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Los Alamos National Laboratory
Environmental Restoration Project

EXPEDITED CLEANUP PLAN

for

SOLID WASTE MANAGEMENT UNIT 36-003(a)

June 1995
Revision 0

Environmental
Restoration

2312

ACRONYMS

AOC	area of concern
AP	Administrative Procedure
CEARP	Comprehensive Environmental Assessment and Response Program
COC	chemical of concern
COPC	chemical of potential concern
CST	Chemical Science and Technology (Division)
CST-3	Analytical Services (Group)
DOE	U.S. Department of Energy
EC	expedited cleanup
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FPL	Field Project Leader
FTL	Field Team Leader
HSWA	Hazardous and Solid Waste Amendments
LANL, the Laboratory	Los Alamos National Laboratory
PPE	personal protective equipment
PRS	potential release site
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAL	screening action level
SOP	Standard Operating Procedure
SSHASP	Site-Specific Health and Safety Plan
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	Technical Area
TCLP	Toxicity Characteristic Leaching Procedure
VOC	volatile organic compound

TABLE OF CONTENTS

ACRONYMS i

1.0 INTRODUCTION 1

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING 3
2.1 Detailed Description of SWMU 36-003(a) 3
2.1.1 Operational History 3
2.1.2 Physical Setting 3
2.2 Summary of Investigations 3
2.2.1 Investigations Prior to the RFI 3
2.2.2 RCRA Facility Investigation 6
2.2.3 Evaluation of the Results 7
2.3 Types and Volumes of Waste 7
2.4 Potential Impacts on Public Health and the Environment 8
2.4.1 Potential Pathways 8
2.4.1.1 SWMU-In Place 8
2.4.1.2 SWMU-Remediation 8
2.4.2 Future Land Use 8
2.4.3 Cleanup Levels 10

3.0 EXPEDITED CLEANUP 11
3.1 Overview and Rationale 11
3.2 Permitting, Approval, and Notification Requirements 11
3.2.1 Regulatory Notification/Permit Modifications 11
3.2.2 DOE Approval 11
3.3 Cleanup Activities 11
3.4 Waste Management Issues 12
3.4.1 Characterization of Materials for Disposal 12
3.4.2 Treatment, Storage, and Disposal Plans 12
3.5 Verification Plan 12
3.6 Site Restoration Plan 13
3.6.1 Return of Materials to Site 13
3.6.2 Expedited Cleanup Waste 13
3.7 Acceptance Inspection 13
3.8 Final Report 15

4.0 PROJECT MANAGEMENT 16
4.1 Staff and Resource Requirements 16
4.2 Schedule 17
4.3 Stakeholder Notification 17

5.0 REFERENCES 19

6.0 ANNEXES 20
6.1 Implementation SOPs
6.2 Quality Assurance Plan
6.3 Health and Safety Plan
6.4 Records Management Plan
6.5 Public Involvement Plan
6.6 Waste Management Plan
6.7 Field Work Approval Form
6.8 Proposed Outline for Expedited Cleanup Final Report

TABLES

Table 2-1 Anticipated Waste Volumes 7
Table 3-1 Summary of Verification Samples and Analyses for 36-003(a) 14
Table 4-1 EC Schedule 18

FIGURES

Figure 1-1 Regional Location Map 2
Figure 2-1 SWMU 36-003(a) Location Map 4
Figure 2-2 Septic system SWMU 36-003(a) site sketch 5
Figure 2-3 Conceptual Exposure Model for SWMU 36-003(a) 9

1.0 INTRODUCTION

This Expedited Cleanup (EC) Plan is for Solid Waste Management Unit (SWMU) 36-003(a), located within the central portion of the Los Alamos National Laboratory (the Laboratory), Los Alamos, New Mexico (Figure 1-1). This EC Plan is being proposed as a part of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) process described in the RFI Work Plan for Operable Unit 1130 (LANL 1993, 1088).

SWMU 36-003(a) is included in Table A of the original Hazardous and Solid Waste Amendments (HSWA) module to the Laboratory's RCRA permit.

SWMU 36-003(a) consists of an inactive septic tank, a drainfield, and a seepage pit. The system was in use from 1949 to 1992. Photochemical wastes as well as sanitary wastes were routinely discharged to the system. Analytical results from the RFI sampling effort indicate the septic tank contains elevated levels of metals. Constituents detected within the associated drainfield and seepage pit are significantly below screening action levels (SAL). These data indicate that the contents of the tank should be classified as RCRA hazardous waste and should be removed from the tank for proper disposal. The drainfield will be decommissioned in place without further action.

Activities comprising this EC Plan include verification sampling outside the tank to ensure contamination is confined to the interior of the septic tank, removal of the septic tank contents, and cleaning of the interior of the tank. The contents of the tank will be disposed of at a permitted facility and the site restored to its previous condition.

This EC Plan identifies the level of effort required from initial transmittal of the plan to the U.S. Environmental Protection Agency (EPA) for review, through implementation, to the completion of the final project report. In the development of this EC Plan, the following assumptions are made:

- Land use at the location of this SWMU will continue to be for industrial purposes.
- There will be minimal delays in EC operations resulting from inclement weather, site access delays, and firing schedule delays. Delays that may result from the acquisition and scheduling of heavy equipment and from accepting waste at permitted disposal facilities cannot be anticipated and therefore are not considered within this plan.
- The site-specific health and safety plan (SSHASP) will be developed specifically to address chemicals of concern (COC) identified in this EC Plan. Deviations from these anticipated concentrations of COCs may necessitate adjustments to that plan.
- Any comments generated by agencies for public review may necessitate adjustments to the scope of this EC Plan.

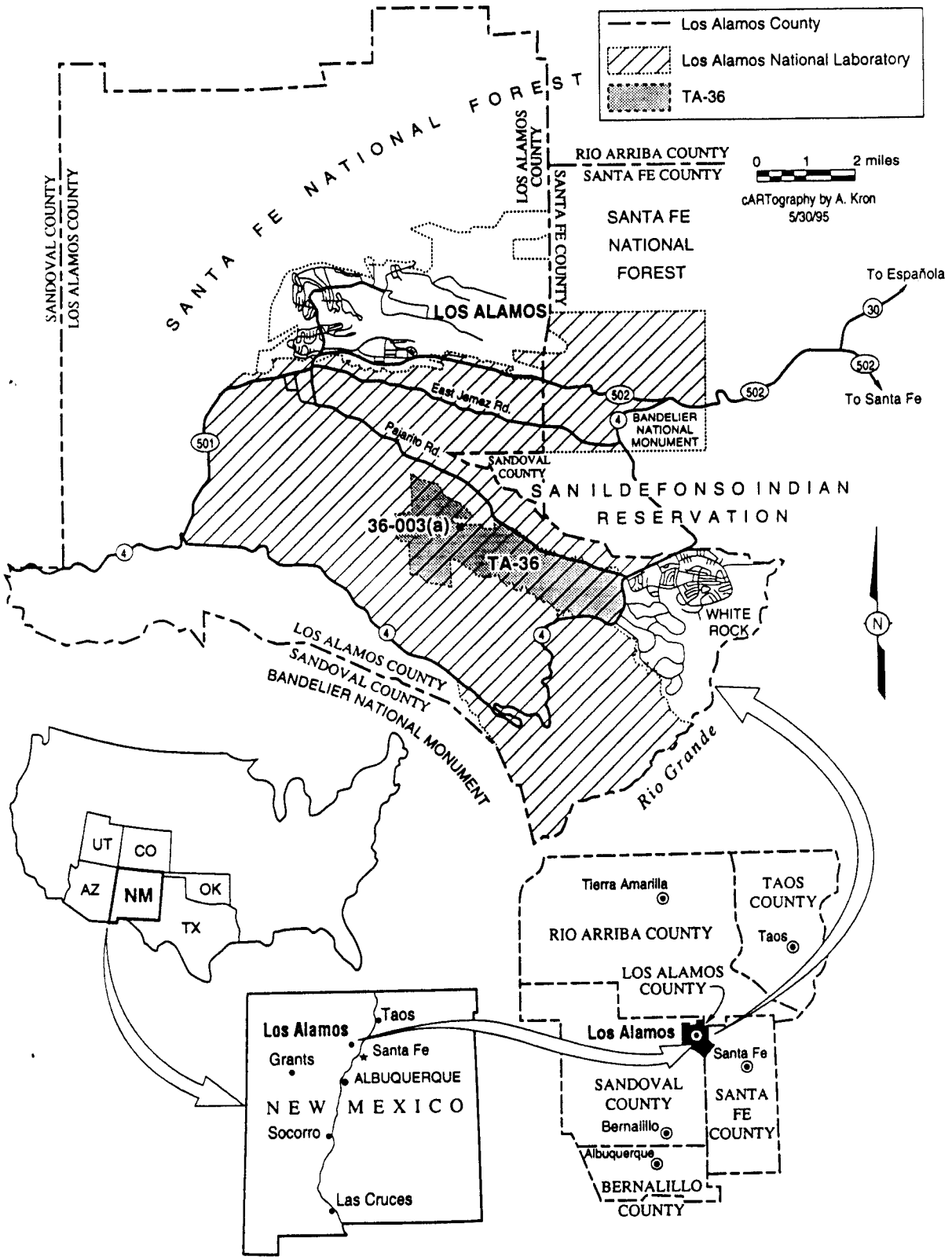


Figure 1-1. Regional location map.

2.0 SITE BACKGROUND AND ENVIRONMENTAL SETTING

2.1 Detailed Description of SWMU 36-003(a)

SWMU 36-003(a), a septic system, is located at TA-36 in the east-central part of the Laboratory (Figure 2-1). The septic system includes two manholes affiliated with the inlet line from TA-36-1 (Figure 2-2). The site is situated approximately 115 ft east of the northeast corner of TA-36-1. The septic tank, which is approximately 9 ft by 5.5 ft by 7.3 ft, and drainfield are located on a mesa an estimated 50 ft south of the southern rim of Threemile Canyon.

The system consists of a 1,160-gal. precast reinforced concrete tank, a distribution box, and a seepage pit. Two vent caps, each protruding 6 in. above the ground, mark the exact location of the tank. The septic tank is buried approximately 1.5 ft below ground surface. An entrance portal is centered between the vents approximately 1.5 ft below grade. A single inlet pipe is located on the western wall of the tank; the outlet pipe is located on the eastern wall. The outlet pipe leads to the concrete distribution box, which measures approximately 2 ft by 2 ft by 2 ft.

