involved in the chain of possession
- Inclusive dates of possession.

4.3.5.5 Sample Analysis Request Sheet

The sample analysis request sheet (Figure 4-5) is intended to accompany the sample on delivery to the laboratory. The field portion of this form must be completed by the person collecting the sample and should include most of the pertinent information

noted in the log book. The laboratory portion of this form is intended to be completed by the laboratory personnel and to include:

- Name of person receiving the sample
- Laboratory sample number
- Date of sample receipt
- Analyses to be performed

4.3.5.6 Sample Delivery to the Laboratory

The sample should be delivered to the laboratory for analysis as soon as practicable, usually the same day as the sampling. The sample must be accompanied by the chain of custody record and by a sample analysis request sheet. The sample must be delivered to the person in the laboratory authorized to receive samples.

4.3.5.7 Shipping of Samples

When a sample is shipped to the laboratory, it must be packaged in a proper container to avoid leakage and/or breakage. Acceptable packing materials include sawdust, crumpled newspapers, vermiculite, polyurethane chips, etc. Other samples that require refrigeration must be packed with reusable plastic packs or cans of frozen gels in molded polyurethene boxes with a sturdy fiberboard protective case. The boxes must be taped closed with masking tape or fiber plastic tape. All packages must be accompanied by a sample analysis request sheet and chain of custody record. Complete address of the sender and the receiving laboratory must legibly appear on each package.

4.3.6 Sampling Parameters

Each sample will be analyzed for pH, cyanides, toxic metals, and organics in Table 4-1.

A minimum of two background samples will be collected from the clean water before it is used to wash the area. If repeated washings occur, a minimum of two clean water samples will be taken to add to the background data base. The background samples will be analyzed for pH, EP toxic metals, organics and cyanides and compared with the results from the wash water. The statistical methods described in Test Methods for Evaluation Solid Waste, USEPA SW 846, will be used to to compare the background sample results to the wash water results. If the comparison indicates no contamination, then further cleaning need not to be done. If comparison of the analytical results indicates contamination, the area will be cleaned until it is confirmed, by testing, that the contamination has been removed.

4.4 Rationale for Closure

The only hazardous waste present at TA3-102 is LiH, which is hazardous because it reacts violently with water. The products of the reaction of water and LiH are hydrogen and lithium hydroxide, neither of which is a listed hazardous waste. Lithium hydroxide can be corrosive but the concentrations resulting from the washing operation will have a pH less than 12.5. Assuming that a 1/8th-inch particle was left undetected in the visual

inspection, an explosion would not occur. The weight of the LiH particle is 0.026 grams which, when reacted with water, would yield 0.078 grams of lithium hydroxide and 0.0065 grams (0.00257 SCF) of hydrogen. The heat of reaction would be only 0.1 kcal (0.4 BTU). These levels of reaction product and energy release do not present a hazard during the area washdown. The closure decontamination procedure is the same procedure that has successfully been used regularly to clean the LiH shop area. The reaction of LiH is rapid and complete, and because it is reactive with water, washing the minute quantities remaining as dust renders the residue non hazardous.

Dirty water from the area washdown is analyzed for EP toxic metals and selected toxic hydrocarbon constituents to demonstrate that the area was not inadvertantly contaminated with other metals and solvents. The pH analysis ensures that LiOH residuals are not in sufficient quantities to be corrosive.

The storage area is within an LiH processing area and will be used in the future for short term storage of the same material that is currently stored. A more rigorous decontamination procedure would serve no purpose.

4.5 Closure Schedule

The closure plan for TA 3-102 will be submitted to the NMEID on September 30, 1985. Upon written approval of the plan by the NMEID, LIH maching in Section 118-A will cease, no further storage of the waste will occur, and closure will commence within 15 days. TA 3-102 will be closed in 1986.

One day is required to move the present waste out of the area. Six weeks are needed to schedule and complete the cleaning of the area, and for analysis. An additional week is allowed to ensure that the area is dry before returning the waste to the storage area. One day is provided to replace the drums in their original location. Total closure time from plan approval to completion will take 51 days.

The owner of the facility will have a copy of this closure plan at the facility until closure is complete and certified. The plan must be amended if any change occurs to affect it, as per [HWMR 206.C.2.c.(2).].

4.6 Certification

An independent registered professional engineer and the owner/operator of the facility shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the container storage area has been closed in accordance with this plan. The letter shall be dated and signed by each party and

stamped by the registered engineer, and the original copy submitted by the DOE to the Director of the NMEID; one copy shall be maintained at the Building 102 office and one copy maintained by the HSE-8 Regulatory Compliance Group.

4.7 Closure Schedule Summary

Activity	Duration
Submit Closure Plan to NMEID	September 28, 1985
Discontinue LiH generation and storage	Upon written approval of plan
Begin closure operations	Within 15 days of plan approval
Remove waste from the area	1 day
Schedule and complete clean-up and analysis	6 weeks
Allow area to dry	1 week
Replace drums in original location	1 day

5.0 GENERAL CONSIDERATIONS

5.1 Contact Person

Upon approval of this closure plan, the NMEID and LANL will coordinate in writing the respective contact person(s) for organization of activities and communications between the parties under the plan. The parties will provide timely written notification of any changes in the designation of contact persons during the term of this plan. LANL will provide a minimum of ten days advance notice to the NMEID, through the NMEID contact person(s), of any construction, sampling, or activities conducted under this closure plan.

5.2 Quality Assurance

Effectiveness of the programs contained in this plan is specifically dependent on the proper sampling and analytical methods. LANL will use sampling, quality assurance, quality control, and chain of custody procedures that are consistent with the USEPA Regulations throughout all activities contemplated under this plan. All analytical testing will be performed in a laboratory using appropriate USEPA procedures with QA/QC in conformance with USEPA requirements.

5.3 Split Samples

Upon request by authorized representatives of the NMEID, LANL will provide split samples of any samples collected under this plan. If any analysis shall is made of the split, a copy of the

results of the analysis shall be furnished promptly to LANL. This includes all relevant technical data genrated by the NMEID representatives, their agents or contractors.

5.4 Facility Access

Upon request, LANL will provide reasonable access to its facility to authorized representatives of the NMEID for the purpose of monitoring, sampling, and observing activities carried out under this plan. NMEID representatives shall comply with established LANL safety and security practices.

5.5 Cooperation

LANL and the EID's representatives will cooperate to the fullest extent possible in the reporting and exchange of data developed under this plan. Copies in LANL's possession of results of all sampling and analyses, and other relevant technical data generated by the parties, or their agents or contractors under this plan, including raw data, field notes, and laboratory bench sheets and reports, will be exchanged as soon as practicable. In the event LANL contracts with a laboratory to perform work and the State of New Mexico requests from the laboratory copies of raw data, field notes, or laboratory bench sheets generated for LANL under this plan, LANL shall indicate to the laboratory that it has no objection to the documents being provided to the State of New Mexico.

TABLE 4-1

SAMPLING PARAMETERS

AND METHODS

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA* Analytical Method
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
-	Nickel	-	6010
-	Beryllium	-	6010

<u>Organics</u>

GC/MS for volatiles	8240
GC/MS for semivolatiles	8250 or 8270

<u>Other</u>

Cyanide	9010

*Analytical methods may include any applicable methods found in USEPA SW 846.

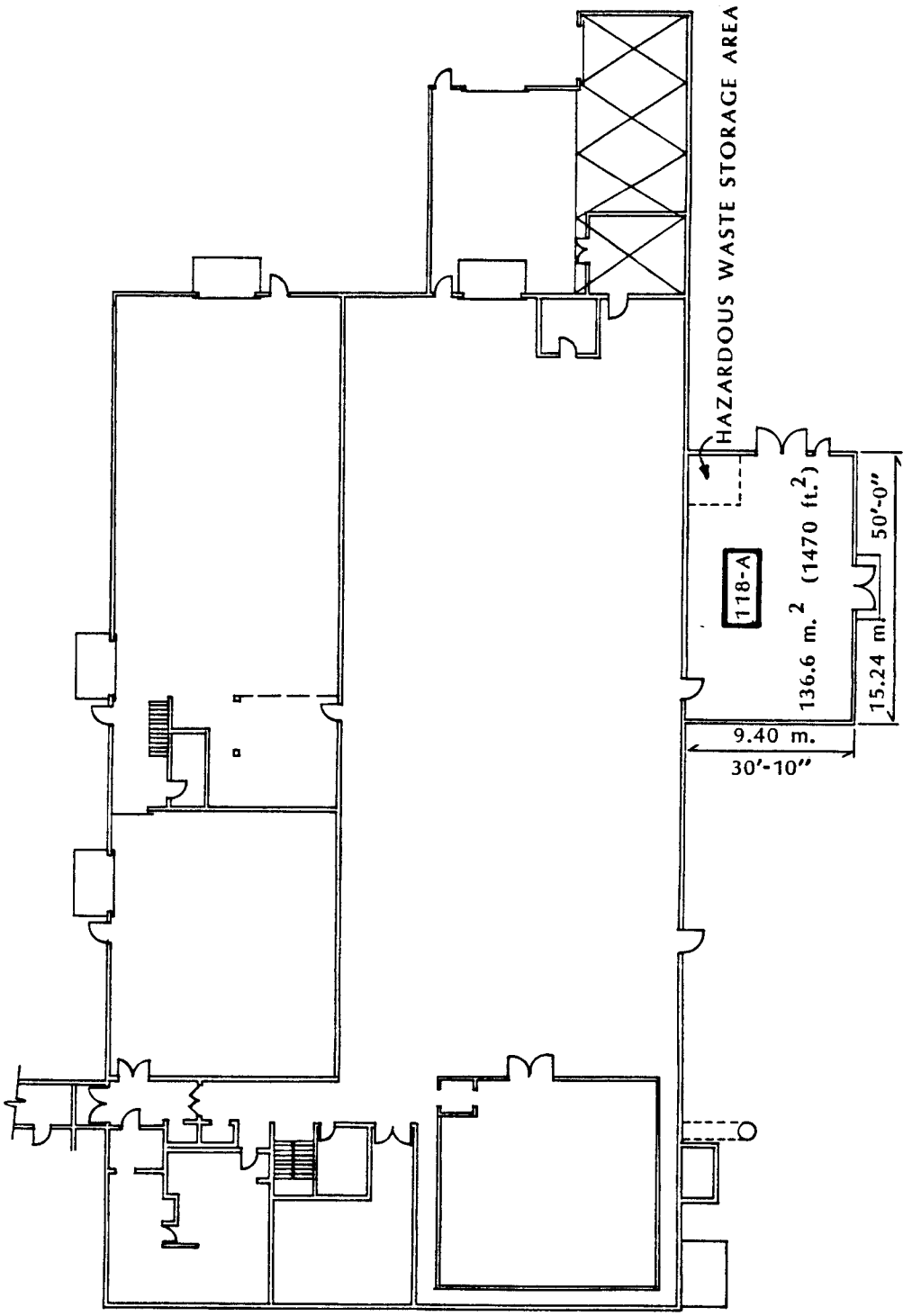

FIGURE 2-1

TA 3 BUILDING 102
FLOOR PLAN

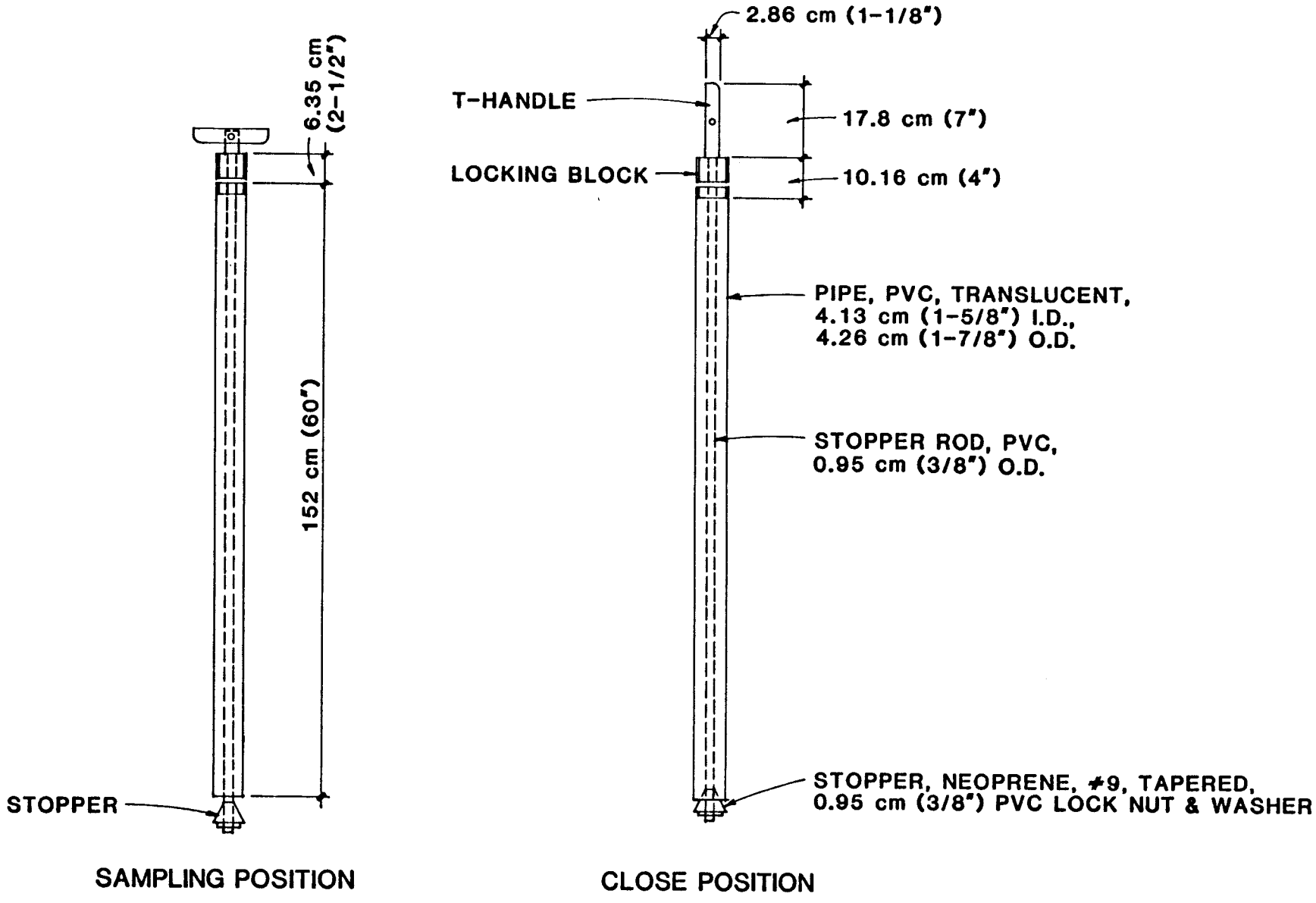

FIGURE 4-1

COMPOSITE LIQUID WASTE SAMPLER (COLIWASA)

FIGURE 4-2
EXAMPLES OF SAMPLE LABELS

OFFICIAL SAMPLE LABEL

Collector_____ Collector's Sample No._____

Place of Collection_____

_____

Date Sampled_____ Time Sampled_____

Field Information_____

_____

_____

ALTERNATE SAMPLE LABEL

DATE_____ TIME_____ SAMPLE NO._____ ORIGIN_____

LOCATION SAMPLED

_____

DESCRIPTION

_____

REMARKS

_____

REQUESTED ANALYSIS

_____

SAMPLED BY: (PRINT AND SIGN) LOG REFERENCE

TAG NO.____OF____

_____

FIGURE 4-3
EXAMPLE OF SAMPLE SEAL

OFFICIAL SAMPLE SEAL

Collected by_____ Collector's Sample No._____
(Signature)

Date Collected_____ Time Collected_____

Place Collected_____

_____

_____

FIGURE 4-4
CHAIN OF CUSTODY RECORD
Hazardous Materials
Collectors Sample No.____

Location of Sampling: __Producer __Hauler __Disposal Site

__Other:_____

Company's Name_____Telephone (___)_____

Address_____
number street city state zip

Collector's Name_____Telephone (___)_____
signature

Date Sampled_____ Time Sampled_____hours

Type of Process Producing Waste_____

Waste Type Code_____ Other_____

Field Information_____

_____

_____

Sample Allocation:

1. _____
name of organization

2. _____
name of organization

3. _____
name of orgainzation

Chain of Possession

1. _____ _____ _____ _____
signature title inclusive dates

2. _____ _____ _____ _____
signature title inclusive dates

3. _____ _____ _____ _____
signature title inclusive dates

FIGURE 4-5
HAZARDOUS MATERIALS SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION
==========

Collector_____ Date Sampled_____ Time_____hours

Location of Sampling_____
name of company, disposal site, etc.

Address_____
number street city state zip

Telephone (___)_____ Company Contact_____

HML NO. (Lab only)	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Analysis Requested_____

_____

_____

Special Handling and/or Storage_____

_____

PART II: LABORATORY SECTION
==========

Received by_____Title_____Date_____
Sample Allocation: __HML __LBL __LABL __SRL Date_____
Analysis Required_____
_____
_____

*Indicate whether sample is sludge, soil, etc.; **Use back of page for additional information.

CLOSURE PLAN FOR
TA 22-24 MAGAZINE
CONTAINER STORAGE AREA
FOR
HIGH EXPLOSIVE CONTAMINATED WASTES

Facility ID No.: NM0890010515
Facility Name: Los Alamos National Laboratory
Legal Owner: United States Department of Energy
City, State: Los Alamos, New Mexico 87545
Phone: (505)667-5288

SEPTEMBER 1985

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4-1 Composite Liquid Waste Sampler (Coliwasa)

4-2 Examples of Sample Labels

4-3 Example of Sample Seal

4-4 Chain of Custody Record

4-5 Hazardus Materials Sample Analysis Request

1.0 INTRODUCTION

The Los Alamos National Laboratory's Technical Area 22 Building 24 (TA 22-24) is a magazine used for the storage of high explosives (HE) and explosive contaminated wastes. HE wastes are hazardous and regulated under New Mexico Environmental Improvement Division's (NMEID) Hazardous Waste Management Regulations (HWMR) because they are reactive (D003) or ignitable (D001). TA 22-24 is a container storage area operated under a Resource Conservation and Recovery Act (RCRA) Part A Permit. A Part B permit is not being sought for this facility. TA 22-24 will be closed under interim authority; following closure, the facility will be put back in service for HE storage and/or short-term (less then 90 days) storage of HE wastes. The operation of TA 22-24 for less than 90 day waste storage does not require a Part B permit (HWMR 204 B.1.).

This document is the closure plan required by HWMR 206 C.2. Closure consists of removing the wastes from and decontaminating the storage area.

2.0 TA 22-24 CONTAINERIZED STORAGE DESCRIPTION

TA 22-24 is a 2 m (6 ft) wide by 2 m (6 ft) long by 2.1 m (7 ft) high concrete magazine bunkered with earth on three sides (Figure 2-1). The fourth side has a steel door that opens to the south, and is kept locked except when the magazine is entered. The three bunkered walls have steel shelves approximately 0.6 m (2 ft) deep by 1.2 m (4 ft) wide and 2 m (6 ft) high, on which waste pails are kept. The magazine has a smooth crack-and seam-free concrete floor. Walls are rough concrete.

3.0 WASTE DESCRIPTION

HE wastes and HE contaminated wastes are the only hazardous materials stored at TA 22-24. Wastes consist of small scraps of HE resulting from assembly of test shots, as well as rags, paper, tape, cotton swabs, and other trash items that have contacted HE and are suspected of being contaminated. HE handled at the Laboratory includes HMX, RDX (cyclonite), TNT (2,4,6 trinitrotoluene), PETN (pentoerythritol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine and various plastic binders. Barium nitrate is also categorized as an EP toxic waste. The wastes are placed in plastic bags, which are placed in 5-gallon plastic pails with tight fitting covers. Pails and plastic bags are not opened in the magazine.

The maximum HE or HE-contaminated waste stored at any given time at TA 22-24 is 250 kg (500 lbs) and is limited by administratively controlled standard operating procedures (SOP). From TA 22-24 waste is taken to burn pads at S-Site where it is ignited. Wastes containing metal pieces are burned at a permitted detonation site. The detonation site can safely accomodate shrapnel that results from detonation.

No wastes are currently stored at TA 22-24, nor are any wastes expected to be stored there before closure. Although several empty pails remain in the magazine, it is otherwise empty.

The waste storage service provided in the past by TA 22-24 has been replaced by a small magazette located at TA 24-96, which is used for less than 90-day storage.

4.0 CLOSURE PLAN

4.1 Waste Removal

Currently, TA 22-24 has no wastes in storage and none are expected. Should wastes accumulate before closure, those wastes will be moved to the burn pad at TA-16 or to the permitted detonation site. The wastes will be in plastic bags in five gallon plastic pails, which are never more than half full by SOP. The pails of wastes are manually loaded from the magazine into a pickup truck and taken to the burn pad or detonation site. The pickup trucks used to move HE at the Laboratory are specially equipped to prevent ignition.

The empty pails remaining in TA 22-24 will be removed by hand and taken to other facilities where they will be used for similar purposes, such as the accumulation of volumes of waste for short-term storage or containers for HE. The decontamination practice for equipment suspected of being contaminated with HE is to burn the equipment, however, burning the plastic pails would end their usefulness. Because the pails never directly contact the waste, and because the actual contents of the pails present a greater risk than any residual contamination, simply removing the pails and reusing them is considered adequate handling.

4.2 Decontamination

Following the removal of the empty pails, the shelves will be dusted with rags and the floor swept with a broom. The accumulated dust and the rags used to wipe the shelves will be placed

in plastic bags and pails and transferred with appropriate labeling to short-term storage in the magazette at TA 22-96, to be burned with other wastes at S-Site. Following the dusting and sweeping, the area supervisor will inspect TA 22-24 for visible evidence of HE or HE-contaminated material. If any such materials found, they will be picked up, placed in plastic bags, and handled as was the dust removed from the magazine. Following the inspection verifying that TA 22-24 is free of visible indications of HE or HE-contam-inated wastes the shelves and floor will be washed with a warm Liquinox or Alconox solution in water. The excess water will be picked up with rags and wrung into a plastic bucket. The wash water will be sampled and analyzed to ensure adequate deconta-mination. Sampling and analytical procedure are defined in Section 4.3. The recovered wash water will be poured into an HE contaminated water sump at TA 22. This water is picked up with a dedicated vacuum truck and hauled to the burn pad area at S-Site where the water is filtered in sand filters and the residue is burned. Filtered water is discharged under a NPDES permit.

4.3 Sampling and Analytical Procedures

4.3.1 General Considerations

The following sections define procedures and methods for sampling, analysis, and documentation applicable to closure. While specific procedures are defined, alternate methods given in Test Methods for Evaluating Solid Wastes, USEPA, SW 846, most

current edition, (SW 846) may be used if sampling conditions or experience indicate another method is preferable. The following methods are from SW 846.

4.3.2 Sampler

The Coliwasa sampler will be used to sample the clean water for background parameters before washing the area, and to sample the wash water after cleaning of the area. The simple design makes the sampler easy to use and allows the rapid collection of samples, which minimizes chances of exposuring of the sample collector to potential hazards from the waste. The recommended model of the Coliwasa is shown in Figure 4-1, the main parts consisting of the sampling tube, the closure-locking mechanism, and the closure system.

4.3.3 Cleaning and Storage of Sampler

The sampler must be clean before use. The used sampler must be washed with a warm detergent solution (Liquinox or Alconox), rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. A necessary piece of equipment for cleaning the tube of the Coliwasa is a bottle brush that fits tightly inside the diameter of the tube. The brush is connected to a rod of sufficient length to reach the entire length of the sampler tube. Using this ramrod and fiber-reinforced paper towels, the Coliwasa tube may be quickly cleaned. Improper cleaning of sample equipment will cause cross contamination of samples. The absense of contamination is of

particular importance in these samples, since they will be taken for regulatory purposes. Clean samplers should be stored in polyethlene plastic tubes or bags in a clean and protected area.

4.3.4 Sampling Procedures

- Assemble the glass Coliwasa sampler according to 4.3.2.1 and Figure 4-1.

- Make sure that the glass Coliwasa sampler is clean.

- Check to make sure the sampler is functioning properly. Adjust the locking mechanism if necessary to make sure the neoprene rubber stopper provides a tight closure.

- Wear necessary protective clothing and gear and observe required sampling precautions.

- Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.

- Slowly lower the Coliwasa sampler into the liquid at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.

- When the sampler stopper hits the bottom of the liquid container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

- Slowly withdraw the sampler from the container with one hand while wiping the sampler tube with a disposable cloth or rag with the other hand.

- Carefully discharge the sample into a glass container by slowly opening the sampler. This is done by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in the glass container.

- Cap the glass container, attach a label and seal record in the field log book, and complete the sample analysis request sheet and chain of custody record.

- Unscrew the T-handle of the sampler and disengage the locking block. Clean sampler on site or store the contaminated parts of the sampler in a plastic storage tube or bag for subsequent cleaning. Store used rags in plastic bags for subsequent disposal.

- Deliver the sample to the laboratory for analysis.

4.3.5 Sample Handling

After a sample is transferred into the glass container, the container must be tightly capped as quickly as possible to prevent the loss of volatile components and to exclude possible oxidation from the air. The sample should be refrigerated or treated with preservatives as required for the analysis and defined in SW 846. To split or withdraw an aliquot of a sample, considerable mixing, homogenization, or quartering is required to ensure that representative or identical portions are obtained. When transferring a sample aliquot, open the glass container as briefly as possible.

Each sample must be properly labeled and sealed immediately after collection.

4.3.5.1 Sample Labels

Sample labels (Figure 4-2) are necessary to prevent misidentification of samples. Gummed paper labels or tags are adequate. The label must include at least the following information:

- Name of collector
- Date and time of collection
- Place of collection
- Collector's sample number, which uniquely identifies the sample.

4.3.5.2 Sample Seals

Sample seals are used to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory. Gummed paper seals can be used as official sample seals. The paper seal must carry information such as:

- Collector's name
- Date and time of sampling
- Collector's sample number. This number must be identical with the number on the sample label.

The seal must be attached in such a way that it is necessary to break it in order to open the glass sample container. An example of a sample seal is shown in Figure 4-3.

4.3.5.3 Field Log Book

All information pertinent to a field survey and/or sampling must be recorded in a log book, which must be a bound book, preferably with consecutively numbered pages that are 8 1/2 by 11 in. Entries in the log book must include at least the following:

- Purpose of sample
- Location of sampling and address
- Name and address of field contact
- Producer of waste and address
- Type of process producing waste
- Type of waste
- Declared waste components and concentrations
- Description of sampling point

- Date and time of collection
- Collector's sample identification number(s)
- Sample distribution
- References such as maps or photographs of the sampling site
- Field observations
- Any field measurements made, such as pH, flammability, explosibility, etc.

Because sampling situations vary widely, no general rule can be given about the extent of information that must be entered in the log book. A good rule, however, is to record sufficient information so that someone can reconstruct the sampling situation without relying on the collector's memory. The log book must be protected and kept in a safe place.

4.3.5.4 Chain of Custody Record

To establish the documentation necessary to trace sample possession from the time of collection, a completed chain of custody record must accompany every sample. This record becomes especially important when the sample is to be introduced as evidence in a court litigation. An example of a chain of custody record is illustrated in Figure 4-4. The record must contain the following minimum information:

- Collector's sample number
- Signature of collector
- Date and time of collection
- Place and address of collection

- Waste type
- Signatures of persons involved in the chain of possession
- Inclusive dates of possession.

4.3.5.5 Sample Analysis Request Sheet

The sample analysis request sheet (Figure 4-5) is intended to accompany the sample upon delivery to the laboratory. The field portion of this form must be completed by the person collecting the sample and should include most of the pertinent information noted in the log book. The laboratory portion of this form is intended to be completed by the laboratory personnel and to include:

- Name of person receiving the sample
- Laboratory sample number
- Date of sample receipt
- Analyses to be performed

4.3.5.6 Sample Delivery to the Laboratory

The sample should be delivered to the laboratory for analyses as soon as practicable, usually the same day as the sampling. The sample must be accompanied by the chain of custody record and by a sample analysis request sheet. The sample must be delivered to the person in the laboratory authorized to receive samples.

4.3.5.7 Shipping of Samples

When a sample is shipped to the laboratory, it must be packaged in a proper container to avoid leakage and/or breakage. Acceptable packing materials include sawdust, crumpled newspapers, vermiculite, polyurethane chips, etc. Other samples that require refrigeration must be packed with reusable plastic packs or cans of frozen gels in molded polyurethene boxes with a sturdy fiberboard protective case. The boxes must be taped closed with masking tape or fiber plastic tape. All packages must be accompanied by a sample analysis request sheet and chain of custody record. Complete address of the sender and the receiving laboratory must legibly appear on each package.

4.3.6 Sampling Parameters

Each sample will be analyzed for pH, cyanides, toxic metals and organics, as shown in Table 4-1.

Background samples will be collected from the clean Liquinox or Alconox-water solution before it is used to wash the area. If repeated washings occur, a minimum of two additional clean wash solution samples will be taken to add to the background data base. The background samples will be analyzed for pH, EP toxic metals, organics, and cyanides and then compared with the results from the wash water. The statistical methods described in Test Methods for Evaluating Solid Waste USEPA SW 846, will be used to to compare the background sample results to the wash water results. If the comparison indicates no contamination, then fur-

ther cleaning need not be done, however, if comparison of the analytical results indicates contamination, the area will be cleaned until it is confirmed, by testing, that the contamination has been removed.

4.4 Rationale For Closure Plan

The only hazardous waste handled at TA 22-24 are HE and HE-contaminated wastes. These materials are handled in closed containers that are not opened in the magazine, so there is no reason to believe that HE has contaminated the magazine. Dusting the shelves and sweeping the floor are the standard housekeeping procedures used to maintain the cleanliness of the area. Water washing provides an acceptable mechanism within the confines of SW 846 for analysis to demonstrate adequate decontamination. The magazine will be used in the future to store HE, so a more rigorous decontamination procedure will serve no purpose.

The standard procedure for handling suspected contaminated equipment involves a thorough cleaning, followed by burning, which destroys any residual HE. This treatment destroys the equipment and is only done at the end of its useful life. General housekeeping measures are performed to minimize contamination. The closure plan is consistent with these measures, and allows continued use of the magazine for HE storage.

Sampling and analysis for metals and organics are performed to demonstrate that the area has not been contaminated by metals and solvents that are used in other locations at the Laboratory. An analysis for cyanides is conducted to demonstrate that nitrogen based organics have not decomposed to form cyanides, contaminating the area.

4.5 Closure Schedule

The closure plan for TA 22-24 will be submitted to the NMEID on September 28, 1985. Upon written approval of the plan from the NMEID, no additional waste will be admitted to the area and closure activities will begin within 90 days. Four weeks are needed to schedule a waste burn, should any wastes have accumulated, and to remove any full pails from the magazine and move them to the appropriate area. Clean-up will take six weeks, including scheduling, cleaning, removal of rags and accumulated dust, and analysis to verify decontamination. Four weeks will be allocated for the supervisor's inspection and further clean-up, if necessary. The total duration of closure will be 98 days, and the year of closure is 1986.

A copy of this closure plan will be maintained by the DOE at the facility until closure is complete. The plan must be amended by the DOE within 60 days if any changes occ ur to merit it, as per [HWMR 206.C.2.C.(2)].

4.6 Certification

An independent registered professional engineer and a representative of the DOE shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the container storage area has been closed in accordance with this plan. The letter shall be dated and signed by each party, and stamped by the registered engineer. The original copy will be submitted by the DOE to the director of the NMEID, with one copy maintained at the TA 22 Group Office and one copy maintained by the HSE-8 Regulatory Compliance Group.

4.7 Closure Schedule Summary

Activity	Duration
Submit Closure Plan to NMEID	September 28, 1985
Terminate acceptance of waste	Upon written approval of plan
Begin closure activities	Within 90 days of plan approval
Schedule waste burn and move stored wastes to appropriate site.	4 weeks

Schedule and complete clean-up and verification	6 weeks
Supervisor inspects and recommends possible further clean-up.	4 weeks

5.0 GENERAL CONSIDERATIONS

5.1 Contact Person

Upon approval of this closure plan, the NMEID and LANL will coordinate in writing to the respective contact person(s) for organization of activities and communications between the parties under the plan. The parties will provide timely written notification of any changes in the designation of contact persons during the term of this plan. LANL will provide a minimum of ten days advance notice to the NMEID through the NMEID contact person(s), of any construction, sampling, or activities conducted under this closure plan.

5.2 Quality Assurance

Effectiveness of the programs contained in this plan is specifically dependent on the proper sampling and analytical methods. LANL will use sampling, quality assurance, quality control, and chain of custody procedures that are consistent with the USEPA Regulations throughout all activities contemplated under this plan. All analytical testing will be performed in a laboratory using appropriate USEPA procedures with QA/QC in conformance with USEPA requirements.

5.3 Split Samples

Upon request by authorized representatives of the NMEID, LANL will provide split samples of any samples collected under to this plan. If any analysis is made of such samples, a copy of

the results of the analysis shall be furnished promptly to LANL. This includes all relevant technical data generated by the NMEID representatives, their agents, or contractors.

5.4 Facility Access

Upon request, LANL will provide reasonable access to its facility to authorized representatives of the NMEID for the purpose of monitoring, sampling, and observing activities carried out under this plan. NMEID representatives shall comply with established LANL safety and security practices.

5.5 Cooperation

LANL and the EID's representatives will cooperate to the fullest extent possible in the reporting and exchange of data developed under this plan. Copies in LANL's possession of results of all sampling and analyses, and other relevant technical data generated by the parties or their agents or contractors under this plan, including raw data, field notes, and laboratory bench sheets and reports will be exchanged as soon as practicable. In the event LANL contracts with a laboratory to perform work, and the State of New Mexico requests from the laboratory copies of raw data, field notes, or laboratory bench sheets generated for LANL, under this plan, LANL shall indicate to the laboratory that it has no objection to the documents being provided to the State of New Mexico.

TABLE 4-1

SAMPLING PARAMETERS

AND METHODS

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA* Analytical Method
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
-	Nickel	-	6010
-	Beryllium	-	6010

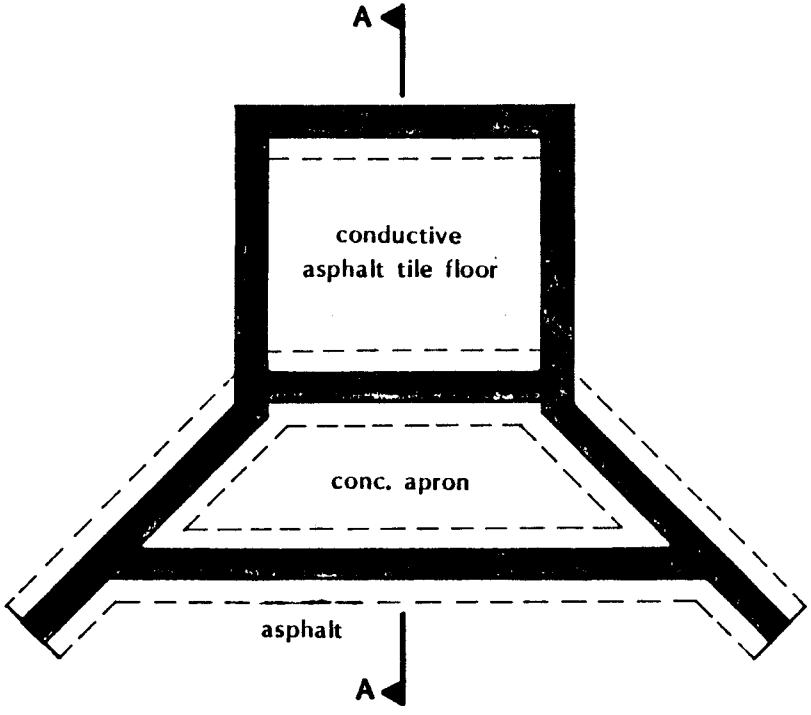
<u>Organics</u>

GC/MS for volatiles	8240
GC/MS for semivolatiles	8250

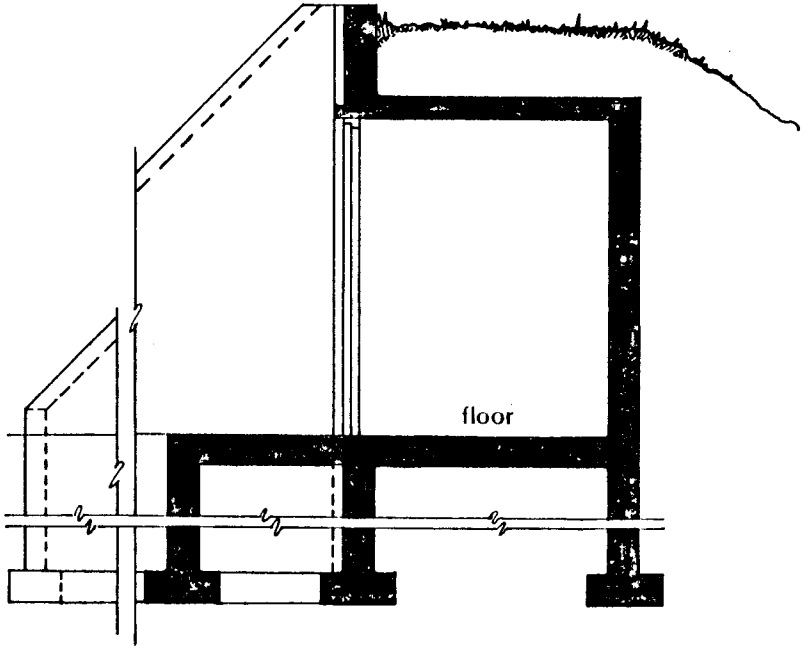
<u>Other</u>

Cyanide	9010

*Analytical methods may include any applicable methods found in USEPA SW 846.



PLAN VIEW



SECTION A-A

FIGURE 2-1

TA 22-24 MAGAZINE STORAGE FACILITY

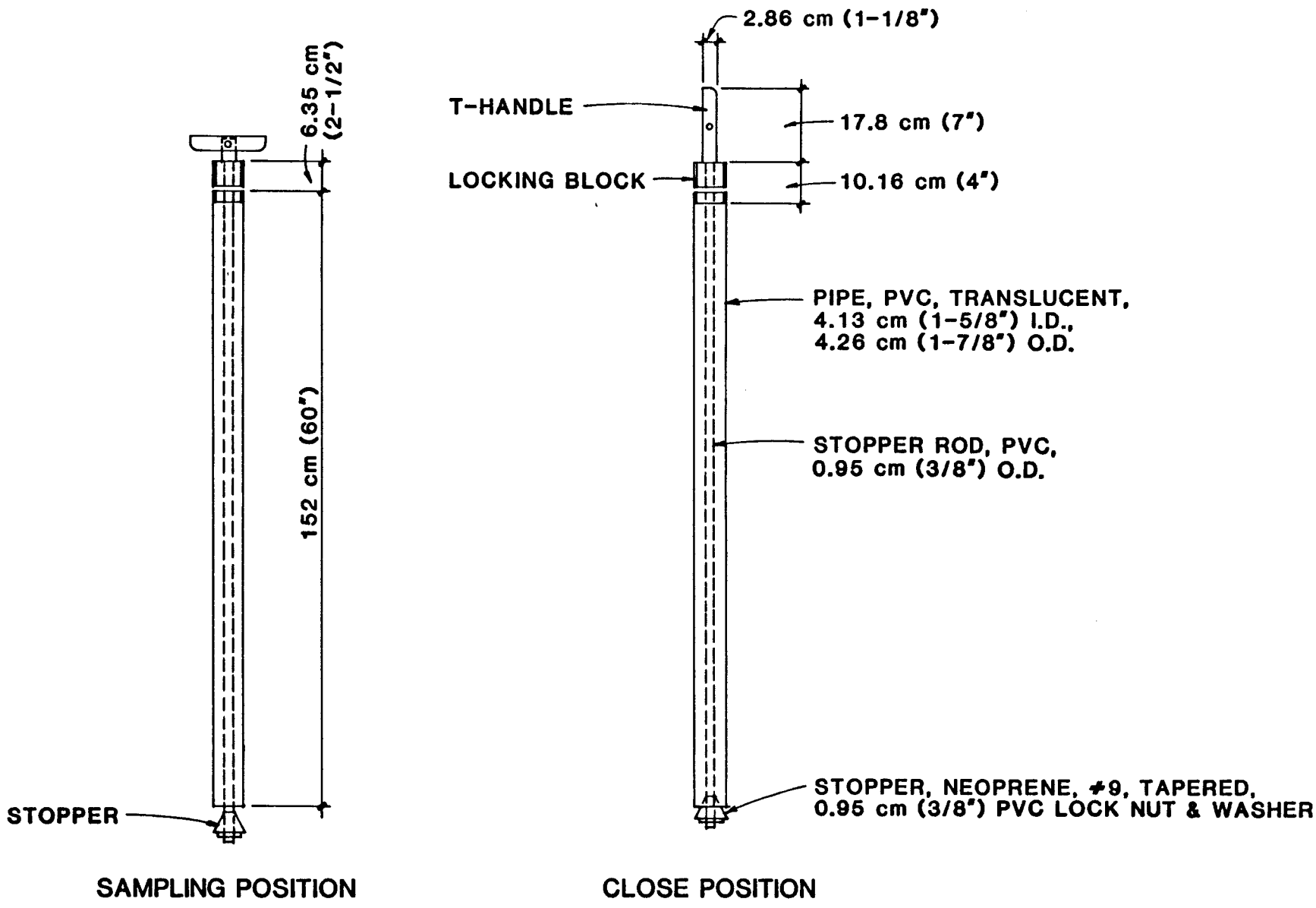


FIGURE 4-1

COMPOSITE LIQUID WASTE SAMPLER (COLIWASA)

FIGURE 4-2
EXAMPLES OF SAMPLE LABELS

OFFICIAL SAMPLE LABEL

Collector_____ Collector's Sample No._____

Place of Collection_____

_____

Date Sampled_____ Time Sampled_____

Field Information_____

_____

_____

ALTERNATE SAMPLE LABEL

DATE_____ TIME_____ SAMPLE NO._____ ORIGIN_____

LOCATION SAMPLED

_____

DESCRIPTION

_____

REMARKS

_____

REQUESTED ANALYSIS

_____

SAMPLED BY: (PRINT AND SIGN) LOG REFERENCE

TAG NO.____OF____

_____

FIGURE 4-3
EXAMPLE OF SAMPLE SEAL

OFFICIAL SAMPLE SEAL

Collected by_____ Collector's Sample No._____
(Signature)

Date Collected_____ Time Collected_____

Place Collected_____

_____

_____

FIGURE 4-4
CHAIN OF CUSTODY RECORD
Hazardous Materials
Collectors Sample No.____

Location of Sampling: __Producer __Hauler __Disposal Site

__Other:_____

Company's Name_____Telephone (___)_____

Address_____
number street city state zip

Collector's Name_____Telephone (___)_____
signature

Date Sampled_____ Time Sampled_____hours

Type of Process Producing Waste_____

Waste Type Code_____ Other_____

Field Information_____

_____

_____

Sample Allocation:

1. _____
name of organization

2. _____
name of organization

3. _____
name of orgainzation

Chain of Possession

1. _____ _____ _____ _____
signature title inclusive dates

2. _____ _____ _____ _____
signature title inclusive dates

3. _____ _____ _____ _____
signature title inclusive dates

FIGURE 4-5
HAZARDOUS MATERIALS SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION
==========

Collector_____ Date Sampled_____ Time_____hours

Location of Sampling_____
name of company, disposal site, etc.

Address_____
number street city state zip

Telephone (___)_____ Company Contact_____

HML NO. (Lab only)	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Analysis Requested_____

_____

_____

Special Handling and/or Storage_____

_____

PART II: LABORATORY SECTION
==========

Received by_____Title_____Date_____
Sample Allocation: __HML __LBL __LABL __SRL Date_____
Analysis Required_____
_____
_____

*Indicate whether sample is sludge, soil, etc.; **Use back of page for additional information.

ENCLOSURE 6

Closure and Post-Closure Plans

TA-54 Area G

CLOSURE AND POST CLOSURE PLANS FOR TA 54-AREA G LANDFILL AT LOS ALAMOS NATIONAL LABORATORY

Legal Owner: United States Department of Energy
Address : Los Alamos Area Office
City/State : Los Alamos, New Mexico 87545
Phone : (505)667-5288

September 1985

AREA G
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APPENDIX A Area G Current Existing Survey
APPENDIX B Area G Original Survey

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4-1 TA 54-Area G Disposal Pit Use Dates

4-2 Soil Sample Analysis Constituents

4-3 Checklist of Items Required for Field Sampling

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FIGURES

2-1 TA 54-Area G

4-1 Velhmeyer Soil Sampler

4-2 Examples of Sample Labels

4-3 Example of Sample Seal

4-4 Chain of Custody Record

4-5 Hazardous Materials Sample Analysis Request

1.0 INTRODUCTION

Area G at Los Alamos National Laboratory is situated on Mesita del Buey in TA-54 and is the primary operating radioactive solid waste burial/storage site at the Laboratory. Burial facilities include pits and shafts, all of varying dimensions. Certain radioactive mixed and nonradioactive hazardous chemical wastes have been buried along with the radioactive wastes at Area G. Such wastes include scintillation vials, asbestos, beryllium residues, empty pesticide containers, PCB-contaminated solids, and solid trash wastes contaminated or suspected of being contaminated by hazardous wastes. The hazardous wastes regulated by RCRA represent less than 1 percent of the total volume of wastes buried at Area G. Area G is a waste disposal facility operated under a Resource Conservation and Recovery Act (RCRA) Part A permit. A Part B permit is not being sought for this facility and Area G will be closed under interim authority.

2.0 AREA G DESCRIPTION

The active portion of the site comprises a total area of 63 acres. Burial/storage facilities within the area include pits, shafts, trenches, and pads, all of varying dimensions. The facility has only been used for pit and shaft disposal of regulated wastes. Trench and pad storage is applicable to non-regulated wastes. Figure 2-1 shows the present layout of Area G within the fenced portion of the site, and support facilities at the site. A more detailed description of the use of these facilities and of the current waste management operations is contained in the Los Alamos Final Environmental Impact Statement. TA 54 Area G has been an active landfill site for low level radioactive wastes since 1957.

3.0 WASTE DESCRIPTION

The majority of the wastes that are buried in Area G is low level radioactive waste. A list of certain regulated mixed wastes, and Appendix VIII constituents that have been placed in pits and shafts at Area G is given in Table 3-1, along with the waste container volume and the number of the pit or shaft into which the waste was placed. The waste list is based on a computer inventory which includes data only back to 1971. Most of the wastes listed in Table 3-1 are radioactive and are therefore mixed wastes. All regulated wastes transported to Area G are containerized or are a contaminated piece of equipment. The waste volumes listed on Table 3-1 are the volumes of the container or the estimated volume taken up by the contaminated equipment and does not include voids in partially filled containers, or the volume of adsorbents. The hazardous waste regulated by RCRA consists of less than 1 percent of the total wastes buried at Area G. Much of the previously mentioned wastes are containerized. Only solid wastes or liquid wastes packed in adsorbents are accepted at Area G. Trucks deliver containerized wastes to Area G. For pit disposal, the truck drives to the bottom of the pit and the wastes are unloaded and covered with backfill at the end of the day. For shaft disposal, containerized wastes are delivered to the site, unloaded next to the shaft, then placed in the shaft with a crane. No regulated wastes have ever been stored for more than 90 days or treated at Area G. There are no wastes in storage or treatment at the start of closure.

4.0 CLOSURE PLAN

4.1 Partial Closure

Partial closure has occurred at Area G when pits and shafts were closed as they were filled. In all disposal facilities, wastes are buried beneath the undisturbed rock (tuff) surface to minimize potential erosion effects. Shafts were filled with wastes to a level no higher than 3 feet below the "spill point" (lowest point on the shaft rim). Wastes were covered with a minimum of 0.5 feet layer of compacted crushed tuff. The final cover of a shaft was noncontaminated concrete, a minimum of 3 feet thick, slightly rounded, and extending about 0.5 feet above the land surface. Identifying engineering markers, brass caps,were placed in the final pour of seal concrete. Because shafts contain primarily radioactive wastes, information on the cap included the wording "Buried Radioactive Wastes," along with the shaft number, radionuclides buried, total curies, and dates of use.

The pits were closed when the waste level reached 3 feet of the spill point. The pits were filled with crushed compacted tuff (minimum 3 feet) overlain by topsoil (approximately 4 inches). The final cover was graded to match the original land surface, and grass has been planted.

The pits that have been closed and the date closed are shown on Table 4-1. Shaft 124 is the only shaft open which has received a regulated waste.

4.2 Closure of Regulated Wastes Landfill

The following closure is specific to pits and shafts that are open and have received regulated wastes. This includes pit 29 and shaft 124. Area G will be closed to acceptance of RCRA wastes and will continue to receive radioactive wastes.

Only wastes in solid or solidified form are accepted for burial. Shafts will be filled with nonregulated wastes to a level no higher than 3 feet below the "spill point" (lowest point on the shaft rim). Wastes are to be covered with a minimum of a 0.5 feet layer of compacted crushed tuff. The final cover of a shaft will be noncontaminated concrete, a minimum of 3 feet thick, slightly rounded, and extending about 0.5 feet above the land surface and extending beyond the shaft edge 6 inches. Identifying engineering markers, brass caps, will be placed on the final pour of seal concrete in the shaft. Because shafts contain radioactive wastes, information on the cap will include the wording "Buried Radioactive Wastes," along with the shaft number, radionuclides buried, total curies, and dates of use.

The pits are closed when the waste level reaches 3 feet of the spill point. The pit is filled with crushed compacted tuff (minimum 3 feet) overlain by topsoil (approximately 4"). The final cover of a pit will be at or above the original land surface, as required for contouring to provide the desired drainage within the area and provide for settling.

Wastes are placed in the pits in layers and each layer is covered with a layer of crushed tuff. Compaction is provided by delivery truck traffic and earth moving equipment. When the pit is filled within 3 feet of the spill point, the pit next to the full pit is excavated, and the excavated material stored in a pile on top of the full pit to provide further compaction. The stored excavated material is removed to provide layer fill and backfill in the pit it came from as that pit is filled. When the neighboring pit is nearly full, the excess tuff is removed and the full pit cover is contoured, covered with top soil and revegetated.

Provisions will be made to control run-off in the disposal area to minimize infiltration and erosion of the final cover of the pit. Turf-forming grasses and bunch grasses will be planted in the final cover to prevent wind and sheet wash erosion. The grass will be watered and fertilized for two growing seasons to ensure successful revegetation. Identifying engineering type markers will be placed at two diagonal corners of each pit. The markers, at least 12 inches in diameter, will be set approximately 2-3 deep in undisturbed tuff and will extend 0.5 to 1.0 feet above the ground surface.

4.3 Final Contour

In general, pit covers are contoured to match the original contour, sloping gently from the axis downward to the east. Areas including several pits are revegetated when disposal operations have moved far enough from the covered pits that truck and earth

moving equipment traffic no longer disrupts the area. Following revegetation, the area is resurveyed. Appendix A includes plats for those areas for which the final survey has been completed. Appendix B contains the original contour maps for areas not included in Appendix A and represents the target contours for pits in those areas including pit 29.

Because it is a mesa top, the surface is not prone to pond water. Temporary berms are formed at the inlet and outlet of a pit and a ditch is cut on the upslope side to prevent surface drainage into the pit while it is opened. These surface drainage controls are degraded by truck and earth moving equipment and are reconstructed and maintained daily using earth moving equipment. Because these controls are field constructed and change almost daily, their adequacy is judged by observing drainage patterns during precipitation. Surface drainage for closed pits follows the natural contours and is shown for completed areas on the plats in Appendix A.

On closing Area G for regulated wastes and as part of the closure plan, an engineering study for the entire site will be conducted to determine if existing drainage facilities are adequate to meet regulatory requirements, to minimize maintenance, and to control run-on so that exposure of the waste is prevented and infiltration is minimized. Should the engineering study determine any inadequacies, the surface water drainage controls will be redesigned using good engineering practice. Design improve-

ments can include modifications of contour to reduce slopes and minimize erosion as well as controls such as the use of rip rap, cobbles, diversion structures, and paving of drainage channels.

The findings of the engineering study and any design changes will be submitted to the NMEID within 30 days of the study completion for review and approval. Should the NMEID not approve the findings of the study, or the engineering design, the Laboratory will negotiate with NMEID for modifications that are acceptable to both parties.

As part of the closure, the existing cap design for all shafts containing regulated waste will be improved to prevent undercutting of the cap. An 8 inch deep by 8 inch wide trench will be dug a minimum of 1.5 feet from the edge of each shaft. Additional concrete will be added to the cap to extend the cap out and fill the trench.

4.4 Infiltration

Because only solid and solidified waste have been placed in the pits and shafts, the potential for leachate formation and transport to groundwater depends on infiltration. The adequacy of the pit cover design is based on information that indicates that run off and potential evapotranspiration exceed precipitation for the mesa top and that there is no infiltration to generate leachate. Information to support this position was in the "Ground Water Monitoring Waiver Request" submitted July 26, 1984,

and in subsequent submittals supporting the monitoring waiver. Additional information is being gathered in response to the May 7, 1985 Compliance Order/Schedule.

4.5 Decontamination

Area G will be closed in place, so that no waste will be removed unless the soil surface shows signs of contamination. There have been no spills of regulated waste at Area G. Nevertheless the soil surface in Area G around pit 29 and access areas to pit 29 will be inspected for signs of contamination, such as discolored areas or unidentified residues. Soil samples will be taken from any areas where leakage appears to have occurred, and analyzed for waste constituents for that area (Table 4-2). The results from the analysis shall be compared to four background control samples. If hazardous waste constituents show a significant increase over background levels, the areas containing the constituents will be excavated and the material placed in drums for transport to Area L for storage. Ultimate disposal will depend on the nature of the contamination. Decontamination will be verified by obtaining samples that do not contain hazardous waste constituents significantly higher than those found in the controls. Excavated areas will be backfilled to grade.

