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Mr. William Honker
Hazardous Waste Management Division
U.S. Environmental Protection Agency
Region 6
1445 Ross Ave, Suite 1200
Dallas, TX 75202-2733

Date: January 25, 1995
Refer to: EM/ER:95-J013

Dear Mr. Honker:

SUBJECT: NOTICE OF DEFICIENCY (NOD) RESPONSE FOR OPERABLE UNIT (OU) 1130 RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) WORK PLAN, WORK BREAKDOWN STRUCTURE NUMBER 1.4.2.6.1.19

Enclosed is the NOD response requesting a sampling plan for the RFI Work Plan for OU 1130. The final response is due to the Environmental Protection Agency (EPA) on Friday, January 27, 1995. The signed certification form is also attached.

If you have any questions about this material, please contact Gene Gould of my staff at (505) 667-0402.

Sincerely,

Jorg Jansen, Project Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

Environmental Restoration

Received by ER-RPF
FEB 15 1995

JJ/plp

Enclosures: NOD Response for OU 1130 Resource Conservation RFI Work Plan
Notification Form

Cy:
T. Baca, EMP, MS J591
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CERTIFICATION

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

Document Title:

Response to NOD for RFI Work Plan for OU 1130

Name: _____ Date: 1-30-95

Dennis Erickson
Division Director
Los Alamos National Laboratory

Name: _____ Date: _____

Joseph Vozella, Chief
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or

Theodore J. Taylor
Program Manager
Environmental Restoration Program
DOE-Los Alamos Area Office

SAMPLING AND ANALYSIS PLAN

PRS 36-006, SURFACE DISPOSAL AREA

LOS ALAMOS NATIONAL LABORATORY
Los Alamos, New Mexico

Prepared by: ICF KAISER ENGINEERS
Los Alamos, New Mexico
January 27, 1995

CONTENTS

1.0 DESCRIPTION AND HISTORY 1

2.0 CONCEPTUAL MODEL 1

2.1 Nature and Extent of Contamination 1

2.2 Potential Pathways and Exposure Routes 5

3.0 REMEDIATION DECISIONS AND INVESTIGATION OBJECTIVES 5

4.0 DATA NEEDS AND DATA QUALITY OBJECTIVES 6

5.0 SAMPLING AND ANALYSIS PLAN 7

5.1 Land Survey 7

5.2 Health and Safety Screening 7

5.3 Sampling 7

5.4 Laboratory Analyses 9

REFERENCES 10

List of Figures

Figure 1-1 Location of Surface Disposal Area, Firing Sites and Associated Hazardous Radii 2

Figure 1-2 Location of the Surface Disposal Area (36-006) 3

Figure 2-1 Conceptual Exposure Model for Surface Disposal Area (36-006) 4

List of Tables

Table 5-1 Summary of Sampling and Analyses for 36-006 Surface Disposal Area 8

SAMPLING AND ANALYSIS PLAN FOR PRS 36-006, SURFACE DISPOSAL AREA

1.0 DESCRIPTION AND HISTORY

PRS 36-006, known as the Surface Disposal Area, is an abandoned debris pile located in Potrillo Canyon (Figure 1-1). The site is situated approximately 100 ft north of the active firing site PRS 36-004(a) commonly referred to as Eenie (Figure 1-2). Historically, the Surface Disposal Area was used to dispose of cables, metal, concrete, and other solid waste residuals from the explosive testing performed at the TA-36 firing sites. Solid and liquid explosives as well as depleted uranium(DU) were used in these tests. It is surmised that debris from the TA-36 firing tests were transported to the edge of the steeply sloping Potrillo Canyon wall and off-loaded into the canyon. Although the firing sites are currently active, residual debris is no longer disposed of in this manner. The Surface Disposal Area received the wastes from approximately 1955 to 1970.

The Surface Disposal Area is an undeveloped area along the steeply sloping Potrillo Canyon wall (Figure 1-2). The majority of the debris occurs in a thick wedge extending down the canyon wall. The length of the pile is measured along the mesa top is approximately 75 ft. The estimated height is roughly 100 ft. The remainder of the debris is randomly scattered across approximately 300 ft of the canyon wall primarily downstream of the main pile.