During 1973 and 1974, this line was abandoned and its effluent rerouted to an adjacent cylindrical seepage pit. This gravel-filled seepage pit is an estimated 50 ft deep and 4 ft in diameter. A 4-in. diameter drain line extends into and within 2 ft of the pit's base.

2.1.1 Operational History

SWMU 36-003(a) was in use from 1949 to 1992 and served the TA-36-1 offices/laboratory and the TA-36-22 main guard station. Until 1990 or 1991, the septic system received photochemical wastes and sanitary wastes; the system is presently inactive. In 1973 or early 1974, the drainfield was disconnected as a result of the increased use. In 1988, TA-36-22 was disconnected from this septic tank and connected to septic tank TA-36-100. In late 1992, the line from TA-36-1 was disconnected and rerouted to the Laboratory's sanitary waste line.

2.1.2 Physical Setting

SWMU 36-003(a) lies entirely on U.S. Department of Energy (DOE)-owned land on a mesa top south of Threemile Canyon. The area is removed from any public access roads.

The prevalent soil type on the mesa top is the moderately deep (20 to 40 in.) and well-drained Nyjack Loam. Pleistocene ash flows of the Bandelier Tuff directly underlie the soil. The tuff is moderately welded to nonwelded in the area of the septic system. Because the site is situated on a mesa, the existence of shallow aquifers in the area is unlikely. The depth to the main aquifer is estimated at 875 to 1,100 ft below ground surface.

Surface-water runoff from the site flows to ephemeral streams in the adjacent Threemile Canyon, which then discharges to an ephemeral stream in Pajarito Canyon.

2.2 Summary of Investigations

2.2.1 Investigations Prior to the RFI

No information is available regarding any sampling investigations of SWMU 36-003(a) prior to the RFI. The location and potential chemicals of potential concern (COPC) at this site were noted in

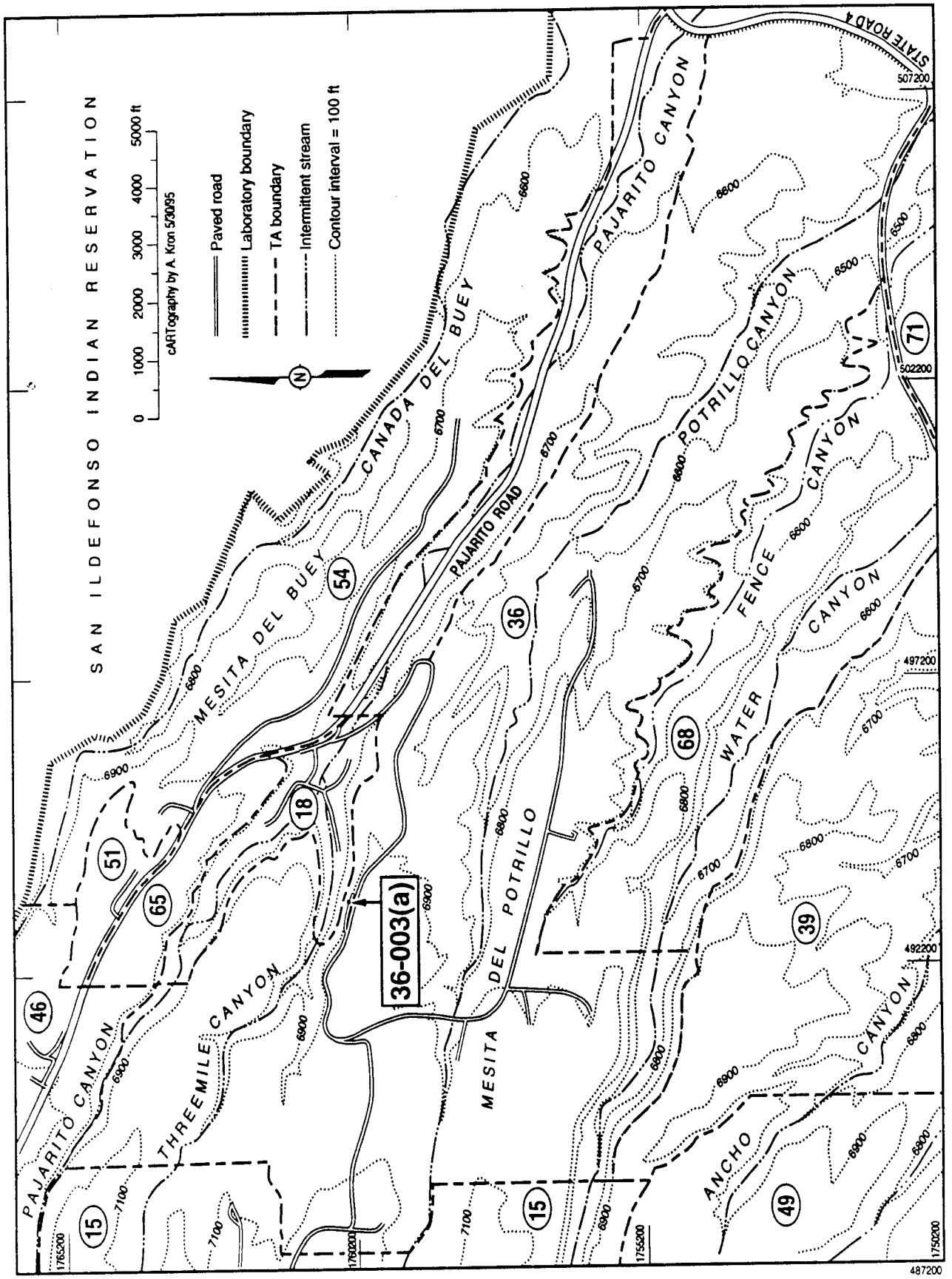


Figure 2-1. Location of SWMU 36-003(a).

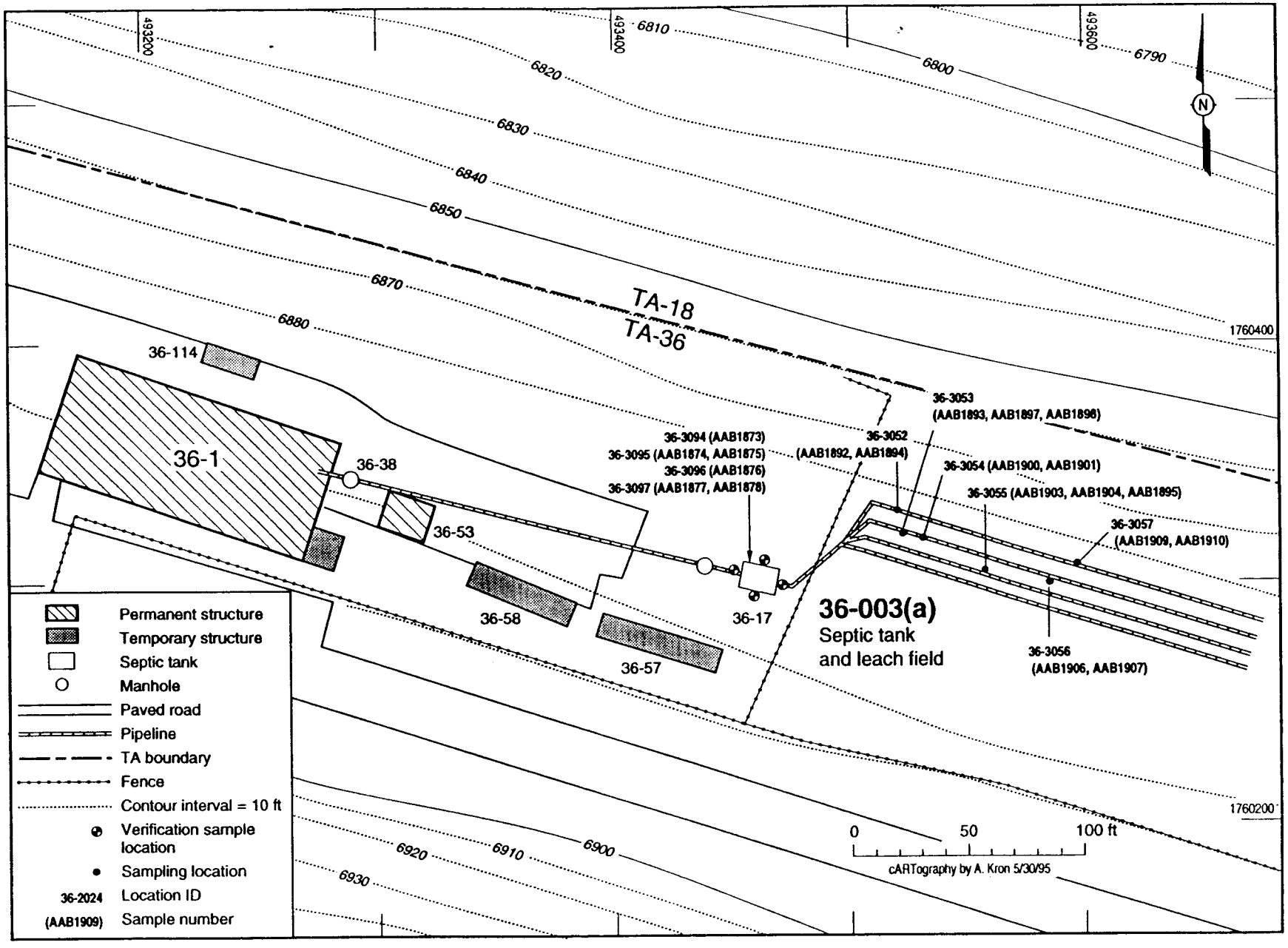


Figure 2-2. Septic system SWMU 36-003(a) site sketch.

the 1987 Comprehensive Environmental Assessment and Response Program (CEARP) Report (DOE 1987, 0264) and the 1990 Solid Waste Management Units Report (LANL 1990, 0145). A review of past operations in buildings served by the septic system led to the development of a list of COPCs. These COPCs, which are derived primarily from spent photochemicals from the x-ray developing process that operated in the served buildings, include thiosulfates, silver cyanides, and organic compounds.

2.2.2 RCRA Facility Investigation

During August 1994, multimedia samples were collected from the septic tank and associated drainfield to ascertain the potential effect of the inactive septic system on public health and the environment. The effort is summarized below.