No decontamination of equipment is anticipated during closure because no contact is expected between the previously buried wastes and equipment.

If it appears that contamination is evident in the soil, all equipment used to clean up the area in question will be decontaminated by steam cleaning or washing with a detergent (Liquinox or Alconox) solution. The equipment will be put on a sheet of plastic which will cover a bermed area to collect the residue, and will be washed or cleaned to remove any contaminants. The residue will be left to evaporate and the solid residue, if any, will be picked up, placed in a drum and transferred to Area L for storage and disposal.

Personnel washing down equipment will wear rubber gloves, neoprene acid/solvent resistant coveralls, rubber boots, and a face shield. The Laboratory's Industrial Hygiene Group, HSE-5, will review the site situation and recommend additional protective clothing and or respiratory protection as necessary.

4.6 Sampling and Analytical Procedures

While specific sampling and analytical methods are described here, any applicable method described in Test Methods for Evaluating Solid Wastes, USEPA, most current edition (SW846) may be used.

4.6.1 General Considerations

If sampling is necessary due to contamination of the soil, then adequate preparation for sampling of any regulated waste is necessary. A checklist of items required for field sampling helps

to ensure proper preparation. Such a checklist is given in Table 4-3. This table lists the minimal equipment, accessories, and supplies necessary to sample regulated wastes.

4.6.2 Sampler

A trowel and/or scoop, and a Veihmeyer soil sampler, will be used to sample the soil. The trowel and/or scoop will be used to sample the topsoil. A Veihmeyer soil sampler will be used to take core samples at one foot intervals to bedrock or to a maximum depth of three feet for the initial survey. Outlined below are descriptions of the samplers.

4.6.2.1 Trowel and/or Scoop

The garden variety trowel looks like a small shovel. The blade is usually about 7 by 13 cm (3 by 5 in) with a sharp tip. A laboratory scoop is similar to the trowel but the blade is usually more curved and has a closed upper end to permit the containment of material. Scoops come in different sizes and makes. Stainless steel with 7 by 15 cm (2 3/4 by 6 in) blades are preferred. A trowel can be bought from hardware stores; the scoop can be bought from laboratory supply houses.

4.6.2.1(a) Sampling Procedures

- At regular intervals, take small, equal portions of sample from the surface or near the surface of the material to be sampled.
- Combine the samples in a glass containers.

- Cap the container, attach the label and seal, record in field log book, and complete sample analysis request sheet and chain of custody record.
- Deliver the sample to the laboratory for analysis.

4.6.2.2 Veihmeyer Sampler

The Veihmeyer sampler is recommended for core sampling of most types of soil, but it may not be applicable to sampling stony, rocky, or very wet soil. The basic sampler is shown in Figure 4-1. The tube is chromium-molybdenum steel in various lengths and is calibrated every 30.48 cm (12 in). Different points are available for different types of soil and sampling. Each point is shaped to penetrate specific types of soil without pushing the soil ahead of it, thus preventing the core from compacting in the tube. The standard point is adequate for most general sampling purposes. The inside taper of each point is designed to keep the sample from being sucked out of the tube as it is pulled from the ground. The drive head protects the top of the tube from deforming when the tube is driven into the ground with the drive hammer, which doubles as a drive weight and handle when pulling the sampler from the ground. When the sampler tube cannot be pulled easily from the ground, a special puller jack and grip are also available.

4.6.2.2(a) Sampling Procedures

- Assemble the sampler by screwing in the tip and the drive head on the sampling tube.

- Insert the tapered handle (drive guide) of the drive hammer through the drive head.
- Place the sampler in a perpendicular position on the soil to be sampled.
- With the left hand holding the tube, drive the sampler into the ground to the desired sampling depth by pounding the drive head with the drive hammer. Do not drive the tube further than the tip of the hammer's drive guide.
- Record the length of the tube that penetrated the ground.
- Remove the drive hammer and fit the keyhole-like opening on the flat side of the hammer onto the drive head. In this position, the hammer serves as a handle for the sampler.
- Rotate the sampler at least two revolutions to shear off the sample at the bottom.
- Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head and rotate about 90 degrees.
- Withdraw the sampler from the ground by pulling the handle (hammer) upwards. When the sampler cannot be withdrawn by hand, as in deep soil sampling, use the puller jack and grip.
- Dislodge the hammer from the sampler, turn the sampler tube upside down, tap the head gently against the hammer, and carefully recover the sample from the tube. The sample should slip out easily.
- Collect additional core samples if needed.

o Label the samples, affix the seals, record in the field log book, complete sample analysis request sheet and chain of custody record, and deliver the samples to the laboratory for analysis.

4.6.3 Cleaning and Storage of Sampler

The sampler must be clean before use. The used sampler must be washed with a warm detergent solution (Liquinox or Alconox), rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. Improper cleaning of sample equipment will cause cross contamination of samples. The absence of contamination is of particular importance in these samples, because they will be taken for regulatory purposes. Clean samplers should be stored in a clean and protected area in polyethiene plastic tubes or bags.

4.6.4 Sample Handling

After a sample is transferred into the glass or polyethiene container, the container must be tightly capped as quickly as possible to prevent the loss of volatile components and to exclude possible oxidation from the air. The sample should be refrigerated or treated with preservatives. To split or withdraw an aliquot of a sample, considerable mixing, homogenization, or quartering is required to ensure that representative or identical portions are obtained. When transferring a sample aliquot, open the glass container as briefly as possible.

4.6.5 Identification of Sample

Each sample must be labeled and sealed properly immediately after collection.

4.6.5.1 Sample Labels

Sample Labels (Figure 4-2) are necessary to prevent misidentification of samples. Gummed paper labels or tags are adequate. The label must include at least the following information:

- o Name of Collector
- o Date and time of collection
- o Place of collection
- o Collector's sample number, which uniquely identifies the sample.

4.6.5.2 Sample Seals

Sample seals are used to preserve the integrity of the sample from the time it is collected until it is opened in the Laboratory. Gummed paper seals can be used as official sample seals. The paper seal must carry information such as:

- o Collector's name
- o Date and time of sampling
- o Collector's sample number. This number must be identical with the number on the sample label.

The seal must be attached in such a way that it is necessary to break it in order to open the glass sample container. An example of a sample seal is shown in Figure 4-3.

4.6.5.3 Field Log Book

All information pertinent to a field survey and/or sampling must be recorded in a log book. This must be a bound book, preferably with consecutively numbered pages that are 21.6 by 27.9 cm (8 1/2 by 11 in). Entries in the log book must include at least the following:

- Purpose of sample
- Location of sampling and address
- Producer of waste and address
- Type of process producing waste
- Type of waste
- Declared waste components and concentrations
- Number and volume of sample taken
- Description of sampling point
- Date and time of collection
- Collector's sample identification number(s)
- Sample distribution
- References such as maps or photographs of the sampling site
- Field observation
- Any field measurements made such as pH, flammability, explosibility, etc.

Sampling situations vary widely. No general rule can be given as to the extent of information that must be entered in the log book. A good rule, however, is to record sufficient informa-

tion so that someone can reconstruct the sampling situation without relying on the collector's memory. The log book must be protected and kept in a safe place.

4.6.5.4 Chain of Custody Record

To establish the documentation necessary to trace sample possession from the time of collection, a chain of custody record must be filled out and accompany every sample. The record becomes especially important when the sample is to be introduced as evidence in a court litigation. An example of a chain of custody record is illustrated in Figure 4-4. The record must contain the following minimum information:

- Collector's sample number
- Signature of collector
- Date and time of collection
- Place and address of collection
- Waste type
- Signatures of persons involved in the chain of possession
- Inclusive dates of possession

4.6.5.5 Sample Analysis Request Sheet

The sample analysis request sheet (Figure 4-5) is intended to accompany the sample on delivery to the laboratory. The field portion of this form must be completed by the person collecting the sample and should include most of the pertinent information

noted in the log book. The laboratory portion of this form is intended to be completed by the laboratory personnel and to include:

- o Name of person receiving the sample
- o Laboratory sample number
- o Date of sample receipt
- o Analyses to be performed

4.6.5.6 Sample Delivery to the Laboratory

The sample should be delivered to the laboratory for analyses as soon as practicable, usually the same day as the sampling. The sample must be accompanied by the chain of custody record and by a sample analysis request sheet. The sample must be delivered to the person in the laboratory authorized to receive samples.

4.6.5.7 Shipping of Samples

When a sample is shipped to the laboratory, it must be packaged in a proper container to avoid leakage and/or breakage. Acceptable packing materials include sawdust, crumpled newspapers, vermiculite, polyurethane chips, etc. Other samples that require refrigeration must be packed with reusable plastic packs or cans of frozen freezing gels in molded polyurethene boxes with a sturdy fiberboard protective case. The boxes must be taped closed with masking type or fiber plastic tape. All packages must be accompanied by a sample analysis request sheet and chain of custody record. Complete address of the sender and the receiving laboratory must legibly appear on each package.

4.6.6 Sampling Parameters

Each sample will be analyzed for selected wastes stored whose presence in samples would indicate a breach of containment (Table 4-2).

4.6.7 Analytical Procedures

The test methods that will be used by the laboratory to perform analyses for the selected constituents are found in the SW-846. All analytical testing will be performed in a laboratory using appropriate EPA procedures with QA/QC in conformance with EPA requirements.

4.6.8 Contamination Criteria

Soil samples will be considered contaminated if the analyses for selected constituents show a significant increase over the background samples using statistical methods described in SW-846. A minimum of four background samples will have to be obtained to be statistically comparative. Background samples will be site selected based on similar topography and geology to the site under study. Each background sample will be a composite of four cores taken at least 10 feet apart.

4.7 Decontamination Verification

Decontamination of the site, if needed, will be demonstrated by additional sampling, testing and analysis. The removal of contaminated soil will leave an exposed surface, which will be sam-

pled in the same area. Analysis will be conducted only on the constituents that caused the area to be contaminated. The program will be repeated until contamination is no longer evident.

4.8 Closure Schedule

The closure plan for TA-54 Area G will be submitted to the NMEID on September 30, 1985. Upon written approval of the plan by NMEID, no additional regulated wastes will be admitted to the Area. Closure of Area G requires that pit 29 be filled with non-regulated waste and covered with the excavated material from the pit next to it. Pit 32 will be in service while the pit next to pit 29 is excavated, therefore, two pits must be filled before the compaction dirt is removed from pit 29, allowing final grading. The following list gives the time required for each closure step and the approximate date of completion.

ACTIVITY	TIME REQUIRED	APPROXIMATE DATE OF COMPLETION
Submit closure plan		September 30, 1985
Approve closure plan	3 months (under NMEID control)	January, 1986
Complete filling pit 29	6 months	March, 1986
Inspect soil and analytical Survey for contamination	2 months	May, 1986
Remove contaminated soil	2 months	July, 1986
Decontaminate equipment	15 days	August, 1986
Implement modification of shaft covers including design, contracting and construction	1 year	January, 1987

Excavate pit neighboring pit 29 and store excavated material on pit 29 compaction	3 months	December, 1986
Complete filling pit 32 with non-regulated wastes	1.5 years	September, 1987
Complete filling neighboring pit with non-regulated wastes and removal of stored crushed tuff from pit 29	1.5 years	March, 1989
Conduct Area G drainage engineering study	1 year	March, 1989
Final grade, prepare, topsoil, and revegetate	3 months	June, 1989
Construct Area G drainage controls	1 year	March, 1990
Irrigate and fertilize grass cover	2 growing seasons	October 1991

The year of closure is 1986 (starting year). Total closure time from approval of the closure plan is six years. Because of the nature of closure required, approval of a closure period greater than 180 days required under HWMR 206.C.2.d.(2) is requested per HWMR 206.C.2.d.(2)(b)(i).

4.9 Certification

An independent registered professional engineer and a representative of the DOE shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that Area G has been closed in accordance with the plan. The letter shall be dated and signed by each party, and stamped by the engineer. The

original copy shall be submitted by the DOE to the Director of the NMEID, with one copy maintained at the Division Office and one copy maintained by the HSE-8 Regulatory Compliance Section.

4.10 Post-Closure

Within 90 days after closure is completed, the EPA, NMEID, DOE, and the county of Los Alamos shall be furnished with a survey plat indicating the location and dimensions of all the closed pits and shafts. The plat shall be prepared and certified by a professional land surveyor. The plat filed with Los Alamos County shall include a note, prominently displayed, which states the owner's or operator's obligation to restrict disturbance of the site in accordance with 206.C.2.g(3). In addition, the EPA, NMEID, DOE, and County of Los Alamos shall be provided with the records of type, location, and quantities of wastes stored. Information for wastes buried before the promulgation of hazardous waste regulations shall be estimated based on available records. Also in accordance with State Law, a notation on the deed to the facility property (or on some other document that is normally examined during title search) that will, in perpetuity, notify any potential purchaser of the property that the land has been used to manage hazardous waste.

The property deed shall be noted or documented to comply with the requirements of HWMR 206.C.2.j.

The site shall be inspected semi-annually, checking:

- o the cover system for integrity, settlement and erosion,
- o the site drainage system for any blockages or evidence of poor function,
- o the integrity of the fence, gate and locks, and
- o the condition of the surveyed benchmarks.

Repairs shall be made to any of the items mentioned in the semi-annual checklist should the inspection reveal conditions requiring further attention for the proper function of the closure system. Monitoring consistent with ensuring containment of radioactive wastes, which represents the major portion of buried wastes, shall be maintained. Soil, sediment, surface water, and biota sampling shall be taken every three years. Samples shall be analyzed for constituents (Table 4-2), whose presence in samples would indicate a breach of containment.

Post-closure care activities shall be performed for 30 years as required by 206.C.2g(1) and will consist of at least:

(a) groundwater monitoring and reporting in accordance with the requirements of 206.C.1 and

(b) maintenance of monitoring and waste containment systems as specified in 206.C.(b), C.6.c. and f., C.8.g, and C.9.d. where applicable.

For the groundwater monitoring program samples will be obtained from six observation wells, three in Canada del Buey and three in Pajarito Canyon. Sampling and analysis will be performed starting on November 30, 1985, and be repeated quarterly for the first year. The sampling methodology and monitoring for the groundwater monitoring program are contained in the SW-846 revisions and will be used by LANL in its program. The applicable SW 846 section numbers can be found in Table 4-4. The samples will be analyzed for the parameters outlined in HWMR 206.C.1.c(2). For each of the indicator parameters in 206.C.1.c(2)(c) at least four replicate measurements will be obtained for each sample. The initial background arithmetic mean and variance must be determined by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained from upgradient wells during the first year.

Records shall be kept of inspections, repairs, sampling, and analytical results for the duration of post-closure care activities. The name, address, and phone number of the person and/or office to contact about the facility during the post-closure care period is:

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

5.0 General Considerations

5.1 Contact Person

Upon approval of this closure plan, the NMEID and LANL will coordinate in writing to the respective contact person(s) for organization of activities and communications between the parties under the plan. The parties will provide timely written notification of any changes in the designation of contact persons during the term of this plan. LANL will provide a minimum of ten days advance notice to the NMEID through the NMEID contact person(s), of any construction, sampling, or activities conducted.

5.2 Quality Assurance

Effectiveness of the programs contained in this plan is specifically dependent on the proper sampling, analytical methods, and techniques. LANL will use sampling, quality assurance, quality control, and chain of custody procedures that are consistent with the USEPA Regulations throughout all activities. All analytical testing will be performed in a laboratory using appropriate USEPA procedures with QA/QC in conformance with USEPA requirements.

LANL will submit the following information for NMEID approval before any soil sampling in the closure plan:

o The name and the Quality Assurance and Control procedures of the laboratory doing the analysis of the samples. This will include appropriate USEPA procedures for analytical methodology, sample preservation, and detection limits of constituents.

o Detailed chain of custody and sampling methods indicating a step-by-step procedure for taking samples.

5.3 Split Samples

Upon request by authorized representatives of the NMEID, LANL will provide split samples of any samples collected under to this plan. If any analysis is made of such samples, a copy of the results of the analysis shall be furnished promptly to LANL. This includes all relevant technical data generated by the NMEID representatives, their agents, or contractors. Samples taken at Area G may contain radioactivity. Any laboratory receiving radioactive samples must be properly equipped to handle these samples.

5.4 Facility Access

LANL will provide reasonable access to its facility upon request to authorized representatives of the NMEID for the purpose of monitoring, sampling, and observing activities carried out under this plan. NMEID representatives shall comply with established LANL safety and security practices.

5.5 Cooperation

LANL and the EID's representatives will cooperate to the fullest extent possible in the reporting and exchange of data developed under to this plan. Copies within LANL's possession of results of a sampling and analyses, and other relevant technical data generated by the parties or their agents or contractors under

this plan, including raw data, field notes, laboratory bench sheets and reports will be exchanged as soon as practicable. In the event LANL contracts with a laboratory to perform work hereunder and the State of New Mexico requests from the laboratory copies of raw data, field notes, or laboratory bench sheets generated for LANL, LANL shall indicate to the laboratory that it has no objection to such documents being provided to the State of New Mexico.

TABLE 3-1
MIXED, REGULATED OR APPENDIX VIII
CONSTITUENT WASTE DISPOSED OF AT AREA G

WASTE	VOLUME(M^3)*	VOLUME (GAL)*	PIT/SHAFT
ORGANICS			
Organic chemicals	0.03		S057
Carcinogens	.42		P27
Carcinogens lab waste clothing, bottles, filters	1.13		P28
Organics	.10		S124
TOTAL	1.68	444.6	
GASES			
Empty flourine gas cylinders	.113	29.9	P27
ACIDS			
MO & HCl liquids	.11		S055
Empty waste acid	.04		P29
TOTAL	0.15	40.0	
REACTIVES			
Lithium hydride disk	.02		S078
Pyrophoric powder	.003		S043
Sodium loop	.11		S039
Sodium loop	.08		S091
Sodium	.76		S096
Combustible waste	.07		P27
TOTAL	1.043	275.1	
PESTICIDES/HERBICIDES			
Empty pesticide barrels (herbicide)	.41		P19
Pesticide drums	.41		P25
Empty pesticide drums (herbicide & insecticide)	.28		P25
Empty herbicide cont. and obsolete herb. material	.14		P27
Empty herbicide cont.	.83		P27
Empty herbicide cont. (roundup)	.09		P27
Empty herbicide containers	.03		P27
Empty herbicide containers	.73		P27

TABLE 3-1 Continued
MIXED, REGULATED OR APPENDIX VIII
CONSTITUENT WASTE DISPOSED AT AREA G

WASTE	VOLUME(M^3)*	VOLUME (GAL)*	PIT/SHAFT
Empty herbicide containers	.73		P27
Empty herbicide containers	.79		P27
Empty herbicide containers	.73		P27
Pesticides	.04		P33
Empty pesticide containers	1.13		P29
Herbicides	.10		P33
Herbicides	.10		P33
Herbicide container	1.10		P33
Herbicide container	.90		P33
Empty packets of pesticide	.28		P26
Empty sacks and drums of herbicide	1.35		P26
Empty herbicide containers	.22		P29
Empty herbicide containers	.84		P29
Empty herbicide containers	1.10		P33
Empty herbicide containers	.10		P33
Empty pesticide containers	.19		P33
Empty herbicide containers	.20		P26
Empty herbicide containers	.30		P26
Empty herbicide containers	.50		P26
Plastic herbicide containers	.14		P26
Empty herbicide and pesticide containers	.28		S35
Empty herbicide containers	.03		P27
TOTAL	14.07	3717.3	
SOLVENTS			
Xylene counter sol'n bottles with vermiculite	.20		P07
Xylene, toluene with scintillation	.20		P07
PCS scintillation fluid toluene aquasol glass vials	.62		P07
Xylene counting sol'n	.62		P07
Acetone	1.04		P05
Contaminated Solvent	.03		P19
Scintillation counting sol'n	.20		P20
Toluene	3.03		P20
Solvent	.45		P24
Toluene and xylene	.62		P20
Solvent	.001		S107
Counting sol'n	.03		S050

TABLE 3-1 Continued
MIXED, REGULATED OR APPENDIX VIII
CONSTITUENT WASTE DISPOSED AT AREA G

WASTE	VOLUME(M^3)*	VOLUME (GAL)*	PIT/SHAFT
Solvent & solid material also containing As&Hg	.01		S072
Scintillation counting solution	.20		P20
Counting vials	.41		P24
Counting vials	.41		P20
Counting vials	.41		S150
Counting vials	.41		S150
Liquid scintillating cocktail	.20		P20
Counting vials and solution	.51		P20
Xylene & toluene solvent scintillation	.20		P20
Counting vials and solution	.20		P20
Vials with counting solution	.20		P13
Vials with counting solution	.62		P20
Counting solution toluene	.20		P20
Counting vials	1.04		P22
Counting vials sol'n	.20		P22
Counting vials sol'n	.83		P22
Counting vials sol'n	.20		P22
Counting vials sol'n	.96		P22
Counting vials sol'n	.20		P22
Counting vials sol'n	.20		P22
Counting vials sol'n	.83		P18
Counting vials sol'n	2.29		P18
Scintillation counting vials	1.24		P18
Scintillation counting vials	.16		P18
Scintillation vials	1.04		P18
Scintillation vials	1.04		P18
Scintillation vials	1.66		P18
Counting Sol'n	.20		P18
Counting sol'n	.45		P18
Counting sol'n	.41		P10
Counting sol'n	.75		P25
Counting sol'n	2.70		P25
Counting sol'n	.62		P25
Scintillation fluids	1.24		P25
Counting fluids	.11		P25
Counting fluids	2.29		P10
Scintillation vials	1.66		P25
Counting vials	.45		S115
Scintillation	2.29		S115
Scintillation vials	1.87		S115

TABLE 3-1 Continued
MIXED, REGULATED OR APPENDIX VIII
CONSTITUENT WASTE DISPOSED AT AREA G

WASTE	VOLUME(M^3)*	VOLUME (GAL)*	PIT/SHAFT
Scintillation vials	1.66		S104
Vials	.20		S103
Vials Xylene	.34		S114
Vials Xylene	.34		S103
Vials Xylene	.34		S115
Vials Xylene	.45		S097
TOTAL	41.28	1096.2	
METALS			
5 empty mercury flasks	.14		P21
Beryllium pieces	.02		S079
Beryllium	1.24		P24
Beryllium scrap	.06		S068
Beryllium scrap	.14		S062
Be trash	.22		S040
Be & BeO, broken chips	.06		S032
BeO_2	.11		S032
Be_7 & Hg	.08		S029
Be chips	.03		S045
H_2 F_2 contam. mercury in mercury container	.003		S041
Steel pipe, Be waste	2.29		P06
BeO, chips & dust	.11		S058
Beryllium	22.08		P21
Be glass shapes	.11		S058
Be glass shapes	.11		S061
Beryllium	.22		S061
Beryllium solids	1.35		P21
Be metal shapes	.03		S061
Be shapes	.04		S061
Be metal, Be oxide	.03		S054
Be thin window target foil	.01		S067
Contaminated Be blocks	1.19		P13
Chunk Be	.03		S094
Be waste	.33		P18
Contaminated waste cans Be inside	.22		P18
Be contaminated trash	.84		P19
Be contaminated	.56		P19
Be contaminated	.84		P19
Be contaminated	.28		P10
Be stainless reactor control rods	.18		P25

TABLE 3-1 Continued
MIXED, REGULATED OR APPENDIX VIII
CONSTITUENT WASTE DISPOSED AT AREA G

WASTE	VOLUME(M^3)*	VOLUME (GAL)*	PIT/SHAFT
Be stainless reactor control rods	.24		P25
Hg vapor	.22		P13
Hg filled ignitrons	.08		P13
Hg contaminated felt	.03		P19
Be waste chips	.45		P18
Mercury contaminated barometer	.07		S097
Mercury filled tubes	.06		S094
Contaminated mercury	.02		S093
Hg contaminated pipes	.11		P18
Hg in electronic tubes	.01		S093
Pressure guage containing mercury	.03		S083
Barium nitrate	6.79		P28
Barium nitrate	6.79		P28
Barium nitrate	4.41		P28
Asbestos, beryllium waste	.42		P27
Barium nitrate	6.79		P28
Be waste	.62		P28
Be waste	.42		P28
Be waste	.56		P27
Be waste	.33		P27
Be waste	.45		P25
Be waste	.28		P27
Lead slags	.76		P27
Be contaminated materials	1.45		P27
Mixed fission products, Hq contaminted	.11		P27
Lead batteries	.10		P28
Be wastes (dust)	.39		P33
Be wastes	.90		P33
Be container pump & bottle	.20		P33
Be contaminated waste	.40		P33
Lead scrap	.80		P33
Lead scrap	.30		P33
Arsine waste	.10		P33
Bags with Be contam.	.20		P33
Be & thallium waste	.01		S35
Be waste	6.20		S120
Boxes with Be contam.	.30		P33
Be chips rag wipes	.06		S122
Barium nitrate	.90		P33
Storage batteries and frames	.20		P33

TABLE 3-1 Continued
MIXED, REGULATED OR APPENDIX VIII
CONSTITUENT WASTE DISPOSED OF AT AREA G

WASTE	VOLUME(M^3)*	VOLUME (GAL)*	PIT/SHAFT
Cooling tower debris	8.00		P29
Be & CO contam. waste	1.13		P26
Be chips, rags	.06		S122
Be contam. waste	.06		P29
Be chips and waste	.08		P29
TOTAL	112.82	29807.0	

*Volumes noted are the volumes of the waste container and include voids, packing materials, and adsorbents.

TABLE 4-1
TA 54 AREA G
DISPOSAL PIT USE DATES

PIT#	BEGIN DATE	END DATE
1	1957	4/19/61
2	4/20/61	7/31
3	6/63	4/21/66
4	4/66	11/67
5	12/66	3/67
6	10/69	9/72
7	3/74	10/75
8	10/71	3/74
9 (retriev.)	11/74	11/79
10	5/79	3/80
12	10/71	11/75
13	11/76	9/77
16	10/71	7/75
17	8/78	3/74
18	2/78	8/79
19	11/75	8/79
20	11/75	4/77
21	8/72	12/74
22	9/76	3/78
24	8/75	11/76
25	12/79	5/81
26	2/84	2/85
27	5/81	7/82
28	12/81	4/83
33	11/82	7/84

Pit 29 is currently in use.
Pit 32 has been excavated.

TABLE 4-2
SOIL SAMPLE ANALYSIS
CONSTITUENTS

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA* Analytical Method
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
-	Nickel	-	6010
-	Beryllium	-	6010

<u>Organics</u>

GC/MS for volatiles	8240
GC/MS for semivolatiles	8250

<u>Other</u>

Cyanide	9010
Nitrate	9200

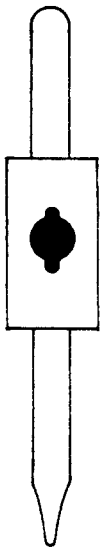
*Analytical methods may include any applicable methods found in USEPA SW 846

TABLE 4-3
CHECKLIST OF ITEMS REQUIRED FOR FIELD SAMPLING

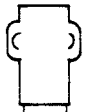
Quantity	Item	Use	Supplier
1	Field log book	To keep sample records	Office supply stores
1	Disposable towels or rags	To clean sampling equipment	Terry towels or equivalent. Available at chemical supply houses
6	Large poly-ethylene bags	To store waste papers, rags, etc.	Plastic supply houses
12	Polyethylene bags	To store sample containers	Plastic supply houses
4	Waterproof pens	To complete records and labels	Stationery stores
1	Apron, oil and acid proof	Protective garment	McMaster-Carr Co. P.O. Box 4355 Chicago, Ill.
1	Face mask	Protective garment	MSA 400 Penn Center Blvd. Pittsburg, Pa. 15235
1	Liquinox or Alconox Detergent	Used to clean sampler	

TABLE 4-4
SAMPLING METHODOLOGY AND MONITORING

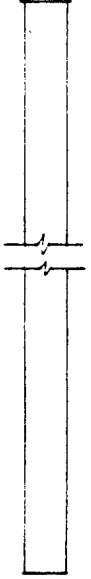
	Second Edition Section Number
Sampling methodology	1.4
Groundwater Sampling	1.4.6
Monitoring	3.0
Groundwater	3.1



A. DRIVE HAMMER

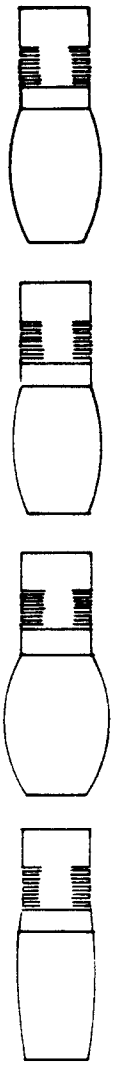


B. HEAD



C. TUBE

D. POINT



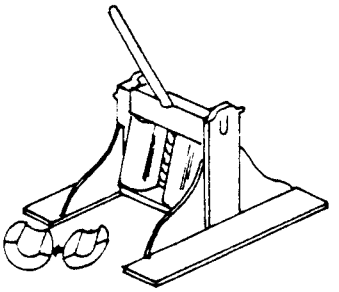
STANDARD POINT

CONSTRICTED POINT

BULGE POINT

SPECIAL POINT

POINT TYPES



PULLER JACK & GRIP

FIGURE 4-1

VEIHMEYER SOIL SAMPLER

FIGURE 4-2
EXAMPLES OF SAMPLE LABELS

OFFICIAL SAMPLE LABEL

Collector_____ Collector's Sample No._____

Place of Collection_____

_____

Date Sampled_____ Time Sampled_____

Field Information_____

_____

_____

ALTERNATE SAMPLE LABEL

DATE TIME SAMPLE NO. ORIGIN

LOCATION SAMPLED

_____

DESCRIPTION

_____

REMARKS

_____

REQUESTED ANALYSIS

_____

SAMPLED BY: (PRINT AND SIGN) LOG REFERENCE

TAG NO.____OF____

_____

FIGURE 4-3
EXAMPLE OF SAMPLE SEAL

OFFICIAL SAMPLE SEAL

Collected by_____ Collector's Sample No._____
(Signature)

Date Collected_____ Time Collected_____

Place Collected_____

_____

_____

FIGURE 4-4
CHAIN OF CUSTODY RECORD
Hazardous Materials
Collectors Sample No.____

Location of Sampling: __Producer __Hauler __Disposal Site

__Other:_____

Company's Name_____Telephone (___)_____

Address_____
number street city state zip

Collector's Name_____Telephone (___)_____
signature

Date Sampled_____ Time Sampled_____hours

Type of Process Producing Waste_____

Waste Type Code_____ Other_____

Field Information_____

_____

_____

Sample Allocation:

1. _____
name of organization

2. _____
name of organization

3. _____
name of orgainzation

Chain of Possession

1. _____ _____ _____ _____
signature title inclusive dates

2. _____ _____ _____ _____
signature title inclusive dates

3. _____ _____ _____ _____
signature title inclusive dates

FIGURE 4-5
HAZARDOUS MATERIALS SAMPLE ANALYSIS REQUEST

PART I: FIELD SECTION

Collector_____ Date Sampled_____ Time_____hours

Location of Sampling_____
name of company, disposal site, etc.

Address_____
number street city state zip

Telephone (___)_____ Company Contact_____

HML NO. (Lab only)	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION

Analysis Requested_____

_____

_____

Special Handling and/or Storage_____

_____

PART II: LABORATORY SECTION

Received by_____Title_____Date_____

Sample Allocation: __HML __LBL __LABL __SRL Date_____

Analysis Required_____

_____

_____

*Indicate whether sample is sludge, soil, etc.; **Use back of page for additional information.

ENCLOSURE 7
Part-B
Closure and Post-Closure Plans
TA-54 Area L

The survey to determine the nature and level of contamination and to prepare the decommissioning document is estimated to take one year. Decommissioning and final disposal are estimated to take up to two years.

9.3.2.3 Post-Closure

Post-closure plans are not required for incineration facilities.

9.4 Closure Plan for TA 54 - Area L Facilities

9.4.1 TA 54-Area L Description

TA 54-Area L consists of a waste transfer, packaging, and storage facility, land disposal shafts, and liquid treatment tanks (see Figure 9-10).

The treatment, storage, and disposal facilities consist of a single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1,595 square feet. These areas are used for the accumulation, packaging, and storage of waste containers which are generated throughout the laboratory and delivered to the facility routinely. They are segregated into compatible types and placed upon the three fiberglass grates inside the metal building or within one of the six storage cells on the roofed concrete pad. Wastes in small containers are put into lab packs. Wastes suitable for recycling are consolidated into drums, and any damaged or leaking drums are repackaged into larger drums in this area.

Four 1,665-gallon, 10-gauge steel tanks are located at Area L. They are lined with plastic and used to neutralize, oxidize and evaporate waste. The tanks are located on a bermed concrete pad. The waste most commonly oxidized in

these tanks is lithium hydride. Aqueous ammonium biflouride solution (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks.

As of August, 1985, land disposal facilities at Area L include 34 shafts that range in diameter from 1 to 2.4 m (3 to 8 ft). Thirty-three of these shafts have been capped, all of which are approximately 118 m (60 ft) deep. When in use, the shafts are covered with a heavy steel cap; when filled, they are closed using a 1 m (3 ft) thick concrete plug (Figure 9-11). Each shaft is used for the disposal of a single category of waste, which is accumulated on site and packaged into 55-gallon drums.

9.4.1.1 Estimate of Maximum Waste in Storage and Treatment

The approximate amount of waste in storage or treatment at Area L is 67 m^3 (17,650 gal) at the transfer, packaging, and storage area, and 22 m^3 (5700 gal) in the treatment tanks.

9.4.1.2 Description of Waste Handled

A wide variety of wastes generated throughout the Laboratory are brought to Area L, including wastes from basic and applied chemistry R & D programs (small quantities of different acids, bases, organics, inorganics and reactive metals), processing wastes (sludge resulting from treatment either at Area L or at TA 50-1 Batch Treatment Plan), and chemically contaminated equipment to be landfilled.

9.4.1.3 Partial Closure

Because 33 of the 34 existing shafts have been capped partial closure has occurred at Area L. Closing of individual shafts occur as they are filled, and the dates of shaft closings is shown on Figure 9-10. These shafts were

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filled to three feet below the lowest edge of the shaft rim with waste, and the void spaces around the waste filled with crushed tuff as the wastes were placed in the shaft. The remaining three feet of the shaft was filled with noncontaminated concrete. The top of the concrete cap is slightly rounded, extending 0.5 feet above the land surface and overlapping the edge of the shaft 2 to 6 inches. A brass identification marker is placed in the center of the cap during the final pour.

In the past, a small surface impoundment was operated within Area L to evaporate nonregulated waste. Because no verification exists that regulated waste had not been put in the pit, analysis of the pit residue and soil cores extending below the pit was required under a NMEID Compliance Order/Schedule dated May 7, 1985. Should this analysis determine the presence of hazardous constituents, the impoundment will be closed as a regulated site, constituting partial closure. The results of the analytical work for the impoundment will be complete in December 1986.

The remaining shaft will be closed when filled, as compatible wastes are generated. There is no anticipated date for closure of this shaft before final closure of Area L.

9.4.2 Closure Procedure

Clean-up and closure for treatment and storage facilities at Area L will be done in sequential order, culminating in the disposal of any residues or contaminated material by permitted landfill in the existing land disposal facility, or by shipment to an offsite permitted disposal site, followed by closure of the onsite land disposal facility. Before decontamination, all wastes in storage in either the roofed storage pad or the metal building will either be

treated or disposed of onsite or offsite. Given the diversity of wastes handled, it is not possible to estimate the exact wastes on hand at the initiation of closure and, therefore, the final disposition of the wastes. In general, recyclable wastes will be reused internally or recycled to users offsite. Organic wastes will be burned at the CAI (Controlled Air Incinerator) at TA 50-37. Any wastes compatible with permitted treatment at the TA 50-1 Batch Treatment Plant or the Area L treatment tanks will be so treated. The remaining wastes will be disposed of onsite at the disposal facility that is permitted at the time or transported offsite to a permitted disposal facility.

Following removal or treatment of the wastes onsite at the start of closure, the two storage facilities will be decontaminated by washing with Liquinox or Alconox in water. The resulting wash solutions will be evaporated in the four treatment tanks. When the wash water has evaporated, the residual in the tanks and the tank liners will be removed, placed in drums, and either landfilled at a permitted onsite facility or transported offsite to a permitted disposal facility.

The tanks will then be decontaminated by washing and the decontaminated tanks handled as a nonregulated waste.

Finally, the remaining open shafts will be closed by capping with concrete. Additional concrete will be added to previous caps to extend the overlap of the shaft cover to prevent surface drainage from undercutting the cap. The existing topography of the site will be preserved and the disturbed area will be revegetated.

The closure steps are discussed in more detail in the following text.

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9.4.2.1 Waste Removal

The waste onsite at the start of closure includes containerized wastes, as well as liquids and residues in the treatment tanks. Containerized wastes will be handled with hand trucks or fork lifts. Trucks of adequate size will be used to move containerized wastes to offsite treatment facilities, and a fork lift is suitable to move wastes to the treatment tanks at Area L. All wastes shipped offsite will be manifested in accordance with HWMR 203. The waste transporter will have an EPA identification number in accordance with HWMR 205.B.

9.4.2.2 Storage Area Decontamination

All floor surfaces within the roofed concrete storage pad, as well as any equipment present, will be washed down using a solution of Liquinox or Alconox in warm water. Areas will be scraped or brushed clean as necessary to remove any residues. The floor of the concrete pads are sloped to sumps, and wash water will flow into them. The water in each cell will be tested using the sampling and analytical procedures described in Section 9.5. Afterwards, the water will be removed from each sump with a vacuum truck or pumped into drums with a hand pump, and transferred into the treatment tanks to be evaporated. This washing procedure will be repeated until decontamination of the cells is demonstrated by testing of the wash water. Following decontamination, the building and equipment will be handled as a nonregulated waste. The inside of the vacuum truck, if used, will be rinsed when its service is complete, and the rinse water will be placed in evaporation tanks.

The same procedure will be used for the metal building. All equipment, as well as the walls and floor, will be washed and the wash water will be channeled into one of the three

floor sumps. The fiberglass grates covering each sump and the sumps themselves will be washed down. The wash water will be sampled and analyzed to determine adequate decontamination. Every effort will be made to minimize the volume of wash and rinse water generated by decontamination.

9.4.2.3 Treatment Tank Decontamination

When all liquid has been evaporated from the treatment tanks, the plastic liner with any dry residue will be removed and placed in the existing land disposal facility or placed in drums for transport to an offsite disposal facility.

The tanks will be scraped and brushed to remove residue, and the residue collected and placed in drums. The tanks and the concrete pad on which the treatment tanks are placed will be washed with a Liquinox or Alconox solution in water. The wash water will be contained within the curbed concrete pad, sampled, and analyzed. If the wash water is free of significant concentrations of regulated constituents, as described in Section 9.4.3., the water will be removed with a vacuum truck and transported to an industrial sewer, which drains to the water treatment plant at TA 50-1. If the water contains significant concentrations of hazardous constituents, one of the treatment tanks will be double lined with sheet polyethylene plastic and the water pumped into the tank for evaporation. Wash down of the tanks and pad will be repeated until the wash water is free of significant contamination. The plastic liner and residue from the final evaporation will be removed and handled as per the previous tank residue.

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9.4.2.4 Soil Decontamination

Soil sampling, which will be conducted to determine if hazardous wastes have been tracked outside of contaminant areas, will be taken in the manner described in Section 9.5. Composite soil samples will be collected around the edge of the roofed concrete pad asphalt apron as shown in Figure 9-12, and also at the bermed concrete pad beneath the treatment tanks, as shown in Figure 9-13. Composite soil samples will be taken at each edge of the asphalt apron around the metal building. Each composite shall be made up from three cores taken 15 cm (6 in.) off the asphalt edge and equally spaced to cover the edge. A composite soil sample will be taken for each of the two groupings of disposal shafts, each composite consisting of four samples taken at the four corners of the shaft lines.

If contamination is found in these samples, the limits of the sampling area will be expanded by establishing a sampling grid to determine the outside parameter of the contamination. Sampling will be continued at the sampler's discretion to determine the extent of contamination.

Four background soil samples will be taken on the outside of the fenced boundary at Area L. They will be taken on top of the mesa, preferably one in each of four different directions. The exact sites for these samples will be field selected based on similar topographic and geologic characteristics, and the lack of possible interference of other operating Laboratory sites.

Soil and sediment samples will be analyzed for the constituents listed in Table 9-7. Analysis and Quality Assurance/Quality Control will follow methods defined in SW 846.

The approach to soil decontamination depends on the extent of contamination determined by the sampling. If the sample survey indicates that there are no contaminated soil areas, no further soil decontamination action will be taken at the site. Should the soil be contaminated, it will be disposed of in the land disposal facility onsite, or placed in drums to be transported offsite for disposal at a permitted facility.

9.4.2.5 Personnel Protection

Personnel washing down equipment will wear rubber gloves, neoprene acid/solvent resistant coveralls, rubber boots, and a face shield. The Laboratory's industrial Hygiene Group, HSE-5, will review the site survey analytical data and recommend additional protective clothing.

9.4.2.6 Equipment Decontamination

Shovels, drum trucks, and other equipment used for decontamination will be scraped and brushed to remove residue, and the residue collected and placed in drums for disposal on/or offsite at a permitted disposal site for regulated wastes.

The equipment will be placed on a plastic sheet that is bermed to contain liquids, and washed with water and detergent. Larger equipment such as backhoes and forklifts will also be washed. No testing will be performed on this water and washing is considered adequate to decontaminate the equipment. The wash water will be allowed to evaporate, and the plastic and residue will be packed in drums for disposal as a regulated waste.

9.4.2.7 Shaft Closure

Following the decontamination of pads and equipment, and removal of contaminated soil, any open shaft will be closed by filling the empty volume of the shaft with crushed tuff up to three feet from the lowest edge of the rim. The top three feet will be capped with uncontaminated concrete. The top of the concrete cap will be rounded and extend at least 0.5 feet above the land surface and overlap the edge of the shaft by 6 inches.

Following capping of the final shaft, a trench will be dug around each shaft at the site. The trench will be a minimum of 1.5 feet from the edge of the shaft. Additional concrete will be added to extend each cap out to and fill the trench. The concrete added shall be sloped to prevent ponding of water on the cap.

9.4.2.8 Site Drainage

The areas around the shafts will maintain the current slopes as shown in Figure 9-14. Disturbed areas will be lightly mulched with pea gravel and planted with turf-forming grasses and bunch grasses to prevent wind and sheet wash erosion. The grass will be fertilized and irrigated with sprays through two growing seasons.

Site drainage controls described in Section 6.5.2 will be maintained through closure and post-closure.

9.4.3 Decontamination Verification

Soil samples will be analyzed for the constituents shown in Table 9-7. These combined tests are adequate to screen for all but a handful of regulated constituents which, if

handled at Area L, would have been present in small volume laboratory-size containers.

The criteria for determining contaminated soil are the same as discussed in Section 9.2.1.7. Regulated constituent concentrations will be compared to background concentrations. A risk assessment will be prepared for each regulated constituent showing a significant increase over background concentration. A significant increase will be determined by using statistical methods described in USEPA SW 846. The risk assessment will determine the threshold concentration for each constituent that represents a significant risk to human health and the environment, and will take into account all possible pathways. Soils containing levels of contamination above the threshold will be considered contaminated.

A copy of the completed risk assessment, along with pertinent backup data, will be provided to the NMEID for review and approval. Should NMEID find the threshold contamination levels inadequate, the Laboratory will negotiate threshold values agreeable to both parties.

Decontamination of the site soil will be demonstrated by additional sampling. Removal of contaminated soil will leave an exposed surface. The disturbed surface will be resampled in the same places used to define the contaminated area. Analysis and the determination of contamination is as previously discussed, and an analysis will be conducted only for those constituents that caused the area to be contaminated.

A minimum of two samples of the clean Liquinox or Alconox solution will be sampled as background for wash water and, along with the wash water samples, analyzed for the constituents shown in Table 9-7. The area will be

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considered contaminated if the wash water analyses show a significant increase in constituents over the clean wash solution. A significant increase is determined by using statistical methods defined in USEPA SW 846.

9.4.5.4 Closure Schedule

The year of closure is 2110. Closure activities will observe the following schedule:

Activity	Maximum Time Required
Contract for sampling and/or analytical services	90 days
Treat or remove final wastes from transfer packaging and storage areas	90 days
Decontaminate waste packaging, transfer and storage areas	30 days
Evaporate waste water from treatment tanks	180 days
Dispose of tanks and residue	180 days
Conduct first soil sampling survey	30 days
Analyze first soil samples	60 days
Conduct second soil sampling survey if needed	30 days
Analyze second soil samples if needed	60 days
Contract for soil decontamination	90 days
Remove Soil	90 days
Weather delay contingency	90 days
Conduct verification samples	30 days
Analyze samples	60 days
Close shafts	20 days
Establish ground cover	760 days
TOTAL	1890 days

Contracts for analytical work and soil removal are expected to exceed $100,000. The Laboratory is required by policy to put the work out for bid, and ninety days are required to solicit and process the bids.

The location of the site is prone to snow cover in the winter months. Depending on the date NMEID approves the

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closure plan, the closure may be delayed until the site is free of snow and the ground is thawed adequately to allow the soil sampling and other closure operations. The schedule includes a weather contingency to allow for this potential delay.

Because of the time required for wash water evaporation, and the projected decontamination time, approval of a closure period greater than 180 days [HWMR 206.C.2.d(2)] is requested per [HWMR 206.C.2.d.(2) (b) (1)].

9.4.5 Closure Certification

An independent registered professional engineer and the owner/operator of the facility shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the area has been closed accordingly. The letter shall be dated and signed by each party and stamped by the registered engineer, and the original copy shall be submitted by the DOE to the Director of the NMEID. One copy shall be maintained at the DOE offices and one copy maintained by the HSE-8 Regulatory Compliance Section.

9.4.6 Post-Closure

Post-closure activities include the following items:

1. Within 90 days after closure is complete, the EPA, NMEID, DOE and the County of Los Alamos shall be furnished with a survey plat indicating the location and dimensions of the closed pits and shafts. The plat shall be prepared and certified by a professional land surveyor. It will be filed with Los Alamos County and shall include a note, prominently displayed, which states the owner's or operator's obligation to restrict

disturbance of the site in accordance with 40 CFR 264.117(c) (NMHWMR 206,D.2.g[3]). In addition, the EPA, NMEID, DOE, and County of Los Alamos shall be provided the records of type location, and quantities of wastes stored. Information for waste stored before the promulgation of hazardous waste regulations shall be estimated based on available records.

2. The property deed shall be noted or documented to comply with the requirements of 40 CFR 264.120 (NMHWMR 206.D.2.j).

3. The site shall be inspected semi-annually or more frequently as determined necessary, checking:

   (a) the cover system for integrity, settlement, and erosion,
   (b) the site drainage system for any blockages or evidence of poor function,
   (c) the integrity of the fence, gate and lock, and
   (d) the conditions of surveyed benchmarks.

4. Repairs shall be made to any of the items mentioned in activity No. 3, should the inspection reveal conditions requiring further attention for the proper function of the closure system.

5. Post-closure care activities shall be performed for 30 years as required by 40 CFR 264.117(a)(1) (NMHWMR 206.D.2.g[1][a]).

6. Records shall be kept of inspections, repairs, sampling, and analytical results for the duration of post-closure care activities.

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9.4.6.1 Post-Closure Ground Water Monitoring

For the ground water monitoring program, samples will be obtained from six observation wells, three in Canada del Buey and three in Pajarito Canyon, installed in response to the NMEID Compliance Order/Schedule dated May 7, 1984. Sampling and analysis will be performed starting on November 30, 1985, and repeated quarterly for the first year. The sampling methodology and monitoring for the ground water monitoring program are contained in the USEPA SW 846 revisions and will be used by LANL in their program. The applicable section numbers can be found in Table 9-8. The samples will be analyzed for the parameters outlined in HWMR 206.C.1.c(2). For each of the indicator parameters in 206.C.1.c(2)(c), at least four replicate measurements will be obtained for each sample. The initial background arithmetic mean and variance must be determined by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained from upgradient wells during the first year.

9.4.6 Post-Closure Care Office

Copies of records of inspections, repairs, sampling, and analytical results for the duration of post-closure care activities are to be kept at the DOE Los Alamos Operations office, HSE-8 Regulatory Compliance office, and the TA 54 Operations office. The name, address, and phone number of the person and/or office to contact about the facility during the post-closure care period is:

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

9.5 SAMPLING AND ANALYTICAL PROCEDURES

The following sections define procedures and methods for sampling, analysis, and documentation applicable to closure and post-closure plans. While the procedures and method are specific, any applicable procedure or method given in SW 846 may be used if conditions or experience shows the alternate method to be more appropriate.

9.5.1 Soil Sampling

The sampling procedures outlined below are used to determine the amount of hazardous material deposited on a particular area of land or to determine the leaching rate of the material and/or determine the residue level on the soil. Adequate preparation ensures that proper sampling is accomplished. A checklist of items required for field sampling is given in Table 9-9.

Surface soil samples will be collected with a trowel or scoop. To sample below 8 cm (3 in), samples will be collected with a Velhmeyer soil sampler (Figure 9-15).

9.5.1.1 Cleaning and Storage of Sampler

It is important to clean samplers after each site is sampled. The samplers will be washed with a warm Liquinox or Alconox solution, rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. Lack of cross-contamination is of particular importance in these samples, because they will be taken for regulatory purposes. One-quart glass containers will be used for the samples, because they are compatible with the waste. Sampling will be conducted in accordance

Figure 9-17

Example of Sample Seal

OFFICIAL SAMPLE SEAL

Collected by _____ Collector's Sample No._____
(Signature)

Date Collected_____ Time Collected_____

Place Collected_____

_____

_____

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Figure 9-18

Example of Sample Label

OFFICIAL SAMPLE LABEL

Collector_____Collector's Sample No._____

Place. of Collection_____

_____

Date Sampled_____Time Sampled_____

Field Information_____

_____

_____

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Figure 9-19

CHAIN OF CUSTORY RECORD
Hazardous Materials
Collector's Sample No.___

Location of Sampling: __Producer __Hauler
__Disposal Site
__Other:_____

_____

Company's Name _____Telephone (___)_____

Address_____
number street city state zip

Collector's Name_____Telephone (___)_____
signature

Date Sampled_____Time Sampled_____hours

Type of Process Producing Waste_____

Waste Type Code_____Other_____

Field Information_____

_____

_____

Sample Allocation:

1. _____
name of organization

2. _____
name of organization

3. _____
name of organization

Chain of Possession:

1. _____ _____ _____
signature title inclusive dates

2. _____ _____ _____
signature title inclusive dates

3. _____ _____ _____
signature title inclusive dates

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Figure 9-20

Hazardous Materials Sample Analysis Request

PART I: FIELD SECTION

Collector_____ Date Sampled_____ Time_____ hours

Location of Sampling_____
name of company, disposal site, etc.

Address_____
number street city state zip

Telephone (____)_____ Company Contact_____

HML NO.. (Lab only)	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION

Analysis Requested_____

Special Handling and/or Storage_____

PART II: LABORATORY SECTION

Received by _____ Title_____ Date_____
Sample Allocation: ___HML ___LBL ___SRL Date_____
Analysis Required_____

*Indicate whether sample is sludge, soil, etc.:**Use back of page for additional information.

with procedures given in Samplers and Sampling Procedures for Hazardous Waste Streams, EPA 600/2-80-018 and SW 846.

Samples will be taken, placed in bottles, sealed, tagged, and immediately packed in vermiculite, sawdust, or, if refrigeration is required, an insulated container with ice. One sample for every ten samples will be either duplicated or split. The duplicated or split sample will be identified by a code so that its source is not available to the analytical laboratory, but analytical results can be compared to its twin.

9.5.1.2. Sampling Procedures

TROWEL OR SCOOP

- Take small, equal portions of sample from the surface or near the surface of the material to be sampled.
- Combine the samples in a glass container.
- Cap the container, attach a label and seal, record in field log book, and complete the sample analysis request sheet and chain of custody record.

VEIHMEYER SAMPLER

- Assemble the sampler by screwing in the tip and drive head on the sampling tube.
- Insert the tapered handle (drive guide) of the drive hammer through the drive head.
- Place the sampler in a perpendicular position on the soil to be sampled.
- With the left hand holding the tube, drive the sampler into the ground to the desired sampling depth by pounding the drive head with the drive hammer. Do not drive the tube further than the tip of the hammer's drive guide.

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- Record the length of the tube that penetrated the ground.
- Remove the drive hammer onto the drive head. In this position, the hammer serves as a handle for the sampler.
- Rotate the sampler at least two revolutions to shear off the sample at the bottom.
- Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head and rotate about 90 degrees.
- Withdraw the sampler from the ground by pulling the handle (hammer) upwards. When the sampler cannot be withdrawn by hand, as in deep soil sampling, use a puller jack and grip.
- Dislodge the hammer from the sampler, turn the sampler tube upside down, tap the head gently against the hammer, and carefully recover the sample from the tube. The sample should slip out easily.
- Store the core sample in a 1,000 or 2,000 ml (1 qt or 1/2 gal) sample container.
- Label the sample, affix the seals, record in the field log book, complete sample analysis request sheet and chain of custody record, and deliver the samples to the laboratory for analysis.

9.5.2 LIQUID SAMPLING

The Coliwasa sampler will be used to sample water solutions before washing the area for background parameters, and to sample the wash water used after cleaning equipment. Its simple design makes it easy to use and allows the rapid collection of samples, which minimizes chances of exposure of the sample collector to potential hazards from the waste. The recommended model of the Coliwasa is shown in Figure 9-16, the main parts consisting of the sampling tube, the closure-locking mechanism, and the closure system.

9.5.2.1 Cleaning and Storage of Sampler

The sampler must be clean before use. The used sampler must be washed with a warm detergent solution (Liquinox or Alconox), rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. A necessary piece of equipment for cleaning the tube of the Coliwasa is a bottle brush that fits tightly inside the diameter of the tube. The brush is connected to a rod of sufficient length to reach the entire length of the sampler tube. Using this ramrod and fiber-reinforced paper towels, the Coliwasa tube may be quickly cleaned. Improper cleaning of sample equipment will cause cross contamination of samples. Lack of contamination is of particular importance in these samples, because they will be taken for regulatory purposes. Clean samples should be stored in polyethlene plastic tubes or bags in a clean and protected area.