2.0 CONCEPTUAL MODEL

The conceptual exposure model for the Surface Disposal Area, shown in Figure 2-1, describes the historical sources of contamination, migration pathways and conversion mechanisms, potential current sources and release mechanisms, receptor contact media, and exposure routes for released contaminants. These components of the conceptual exposure modes are described in relation to the Surface Disposal Area in the sections that follow.

2.1 Nature and Extent of Contamination

The Surface Disposal Area is an abandoned debris pile reportedly used to dispose of solid waste residuals from the explosive testing at the TA-36 firing sites. There has been no reported sampling at the site; therefore, the extent of contamination associated with the debris is not known. Potential contaminants of concern (PCOC), if they occur, are likely to be similar to those of firing sites where the debris originated.

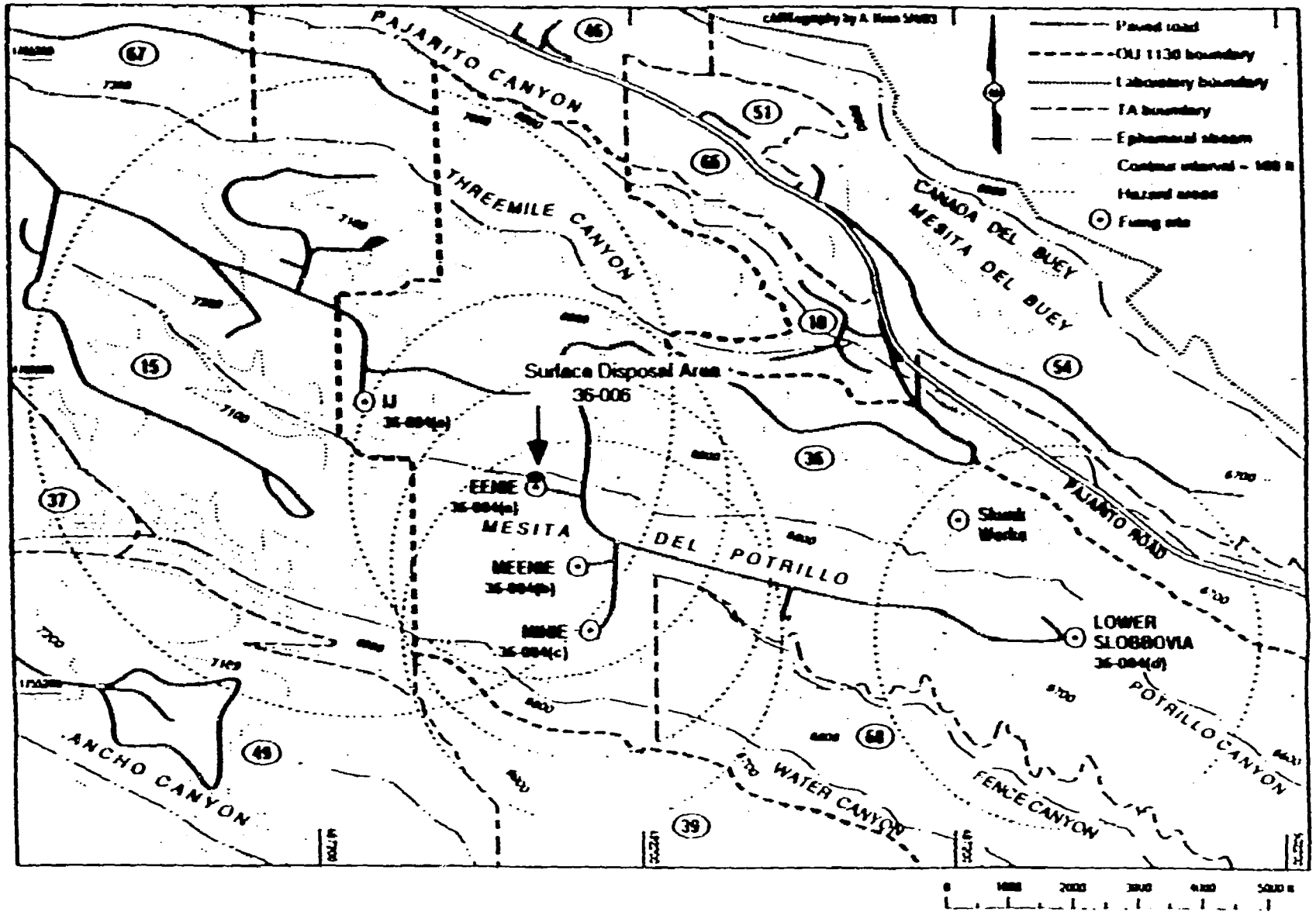

Figure 1-1. Location of Surface Disposal Area, firing sites and associated hazardous radii.