Septic Tank. Six samples of the tank's contents were obtained. Both the liquid and sludge phases from within the septic tank were sampled and analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), RCRA metals (total), and cyanide. A gross alpha/beta/gamma screening was also performed. Results indicate the following:

- The tank contents contain elevated levels of metals. SALs (for either soils or water) were exceeded for barium, cadmium, lead, mercury, and silver. Maximum values for these metals of concern (in µg/L) are barium (3,350), cadmium (30), lead (290), mercury (66.4), and silver (18,300).

  The concentration of silver qualifies the liquid and sludge in the tank as a D-listed hazardous waste, in that this concentration indicates that it is highly likely the waste exceeds the Toxicity Characteristic and Leaching Procedure (TCLP) regulatory level (40 CFR 261.24).

- The VOC analysis revealed slightly elevated concentrations. These contaminant levels, which are significantly below SALs, do not pose an unacceptable risk to human health or the environment. The maximum values of these reported constituents (in µg/L) are 2-butanone (49), carbon disulfide (210), chlorobenzene(6), chloromethane (13), and p-dichlorobenzene (44).

  The presence of chlorobenzene and carbon disulfide qualify the tank contents as an F-listed hazardous waste.

- Detected SVOC results were all below background levels. Reported levels of cyanide are less than SALs.

Drainfield/Seepage Pit. Approximately 14 samples were collected from the septic drainfield. The seepage pit, used until 1972 (when the drainfield was put in place), was not sampled. If levels of COPCs had been detected above SALs in the drainfield, the seepage pit would have been sampled as part of a Phase II investigation. Samples were obtained from the base of the vitrified clay pipes. This location coincides with the contact between the soil and Bandelier Tuff. Additional subsurface soil samples were obtained from 2 ft within the tuff. The samples were analyzed for VOCs, SVOCs, RCRA metals, and cyanide. A gross alpha/beta/gamma screening was also performed. A preliminary review of the available data indicates the following:

- The drainfield constituents were below detection level for VOC analytes with the exception of methylene chloride, which is considered a laboratory contaminant.

- The SVOC analysis contain slightly elevated concentrations of di-n-butylphthalate and bis(2-ethylhexyl)phthalate. These compounds are considered common laboratory or plastic contaminants.

- Levels of cyanide were either below detection limits or significantly below SALs.

- Reported levels of metal constituents were below detection limits or below SALs.

2.2.3 Evaluation of the Results

Based on preliminary review of the data, the contents of the septic tank are classified as D-listed (toxic) waste because of the presence of silver. The contents also fall into the F-listed category (hazardous waste) because of the presence of carbon disulfide and chlorobenzene. In addition, concentrations of other metals in the waste at concentrations above SALs suggest a need to remediate the tank contents. However, reported concentrations of PCOCs in the drainfield were below SALs, so no remediation is proposed for this area.

2.3 Types and Volumes of Waste

The nature of the wastes expected to be generated by the proposed cleanup is presented in Table 2-1. As indicated above, constituents detected in the septic drainfield are significantly below SALs. This EC Plan proposes that the drainfield area be decommissioned in place; therefore, no waste generation will be associated with this area.

The tank liquid and sludge samples revealed elevated levels of metals. These concentrations are such that the material would fail TCLP criteria and thus be classified as EPA hazardous waste (40 CFR 261.24). In addition to the existing material in the tank, potentially contaminated water will be generated during the washing of the tank interior following the removal of the existing sludge. As described in Section 3.3, the tank contents and washwater will be pumped into containers to be handled by an approved waste facility. Treatment or stabilization of the residuals by the waste facility may be necessary before its disposal. The specific nature of this stabilization will be determined by the disposal facility.

Verification sampling will be performed as described in Section 3.5. Although soil cuttings will be segregated and returned to their respective boreholes, a small volume of solid and liquid wastes will be generated by the sampling activity. Waste associated with this effort include disposable sampling equipment and decontamination water. These materials will be handled in accordance with the task- specific waste management checklist and treated as potentially hazardous waste pending characterization.

TABLE 2-1
ANTICIPATED WASTE VOLUMES

Item	Type	Anticipated Volume
Sampling waste	solid - potential hazardous	5 gal.
Decontamination waste	water - potential hazardous	300 gal.
Tank contents	sludge/liquid - hazardous	500 gal.

2.4 Potential Impacts on Public Health and the Environment

Receptors of possible contaminants include animals and humans. Potential exposure routes of receptors include the following:

- Inhalation (especially when the facility is disturbed)
- Ingestion (in particular, receptors living onsite may be exposed by eating plants growing in soil contaminated by releases from the tank)
- Skin contact with contaminated soils or sediments

2.4.1 Potential Pathways

2.4.1.1 SWMU - In Place

The only source from which contaminants could migrate is the septic tank and its contents (Figure 2-3). Available analytical results from the drainfield indicate that soils from this area do not serve as a potential source area for contaminant migration. Therefore, the primary source area for COC migration is via residuals within the septic tank. Although a significant release of contaminants from the septic system was not detected during the RFI effort, possible future releases of the COCs to the environment via septic tank leaks or movement of residuals through the drain lines may occur if the contents remain in place.

Should releases occur, the primary mode for COC migration is via subsurface soils. Because the tuff is less permeable than the overlying soil, the interface serves as a preferential subsurface pathway. Thus, the most likely subsurface migration scenario has COCs moving along the soil/tuff interface toward the Threemile Canyon floor. Release to the surface could also occur along this pathway where the Bandelier Tuff is exposed along the steep canyon walls. Minor migration pathways through surface-water runoff and wind mechanisms could then develop.

2.4.1.2 SWMU - Remediation

EC activities to be performed at SWMU 36-003(a) include removing the septic tank's contents and washing its interior, filling the excavated tank with concrete, and subsurface drilling associated with the verification sampling. These tasks may present additional temporary potential pathways for contaminant migration as a result of the increased surface exposure of contaminated soil, sludges, and liquids.

The primary pathways associated with these activities are wind dispersion and surface-water runoff. To minimize the potential for surface-water runoff, tank residuals will be pumped directly into drums, thus reducing the risk of spills to surrounding soils. The interior tank wash spray will be directed downward into the tank rather than up into the air and surrounding soils. Soil cuttings generated during the verification sampling will be field monitored for organic vapors and radioactive constituents. These cuttings will be returned to their respective boreholes. Should field screenings indicate potential contamination, the soil will be placed in containers and disposed of in accordance with the site-specific waste management checklist.

2.4.2 Future Land Use

SWMU 36-003(a) lies entirely on DOE-owned land on a mesa top north of Potrillo Canyon. The area is removed from any public access roads. In the foreseeable future, the land is anticipated to be used exclusively for Laboratory industrial operations.

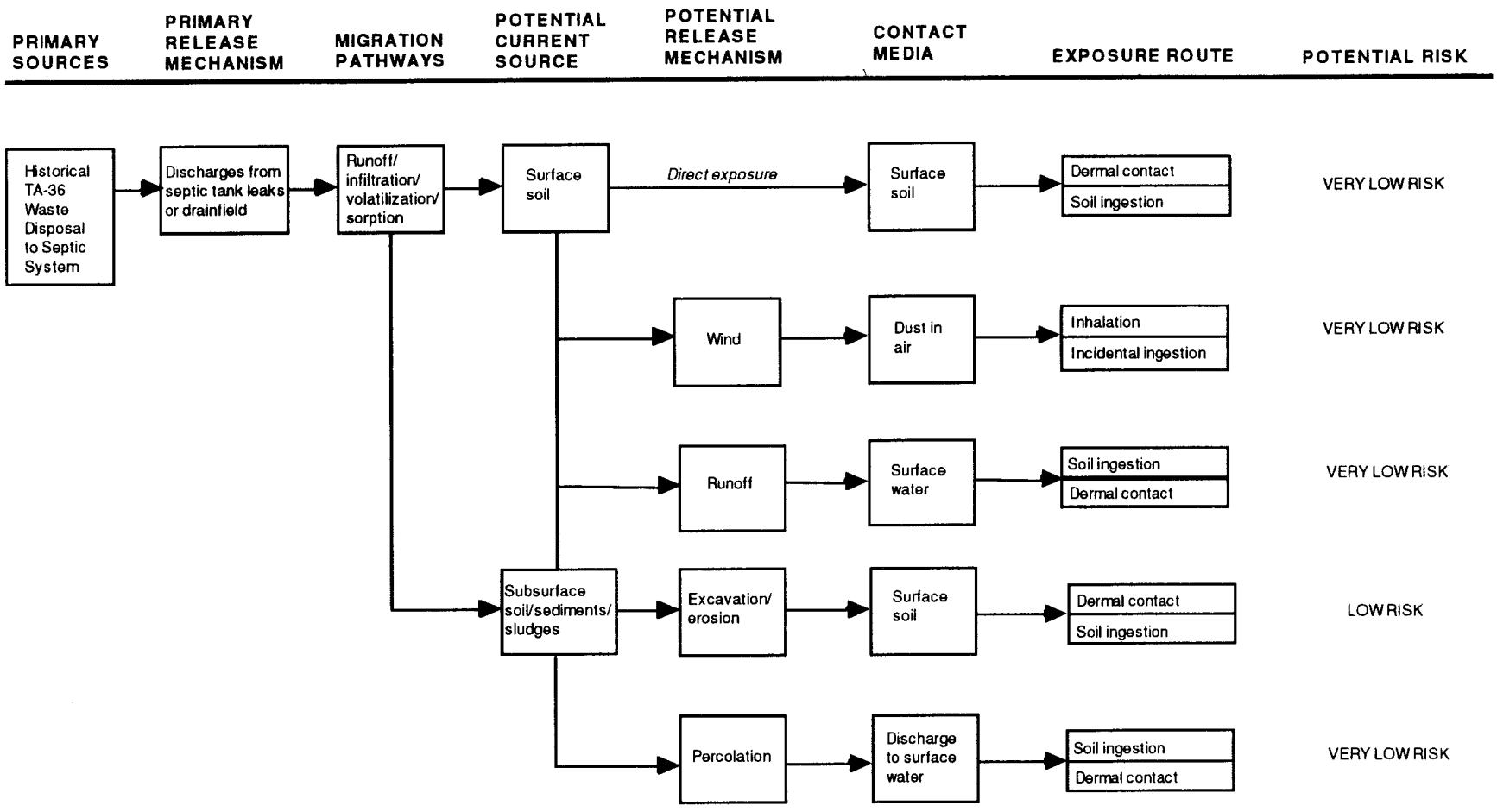


Figure 2-3. Conceptual exposure model for SWMU 36-003(a)

2.4.3 Clean-up Levels

The initial site assessment consisted of a comparison of measured concentrations with SALs. SALs are risked-based, media-specific action levels with which the maximum concentrations of an analyte are compared to determine whether further evaluation of potential contamination is warranted (LANL 1993, 1088). SALs are based on regulatory levels (e.g., maximum contaminant levels) or are calculated using a risk-based methodology described in the proposed RCRA Subpart S, Corrective Action for Solid Waste Management Units (EPA 1990, 0432) assuming residential use. An additional conservative modification of the Subpart S methodology was introduced to account for exposure to VOCs volatilizing from water or soil. Calculation of the soil/water-to-air volatilization factor was based on an equation given by EPA and on chemical-specific parameters (LANL 1993, 1088).