9.5.2.2 Sampling Procedures

- Assemble the glass coliwasa sampler.
- Make sure that the Coliwasa sampler is clean.
- Check to make sure the sampler is functioning properly. Adjust the locking mechanism, if necessary, to make sure the neoprene rubber stopper provides a tight closure.
- Wear necessary protective clothing and gear and observe required sampling precautions.
- Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.
- slowly lower the Coliwasa sampler into the liquid at a rate that permits the levels of the liquid inside and

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outside the sampler tube to be about the same. If the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.

- When the sampler stopper hits the bottom of the liquid container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.
- Slowly withdraw the sampler from the container with one hand while wiping the sampler tube with a disposable cloth with the other hand.
- Carefully discharge the sample into a glass container by slowly opening the sampler. This is done by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in the glass container.
- Cap the glass container, attach a label and seal record in the field log book, and complete the sample analysis request sheet and chain of custody record.
- Unscrew the T-handle of the sampler and disengage the locking block. Clean the sampler on site or store the contaminated parts of the sampler in a plastic storage tube or bag for subsequent cleaning. Store used rags in plastic bags for subsequent disposal.

9.5.3 Sample Handling and Documentation

Soil and liquid samples will be analyzed either internally or at a commercial laboratory. In either case each sample will be labelled, sealed, and accompanied by a chain of custody and a sample analysis request form.

The sample container must be sealed with a gummed paper seal attached to the container in such a way that the seal must be broken in order to open the container. The seal and

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sample tag must be completed with a waterproof pen. An example of a sample seal is shown in Figure 9-17.

The sample label is necessary to prevent misidentification of samples and shall include, if applicable, the grid number referenced to positions staked on the site perimeter. The "field information" in the case of soil sampling, shall include observations such as the soil texture and surface appearance, ambient temperature and cloud cover at time of sampling, and precipitation conditions 24 hours before sampling. An example of a sample label is shown in Figure 9-18.

The chain of custody form is necessary to trace sample possession from the time of collection, and must accompany every sample. This record becomes especially important when the sample is to be introduced as evidence in a court litigation. This is a two-page record with the original accompanying shipment and the "copy" being retained by the Laboratory. An example of this form is shown in Figure 9-19.

A separate closure sampling field log book will be kept and will contain all information pertinent to field surveys and sampling. The log book shall have bound and consecutively numbered pages in 8-1/2 by 11-inch format. Minimum entries include:

a. Purpose of sample (routine sampling, special sampling)
b. Location of sampling (coordinates referenced to staked field points, if soil sample).
c. Name and address of person making log entry.
d. Type of process producing waste.
e. Number and volume of sample taken.
f. Description of each sampling location, sampling methodology, equipment used, etc.
g. Date and time of sample collection.

h. Sample destination and transporter's name (name of laboratory, UPS, etc.)
i. Map or photograph of the sampling site, if any.
j. Field observations (ambient temperature, sky conditions, past 24-hour precipitation, etc.).
k. Field measurements, if any (pH, flammability, explosivity, etc.).
l. Collector's sample identification number (s).
m. Signature of person responsible for the log entry.

Sampling situations vary widely. No general rule can be given as to the extent of information that must be entered in the log book. A good rule, however, is to record sufficient information so that someone can reconstruct the sampling situation without relying on the collector's memory.

The sample shipment and chain-of-custody record is accompanied by a sample analysis request sheet (Figure 9-20). The request sheet has two parts: field and laboratory. The field portion of this form must be completed by the person collecting the sample and include most of the pertinent information noted in the log book. The laboratory portion is intended to be completed by the laboratory personnel when the sample is received.

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Table 9-7

Sampling Parameters and Methods
for TA 54 - Area L

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA Analytical Method[1]
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
--	Nickel	-	6010
--	Beryllium	-	6010

Organics

GC/MS for volatiles	8240
GC/MS for semivolatiles	8250

Other

Cyanide	9010
Nitrate	9200
Sulfides	9030
pH (liquids)	9040
Soil pH	9045

[1]Analytical methods are taken from Test Methods for Evaluating Solid Wastes, EPA SW-846, and may be superceded by more current or alternate methods from SW 846.

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Table 9-8

Ground Water

Sampling Methodology and Monitoring
from SW-846

	Second Edition Section No.
Sampling methodology	1.4
Ground water Sampling	1.4.6
Monitoring	3.0
Ground water	3.1

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Table 9-9

Checklist of Items

Required for Field Sampling

Quantity	Item	Use	Supplier
1	Field log book	To keep sample records	Office supply stores
1	Disposable towels or rags.	To clean sampling equipment	Terry towels or equivalent. Available at chemical supply houses
6	Large polyethylene bags	To store waste papers, rags, etc.	Plastic supply houses
12	Polyethylene bags	To store sample containers	Plastic supply houses
4	Waterproof pens	To complete records and labels	Stationery stores
1	Apron, oil and acid proof	Protective garment	McMaster-Carr Co. P.O. Box 4355 Chicago, IL

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Table 9-9 (cont)

Quantity	Item	Use	Supplier
1	Face mask	Protective garment	MSA 400 Penn Center Blvd. Pittsburg, PA 15235
1	Liquinox or Alconox Detergent	Used to clean sampler	

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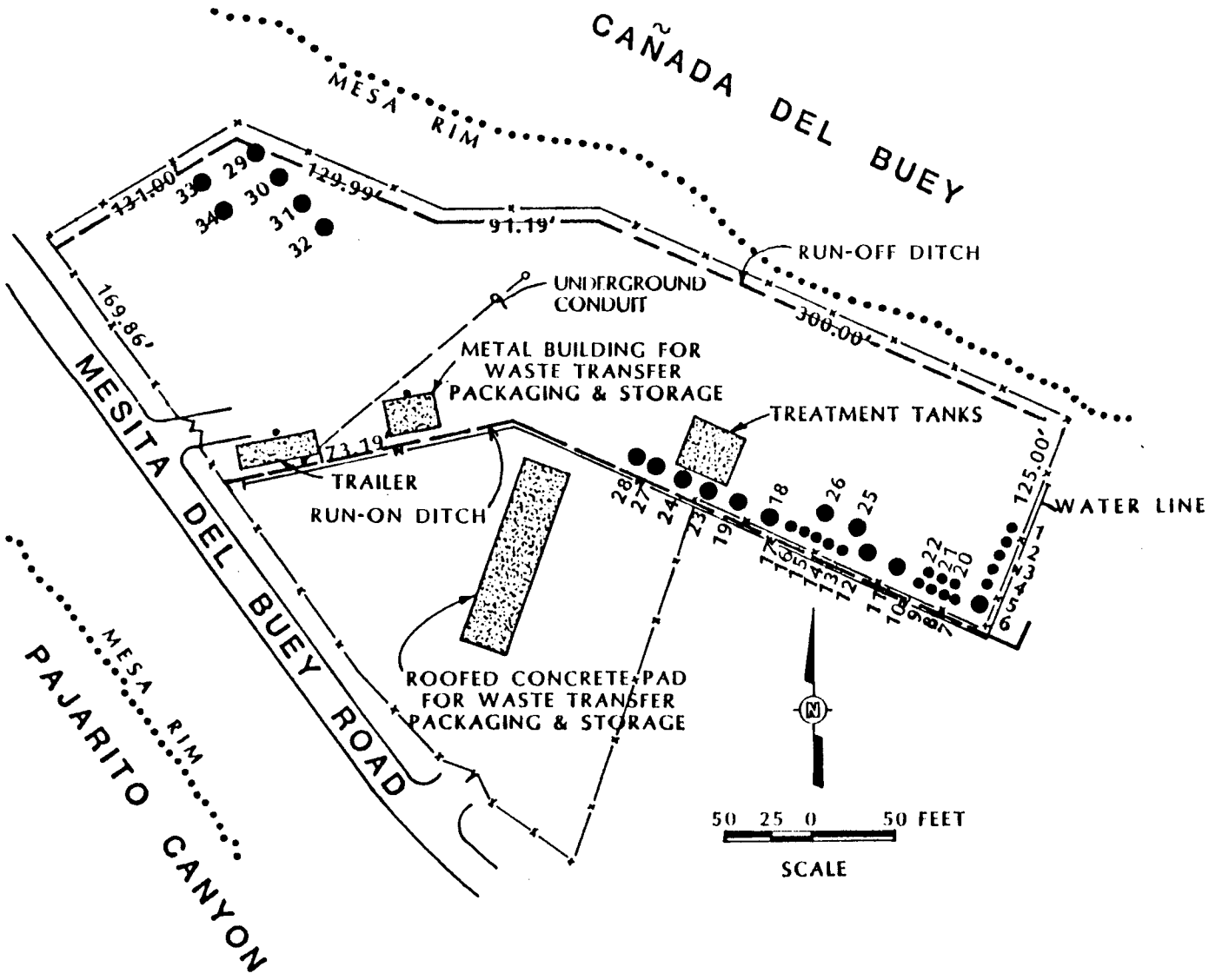

AREA L SHAFTS (1)

(INFORMATION CURRENT MARCH, 1985)

SHAFT #	SHAFT DIAMETER (FEET)	DATE DRILLED	DATE CAPPED	CONTENTS
1	3	4/80	9/83	ORGANICS
2	3	2/75	7/79	ACIDS & BASES
3	3	2/75	11/78	INORGANIC
4	3	2/75	5/80	ORGANIC
5	3	2/75	6/77	WASTE OIL
6	4	6/75	6/79	REACTIVE
7	3	6/75	6/79	REACTIVE
8	3	6/75	6/79	REACTIVE
9	3	6/75	6/79	GAS CYLINDERS
10	3	6/77	6/79	WASTE OIL
11	8	1/78	7/79	WASTE OIL/SOLVENT
12	4	1/78	7/79	WASTE OIL/SOLVENT
13	3	6/79	5/82	INORGANIC
14	3	6/79	5/82	REACTIVE
15	3	6/79	5/82	REACTIVE
16	3	6/79	5/82	GAS CYLINDERS
17	3	6/79	5/82	ORGANIC
18	8	6/79	6/80	WASTE OIL
19	8	4/80	5/82	WASTE OIL
20	3	4/80	9/83	INORGANIC
21	3	4/80	OPEN	GAS CYLINDERS
22	3	4/80	9/83	ORGANIC
23 (2)	8	4/82	3/84	WASTE OIL
24 (3)	8	4/82	4/84	ORGANIC & WASTE OIL
25	6	9/82	5/85	INORGANIC
26	6	9/82	3/84	ORGANIC
27	4	1/83	2/85	SPECIAL (4)
28	4	1/83	5/85	SPECIAL
29	6	12/83	8/84	ORGANIC
30	6	12/83	8/84	ORGANIC
31	6	12/83	9/84	ORGANIC
32	4	9/84	9/84	ORGANIC
33	6	9/84	2/85	ORGANIC
34	6	2/85	5/85	ORGANIC

(1) ALL SHAFTS ARE APPROXIMATELY 60 FEET DEEP

(2) PRIOR TO SHAFT 23 EXCEPT SHAFT 1, LIQUIDS WERE DISPOSED OF IN DRUMS WITHOUT ADDING ABSORBENTS

(3) MIDDLE SECTION OF THIS SHAFT NOT USED

(4) USED FOR MISCELLANEOUS WASTE REQUIRING GREATER ISOLATION

FIGURE 9-10

TA 54-AREA L

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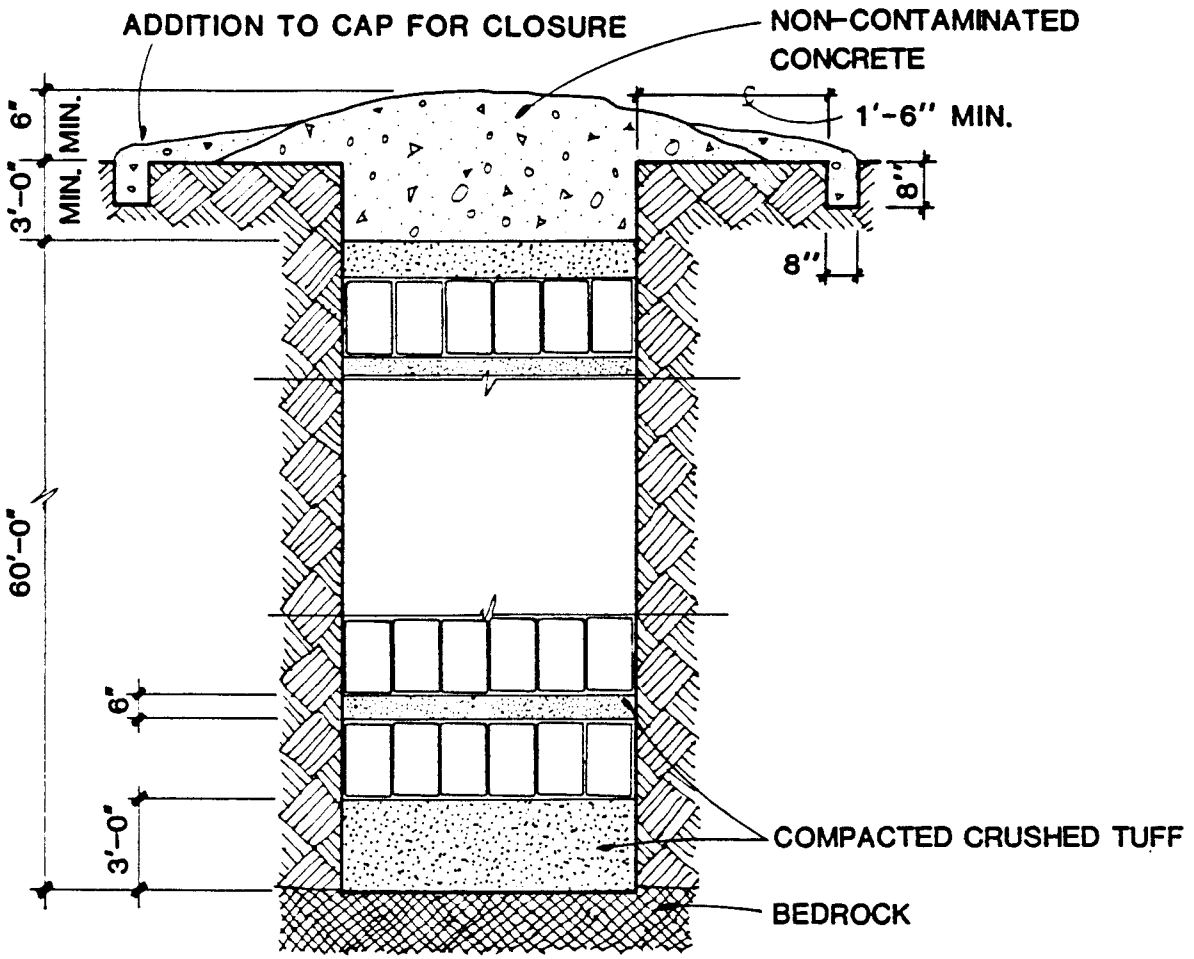

FIGURE 9-11

TYPICAL SHAFT SECTION AREA L

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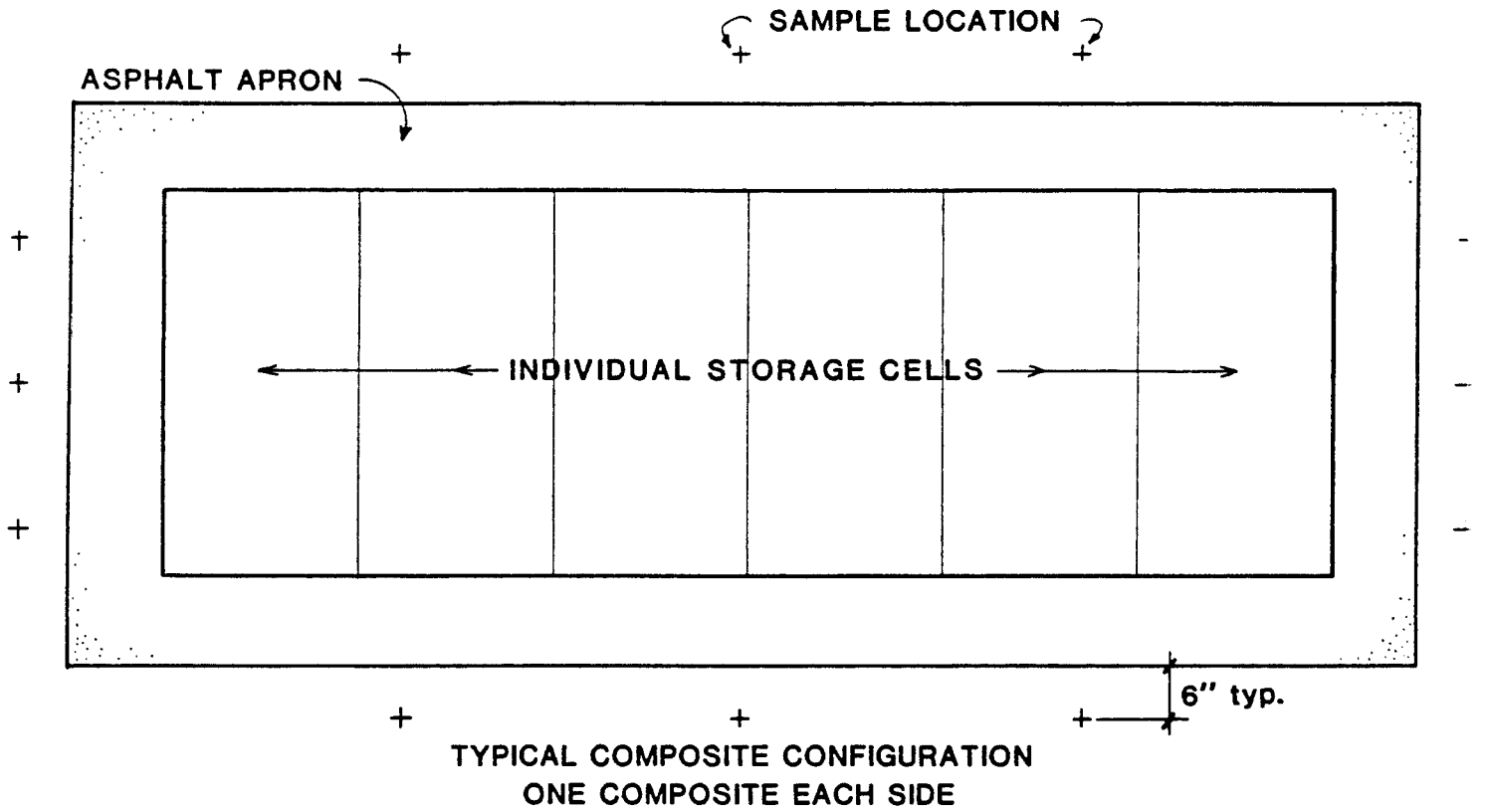

FIGURE 9-12

TA 54-AREA L

COVERED CONC. PAD SAMPLE LOCATIONS

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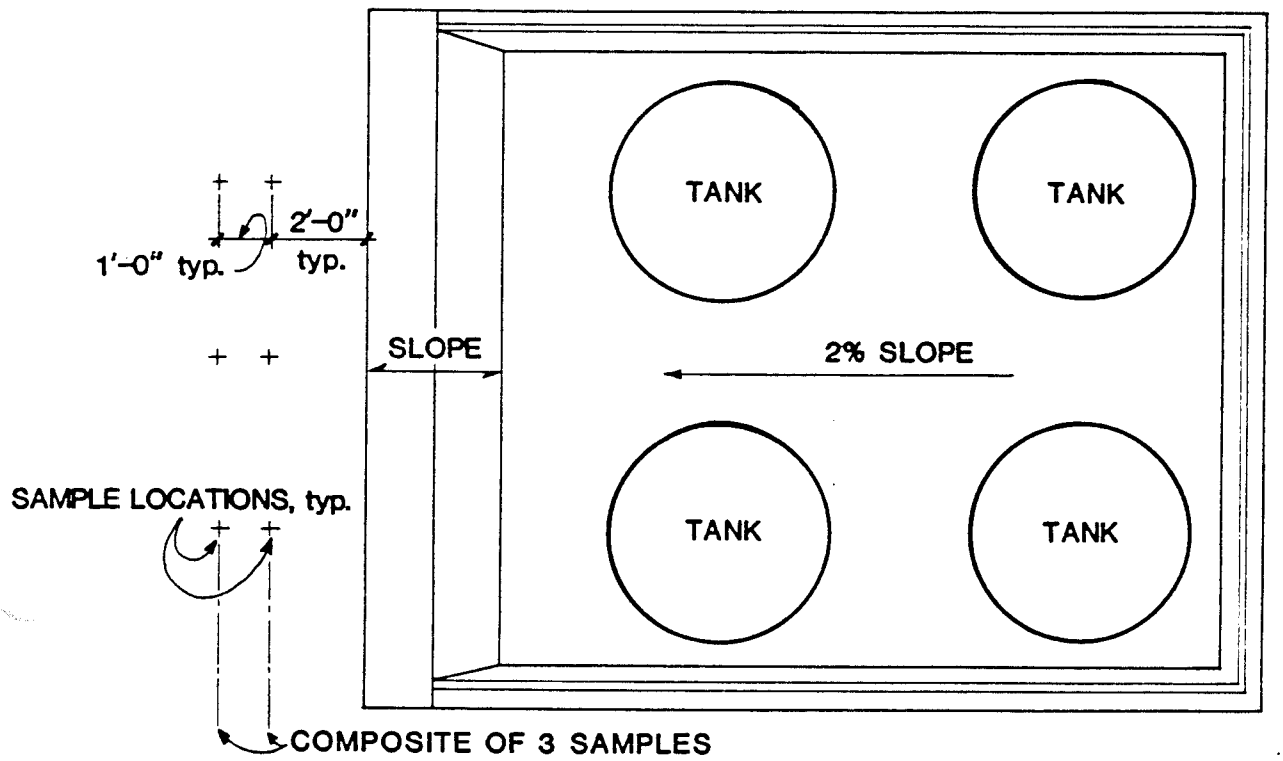

FIGURE 9-13

TA 54-AREA L

TREATMENT TANKS SAMPLE LOCATIONS

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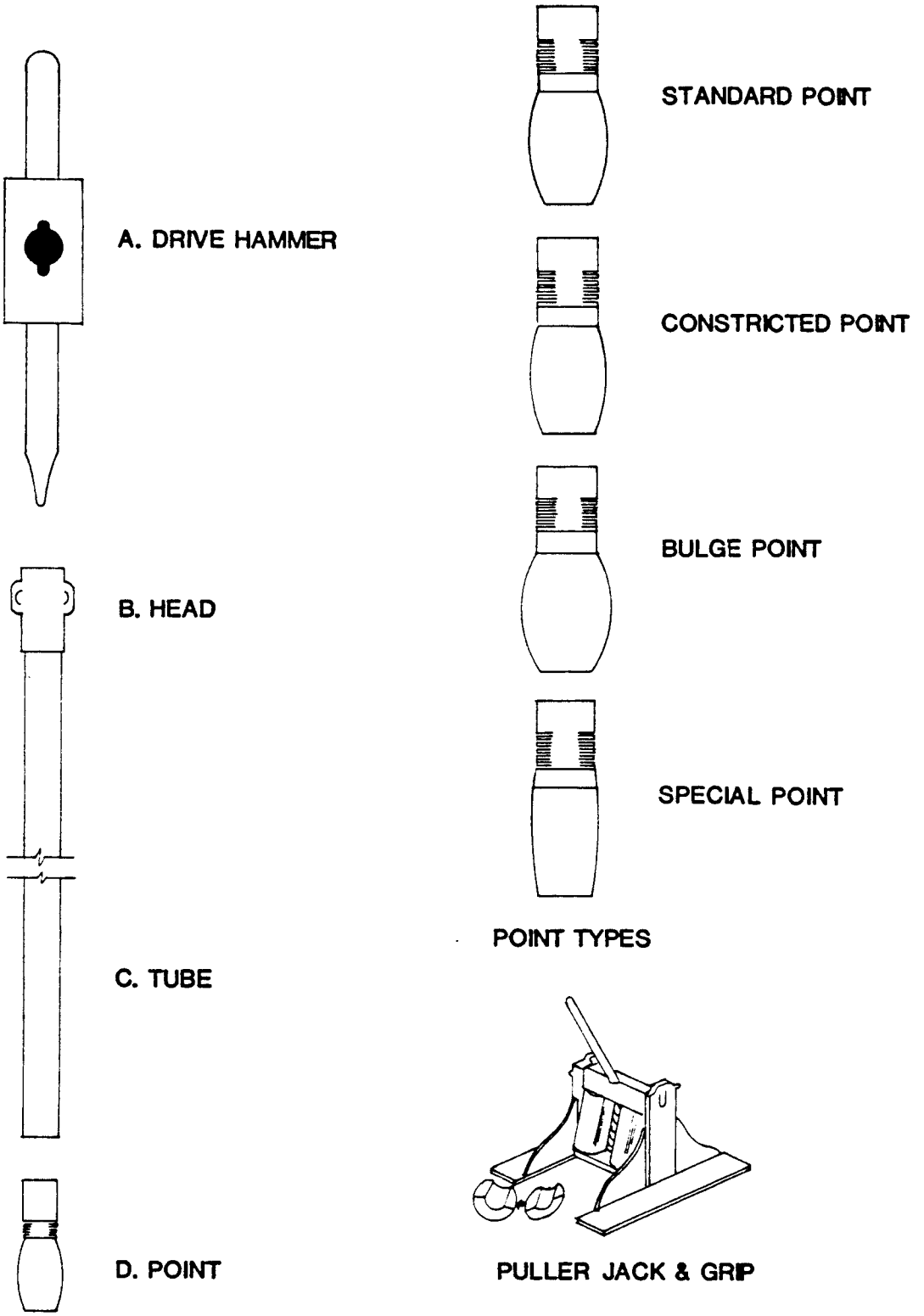

FIGURE 9-15

VEIHMEYER SOIL SAMPLER

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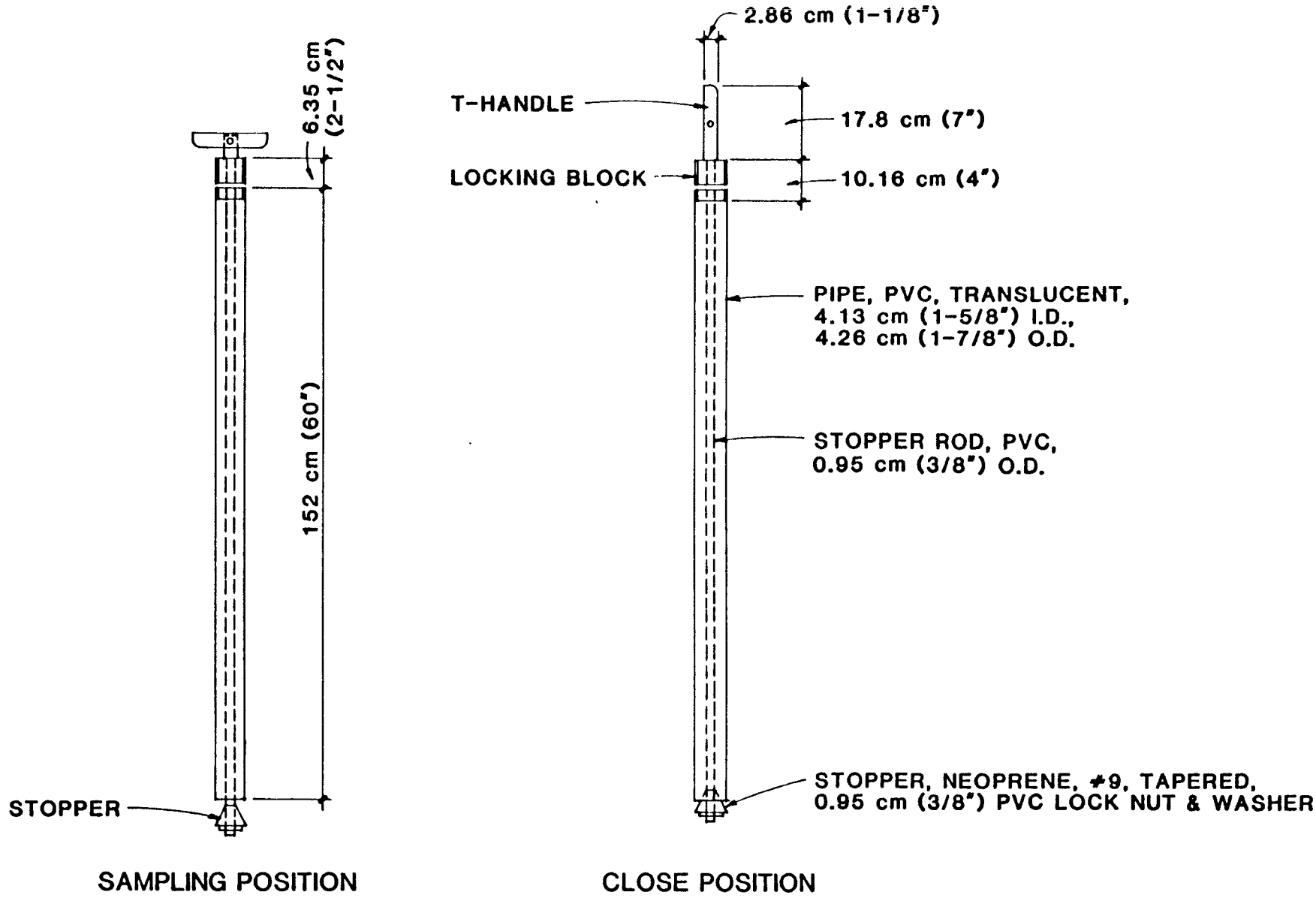

FIGURE 9-16

COMPOSITE LIQUID WASTE SAMPLER (COLIWASA)

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ENCLOSURE 8

Part B

Contingency Plan

7.0 HAZARDOUS WASTE FACILITIES CONTINGENCY PLAN

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

7.1 INTRODUCTION

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

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

Overall responsibility for Hazardous Waste Management is with the HSE-7 Waste Management Group in the Health, Safety and Environment (HSE) Division (Figure 7-2). Generators of

hazardous wastes are responsible for proper identification, segregation, and documentation of their wastes. Except for HE wastes, packaging, transportation, and final disposition of hazardous wastes are the responsibility of HSE-7 Solid Wastes Operations. Processing operation wastes handled in dumpster tanks are an exception, these being transported by Zia Company under the direction of HSE-7 Solid Wastes Operations.

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

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

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

7.1.1 HAZARDOUS WASTES

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

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

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

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

7.1.1.1 Wastes from Basic and Applied Chemistry R&D Programs

Primary Laboratory sites for basic and applied chemistry R&D include the Chemistry and Metallurgy Research Building (TA-3-29), Radiochemistry Laboratory (TA-48), Sigma Building (TA-3-66) and the Health Research Laboratory (TA-43). Typical hazardous chemical wastes consist of partly empty small containers of laboratory reagents, solvents, test samples and other laboratory wastes. Up to several hundred relatively small quantities of different acids, bases, organics, inorganics, reactive metals and other chemicals require disposal. The variability of research work prohibits limitation on the variety that can occur in this grouping. Conversely, quantities of individual chemical constituents are small.

7.1.1.2 Wastes from Processing Operations

Processing wastes typically are significant volumes of material that contain a very limited number of contaminants. The wastes are recurring resulting from ongoing experiments or materials production. The composition and concentration of contaminants

in a given process waste are generally uniform unless modifications to the process are made.

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

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

- Shops Department Wastes
  The Main Shops Department, Building TA-3-39, houses most of the highly versatile machine shop capabilities at the Laboratory. Parts can be machined from almost any metal, alloy or other materials. The machining operations generate hazardous wastes including lithium metal and lithium hydride, both of which are reactive.

7.1.1.3 Explosives Wastes

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

7.1.1.4 Chemically Contaminated Equipment

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

7.1.2 Hazardous Waste Facilities

The safe handling, treatment, and/or storage of hazardous wastes is the responsibility of HSE-7. Daily operations involving hazardous wastes are performed by Solid Waste Operations. HE wastes are an exception, their treatment being the responsibility of M and WX Divisions. HSE-7 is only responsible for residuals from HE treatment when these residuals are determined to be hazardous wastes.

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

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

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

A second type of thermal treatment facility present at TA-16 consists of a large metal pan on a sand pad in which there are five secondary metal pans lined with fire brick. Waste HE fluids are poured into the secondary pans and the HE is remotely ignited, with an "electric match." There is one facility of this type at the Laboratory. About 55 gallons of waste are burned once a month. The third type of facility present at TA-16 is used to burn sludges containing waste HE.

These facilities consist of steel cone-shaped vessels having a diameter of about five feet, buried with only the upper three to four feet of the vessel above ground. The steel vessels are filled with sand and gravel and an open fluids drain is located at the bottom of the cone. Sludge HE is pumped into the top of the cone, onto the sand and gravel bed. A heavy steel cap is then placed over the top of the cone and hot air is forced into the cone through air ducts. The hot air dries the waste sludge and liquids from the sludge migrate downward through the sand and gravel bed and through the fluids drain. Effluent from these drains is regulated by NPDES permit (NM 0028355). When the remaining explosive material is relatively free of moisture, the steel cap is removed from the cone and the explosive is ignited remotely with an "electric match." There are two facilities of this type at Los Alamos; both of these are located in Technical Area 16. Explosives are burned at these two facilities at a rate of about one burn per week. Each burn consists of about 750 pounds of waste explosive sludge.

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

7.1.2.2 <u>TA-14, 15, 36, and 39 Thermal Treatment Facilities</u>
Waste HE detonation sites are located at Los Alamos in Technical Areas 14, 15, 36, and 39. These sites are used routinely to detonate scrap HE, failed experimental detonations, unneeded classified explosives shapes, other HE determined to be excess, and reactive wastes. These sites

consist of firing pads often located within a small canyon. Associated facilities at these sites include bunkers which are occupied by technical personnel during detonations. Prior to all firings, nearby roads are checked and kept clear.

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

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

A chemical waste storage area is located in the same room housing the Batch Treatment System. Storage space consists of a bermed area encompassing 16 square feet. The area is designed to accommodate four 55-gallon waste drums. Wastes are stored in this area prior to treatment in the Batch Treatment System. Only compatible wastes are stored in this area at one time. A ventilated hood is provided for transferring wastes between drums.

7.1.2.4 TA-50-37 Chemical Waste Incinerator

The waste incinerator is located in Building 37 at Technical Area 50 (Figure 7-6). The highly modified, controlled air incinerator is rated at a nominal 45 kilograms per hour waste feed throughput. The incinerator was developed as part of a continuing incinerator study and demonstration program being conducted by Los Alamos and is currently permitted by the EPA

to burn PCB-contaminated materials. Modifications to the incinerator include additions of liquid and solid waste feed preparation lines, a continuous ash removal system, a high-efficiency off-gas cleanup system, and backup utility systems (Figure 7-7). Standard combus-tion equipment has been modified to permit effective incineration of waste in solid, liquid, slurry, or gaseous form. Particular attention has been given to engineering for proper waste containment, resulting in a system that is safe for evaluating the incineration of hazardous chemicals and certain radioactive waste forms.

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

Waste Transfer, Packaging and Storage Facilities

A single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1595 square feet are located in Area L of Technical Area 54. These facilities are used for the accumulation, packaging and storage of waste containers generated from throughout the Laboratory (Figure 7-8). Area L of TA-54 is an area of about two acres surrounded by an eight-feet-high chain-link and barbed-wire fence (Figure 7-8). Currently active waste management facilities located within this area include four waste treatment tanks and six waste disposal shafts as well as the transfer, packaging and storage facilities. The metal building has a concrete floor having a design standard load-bearing capacity of 250 pounds per square foot. Three shallow sumps covered by fiberglass grates are located within the floor of the building. The storage pad has a concrete floor having a design standard load-bearing capacity of 700 pounds per square foot.

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

Treatment Tanks

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

Land Disposal Facilities

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

7.2 HAZARDOUS WASTE EMERGENCY RESPONSE RESOURCES

The Laboratory maintains its own response resources to handle emergencies. Interaction with outside agencies is limited for security reasons and because it is impractical to train these agencies to cope with the technical diversity of the Laboratory's operations such that they could safely contribute in an emergency. Response resources include personnel, emergency equipment, and communication systems.

7.2.1 Response Groups

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

7.2.1.1 Medical Facilities

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

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

computer access to TOXLINE, CHEMLINE, and the Toxicity Data Bank.

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

7.2.1.2 HSE-3 Safety

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

7.2.1.3 HSE-5 Industrial Hygiene

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

7.2.1.4 HSE-7 Waste Management

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

7.2.1.5 HSE-8 Environmental Surveillance

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

7.2.1.6 DOE Fire Department

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

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

The Fire Department personnel make regular tours of the Laboratory facilities to detect and discuss hazards associated with individual facilities and are instructed in hazardous material handling and emergency procedures. They are aware of the hazardous waste practices at the Laboratory, and are well equipped to handle any credible emergency situation.

7.2.1.7 Mason & Hanger Protective Force (Pro-Force)

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

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

7.2.1.8 Zia Company

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

7.2.1.9 Los Alamos County Police

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

7.2.2 Emergency Equipment

A list of emergency equipment for use at the Laboratory and the location of this equipment can be found in Table 7-4. The equipment immediately available for use is located at TA-54, Area L, the TA-50 batch treatment system and container storage area, and the TA-50 waste incinerator.

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

7.2.3 Communications

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

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

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

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

The maintenance CAS board, located in Building 223 at TA-3, is manned by Zia personnel 24 hours a day. The maintenance CAS board interfaces with computers which monitor critical equipment throughout the Laboratory. Activation of an alarm triggers a callout procedure to provide maintenance personnel and management supervision to correct the malfunction. The maintenance CAS does not directly trigger an emergency response.

Internal communication systems at the Laboratory include:

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

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

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

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

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

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

7.3 NONSUDDEN RELEASES

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

7.3.1 Responsibility

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

7.3.2 Credible Nonsudden Releases

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

7.3.3 Nonsudden Release Surveillance

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

Monitoring and sampling locations for various types of measurements are organized into three main groups. Regional monitoring stations are located within the five counties surrounding Los Alamos County. They are placed up to 80 kilometers (50 miles) from the Laboratory, and serve to determine background conditions. Perimeter stations are located within approximately four kilometers (2.5 miles) of the Laboratory boundary, and document conditions in residential areas surrounding the Laboratory. On-site stations are within the Laboratory boundary, and most are accessible only to employees during work hours.

The types of routine surveillance conducted at these stations includes radiation measurements and collection of air

particulates, waters, soils, sediments, and foodstuffs for subsequent analysis.

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

7.4 SUDDEN RELEASES

This section deals with incidents involving sudden release such as spills, fires, or explosions which pose a significant threat to human health or the environment and includes the release of hazardous materials and hazardous wastes Hazardous materials are chemical substances that become a regulated waste as a result of the incident and can include hazardous raw materials that are spilled, products of combustion, and products of uncontrolled reactions..

7.4.1 Hazardous Waste Emergency Coordinator (HWEC)

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

The HSE-7 Group Leader is the primary HWEC. The list of the primary and secondary HWECs and their telephone numbers is on Table 7-6. Either the primary HWEC or a secondary HWEC is on call to provide coverage 24 hours a day, 365 days per year.

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

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

7.4.2 HWF Emergency Contingency Plan

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

7.4.2.1 Guidelines for Implementation

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

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

Spills

- A hazardous waste or hazardous material spill cannot be contained with secondary containment or application of absorbents,

- Precipitation threatens to move spilled material off site,

- A hazardous waste or hazardous material spill causes the release of flammable material, creating a fire or explosion hazard,

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

- An earthquake or other natural disaster threatens containment integrity.

Explosions

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

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

Fires

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

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

7.4.2.2 Emergency Notification

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

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

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

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

Because the initial observer may not be able to recognize the involvement of hazardous materials, the HWEC shall be notified of any incident as described in Section 7.4.2.1. The HWEC

shall use whatever means available including the assistance of other response groups, computer data searches, and sampling to determine if a hazardous waste is generated.

7.4.2.3 HWEC Actions

Upon notification of an incident, the HWEC shall:

1. Proceed directly to the site;

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

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

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

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

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

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

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

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

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

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

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

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

1. Arrange for site cleanup;

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

3. Provide for decontamination of equipment as needed;

4. Replace and/or repair equipment as needed;

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

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

7.5 SPECIFIC EMERGENCY RESPONSE PROCEDURES FOR HAZARDOUS WASTE FACILITIES

The following section summarizes the guidelines for handling emergencies.

7.5.1 Chemical Spills

Hazardous wastes are handled and stored in small containers, lab packs, 55-gal. drums, and dumpster tanks. The individual volumes handled are small. Handling of hazardous materials may involve truck load quantities of material such as solvents, fuels, acids, and bases.

The general steps in handling hazardous wastes are:

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

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

7.5.2 Fire

Depending on the size of the fire and fuel source, portable ABC fire extinguishers may be used to put out fires. However, the Laboratory is discouraging the use of portable fire extinguishers by employees and encouraging the immediate evacuation and notification of the DOE Fire Department. The person fighting the fire must wear appropriate protective equipment. If the fire spreads or increases in intensity, all personnel should evacuate to an upwind point at least 100 yards away from the fire. For any fire involving hazardous waste, the HWEC must be contacted immediately, and he will alert all necessary emergency preparedness personnel. The DOE Fire Department is automatically alerted when the CAS is activated. The HWEC should remain near the disposal site, but at a safe distance, so he can advise the personnel responding to the fire of the known hazards. Upon arrival at a fire, the Fire Department Officer-in-Charge will be in command of fire fighting. He will accept and evaluate the advice of Los Alamos personnel and emergency preparedness organization members, but he will retain the responsibility to select the fire fighting methods and tactics. The HWEC will be in overall control of the Laboratory's emergency response efforts until the emergency is terminated.

7.5.3 Explosion

In the case of explosions, all personnel will immediately evacuate the area. Any injured personnel will be immediately transported to the Medical Department for treatment. The HWEC must be contacted immediately upon activation of the CAS, and then he must alert all necessary emergency response personnel. The DOE Fire Department is notified automatically upon CAS

activation. The HWEC will remain near the disposal site, but at a safe distance, so he can advise the personnel responding to the explosion of the known hazards.

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

7.5.4 Exposure

Chemical material in the eye or on the skin will be washed either with the entire contents of the portable eye wash station or for at least 15 minutes. The eyelids will be held open during washing. The injured person will then be quickly transported to the Medical Department for evaluation. If possible, the chemical material involved in the injury will be ascertained and the information given to the Medical Department.

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

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

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

7.5.5 Flood

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

7.6 EVACUATION

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

7.6.1 Evacuation Plan

Emergency situations may warrant the shutdown and evacuation of an area(s) or building(s) in order to protect personnel and property, to anticipate the emergency condition, or to enhance the appropriate response. Table 7-7 shows the criteria for evacuation, persons responsible for initiating evacuations, and reentry conditions. The TA-54, Area L evacuation route is shown in Figure 7-11. Building evacuation routes for the TA-50 batch treatment system and TA-50 incinerator building are shown in Figures 7-12 and 7-13. The evacuation route for TA-50 is shown in Figure 7-14.

To initiate building evacuation, the evacuation alarm is sounded and/or the public address system is used. The evacuation alarm, which is more suitable for evacuation of the

whole facility, is a steady, continuous, audible signal. This alarm cannot be silenced and reset by site personnel. The Fire Alarm Maintenance Section at 667-4027 and the Fire Department Platoon Chief at 667-7026 can silence and reset the alarm.

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

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

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

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

while the other reports to the muster area or control point to obtain additional aid.

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

- Group Leader determines cause and probable extent of hazard.
- Group Leader will sound the evacuation alarm or make an announcement on the PA system.
- Group Leader will designate an assembly area if other than muster area.
- Group Leader will notify the on-call HWEC.
- Personnel will shut down equipment that might contribute to the hazard.
- Personnel will activate fire suppression systems.
- Personnel will not remain in affected area except to assist injured personnel.

- Personnel will report to the muster area or designated control point.

- Roll call (general evacuation) or personnel accounting (partial evacuation).

- Building or Area sweep by assigned personnel.

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

7.6.2 Process Shutdown

Personnel are instructed to shut down equipment prior to evacuating a building unless an immediate building evacuation is announced. To ensure efficient shutdown, training and exercises in process shutdown are required. In the case of an immediate evacuation, a selected team may shutdown designated equipment in an evacuated area. The team will be equipped with the proper equipment, clothing and breathing apparatus. If present, HSE-1, HSE-3, and HSE-5 will provide advice and assistance. Process shutdown procedures only apply to the TA-50 batch treatment system and waste incinerator. Process shutdown procedures are as follows.

7.6.2.1 TA-50 Batch Treatment System

If a fire or evacuation alarm sounds during the operation of the Batch Treatment System, the operating crew will initiate a process shutdown in accordance with the current Standard Operating Procedures. Because the process is a batch

treatment, cessation of treatment is adequate to bring the process to a safe condition. In general, the process shut should include the following:

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

7.6.2.2 TA-50 Waste Incinerator

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

- The SCRAM - initiated in any situation that could lead to an immediate loss of containment. A SCRAM can be initiated manually at any time at the discretion of an operator. The upper and lower chamber burners are shut down, all combustion air and

induced draft blowers are shut down and the valves and dampers are positioned so as to minimize flow into the system while maintaining a negative pressure. Snuffing steam is introduced into the lower chamber.

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

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

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

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

7.7 SALVAGE AND CLEANUP

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

- Provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion. Contaminated material will be treated as a hazardous waste and disposed of according to Laboratory procedures.

- Remain at the site to ensure that no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed.

- Ensure that emergency equipment is cleaned and fit for its intended use before operations are resumed.

Equipment will be visually inspected and sampled if necessary to determine the type and degree of contamination and appropriate cleanup measures will be used.

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

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

7.8 POST-EMERGENCY ASSESSMENT

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

7.9 EMERGENCY RECORDS

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

7.10 EMERGENCY REPORTS

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

The report shall include the following data:

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

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

7.11 CONTINGENCY PLAN AMENDMENT

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

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

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

TABLE 7-6

HAZARDOUS WASTE EMERGENCY COORDINATOR

Primary Coordinator	Laboratory Telephone	Telephone	Home Address
Ray Garde, HSE-7 Group Leader	7-7920/4301	753-7737	2560 Aeby Lane, Espanola, NM
Secondary Coordinators (by succession order)			
1. Lud Emelity, HSE-7 Deputy Group Leader	7-5839/4301	662-7993	388 El Conejo, Los Alamos, NM
2. J. L. Warren, HSE-7 Associate Group Leader	7-5398	661-9639	1082 Big Rock Loop, Los Alamos, NM
3. Jerry Buchholz Associate Group Leader	7-4301	672-3647	316 Potrillo Dr., White Rock, NM
4. Lee Borduin Associate Group Leader	7-7391	455-2882	Rt. 1, Box 92G, Santa Fe, NM
5. Karen Balo Section Leader	7-6095	672-1369	400 Kolleen Court White Rock, NM
6. W. M. Sanders Section Leader	7-4301	672-1931	214 Rover White Rock, NM
7. R. A. Koenig Staff Member	7-7391	662-2458	971 Alamo Road Los Alamos, NM
8. B. R. Myers Staff Member	7-6095	672-9509	83 Mimbes White Rock, NM

TABLE 7-6 (cont)

HAZARDOUS WASTE EMERGENCY COORDINATOR

Primary Coordinator	Laboratory Telephone	Telephone	Home Address
9. D. G. Vance Staff Member	7-4301	None at present	Rt. 14 Box 750 Santa Fe, NM
10. M. D. Salazar Staff Member	7-6095	753-4423	Rt. 2 Box 124 Espanola, NM
11. N. W. Weeks Tech. Supervisor	7-6094	662-5366	2176 37th, Los Alamos, NM
12. W. D. Moss Fac. Eqp. Oper.	7-6094	662-5124	2932 Woodland Los Alamos, NM
13. D. L. Volz Fac. Eqp. Oper.	7-6904	662-3287	2146-C 43rd St. Los Alamos, NM
14. D. F. Salazar Fac. Eqp. Oper.	7-6904	852-2456	P.O. Box 922 San Juan Pueblo, NM
15. L. D. Williams Fac. Eqp. Oper.	7-6904	753-5782	P.O. Box 3754 Fairview, NM
16. L. L. Hupke PCB Disposal Coord.	7-7316	753-6984	P.O. Box 905 Los Alamos, NM
17. C. L. Gilley Matr. Tech.	7-7391	662-4051	2173 B. 36th St. Los Alamos, NM
18. R. J. Payne Fac. Oper.	7-4301	672-9744	128 Aragon Los Alamos, NM

ENCLOSURE 9

Part-B

Water Analysis Plan

3.0 WASTE CHARACTERISTICS AND ANALYSIS PLAN

3.1 CHEMICAL AND PHYSICAL ANALYSES

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

Hazardous waste generated by Laboratory activities can be considered as three very general types: (1) wastes from processing operations, (2) wastes from research and development (R&D) activities, and (3) high explosive (HE) waste. Each of these general types has unique characteristics. Processing wastes typically are significant volumes of material that contain a very limited number of contaminants. R&D wastes, however, are typically lesser volumes of a vast number of different laboratory reagents, chemicals, solvents and other general laboratory waste. In addition, the composition and concentration of contaminants in a given process waste is generally uniform unless modifications to the process are made. Conversely, the waste species from R&D activities continually vary depending on the nature of the rapidly changing R&D efforts at the Laboratory. HE wastes consist of a narrow

assemblage of chemicals, the concentrations of which may vary. The chemical assemblage, however, remains fairly constant. Los Alamos has developed procedures for the identification and segregation of hazardous wastes (see Section 3.3). Once a waste is identified as a hazardous waste, it is diverted to the appropriate treatment/disposal method (described in Section 4.0) based on its characteristics as determined by the Waste Analysis Plan (see Section 3.2).

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

3.1.1 Wastes from Basic and Applied Chemistry R&D Programs

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

3.1.2 Electrochemistry Processing Wastes

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

3.1.3 Isotope Separation Wastes

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

3.1.4 Shops Department Wastes

The Main Shops Department, Building TA-3-39, houses most of the highly versatile machine shop capabilities at the Laboratory. Parts can be machined from almost any known metal or known alloy. Waste materials from machining operations are segregated by metal when generated. (For example, there are containers for aluminum, chips and turnings.) The machining operations routinely generate waste lithium metal and lithium hydride, both of which are hazardous due to their reactivity (D003). Again, these materials, when generated, are known and not comingled with other metal wastes. The Main Shops

Department also generates waste nonhalogenated solvents (F003) and halogenated degreasers (F001) and solvents (F002).

3.1.5 Explosives Wastes

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

3.1.6 Chemically Contaminated Equipment

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

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

3.2 WASTE ANALYSIS PLAN

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

When commercial chemical products and off-specification species are declared to be excess, the originating group completes a Chemical Waste Disposal Request (see Form H-1 in Appendix H) and sends the form to the Waste Management Group. The Request lists the specific chemicals the generating group needs to dispose of, the quantity and form of the chemicals and other pertinent information such as the condition of the containers. Most chemicals disposed of are residual substances in small reagent size containers with the original detailed label intact. Thus, the completed Request form and the container label serve as the waste analysis record for the waste to be disposed of. Should the label become detached, the waste is handled as an unknown material, as discussed later. If a mixture of solvents is generated for disposal, a complete list of the solvents involved is provided on the Chemical Disposal Request Form. This documentation is permitted by HWMR 206.B.3.a. (1) in place of a chemical analysis. After the Waste Management Group collects the chemical wastes, individual reagent containers are sorted to insure compatibility (as described in Section 3.3) and are packaged with vermiculite into metal drums for disposal. The composition of waste in each drum is derived from recording the known compositions of waste that is placed in the container on a form developed for this purpose (Forms H-2 and H-3 in Appendix H).

For the processing waste streams (e.g., wastes generated by the electrochemistry processing activities), periodic analyses of the waste composition are performed. Thorough knowledge of the waste-generating process allows analyses of specific processing waste streams to be tailored to provide necessary characterization information in an efficient manner. In

addition, the frequency of analysis is based on the possible temporal variation in the waste composition. The waste analysis program developed with these considerations in mind provides the information required to properly treat and dispose of Laboratory processing wastes (see Appendix H for analyses forms of processing wastes).

Occasionally, chemicals of an unknown nature require disposal. These wastes are handled on a case-by-case basis. Often the individual waste can be characterized by knowledge of the operations and activities that were performed in the specific area in which the waste was generated. It has been deemed acceptable "to not completely analyze small quantities (less than one gallon) of unknown wastes if 1) these wastes are handled with the caution (in terms of potential occupational exposures) accorded the most hazardous substances LANL handles; 2) they are landfilled within 90 days in the disposal shaft(s) reserved for the most potentially mobile and toxic wastes LANL handles; 3) a complete operating record is kept of the disposal of these wastes; and 4) these unknown wastes do not exceed a very small fraction of the wastes handled. Reactive wastes cannot be landfilled, and LANL must at least test these wastes for reactivity, pH, and ignitability prior to lab-packing for disposal.

Larger quantities than one gallon of waste must be analyzed sufficiently to determine if the waste is a pure listed waste or is a regulated hazardous waste by the mixture rule or by its characteristics. It is not sufficient to "define" the waste "in terms of basic parameters such as pH and ignitability." The waste identification scheme of 204.A.3., in other words,

must be followed. It is acceptable to bulk unknown wastes, up to one (absorbed) drum in quantity, after careful compatibility testing, and run analyses on the bulked waste."[1] Analyses to characterize unknown wastes are performed in accordance with the procedures given in the most recent EPA test methods manual (currently SW-846, Second Edition) or approved equivalent methods, as noted in Table 3-2.

If based on the activities performed in the specific area in which the waste was generated, the waste is determined to be a potentially dangerous reactive material, analysis is not attempted and the waste is detonated.