SALs are calculated using the most current route-specific chemical toxicity values and default exposure parameters. They are based on average daily exposures that will not result in exceeded target risks or hazard values (i.e., a cancer risk of 1 in a million for all Class A and B carcinogens, 1 in 100,000 for all Class C carcinogens, and a hazard index of 1 for noncarcinogens).

As noted in Section 2.4.2, the anticipated future use of this site is for industrial purposes. Cleanup levels based on an industrial use are greater than SALs. Cleanup levels for the individual COCs have been calculated using the methodology presented in Annex 6.6. These cleanup levels will be applied to soil adjacent to the septic tank, should verification sampling reveal the presence of COCs. If more than one COC is detected, a multiconstituent analysis will be performed to establish cleanup levels for multiple constituents. The proposed cleanup level for lead, the primary contaminant at this site, is 2,000 mg/kg.

3.0 EXPEDITED CLEANUP

3.1 Overview And Rationale

Preliminary analytical results indicate that the septic tank contents are hazardous waste. Using a conservative risk-based screening assessment, the contaminant concentrations in the drainfield soils do not pose a significant risk to human health or the environment. Therefore, the proposed EC (described in Section 3.3) will be performed to remove the potential risk of the remaining tank contents quickly and economically. Verification sampling will be performed to confirm the results of the RFI and the EC.

3.2 Permitting, Approval, and Notification Requirements

An excavation permit will be prepared and submitted for approval before execution of this plan.

Documentation will be prepared in accordance with Laboratory Environmental Restoration (ER) Administrative Procedure (AP) LANL-ER-AP-05.1, Rev. 0, Readiness Review for Environmental Restoration Program Field Activities (LANL 1993, 0951). Key documents to be prepared for this review include a site-specific health and safety plan (SSHASP) and a task-specific waste management checklist. Personnel training requirements will be specified and will require completion prior to implementation of this EC Plan. Site workers must have received all training for this project as specified in the SSHASP.

3.2.1 Regulatory Notification/Permit Modifications

SWMU 36-003(a) is included in Table A of the Hazardous and Solid Waste Amendments module of the Laboratory's RCRA permit. Implementation of this EC will require a Class III modification to the Laboratory's RCRA permit. EPA and the New Mexico Environment Department have been notified of this project, and a request for a permit modification has been submitted. Implementation of this EC Plan will proceed upon receipt of EPA approval.

3.2.2 DOE Approval

If the Laboratory intends to implement this EC prior to receiving EPA approval, DOE approval must be documented through receipt of the signed Field Work Approval Form (Annex 6.7).

3.3 Cleanup Activities

SWMU 36-003(a) is located within a secured area of TA-36; therefore, site preparation will be limited to scheduling site access and establishing work zones. Initially, the overburden from the tank will be removed to expose the tank's lid and central portal. The central portal will be opened, and a sample of the sludge may be collected to establish the current waste characterization profile for disposal purposes.

The tank will be vacuum-pumped from the central portal, if possible; otherwise, the activities will proceed to the removal of the tank's concrete lid and subsequent removal of the residuals. Once the tank's contents have been removed and placed in containers, the concrete lid will be removed and the interior of the tank rinsed using a pressure wash. The rinsing will be sufficient to remove all contamination from the interior of the tank. The wash liquid will then be pumped from the tank and placed in containers. Air exhausted from the vacuum unit will be filtered in a manner consistent with health and safety requirements. Both the solid waste and the wash liquid will be disposed of in accordance with the waste management checklist.

After the tank is rinsed, verification sampling will be performed as described in Section 3.5. If, as expected, the sampling indicates that no COCs are present above cleanup levels, no further cleanup will be performed. The inlet/outlet pipes of the tank will be plugged with concrete and monitored to ensure a proper seal has been achieved. The lid of the tank will be then be replaced and the overburden reapplied to its original location.

In the event that field screening indicates that COCs are present adjacent to the tank at concentrations above cleanup levels, the tank will be removed from the ground. Soil material will then be removed from the perimeter of the excavation until field screening indicates that cleanup levels have been obtained. This screening will use a field-portable x-ray fluorescence (XRF) instrument to detect metals (primarily silver) that may exceed cleanup levels.

3.4 Waste Management Issues

As indicated in Section 2.3, wastes in the septic tank should be classified as RCRA hazardous wastes. Any wastes generated by this EC that are temporarily stored onsite will be placed in a designated less-than-90-day storage facility. In the event that the tank must be removed to allow for excavation of contaminated soil (as a result of detecting COCs above cleanup levels adjacent to the tank), the tank will be disposed of as non-contaminated construction debris. All soil removed from the excavation will be temporarily stored as potentially hazardous waste awaiting characterization.

3.4.1 Characterization of Materials for Disposal

Field screening of samples for radioactivity and organic vapors will be used to identify gross contamination. Previous analyses of the tank contents will be used to characterize the contents and associated wastewater, except as noted below. Characteriztion of personal protective equipment and other sampling wastes will be based on environmental sample analyses.

3.4.2 Treatment, Storage, and Disposal Plans

Wastes generated during the EC are expected to be limited to liquids and sludge (i.e., decontamination water, residual sludges within the tank, and liquid waste from the tank cleaning). Because these wastes are from a single source area, the liquids will be consolidated into one wastestream. Characterization of the wastestream prior to its consolidation may be necessary to ensure timely and economical disposal. Therefore, as concentrations of COCs are likely highest in the sludge, a sample of these residuals will be obtained during the initial field activities. This sample will be analyzed for constituents as requested by the permitted transportation and disposal facilities. A composite sample will be obtained of any excavated soil to characterize the material for disposal.

Based on 1994 sample results, the consolidated wastestream will be designated a RCRA hazardous waste. Contractors, such as the vacuum truck operators, and permitted disposal facilities to handle D-listed waste are readily available. Transportation of the wastes to the permitted disposal facility by the selected subcontractor will be handled under appropriate manifests. Once at the disposal facility, the liquid waste may require treatment, such as stabilization.

3.5 Verification Plan

Sample results obtained during the RFI indicate the tank contents are hazardous, while reported levels of contaminants in the drainfield samples show the surrounding soils are significantly below SALs. RFI field observation revealed the septic tank contained liquids and sanitary residuals after

being abandoned for 2 years. These observations indicate that significant fractures or breeches within the structure are unlikely.

Excavation of the septic tank will not be performed. However, to confirm that there has been no release of COCs from the tank, four boreholes will be installed adjacent to the tank and soil samples collected for laboratory analysis (Table 3-1). The four boreholes will be installed in accordance with LANL -ER-SOP-04.01, R0, Drilling Methods and Drill Site Management (LANL 1993, 0951). Boreholes will be located at the western wall, adjacent to the inlet port; at the eastern wall, adjacent to the outlet port; and at midpoints of the north and south walls (Figure 2-2).

For each boring, core material will be field-screened for COCs using the following methods:

- Portable XRF configured to detect silver and other metals at concentrations below 100 mg/kg
- An immunoassay field test kit capable of detecting total polycyclic aromatic hydrocarbons in soils with a detection level of 0.6 mg/kg.

The field screening will be used to identify the depth intervals evidencing the highest concentrations of COCs, and these intervals will be sampled. If screening is inconclusive, a sample will be collected from each borehole at the soil-tuff interface. Subsurface soil samples will be collected following LANL-ER-SOP-06.24, R0, Sample Collection From Split-Spoon Samplers and Shelby Tube Samplers (LANL 1993, 0951). A duplicate soil sample and rinsate blank of any reusable sampling equipment will be collected in accordance with LANL-ER-SOP-01.05, R0, Field Quality Control Samples (LANL 1993, 0951).

3.6 Site Restoration Plan

3.6.1 Return of Materials to Site

Every attempt will be made to return the excavation and its adjacent area to the preinvestigation condition. Excavated soils and unused samples will be replaced and compacted in the excavation and the ground surface returned to its original condition. Soil cuttings derived during the verification sampling will be returned to their respective boreholes.

3.6.2 Expedited Cleanup Waste

Waste storage and handling procedures to be used depend upon the type of waste generated. If contamination is suspected and the return of soil materials to the site is determined to pose a potential for increased exposure, the EC waste will be stored in a designated less-than-90-day storage area until the laboratory analysis is completed and/or the material is sent to an appropriate treatment, storage, or disposal facility. The septic tank residuals, washwater and decontamination water will be placed in containers, characterized and disposed of in accordance with waste management checklist.

3.7 Acceptance Inspection

The Laboratory proposes an Acceptance Inspection as the mechanism for DOE and EPA to assess that the Laboratory has implemented this EC Plan effectively. A minimum of 10 days' notification will be provided to the agencies before the start of field activities. At this time, a tentative date for the inspection will be agreed upon.

TABLE 3-1
SUMMARY OF VERIFICATION SAMPLES AND ANALYSES FOR 36-003(a)

Description	Samples						Field Screening				Laboratory Analyses			
	Structure		Surface		Subsurface									
	primary	duplicate	primary	duplicate	primary	duplicate	Beta-gamma	Alpha	Organic Vapor	Radiological Smear and Swipe Techniques	Metals (SW 6010/7000)*	Mercury	VOCs (SW 8260)*	SVOCs (SW 8270)*
Borehole Soil Samples					4	1	x	x	x		x	x	x	x
Disposable Equipment	x						x	x	x	x				
Equipment Rinsate	1						x	x	x		x	x	x	x
Decontamination Water(1)	1						x	x	x		x	x	x	x
Current Tank Profile(1)	1						x	x	x		x	x	x	x

x : All samples
Note: Additional samples may be taken based on field surveys and observations.
* : Applicable EPA SW-846 methods.

An Acceptance Inspection Checklist will be used to document the scope of the inspection and will become part of the EC Final Report. The checklist and the timing of the inspection will be developed by the Laboratory and agreed to by the other agencies. This inspection checklist will contain specific items, components, and requirements agreed upon by all parties to be inspected that will constitute acceptance of remediation activities.

The Acceptance Inspection will be conducted by an independent professional skilled in the appropriate technical discipline. During the final inspection, written resolution and anticipated schedule for completion will be identified for any outstanding items and documented on the inspection checklist. The Laboratory Field Project Leader (FPL) or designee will be responsible for addressing outstanding inspection items and documenting their resolution in the EC Final Report.

Upon completion of remediation activities, the Laboratory will submit a written certification to EPA Region 6, stating that the remedy has been completed in accordance with the EC Plan and Acceptance Inspection Checklist. The certification will be signed by the Laboratory and by the independent professional conducting the inspection. The certification will accompany the final EC Report.

3.8 Final Report

Following the return of analytical data from the verification sampling and completion of all field activities, a final report will be prepared. A proposed outline for this report is presented as Annex 6.8.

4.0 PROJECT MANAGEMENT

Overall implementation of this expedited cleanup will be managed by Gene Gould, FPL. Catherine Goetz of ICF Kaiser Engineers will serve as Field Team Leader (FTL) for the EC activities.

4.1 Staff and Resource Requirements

Total anticipated costs for the EC is $54,120, as detailed below.

Prefield Activities

Preparation of SSHASP		2,800
Site Preparation/Subcontractor Scheduling/Preparation of Field Plan		2,800
Subtotal		$5,600

Field Activities

Removal of tank's contents and pressure work		$5,800
Disposal of tanks residuals and wastewater		3,600
Site restoration/reseeding		1,000
Equipment to be rented:		
Backhoe @ $500/week		$500
LANL drill rig		0
Subtotal		$10,900

Personnel Costs

ICF Kaiser FTL	$70/hr x 6 days	$3,360
Site Health and Safety Officer	$70/hr x 6 days	3,360
Sample Technicians (2)	$120/hr x 4 days	3,840
Backhoe Operator	$60/hr x 2 days	960
Subtotal		$11,470

Analytical Costs

Verification sampling 6 samples x $2,500		$15,000
Waste disposal characterization (2 samples)		5,000
Subtotal		$20,000

Post-Field Activities

Acceptance Inspection		500
Final Report		5,600
Subtotal		$6,100
TOTAL ESTIMATED COST		**$54,120**

4.2 Schedule

The proposed EC schedule is shown in Table 4-1. The submittal of this EC Plan to EPA in June 1995 will initiate the 60-day public review/comment period. No sooner than 15 days after the start of this period, a public meeting will be held. Preparation of field work and development of implementation plans will be conducted concurrent to the public review period. Should this proposed EC Plan be approved by the agencies and the public, implementation of the remaining EC activities will be initiated in July. Completion of field work and the Acceptance Inspection should be completed in August, and the EC Final Report will be submitted by the end of September 1995.

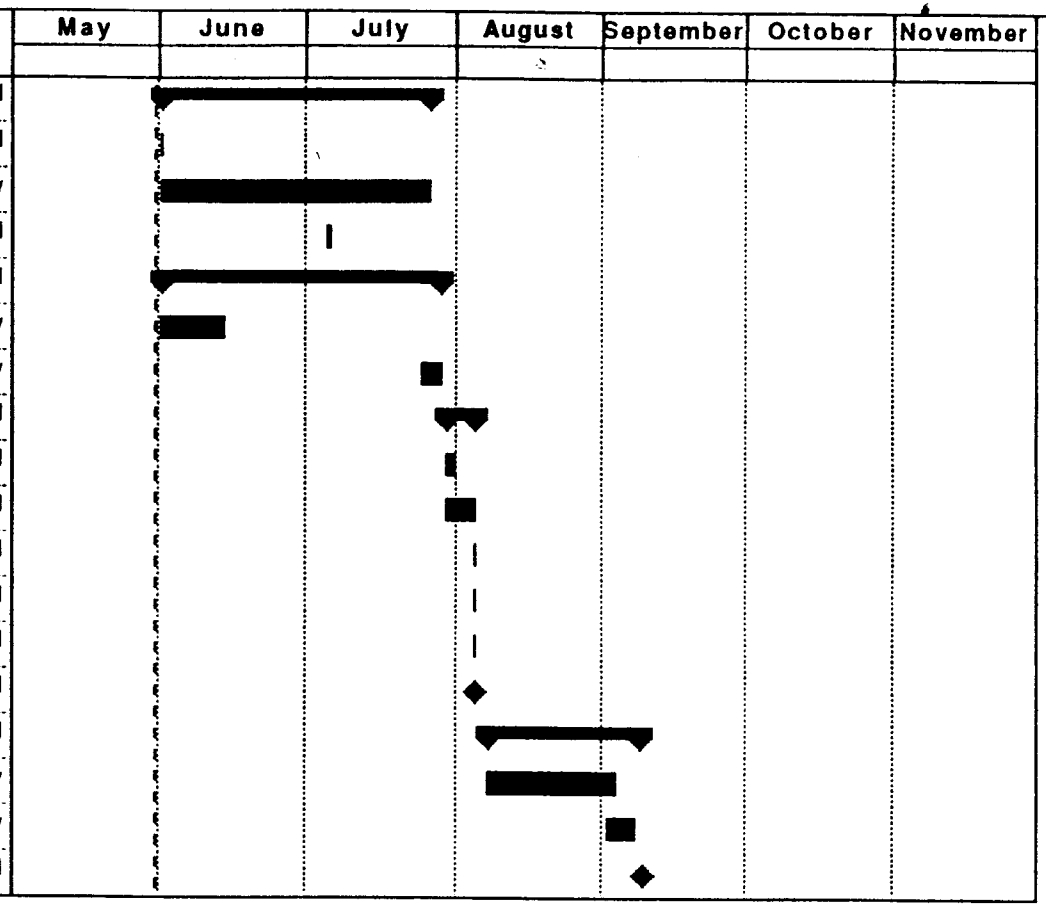
4.3 Stakeholder Notifications

Stakeholder notifications are an integral part of the procedure for conducting ECs. The ER Project will notify state and local governments, external and internal stakeholders, and individuals on the ER Project mailing list of the availability of the EC Plan. The EC Plan will be available to the stakeholders at the LANL Community Reading Room in Los Alamos, at the document repositories at the Los Alamos, Española, and Santa Fe public libraries, and at the Governor's Office at San Ildefonso Pueblo.

The submission of this EC Plan to EPA will trigger publication of a public notice indicating the start of the 60-day public comment period.

TABLE 4-1 PROPOSED SCHEDULE FOR SWMU 36-003(a)

ID	Name	Duration
1	1 PUBLIC ACCEPTANCE	55.38ed
2	1.1 SUBMIT EC PLAN TO EPA	1d
3	1.2 PUBLIC COMMENTS	8w
4	1.3 PUBLIC MEETINGS	1d
5	2 PLANNING	57.38ed
6	2.1 PREPARE HEALTH/SAFETY PLAN	2w
7	2.2 FIELD WORK PLANNING	1w
8	3 IMPLEMENT EXPEDITED CLEANUP	6.38ed
9	3.1 MOBILIZATION	1d
10	3.2 PERFORM CLEAN UP	5d
11	3.3 SITE RESTORATION	1d
12	3.4 INSPECTION & SUPERVISION	1d
13	3.5 DEMOBILIZATION	1d
14	3.6 COMPLETE EC	0d
15	4 ANALYSIS AND REPORT PREPARTION	32.38ed
16	4.1 SAMPLE ANALYSIS	4w
17	4.2 PREPARE FINAL REPORT	1w
18	4.3 SUBMIT REPORT	0d



Project: SWMU 36-003(a) schedul
Date: 5/31/95

Critical — Noncritical — Progress — Milestone — Summary

ICF KAISER ENGINEERS, INC.

5.0 REFERENCES

DOE (U.S. Department of Energy), October 1987. "Phase I: Installation Assessment, Los Alamos National Laboratory," Volumes 1 and 2, (draft), Comprehensive Environmental Assessment and Response Program, Albuquerque Operations Office, Albuquerque, New Mexico. (DOE 1987, 0264) (Title for Volume 2 not included).

EPA (US Environmental Protection Agency), July 27, 1990. "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," proposed rule, Title 40 Parts 264, 265, 270, and 271, Federal Register, Vol. 55., pp. 30798-30884 (EPA 1990, 0432).

LANL (Los Alamos National Laboratory) April 1993. "Administrative and Quality Procedures for Environmental Restoration," Los Alamos National Laboratory Report, Los Alamos, New Mexico. (LANL 1993, 0951).

LANL (Los Alamos National Laboratory), January 1993. "Los Alamos National Laboratory Environmental Restoration Program Standard Operating Procedures," Los Alamos National Laboratory Report, Los Alamos, New Mexico. (LANL 1993, 0875).

LANL (Los Alamos National Laboratory), June 1993. "RFI Work Plan for Operable Unit 1130," Los Alamos National Laboratory Report LA-UR-93-1152, Los Alamos, New Mexico. (LANL 1993, 1088).

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Volumes I through IV, Los Alamos National Laboratory Report No. LA-UR-90-3400, prepared by International Technology Corporation under Contract 9-XS8-0062R-1, Los Alamos, New Mexico. (LANL 1990, 0145).

LANL (Los Alamos National Laboratory), November 1993. "Installation Work Plan for Environmental Restoration," Revision 3, Los Alamos National Laboratory Report LA-UR-93-3987, Los Alamos, New Mexico. (LANL 1993, 1017).

LANL (Los Alamos National Laboratory), February 1995. "Installation Work Plan for Environmental Restoration," Revision 4, Los Alamos National Laboratory Report LA-UR-95-740, Los Alamos, New Mexico. (LANL 1995, 1164).

6.0 ANNEXES

6.1 Implementation SOPs

See Environmental Restoration Standard Operating Procedures, Volumes I and II, November 17, 1993, Los Alamos National Laboratory.

6.2 Quality Assurance Plan

See Quality Program Plan And Quality Assurance Project Plan For Environmental Restoration, last revision January 1993, May 1991, Los Alamos National Laboratory, Los Alamos, New Mexico.