"The EID feels that the detonation of small quantities of unknown and unsamplable, but potentially very dangerous, substances is preferable to exposing workers to unknown hazards. LANL's waste management group should use its best discretion in such cases."[1]

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

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

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[1]October 26, 1984, Letter from Denise Fort, EID to Harold Valencia, DOE/LAAO and Donald Kerr, Los Alamos National Laboratory.

3.3 WASTE SEGREGATION

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

- Organics, including solvent wastes such as acetone, benzene, toluene, etc.

- Corrosive acidic wastes, including organic and mineral acids but excluding oxidizers such as nitric or perchloric acid

- Corrosive alkalic and caustic wastes

- Oxidizers, such as perchloric or chromic acid and nonacidic oxidizers such as permanganates and chlorates

- Reactive metals and compounds, such as sodium, lithium hydride, phosphorous trichloride, etc.

- Nonreactive metals, salts and neutral compounds, such as lead, barium salts, etc. and cyanide or sulfide compound containing wastes (in lab pack quantities only)

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

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

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

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

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

(2) Not available.

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

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

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

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

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TABLE 3-3.
WASTE ANALYSIS PARAMETERS AND TEST METHODS

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

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

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

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

"L" refers to liquid waste.

"S" refers to solid waste.

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

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

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

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

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

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

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TABLE 3-5.
FREQUENCY OF ANALYSES AND RATIONALE

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

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

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

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

MAY 01 1985

ENCLOSURE 10
Part B
Closure Plans

TA-14, 15, 36 & 39
TA-16
TA-50-1 BTP

9.0 CLOSURE AND POST-CLOSURE PLAN

9.1 GENERAL CLOSURE/POST-CLOSURE INFORMATION

Introduction

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

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

9.1.1 Closure Performance Standard

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

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

9.1.2 Partial and Final Closure

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

Partial closure of individual facilities is discussed in the respective sections.

9.1.3 Closure and Post-Closure Cost Estimates

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

9.1.4 Groundwater Monitoring

Los Alamos National Laboratory has applied for a ground water monitoring waiver in accordance with the provisions of 40 CFR 264.90 (b)(4) (NMHWMR 206.D.1.a[2]). Groundwater monitoring is only applicable to the landfill operations at Area L. The waiver request was based on the determination-nation that average annual precipitation is equaled or exceeded by runoff and evapotranspiration resulting in negative percolation rates. Past free liquids disposed of at this site are of inadequate volume to threaten the main aquifer 290 meters (950 feet) below Area L. As a result of the NMEID Compliance Order/Schedule/date May 7, 1985, sampling of perched water in Canada del Buey and Pajarito Canyon commenced in November of 1985. This water monitoring will be continued as ground water monitoring for post-closure.

9.1.5 Personal Protection

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

9.1.6 Certification of Closure

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

9.1.7 Post-Closure Care Office

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

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

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

9.1.8 Security

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

9.1.9 Notation of Deed

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

9.1.10 Individual Closure and Post-Closure Plans

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

9.2 CLOSURE PLAN FOR THERMAL TREATMENT FACILITIES

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

Detonation sites for high explosive (HE) waste are located in Los Alamos at Technical Areas 14, 15, 36, and 39. These sites are used routinely to detonate scrap high explosives (HE), failed experimental detonations, unneeded classified explosive shapes, and other HE determined to be excess. A site at TA 36 has been used to detonate reactive wastes and other assorted regulated wastes.

9.2.1.1 TA 14 Firing Site Description

The waste firing site at TA 14 is located just south of Control Building TA 14-23 (Figure 9-1). Four additional firing points are located south of the waste detonation site, but these have not been used for waste detonations. The waste detonation firing site consists of a three-sided blast shield that directs the impact of detonations away from the control building. At the base the shield is a 0.5 m (2 ft) thick by 2 m (6 ft) square concrete pad overlaid with a neoprene shock pad, a 11.4 cm (4.5 in.) steel plate and several inches of sand. Wastes are placed on the pad and detonated from the Control Building. Detonations at this firing site are limited to small pieces. Just southeast of the firing pad is a small wire cage used to burn paper, tape, cotton swabs and other trash items that have contacted HE and are suspected of being contaminated.

The firing site is located on a mesa top and the topography around the firing site is generally flat, sloping gently to the south.

9.2.1.2 TA 15 Firing Site Description

The firing site at TA 15 is occasionally used to detonate regulated wastes, and is located at the end of Building TA 15-184, the Phermex Chamber (Figure 9-2). The site is normally used for test detonations, but unneeded classified shapes and scrap HE have also been detonated. The firing site is underlain with two massive steel plates 15 cm (0.5 ft) thick by 1.5 m (5 ft) wide by 6 m (20 ft) long. The steel plates are laid lengthwise end-to-end with one end against the Phermex Building. There are various small housings for cameras and instrumentation around the firing pad. The Phermex Chamber and small housings are protected from detonations with sand bags.

The firing site is located on a mesa top and the topography of the area is generally flat with a gentle slope to the southwest.

9.2.1.3 TA 36 Firing Site Description

The firing site at TA 36 used for waste detonation is designated as Meenie Site and is located west-southwest of Control Building 8 (Figure 9-3). The site is a flat area covered with sand. To the south of the detonation site is an instrument chamber.

In addition to the HE wastes associated with explosives studies, reactive wastes and other regulated wastes have been detonated or included in HE detonations.

TA-36 Meenie Site is located in a small canyon.

9.2.1.4 TA 39 Firing Site Description

Two sites normally used for test detonations have been used for HE waste detonations at TA 39. These detonation sites are those located at Firing Point 6 and 57 (Figures 9-4, and 9-5). The sites are all similar and consist of a sand pad located at the bottom of a narrow canyon. The canyon walls rise steeply 220 to 270 feet near the detonation sites and contain debris thrown by the detonations. The drainage channel is approximately in the center of canyon floor and drains to the southwest.

9.2.1.5 Estimate of Maximum Waste in Treatment

Wastes are not stored at the detonation site, but are held in short-term storage (less than 90-days) at the generation point and moved to the site just before detonation. The maximum HE waste in treatment at any one time is 45 kg (100 lbs).

9.2.1.6 Description of Waste Handled

All the detonation sites have been used to detonate waste HE and some of the sites have been used to burn paper, tape, and other trash items assumed to be contaminated with HE. HE considered to have been burned or detonated include HMX, RDX (cycionite), TNT (2, 4, 6 trinitrotoluene), PETN (pentaerythritol tetronitrate), ammonia nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine, and various plastic binders.

The detonation site at TA 36-Meenie has been used to detonate other regulated wastes that represented handling or storage risks. The wastes so detonated are listed in Table 9-2 and were small volumes, usually residual laboratory chemicals in small packages, or leaking gas cylinders.

9.2.1.7 TA 14, 15, 36, and 39 Closure Procedure

Closure for each site is similar. A sampling survey is conducted using a grid to determine the area of possible contamination. A surface sample is taken at each grid point, and vertical soil sampling is done at 1-foot intervals to bedrock or to a maximum depth of 3 feet for the initial survey. If the initial grid sample analysis indicates vertical contamination at the maximum sample depth, additional sampling at 1 foot intervals will be performed to determine the depth of contamination. If contamination is determined on the surface, addition sampling will be conducted by reducing the grid distance by one half and taking additional site samples, dictated by terrain, until the contaminated area is defined. If significant contamination is found at the outside grid samples, the limits of the grid will be expanded to determine the outside parameter of contamination. The contaminated soil is then removed and handled as a regulated waste. The adequacy of decontamination is determined by additional sampling. Sampling, analysis, and documentation procedures are defined in Section 9.5.

TA 14 SAMPLING AND ANALYSIS SURVEY

The TA 14 waste detonation site will be separated into 12 m by 12 m (40 ft by 40 ft) grid squares extending 18 m (60 ft) to 43 m (140 ft) from the detonation point (Figure 9-1). The grid is offset to the south because deflection from the blast shield directs the debris in that direction. The grid is small in size because the site is used for the detonation of small HE pieces.

Composite soil samples will be taken representing the intersection of grid lines. Additional composite sediment

sample will be taken in the drainage channel at the approximate locations shown in Figure 9-1. If channel sediment samples show contamination of regulated constituents, additional samples will be taken along the channel at 10-yard intervals. One additional composite soil sample be taken at the burn cage location.

Four background composite samples will be taken: one to the north, east, south, and west of the site at a distance greater than 500 yards from the detonation site. The exact sites for background samples will be field selected based on similar topographic and geologic characteristics to the detonation site, and the lack of possible interference of other operating Laboratory sites. Two background sediment samples will be taken from the drainage channel upstream of the detonation site. If there is no sediment channel site outside the grid, background samples may be taken from similar nearby drainage channels. Care will be taken in selecting these background sample sites to preclude influences of other operating sites.

Field relocation of grid points may be required by topographic features. In such a case, the sample will be taken as closely as possible to the grid point and the new location will be documented.

Each grid point will be represented by a composite sample made up of four core samples taken 3 m (10 ft) along each grid line from the grid intersection. Background soil samples will be a composite of four cores with the same orientation as grid samples.

Sediment samples will be a composite of four sediment samples taken from the channel and evenly spaced over a 3 m (10 ft) line following the channel. The burn pit center

composite sample will be made up of four core samples taken from the center of each quarter of the pit.

Vertical soil sampling will be done at the topsoil, then at 1-foot intervals to bedrock or to a maximum depth of 3-feet for the initial survey. Core samples shall include soil depth segments from 0.5-foot to 1-foot, 1.5-feet to 2-feet and 2.5-feet to 3-feet.

Soil and sediment samples will be analyzed for the constituents listed in Table 9-3. Barium is a possible contaminant because it is in several HE mixtures. The other toxic metals are included to ensure that these materials were not included in past detonations. A scan for volatile and semivolatile organics is conducted to ensure that residual from solvents used in HE preparation are not present.

Analysis is not conducted for HE constituents because these are a regulated waste based on reactivity, and detonation or burning renders then nonreactive. Furthermore, none of the HE materials used at this site are 40 CFR 261 Appendix VIII constituents. Analysis and Quality Assurance/Quality Control will follow methods defined in Test Methods for Evaluating Solid Wastes, USEPA SW 846, most current edition (SW 846).

The closure regulation HWMR 206.C.2.e requires that all facility equipment and structures must have been properly disposed of, or decontaminated by removing all hazardous waste and residues. The closure regulation specific to thermal treatment (HWMR 206.C.11.e) states that the owner or operator must remove all hazardous waste and hazardous waste residues from the thermal treatment process or equipment. The above regulations both relate decontamination to equipment and the term residue is not defined. The

regulation HWMR 201 A.2.c.(2) states that any solid waste generated from the treatment of solid waste is a hazardous waste except as provided in HWMR 201.A.2.c.(3) which states that solid waste described in HWMR 201 A.2.c.(2) is not a hazardous waste if, in the case of any solid waste, it does not exhibit any of the characteristics of a hazardous waste identified in HWMR 201.B. Those characteristics include ignitability, corrosivity, reactivity, and EP Toxicity. The intent of these closure regulations is to guarantee that a closed area possesses no risk to human health or the environment.

The definition as to what constitutes contamination of the detonation site based on the above cited regulations is not clear. Barium is the most probable regulated constituent expected to be found at a detonation site. According to HWMR 201.a.2.C.(3), the residue would not be a regulated waste for barium or other metals unless the concentration exceeded the EP Toxicity limit. There are no limiting concentrations for hazardous constituents other than those listed as EP Toxic.

If a significant increase of hazardous constituents over background is used to determine the residue which must be removed, then it is conceivable the large quantities of soil around the detonation site would have to be removed even though the concentration of hazardous constituents would not pose a risk to human health or the environment. The comparison against background samples is further complicated by validity of the background samples. The detonation site is located on a mesa and the area survey of this site and other detonation sites include the mesa's surface and in some cases, a canyon floor. Developing background constituent concentrations levels which account for rapid changes in geology as well as the effects of erosion and deposition is not practical.

Should contamination removal be based solely on a significant increase of a hazardous constituent, the soil may not be a regulated waste per HWMR 201.A.2.c.(3) and may be handled and disposed of as an unregulated waste. The cost of removing the contamination may not afford any additional protection to human health or the environment.

Basing the determination of contamination of total metals on EP toxicity limits is not valid. As shown in Table 9-6, the mean ambient background concentration for total metals for soils, exceeds the EP toxicity limit for several metals. It is possible that background concentration of EP Toxic metals may exceed the limit.

As a result of these considerations, the following contamination criteria is selected. On completion of the analytical survey, the Laboratory will prepare a risk assessment for each constituent showing significant increase over background concentrations. A significant increase will be determined using statistical methods described in SW 846. The risk assessment will determine the threshold concentration for each constituent that represents a significant risk to human health and the environment and will take into account all possible pathways. Soils containing regulated constituent levels above the threshold concentration will be considered contaminated.

A copy of the completed risk assessment along with pertinent backup data will be provided to the NMEID for review and approval of the threshold values. Should NMEID find the threshold contamination levels inadequate, the Laboratory will negotiate threshold values agreeable to both parties.

TA 15 SAMPLING AND ANALYSIS SURVEY

The TA 15 waste detonation site will be divided into a grid on 23 m (75 ft) grid centers near the detonation site center expanded to 43 m (150 ft) centers at a distance of 46 m (150 ft) or greater from the center (Figure 9-2). Because TA 15 has been used for major detonations, the grid is expanded to cover an extensive area.

Composite sediment samples will be taken in the drainage channels at the approximate locations indicated in Figure 9-2. The location of the samples will be documented.

Four background samples: north, east, south, and west, at a distance greater than 1,000 yards from the detonation site and two background channel sediments samples will be taken. Considerations for selecting background sample sites are as discussed for TA 14.

Composite sampling, analysis, and determination of contamination are the same as discussed for TA 14.

TA 36 SAMPLING AND ANALYSIS SURVEY

The TA 36 waste detonation site will be divided into a grid on 23 m (75 ft) centers near the site center expanded to 43 m (150 ft) centers at a distance of 43 m (150 ft) or greater from the center (Figure 9-3). The center of the grid is at the firing point. Composite soil samples will be taken representing the intersection of grid lines. A composite sediment sample will be taken in the drainage channels at the approximate locations indicated in Figure 9-3.

Background samples and determination of contamination are the same as discussed for TA 14. Soil background samples

will be taken at a distance greater than 1,000 yards from the detonation site. The samples will be analyzed for the constituents given in Table 9-4, which include the regulated waste detonated at this site.

TA 39 SAMPLING AND ANALYSIS SURVEY

TA 39 waste detonation sites will be separated into 23 m (75 ft) grids extending down the canyon floor from the detonation site (Figures 9-4 and 9-5). Composite soil samples will be taken representing the intersection of grid lines. Sediment samples will be taken in the drainage channels at the approximate locations shown on the figures. The exact locations of the sediment samples will be documented.

Four background samples: north, east, south, and west at a distance greater than 1,000 yards from the detonation sites and two background channel sediment samples will be taken. Because the debris from detonations may have been confined to the canyon floor by the steep canyon walls, the four background samples may be taken from the floors of similar adjacent canyons that are not affected by other laboratory operations. The northern most firing point is near the head of the canyon and may have contaminated the channel sediment throughout the canyon. Background samples for sediment will be taken from an adjacent canyon.

The determination of contamination is the same as discussed for TA-14.

9.2.1.8 Decontamination

The decontamination procedure is similar for all sites. The approach to decontamination depends on the extent of contamination, as determined by the sampling survey. If the

sampling survey indicates that there are no contaminated areas, no further action will be taken at the site except that the burn cage at TA 14 will be removed and hauled to Area L for storage and ultimate landfill disposal onsite, or shipment offsite to a permitted disposal site. Where sites have small concrete pads covered with sand, such as TA 14, the sand will not be tested, but will be placed in barrels and taken to Area L for storage and disposal. The sand pad at TA 15 will be tested for contamination is part of the grid because of its size. The pads of TA 36 and TA 39 have no concrete pad or other base, and will be handled similarly to other potentially contaminates soil areas.

Should a small soil area be affected, the contaminated soil will be removed with hand shovels or a backhoe, loaded into drums, and transferred in a truck to Area L for storage and ultimate landfill disposal, or shipped offsite to a permitted disposal site.

Large contaminated soil volumes will dictate the use of sealed and covered dump trucks. The Laboratory, therefore, reserves the option of shipping the contaminated soil for offsite disposal, because Area L is not equipped to handle large volumes. In this event, the Laboratory will contract with a permitted transporter and disposal site contractor who will provide sealed gondola trucks and provide for decontamination of those trucks at the disposal site.

Personnel involved in sampling and decontamination will wear rubber gloves, safety glasses, and coveralls. Personnel involved in dust generating activities, such as digging and filling drums, will wear dust masks to prevent inhalation of contaminated dust. The Laboratory's Industrial Hygiene Group, HSE-5, will review the site survey analytical data and recommend additional protective clothing.

Small equipment used to pick up soil will be scraped and brushed clean, and the accumulated dust will be placed in drums for transport to Area L. The equipment will be wrapped in sheet plastic and sealed with tape, then transported to the HE decontamination slab at TA 16-400.

The decontamination pad at TA 16-400 is used to wash down equipment used in handling HE. The cleaning water is collected in a sump and then hauled to the TA 16 burn pad area with a vacuum truck. At the burn pads, the water is filtered in two sand filters, the filter residual is burned, and the filtered water discharged under a NPDES permit. Residues from the filter are disposed of at Area L. The equipment will be decontaminated by washing with detergent and water at TA 16-400. No testing for decontamination of equipment will be conducted because the regulated substances present are not acutely toxic and washing with detergent is adequate for safe handling.

The Laboratory recognizes that should extensive contamination have occurred, the closure plan presented here may be impractical. Should the detonation site analytical survey prove this to be true, the Laboratory will provide the survey data the Director of NMEID within 30 days of the completion of the analytical work. Within 60 days of submission of the survey data, the Laboratory will provide an amended closure plan. The plan may also be amended under other circumstances as per [HWMR 206.C.2.c(2)].

9.2.1.9 Decontamination Verification

Decontamination of the site will be demonstrated by additional sampling. Removal of contaminated soil will leave an exposed surface. The disturbed surface will be resampled on the same grid used to define the contaminated area. Analysis and the determination of contamination is as

previously discussed, and an analysis will be conducted only for those constituents that caused the area to be contaminated.

9.2.1.10 Closure Schedule for TA 14, TA 15, TA 36, and TA 39

The year of closure is 2100. The following closure schedule allows closure of the four thermal treatment areas in a consecutive manner, that is, on completion of the initial site sampling survey at the first site, the survey will be initiated at the second site. All four sites will be closed together but will by necessity be at different stages of closure. The time required for individual closure steps are as follows:

Activity	Maximum Time Required
Contract for sampling and/or analytical services	90 days
Conduct the first sampling survey	30 days
Analyze the first samples	60 days
Determine contaminated areas	20 days
Conduct the second sampling survey	30 days
Analyze the second samples	60 days
Determine contaminated areas	20 days
Contract for decontamination	90 days
Remove soil	180 days
Decontaminate equipment	7 days
Weather delay contingency	90 days
Conduct verification samples	20 days
Analyze samples	30 days

Contracting for analytical services will include all four sites. The sampling survey will have to be staggered from

site to site for efficient use of time and must be completed at all sites before complete data is available to allow contracting for decontamination. The analytical survey for the four sites will take a cumulative 570 days and is limited by sample analysis. Decontamination will also be staggered. Decontamination followed by decontamination verification will take a cumulative 1010 days for four sites. Total closure time is 1580 days, or 4.3 years.

There is no time allowed for removal or treatment of the final volume of wastes because there is no waste on site except just before treatment. Closure will not commence until the last wastes from the source generator has been received and treated, and further acceptance of waste will cease.

Contracts for analytical work and soil removal are expected to exceed $100,000. Because Laboratory policy requires that the work be put out for bid, 90 days are allowed to solicit and process the bids.

The location of the site is prone to snow cover in the winter months. Depending on the date NMEID approves the closure plan, the sampling survey may be delayed until the site is free of snow and the ground is thawed adequately to allow the soil sampling. The schedule includes a weather contingency to allow for weather delays.

Because of the extensive sampling survey required and the projected decontamination time, approval of a closure time greater than 180 days [HWMR 206.C.2.d.(2)] is requested per [HWMR 206.C.2.d(2)(b)(1)].

9.2.1.12 Post-Closure Care

Post-Closure care plans are not required for thermal treatment facilities.

9.2.1.13 Closure Certification for TA 14, 15, 36, and 39 Waste Detonation Sites

An independent registered professional engineer and the owner/operator of the facility shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the area has been closed in accordance with this plan. The letter shall be dated and signed by each party and stamped by the registered engineer, and the original copy submitted by the DOE to the Director of the NMEID. One copy shall be maintained at the DOE offices and one copy maintained by the HSE-8 Regulatory Compliance Section.

9.2.2 Technical Area 16 (TA 16) Thermal Treatment Facilities

the thermal treatment facilities located at TA 16 include three general types. One type consists of a sand pad on which explosives or explosives-contaminated equipment are placed and remotely burned using an "electric match" firing device. The burn pad is a 10 m by 10 m (30 ft by 30 ft) square concrete pad covered with two inches of sand. Each pad is located at the center of a 30 m by 30 m (100 ft by 100 ft) square area enclosed with a cyclone fence. The concrete slopes from the center to the edge. The pads are dedicated to wastes that can be burned without deconation, although unplanned detonations have occurred. The pads used for waste burning are designated as TA 16-387, TA 16-388, and TA 16-399.

A second type of thermal treatment facility present at TA 16 consists of a sand-filled metal pan on which five smaller shallow pans lined with fire brick are located. Waste HE-contaminated fluids are poured into the smaller pans and the HE is remotely ignited, with an "electric match." The outside pan is roughly 4 m by 4 m (12 ft by 12 ft) square and is filled with sand to 15 cm (6 in.) below the lip. The smaller pans are approximately 0.6 m by 1 m (2 ft by 3 ft) rectangular pans. There is one facility of this type at the Laboratory. About 55 gallons of waste are burned approximately once a month.

The third type of facility at TA 16 is used to burn sludges containing waste HE. These facilities consist of steel cone-shaped vessels having a diameter of about 8 feet, buried with only the upper 3 to 4 feet of the vessel above ground. The steel vessels are filled with sand and gravel and an open fluids drain is located at the bottom of the cone. Sludge HE is gravity fed from vacuum trucks into the top of the cone, onto the sand and gravel bed. A heavy steel cap is then placed over the top of the cone and hot air is forced into the cone through air ducts. The hot air dries the waste sludge and liquids from the sludge migrate downward through the sand and gravel bed and through the fluids drain. Effluent from these drains is regulated by NPDES permit (NM 0028355). When the remaining explosive material is relatively free of moisture, the steel cap is removed from the cone and the filter surface residue is ignited remotely with an "electric match." There are two facilities of this type at Los Alamos, and both are located in Technical Area 16. Explosives are burned at these two facilities at a rate of about one burn per week. Each burn consists of about 750 pounds of waste explosive sludge.

9.2.2.1 Estimate of Maximum Waste in Treatment

HE wastes are not stored at this site, but are held in short-term storage (less than 90 days) at the generation point and moved to the site just before a scheduled burn. The maximum waste in treatment at one time is 340 kg (750 lbs). Residual barium contaminated sand may be stored in drums on the site. The maximum volume of sand stored is 2 m^3 (550 gal).

9.2.2.2 Description of Waste Handled

The burn pads are used to burn scrap HE, equipment, and trash that have contacted HE and are considered to be contaminated. HE thought to have been burned include HMX, RDX (cyclonite), TNT (2, 4, 6 trinitrotoluene), PETN (pentaery-thritol netranitrate), ammonia nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine and various plastic binders. These wastes are transferred to the site by trucks. Trash and HE scrap are containerized. Large equipment is wrapped to ensure containment.

The pan burning pad handles waste oils and solvents that are considered contaminated with HE. Small volumes are handled in metal containers, and the contents are poured by hand into the burn pans. Larger volumes are delivered with a vacuum truck and drained through a hose into the pans.

The waste handled at the sand filter is HE-contaminated wastewater delivered to the site with a vacuum truck and drained from the truck through a hose into the filter.

Burning HE wastes can leave a residual that is EP toxic for barium. The concentration of barium in the residual varies with the concentration of barium nitrate in the waste.

9.2.2.3 TA 16 Closure Procedure

For each pad, an analytical survey will be conducted to determine the nature and extent of contamination. Decontamination of the facility will include removal of contaminated soil and cleaning of equipment. Adequate decontamination will be verified by additional sampling and analysis.

SAND PAD SAMPLING AND ANALYSIS SURVEY

The sand on the sand pad is to be handled as a regulated waste and not sampled. One composite soil sample will be taken 15 cm (6 in.) off each edge of each pad to determine if surface drainage has moved contamination off the pad. The composite will be three soil cores, one on the pad centerline and two 3 m (10 ft) from centerline. To determine if unplanned detonations have caused significant contamination, 12 composite soil samples will be taken at each pad. These composite samples will be made up of three cores each taken in each direction at 7.6 m (25 ft) intervals, the first sample 7.6 m (25 ft) off the pad edge. One core will be taken on the centerline, the other two at the pad ends. The sampling locations are shown in Figure 9-6.

At the liquid burn pans, the sand in the large pan and the fire bricks will be handled as a regulated waste and need not be sampled. Soil samples will be taken around the pan perimeter as shown in Figure 9-7 to determine if materials have splashed out of the pan and caused contamination. Composite soil samples of three cores will be taken along each edge of the large pan 15 cm (6 in.) and 45 cm (1.5 ft) off the pan edge.

The sand and gravel in the soil filters will be considered a regulated waste, packed in drums and transported to Area L for disposal. Composite soil sampling will be conducted outside the filters as shown in Figure 9-8 to determine if contamination outside the vessel has occurred. Each composite will be three cores equally spaced to represent a quadrant of the circumference of the vessel. Cores will be taken 15 cm (6 in.) and 45 cm (1.5 ft) off the vessel edge.

If contamination is found at the outside samples, the limits of the sampling area will be expanded by the same distance intervals to determine the outside perimeter of the contamination. If any soil sample shows contamination, additional sampling will be conducted at the sampler's discretion to determine the extent of contamination.

Six background samples will be taken around the site no closer than 200 yards from any pad. The exact sites for background samples will be field selected based on similar topography characteristics and geologic structure to the site and the lack of possible interference of other operating Laboratory sites.

Field relocation of sample points may be required by topographic features. In such a case, the sample will be taken as closely as possible to the designated sample point and the new location will be documented.

Soil and samples will be analyzed for the constituents listed in Table 9-3. Barium is a possible contaminant because it is in several HE mixtures. The other toxic metals are included to ensure that thee materials were not included in past burns. A scan for volatile and semivolatile organics is conducted to ensure that residual from solvents used in HE preparation are not present.

Analysis is not conducted for HE constituents because these are a regulated waste based on reactivity, and detonation or burning renders them nonreactive. Furthermore, none of the HE materials used at this site are 40 CFR 261 Appendix VIII constituents. Analysis, Quality Assurance, and Quality Control will follow methods defined in SW 846.

9.2.2.4 TA 16 Decontamination

Sand from the burn pads, liquid burn pans, and the filters will be manually shoveled into drums and transported to Area L for disposal. The pads, pans, and equipment will be scraped, swept, or brushed clean, the resulting residue picked up and placed in drums for disposal at Area L.

A small trench will be dug around the burn pads, with a sump at one corner. The trench and sump will be lined with sheet plastic. The pads will then be scrubbed with a warm Liquinox or Alconox solution in water. The run off from the pad collected in the sump will be sampled, then bailed into drums and transported to Area L where the solution will be evaporated in open treatment tanks.

Residue from this evaporation will be landfilled. Section 9.5 describes sampling procedures for this water. The washing will be repeated until decontamination is demonstrated. The clean pads will be treated as an nonregulated waste and left in place or, if removed, the resulting rubble used as landfill.

The same procedures will be used for the liquid burn pans. The sand and any fire brick will be removed manually with shovels and containerized for disposal at Area L. The remaining pans will be scraped, swept, and/or brushed to remove residuals. The residuals will be placed in drums for transport to Area L. The pans will then be washed

internally with the warm Liquinox or Alconox solution, the dirty wash water sampled to determine decontamination, then transported to Area L in drums for evaporation. Washing will be repeated until decontamination is demonstrated by testing the wash water. The decontaminated pan is a nonregulated waste and will be sold as scrap or landfilled.

The filter vessels will be manually emptied of sand and gravel with shovels, and the sand and gravel will be placed in drums for disposal at Area L. Residues will be removed by scraping, wiping, and/or brushing, and the residues placed in drums for disposal at Area L. The internal walls of the filter vessels will be washed with warm Liquinox or Alconox solution in water. The wash water will be drained from the bottom of the vessels through existing drain piping into drums. The dirty water will be sampled to determine the adequacy of decontamination. The washing will be repeated until decontamination is demonstrated. The wash water will be evaporated in treatment tanks at Area L. The decontaminated vessels are not a regulated waste and can be landfilled or disassembled and sold as scrap.

Soil decontamination is similar for all burn pads. The approach to decontamination depends on the extent of contamination, as determined by the sampling. If the sampling survey indicates that there are no contaminated soil areas, no further action will be taken at the site. Should a small soil area be affected, the contaminated soil will be removed with shovels or a backhoe, loaded into drums, and transferred in a stake truck to Area L for storage and ultimate landfill disposal.

Large contaminated soil volumes will dictate the use of sealed and covered dump trucks. The Laboratory reserves the option of shipping the contaminated soil for offsite for disposal because Area L is not equipped to handle large

volumes. In this event, the Laboratory will contract with a permitted transporter and disposal site contractor who will provide sealed gondola trucks and provide for decontamination of the trucks at the disposal site.

Personnel involved in soil sampling and soil decontamination will wear rubber gloves, safety glasses, and coveralls. Personnel involved in dust generating activities, such as digging and filling drums, will wear dust masks to prevent inhalation of contaminated dust. Personnel washing down equipment will wear rubber gloves, neoprene acid/solvent resistant coveralls, rubber boots, and a face shield. The Laboratory's Industrial Hygiene Group, HSE-5, will review the site survey analytical data and recommend additional protective clothing.

Small equipment used to pick up soil will be scraped and brushed clean, and the dust accumulated will be placed in drums for transport to Area L. The equipment will be taken to the decontaminated liquid burn pan, which will function as a trough to collect run off wash water. The backhoe will be scraped and brush-cleaned, the shovel positioned over the liquid burn pan. The shovel and small equipment will be washed with warm Liquinox or Alconox in water solution. The wash water will be placed in drums for transport to Area L where the water will be evaporated in open tanks.

The residues from evaporating wash water at Area L will be placed in drums and disposed of at Area L.

The Laboratory recognizes that should extensive contamination have occurred, the closure plan presented here may be impractical. Should the site analytical survey prove this to be true, the Laboratory will provide the survey data to the Director of NMEID within 30 days of the completion of the analytical work. Within 60 days of submission of the

survey data, the Laboratory will provide an amended closure plan. The plan may also be amended under other circumstances as per [HWMR 206.C.2.c.2)].

9.2.2.5 Decontamination Verification

Decontamination of the site soil will be demonstrated by additional sampling. Removal of contaminated soil will leave an exposed surface. The disturbed surface will be resampled in the same places used to define the contaminated area. Analysis and the determination of contamination are as discussed in Section 9.2.1.7, and an analysis will be conducted only for those constituents that caused the area to be contaminated.

For washed surface, a minimum of two samples of the clean Liquinox or Alconox solution will be sampled and, along with the wash water samples, analyzed for the constituents shown in Table 9-3. The rationale for this analysis is the same as discussed in Section 9.2.2.3. Equipment will be considered contaminated if the dirty wash water analyses show a significant increase in over the clean wash solution. A significant increase is determined using statistical methods defined in SW 846.

9.2.2.6 Closure Schedule for TA 16

The year of closure is 2100. All pads and equipment at TA 16 will be closed at the same time. Closure activities will observe the following schedule:

Activity	Maximum Time Required
Contract for sampling and/or analytical services	90 days
Conduct first soil sampling survey	30 days
Analyze first soil samples	60 days
Determine areas of contamination	20 days
Conduct second soil sampling survey	30 days
Analyze second samples	60 days
Determine areas of contamination	20 days
Contract for decontamination	90 days
Decontaminate pads and equipment	30 days
Soil removal	180 days
Weather delay contingency	90 days
Conduct verification samples	30 days
Analyze samples	60 days
Total	790 days

Because wastes are not stored on site and closure will not start until the last wastes are treated, no time is allowed for treatment or removal of final wastes.

Contracts for analytical work and soil removal are expected to exceed $100,000. Laboratory procedures require that the work be put out for bid, 90 days are required to solicit and process the bids.

The location of the site is prone to snow cover in the winter months. Depending on the date NMEID approves the closure plan, the sampling survey may be delayed until the site is free of snow and the ground is thawed adequately to allow the core sampling. The schedule includes a weather contingency to allow for this potential delay.

Because of the extensive sampling survey required and the projected decontamination time, approval of a closure time greater than 180 days [HWMR 206.C.2.d(d)] is requested per [HWMR 2.06.c.2.d.(2)(b)(1)].

9.2.2.7 Closure Certification for TA 16

An independent registered professional engineer and the owner/operator of the facility shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the area has been closed in accordance with this plan. The letter shall be dated and signed by each party and stamped by the registered engineer, and the original copy submitted by the DOE to the Director of the NMEID. One copy shall be maintained at the DOE offices and one copy maintained by the HSE-8 Regulatory Compliance Section.

9.2.2.8 Post-Closure for TA 16

Post-closure plans are not required for thermal treatment facilities.

9.3 CLOSURE PLAN FOR TA 50 STORAGE, BATCH TREATMENT AND INCINERATION FACILITIES

9.3.1 Batch Treatment System and Container Storage Area

The Batch Treatment System is located in Building 1 at Technical Area 50 (Figure 9-9). The system consists of a totally enclosed, vented, 500-gallon pressure vessel equipped with a filtering system, condenser, and vacuum transfer lines. Total system wash down between batches allows for the treatment of incompatible wastes in the facility. Wastes treated in the Batch Treatment System

include cyanide, chromate plating solutions, and solutions of acids, bases, and heavy metals. The batch treatment equipment is mounted on a crack-free concrete floor curbed to contain the contents of the process equipment should a leak occur.

A chemical waste storage area is located in the same room housing the Batch Treatment System. Storage space consists of a bermed area encompassing 16 square feet. The area is designed to accommodate four 55-gallon waste drums. Wastes are stored in this area before treatment in the Batch Treatment System. Only compatible wastes are stored in this area at one time. Although waste residence time in this area is generally only 30 to 60 days, the Laboratory may store waste in this area in excess of 90 days to provide for operational flexibility.

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

9.3.1.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes in storage or treatment at the TA 50 storage and Batch Treatment Facilities is estimated at 3 cubic meters (800 gal).

9.3.1.2 Description of Waste Handled

Three waste streams comprise the bulk of the waste treated in the Batch Treatment System, although the system is flexible enough to allow treatment of other wastes that may be generated through new Laboratory projects. These streams are an acid/base waste that contains copper, chromate

plating waste, and waste cyanide plating solutions. Treatment includes of acids and bases, decomposition of cyanides, and precipitation of metals.

Upon completion of treatment, the resulting solution is filtered and the filtered liquid discharged to an industrial sewer, which flows to the wastewater treatment plant at TA 50-1. The effluent from the wastewater treatment plant is discharged under an NPDES permit. Metal sludges recovered in the filters are taken to Area L for storage and disposal.

9.3.1.3 Closure Procedures and Decontamination

Within the chemical treatment room in TA 50 is a curbed area for storage. The area is designed to accommodate four drums of liquid waste requiring treatment before disposal. The treatment facility in TA 50 consists of versatile wet chemical processing equipment capable of neutralizing acids and bases, oxidizing cyanides, and precipitating heavy metals. Wastes in storage at the initiation of closure will be treated using the standard operating procedure (SOP) for the waste, and no more waste will be received.

Following the treatment of the last waste, the system will be washed down using the facility's wash-down system, and the resulting liquid discharged to the industrial wastewater sewer. This is consistent with normal operating procedures for system wash-down between treating noncompatible wastes and acknowledges that analytical procedures associated with previous treatment have reduced hazardous constituents to a level allowable for discharge. Following wash-down, the system filter cartridges will be replaced with new cartridges. The used cartridges will be placed in drums and transferred to Area L for disposal. The equipment will then be filled with a Liquinox or Alconox solution in water and circulated and flushed for 2 hours. Following circulation

the solution will be sampled to verify decontamination, then pumped into drums and transported to the evaporation tanks at Area L. Although this fluid might be safely discharged to the industrial sewer, it will be handled at the Area L evaporation tanks to avoid any disruptive effects Liquinox and Alconox might have on the treatment plant. If analysis of the solution indicates contamination, additional washings will be conducted until decontamination is verified. Following successful internal decontamination, the filter cartridges will be removed, placed in drums, and disposed at Area L.

When internal decontamination is complete, the outside of the equipment will be scrubbed and rinsed with a warm solution of Liquinox or Alconox in water. The cleaning solutions will accumulate in the curbed area and will be pumped into drums with a small manually operated drum pump. Samples of this solution will be taken from the drum to verify decontamination. Wash down will be repeated until decontamination is verified. The drummed liquid will be transported to Area L for evaporation.

Upon successful external decontamination, the equipment will be disassembled and internally inspected. Any residual matter found will be scraped or brushed off the area where the residue occurred, then washed and rinsed. Dry residues will be placed in drums for disposal at Area L. Liquids from washing and rinsing will be placed in drums and transported to Area L for evaporation. Cleaned equipment will be removed from the building and handled as a nonregulated waste.

Following removal of the batch treatment equipment, the floor within the curbed area and the waste handling hood will be washed and rinsed with a warm Liquinox and Alconox solution in water. The wash water will be picked up and put

in drums using a drum pump, rags and/or mops, wringing the excess water into a drum. This water will be sampled to demonstrate decontamination.

Ultimately, residues from evaporation of dirty wash waters at Area L will be placed in drums and landfilled at Area L. The only regulated constituents credibly expected in these residues are metal.

Personnel involved in disassembly and handling of equipment will wear protective equipment to include as minimum protection: acid/solvent resistant coveralls, head protection, neoprene-coated gloves, and boots. Wrists and ankles are to be taped to protect against upward and inward splash. As a minimum protection, face shields will be worn. Full face respirators will be used if specified by the Laboratory's Industrial Hygiene Group, HSE-5, following a field inspection.

Spills occurring during equipment disassembly will be contained in the curbed area and will be picked up with mops. No decontamination of container handling equipment is anticipated during closure because the wastes are inside containers and no contact is expected between wastes and handling equipment.

Protective clothing, coveralls, face shields, and boots worn during the wash down will be rinsed in clean water while the items are within the curbed area. The rinse water will be handled with the dirty water from the external wash down. Following internal and external decontamination, the equipment will be considered free from regulated wastes. Protective clothing will be worn by personnel disassembling the equipment. The protective clothing and tools used during disassembly will be washed with detergent and water, and the water discharged to the industrial waste water

sewer. Mops and rags used for clean-up will be placed in drums for disposal at Area L.

9.3.1.4 Decontamination Verification

Before the first wash down, two samples will be taken of the clean Liquinox or Alconox solution in water and analyzed for the constituents listed in Table 9-5.

One additional clean solution sample will be taken for each additional wash down event. These analytical results provide background data for decontamination verification.

"Dirty" wash down solutions will also be analyzed for the constituents listed in Table 9-5. Analytical procedures will conform to methods found in SW 846. Equipment will be considered to be contaminated if the "dirty" wash wolutions show a significant increase in the listed constituents over the clean wash solutions. A significant increase is determined using statistical methods defined in SW 846.

The constituents listed in Table 9-5 include regulated constituents normally treated in the plant, and additional metals which may have been inadvertently included in treated solutions. A scan for volatile and semivolatile organics is performed to ensure that solvents commonly used within the Laboratory have not contaminated the equipment.

9.3.1.5 Closure Schedule

The year of closure for the TA 50-1 Batch Treatment Plant is 2100. Closure will observe the following schedule:

Activity	Maximum Time Required
Treatment of final wastes	30 days
Internal wash down	14 days
External wash down	7 days
Contract for disassembly	90 days
Disassemble equipment	180 days
Floor wash down	30 days
Final Cleanup	14 days
Total	365 days

The contracts for equipment disassembly is expected to exceed $100,000. Laboratory policy requires that the work be put out for bid, 90 days are required to solicit and process the bids.

Because of the time required for equipment disassembly, approval of a closure time greater than 180 days [HWMR 206.C.2.d.(2)] is requested per [HWMR 206.C.2.d.(2)(b)(1)].

9.3.1.6 Closure Certification

An independent registered professional engineer and the owner/operator of the facility shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the facility has been closed in accordance with this plan. The letter shall be dated and signed by each party, stamped by the registered engineer, and the original copy submitted by the DOE to the Director of the NMEID. One copy shall be maintained at the DOE office and one copy maintained by the HSE-8 Regulatory Compliance Section.

9.3.1.7 Post-Closure

Post-closure plans are not required for container storage facilities or treatment facilities.

9.3.2 Chemical Waste Incinerator

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

9.3.2.1 Estimate of Maximum Waste in Storage

The maximum inventory of hazardous wastes at the TA-50 waste incinerator is estimated at ten cubic meters (2640 gal).

9.3.2.2 Closure Plan

All remaining wastes will be incinerated before shutting down the incinerator. If for some reason it is not possible to incinerate all the waste on site, it will be sent to a designated treatment and disposal facility. Once all the waste inventory has been properly disposed of, the facility

will be decontaminated as follows: First, the entire incineration system (incinerator, all relevant lines and pumps, and the air pollution control system) will be cleaned. The two incinerator chambers, including all attached refractory and residual solid residue, will then be sealed and sent to a designated treatment and disposal facility. Next, the remaining components of the system will be steamed for a minimum of 24 hours, after which they will be visually inspected, may be dismantled, and will be disposed of in an appropriate manner. All radioactive components will be decontaminated and disposed of according to appropriate regulations.

A detailed description of decontamination procedures upon closure is not possible at this time since the equipment may be contaminated with transuranic (TRU) and low-level radioactive wastes. Decommissioning will follow Laboratory guidelines and procedures for handling radioactive contaminated equipment. Exact procedures are a function of the degree of contamination at the time of closure.

Upon the decision to close the facility, the equipment and building will be surveyed to determine the nature and levels of both radioactive and hazardous chemical contamination. Using the Laboratory guidelines and procedures, a decommissioning document will be prepared describing in detail the methods and procedures for decontamination, demolition, packaging, and disposal. All materials generated from decontamination and demolition will be treated as radioactive wastes and disposed of in accordance with DOE radioactive waste management guidelines.

Characterization of the final delivery of hazardous waste may require up to 30 days. An estimated 60 days will be required to schedule and process the final wastes received.

The survey to determine the nature and level of contamination and to prepare the decommissioning document is estimated to take one year. Decommissioning and final disposal are estimated to take up to two years.

9.3.2.3 Post-Closure

Post-closure plans are not required for incineration facilities.

9.4 Closure Plan for TA 54 - Area L Facilities

9.4.1 TA 54-Area L Description

TA 54-Area L consists of a waste transfer, packaging, and storage facility, land disposal shafts, and liquid treatment tanks (see Figure 9-10).

The treatment, storage, and disposal facilities consist of a single-story metal building encompassing 196 square feet and a roofed concrete storage pad encompassing 1,595 square feet. These areas are used for the accumulation, packaging, and storage of waste containers which are generated throughout the laboratory and delivered to the facility routinely. They are segregated into compatible types and placed upon the three fiberglass grates inside the metal building or within one of the six storage cells on the roofed concrete pad. Wastes in small containers are put into lab packs. Wastes suitable for recycling are consolidated into drums, and any damaged or leaking drums are repackaged into larger drums in this area.

Four 1,665-gallon, 10-gauge steel tanks are located at Area L. They are lined with plastic and used to neutralize, oxidize and evaporate waste. The tanks are located on a bermed concrete pad. The waste most commonly oxidized in

these tanks is lithium hydride. Aqueous ammonium biflouride solution (a "non-RCRA" waste) is the waste most commonly evaporated in the tanks.

As of August, 1985, land disposal facilities at Area L include 34 shafts that range in diameter from 1 to 2.4 m (3 to 8 ft). Thirty-three of these shafts have been capped, all of which are approximately 118 m (60 ft) deep. When in use, the shafts are covered with a heavy steel cap; when filled, they are closed using a 1 m (3 ft) thick concrete plug (Figure 9-11). Each shaft is used for the disposal of a single category of waste, which is accumulated on site and packaged into 55-gallon drums.

9.4.1.1 Estimate of Maximum Waste in Storage and Treatment

The approximate amount of waste in storage or treatment at Area L is 67 m^3 (17,650 gal) at the transfer, packaging, and storage area, and 22 m^3 (5700 gal) in the treatment tanks.

9.4.1.2 Description of Waste Handled

A wide variety of wastes generated throughout the Laboratory are brought to Area L, including wastes from basic and applied chemistry R & D programs (small quantities of different acids, bases, organics, inorganics and reactive metals), processing wastes (sludge resulting from treatment either at Area L or at TA 50-1 Batch Treatment Plan), and chemically contaminated equipment to be landfilled.

9.4.1.3 Partial Closure

Because 33 of the 34 existing shafts have been capped partial closure has occurred at Area L. Closing of individual shafts occur as they are filled, and the dates of shaft closings is shown on Figure 9-10. These shafts were

filled to three feet below the lowest edge of the shaft rim with waste, and the void spaces around the waste filled with crushed tuff as the wastes were placed in the shaft. The remaining three feet of the shaft was filled with noncontaminated concrete. The top of the concrete cap is slightly rounded, extending 0.5 feet above the land surface and overlapping the edge of the shaft 2 to 6 inches. A brass identification marker is placed in the center of the cap during the final pour.

In the past, a small surface impoundment was operated within Area L to evaporate nonregulated waste. Because no verification exists that regulated waste had not been put in the pit, analysis of the pit residue and soil cores extending below the pit was required under a NMEID Compliance Order/Schedule dated May 7, 1985. Should this analysis determine the presence of hazardous constituents, the impoundment will be closed as a regulated site, constituting partial closure. The results of the analytical work for the impoundment will be complete in December 1986.

The remaining shaft will be closed when filled, as compatible wastes are generated. There is no anticipated date for closure of this shaft before final closure of Area L.

9.4.2 Closure Procedure

Clean-up and closure for treatment and storage facilities at Area L will be done in sequential order, culminating in the disposal of any residues or contaminated material by permitted landfill in the existing land disposal facility, or by shipment to an offsite permitted disposal site, followed by closure of the onsite land disposal facility. Before decontamination, all wastes in storage in either the roofed storage pad or the metal building will either be

treated or disposed of onsite or offsite. Given the diversity of wastes handled, it is not possible to estimate the exact wastes on hand at the initiation of closure and, therefore, the final disposition of the wastes. In general, recyclable wastes will be reused internally or recycled to users offsite. Organic wastes will be burned at the CAI (Controlled Air Incinerator) at TA 50-37. Any wastes compatible with permitted treatment at the TA 50-1 Batch Treatment Plant or the Area L treatment tanks will be so treated. The remaining wastes will be disposed of onsite at the disposal facility that is permitted at the time or transported offsite to a permitted disposal facility.

Following removal or treatment of the wastes onsite at the start of closure, the two storage facilities will be decontaminated by washing with Liquinox or Alconox in water. The resulting wash solutions will be evaporated in the four treatment tanks. When the wash water has evaporated, the residual in the tanks and the tank liners will be removed, placed in drums, and either landfilled at a permitted onsite facility or transported offsite to a permitted disposal facility.

The tanks will then be decontaminated by washing and the decontaminated tanks handled as a nonregulated waste.

Finally, the remaining open shafts will be closed by capping with concrete. Additional concrete will be added to previous caps to extend the overlap of the shaft cover to prevent surface drainage from undercutting the cap. The existing topography of the site will be preserved and the disturbed area will be revegetated.

The closure steps are discussed in more detail in the following text.

9.4.2.1 Waste Removal

The waste onsite at the start of closure includes containerized wastes, as well as liquids and residues in the treatment tanks. Containerized wastes will be handled with hand trucks or fork lifts. Trucks of adequate size will be used to move containerized wastes to offsite treatment facilities, and a fork lift is suitable to move wastes to the treatment tanks at Area L. All wastes shipped offsite will be manifested in accordance with HWMR 203. The waste transporter will have an EPA identification number in accordance with HWMR 205.B.

9.4.2.2 Storage Area Decontamination

All floor surfaces within the roofed concrete storage pad, as well as any equipment present, will be washed down using a solution of Liquinox or Alconox in warm water. Areas will be scraped or brushed clean as necessary to remove any residues. The floor of the concrete pads are sloped to sumps, and wash water will flow into them. The water in each cell will be tested using the sampling and analytical procedures described in Section 9.5. Afterwards, the water will be removed from each sump with a vacuum truck or pumped into drums with a hand pump, and transferred into the treatment tanks to be evaporated. This washing procedure will be repeated until decontamination of the cells is demonstrated by testing of the wash water. Following decontamination, the building and equipment will be handled as a nonregulated waste. The inside of the vacuum truck, if used, will be rinsed when its service is complete, and the rinse water will be placed in evaporation tanks.

The same procedure will be used for the metal building. All equipment, as well as the walls and floor, will be washed and the wash water will be channeled into one of the three

floor sumps. The fiberglass grates covering each sump and the sumps themselves will be washed down. The wash water will be sampled and analyzed to determine adequate decontamination. Every effort will be made to minimize the volume of wash and rinse water generated by decontamination.

9.4.2.3 Treatment Tank Decontamination

When all liquid has been evaporated from the treatment tanks, the plastic liner with any dry residue will be removed and placed in the existing land disposal facility or placed in drums for transport to an offsite disposal facility.

The tanks will be scraped and brushed to remove residue, and the residue collected and placed in drums. The tanks and the concrete pad on which the treatment tanks are placed will be washed with a Liquinox or Alconox solution in water. The wash water will be contained within the curbed concrete pad, sampled, and analyzed. If the wash water is free of significant concentrations of regulated constituents, as described in Section 9.4.3., the water will be removed with a vacuum truck and transported to an industrial sewer, which drains to the water treatment plant at TA 50-1. If the water contains significant concentrations of hazardous constituents, one of the treatment tanks will be double lined with sheet polyethylene plastic and the water pumped into the tank for evaporation. Wash down of the tanks and pad will be repeated until the wash water is free of significant contamination. The plastic liner and residue from the final evaporation will be removed and handled as per the previous tank residue.

9.4.2.4 Soil Decontamination

Soil sampling, which will be conducted to determine if hazardous wastes have been tracked outside of contaminant areas, will be taken in the manner described in Section 9.5. Composite soil samples will be collected around the edge of the roofed concrete pad asphalt apron as shown in Figure 9-12, and also at the bermed concrete pad beneath the treatment tanks, as shown in Figure 9-13. Composite soil samples will be taken at each edge of the asphalt apron around the metal building. Each composite shall be made up from three cores taken 15 cm (6 in.) off the asphalt edge and equally spaced to cover the edge. A composite soil sample will be taken for each of the two groupings of disposal shafts, each composite consisting of four samples taken at the four corners of the shaft lines.

If contamination is found in these samples, the limits of the sampling area will be expanded by establishing a sampling grid to determine the outside parameter of the contamination. Sampling will be continued at the sampler's discretion to determine the extent of contamination.

Four background soil samples will be taken on the outside of the fenced boundary at Area L. They will be taken on top of the mesa, preferably one in each of four different directions. The exact sites for these samples will be field selected based on similar topographic and geologic characteristics, and the lack of possible interference of other operating Laboratory sites.

Soil and sediment samples will be analyzed for the constituents listed in Table 9-7. Analysis and Quality Assurance/Quality Control will follow methods defined in SW 846.

The approach to soil decontamination depends on the extent of contamination determined by the sampling. If the sample survey indicates that there are no contaminated soil areas, no further soil decontamination action will be taken at the site. Should the soil be contaminated, it will be disposed of in the land disposal facility onsite, or placed in drums to be transported offsite for disposal at a permitted facility.

9.4.2.5 Personnel Protection

Personnel washing down equipment will wear rubber gloves, neoprene acid/solvent resistant coveralls, rubber boots, and a face shield. The Laboratory's industrial Hygiene Group, HSE-5, will review the site survey analytical data and recommend additional protective clothing.

9.4.2.6 Equipment Decontamination

Shovels, drum trucks, and other equipment used for decontamination will be scraped and brushed to remove residue, and the residue collected and placed in drums for disposal on/or offsite at a permitted disposal site for regulated wastes.

The equipment will be placed on a plastic sheet that is bermed to contain liquids, and washed with water and detergent. Larger equipment such as backhoes and forklifts will also be washed. No testing will be performed on this water and washing is considered adequate to decontaminate the equipment. The wash water will be allowed to evaporate, and the plastic and residue will be packed in drums for disposal as a regulated waste.

9.4.2.7 Shaft Closure

Following the decontamination of pads and equipment, and removal of contaminated soil, any open shaft will be closed by filling the empty volume of the shaft with crushed tuff up to three feet from the lowest edge of the rim. The top three feet will be capped with uncontaminated concrete. The top of the concrete cap will be rounded and extend at least 0.5 feet above the land surface and overlap the edge of the shaft by 6 inches.

Following capping of the final shaft, a trench will be dug around each shaft at the site. The trench will be a minimum of 1.5 feet from the edge of the shaft. Additional concrete will be added to extend each cap out to and fill the trench. The concrete added shall be sloped to prevent ponding of water on the cap.

9.4.2.8 Site Drainage

The areas around the shafts will maintain the current slopes as shown in Figure 9-14. Disturbed areas will be lightly mulched with pea gravel and planted with turf-forming grasses and bunch grasses to prevent wind and sheet wash erosion. The grass will be fertilized and irrigated with sprays through two growing seasons.

Site drainage controls described in Section 6.5.2 will be maintained through closure and post-closure.