6.3 Health and Safety Plan

See Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project Health and Safety Plan (HASP) (LANL, February 11, 1995).

6.4 Records Management Plan

See Installation Work Plan for Environmental Restoration, Revision 4, Chapter IV, Records Management Program Plan.

6.5 Public Involvement Plan

See Installation Work Plan for Environmental Restoration, Revision 4, Chapter V, Public Involvement Program Plan.

6.6 Methodology for Development of Preliminary Remedial Goals to Demonstrate Clean Closure

6.7 Field Work Approval Form

6.8 Proposed Outline for Expedited Cleanup Final Report

6.9 RFI Analytical Reports

ANNEX 6.6

METHODOLOGIES FOR DEVELOPING SITE-SPECIFIC PRELIMINARY REMEDIAL GOALS TO DEMONSTRATE CLEAN CLOSURE

1.0 APPROACH

Risk-based cleanup levels will be calculated for those constituents failing the screening assessment (comparison to SALs and background concentrations, including the analysis of multiple constituents) as documented in the RFI Report for this SWMU. Those contaminants failing the screening assessment phase will be called contaminants of concern (COCs) for the EC.

For those constituents that fail the screening assessment, cleanup levels will be calculated using EPA equations and default input parameters modified for site-specific information. Due to the location of this SWMU, cleanup levels will be based on a reasonable maximum exposed individual (a health working adult) under a continued laboratory operations land use scenario.

Under the EPA default industrial land use scenario, risk due to exposure to contaminants in soil is assumed to be due to direct ingestion, inhalation of volatiles from the soil, inhalation of particulates from the soil, and dermal exposure. For intrusive work (e.g., soil excavation), it is also assumed that there is a greater potential for the use of heavy equipment and thus a greater potential for soils to be disturbed and produce particulate and volatile emissions than in most residential and recreational land use scenarios. EPA default parameters are based on the type of industrial exposure activities expected after cleanup, and the physical properties of the COCs. One set of circumstances includes parameters such as exposure frequency and exposure duration, which are adjusted to reflect a maintenance worker versus a construction worker (or surface versus subsurface contamination scenarios), depending on the type of continued laboratory operations activity expected (i.e., non-intrusive or intrusive, respectively). The most conservative calculated cleanup goal (i.e., intrusive or non-intrusive) for a particular analyte will be used as the target cleanup level. Negotiation and agreement on the site-specific cleanup level parameters will have to be reached by appropriate Stakeholders per implementation of the EC and Permit Modification processes.

2.0 PRG EQUATIONS

Calculations of PRGs are consistent with Risk Assessment Guidance for Superfund (RAGS) Part B (EPA 1991) but also consider updates to the RAGS Part B equations (EPA 1994). The PRGs will use the most current sources of EPA-approved toxicity criteria such as the Integrated Risk Information System (IRIS), the Health Effects Assessment Summary Table (HEAST), and the Environmental Criteria and Assessment Office (ECAO). Should no toxicity criteria be available from the primary source of information (i.e., IRIS) for a specific route of exposure (i.e., inhalation or oral), the other two sources (HEAST and ECAO) will be consulted. Should toxicity criteria be available for only one route of exposure (i.e., either inhalation or oral), the missing toxicity criteria will be derived from the available route-specific toxicity criteria for that constituent. Equations 1 and 2 are used to calculate PRGs for carcinogenic and noncarcinogenic contaminants, respectively. The methodology backcalculates a soil concentration for carcinogens from a target cancer risk value of 10^{-4} (i.e., 1 in 10,000) and for non-carcinogens from a target hazard quotient of 1. The equations for soil combine across pathways for direct exposure (i.e., ingestion, skin contact, and inhalation).

To calculate soil PRGs, the cancer slope factor and reference dose (RfD) for dermal exposure is calculated in Equations 3 and 4, respectively. For volatile chemicals in soil, a chemical-specific volatilization factor is calculated in Equation 5.

Should COCs for this EC contain radionuclides, cleanup levels based on an acceptable level of dose to the worker (i.e., 100 mrem/year) will be calculated using the RESRAD code. The exposure parameters described in this document, and other inputs as required to successfully run the model for the final exposure scenario will be incorporated.

Equation 1: Direct Exposures to Carcinogenic Constituents in Industrial Soil

$$C(mg/kg) = \frac{TR \times BW_a \times AT_c \times 365 d/y}{EF_o \times ED_o \left[\frac{IRS_o \times CSF_o}{10^6\ mg/kg} + \frac{SA_a \times CSF_d \times AF \times ABS}{10^6\ mg/kg} + IRA_a \times CSF_i \times \left(\frac{1}{VF_s} + \frac{1}{PEF} \right) \right]}$$

Where:

C(mg/kg) = Preliminary remedial goal for soil based on exposure to carcinogenic constituents (mg/kg)

TR = Target cancer risk (unitless)
Considered to be 1×10^{-4}

BW_a = Body weight, adult (kg)
Considered to be 70 kg (EPA 1991a)

AT_c = Averaging Time - cancer (years)
Considered to be 70 years (EPA 1991a)

EF_o = Exposure Frequency - occupational (d/y)
NONINTRUSIVE
Considered to be 200 d/y
Based on 250 d/y (EPA 1991a) minus 50 workdays when soil is wet or covered with snow
INTRUSIVE
Considered to be 90 d/y (LANL, 1993)

ED_o = Exposure duration - occupational (years)
NONINTRUSIVE
Considered to be 25 years (EPA 1991a)
INTRUSIVE
Considered to be 1 year (LANL 1993)

IRS_o = Soil ingestion - occupational (mg/day)
NONINTRUSIVE
Considered to be 50 mg/day (EPA 1991a)
INTRUSIVE
Considered to be 480 mg/day (LANL 1993)

CSF_o = Cancer slope factor-oral $(mg/kg\text{-}d)^{-1}$ (IRIS, HEAST, or ECAO)

SA_a = Surface area, adult (cm^2)
NONINTRUSIVE
Considered to be 5000 cm^2 (EPA 1992)
INTRUSIVE
Considered to be 3200 cm^2

CSF_d = Cancer slope factor-dermal $(mg/kg\text{-}d)^{-1}$
(See Equation 3)

AF = Adherence factor (mg/cm^2)
Considered to be 0.2 mg/cm^2 (EPA 1992)

ABS = Skin absorption
Considered to be 0.1 for organics (EPA 1994)
Considered to be 0.01 for inorganics (EPA 1994)

IRA_a = Inhalation rate - adult (m^3/day)
Considered to be 20 m^3/day (EPA 1991a)

CSF_i = Cancer slope factor-inhalation $(mg/kg\text{-}d)^{-1}$ (IRIS, HEAST, or ECAO)

VF_s = Volatilization factor for soil (m^3/kg)
(See Equation 5)

PEF = Particulate emission factor (m^3/kg)
Considered to be $1.32 \times 10^{+9}$ m^3/kg (EPA 1994)

Equation 2: Direct Exposures to Noncarcinogenic Constituents in Industrial Soil

$$C(mg/kg) = \frac{THQ \times BW_a \times ED_o \times 365\ d/y}{EF_o \times ED_o \left[\frac{1}{RfD_o} \times \frac{IRS_o}{10^6 mg/kg} + \frac{1}{RfD_d} \times \frac{SA_a \times AF \times ABS}{10^6 mg/kg} + \frac{1}{RfD_i} \times \left(\frac{IRA_a}{VF_s} + \frac{IRA_a}{PEF} \right) \right]}$$

Where:

$C(mg/kg)$ = Preliminary remedial goal for soil based on exposure to noncarcinogenic constituents (mg/kg)

THQ = Target hazard quotient (unitless)
Considered to be 1

BW_a = Body weight, adult (kg)
Considered to be 70 kg (EPA 1991a)

ED_o = Exposure duration - occupational (years)
NONINTRUSIVE
Considered to be 25 years (EPA 1991a)
INTRUSIVE
Considered to be 1 year (LANL 1993)

EF_o = Exposure Frequency - occupational (d/y)
NONINTRUSIVE
Considered to be 200 d/y
Based on 250 d/y (EPA 1991a) minus 50 workdays when soil is wet or covered with snow
INTRUSIVE
Considered to be 90 d/y (LANL, 1993)

RfD_o = Reference dose-oral (mg/kg-d) (IRIS, HEAST, or ECAO)

IRS_o = Soil ingestion - occupational (mg/day)
NONINTRUSIVE
Considered to be 50 mg/day (EPA 1991a)
INTRUSIVE
Considered to be 480 mg/day (LANL 1993)

RfD_d = Reference dose-dermal (mg/kg-d) (IRIS, HEAST, or ECAO)
(See Equation 4)

SA_a = Surface area, adult (cm^2)
NONINTRUSIVE
Considered to be 5000 cm^2 (EPA 1992)
INTRUSIVE
Considered to be 3200 cm^2

AF = Adherence factor (mg/cm^2)
Considered to be 0.2 mg/cm^2 (EPA 1992)

ABS = Skin absorption
Considered to be 0.1 for organics (EPA 1994)
Considered to be 0.01 for inorganics (EPA 1994)

RfD_i = Reference dose inhalation (mg/kg-d) (IRIS, HEAST, or ECAO)

IRA_a = Inhalation rate - adult (m^3/day)
Considered to be 20 m^3/day (EPA 1991a)

VF_s = Volatilization factor for soil (m^3/kg)
(See Equation 5)

PEF = Particulate emission factor (m^3/kg)
Considered to be $1.32 \times 10^{+9}$ m^3/kg (EPA 1994)

Equation 3: Dermal Cancer-Slope Factor (CSFd) Based Upon Absorbed Dose

Cancer slope factors based upon administered doses will be adjusted for absorption to obtain estimates of potential dermal cancer-slope factors (1992). Where absorption factors and oral cancer slope factors are available, dermal cancer-slope factors will be calculated using the following equation:

$$CSF_{absorbed} = \frac{CSF_{administered}}{A_{bs}}$$

Where:

$CSF_{absorbed}$ = cancer-slope factor based on absorbed dose
$CSF_{administered}$ = oral cancer-slope factor
A_{bs} = oral absorption factor

Equation 4: Dermal Reference Dose (RfDd) Based Upon Absorbed Dose

Reference doses based upon administered doses will be adjusted for absorption to obtain estimates of potential dermal reference doses (1992). Where absorption factors and oral reference doses are available, dermal reference doses will be calculated using the following equation:

$$RfD_{absorbed} = RfD_{administered} \times A_{bs}$$

Where:

$RfD_{absorbed}$ = reference dose based on absorbed dose
$RfD_{administered}$ = oral reference dose
A_{bs} = oral absorption factor

Equation 5: Derivation of the Volatilization Factor

$$VF(m^3/kg) = \frac{LS \times V \times DH}{A} \times \frac{(\pi \times \alpha \times T)^{1/2}}{2 \times D_{ei} \times P_a \times K_{as} \times 10^{-3}\ kg/g}$$

Where:

$$\alpha = \frac{D_{ei} \times P_a}{P_a + \frac{(\rho_s)\ (1-P_a)}{K_{as}}}$$

VF = Volatization factor (m^3/kg)

LS = Length of side of contaminated area (m) Considered to be 45 m

V = Windspeed in mixing zone (m/s) Considered to be default of 2.25 m/s

DH = Diffusion height (m) Considered to be default of 2 m

A = Area of contamination (cm^2) Considered to be 20,000,000 cm^2

D_{ei} = Effective diffusivity (cm^2/s) Considered to equal to $D_i(P_a^{3.33}/P_i^2)$

P_a = Air-filled soil porosity (unitless) Considered to be equal to P_i-θß

P_i = Total soil porosity (unitless) Considered to be equal to 1-(ß/P_s)

θ = Soil moisture content (cm^3-water/g-soil) Considered to be default of 0.1 cm^3-water/g-soil

ß = Soil bulk density (g/cm^3) Considered to be default of 1.5 g/cm^3

ρ_s = True soil density or particle density (g/cm^3) Considered to be default of 2.65 g/cm^3

K_{as} = Soil-air partition coefficient (g-soil/cm^3-air) Considered to be equivalent to (H/K_s) x 41 (41 is a conversion factor)

T = Exposure interval (s) Considered to be 28,800 s (8 hr)

D_i = Diffusivity in air (cm^2/s) Chemical-specific

H = Henry's Law constant (atm-m^3/mol) Chemical-specific

K_s = Soil-water partition coefficient (cm^3/g) K_{OC}xOC

OC Organic carbon content of soil (fraction) Considered to be default of 0.02

3.0 References

EPA (U.S. Environmental Protection Agency), December 1989. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim Final Report, EPA/540/1-89/002, Office of Emergency and Remedial Response, Washington, D.C., 1989. (EPA 1989)

EPA (U.S. Environmental Protection Agency), July 27, 1990. "Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities," proposed rule, 40 CFR Parts 264, 265, 270, and 271, Federal Register, Vol. 55, No. 145, pp. 30798-30884, July 27, 1990. (EPA 1990)

EPA (U.S. Environmental Protection Agency), March 25, 1991. 'Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance,' "Standard Default Exposure Factors," Interim Final, OSWER Directive 9285.6-03, Office of Solid Waste and Emergency Response, Toxics Integration Branch, Washington, D.C., 1991 (EPA 1991a)

EPA (U.S. Environmental Protection Agency), 1991. "Risk Assessment Guidance for Superfund, Volume I--Human Health Evaluation Manual (Part B: Development of Risk-Based Preliminary Remediation Goals)," Interim, EPA/540/1-89/002, Office of Emergency and Remedial Response, Washington, D.C. (EPA 1991)

EPA (U.S. Environmental Protection Agency), January 1992. "Dermal Exposure Assessment: Principles and Applications," Interim Report, EPA/600/8-91/011B, Office of Research and Development, Washington D.C., 1992 (EPA 1992)

EPA (U.S. Environmental Protection Agency Region IX), August 1994. Region IX Preliminary Remediation Goals (PRGs), Second Half 1994. Memo from Standford J. Smucker, Ph.D., Regional Toxicologist (H-9-3), Technical Support Section to PRG Table Mailing List. (EPA 1994)

LAC 1991: Los Alamos County Community Development Department, "Los Alamos Development Code," Chapter 17.42, Site Development Requirements, 1991.

LANL 1993: Los Alamos National Laboratory, November 1993. "Installation Work Plan for Environmental Restoration," Revision 3, Los Alamos National Laboratory Report LA-UR-93-3987, Los Alamos, New Mexico. (LANL 1993)

ANNEX 6.7
FIELD WORK APPROVAL FORM

This form must be completed prior to starting site remediation field work for Expedited Cleanups that do not have an EPA-approved work plan.

I, _____, DOE-LAAO, **APPROVE** the field work as proposed in the accompanying Expedited Cleanup Plan for SWMU 36-003(a), TA-36, for the decommissioning of the inactive septic tank and drainfield.

I, _____, DOE-AL, **DO NOT APPROVE** the field work as proposed for SWMU 36-003(a),TA-36, as described in the accompanying Expedited Cleanup Plan for the decommissioning of the inactive septic tank and drainfield.

The following reasons reflect the decision for disapproval:

Signed: _____ Date: _____

ANNEX 6.8
PROPOSED OUTLINE FOR EXPEDITED CLEANUP REPORTS

1.0 Summary of Expedited Cleanup

1.1 Overview
1.2 Expedited Cleanup

2.0 Site Restoration

3.0 Modifications to the EC Plan

4.0 Quantities and Types of Waste Generated

5.0 Outstanding Items from the Acceptance Inspection

6.0 Problems Encountered and Lessons Learned

APPENDICES

A Analytical Data
B Acceptance Inspection Checklist
C Wastestream Inventory
D Photographs
E Certification of Completion

ANNEX 6.9
RFI ANALYTICAL REPORTS

MEASURED CONCENTRATIONS OF COPCs FOR OU 1130

Location	Sample # and Location ID	Sample Type	Units	Metals	Cyanide	SVOCs	VOCs	SALs mg/kg	CRQLs mg/kg	Background mg/kg
Septic Tank	AAB1873	Sludge	ug/L	35,000 Calcium (J)	None Detected	None Detected	None Detected	~	1000	54400
East Bldg-1	36-3094	(Watery)	ug/L	15.6 Chromium				400	2	34.2
TA-36			ug/L	264 Iron (J)				~	20	35600
			ug/L	16,900 Potassium (J)				~	1000	6180
			ug/L	5010 Magnesium (J)				~	1000	16100
			ug/L	18,000 Sodium (J)				~	1000	1880
			ug/L	5.3 Lead (J)				400	0.6	39
Septic Tank	AAB1874	Sludge	ug/L	11.3 Silver	None Detected	None Detected	None Detected	400	2	~
East Bldg-1	36-3095	(Watery)	ug/L	27,600 Calcium (J)				~	1000	54400
TA-36			ug/L	22.9 Chromium				400	2	34.2
			ug/L	349 Iron (J)				~	20	35600
			ug/L	13,000 Potassium (J)				~	1000	6180
			ug/L	14,300 Sodium (J)				~	1000	1880
			ug/L	3.7 Lead (J)				400	0.6	39
Septic Tank	AAB1875	Sludge	ug/L	14 Silver	None Detected	None Detected	None Detected	400	2	~
East Bldg-1	36-3095	(Watery)	ug/L	40,500 Calcium (J)				~	1000	54400
TA-36			ug/L	252 Iron (J)				~	20	35600
			ug/L	19,600 Potassium (J)				~	1000	6180
			ug/L	5820 Magnesium (J)				~	1000	16100
			ug/L	20,700 Sodium (J)				~	1000	1880
			ug/L	8.8 Lead (J)				400	0.6	39
Septic Tank	AAB1876	Septic	ug/L	**10,800 Silver**				400	2	~
East Bldg-1	36-3096	Water	ug/L	29,100 Aluminum (J)				~	40	58900
TA-36			ug/L	2300 Barium (J)				5600	40	1140
			ug/L	259,000 Calcium (J)				~	1000	54400
			ug/L	21 Cadmium (J)				80	1	2.7
			ug/L	**451 Chromium**				400	2	34.2
			ug/L	73,900 Iron (J)				~	20	35600
			ug/L	**66.4 Mercury**				24	0.04	0.1
			ug/L	28,300 Potassium (J)				~	1000	6180
			ug/L	18,300 Magnesium (J)				~	1000	16100
			ug/L	1,000 Manganese (J)				11000	3	1030
			ug/L	24,000 Sodium (J)				~	1000	1880
			ug/L	102 Nickel (J)				1600	8	26.7
			ug/L	290 Lead (J)				400	0.6	39
			ug/L	24.2 Selenium				400	1	1.7
			ug/L	392 Vanadium (J)				560	10	66
			ug/L		61.4 Cyanide			1600	2	~
			ug/L			.044 1,4 p-Dichlorobenzene		29	0.33	~
			ug/L				.049 2 Butanone	4000	0.01	~
			ug/L				.210 Carbon Disulfide	7.4	0.01	~
			ug/L				.014 1,4 p-Dichlorobenzene	29	0.33	~

Values above SALs are shown in boldface
(J) = Indicates estimated value
NA = Not Applicable, ~ = Not Avail