9.4.3 Decontamination Verification

Soil samples will be analyzed for the constituents shown in Table 9-7. These combined tests are adequate to screen for all but a handful of regulated constituents which, if

handled at Area L, would have been present in small volume laboratory-size containers.

The criteria for determining contaminated soil are the same as discussed in Section 9.2.1.7. Regulated constituent concentrations will be compared to background concentrations. A risk assessment will be prepared for each regulated constituent showing a significant increase over background concentration. A significant increase will be determined by using statistical methods described in USEPA SW 846. The risk assessment will determine the threshold concentration for each constituent that represents a significant risk to human health and the environment, and will take into account all possible pathways. Soils containing levels of contamination above the threshold will be considered contaminated.

A copy of the completed risk assessment, along with pertinent backup data, will be provided to the NMEID for review and approval. Should NMEID find the threshold contamination levels inadequate, the Laboratory will negotiate threshold values agreeable to both parties.

Decontamination of the site soil will be demonstrated by additional sampling. Removal of contaminated soil will leave an exposed surface. The disturbed surface will be resampled in the same places used to define the contaminated area. Analysis and the determination of contamination is as previously discussed, and an analysis will be conducted only for those constituents that caused the area to be contaminated.

A minimum of two samples of the clean Liquinox or Alconox solution will be sampled as background for wash water and, along with the wash water samples, analyzed for the constituents shown in Table 9-7. The area will be

considered contaminated if the wash water analyses show a significant increase in constituents over the clean wash solution. A significant increase is determined by using statistical methods defined in USEPA SW 846.

9.4.5.4 Closure Schedule

The year of closure is 2110. Closure activities will observe the following schedule:

Activity	Maximum Time Required
Contract for sampling and/or analytical services	90 days
Treat or remove final wastes from transfer packaging and storage areas	90 days
Decontaminate waste packaging, transfer and storage areas	30 days
Evaporate waste water from treatment tanks	180 days
Dispose of tanks and residue	180 days
Conduct first soil sampling survey	30 days
Analyze first soil samples	60 days
Conduct second soil sampling survey if needed	30 days
Analyze second soil samples if needed	60 days
Contract for soil decontamination	90 days
Remove Soil	90 days
Weather delay contingency	90 days
Conduct verification samples	30 days
Analyze samples	60 days
Close shafts	20 days
Establish ground cover	760 days
TOTAL	1890 days

Contracts for analytical work and soil removal are expected to exceed $100,000. The Laboratory is required by policy to put the work out for bid, and ninety days are required to solicit and process the bids.

The location of the site is prone to snow cover in the winter months. Depending on the date NMEID approves the

closure plan, the closure may be delayed until the site is free of snow and the ground is thawed adequately to allow the soil sampling and other closure operations. The schedule includes a weather contingency to allow for this potential delay.

Because of the time required for wash water evaporation, and the projected decontamination time, approval of a closure period greater than 180 days [HWMR 206.C.2.d(2)] is requested per [HWMR 206.C.2.d.(2) (b) (1)].

9.4.5 Closure Certification

An independent registered professional engineer and the owner/operator of the facility shall witness the closure and ensure that the closure follows this plan. Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the area has been closed accordingly. The letter shall be dated and signed by each party and stamped by the registered engineer, and the original copy shall be submitted by the DOE to the Director of the NMEID. One copy shall be maintained at the DOE offices and one copy maintained by the HSE-8 Regulatory Compliance Section.

9.4.6 Post-Closure

Post-closure activities include the following items:

1. Within 90 days after closure is complete, the EPA, NMEID, DOE and the County of Los Alamos shall be furnished with a survey plat indicating the location and dimensions of the closed pits and shafts. The plat shall be prepared and certified by a professional land surveyor. It will be filed with Los Alamos County and shall include a note, prominently displayed, which states the owner's or operator's obligation to restrict

disturbance of the site in accordance with 40 CFR 264.117(c) (NMHWMR 206,D.2.g[3]). In addition, the EPA, NMEID, DOE, and County of Los Alamos shall be provided the records of type location, and quantities of wastes stored. Information for waste stored before the promulgation of hazardous waste regulations shall be estimated based on available records.

2. The property deed shall be noted or documented to comply with the requirements of 40 CFR 264.120 (NMHWMR 206.D.2.j).

3. The site shall be inspected semi-annually or more frequently as determined necessary, checking:

   (a) the cover system for integrity, settlement, and erosion,
   (b) the site drainage system for any blockages or evidence of poor function,
   (c) the integrity of the fence, gate and lock, and
   (d) the conditions of surveyed benchmarks.

4. Repairs shall be made to any of the items mentioned in activity No. 3, should the inspection reveal conditions requiring further attention for the proper function of the closure system.

5. Post-closure care activities shall be performed for 30 years as required by 40 CFR 264.117(a)(1) (NMHWMR 206.D.2.g[1][a]).

6. Records shall be kept of inspections, repairs, sampling, and analytical results for the duration of post-closure care activities.

9.4.6.1 Post-Closure Ground Water Monitoring

For the ground water monitoring program, samples will be obtained from six observation wells, three in Canada del Buey and three in Pajarito Canyon, installed in response to the NMEID Compliance Order/Schedule dated May 7, 1984. Sampling and analysis will be performed starting on November 30, 1985, and repeated quarterly for the first year. The sampling methodology and monitoring for the ground water monitoring program are contained in the USEPA SW 846 revisions and will be used by LANL in their program. The applicable section numbers can be found in Table 9-8. The samples will be analyzed for the parameters outlined in HWMR 206.C.1.c(2). For each of the indicator parameters in 206.C.1.c(2)(c), at least four replicate measurements will be obtained for each sample. The initial background arithmetic mean and variance must be determined by pooling the replicate measurements for the respective parameter concentrations or values in samples obtained from upgradient wells during the first year.

9.4.6 Post-Closure Care Office

Copies of records of inspections, repairs, sampling, and analytical results for the duration of post-closure care activities are to be kept at the DOE Los Alamos Operations office, HSE-8 Regulatory Compliance office, and the TA 54 Operations office. The name, address, and phone number of the person and/or office to contact about the facility during the post-closure care period is:

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

9.5 SAMPLING AND ANALYTICAL PROCEDURES

The following sections define procedures and methods for sampling, analysis, and documentation applicable to closure and post-closure plans. While the procedures and method are specific, any applicable procedure or method given in SW 846 may be used if conditions or experience shows the alternate method to be more appropriate.

9.5.1 Soil Sampling

The sampling procedures outlined below are used to determine the amount of hazardous material deposited on a particular area of land or to determine the leaching rate of the material and/or determine the residue level on the soil. Adequate preparation ensures that proper sampling is accomplished. A checklist of items required for field sampling is given in Table 9-9.

Surface soil samples will be collected with a trowel or scoop. To sample below 8 cm (3 in), samples will be collected with a Velhmeyer soil sampler (Figure 9-15).

9.5.1.1 Cleaning and Storage of Sampler

It is important to clean samplers after each site is sampled. The samplers will be washed with a warm Liquinox or Alconox solution, rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. Lack of cross-contamination is of particular importance in these samples, because they will be taken for regulatory purposes. One-quart glass containers will be used for the samples, because they are compatible with the waste. Sampling will be conducted in accordance

with procedures given in Samplers and Sampling Procedures for Hazardous Waste Streams, EPA 600/2-80-018 and SW 846.

Samples will be taken, placed in bottles, sealed, tagged, and immediately packed in vermiculite, sawdust, or, if refrigeration is required, an insulated container with ice. One sample for every ten samples will be either duplicated or split. The duplicated or split sample will be identified by a code so that its source is not available to the analytical laboratory, but analytical results can be compared to its twin.

9.5.1.2. Sampling Procedures

TROWEL OR SCOOP

- Take small, equal portions of sample from the surface or near the surface of the material to be sampled.
- Combine the samples in a glass container.
- Cap the container, attach a label and seal, record in field log book, and complete the sample analysis request sheet and chain of custody record.

VEIHMEYER SAMPLER

- Assemble the sampler by screwing in the tip and drive head on the sampling tube.
- Insert the tapered handle (drive guide) of the drive hammer through the drive head.
- Place the sampler in a perpendicular position on the soil to be sampled.
- With the left hand holding the tube, drive the sampler into the ground to the desired sampling depth by pounding the drive head with the drive hammer. Do not drive the tube further than the tip of the hammer's drive guide.

- Record the length of the tube that penetrated the ground.
- Remove the drive hammer onto the drive head. In this position, the hammer serves as a handle for the sampler.
- Rotate the sampler at least two revolutions to shear off the sample at the bottom.
- Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head and rotate about 90 degrees.
- Withdraw the sampler from the ground by pulling the handle (hammer) upwards. When the sampler cannot be withdrawn by hand, as in deep soil sampling, use a puller jack and grip.
- Dislodge the hammer from the sampler, turn the sampler tube upside down, tap the head gently against the hammer, and carefully recover the sample from the tube. The sample should slip out easily.
- Store the core sample in a 1,000 or 2,000 ml (1 qt or 1/2 gal) sample container.
- Label the sample, affix the seals, record in the field log book, complete sample analysis request sheet and chain of custody record, and deliver the samples to the laboratory for analysis.

9.5.2 LIQUID SAMPLING

The Coliwasa sampler will be used to sample water solutions before washing the area for background parameters, and to sample the wash water used after cleaning equipment. Its simple design makes it easy to use and allows the rapid collection of samples, which minimizes chances of exposure of the sample collector to potential hazards from the waste. The recommended model of the Coliwasa is shown in Figure 9-16, the main parts consisting of the sampling tube, the closure-locking mechanism, and the closure system.

9.5.2.1 Cleaning and Storage of Sampler

The sampler must be clean before use. The used sampler must be washed with a warm detergent solution (Liquinox or Alconox), rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. A necessary piece of equipment for cleaning the tube of the Coliwasa is a bottle brush that fits tightly inside the diameter of the tube. The brush is connected to a rod of sufficient length to reach the entire length of the sampler tube. Using this ramrod and fiber-reinforced paper towels, the Coliwasa tube may be quickly cleaned. Improper cleaning of sample equipment will cause cross contamination of samples. Lack of contamination is of particular importance in these samples, because they will be taken for regulatory purposes. Clean samples should be stored in polyethlene plastic tubes or bags in a clean and protected area.

9.5.2.2 Sampling Procedures

- Assemble the glass coliwasa sampler.
- Make sure that the Coliwasa sampler is clean.
- Check to make sure the sampler is functioning properly. Adjust the locking mechanism, if necessary, to make sure the neoprene rubber stopper provides a tight closure.
- Wear necessary protective clothing and gear and observe required sampling precautions.
- Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.
- slowly lower the Coliwasa sampler into the liquid at a rate that permits the levels of the liquid inside and

outside the sampler tube to be about the same. If the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a non-representative sample.

- When the sampler stopper hits the bottom of the liquid container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.
- Slowly withdraw the sampler from the container with one hand while wiping the sampler tube with a disposable cloth with the other hand.
- Carefully discharge the sample into a glass container by slowly opening the sampler. This is done by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in the glass container.
- Cap the glass container, attach a label and seal record in the field log book, and complete the sample analysis request sheet and chain of custody record.
- Unscrew the T-handle of the sampler and disengage the locking block. Clean the sampler on site or store the contaminated parts of the sampler in a plastic storage tube or bag for subsequent cleaning. Store used rags in plastic bags for subsequent disposal.

9.5.3 Sample Handling and Documentation

Soil and liquid samples will be analyzed either internally or at a commercial laboratory. In either case each sample will be labelled, sealed, and accompanied by a chain of custody and a sample analysis request form.

The sample container must be sealed with a gummed paper seal attached to the container in such a way that the seal must be broken in order to open the container. The seal and

sample tag must be completed with a waterproof pen. An example of a sample seal is shown in Figure 9-17.

The sample label is necessary to prevent misidentification of samples and shall include, if applicable, the grid number referenced to positions staked on the site perimeter. The "field information" in the case of soil sampling, shall include observations such as the soil texture and surface appearance, ambient temperature and cloud cover at time of sampling, and precipitation conditions 24 hours before sampling. An example of a sample label is shown in Figure 9-18.

The chain of custody form is necessary to trace sample possession from the time of collection, and must accompany every sample. This record becomes especially important when the sample is to be introduced as evidence in a court litigation. This is a two-page record with the original accompanying shipment and the "copy" being retained by the Laboratory. An example of this form is shown in Figure 9-19.

A separate closure sampling field log book will be kept and will contain all information pertinent to field surveys and sampling. The log book shall have bound and consecutively numbered pages in 8-1/2 by 11-inch format. Minimum entries include:

a. Purpose of sample (routine sampling, special sampling)
b. Location of sampling (coordinates referenced to staked field points, if soil sample).
c. Name and address of person making log entry.
d. Type of process producing waste.
e. Number and volume of sample taken.
f. Description of each sampling location, sampling methodology, equipment used, etc.
g. Date and time of sample collection.

h. Sample destination and transporter's name (name of laboratory, UPS, etc.)
i. Map or photograph of the sampling site, if any.
j. Field observations (ambient temperature, sky conditions, past 24-hour precipitation, etc.).
k. Field measurements, if any (pH, flammability, explosivity, etc.).
l. Collector's sample identification number (s).
m. Signature of person responsible for the log entry.

Sampling situations vary widely. No general rule can be given as to the extent of information that must be entered in the log book. A good rule, however, is to record sufficient information so that someone can reconstruct the sampling situation without relying on the collector's memory.

The sample shipment and chain-of-custody record is accompanied by a sample analysis request sheet (Figure 9-20). The request sheet has two parts: field and laboratory. The field portion of this form must be completed by the person collecting the sample and include most of the pertinent information noted in the log book. The laboratory portion is intended to be completed by the laboratory personnel when the sample is received.

TABLE 9-1. SUMMARY OF HAZARDOUS WASTE FACILITIES AT LOS ALAMOS NATIONAL LABORATORY

Facility	Treatment	Storage	Disposal
TA-14	Thermal	none	none
TA-15	Thermal	none	none
TA-16	Thermal	none	none
TA-36	Thermal	none	none
TA-39	Thermal	none	none
TA-50	Batch Chemical Incineration	container	none
TA-54	Solidification Neutralization Oxidation Evaporation	container	landfill

Table 9-2

Regulated Wastes Detonated at TA 36 Meenie

Hazardous Waste Code	Name	Hazard
P006	Aluminum Phosphide	
P009	Ammonium Picrate	R
P022	Carbon Disulfide	
P031	Cyanogen	
P033	Cyanogen Chloride	
P048	2, 4,-Dinitrophenol	
P054	Ethylenimine	
P056	Fluorine	
P063	Hydrogen Cyanide	
P064	Isocyanic Acid (methyl isocyanate)	
P065	Mercury Fulminate	R,T
P069	2-Methyil Actonitrile	
P071	Methyl Parathion	
P073	Nickel Carbonyl	
P076	Nitric Oxide	
P077	P-Nitroaniline	
P081	Nitroglycerine	R
P096	Phosphine	
P107	Strontium Sulfide	
P112	Tetranitromethane	R
P122	Zinc Phosphide (10%)	
U006	Acetyl Chloride	
U008	Acrylic Acid	
U020	Benzenesulfonyl Chloride	C,R
U023	Benzene	C,R,T
U033	Carbonyl Oxyfluoride	R,T
U042	2 Chloroethyl Vinyl Ether	
U044	Chloroform	
U045	Chloromethane	I,T
U075	Dichlorodifluoromethane	
U092	Dimethylamide	I
U096	alpha, alpha Dimethylbenzylhydro-peroxide	R
U108	1,4-Dioxane	
U112	Ethyl Acetate	I
U113	Ethyl Acrylate	I
U115	Ethlene Oxide	I,T
U117	Ethyl Ether	I
U118	Ethylmethacrylate	

Table 9-2 (cont)

U133	Hydrazine	R,T
U134	Hydrogen Fluoride	C,T
U135	Hydrogen Sulfide	
U171	Nitropropane	I
U205	Selenium Disulfide	R,T
U213	Tetrahydrofuran	I
U217	Thallium Nitrate	I
U234	sym-Trinitrobenzene	R,T

Table 9-3

Sampling Parameters and Methods for

TA 14, TA 15, TA 16 and TA 39

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA Analytical Method[1]
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
--	Nickel	-	6010
Organic Scan			
GC/MS for volatiles			8240
GC/MS for semivolatiles			8250 or 8270
Other			
Cyanide			9010
Nitrates			9200

[1]Analytical methods are taken from Test Methods for Evaluating Solid Waste, EPA SW-846, and may be superceded by more current or alternate methods from SW 846.

Table 9-4

Sampling Parameters and Methods for TA 36

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA Analytical Method[1]
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
--	Nickel	-	6010
--	Zinc	-	6010
--	Thallium	-	6010
--	Selenium	-	6010
Organic Scan			
GC/MS for volatiles			8240
GC/MS for semivolatiles			8250 or 8270
Total Organic Halogen			9020 or 9022
Other			
Cyanide			9010
Soil pH			9045
Sulfides			9030
Nitrates			9200

[1]Analytical methods are taken from Test Methods for Evaluating Solid Waste, EPA SW-846, and may be superceded by more current or alternate methods from SW 846.

Table 9-5

Sampling Parameters and Methods for 50-1

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA Analytical Method[1]
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
--	Nickel	-	6010
--	Zinc	-	6010
--	Thallium	-	6010
--	Selenium	-	6010
Organic Scan			
GC/MS for volatiles			8240
GC/MS for semivolatiles			8270
Other			
Cyanide			9010
pH			9045
Sulfides			9030

[1]Analytical methods are taken from Test Methods for Evaluating Solid Waste, EPA SW-846, and may be superceded by more current or alternate methods from SW 846.

Table 9-6

Ambient Total Metals in Soil

PARAMETER	Mean Ambient Background[1] Western U. S.	Eastern U. S.
Matrix Type	Soil	Soil
Aluminum	5.4	3.3
Chromium	38	36
Barium	560	500
Beryllium	0.6	0.6
Cobalt	8	7
Copper	21	14
Iron	20,000	15,000
Nickel	16	13
Manganese	390	290
Zinc	51	36
Boron	22	32
Vanadium	66	46
Silver	-	-
Arsenic	6.1	5.4
Antimony	150	-
Selenium	0.25	0.39
Thallium	-	-
Mercury	0.055	0.096
Tin	10	10
Cadmium	1	1
Lead	18	14
Ammonia	-	-
Cyanide	-	-
Sulfide	-	-

[1]Ambient background concentrations apply only to soil matrix samples. Values obtained from "Geochemistry of Some Rocks, Soils, Plant, and Vegetables in the Conterminous United States" United States Geological Survey Professional Paper 574 F, 1975.

Table 9-7

Sampling Parameters and Methods
for TA 54 - Area L

EPA Hazardous Waste Number	Metals	EP Toxic Regulated Concentrations	EPA Analytical Method[1]
D004	Arsenic	5.0 mg/l	6010
D005	Barium	100.00	6010
D006	Cadmium	1.0	6010
D007	Chromium	5.0	6010
D008	Lead	5.0	6010
D009	Mercury	0.2	7470 or 7471
D010	Selenium	1.0	6010
D011	Silver	5.0	6010
--	Nickel	-	6010
--	Beryllium	-	6010
Organics			
GC/MS for volatiles			8240
GC/MS for semivolatiles			8250
Other			
Cyanide			9010
Nitrate			9200
Sulfides			9030
pH (liquids)			9040
Soil pH			9045

[1]Analytical methods are taken from Test Methods for Evaluating Solid Wastes, EPA SW-846, and may be superceded by more current or alternate methods from SW 846.

Table 9-8

Ground Water

Sampling Methodology and Monitoring
from SW-846

	Second Edition Section No.
Sampling methodology	1.4
Ground water Sampling	1.4.6
Monitoring	3.0
Ground water	3.1

Table 9-9

Checklist of Items

Required for Field Sampling

Quantity	Item	Use	Supplier
1	Field log book	To keep sample records	Office supply stores
1	Disposable towels or rags.	To clean sampling equipment	Terry towels or equivalent. Available at chemical supply houses
6	Large polyethylene bags	To store waste papers, rags, etc.	Plastic supply houses
12	Polyethylene bags	To store sample containers	Plastic supply houses
4	Waterproof pens	To complete records and labels	Stationery stores
1	Apron, oil and acid proof	Protective garment	McMaster-Carr Co. P.O. Box 4355 Chicago, IL

Table 9-9 (cont)

Quantity	Item	Use	Supplier
1	Face mask	Protective garment	MSA 400 Penn Center Blvd. Pittsburg, PA 15235
1	Liquinox or Alconox Detergent	Used to clean sampler	

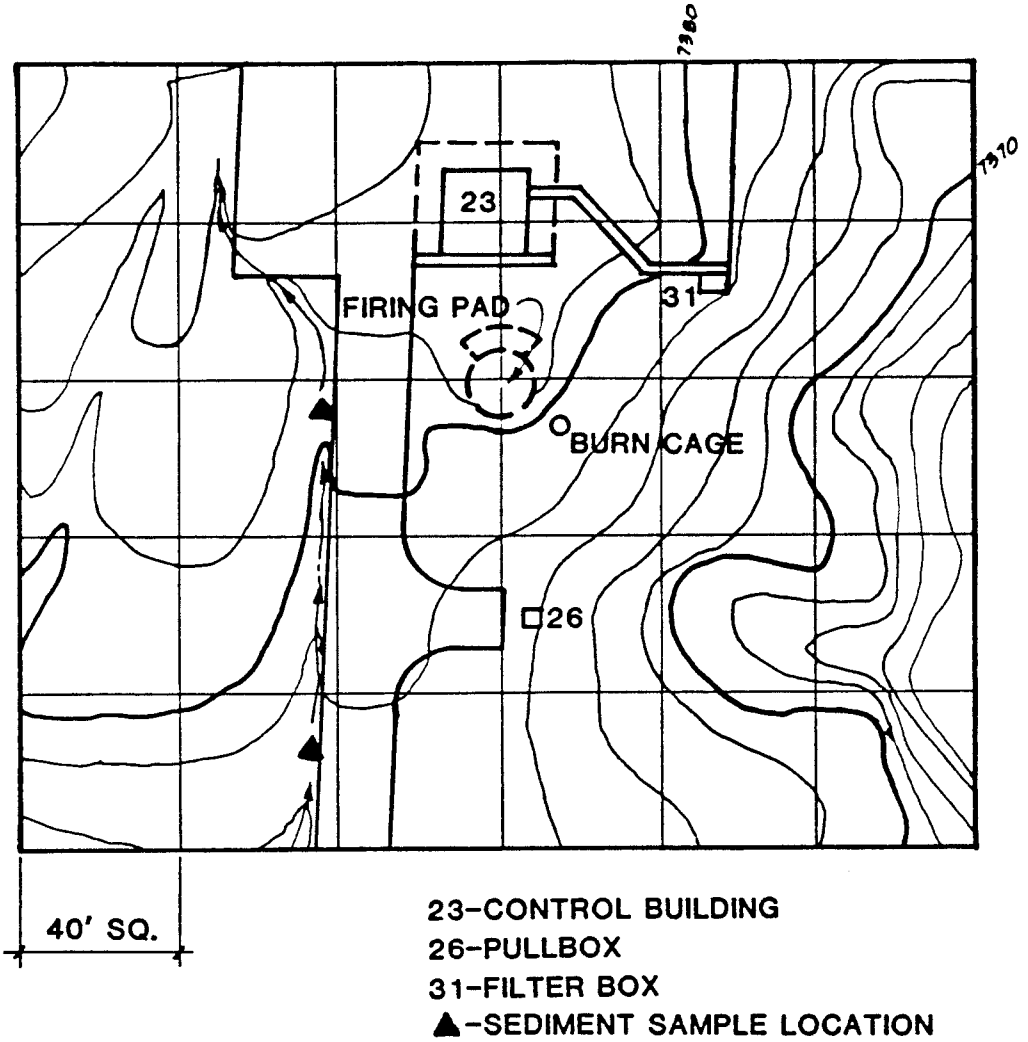


FIGURE 9-1

TA 14 WASTE FIRING SITE

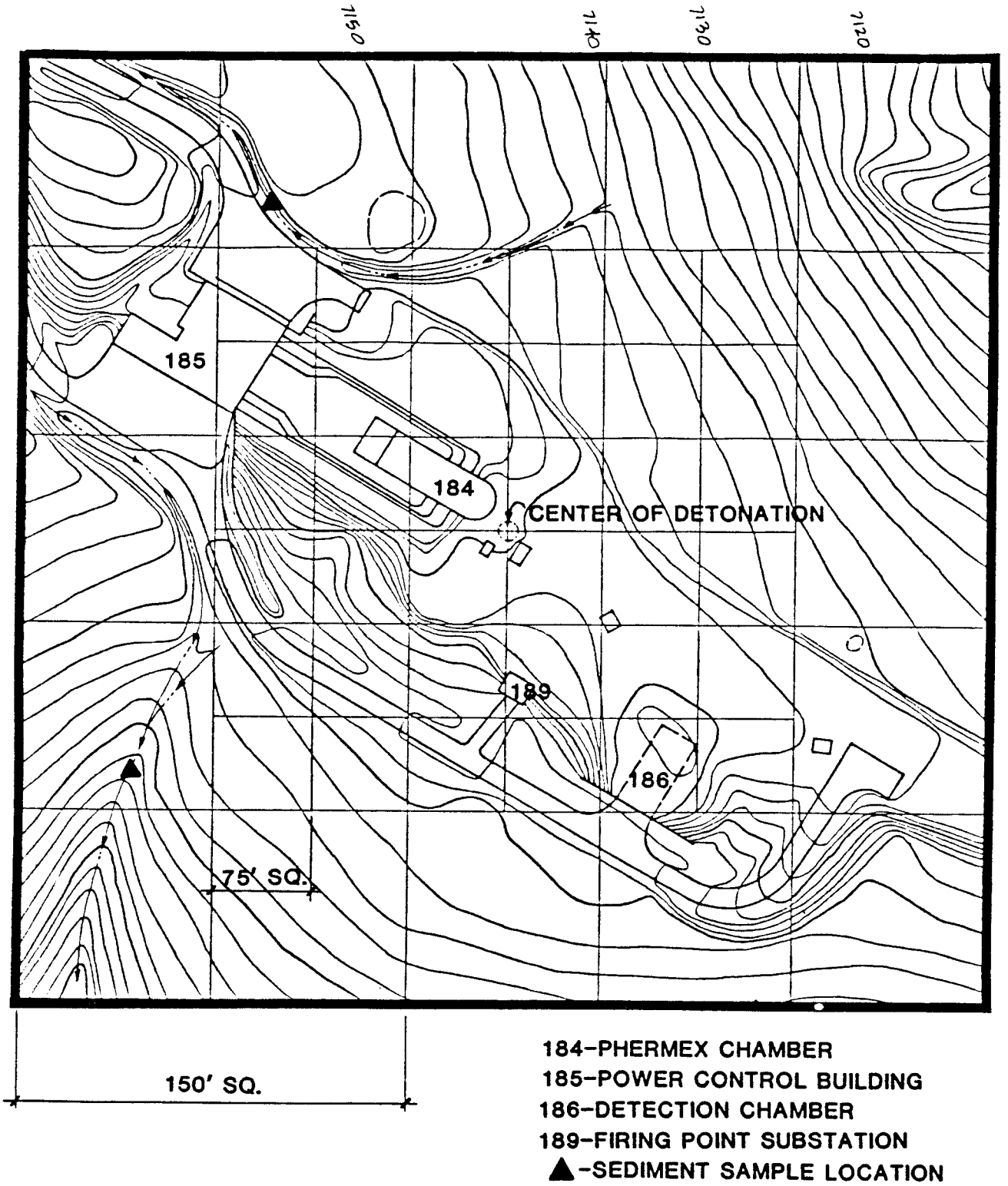


FIGURE 9-2

TA 15 FIRING SITE

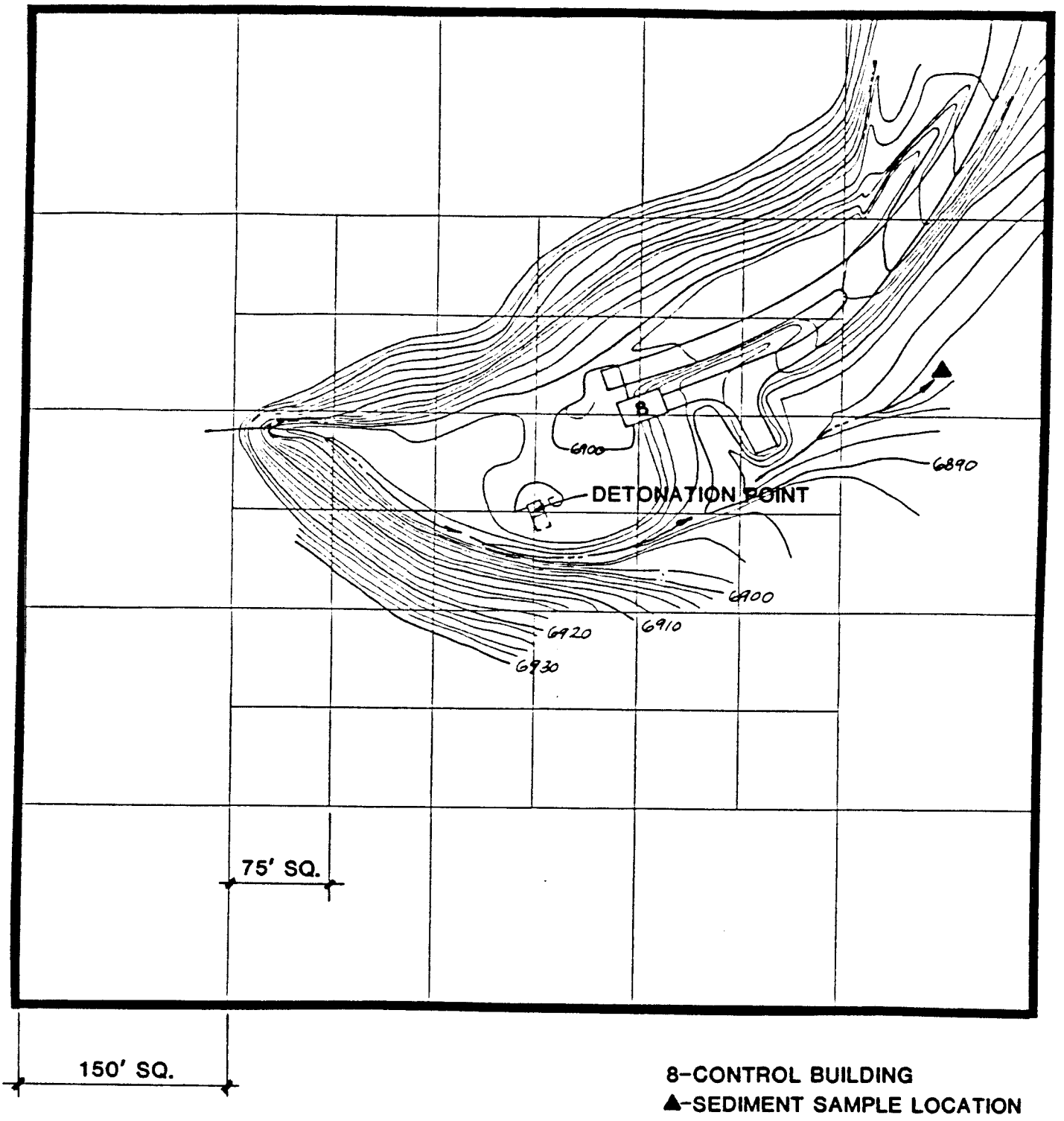


FIGURE 9-3

TA 36-MEENIE FIRING SITE

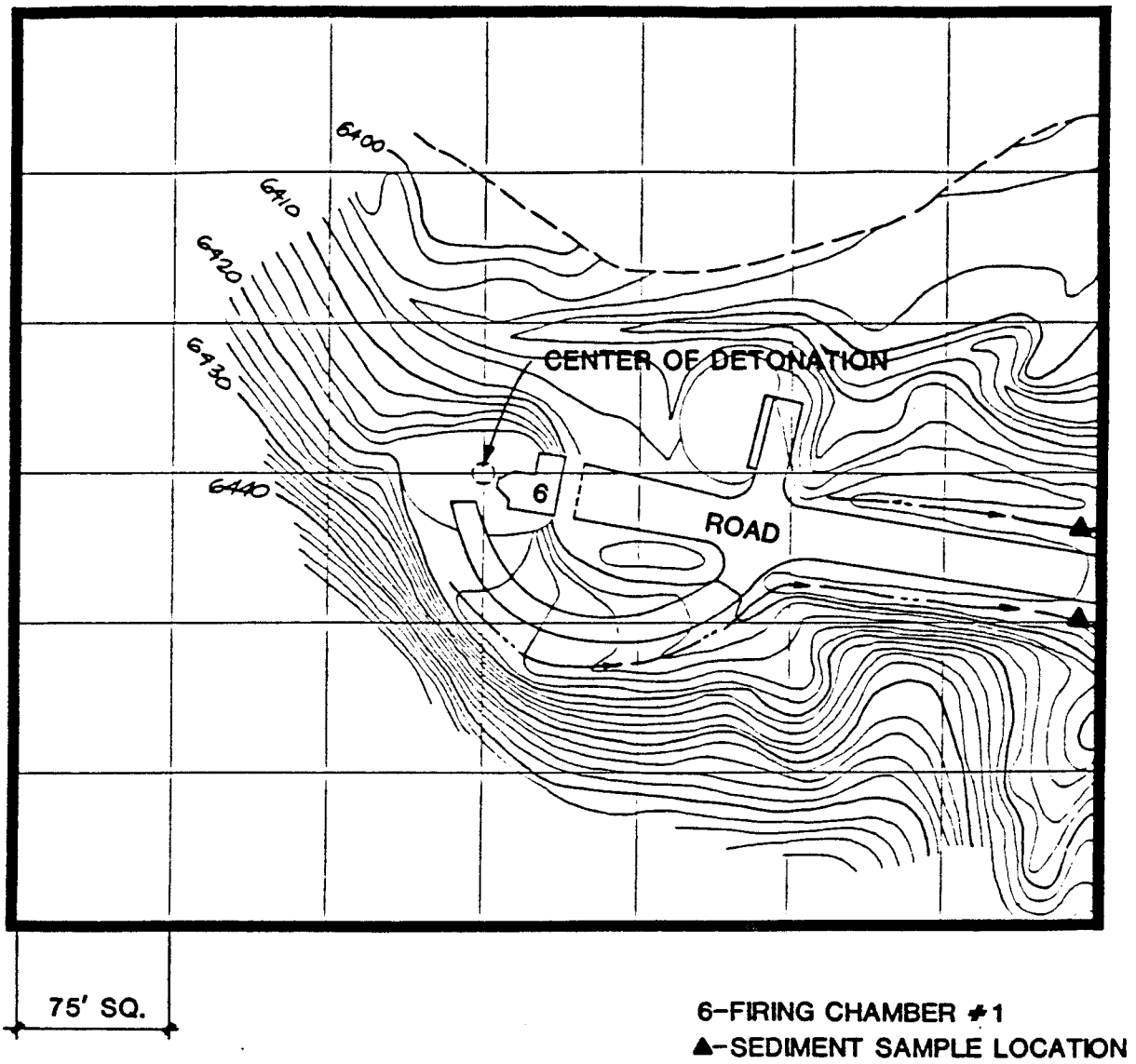
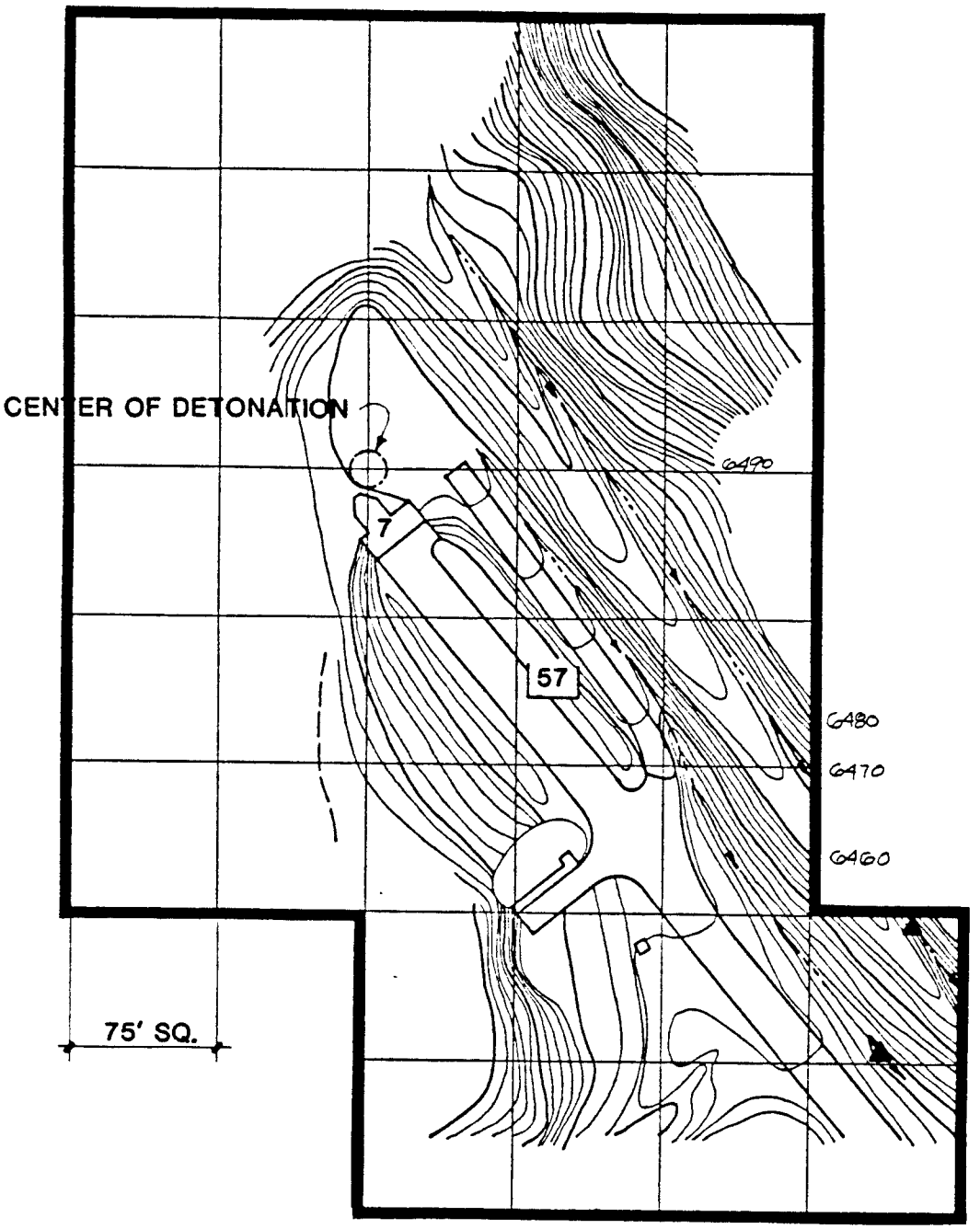


FIGURE 9-4

TA 39-6 FIRING SITE



7–FIRING CHAMBER #2
57–FIRING CHAMBER
▲–SEDIMENT SAMPLING LOCATION

FIGURE 9-5

TA 39-57 FIRING SITE

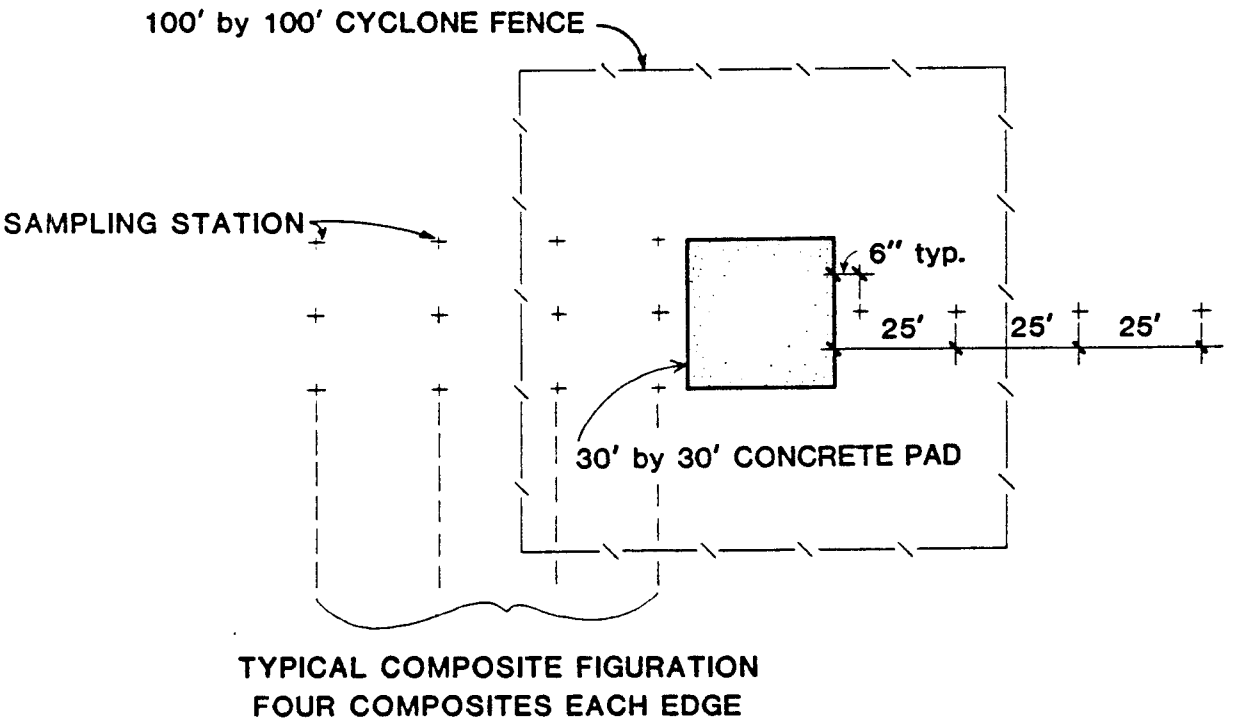


FIGURE 9-6

TA 16 BURN PAD SAMPLE LOCATIONS

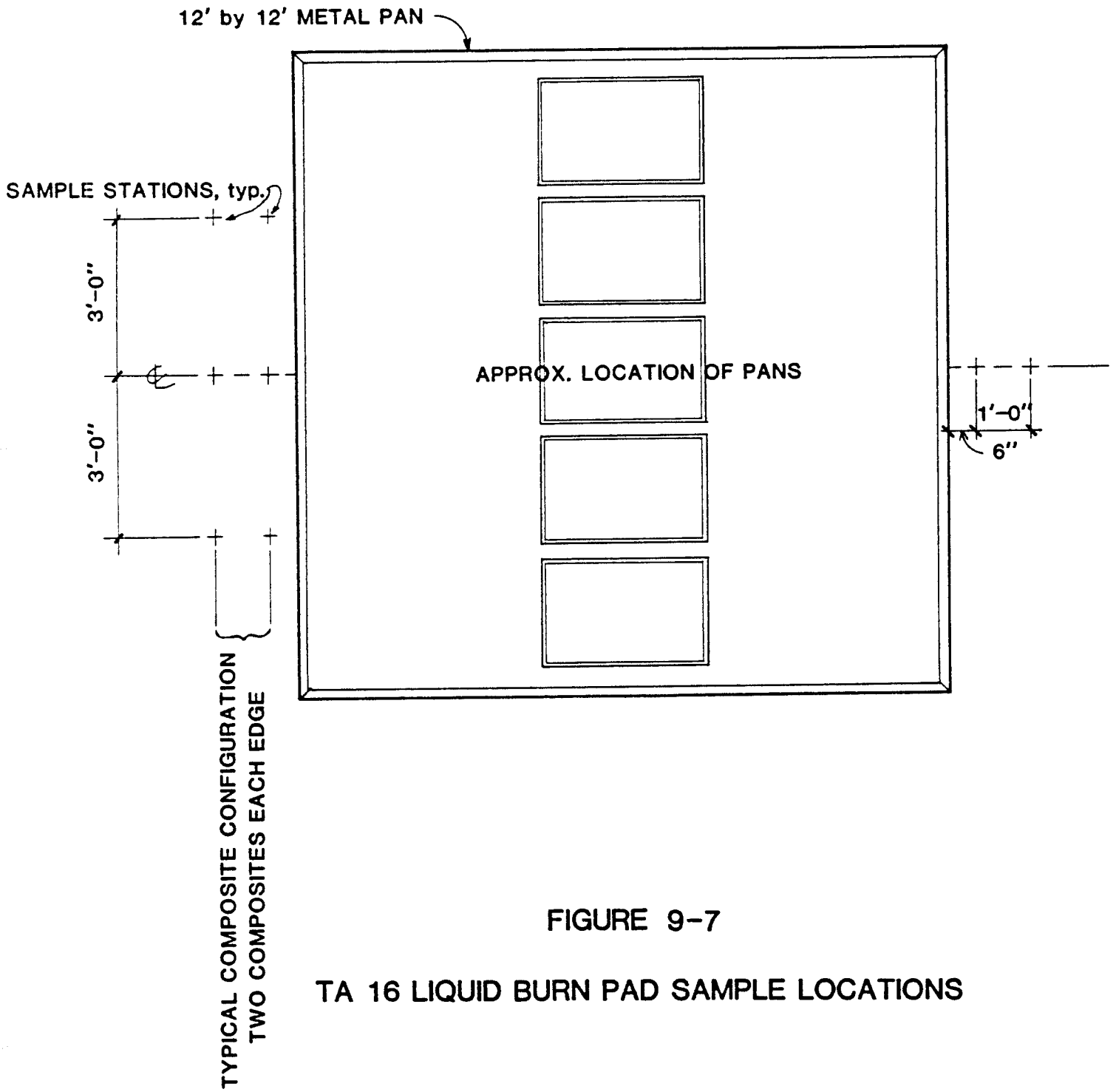


FIGURE 9-7

TA 16 LIQUID BURN PAD SAMPLE LOCATIONS

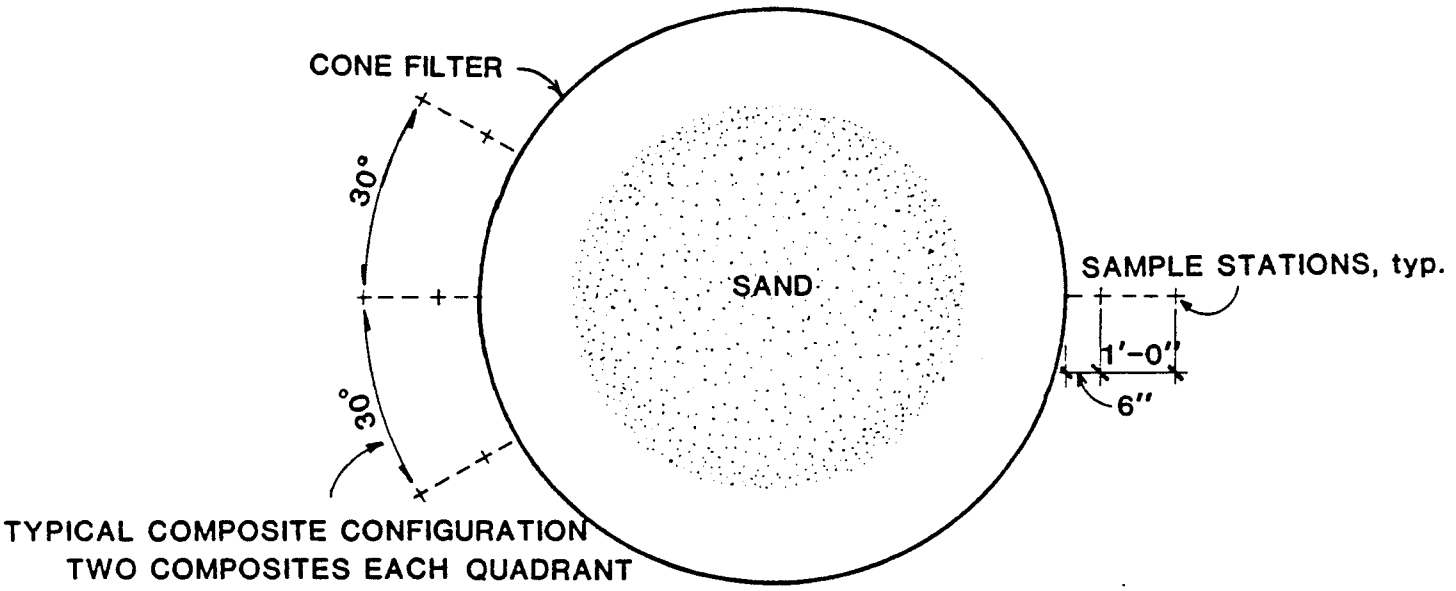


FIGURE 9-8

TA 16 FILTER VESSEL SAMPLE LOCATIONS

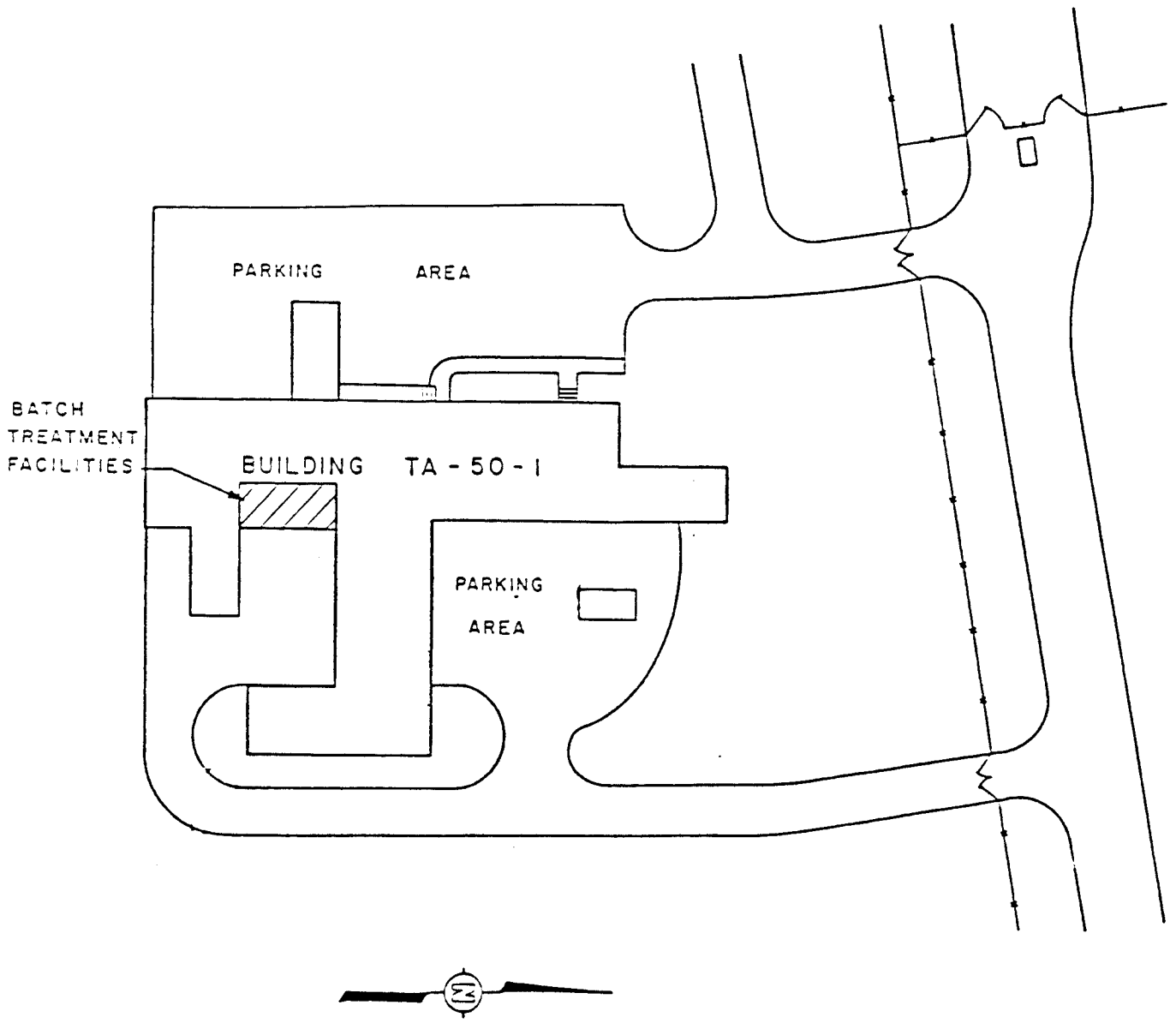
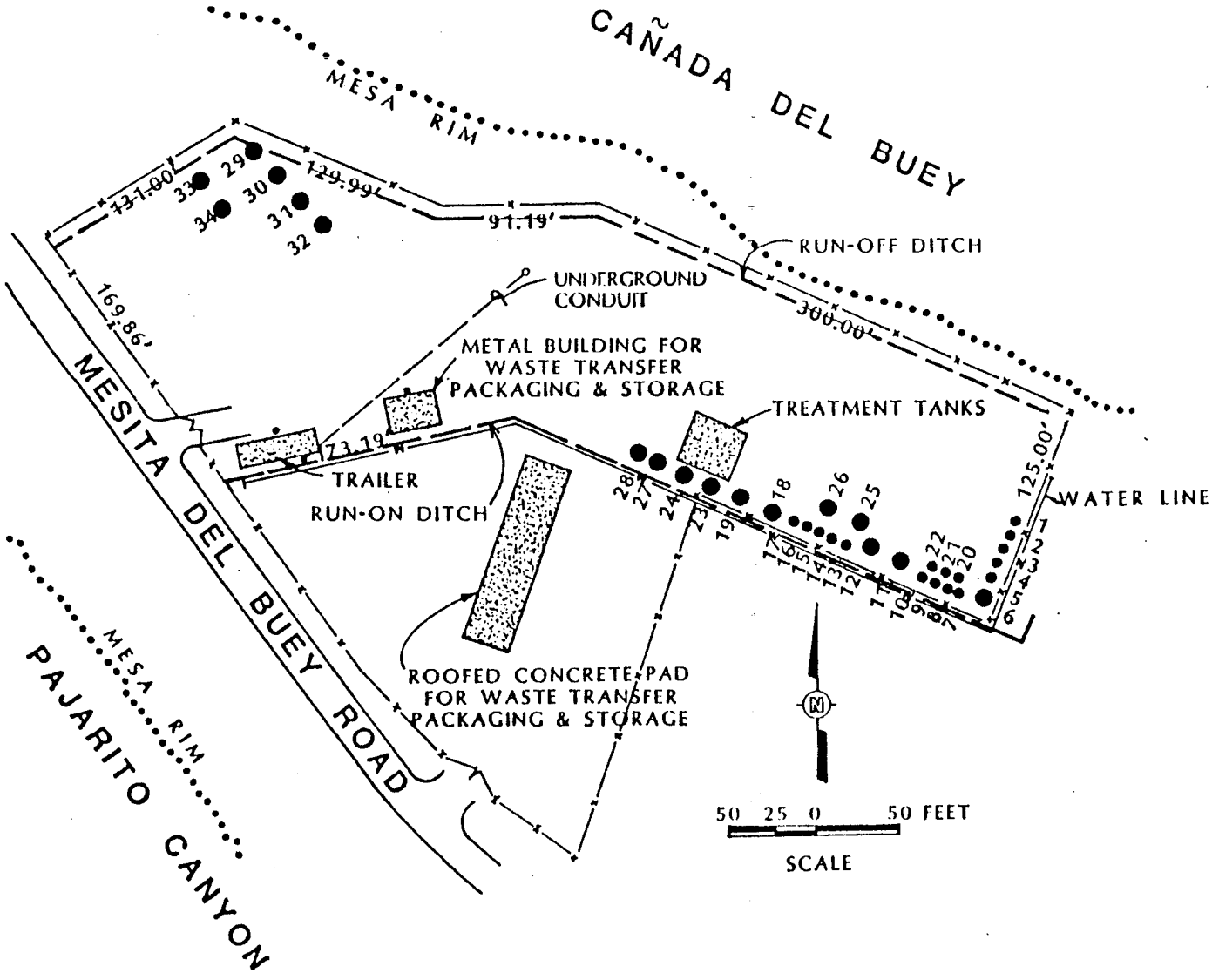