MEASURED CONCENTRATIONS OF COPCs FOR OU 1130

Location	Sample # and Location ID	Sample Type	Units	Metals	Cyanide	SVOCs	VOCs	SALs mg/kg	CRQLs mg/kg	Background mg/kg
Septic Tank	AAB1877	Septic	ug/L	**17,900 Silver**	None Detected	None Detected		400	2	~
East of Bldg	36-3097	Water	ug/L	42,000 Aluminum (J)				~	400	58900
TA-36			ug/L	3350 Barium (J)				5600	40	1140
			ug/L	178,000 Calcium (J)				~	1000	54400
			ug/L	30 Cadmium (J)				80	1	2.7
			ug/L	**780 Chromium**				400	2	34.2
			ug/L	109,000 Iron (J)				~	20	35600
			ug/L	11.5 Mercury				24	0.04	0.1
			ug/L	28,700 Potassium (J)				~	1000	6180
			ug/L	17,400 Magnesium (J)				~	1000	16100
			ug/L	855 Manganese (J)				11000	3	1030
			ug/L	25,600 Sodium (J)				~	1000	1880
			ug/L	128 Nickel (J)				1600	8	26.7
			ug/L	270 Lead (J)				400	0.6	39
			ug/L	**659 Vanadium (J)**				560	10	66
			ug/L							
			ug/L				.028 Carbon Disulfide	7.4	0.01	~
			ug/L				.034 1,4 p-Dichlorobenzene	29	0.33	~
Septic Tank	AAB1878	Septic	ug/L	**18,300 Silver**	None Detected			400	2	~
East of Bldg	36-3097	Water	ug/L	20,600 Aluminum (J)				~	400	58900
TA-36			ug/L	16.7 Arsenic				~	2	11.6
			ug/L	1670 Barium (J)				5600	40	1140
			ug/L	107,000 Calcium (J)				~	1000	54400
			ug/L	15.4 Cadmium (J)				80	1	2.7
			ug/L	**402 Chromium**				400	2	34.2
			ug/L	47,400 Iron (J)				~	20	35600
			ug/L	3.79 Mercury				24	0.04	0.1
			ug/L	25,100 Potassium (J)				~	1000	6180
			ug/L	11,600 Magnesium (J)				~	1000	16100
			ug/L	395 Manganese (J)				11000	3	1030
			ug/L	23,400 Sodium (J)				~	1000	1880
			ug/L	60.7 Nickel (J)				1600	8	26.7
			ug/L	142 Lead (J)				400	0.6	39
			ug/L	364 Vanadium (J)				560	10	66
			ug/L			.023 1,4 p-Dichlorobenzene		29	0.33	~
			ug/L				.038 Carbon Disulfide	7.4	0.01	~
			ug/L				.006 Chlorobenzene	67	0.01	~
			ug/L				.013 Chloromethane	6.4	0.01	~
			ug/L				.015 1,4 p-Dichlorobenzene	29	0.33	~
BHI Sample	AAB1892	Soil	mg/kg	2,200 Aluminum	None Detected	None Detected	None Detected	~	400	58900
at Soil Tuff	36-3052		mg/kg	1,140 Calcium				~	1000	54400
Interface			mg/kg	3.3 Chromium				400	2	34.2
			mg/kg	9 Copper				3000	5	15.7
			mg/kg	7030 Iron				~	20	35600
			mg/kg	0.21 Mercury				24	0.04	0.1
			mg/kg	122 Mangenese				11000	3	1030
			mg/kg	4.5 Lead				400	0.6	39
			mg/kg	43.2 Zinc				24000	4	101

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MEASURED CONCENTRATIONS OF COPCs FOR OU 1130

Location	Sample # and Location ID	Sample Type	Units	Metals	Cyanide	SVOCs	VOCs	SALs mg/kg	CRQLs mg/kg	Background mg/kg
BH1 Sample	AAB1894	Soil	mg/kg	19,400 Aluminium	None Detected	None Detected	None Detected	~	40	58900
at 2 ft into	36-3052		mg/kg	3.2 Arsenic				~	2	11.6
Tuff			mg/kg	96.6 Barium				5600	40	1140
			mg/kg	2.1 Beryllium				~	1	3.31
			mg/kg	4520 Calcium				~	1000	54400
			mg/kg	1.4 Cadmium				80	1	2.7
			mg/kg	13 Chromium				400	2	34.2
			mg/kg	13 Copper				3000	5	15.7
			mg/kg	19,500 Iron				~	20	35600
			mg/kg	0.13 Mercury				24	0.04	0.1
			mg/kg	2590 Potassium				~	1000	6180
			mg/kg	3220 Magnesium				~	1000	16100
			mg/kg	203 Manganese				11000	3	1030
			mg/kg	10.6 Lead				400	0.6	39
			mg/kg	28.4 Vanadium				560	10	66
			mg/kg	66.1 Zinc				24000	4	101
BH2 Sample	AAB1893	Soil	mg/kg	1,650 Aluminum	None Detected		None Detected	~	40	58900
at Soil Tuff	36-3053		mg/kg	3.9 Chromium				400	2	34.2
Interface			mg/kg	9 Copper				3000	5	15.7
			mg/kg	6,340 Iron				~	20	35600
			mg/kg	0.17 Mercury				24	0.04	0.1
			mg/kg	84.5 Manganese				11000	3	1030
			mg/kg	9.6 Lead				400	0.6	39
			mg/kg	44 Zinc				24000	4	101
			mg/kg			.610 Di-n-butylphthalate		8000	0.33	~
BH2 Sample	AAB1897	Soil	mg/kg	1,970 Aluminum	None Detected		None Detected	~	40	58900
at Soil Tuff	36-3053		mg/kg	3.6 Chromium				400	2	34.2
Interface			mg/kg	10 Copper				3000	5	15.7
			mg/kg	5,560 Iron				~	20	35600
			mg/kg	0.18 Mercury				24	0.04	0.1
			mg/kg	75.8 Manganese				11000	3	1030
			mg/kg	9.3 Lead				400	0.6	39
			mg/kg	40.8 Zinc				24000	4	101
			mg/kg			.420- Di-n-butylphthalate				
BH2 Sample	AAB1898	Soil	mg/kg	1,110 Aluminum	None Detected		None Detected	~	40	58900
at 2ft into	36-3053		mg/kg	5,940 Iron				~	20	35600
Tuff			mg/kg	99.4 Manganese				11000	3	1030
			mg/kg	4.7 Lead				400	0.6	39
			mg/kg	38.7 Zinc				24000	4	101
			mg/kg			2.100 Bis(2-ethylhexyl)phthalate				

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MEASURED CONCENTRATIONS OF COPCs FOR OU 1130

Location	Sample # and Location ID	Sample Type	Units	Metals	Cyanide	SVOCs	VOCs	SALs mg/kg	CRQLs mg/kg	Background mg/kg
BH3 Sample	AAB1900	Soil	mg/kg		None Detected	None Detected	None Detected			
at Soil Tuff	36-3054		mg/kg							
Interface			mg/kg	864 Aluminum(s)				~	40	58900
			mg/kg	0.56 Chromium(s)				400	2	34.2
			mg/kg							
			mg/kg							
BH3 Sample	AAB1901	Soil	mg/kg	2,300 Aluminum		None Detected	None Detected	~	40	58900
2ft into Tuff	36-3054		mg/kg	2.2 Chromium				400	2	34.2
			mg/kg	4,480 Iron				~	20	35600
			mg/kg	180 Manganese				11000	3	1030
			mg/kg	3 Lead				400	0.6	39
			mg/kg	22.8 Zinc				24000	4	101
			mg/kg		0.97 Cyanide			1600	2	~
BH4 Sample	AAB1903	Soil	mg/kg	3,310 Aluminum	None Detected	None Detected	None Detected	~	40	58900
at Soil	36-3055		mg/kg	2.3 Chromium				400	2	34.2
Interface			mg/kg	4,920 Iron				~	20	35600
			mg/kg	199 Manganese				11000	3	1030
			mg/kg	2.8 Lead				400	0.6	39
			mg/kg	22 Zinc				24000	4	101
BH4 Sample	AAB1904	Soil	mg/kg	2,420 Aluminum	None Detected	None Detected	None Detected	~	40	58900
at 2ft into	36-3055		mg/kg	2.7 Chromium				400	2	34.2
Tuff			mg/kg	3,620 Iron				~	20	35600
			mg/kg	115 Manganese				11000	3	1030
			mg/kg	5.1 Lead				400	0.6	39
			mg/kg	21.1 Zinc				24000	4	101
			mg/kg							
			mg/kg							
BH4 Sample	AAB1895	Soil	mg/kg	None Detected	None Detected	None Detected				
2ft into Tuff	36-3055		mg/kg				.015 Methylene Chloride	5.6	0.01	~
			mg/kg							
BH5 at	AAB1906	Soil	mg/kg	2,650 Aluminum	None Detected	None Detected	None Detected	~	40	58900
Soil Tuff	36-3056		mg/kg	7,770 Iron				~	20	35600
Interface			mg/kg	141 Manganese				11000	3	1030
			mg/kg	5.1 Lead				400	0.6	39
			mg/kg	45.8 Zinc				24000	4	101

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MEASURED CONCENTRATIONS OF COPCs FOR OU 1130

Location	Sample # and Location ID	Sample Type	Units	Metals	Cyanide	SVOCs	VOCs	SALs mg/kg	CRQLs mg/kg	Background mg/kg
BH5 at	AAB1907	Soil	mg/kg	12,500 Aluminum	None Detected	None Detected	None Detected	~	40	58900
2 ft into	36-3056		mg/kg	2.4 Arsenic				~	2	11.6
Tuff			mg/kg	108 Barium				5600	40	1140
			mg/kg	1.5 Beryllium				~	1	3.31
			mg/kg	2,800 Calcium				~	1000	54400
			mg/kg	8.8 Chromium				400	2	34.2
			mg/kg	8.1 Copper				3000	5	15.7
			mg/kg	14,600 Iron				~	20	35600
			mg/kg	1,720 Potassium				~	1000	6180
			mg/kg	2,290 Magnesium				~	1000	16100
			mg/kg	278 Manganese				11000	3	1030
			mg/kg	9.6 Nickel				1600	8	26.7
			mg/kg	11.2 Lead				400	0.6	39
			mg/kg	18 Vanadium				560	10	66
			mg/kg	37.6 Zinc				24000	4	101
BH6 Sample	AAB1909	Soil	mg/kg	1,870 Aluminum	None Detected	None Detected	None Detected	~	40	58900
at Tuff	36-3057		mg/kg	2.5 Chromium				400	2	34.2
Interface			mg/kg	5.6 Copper				3000	5	15.7
			mg/kg	6,530 Iron				~	20	35600
			mg/kg	158 Manganese				11000	3	1030
			mg/kg	5.4 Lead				400	0.6	39
			mg/kg	40 Zinc				24000	4	101
BH6 Sample	AAB1910	Soil	mg/kg	23,700 Aluminum	None Detected	None Detected	None Detected	~	40	58900
2ft into	36-3057		mg/kg	4.1 Arsenic				~	2	11.6
Tuff			mg/kg	95.8 Barium				5600	40	1140
			mg/kg	2 Beryllium				~	1	3.31
			mg/kg	4,270 Calcium				~	1000	54400
			mg/kg	15.9 Chromium				400	2	34.2
			mg/kg	11.9 Copper				3000	5	15.7
			mg/kg	22,700 Iron				~	20	35600
			mg/kg	2,290 Potassium				~	1000	6180
			mg/kg	4,070 Magnesium				~	1000	16100
			mg/kg	168 Manganese				11000	3	1030
			mg/kg	11.1 Nickel				1600	8	26.7
			mg/kg	18.1 Lead				400	0.6	39
			mg/kg	28.6 Vanadium				560	10	66
			mg/kg	59 Zinc				24000	4	101

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