FIGURE 9- 9

BATCH TREATMENT FACILITIES

BLDG. TA 50-1



AREA L SHAFTS (1)

(INFORMATION CURRENT MARCH, 1985)

SHAFT #	SHAFT DIAMETER (FEET)	DATE DRILLED	DATE CAPPED	CONTENTS
1	3	4/80	9/83	ORGANICS
2	3	2/75	7/79	ACIDS & BASES
3	3	2/75	11/78	INORGANIC
4	3	2/75	5/80	ORGANIC
5	3	2/75	6/77	WASTE OIL
6	4	6/75	6/79	REACTIVE
7	3	6/75	6/79	REACTIVE
8	3	6/75	6/79	REACTIVE
9	3	6/75	6/79	GAS CYLINDERS
10	3	6/77	6/79	WASTE OIL
11	8	1/78	7/79	WASTE OIL/SOLVENT
12	4	1/78	7/79	WASTE OIL/SOLVENT
13	3	6/79	5/82	INORGANIC
14	3	6/79	5/82	REACTIVE
15	3	6/79	5/82	REACTIVE
16	3	6/79	5/82	GAS CYLINDERS
17	3	6/79	5/82	ORGANIC
18	8	6/79	6/80	WASTE OIL
19	8	4/80	5/82	WASTE OIL
20	3	4/80	9/83	INORGANIC
21	3	4/80	OPEN	GAS CYLINDERS
22	3	4/80	9/83	ORGANIC
23 (2)	8	4/82	3/84	WASTE OIL
24 (3)	8	4/82	4/84	ORGANIC & WASTE OIL
25	6	9/82	5/85	INORGANIC
26	6	9/82	3/84	ORGANIC
27	4	1/83	2/85	SPECIAL (4)
28	4	1/83	5/85	SPECIAL
29	6	12/83	8/84	ORGANIC
30	6	12/83	8/84	ORGANIC
31	6	12/83	9/84	ORGANIC
32	4	9/84	9/84	ORGANIC
33	6	9/84	2/85	ORGANIC
34	6	2/85	5/85	ORGANIC

(1) ALL SHAFTS ARE APPROXIMATELY 60 FEET DEEP

(2) PRIOR TO SHAFT 23 EXCEPT SHAFT 1, LIQUIDS WERE DISPOSED OF IN DRUMS WITHOUT ADDING ABSORBENTS

(3) MIDDLE SECTION OF THIS SHAFT NOT USED

(4) USED FOR MISCELLANEOUS WASTE REQUIRING GREATER ISOLATION

FIGURE 9-10

TA 54-AREA L

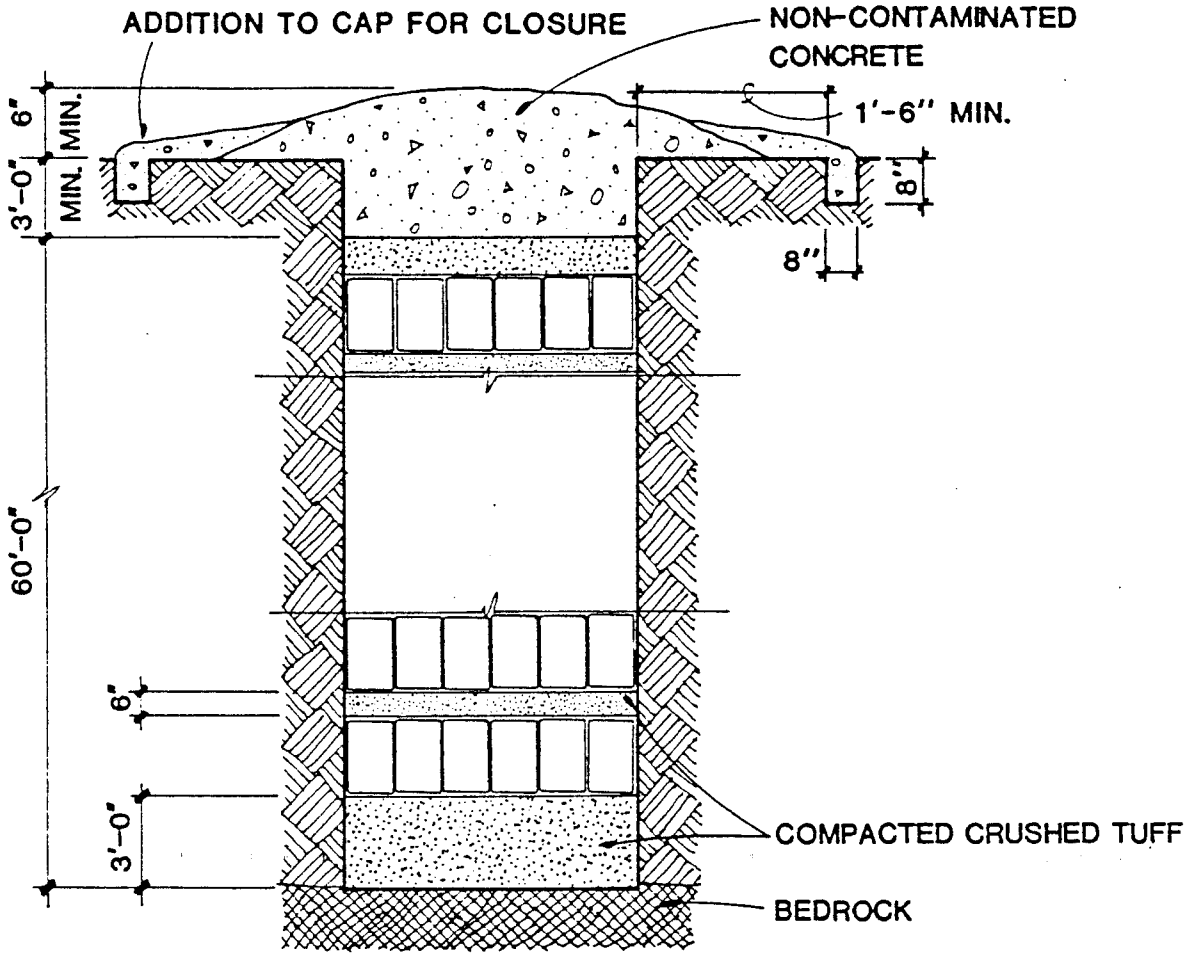


FIGURE 9-11

TYPICAL SHAFT SECTION AREA L

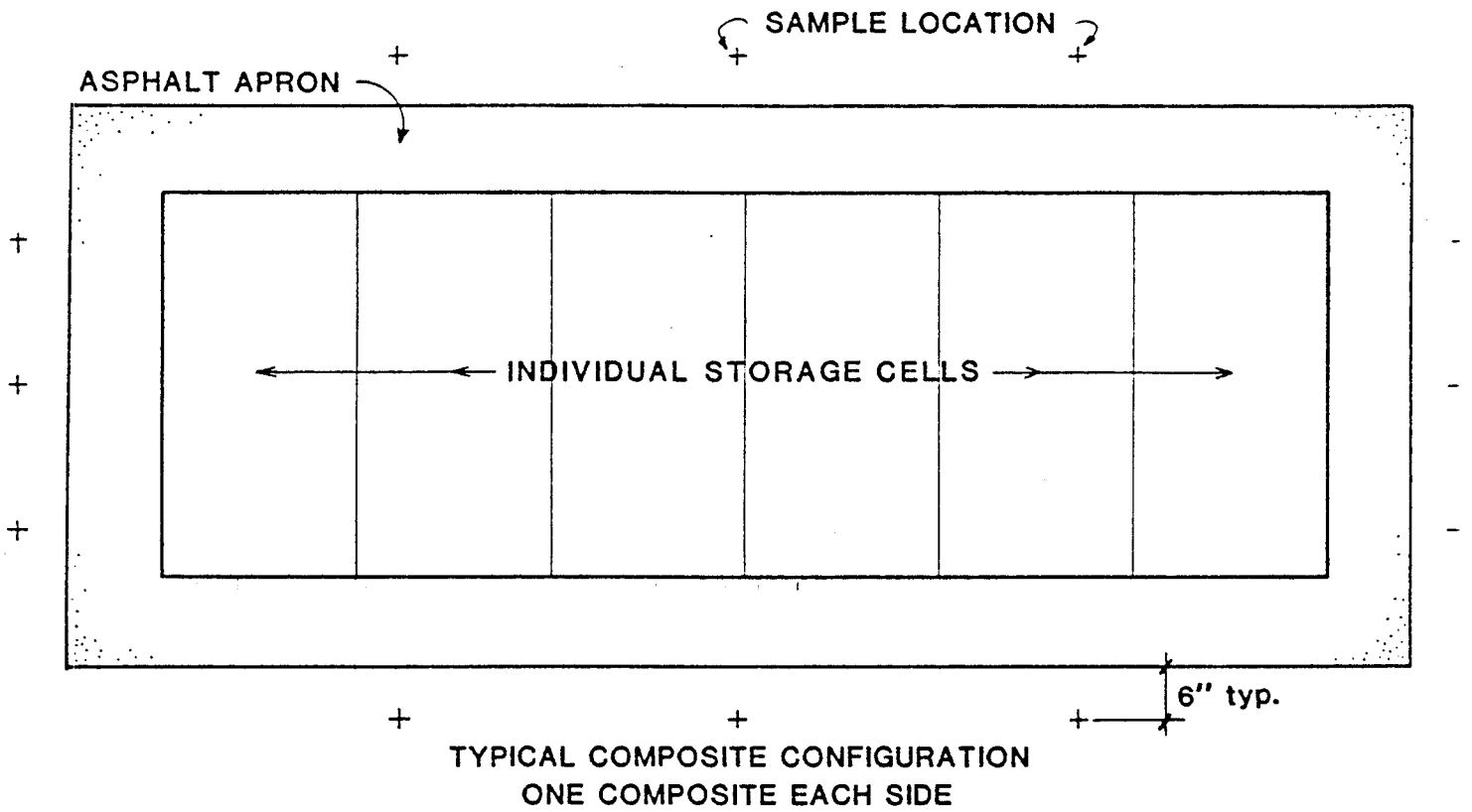


FIGURE 9-12

TA 54-AREA L

COVERED CONC. PAD SAMPLE LOCATIONS

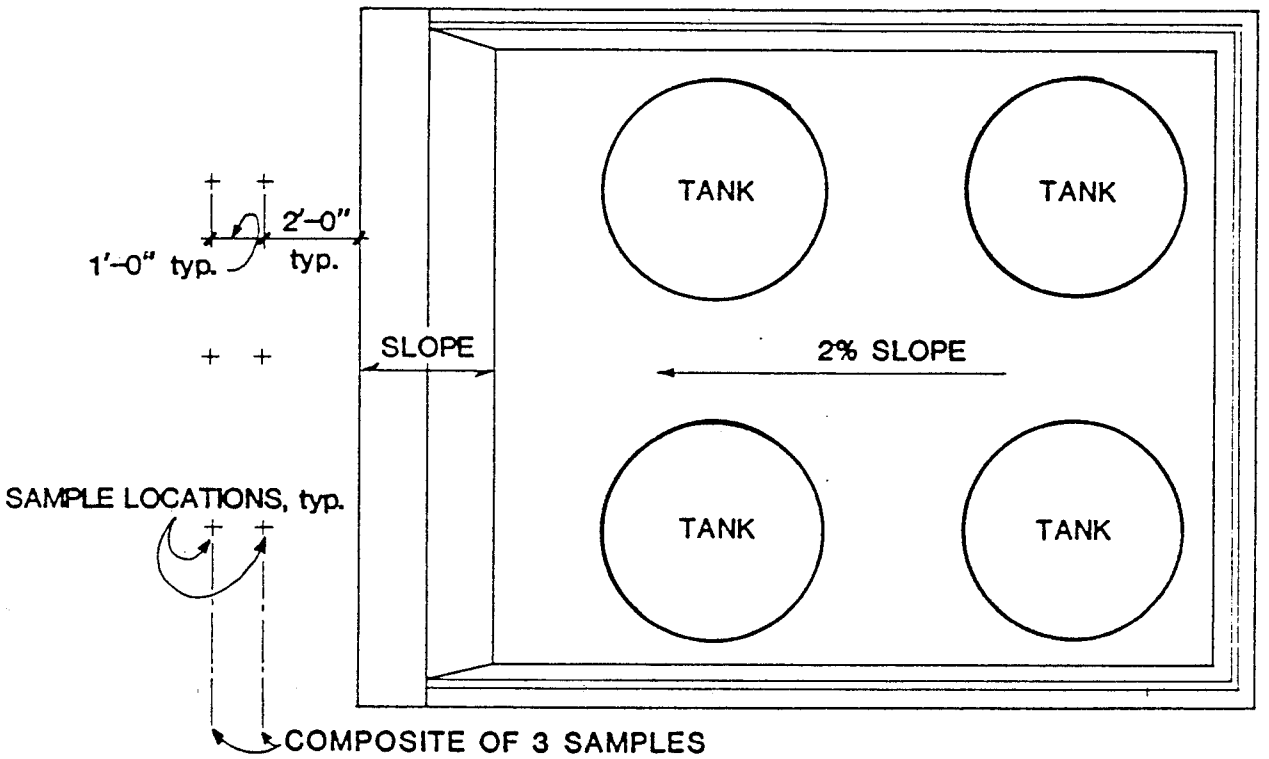
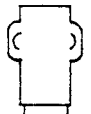


FIGURE 9-13

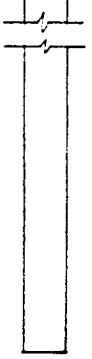
TA 54-AREA L

TREATMENT TANKS SAMPLE LOCATIONS

A. DRIVE HAMMER

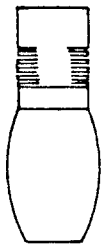


B. HEAD



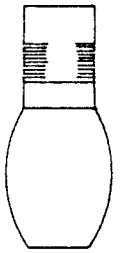
C. TUBE

D. POINT

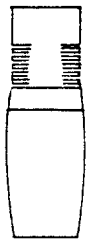


STANDARD POINT

CONSTRICTED POINT

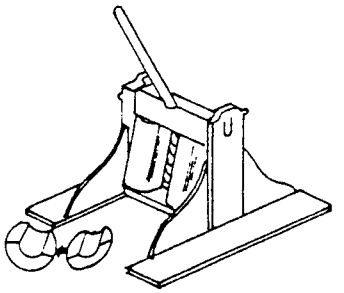


BULGE POINT



SPECIAL POINT

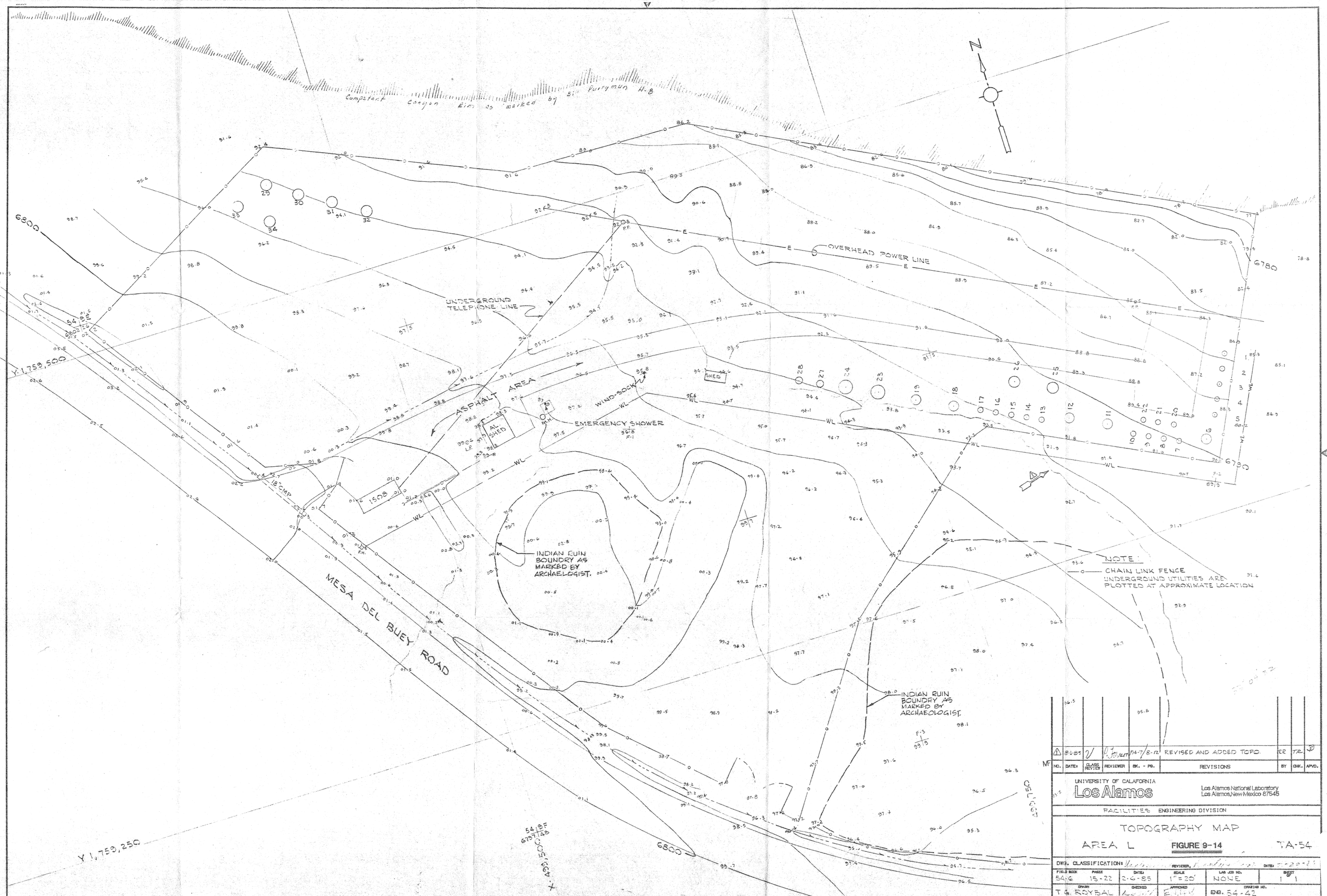
POINT TYPES



PULLER JACK & GRIP

FIGURE 9-15

VEIHMEYER SOIL SAMPLER



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

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

FACILITIES ENGINEERING DIVISION

TOPOGRAPHY MAP

AREA L **FIGURE 9-14** TA-54

DWG. CLASSIFICATION: [illegible] REVIEWER: [illegible] DATE: [illegible]

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

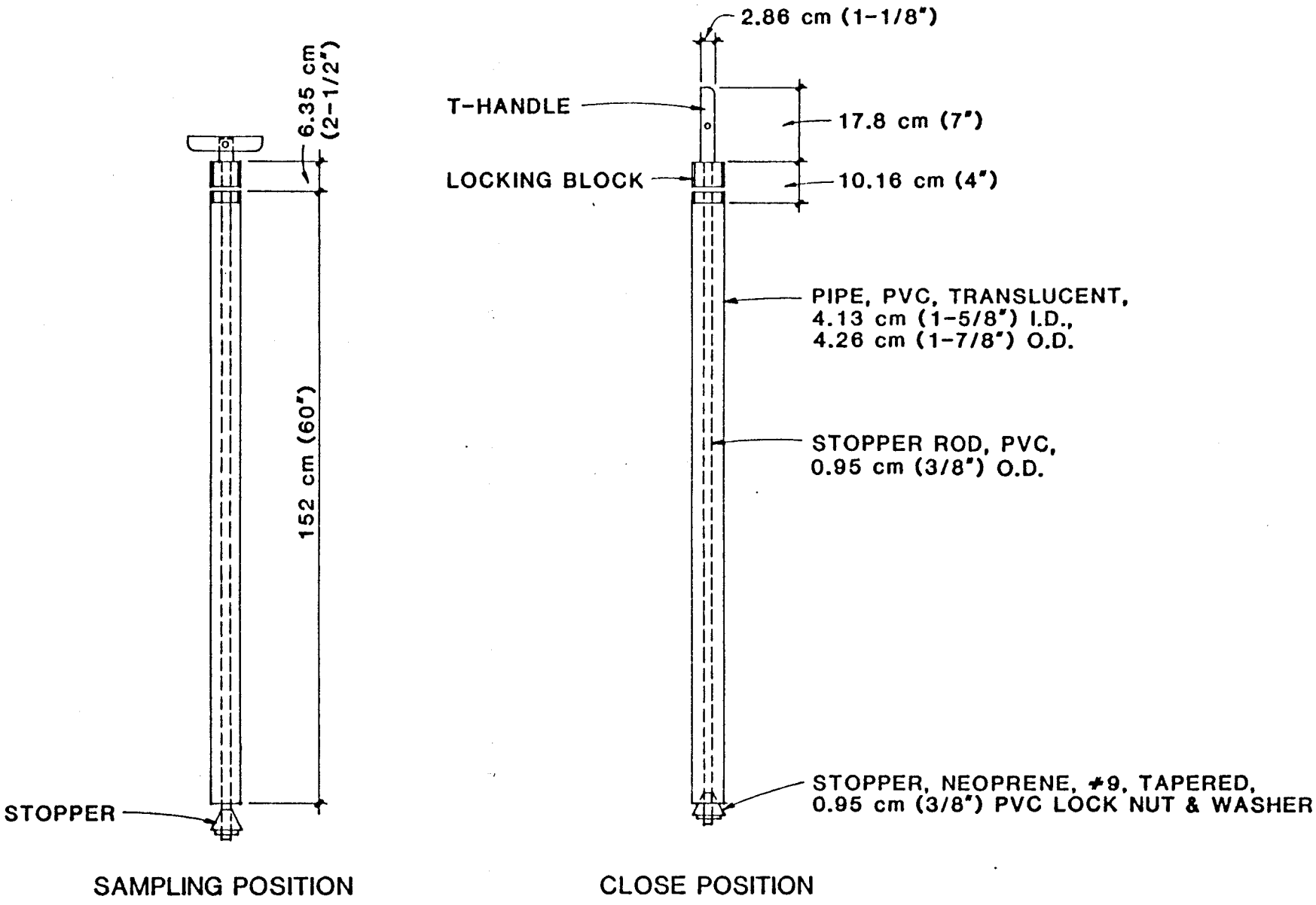


FIGURE 9-16

COMPOSITE LIQUID WASTE SAMPLER (COLIWASA)

Figure 9-17

Example of Sample Seal

OFFICIAL SAMPLE SEAL

Collected by _____ Collector's Sample No._____
(Signature)

Date Collected_____ Time Collected_____

Place Collected_____

_____

_____

Figure 9-18

Example of Sample Label

OFFICIAL SAMPLE LABEL

Collector_____Collector's Sample No._____

Place. of Collection_____

_____

Date Sampled_____Time Sampled_____

Field Information_____

_____

_____

Figure 9-19

CHAIN OF CUSTORY RECORD
Hazardous Materials
Collector's Sample No.___

Location of Sampling: __Producer __Hauler
__Disposal Site
__Other:_____

_____

Company's Name _____Telephone (___)_____

Address_____
number street city state zip

Collector's Name_____Telephone (___)_____
signature

Date Sampled_____Time Sampled_____hours

Type of Process Producing Waste_____

Waste Type Code_____Other_____

Field Information_____

_____

_____

Sample Allocation:

1. _____
name of organization

2. _____
name of organization

3. _____
name of organization

Chain of Possession:

1. _____ _____ _____
signature title inclusive dates

2. _____ _____ _____
signature title inclusive dates

3. _____ _____ _____
signature title inclusive dates

Figure 9-20

Hazardous Materials Sample Analysis Request

PART I: FIELD SECTION

Collector_____ Date Sampled_____ Time_____ hours

Location of Sampling_____
name of company, disposal site, etc.

Address_____
number street city state zip

Telephone (____)_____ Company Contact_____

HML NO.. (Lab only)	COLLECTOR'S SAMPLE NO.	TYPE OF SAMPLE*	FIELD INFORMATION

Analysis Requested_____

Special Handling and/or Storage_____

PART II: LABORATORY SECTION

Received by _____ Title_____ Date_____
Sample Allocation: ___HML ___LBL ___SRL Date_____
Analysis Required_____

*Indicate whether sample is sludge, soil, etc.:**Use back of page for additional information.

ENCLOSURE 11

Part A

TA-16 Area P

(Fill—in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

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

I. EPA I.D. NUMBER

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

FOR OFFICIAL USE ONLY

APPLICATION RECEIVED	DATE RECEIVED (yr., mo., & day)	COMMENTS

II. FIRST OR REVISED APPLICATION

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

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

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

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

YR.	MO.	DAY

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

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

YR.	MO.	DAY

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

☒ 1. FACILITY HAS INTERIM STATUS

☐ 2. FACILITY HAS A RCRA PERMIT

III. PROCESSES – CODES AND DESIGN CAPACITIES

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

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

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

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

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

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

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

C: DUP T/A C 1

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S02	600	G		5	T03	0.15	D	
X-2	T03	20	E		6				
1	S01	18320	G		7				
2	S80	100	B		8				
3	T01	7680	U		9				
4	T04	NA (SEC IIIC)			10				

CONTINUE ON REVERSE

Continued from the front.

III. PROCESSES *(continued)*

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

Discrete pieces of High Explosives (HE) waste are collected, packaged, and burned at the TA-16 burning ground. HE contaminated equipment, pipe, etc that have been flash burned at TA-50 have been disposed of at Area P. Two burn pads (388, 399) are used to burn the discrete pieces of HE while pad 387 is used to flash the equipment. Two pressure vessels (401, 406) are used to burn HE sludge from various processing facilities located at the Laboratory. The sludge is placed on layers of sand in the vessels, the water allowed to drain from the bottom into an evaporation pond and the residue on the sand burned. Sand from burn pads 388 and 399 have been found to be EP toxic for Barium. This sand has in the past been disposed of at Area P. Engineering drawings and location of the sites are included under item V. Design capacities are not applicable as the treatment process is performed on an as-needed basis.

IV. DESCRIPTION OF HAZARDOUS WASTES

A. EPA HAZARDOUS WASTE NUMBER – Enter the four–digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four–digit number*(s)* from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. ESTIMATED ANNUAL QUANTITY – For each **listed waste** entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each **characteristic** or **toxic contaminant** entered in column A estimate the total annual quantity of all the non–listed waste*(s)* that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE – For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:
   For listed hazardous waste: For each **listed** hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non–listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code*(s)* from the list of process codes contained in Item III to indicate **all** the processes that will be used to store, treat, and/or dispose of all the non–listed hazardous wastes that possess that characteristic or toxic contaminant.
   Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER – Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number that can be used to describe the hazardous waste.

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* – A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non–listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

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

 CONTINUE ON PAGE 3

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

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY
NM089001051 5 T/A 1 C	W DUP T/A 2 C DUP

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D001	50000	P	S01 T03 D80	
2	D002	150000	P	S01 T01 D80	
3	D003	5000	P	S01 T04 D80	
4	D003	5000	P	S01 T03 T01 D80	Lithium Hydride only
5	D004	1000	P	S01 D80	
6	D005	150	Y	D80	Sand from clean out of explosives burn pads.
7	D005	250*	P	S01 D80	
8	D006	250*	P	S01 T01 D80	
9	D007	1000	P	S01 T01 D80	
10	D008	2000	P	S01 D80	
11	009	1500	P	S01 T01 D80	
	D010	250*	P	S01 D80	
13	D011	250*	P	S01 T01 D80	
14	D012	250*	P	S01 T03 D80	
15	D016	250*	P	S01 T03 D80	
16		END OF D DESIGNATOR			
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

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

Form Approved OMB No. 158-S80004

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

V. DESCRIPTION OF HAZARDOUS WASTES (continued)

No.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F001	1000	P	S01	T03	D80		
2	F002	1000	P	S01	T03	D80		
3	F003	250*	P	S01	T03	D80		
4	F004	250*	P	S01	T03	D80		
5	F005	250*	P	S01	T03	D80		
6	F006	250*	P	S01		T01	D80	
7	F007	12500	P	S01		T01	D80	
8	F008	1000	P	S01		T01	D80	
9	F009	6000	P	S01		T01	D80	
10	F027	700	P	S01	D80	T03		
11	028	700	P	D80				
		END OF F DESIGNATOR						
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

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

Form Approved OMB No. 158-S80004

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

SCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	K044	50000	P	S01 T04 D80	
2	K047	250*	P	S01 T04 D80	
3		END OF K DESIGNATOR			
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

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

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

. D RIPTION OF HAZARDOUS WASTES *(continued)*

O Z	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P001	250*	P	S01	T03	D80		
2	P002	250*	P	S01	T03	D80		
3	P003	250*	P	S01	T03	D80		
4	P004	250*	P	S01	T03	D80		
5	P005	250*	P	S01	T03	D80		
6	P006	250*	P	S01	T04	D80		
7	P007	250*	P	S01	T03	D80		
8	P008	250*	P	S01	T03	D80		
9	P009	250*	P	S01	T04	D80		
0	P010	250*	P	S01	D80			
1	011	250*	P	S01	D80			
	P012	250*	P	S01	D80			
3	P013	250*	P	S01	T01	D80		
4	P014	250*	P	S01	T03	D80		
15	P015	6000	P	S01	D80			
16	P016	250*	P	S01	T03	D80		
17	P017	250*	P	S01	T03	D80		
18	P018	250*	P	S01	T03	D80		
19	P020	250*	P	S01	T03	D80		
20	P021	250*	P	S01	T01	D80		
21	P022	250*	P	S01	T04	D80		
22	P023	250*	P	S01	T03	D80		
23	24	250*	P	S01	T03	D80		
	P026	250*	P	S01	T03	D80		
25	P027	250*	P	S01	T03	D80		
26	P028	250*	P	S01	T03	D80		

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

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

V. DESCRIPTION OF HAZARDOUS WASTES (continued)

	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P029	250*	P	S01		T01	D80	
2	P030	250*	P	S01	T01	D80		
3	P031	250*	P	S01	T04	D80		
4	P033	250*	P	S01	T04	D80		
5	P034	250*	P	S01	T03	D80		
6	P036	250*	P	S01	T03	D80		
7	P037	250*	P	S01	T03	D80		
8	P038	250*	P	S01	T03	D80		
9	P039	250*	P	S01	T03	D80		
10	P040	250*	P	S01	T03	D80		
11	041	250*	P	S01	T03	D80		
12	P042	250*	P	S01	T03	D80		
13	P043	250*	P	S01	T03	D80		
14	P044	250*	P	S01	T03	D80		
15	P045	250*	P	S01	T03	D80		
16	P046	250*	P	S01	T03	D80		
17	P047	250*	P	S01	T03	D80		
18	P048	250*	P	S01	T03	T04	D80	
19	P049	250*	P	S01	T03	D80		
20	P050	250*	P	S01	T03	D80		
21	P051	250*	P	S01	T03	D80		
22	P054	250*	P	S01	T03	T04	D80	
23	056	250*	P	S01	T01	T04	D80	
24	P057	250*	P	S01	T03	D80		
25	P058	250*	P	S01	T03	D80		
26	P059	250*	P	S01	T03	D80		

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

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

. DESCRIPTION OF HAZARDOUS WASTES (continued)

O Z	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				2. PROCESS DESCRIPTION (if a code is not entered in D(1))
	P060	250*	P	S01	T03	D80		
	P062	250*	P	S01	T03	D80		
	P063	250*	P	S01	T04	D80		
	P064	250*	P	S01	T04	D80		
	P065	250*	P	S01	T04	D80		
	P066	250*	P	S01	T03	D80		
7	P067	250*	P	S01	T03	D80		
8	P068	250*	P	S01	T03	D80		
9	P069	250*	P	S01	T03	T04	D80	
0	P070	250*	P	S01	T03	D80		
1	[illegible]71	250*	P	S01	T03	T04	D80	
	P072	250*	P	S01	T03	D80		
3	P073	250*	P	S01	T01	T04	D80	
4	P074	250*	P	S01		T01	D80	
5	P075	250*	P	S01	T03	D80		
6	P076	250*	P	S01	T01	T04	D80	
7	P077	250*	P	S01	T03	T04	D80	
8	P078	250*	P	S01	T01	D80		
9	P081	250*	P	S01	T04	D80		
0	P082	250*	P	S01	T03	D80		
1	P084	250*	P	S01	T03	D80		
2	P085	250*	P	S01	T03	D80		
3	[illegible]87	250*	P	S01	D80			
	P088	250*	P	S01	T03	D80		
	P089	250*	P	S01	T03	D80		
6	P092	250*	P	S01	T03	D80		

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Form Approved OMB No. 158-S80004

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

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

Line No.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P093	250*	P	S01	T03	D80		
2	P094	250*	P	S01	T03	D80		
3	P095	250*	P	S01	T03	D80		
4	P096	250*	P	S01	T04	D80		
5	P097	250*	P	S01	T03	D80		
6	P098	250*	P	S01	T01	D80		
7	P099	250*	P	S01	T01	D80		
8	P101	250*	P	S01	T03	D80		
9	P102	250*	P	S01	T03	D80		
10	P103	250*	P	S01	T03	D80		
11	104	250*	P	S01	T01	D80		
-	P105	250*	P	S01	D80			
13	P106	250*	P	S01	T01	D80		
14	P107	250*	P	S01	T04	D80		
15	P108	250*	P	S01	T03	D80		
16	P109	250*	P	S01	T03	D80		
17	P110	250*	P	S01	T03	D80		
18	P111	250*	P	S01	T03	D80		
19	P112	250*	P	S01	T03	T04	D80	
20	P113	250*	P	S01	D80			
21	P114	250*	P	S01	D80			
22	P115	250*	P	S01	D80			
23	116	250*	P	S01	D80			
-	P118	250*	P	S01	T03	D80		
25	P119	250*	P	S01	D80			
26	P120	250*	P	S01	D80			

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Form Approved OMB No. 158-S80004

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

RIPTION OF HAZARDOUS WASTES (continued)

O.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	P 1 2 1	250*	P	S 0 1	T 0 1	D 8 0		
2	P 1 2 2	250*	P	S 0 1	T 0 4	D 8 0		
3	P 1 2 3	250*	P	S 0 1	T 0 3	D 8 0		
4		END OF P DESIGNATOR						
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NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

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

DESCRIPTION OF HAZARDOUS WASTES (continued)

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

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

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

DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U028	250*	P	S01	T03	D80		
2	U029	250*	P	S01	T03	D80		
3	U030	250*	P	S01	T03	D80		
4	U031	250*	P	S01	T03	D80		
5	U032	250*	P	S01	T01	D80		
6	U033	250*	P	S01	T04	D80		
7	U034	250*	P	S01	T03	D80		
8	U035	250*	P	S01	T03	D80		
9	U036	250*	P	S01	T03	D80		
10	U037	250*	P	S01	T03	D80		
11	U038	250*	P	S01	T03	D80		
12	U039	250*	P	S01	T03	D80		
13	U041	250*	P	S01	T03	D80		
14	U042	250*	P	S01	T03	T04	D80	
15	U043	250*	P	S01	T04	D80		
16	U044	1000	P	S01	T03	D80		
17	U045	250*	P	S01	T04	D80		
18	U046	250*	P	S01	T03	D80		
19	U047	250*	P	S01	T03	D80		
20	U048	250*	P	S01	T03	D80		
21	U049	250*	P	S01	T03	D80		
22	U050	250*	P	S01	T03	D80		
23	U051	250*	P	S01	T03	D80		
24	U052	250*	P	S01	T03	D80		
25	U053	250*	P	S01	T03	D80		
26	U055	250*	P	S01	T03	D80		

CONTINUE ON REVERSE

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

DESCRIPTION OF HAZARDOUS WASTES (continued)

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

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

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

CRIPTION OF HAZARDOUS WASTES *(continued)*

	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U083	250*	P	S01	T03	D80		
2	U084	250*	P	S01	T03	D80		
3	U085	250*	P	S01	T03	D80		
4	U086	250*	P	S01	T03	D80		
5	U087	250*	P	S01	T03	D80		
6	U088	250*	P	S01	T03	D80		
7	U089	250*	P	S01	T03	D80		
8	U090	250*	P	S01	T03	D80		
9	U091	250*	P	S01	T03	D80		
10	U092	250*	P	S01	T04	D80		
11	U093	250*	P	S01	T03	D80		
12	U094	250*	P	S01	T03	D80		
13	U095	250*	P	S01	T03	D80		
14	U096	250*	P	S01	T03	T04	D80	
15	U097	250*	P	S01	T03	D80		
16	U098	250*	P	S01	T03	D80		
17	U099	250*	P	S01	T03	D80		
18	U101	250*	P	S01	T03	D80		
19	U102	250*	P	S01	T03	D80		
20	U103	250*	P	S01	T03	D80		
21	U105	250*	P	S01	T03	D80		
22	U106	250*	P	S01	T03	D80		
23	107	250*	P	S01	T03	D80		
24	U108	250*	P	S01	T03	T04	D80	
25	U109	250*	P	S01	T03		D80	
26	U110	250*	P	S01	T03	D80		

CONTINUE ON REVERSE

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

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

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

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

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

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U137	250*	P	S01	T03	D80		
2	U138	250*	P	S01	T03	D80		
3	U139	250*	P	S01	T03	D80		
4	U140	250*	P	S01	T03	D80		
5	U141	250*	P	S01	T03	D80		
6	U142	250*	P	S01	T03	D80		
7	U143	250*	P	S01	T03	D80		
8	U144	250*	P	S01	D80			
9	U145	250*	P	S01	D80			
10	U146	250*	P	S01	D80			
11	U147	250*	P	S01	T03	D80		
[illegible]	[illegible]148	250*	P	S01	T03	D80		
13	U149	250*	P	S01	T03	D80		
14	U150	250*	P	S01	T03	D80		
15	U151	250*	P	S01	D80			
16	U152	250*	P	S01	T03	D80		
17	U153	250*	P	S01	T03	D80		
18	U154	250*	P	S01	T03	D80		
19	U155	250*	P	S01	T03	D80		
20	U156	250*	P	S01	T03	D80		
21	U157	1000	P	S01	T03	D80		
22	U158	250*	P	S01	T03	D80		
23	U159	1000	P	S01	T03	D80		
[illegible]	U160	250*	P	S01	T04	D80	T03	
[illegible]	U161	250*	P	S01	T03	D80		
26	U162	250*	P	S01	T03	D80		

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

DESCRIPTION OF HAZARDOUS WASTES (continued)

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

CONTINUE ON REVERSE

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

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

V. T RIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U190	250*	P	S01	T03	D80		
2	U191	250*	P	S01	T03	D80		
3	U192	250*	P	S01	T03	D80		
4	U193	250*	P	S01	T03	D80		
5	U194	250*	P	S01	T03	D80		
6	U196	250*	P	S01	T03	D80		
7	U197	250*	P	S01	T03	D80		
8	U200	250*	P	S01	T03	D80		
9	U201	250*	P	S01	T03	D80		
10	U202	250*	P	S01	T03	D80		
11	203	250*	P	S01	T03	D80		
	U204	250*	P	S01	D80			
13	U205	250*	P	S01	T04	D80		
14	U206	250*	P	S01	T03	D80		
15	U207	250*	P	S01	T03	D80		
16	U208	250*	P	S01	T03	D80		
17	U209	250*	P	S01	T03	D80		
18	U210	250*	P	S01	T03	D80		
19	U211	250*	P	S01	T03	D80		
20	U212	250*	P	S01	T03	D80		
21	U213	250*	P	S01	T03	T04	D80	
22	U214	250*	P	S01	T03	D80		
23	215	250*	P	S01	D80			
	U216	250*	P	S01		D80		
25	U217	250*	P	S01	T04	D80		
26	U218	250*	P	S01	T03	D80		

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Form Approved OMB No. 158-S80004

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

ESCRIPTION OF HAZARDOUS WASTES (continued)

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

CONTINUE ON REVERSE

Continued from the front.

IV. DESCRIPTION OF HAZARDOUS WASTES *(continued)*

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

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

EPA I.D. NO. *(enter from page 1)*

S	N	M	0	8	9	0	0	1	0	5	1	5	T/A	C
F														6

V. FACILITY DRAWING

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

VI. PHOTOGRAPHS

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

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*
35 49 051	106 14 015

VIII. FACILITY OWNER

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

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

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*
E United States Department of Energy	505-667-528

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
F Los Alamos Area Office	G Los Alamos	NM	87545

IX. OWNER CERTIFICATION

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

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Harold Valencia Los Alamos Area Office	H. Valencia	9-27-85

X. OPERATOR CERTIFICATION

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

A. NAME *(print or type)*	B. SIGNATURE	C. DATE SIGNED
Christopher S. Adams, Jr. Assoc. Director, Tech. Service		9-27-85

CONTINUE ON PAGE

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

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

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

ENG-C-27630 - Pressure Vessel (406)

ENG-C-25937 - Pressure Vessel (401)

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

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

Area L Chemical Storage Facility, TA-54.

Area L Chemical Storage Facility, shed.

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

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

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

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

Figure 1 - Technical Area Location Plan

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

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

ENCLOSURE 12

Closure Plan

TA-16 Area P

CLOSURE PLAN FOR
TA 16-AREA P
LANDFILL

Facility ID No:		NM0890010515
Facility Name	:	Los Alamos National Laboratory
Legal Owner	:	United States Department of Energy
Address	:	Los Alamos Area Office
City, State	:	Los Alamos, New Mexico 87545
Phone	:	(505)667-5288

SEPTEMBER 1985

1.0 INTRODUCTION

Technical Area 16 Area P (TA 16-Area P) at the Los Alamos National Laboratory (LANL) has been used as an industrial landfill to dispose of residues resulting from burning high explosive (HE)-contaminated equipment and trash. The landfill is regulated under New Mexico Environmental Improvement Division's (NMEID) Hazardous Waste Management Regulations (HWMR) because residues containing barium in excess of EP toxicity limits (D005) have been placed in the landfill.

Area P is operated under a Resource Conservation and Recovery Act (RCRA) Part A Permit. A Part B Permit is not being sought and the landfill will be closed under interim authority.

The recognition that Area P was a regulated landfill occurred in September 1984, when six samples of the TA 16 thermal treatment residues showed that two samples exceeded the EP toxicity limit for barium. No further wastes have been placed in Area P since that time. As a result of late discovery of the regulatory status of the landfill, data needed to present a definitive closure plan is not available. The closure plan presented here defines the actions and time table for LANL to close Area P in compliance with HWMR 206.C.2. The actions described here are consistent with the November 1, 1984 letter from the Department of Energy (DOE) to the NMEID stating that characterization of Area P would be completed by September 1986.

2.0 TA 16-AREA P DESCRIPTION

TA 16-Area P is located in a saddle of a short eastern trending narrow mesa. The saddle is near the south rim of Canon De Valle, just north of the TA 16 thermal treatment area's pad number 387 (Figure 2-1). The landfill forms a shelf in the saddle and is roughly 20 feet deep at the north end thinning to the south. The general shape is a half ellipse roughly 120 feet in the north-south dimension and 400 feet in the east-west dimension. The estimated landfill volume based on coarse measurements is 13,000 cubic yards. The landfill was covered with top soil as the fill progressed. Most of the fill surface has revegetated itself with native grasses and weeds.

A preliminary geologic and hydrologic description of the site based on available literature and site observations can be found in Appendix A.

Major considerations in closing the site include the proximity of the Canon De Valle and the location of the Water Canyon fault east of Area P.

3.0 WASTE DESCRIPTION

TA 16-Area P is a regulated landfill because of the disposal of residues that exceed the EP toxicity limit for barium. HE-contaminated wastes are burned on sand covered pads at TA 16. The sand is removed after the burn and placed in the landfill. Six samples of pad sand, as well as filter vessel sand, were analyzed. Two of the samples, pad 388 and pad 399, exceeded the EP toxic limit for barium of 100 milligrams per liter (mg/l), with concentrations of 280 mg/l and 1450 mg/l respectively.

The source of barium in the residue is barium nitrate used in the formulation of some HE. The concentration in the pad sand varies with the barium nitrate concentration in the HE and the HE concentration in the waste.

There is no documentation of the types or quantity of wastes landfilled at Area P. The site was initially used in the early 1950's to dispose of equipment burned to decontaminate for HE and rubble from building demolition. Known wastes include concrete rubble, structural steel, burn pad sand, burned equipment and empty solvent cans.

The procedure for handling HE-contaminated equipment was to disassemble and clean to whatever degree possible. The equipment was then taken to the burn pad and burned along with other combustible materials needed to support the fire. After the burn, the equipment was inspected and certified to be free of HE.

Considering the hazard associated with HE, the burned equipment was buried at Area P, rather than salvaged or shipped to an off-site landfill, to protect the public in case any HE residue had not burned and was not found during the final inspection. Equipment buried at Area P includes several large items, including two trucks.

Empty solvent containers have been landfilled at Area P. A majority of these containers consists of quart metal cans. Larger containers, up to 55-gallon drums, have been landfilled. During a site inspection, an empty acetone and an empty methanol can were found in the landfill. Both acetone and methanol are regulated as ignitable wastes. A list of all solvents and chemicals used in container size portions in the area is being prepared to determine the types of containers that may be landfilled at Area P.

4.0 CLOSURE

Given the current knowledge of Area P, it is not possible to prepare a definitive closure plan. The plan presented here states the actions and timetable LANL will use to close Area P in compliance with HWMR 206.C.2.

4.1 Area Land Survey

LANL will conduct a land survey to accurately define the dimensions of the landfill. The new survey will be compared to the original surveys to prepare a three dimensional definition of the landfill.

4.2 Analytical Survey

Based on the land survey, LANL will design and conduct a site analytical study. The sampling program will produce a matrix of vertical and horizontal samples needed to define the nature and distribution of wastes in the landfill. Analytical scans will include, as a minimum, heavy metals, volatile organics, semi-volatile organics, nitrates, sulphides, cyanides, and soil pH. Sampling and analytical procedures will follow methods defined in Test Methods for Evaluating Solid Wastes, USEPA SW 846, most current edition. LANL may petition the NMEID to accept sampling methods outside of SW 846, because none of the approved methods address core sampling through rubble and large equipment pieces to a depth of 20 feet.

4.3 Geologic and Hydrologic Study

Concurrently with the analytical survey, LANL will conduct a geologic and hydrologic study to determine the nature of the site. The study will define the geologic features under the landfill, define the Water Canyon Fault, determine the occurrence of perched water, and define the site's relationship to the main aquifer. Work performed will include surface surveys and a coring program. Wells in the adjacent canyon will be drilled to determine the existance of perched water.

4.4 Engineering Study

Using the data previously collected, LANL will prepare an engineering study determining closure design and costs. The study will be conducted in two phases; the first phase will be a conceptual design of available methods that meet the regulatory requirements. LANL will prepare an engineering closure design and final cost estimate as the second phase.

4.5 Closure

The engineering design study results will be used to prepare and conduct a definitive closure plan. The closure plan and the engineering study report will be provided to the NMEID for review and approval before commencement of closure.

4.6 Information Transfer

LANL will transmit the results of all analyses, surveys, and studies to the NMEID within 30 days of completion of the individual study phase. Before initiation of each study or survey, LANL will contact NMEID to discuss the proposed work and ensure that the goals of studies reflect regulatory concerns.

The NMEID and LANL will coordinate in writing to the respective contact person(s) for organization of activies and communications between the parties under the plan. The parties will provide timely written notification of any changes in the designation of contact persons during the term of this plan. LANL will provide a minimum of ten days' advance notice to the NMEID, through the NMEID contact person(s), of any sampling or activities conducted under this closure plan.

4.8 Closure Certification

Upon completion of closure, the engineer and the DOE shall prepare a letter certifying that the has been closed in accordance with the plan. The letter shall be dated and signed by each party and stamped by the registered engineer, and the original copy submitted by the DOE to the Director of the NMEID. One copy shall be maintained at the DOE office and one copy maintained by the HSE-8 Regulatory Compliance Section.

4.9 Closure Schedule

LANL proposes to conduct the work stated here according to the following schedule:

ACTIVITY	TIME REQUIRED	ESTIMATED COMPLETION DATE
Conduct Land Survey and issue drawings	3 months (in progress)	October, 1985
Define Tasks and Contract for services as required	3 months	December, 1985
Conduct Site Analytical Sample and Analysis Survey	8 months	June, 1986
Conduct Site Geologic and Hydrologic Study	1 year (partially concurrent with above	September, 1986
Conduct Engineering Study	6 months	June, 1986
Prepare and Submit Definitive Closure Plan	1 month	July, 1986
Review and Approval by NMEID	3 months	October, 1986
Closure Activities	1.5 years	April, 1988

The total closure time, including site studies and engineering design, is 2 years and 5 months. Study activities will start in October, 1985, and terminate in April, 1988.

5.0 POST CLOSURE

Post closure activities cannot be defined until the final closure method is selected. Post closure activities will be defined in the closure document discussed in Section 4.5.

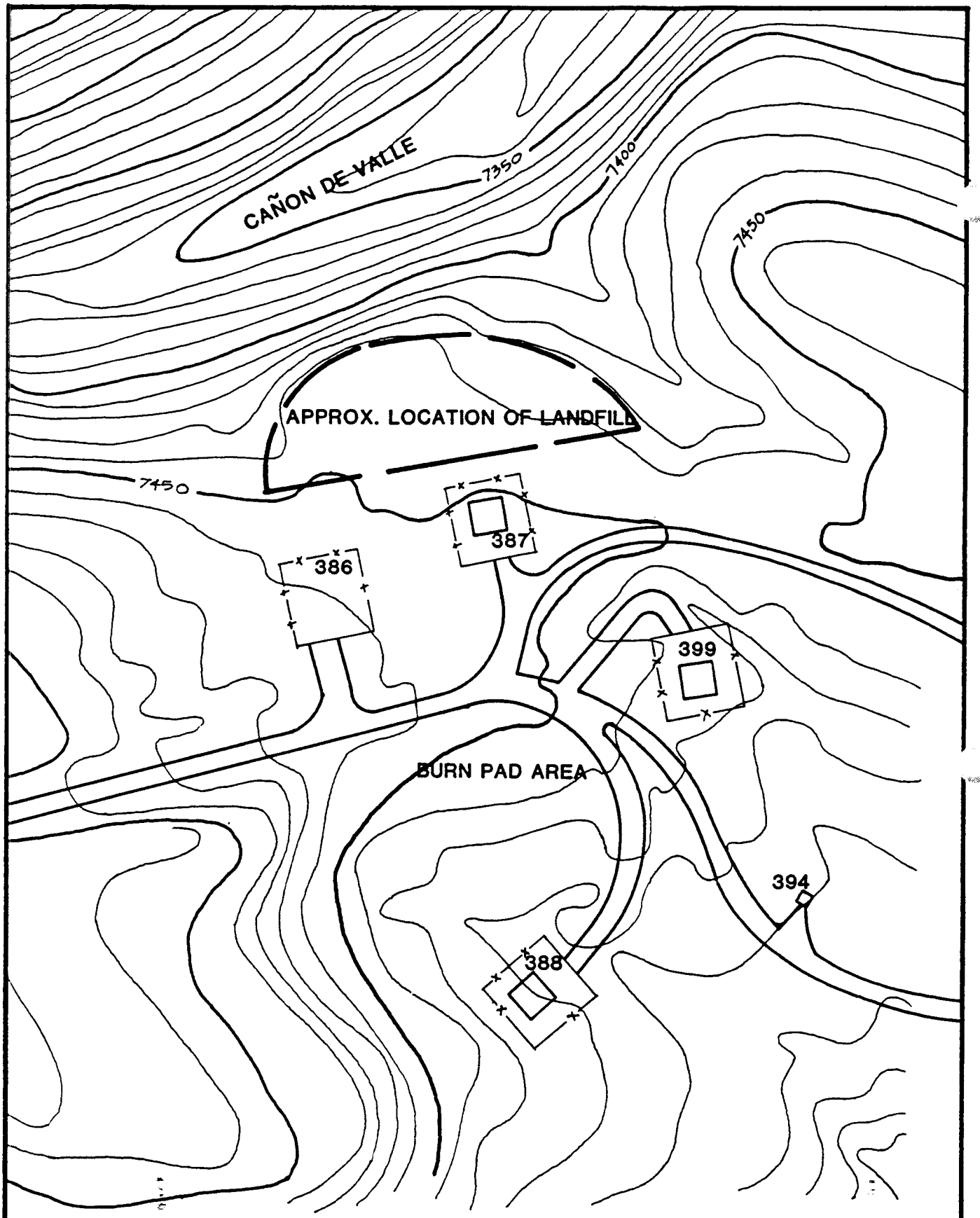

FIGURE 2-1

TA 16 AREA P
LANDFILL

APPENDIX A

PRELIMINARY REPORT

GEOLOGY AND HYDROLOGY OF

AREA P NEAR S-Site

PRELIMINARY DRAFT SUBJECT TO REVISION

ROUGH DRAFT

GEOLOGY AND HYDROLOGY OF AREA P NEAR S-SITE

I. INTRODUCTION

Area P (Industrial Landfill) is located on the western margin of the Pajarito Plateau within the boundaries of the Los Alamos National Laboratory. The Pajarito Plateau formed by a series of ashflows and ashfall tuffs forms an apron around the east flank of the Sierra de los Valles (Fig. 1). The surface of the plateau slopes gently eastward and terminates along Puye Escarpment and White Rock Canyon above the Rio Grande. The surface of the mesa has been dissected into a number of narrow mesa by southeast trenching streams.

II. GENERAL GEOLOGY

The Pajarito Plateau is structurally a part of the Rio Grande depression--a complex series of faulted troughs or basins that extend from southern Colorado along the Rio Grande to northern Mexico (Kelley 1952). The basement rock have been down fault in the depression to as much as 10,000 to 15,000 feet below sea level (Fig. 2). The depression is filled with sedimentation and volcanic rocks.

The rocks that outcrop along the edges of and form the surface of the Pajarito Plateau are from oldest to youngest: the Tesuque Formation, Puye Conglomerate, Basaltic Rocks of Chino Mesa, Tschicoma Formation, and Bandelier Tuff (Fig. 2). For a detailed description of these rock units, see Griggs (1964). The most important rock unit at Area P is the Bandelier Tuff.

The Bandelier Tuff forms the upper surface of the Pajarito Plateau. It is composed of a series of ashfalls and ashflows of rhyolite tuff. The three members of the

Bandelier area in ascending order are Guaje member; a lump pumice, the Otowi Member; a massive nonwelded to welded ashflow, and the Tshirege Member; a series of moderately welded to welded ashflows (Purtymun and Koopman 1965). The Tshirege Member forms the surface of the mesa at Area P.

The most prominent structural feature of the Pajarito Plateau is the Pajarito Fault Zone, which tends northward along the western edge of the plateau (Fig. 3). The fault is downthrown to the east and displaces rocks of the Bandelier Tuff, Puye Conglomerate and Tschicoma Formation (Fig. 2). The displacement is estimated at about 120 m (Budding 1976). Two smaller faults occur north and east of the Fault Zone (Fig. 3). They are the Los Alamos Fault (displacement 6 m) and the Guaje Mountain Fault (displacement 2.4 to 16 m). The Water Canyon Fault is the most important fault in this study as it occurs near Area P (see following section III).

III. LOCAL GEOLOGY

Area P (Industrial Landfill) lies near the western margin of the Pajarito Plateau in a saddle of a short eastern trending narrow mesa. A scarp due to the Water Canyon fault lies to the west of the landfill. To the north, the Canon de Valle has cut through the scarp and drains an area to the west on the flanks of the Sierra de los Valles. A small canyon has cut into the edge of the scarp to the south of the saddle. This south edge of the saddle slopes gently to the south. The explosive burning facility occupies the saddle and gently sloping part of the saddle to the south.

Area P (Landfill) occupies the northern part of the saddle that slopes gently to the north for about 400 feet and then becomes very steep as Canon de Valle has cut a deep

canyon into the Bandelier Tuff. To the east of Area P the saddle rises gently to the top of the narrow mesa that terminates about a mile to the east as Canon de Valle turns abruptly to the south (Fig. 4).

The Bandelier Tuff (Tshirege Member) forms the saddle and underlies the Explosive Burning Facility and part of the landfill. About 40 to 60 feet of tuff in the saddle appears to be a moderately welded tuff, while about 90 to 110 feet of welded tuff is exposed beneath the moderately welded tuff in the south wall of Canon de Valle.

A geologic section of thickness and average depths below the saddle are estimated from logs of Test Hole DT-5A and PM-2 and log of supply Well PM-2 (Purtymun 1968).

Geologic Unit	Thickness (ft)	Average Depth Below Land Surface to Top of Unit (ft)
Bandelier Tuff	800	0
Puye Conglomerate	500	800
Tschicoma Formation	1000	1300
Tesuque Formation and Earlier Volcanics and Sediments	2000	2300
Precambrian Rocks	--	4300

The Water Canyon fault lies about 2 miles east of the Pajarito Fault Zone (fig. 3). It is a normal fault with a displacement of about 9 m as measured between marker beds in the Bandelier tuff. The fault is downthrown to the east and is abut 2.5 to 3 miles long (Budding 1976).

The scarp formed west of Area P appears to be an erosional scarp. The Water Canyon fault lies east (Fig. 4). The outcrop of the upper units of the Bandelier Tuff on the north wall of Canon de Valle shows no breaks (bed dip to the west) northwest, north, and northeast of Area P. Several hundred yards east of Area P these beds are broken by the Water Canyon fault. East of fault the beds dip gently to the east.

The elevation of the saddle is about 7460 ft above sea level. The main aquifer (aquifer capable of municipal and industrial supply) lies at a depth of about 6230 feet or 1230 feet below the saddle in the Puye Conglomerate.

IV. LOCAL HYDROLOGY

Surface runoff from Area P is into Canon de Valle. Canon de Valle heads on the flanks of the Sierra de los Valles to the west and is tributary to a major intermittent stream in Water Canyon about 2 miles to the southeast. Water canyon is tributary to the Rio Grande about 6 miles to the east in White Rock Canyon.

The stream in Canon de Vale below Area P is probably intermittent due to small drainage areas on the flanks of the mountain. It contains some runoff from snowmelt in the spring and from occasional summer thundershowers. It contains some water used in cooling machining processes from facilities to the west. The volume of runoff appears small.

Canon de Valle is over 100 feet deep at saddle near Area P. The canyon is this area of the plateau contains only a thin section of alluvium (probably less than 10 feet thick), which could contain water from the stream perched on the underlying tuff. This is a common occurrence of water

in major stream channels that cross the plateau. In Water Canyon, about 2.5 miles to the southeast, water in shallow observation well fluctuates with t he amount of runoff in the intermittent stream. It is dry most of the time. In this area, a 200-foot deep/2 foot diameter well cased through the alluvium to shut out the water is completed in the tuff. This well has contained no water for the past 25 years.

Based on other test holes and supply wells, the plateau (Frijoles Mesa, Supply Wells PM-2, 3, 4, and 5) there is no known perched water beneath the alluvium in the stream channel and the top of the main aquifer.

The top of the main aquifer lies at a depth of about 1230 feet below the surface in rocks of the Puye Conglomerate at Area P. The main aquifer is recharged from precipitation on the mountain to the west, deep canyon cut into the mountains and from ground water in the Valles Caldera west of the Sierra de los Valles. The movement of water is from the recharge area eastward toward the Rio Grande where part of the water is discharged into the river through seeps and springs. The movement of water in the upper 500-feet of aquifer at Frijoles Mesa to the southwest has been calculated at about 345 feet per year, while to the east the movement in the upper 1740 feet of supply well is much less at 95 feet per year (Purtymun 1984). The movement of the water in the main aquifer is probably near a mean of the two rates at about 170 to 270 feet per year as the thick section of Tschicoma Formation within the main aquifer has a low permeability and tends to restrict the movement of water.

V. AREA P

The landfill at Area P is on the moderately welded tuff on the south wall of Canon de Valle. The moderately welded tuff slopes gently northward from the top of the saddle (divide between the two drainages) northward to the top of the welded tuff. The gentle slope becomes steep at the contact between the moderately welded tuff and the welded tuff that forms the lower wall of Canon de Valle.

The landfill is on the sloping bench of the moderately welded tuff. The landfill was built from west to east. To the west the landfill spills over the moderate tuff and extends to the bottom of the canyon. The waste overlies the welded tuff. To the north and east the landfill sets on the bench with the welded tuff exposed. It is quite evident that water infiltrating through the landfill is being discharged at the top of the dump in this area. The debris in the landfill is more permeable than the underlying moderately welded and welded tuff.

REFERENCES

Budding, A. J. and Purtymun, W. D., "Seismicity of the Los alamos Area Based on Geologic Data," Los Alamos Scientific Laboratory report LA-6278-MS (1976).

Griggs, R. L., "Geology and Ground-Water Resources of the Los Alamos Area, New Mexico," U.S. Geol. Survey Water Supply Paper 1753 (1964).

Kelley, V. C., "Tectonics of the Rio Grande Depression of Central New Mexico," in The Rio Grande Country, NM Geol. Soc Guidebook, 3rd Field Conference (1952).

Purtymun, W. D. and Koopman, F. C., "Physical Characteristics of the Tshirege member of the Bandelier Tuff

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Purtymun, W. D., "Geology of the Microseismograph Station at S-Site, Los Alamos County, New Mexico," U.S. Geol. Survey Admin report (1968).

Purtymun, W. D., "Hydrologic Characteristics of the Main Aquifer in the Los Alamos Area: Development of Water Supplies," Los Alamos National Laboratory report LA-9957-MS (1984).

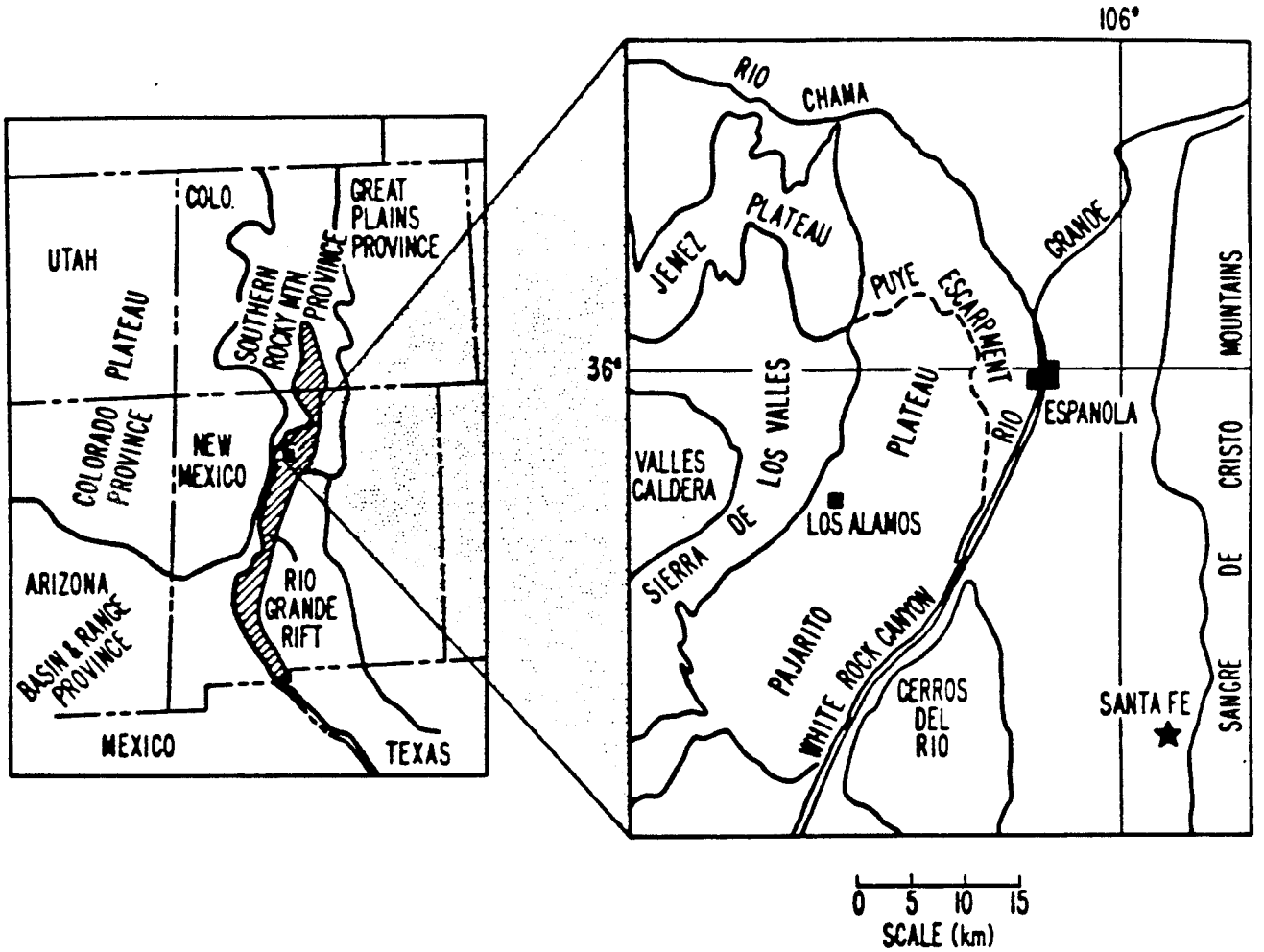


FIGURE 1

PHYSIOGRAPHICAL FEATURES OF THE LOS ALAMOS AREA

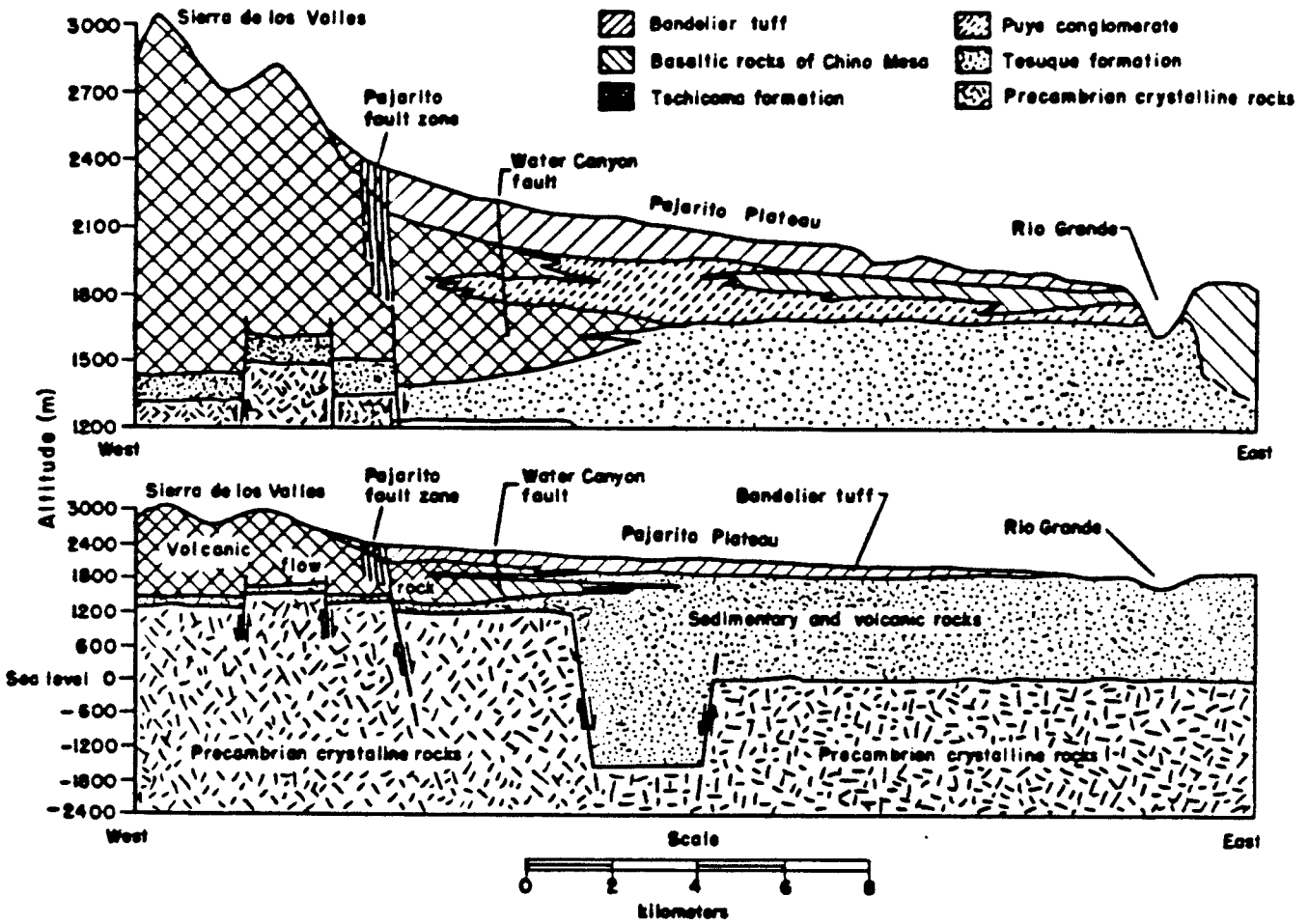


FIGURE 2

GEOLOGICAL CROSS-SECTION SHOWING STRATIGRAPHIC RELATIONSHIP OF GEOLOGIC UNITS

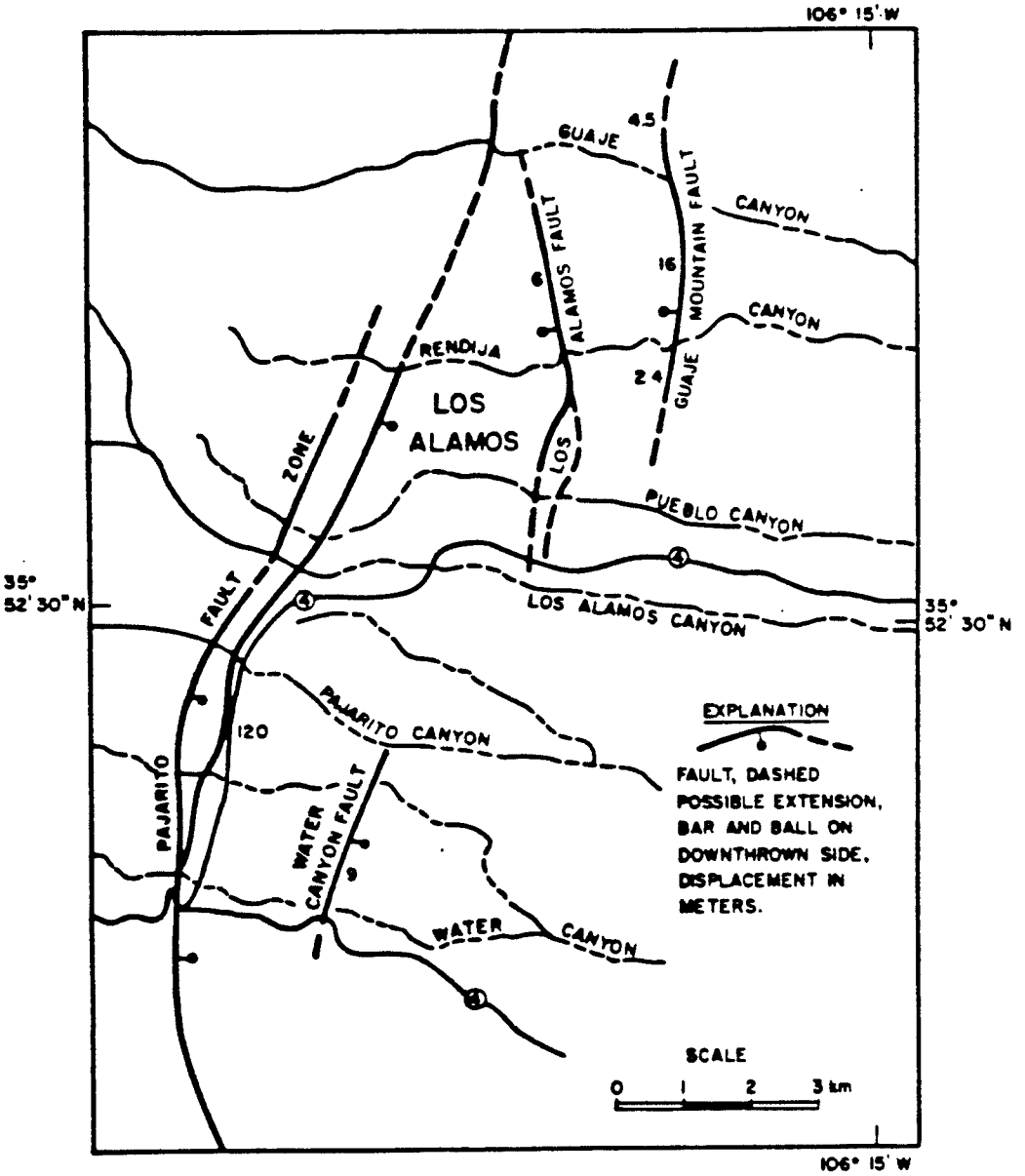
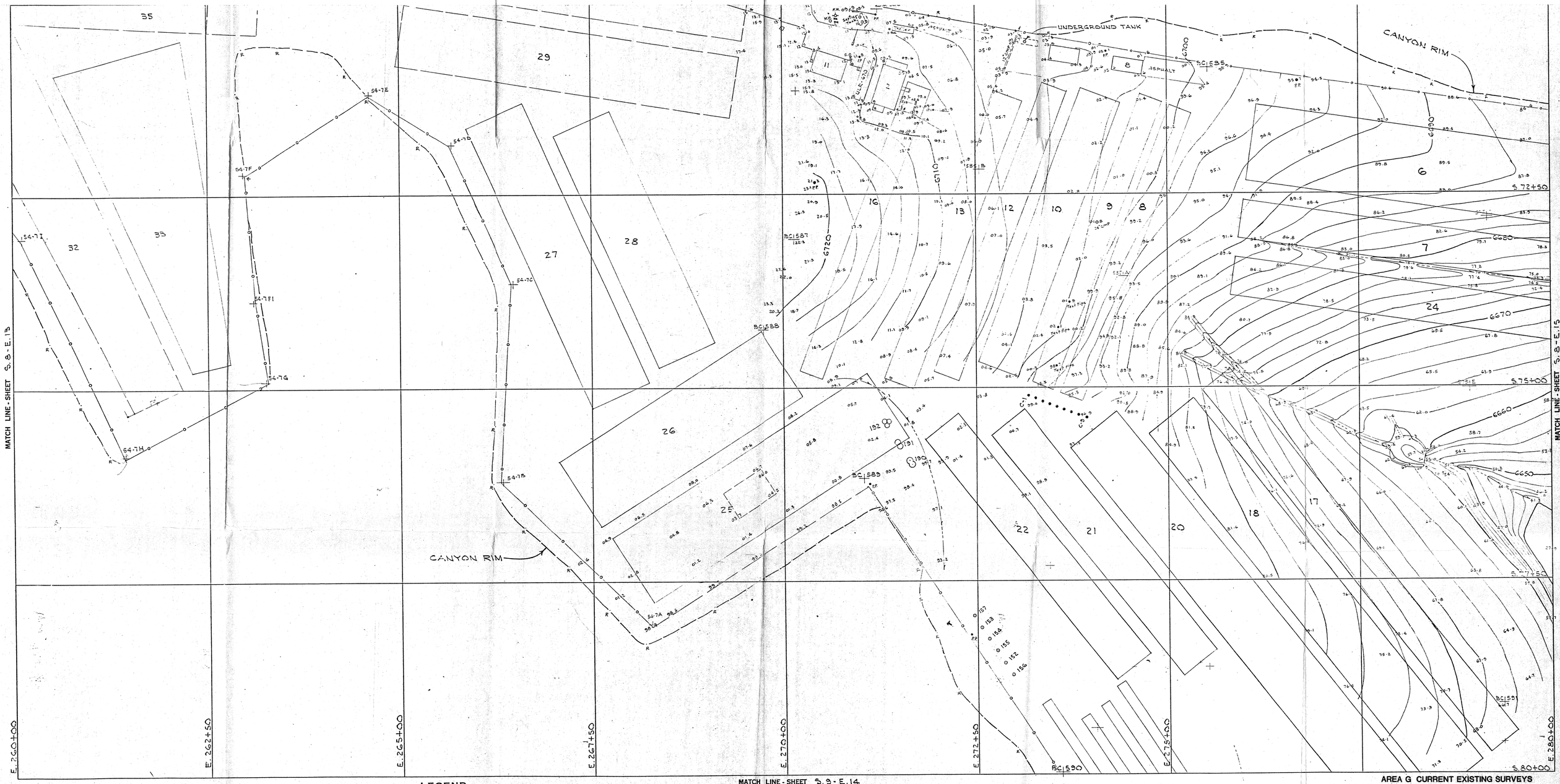


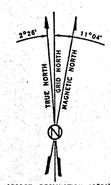
FIGURE 3

MAP SHOWING FAULTS IN THE LOS ALAMOS AREA



LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- GAS VALVE
- PRESSURE REGULATOR VALVE
- SANITARY SEWER MANHOLE
- SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- TELEPHONE POLE
- TELEPHONE MANHOLE
- WATER VALVE
- FIRE HYDRANT
- POST INDICATOR VALVE
- TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. / 1 - TRAVERSE NO. / A - POINT NO.
- BC 525 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 150 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



APPROX. DECLINATION 13°30'

SURVEYED	PLOTTED	CLASS REVIEW	REVIEWER	REMARKS	BY	CHKD	GRP. LDR.

AREA G CURRENT EXISTING SURVEYS

LOS ALAMOS NATIONAL LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

LAND SURVEYS

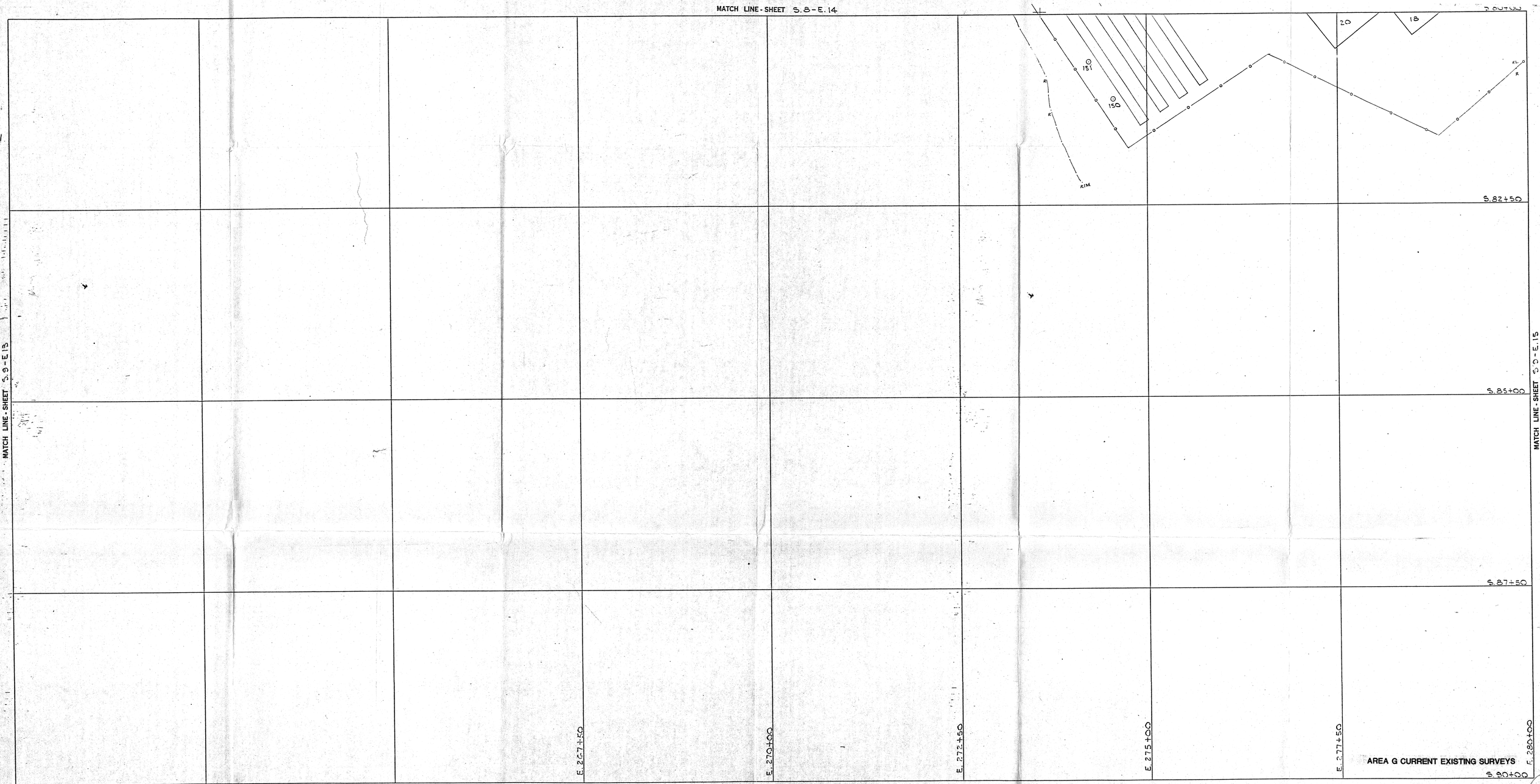
CONTOUR INTERVAL 2 FEET
SCALE: ONE INCH = 50 FEET
SHEET S.8 - E.14
DWG. CLASS REVIEWER DATE
CURRENT AS OF

14860-B

W/ contours

(A)

MATCH LINE - SHEET S.8-E.14



MATCH LINE - SHEET S.9-E.13

MATCH LINE - SHEET S.9-E.15

MATCH LINE - SHEET

LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
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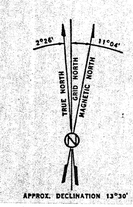
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- GAS VALVE
- PRESSURE REGULATOR VALVE
- SANITARY SEWER MANHOLE
- SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- TELEPHONE POLE
- TELEPHONE MANHOLE
- WATER VALVE
- FIRE HYDRANT
- POST INDICATOR VALVE
- TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. / 1 - TRAVERSE NO. / A - POINT NO.
- BC | 525 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 150 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



SURVEYED	PLOTTED	CLASS. REVIEW	REVIEWER	REMARKS	BY	CHKD	GRP. LDR.

LOS ALAMOS NATIONAL LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

LAND SURVEYS

CONTOUR INTERVAL ____ FEET
SCALE: ONE INCH = 50 FEET
SHEET S.9-E.14
DWG.CLASS REVIEWER DATE
CURRENT AS OF

14860-B

MATCH LINE - SHEET

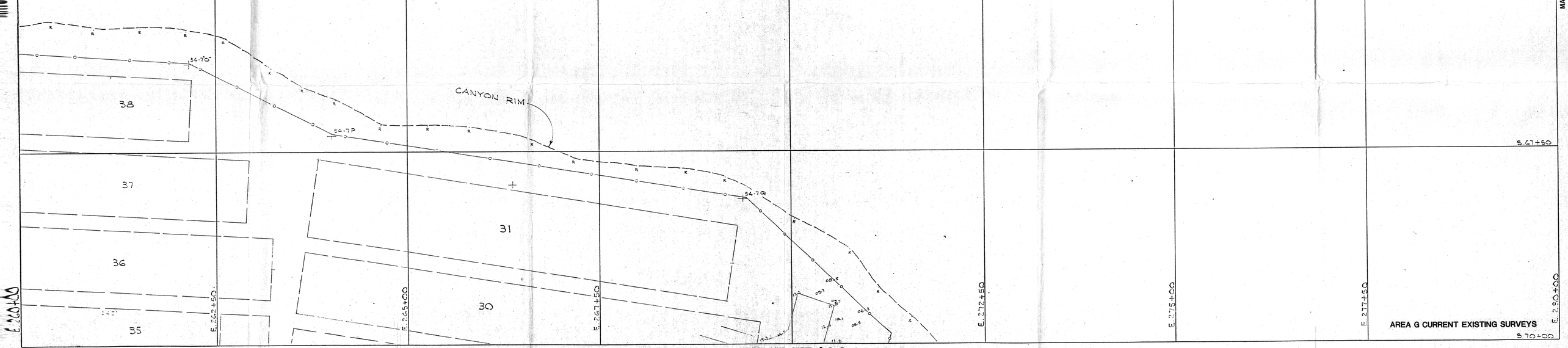
S.60+00

S.62+50

S.65+00

S.67+50

S.70+00

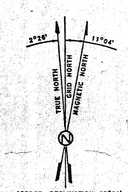


MATCH LINE - SHEET S.8 - E.14

MATCH LINE - SHEET

LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- GAS VALVE
- PRESSURE REGULATOR VALVE
- SANITARY SEWER MANHOLE
- SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- TELEPHONE POLE
- TELEPHONE MANHOLE
- WATER VALVE
- FIRE HYDRANT
- POST INDICATOR VALVE
- TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. / 1 - TRAVERSE NO. / A - POINT NO.
- BC | 525 — BRASS CAP NO. AND ELEVATION
- 7515 | 30 — (PERMANENT LASL SURVEY MARKER)
- LA 150 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



APPROX. DECLINATION 13°30'

SURVEYED	PLOTTED	CLASS REVIEW	REVIEWER	REMARKS	BY	CHKD	GRP. LDR.

LOS ALAMOS NATIONAL LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

LAND SURVEYS

CONTOUR INTERVAL ____ FEET

SCALE: ONE INCH = 50 FEET

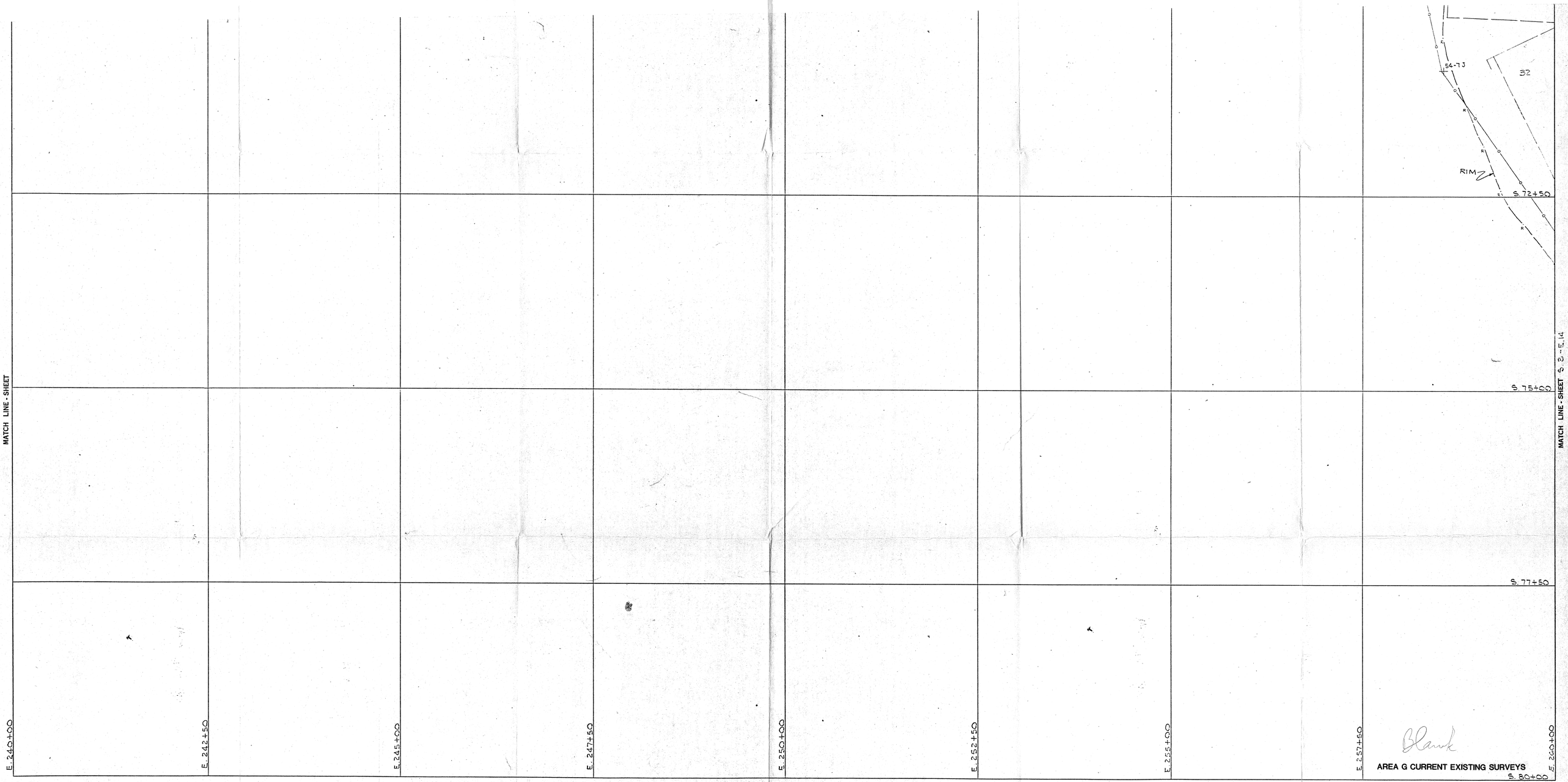
SHEET S.7 - E.14

DWG. CLASS REVIEWER DATE

CURRENT AS OF

14860-B

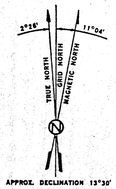
MATCH LINE - SHEET



MATCH LINE - SHEET

LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- GAS VALVE
- PRESSURE REGULATOR VALVE
- SANITARY SEWER MANHOLE
- SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- TELEPHONE POLE
- TELEPHONE MANHOLE
- WATER VALVE
- FIRE HYDRANT
- POST INDICATOR VALVE
- TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO.; 1 - TRAVERSE NO.; A - POINT NO.
- BC | 525 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 1503 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



APPROX. DECLINATION 13°30'

SURVEYED	PLOTTED	CLASS REVIEW	REVIEWER	REMARKS	BY	CHKD	GRP. LDR.

LOS ALAMOS NATIONAL LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

LAND SURVEYS

CONTOUR INTERVAL _____ FEET
SCALE: ONE INCH = 50 FEET
SHEET S.8-E.12
DWG. CLASS REVIEWER DATE
CURRENT AS OF

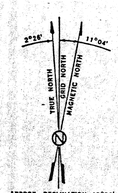
14860-B

MATCH LINE - SHEET

MATCH LINE - SHEET

LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- 2.59 POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- GAS VALVE
- PRESSURE REGULATOR VALVE
- SANITARY SEWER MANHOLE
- SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- TELEPHONE POLE
- TELEPHONE MANHOLE
- WATER VALVE
- FIRE HYDRANT
- POST INDICATOR VALVE
- 3 | 1-A TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. / 1 - TRAVERSE NO. / A - POINT NO.
- BC | 525 BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 150 INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



SURVEYED	PLOTTED	CLASS REVIEW	REVIEWER	REMARKS	BY	CHKD	GRP. LDR.

LOS ALAMOS NATIONAL LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA – LOS ALAMOS, NEW MEXICO

LAND SURVEYS

CONTOUR INTERVAL 2 FEET		SHEET
SCALE: ONE INCH = 50 FEET		S. 8 - E. 15
DWG. CLASS	REVIEWER	DATE
CURRENT AS OF	14860-B	

MATCH LINE - SHEET

S.62+50

S.65+00

Septic Tank Vent

54.7N

38

S.67+50

37

54.7M

CANYON RIM

36

54.7L

54.7K

E. 240+00

E. 242+50

E. 245+00

E. 247+50

E. 250+00

E. 252+50

E. 255+00

E. 257+50

E. 260+00

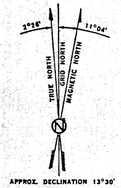
S.70+00

MATCH LINE - SHEET S.7 - E.14

MATCH LINE - SHEET S.8 - E.13

LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- G.V. — GAS VALVE
- P.R.V. — PRESSURE REGULATOR VALVE
- S.M.H. — SANITARY SEWER MANHOLE
- S.D. — SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- T.P. — TELEPHONE POLE
- T.M.H. — TELEPHONE MANHOLE
- W.V. — WATER VALVE
- F.H. — FIRE HYDRANT
- F.I.V. — POST INDICATOR VALVE
- 3 | 1-A | 7525/36 — TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. / 1 - TRAVERSE NO. / A - POINT NO.
- BC | 525 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 1503 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



APPROX. DECLINATION 13°30'

SURVEYED	PLOTTED	CLASS REVIEW	REVIEWER	REMARKS	BY	CHKD	GRP. LDR.

AREA G CURRENT EXISTING SURVEYS

LOS ALAMOS NATIONAL LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA – LOS ALAMOS, NEW MEXICO

LAND SURVEYS

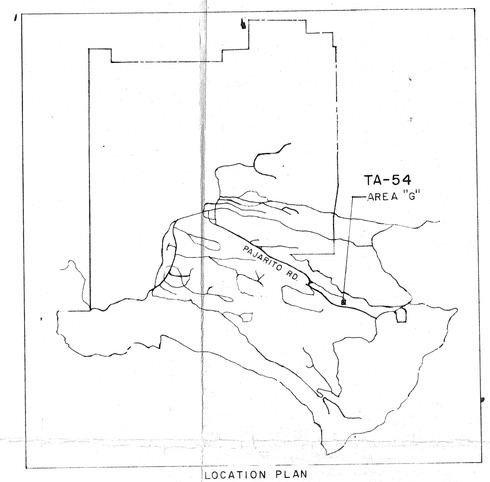
CONTOUR INTERVAL ____ FEET
SCALE: ONE INCH = 50 FEET
SHEET S.7 - E.13
DWG.CLASS REVIEWER DATE
CURRENT AS OF

14860-B

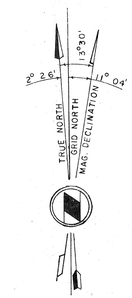
LEGEND

PIT EXCAVATED

PIT UNEXCAVATED



LOCATION PLAN



NOTE
FOR ADDITIONAL PIT INFORMATION
SEE DRAWING'S ENG-R-5005 THRU
ENG-R-5079 AND ENG. R-4464

200 100 0 200 400
SCALE
1" = 200'
1:2400

NO.	DATE	CLASS. REVIEW	REVISIONS	BY	CHKD.	GRP.	D.O.	GRP. LDR.	ENGR. D.O.
5	8-83		REVISED TO STATUS AS OF						
4	1-83	✓	REVISED TO STATUS AS OF 1-17-83	T.R.	✓				
3	7-81		ADDED SHEET 4	T.R.					
2	10-79	✓	REVISED TO STATUS AS OF 10-12-79	B.T.					
1	12-78	✓	REVISED TO STATUS AS OF 12-14-78	B.T.					

THIS JOB MUST BE INSPECTED AND ANY CHANGES APPROVED BY ENG-4 PHONE

LOS ALAMOS SCIENTIFIC LABORATORY

ENGINEERING DEPARTMENT

UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

DWG. CLASSIFICATION: U TITLE:

AUTHORIZED FOR
SECURITY
SAFETY
HEALTH

DIVISION
GROUP

MATERIALS DISPOSAL AREAS

FIGURE 2-1 AREA "G" PLOT PLAN

MESITA DEL BUEY TA-54

SUBMITTED	APPROVED	APPROVED
PROJ. ENGR.	ENGR. GROUP LEADER	ENGR. DEPT. OFFICE

CHECKED R.A. CA BA DATE 7-27-77 SHEET 1 OF 4

DESIGNED M.D.S.-H.A.H. LAB JOB NUMBER 1757 DRAWING NO. ENG-R-4463

DRAWN B. TRUJILLO

E-3

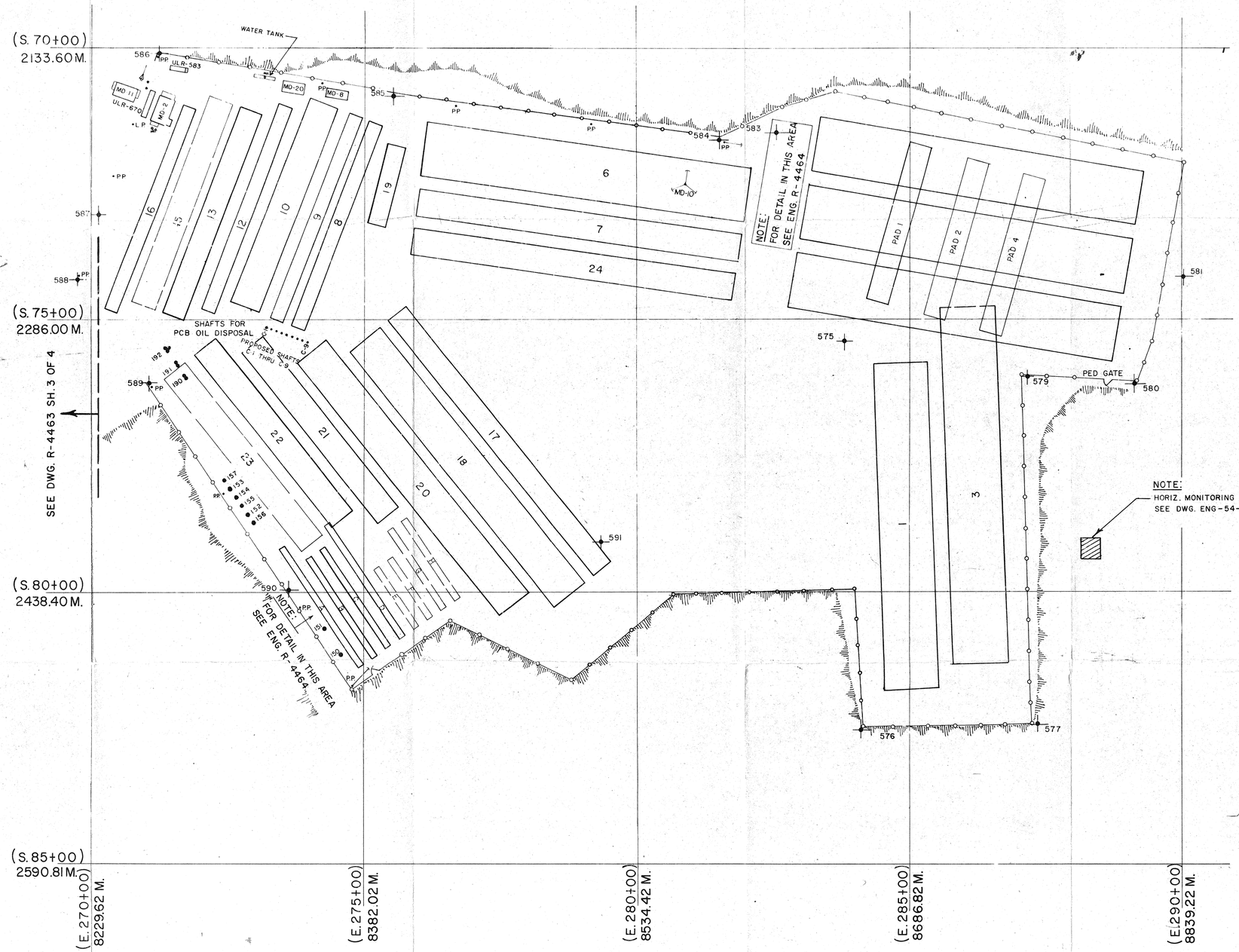
14860-C

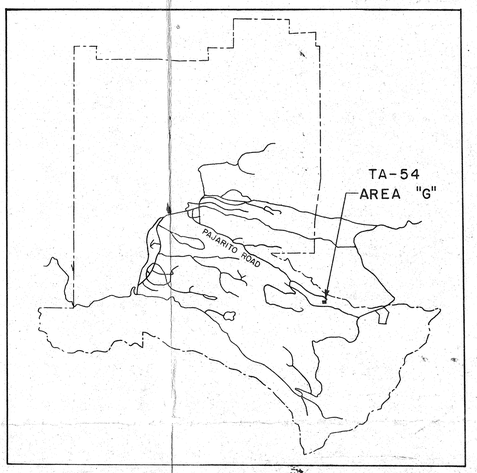
PIT NO.	CENTERLINE COORD. SOUTH	CENTERLINE COORD. EAST
1	75+79 2310.08 M.	284+86 8682.55 M.
	81+79 2492.96 M.	285+06 8688.65 M.
2	71+74 2186.64 M.	283+29 8634.70 M.
	72+75 2217.42 M.	289+21 8815.14 M.
3	81+32 2475.64 M.	286+31 8726.75 M.
	74+78 2279.30 M.	286+07 8719.43 M.
4	72+97 2224.12 M.	283+08 8628.30 M.
	73+99 2255.22 M.	289+00 8808.74 M.
5	74+20 2261.62 M.	282+87 8621.89 M.
	75+22 2292.71 M.	288+78 8802.03 M.
6	72+69 2215.60 M.	282+04 8596.60 M.
	71+84 2189.69 M.	276+10 8415.54 M.
7	72+83 2219.86 M.	275+96 8411.28 M.
	73+68 2245.77 M.	281+90 8592.33 M.
8	75+13 2289.97 M.	273+74 8343.61 M.
	71+39 2175.97 M.	275+17 8387.20 M.
9	71+25 2171.70 M.	274+80 8375.92 M.
	74+99 2285.70 M.	273+37 8332.33 M.
12	74+85 2281.43 M.	272+11 8293.93 M.
	71+11 2167.44 M.	273+54 8337.52 M.
16	74+83 2280.82 M.	270+36 8240.59 M.
	71+09 2166.83 M.	271+79 8284.18 M.
17	79+59 2425.91 M.	279+36 8514.91 M.
	74+90 2282.96 M.	275+62 8400.91 M.
21	75+44 2299.42 M.	272+91 8318.31 M.
	78+57 2394.82 M.	275+40 8394.21 M.
24	73+57 2242.42 M.	275+85 8407.92 M.
	74+42 2268.33 M.	281+79 8588.98 M.
20	75+53 2302.15 M.	274+02 8352.13 M.
	80+23 2445.41 M.	277+76 8466.12 M.
22	75+56 2303.07 M.	272+04 8291.78 M.
	78+69 2398.47 M.	274+54 8367.58 M.
18	80+05 2439.93 M.	278+77 8496.93 M.
	75+36 2296.97 M.	275+03 8504.83 M.

BRASS CAP	CENTERLINE COORD. South	CENTERLINE COORD. East
575	75+41.51 2298.657 M.	283+79.01 8649.939 M.
576	82+55.41 2516.254 M.	284+11.95 8659.979 M.
577	82+44.59 2512.956 M.	287+34.19 8758.198 M.
579	76+04.84 2317.960 M.	287+15.92 8752.630 M.
580	76+18.50 2322.123 M.	289+17.55 8814.086 M.

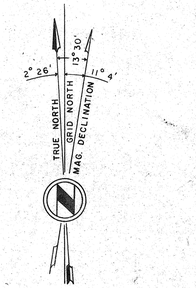
BRASS CAP	CENTERLINE COORD. South	CENTERLINE COORD. East
581	74+21.25 2262.001 M.	290+02.38 8839.943 M.
583	71+55.24 2180.921 M.	282+55.97 8612.437 M.
584	71+70.43 2185.551 M.	281+52.62 8580.936 M.
585	70+86.63 2160.009 M.	275+53.94 8398.457 M.
586	70+10.28 2136.738 M.	271+23.51 8267.262 M.

BRASS CAP	CENTERLINE COORD. South	CENTERLINE COORD. East
587	73+07.15 2227.224 M.	270+14.62 8234.072 M.
588	74+24.63 2263.032 M.	269+73.02 8221.393 M.
589	76+17.09 2321.694 M.	271+02.92 8260.986 M.
590	79+97.44 2437.625 M.	273+59.05 8339.055 M.
591	79+09.80 2410.912 M.	279+35.97 8514.900 M.





LOCATION PLAN



100 50 0 100 200

SCALE
1" = 100
1 : 1200

NOTE:
SEE ENG. C-42867 FOR ELEC. AND TEL. SERVICE.

LEGEND

PIT EXCAVATED

PIT UNEXCAVATED

NO.	DATE	CLASS. REVIEW	REVISIONS	BY	CHKD.	GRP.	D.O.	GRP. LDR.	ENGR D.O.
9	3-28-83		ADDED SHAFTS 154 AND 155	T.R.					
8	1-17-83		REVISED TO STATUS AS OF JANUARY 1983	B.T.					
7	7-81		ADDED SHEET 4	T.R.					
6	12-79		ADDED SHAFTS	B.T.					
5	6-79		REVISED TO STATUS AS OF 6-27-79	B.T.					
4	12-78		REVISED TO STATUS AS OF 12-14-78	B.T.					
3	7-77		REVISED TO STATUS AS OF 7-77	B.T.					
2	10-8-76		REVISED TO STATUS AS OF 10-8-76	T.R.					
1	1-28-76		REVISED TO STATUS AS OF 1-28-76	R.A.					

THIS JOB MUST BE INSPECTED AND ANY CHANGES APPROVED BY ENG-4 PHONE

LOS ALAMOS SCIENTIFIC LABORATORY

ENGINEERING DEPARTMENT

UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

DWG. CLASSIFICATION: TITLE:

AUTHORIZED FOR

SECURITY

SAFETY

HEALTH

DIVISION

GROUP

E-3

MATERIALS DISPOSAL AREAS

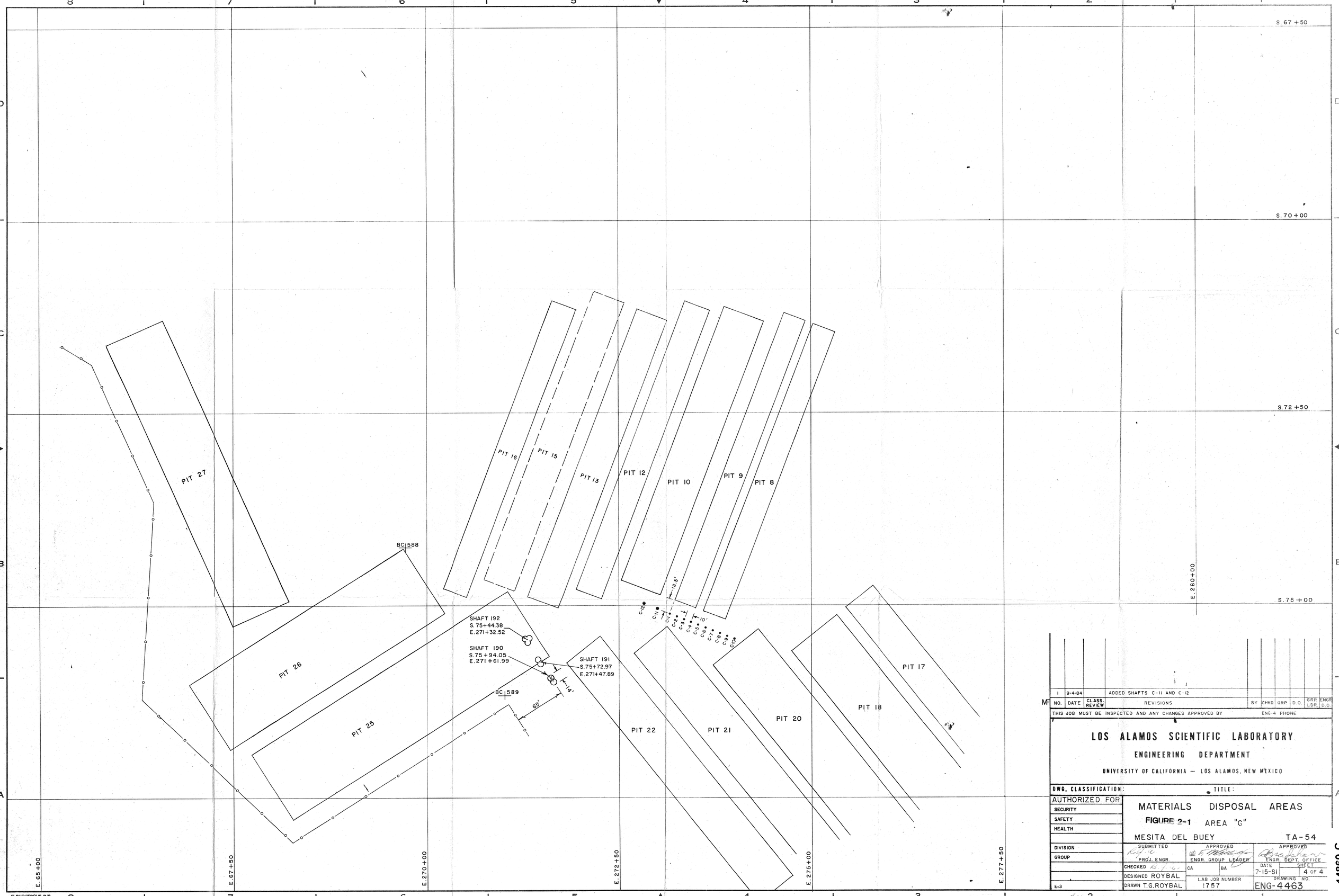
FIGURE 2-1 AREA "G"

MESITA DEL BUEY TA-54

SUBMITTED	APPROVED	APPROVED
PROJ. ENGR.	ENGR. GROUP LEADER	ENGR. DEPT OFFICE
CHECKED R. J. A.	CA / BA	DATE 6-4-74 / SHEET 2 OF 4
DESIGNED H. A. H.	LAB JOB NUMBER 1757	DRAWING NO. ENG- R-4463
DRAWN ALARID		

14860-C

ALBUQUERQUE B/P 17-0253 6-72 313114



NO.	DATE	CLASS. REVIEW	REVISIONS	BY	CHKD	GRP	D.O.	GRP. LDR.	ENGR D.O.
1	9-4-84		ADDED SHAFTS C-11 AND C-12						

MF

THIS JOB MUST BE INSPECTED AND ANY CHANGES APPROVED BY ENG-4 PHONE

LOS ALAMOS SCIENTIFIC LABORATORY

ENGINEERING DEPARTMENT

UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

DWG. CLASSIFICATION:

TITLE:

AUTHORIZED FOR
SECURITY
SAFETY
HEALTH

MATERIALS DISPOSAL AREAS

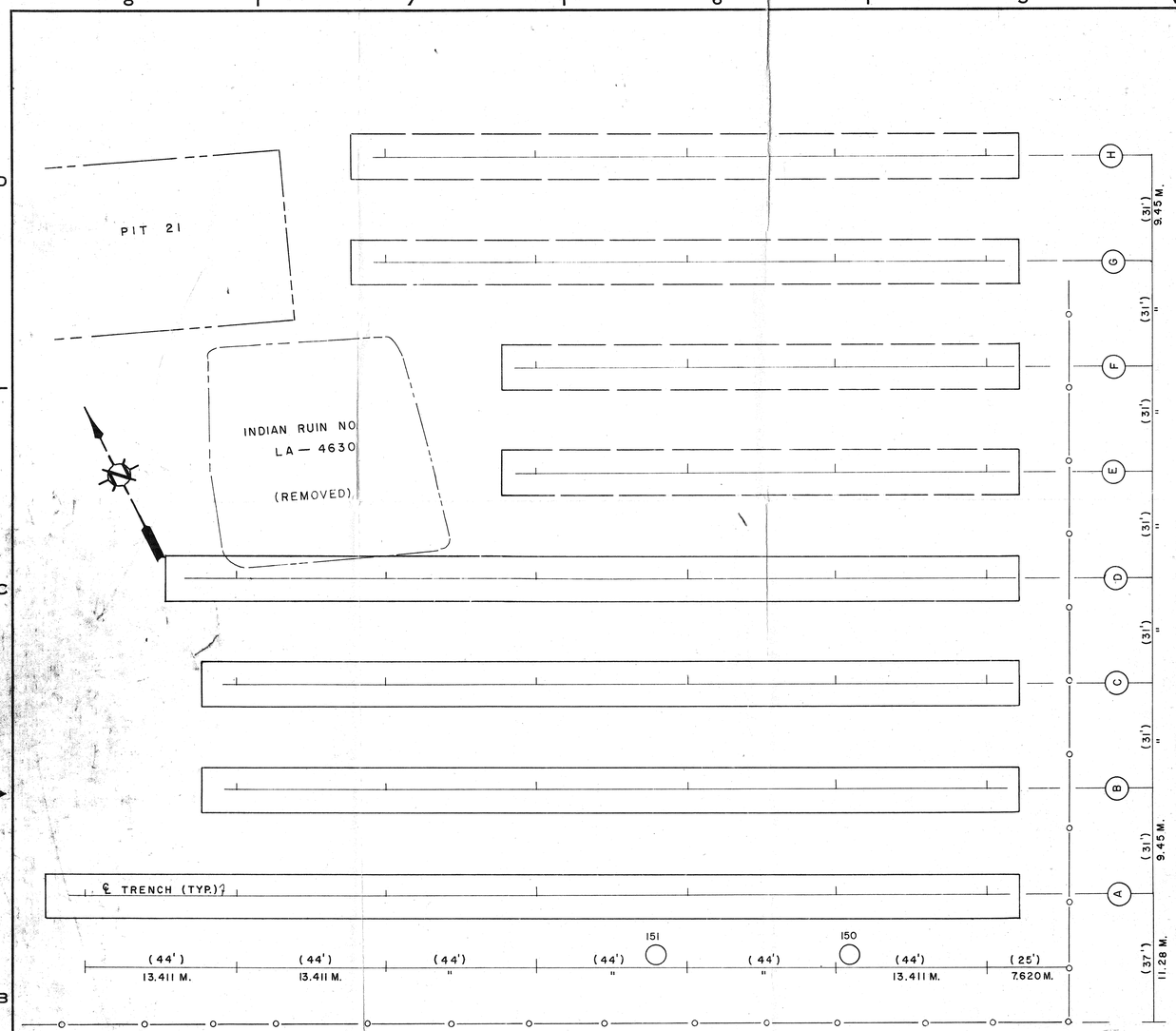
FIGURE 2-1 AREA "G"

MESITA DEL BUEY TA-54

DIVISION	SUBMITTED	APPROVED		APPROVED
GROUP	PROJ. ENGR.	ENGR. GROUP LEADER		ENGR. DEPT. OFFICE
	CHECKED	CA	BA	DATE 7-15-81 / SHEET 4 OF 4
	DESIGNED ROYBAL	LAB JOB NUMBER 1757		DRAWING NO. ENG-4463
E-3	DRAWN T.G. ROYBAL			

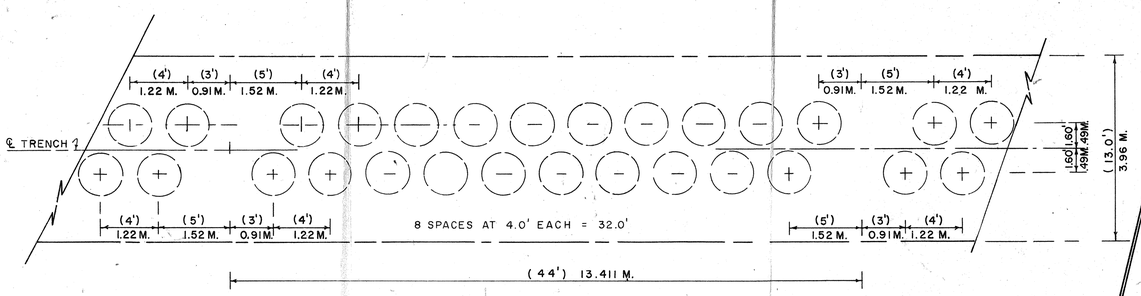
14860-C

ALBUQUERQUE B/P 17 0283 9-75 MC 1421*



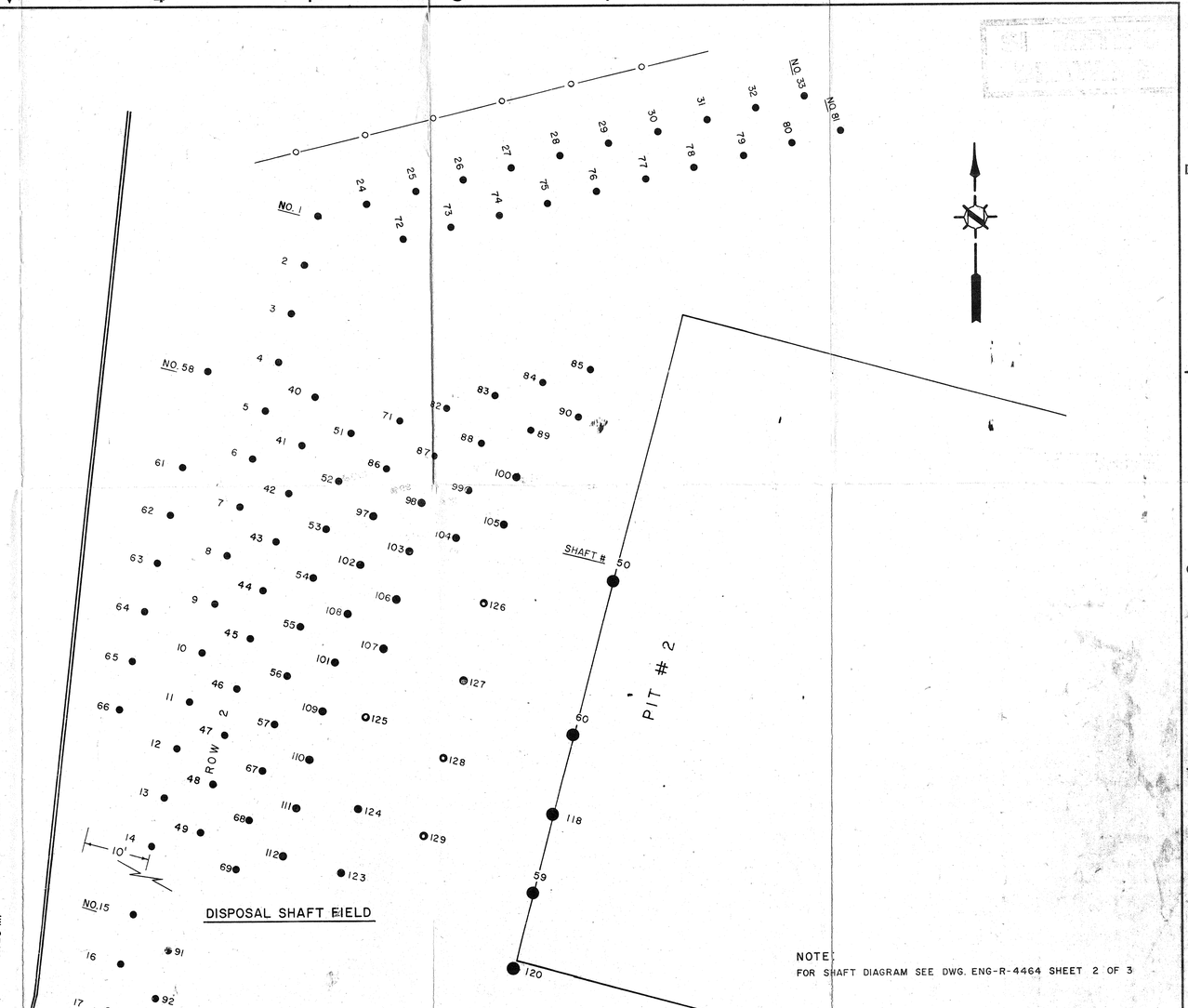
WASTE STORAGE AREA LAYOUT PLAN

SCALE 1" = 20' 1:240'



PLAN-CASK LAYOUT DETAIL (TYPICAL)

SCALE 1" = 5' 1:60



NOTE:
FOR SHAFT DIAGRAM SEE DWG. ENG-R-4464 SHEET 2 OF 3

NO.	DATE	CLASS. REVIEW	REVISIONS	BY	CHKD.	GRP.	D.O.	GRP. ENGR. LDR.	D.O.
9	9-4-84		ADDED SHAFTS 121 THRU 129	T.R.					
8	1-17-83	U Fraum	REVISED TO STATUS AS OF JANUARY 1983	B.T.	RCA			RF	
MF 7	10-26-8	U RRK	CORRECTED SHAFTS 101, 106, 107 AND 108 ADDED SHAFTS 114 AND 115	B.T.	RCA			RRK	
6	2-22-80	U RRK	REVISED TO STATUS AS OF 2-22-80	B.T.				RRK	
MF 5	12-5-78	U RRK	ADDED SHAFTS 97 THRU 112, REVISED PIT D	B.T.	RCA			RRK	
MF 4	2-8-78	J Rowe	REMOVED SHAFT DETAIL	T.R.	HHH			RFS	
3	10-12-76	U Rowe	REVISED TO STATUS AS OF 10-12-76	T.R.	HHH			DWR	DWR
2	1-27-76	U Rowe	REVISED TO STATUS AS OF 1-27-76	R.A.	HHH			DWR	DWR
1	9-9-74	J Rowe	ADDED TYPICAL SHAFT DETAIL AND CORRECTED SHAFT NUMBER 36 TO 39.	R.A.	HHH			DWR	DWR

THIS JOB MUST BE INSPECTED AND ANY CHANGES APPROVED BY ENG-4 PHONE

LOS ALAMOS SCIENTIFIC LABORATORY

ENGINEERING DEPARTMENT

UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

DWG. CLASSIFICATION: U MD Kell TITLE: U

AUTHORIZED FOR
SECURITY
SAFETY
HEALTH
DIVISION
GROUP

MATERIALS DISPOSAL AREAS

FIGURE 2-1 AREA "G"

MESITA DEL BUEY TA-54

SUBMITTED	APPROVED	APPROVED
PROJ. ENGR.	ENGR. GROUP LEADER	ENGR. DEPT. OFFICE
CHECKED R.J.A.	CA	DATE 6-4-74 SHEET 1 OF 1
DESIGNED H.A.H.	LAB JOB NUMBER 1757	DRAWING NO. ENG-R-4464
DRAWN ALARID		

E-3

14860-C

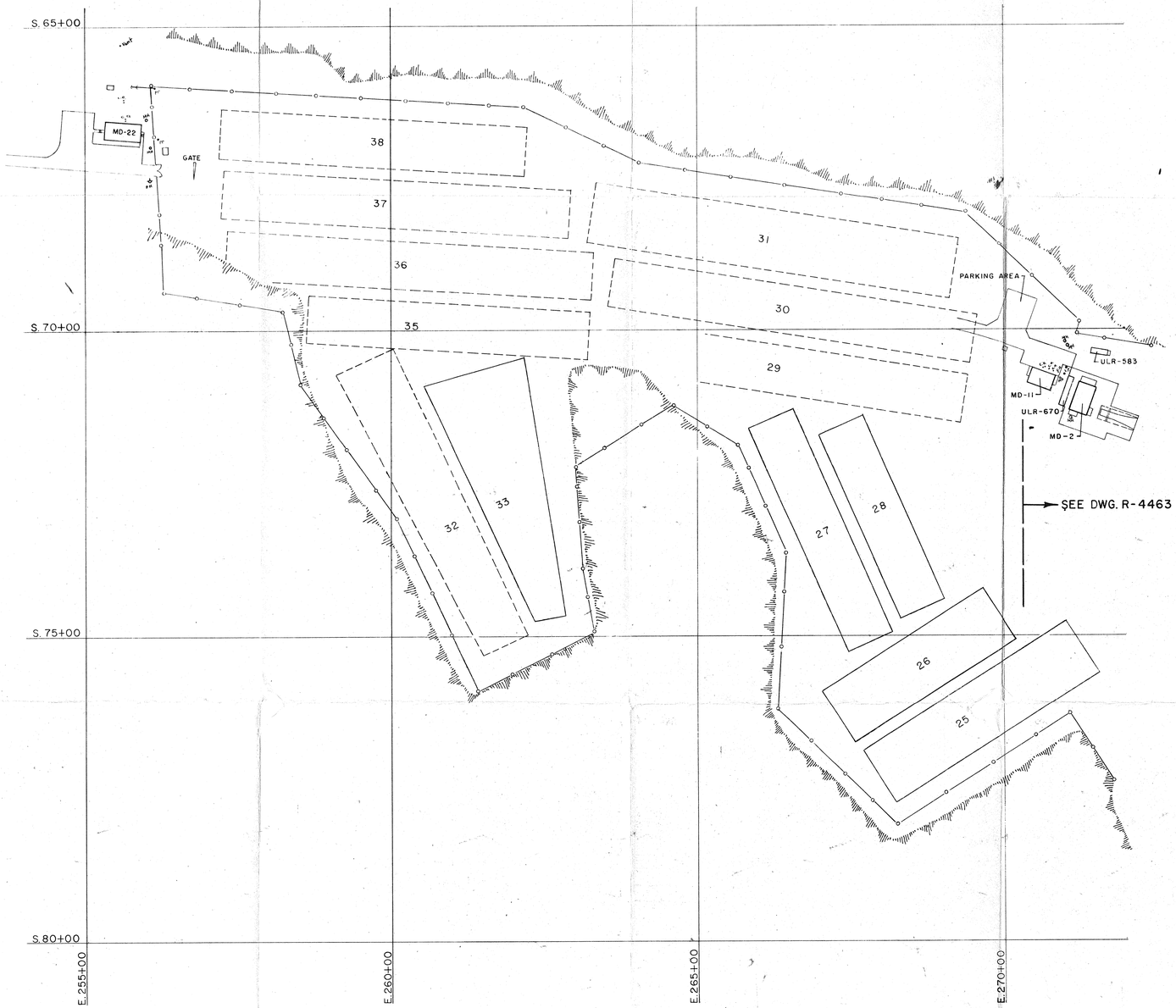
ALBUQUERQUE B/P 17 0253 9-73 MC 1421

CENTERLINE COORDINATES

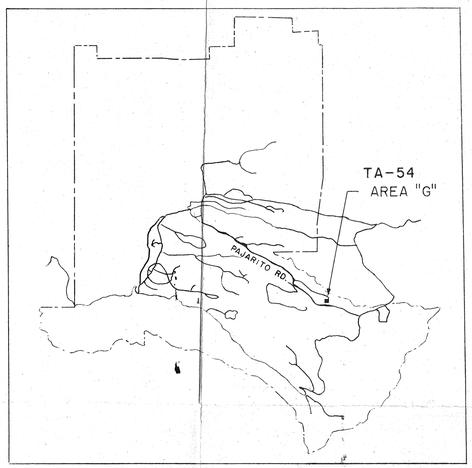
PIT NO.	SOUTH	EAST
25	75+23.27	271+33.71
	77+35.50	268+00.56
26	74+67.73	269+97.54
	76+35.90	267+33.56
27	71+44.89	266+22.61
	75+10.21	267+85.52
28	71+56.22	267+37.16
	74+57.61	268+71.56
29		
30		
31		
32		
33	70+68.88	261+33.28
	74+72.15	262+54.10
34		
35		
36		
37		
38		

GENERAL NOTES:

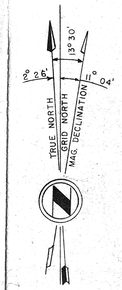
1. PITS WILL BE DUG A MINIMUM OF 50' FROM CANYON EDGE, A MINIMUM OF 20' FROM FENCE, 30' PREFERRED.
2. PITS WILL BE SPACED A MINIMUM OF 15' FROM EACH OTHER, PREFER 20' WHERE POSSIBLE.
3. SOME PITS WILL HAVE ONE RAMP ONLY ON A 4:1 SLOPE.
4. CLEARING WILL BE DONE ONLY OVER PIT AREAS.
5. TOPSOIL WILL BE STOCKPILED FOR LATER USE.



LEGEND
——— PIT EXCAVATED
- - - - - PIT UNEXCATED



LOCATION PLAN



100 50 0 100 200

SCALE
1"=100'
1:1200

NO.	DATE	CLASS. REVIEW	REVISIONS	BY	CHKD.	GRP.	D.O.	GRP. LDR.	ENGR. D.O.
5	8-83		REVISED TO STATUS AS OF						
4	1-83		REVISED TO STATUS AS OF 1-17-83	T.R.					
3	7-81		ADDED SHEET 4	T.R.					
2	10-79		REVISED TO STATUS AS OF 10-12-79	B.T.					
1	6-79		REVISED TO STATUS AS OF 6-27-79	B.T.					

THIS JOB MUST BE INSPECTED AND ANY CHANGES APPROVED BY ENG-4 PHONE

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UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

DWG. CLASSIFICATION: U TITLE:

AUTHORIZED FOR
SECURITY
SAFETY
HEALTH
DIVISION
GROUP

MATERIALS DISPOSAL AREAS

FIGURE 2-1 AREA "G" PIT EXPANSION

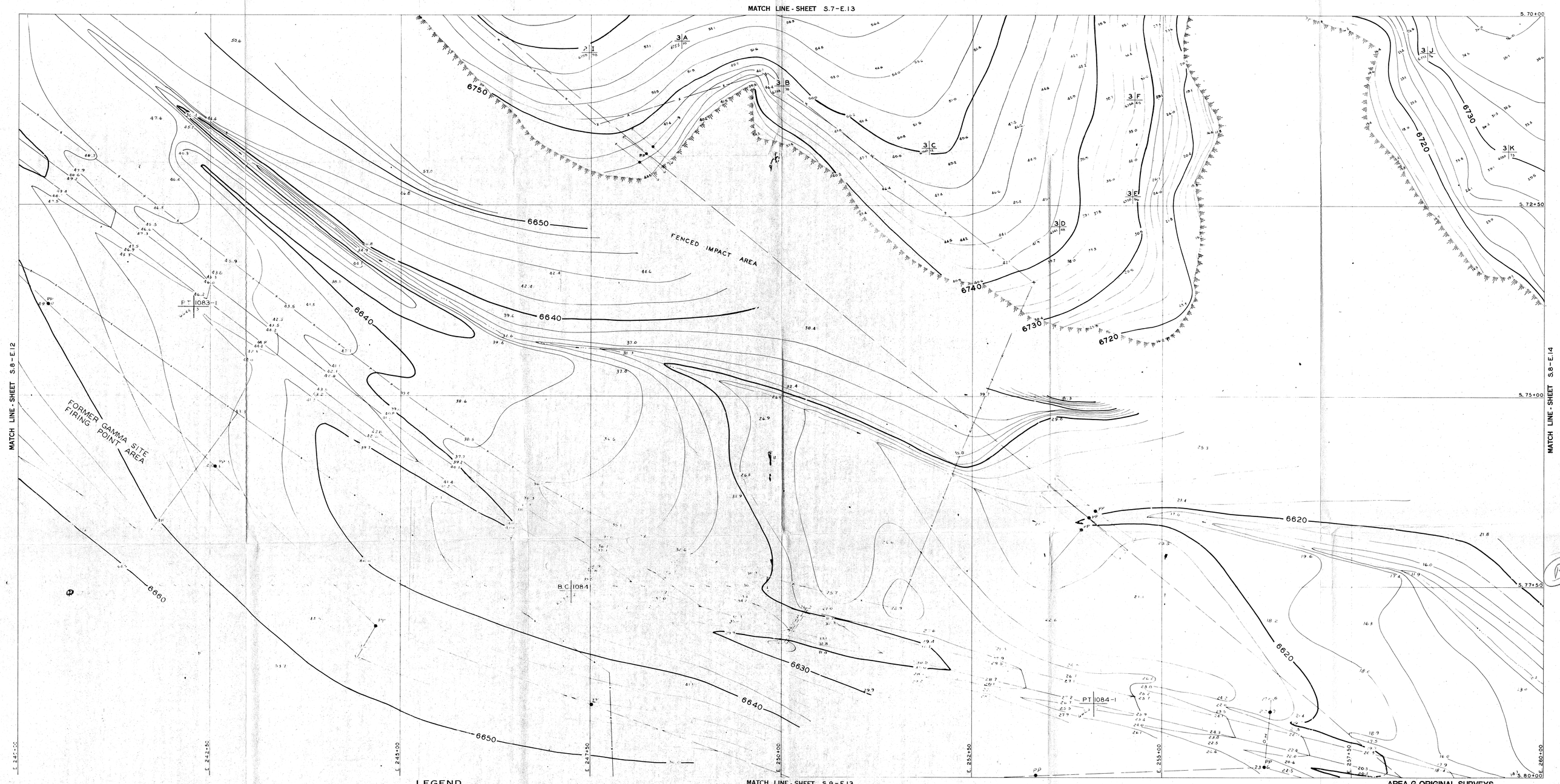
MESITA DEL BUEY TA-54

SUBMITTED	APPROVED	APPROVED
PROJ. ENGR.	ENGR. GROUP LEADER	ENGR. DEPT. OFFICE
CHECKED R.A.	CA / BA	DATE 7-27-77 / SHEET 3 OF 4
DESIGNED MDS-HAH.	LAB JOB NUMBER 1757	DRAWING NO. ENG-R-4463
DRAWN B. TRUJILLO		

E-3

14860-C

ALBUQUERQUE B/P * 17 0253 9-73 MC 1421*



LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- GAS VALVE
- PRESSURE REGULATOR VALVE
- SANITARY SEWER MANHOLE
- SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- TELEPHONE POLE
- TELEPHONE MANHOLE
- WATER VALVE
- FIRE HYDRANT
- POST INDICATOR VALVE
- TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. / 1 - TRAVERSE NO. / A - POINT NO.
- BC 525 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 150-3 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.

TRUE NORTH — MAGNETIC NORTH — 2°26' — 11°04'

APPROX. DECLINATION 13°30'

AREA G ORIGINAL SURVEYS

SURVEYED	PLOTTED	FIELD BOOKS	REMARKS	BY	CHKD	GRP. LDR.
1-57	1-57	307, 308		H.R.		
12-62	2-63	395	PAJARITO RD IMPACT AREA FENCE	JMD		
8-26-64	9-64	393	ADD FIRING POINT AREA & FENCE	T.R.		

LOS ALAMOS SCIENTIFIC LABORATORY
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UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

LAND SURVEYS

CONTOUR INTERVAL 2 FEET
SCALE: ONE INCH = 50 FEET
CURRENT AS OF DEC. 1963

SHEET S.8-E.13

MATCH LINE - SHEET S.6 - E.14

S.60+00

S.62+50

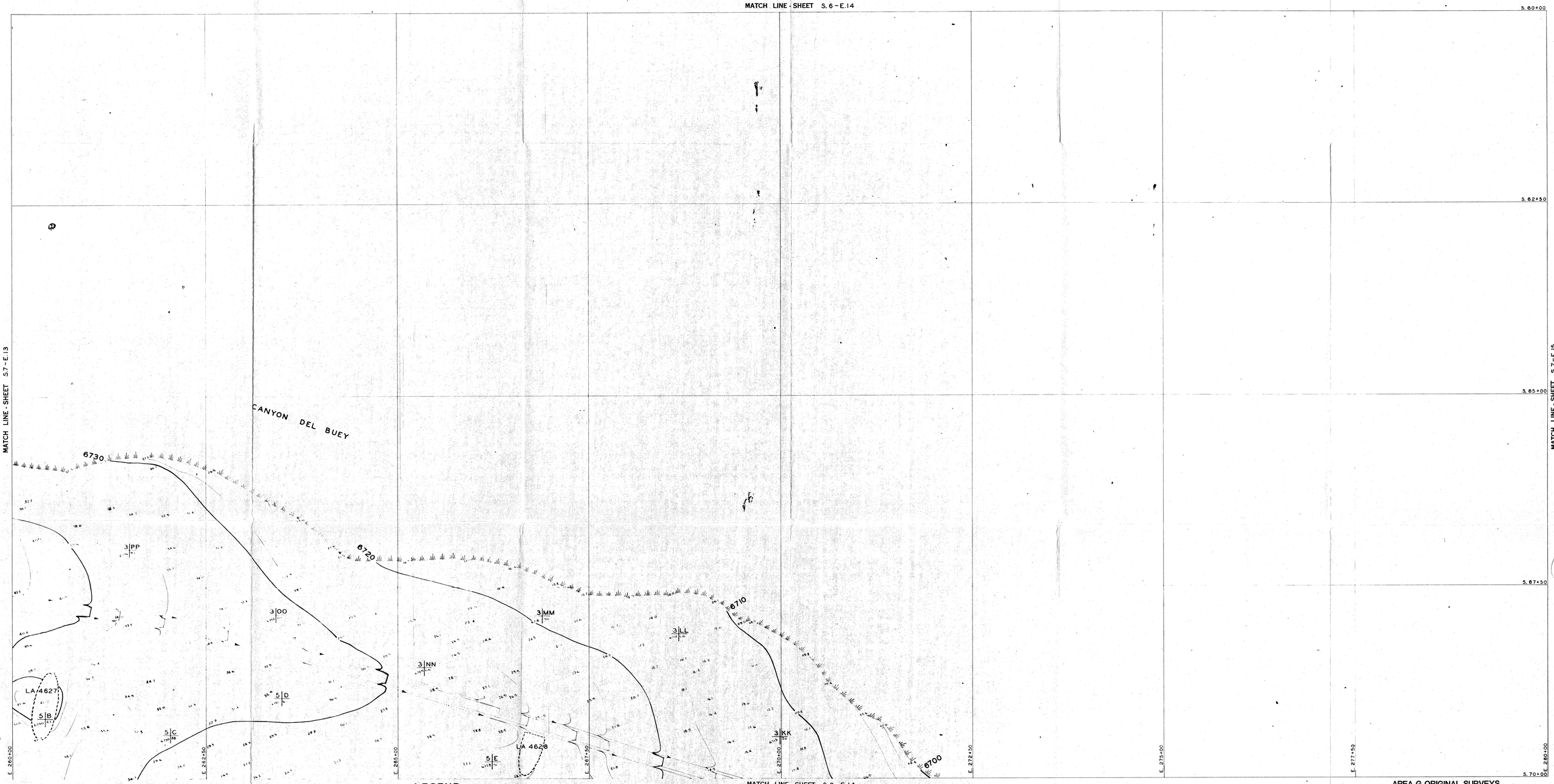
S.65+00

S.67+50

S.70+00

MATCH LINE - SHEET S.7 - E.13

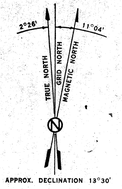
MATCH LINE - SHEET S.7 - E.15



MATCH LINE - SHEET S.8 - E.14

LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- G.V. GAS VALVE
- PRV PRESSURE REGULATOR VALVE
- S-MH SANITARY SEWER MANHOLE
- DB SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- ST STEAM LINE ON PIERS
- TP TELEPHONE POLE
- T-MH TELEPHONE MANHOLE
- WV WATER VALVE
- FH FIRE HYDRANT
- PIV POST INDICATOR VALVE
- 3 | 1-A / 7350 | 39 TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. 1 - TRAVERSE NO. A - POINT NO.
- BC 525 / 7350 | 39 BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 150 3 INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



SURVEYED	PLOTTED	FIELD BOOKS	REMARKS	BY	CHKD	GRP. LDR.
1-57	1-57	307, 308		H.R.		

AREA G ORIGINAL SURVEYS

LOS ALAMOS SCIENTIFIC LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

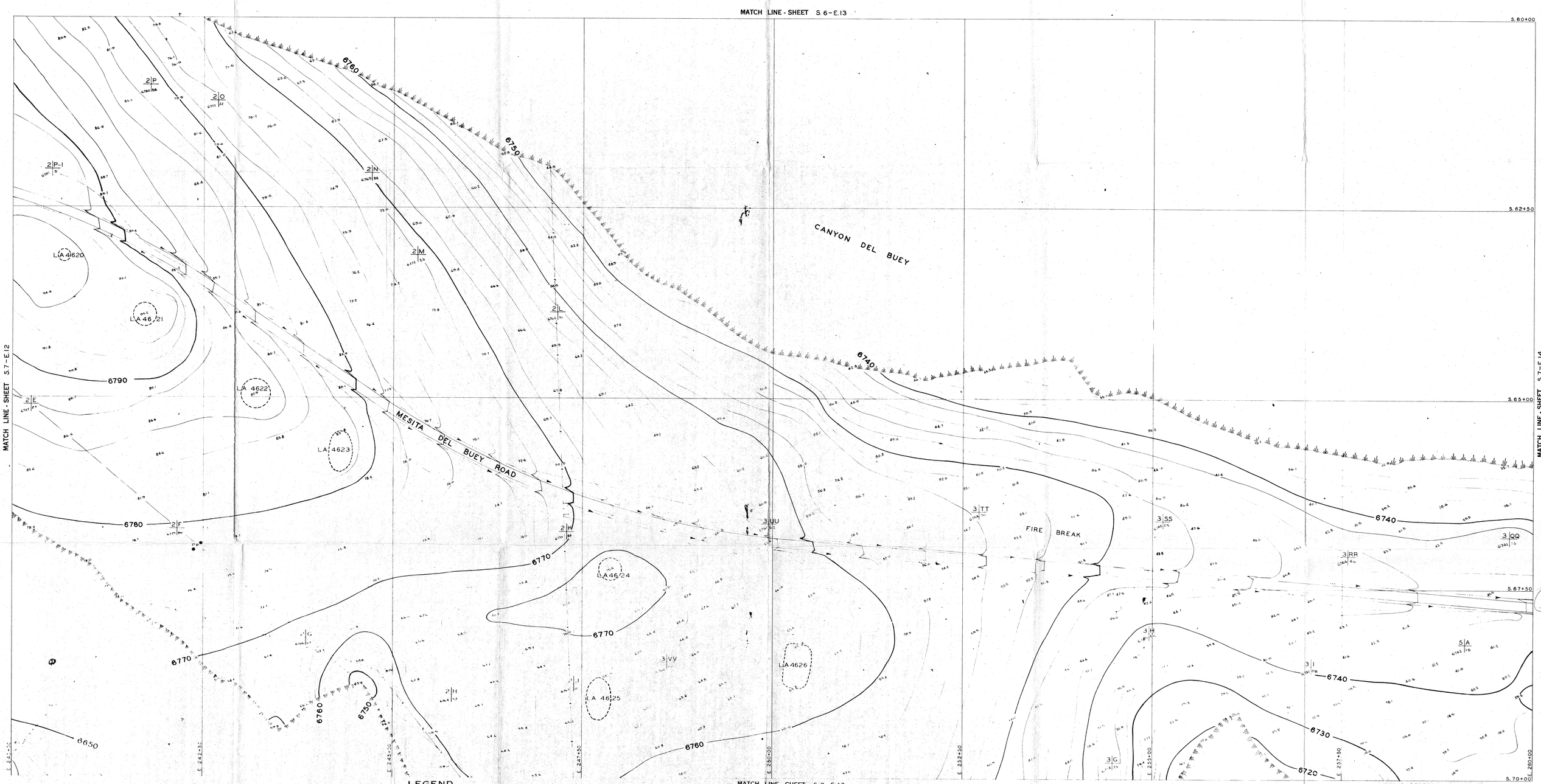
LAND SURVEYS

CONTOUR INTERVAL 2 FEET

SCALE: ONE INCH = 50 FEET

SHEET S.7 - E.14

CURRENT AS OF JAN. 1957



LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- OVERHEAD GUY
- LIGHT POLE (METAL OR WOOD)
- GAS VALVE
- PRESSURE REGULATOR VALVE
- SANITARY SEWER MANHOLE
- SANITARY SEWER DISTRIBUTION BOX
- STEAM BOX
- STEAM LINE ON PIERS
- TELEPHONE POLE
- TELEPHONE MANHOLE
- WATER VALVE
- FIRE HYDRANT
- POST INDICATOR VALVE
- TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO. / 1 - TRAVERSE NO. / A - POINT NO.
- BC 525 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 1503 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.

TRUE NORTH — GRID NORTH — MAGNETIC NORTH
2°28' — 11°04'
APPROX. DECLINATION 13°30'

SURVEYED	PLOTTED	FIELD BOOKS	REMARKS	BY	CHKD	GRP. LDR.
1-57	1-57	306,307,308		H.R		
12-62	2-63	395	PAJARITO RD IMPACT AREA FENCE	JMD		

AREA G ORIGINAL SURVEYS

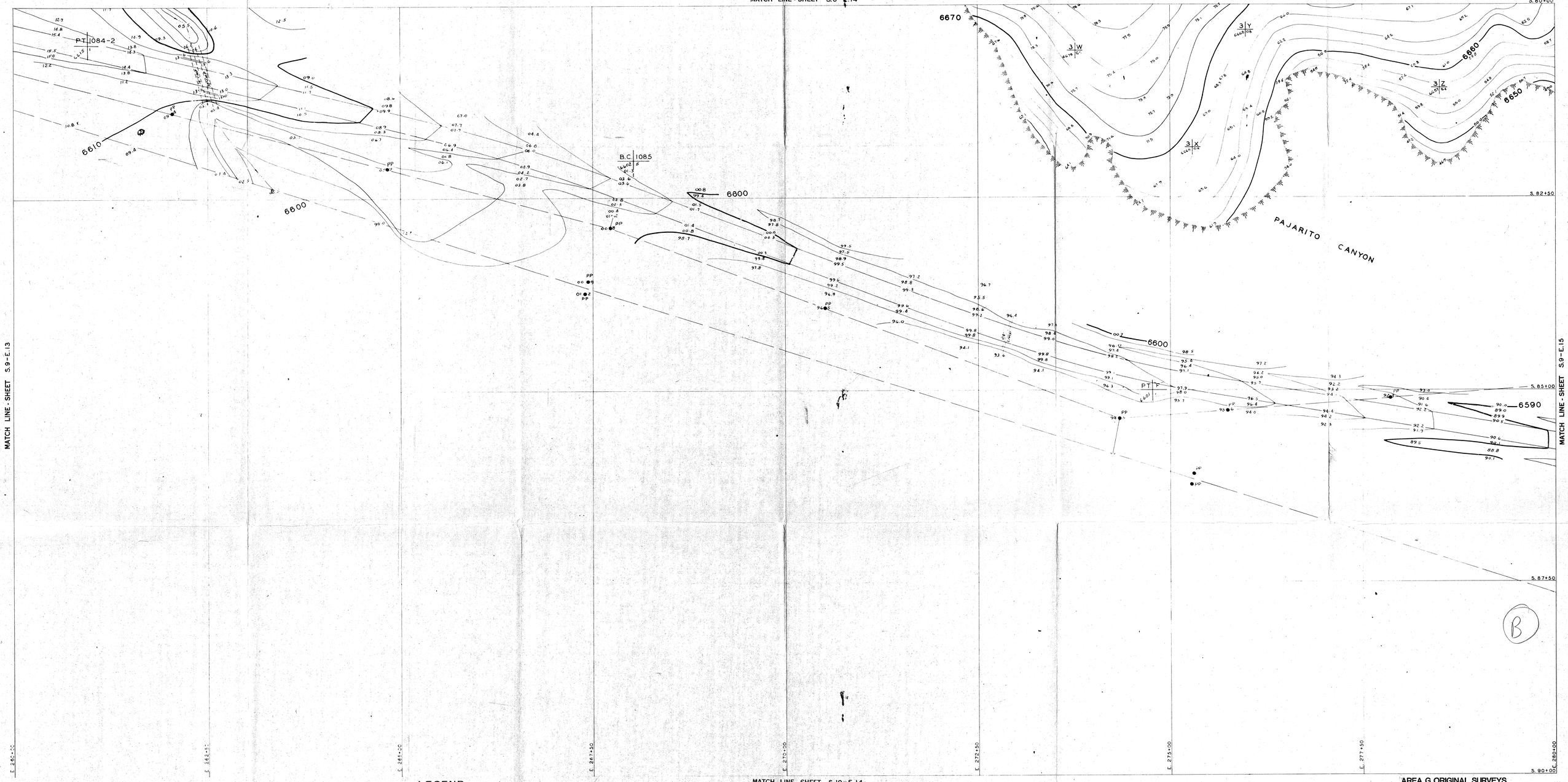
LOS ALAMOS SCIENTIFIC LABORATORY
ENGINEERING DEPARTMENT
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

LAND SURVEYS

CONTOUR INTERVAL 2 FEET
SCALE: ONE INCH = 50 FEET
CURRENT AS OF DEC 1962

SHEET S.7-E.13

14860-D



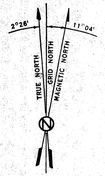
MATCH LINE - SHEET S.9-E.13

MATCH LINE - SHEET S.9-E.15

MATCH LINE - SHEET S.10-E.14

LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WL — WARNING BLINKER LIGHTS
- W.W. — WARNING WIG WAG
- A-MH — ACID MANHOLE
- E-MH — ELECTRICAL MANHOLE
- E-P — ELECTRICAL POWER PEDESTAL
- S.9 — POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- O.H. — OVERHEAD GUY
- LP — LIGHT POLE (METAL OR WOOD)
- G.V. — GAS VALVE
- P.R.V. — PRESSURE REGULATOR VALVE
- S-MH — SANITARY SEWER MANHOLE
- D.B. — SANITARY SEWER DISTRIBUTION BOX
- S.B. — STEAM BOX
- ST — STEAM LINE ON PIERS
- T.P. — TELEPHONE POLE
- T-MH — TELEPHONE MANHOLE
- W.V. — WATER VALVE
- F.H. — FIRE HYDRANT
- P.I.V. — POST INDICATOR VALVE
- 3 | T-A — TRAVERSE POINT AND ELEVATION (3 - AREA OR T.A. NO.; T - TRAVERSE NO.; A - POINT NO.)
- BC | 525 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 1503 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



APPROX. DECLINATION 13°30'

SURVEYED	PLOTTED	FIELD BOOKS[1]	REMARKS	BY	CHKD	GRP. LDR.
1-57	1-57	308		H.R.		
12-62	1-63	395	PAJARITO RD.	JMD		

AREA G ORIGINAL SURVEYS

LOS ALAMOS SCIENTIFIC LABORATORY
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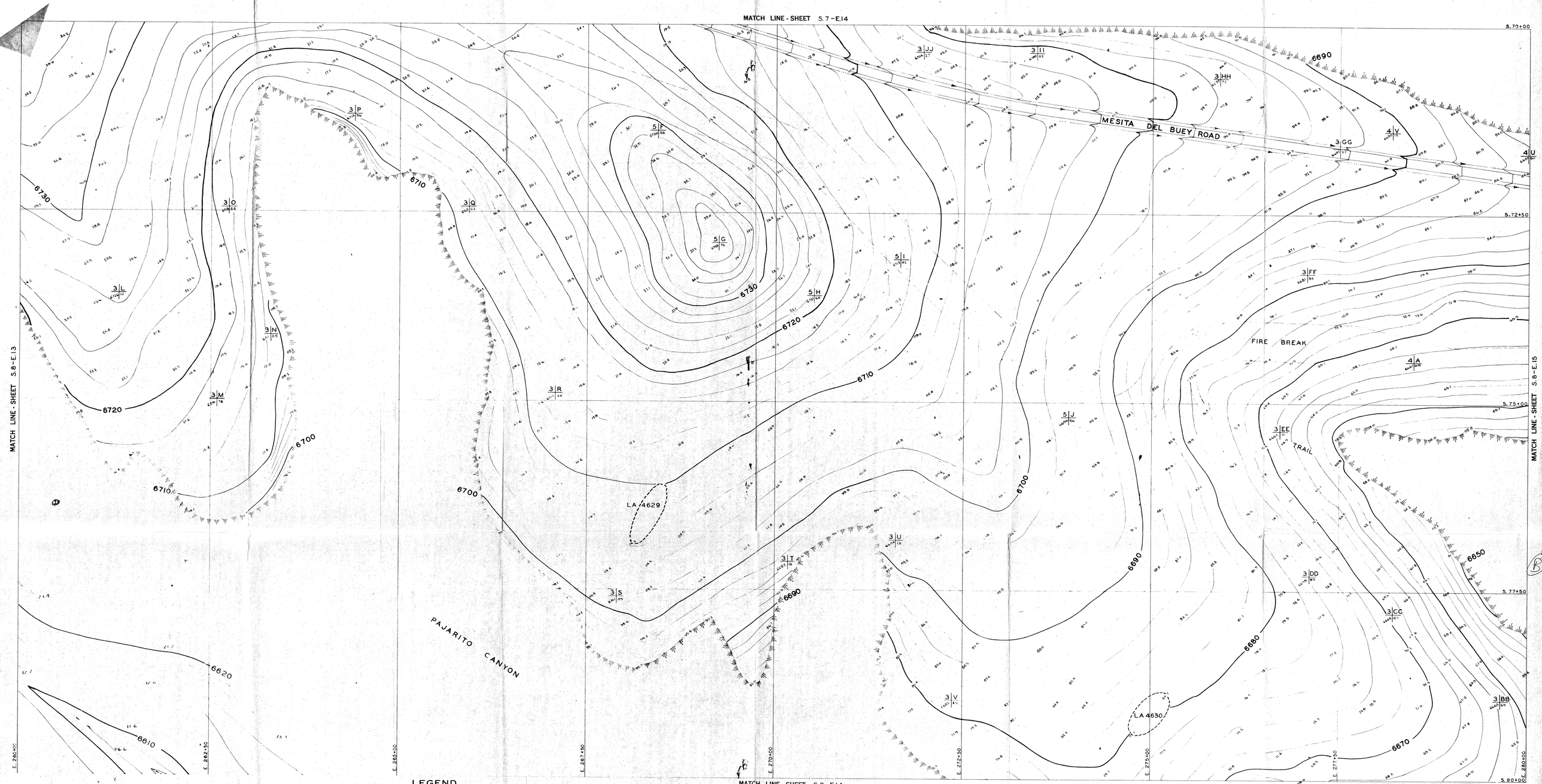
UNIVERSITY OF CALIFORNIA — LOS ALAMOS, NEW MEXICO

LAND SURVEYS

CONTOUR INTERVAL 2 FEET
SCALE: ONE INCH 50 FEET
CURRENT AS OF 12-62

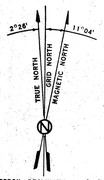
SHEET S.9-E.14

14860-D



LEGEND

- IMPROVED ROAD (GRADED OR PAVED)
- TRAIL ROAD
- BRIDGE
- GUARD RAIL
- CATCH BASIN IN CURB
- STORM DRAINAGE PIPE
- STORM DRAINAGE PIPE WITH HEADWALL
- STORM DRAINAGE MANHOLE
- CHAIN LINK FENCE
- BARBED WIRE FENCE
- BUILDING OR BUNKER WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- BARRICADE WITH EARTH BERM
- RIM OF CANYON (CLIFF OR BEGINNING STEEP SLOPE)
- FLOW LINE OF INTERMITTENT STREAM
- SAFETY OR RAILROAD GATE
- WARNING BLINKER LIGHTS
- WARNING WIG WAG
- ACID MANHOLE
- ELECTRICAL MANHOLE
- ELECTRICAL POWER PEDESTAL
- P.P. S-9 — POWER POLE AND PRIMARY ELECTRICAL CIRCUIT NO.
- POLE WITH GUY
- O.H. — OVERHEAD GUY
- L.P. OR L.P. — LIGHT POLE (METAL OR WOOD)
- G.V. — GAS VALVE
- PRV — PRESSURE REGULATOR VALVE
- S-MH — SANITARY SEWER MANHOLE
- S.D. — SANITARY SEWER DISTRIBUTION BOX
- S.B. — STEAM BOX
- ST — STEAM LINE ON PIERS
- T.P. — TELEPHONE POLE
- T-MH — TELEPHONE MANHOLE
- WV — WATER VALVE
- F.H. — FIRE HYDRANT
- P.I.V. — POST INDICATOR VALVE
- 3 | 1-A, 7340 / 38 — TRAVERSE POINT AND ELEVATION — 3 - AREA OR T.A. NO.; 1 - TRAVERSE NO.; A - POINT NO.
- BC | 525, 7340 / 38 — BRASS CAP NO. AND ELEVATION (PERMANENT LASL SURVEY MARKER)
- LA 1503 — INDIAN RUIN AND LABORATORY OF ANTHROPOLOGY NO.



APPROX. DECLINATION 13°30'

SURVEYED	PLOTTED	FIELD BOOKS	REMARKS	BY	CHKD	GRP. LDR.
1-57	1-57	307, 308		H.R.		
12-62	1-63	395	PAJARITO RD.	JMD		

AREA G ORIGINAL SURVEYS

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LAND SURVEYS

CONTOUR INTERVAL 2 FEET
SCALE: ONE INCH = 50 FEET
CURRENT AS OF DEC 1962

SHEET S.8-E.14

14860-D

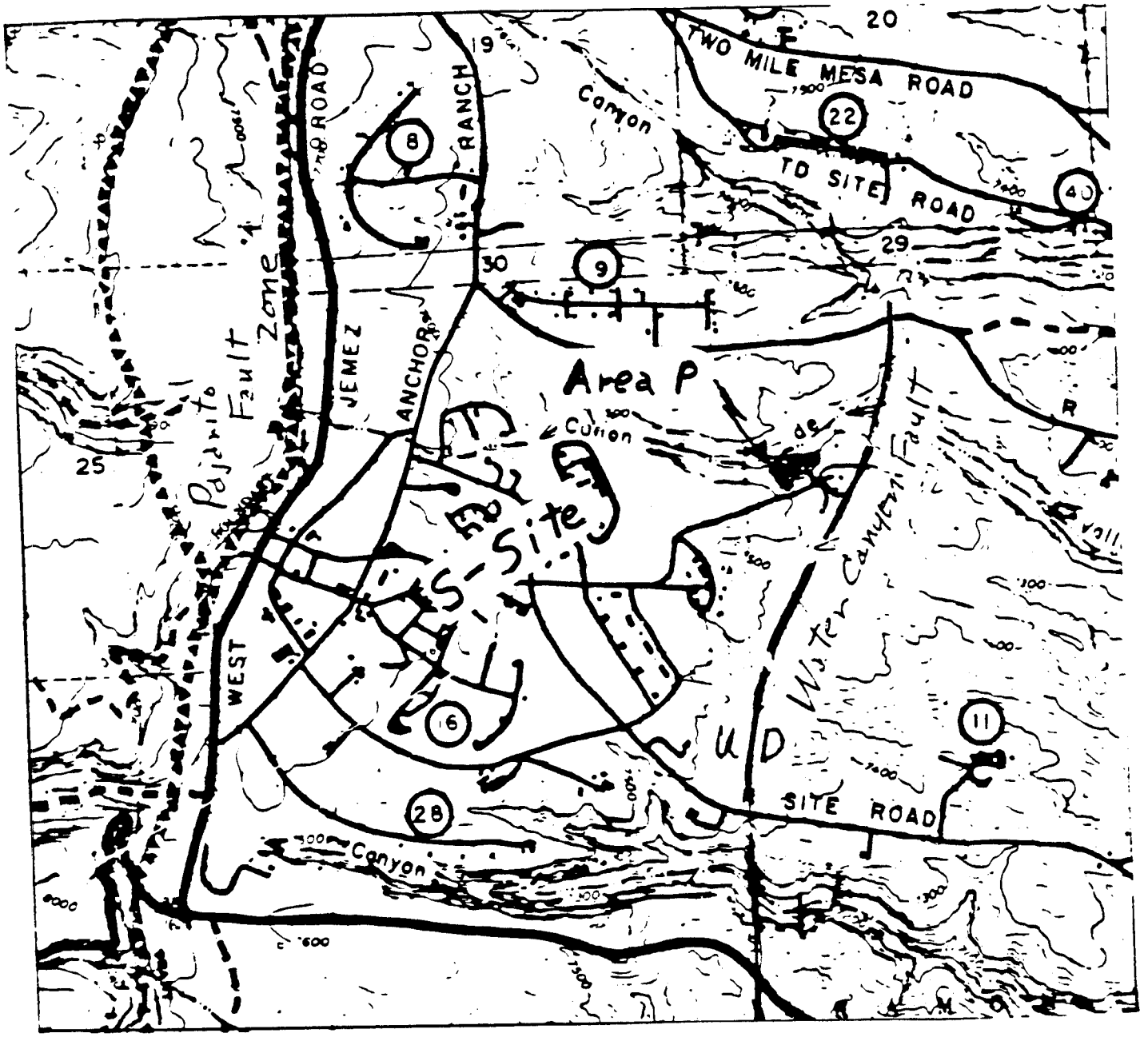

FIGURE 4

MAP SHOWING S-SITE, AREA P & NEARBY FAULTS