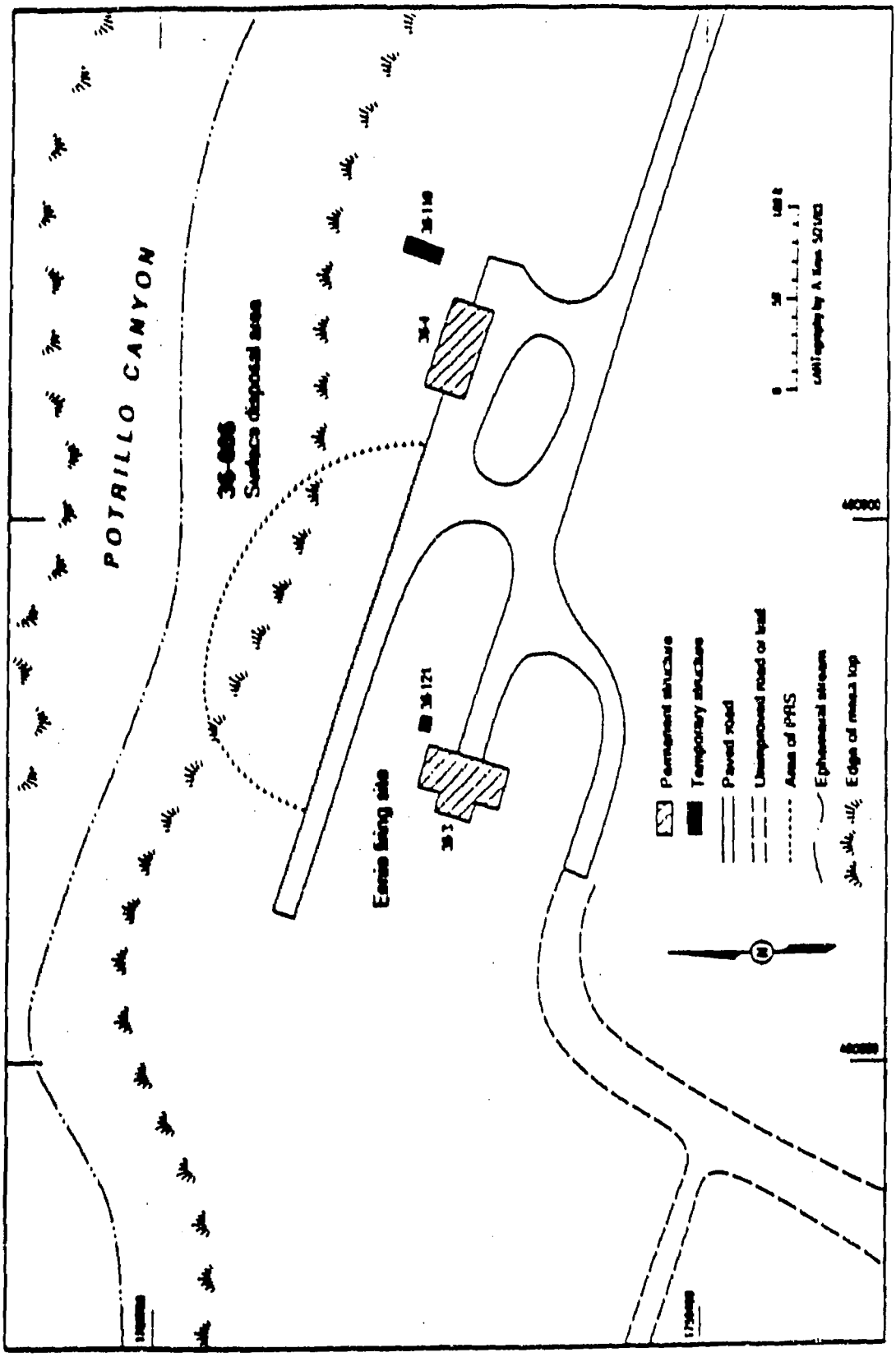

Figure 1-2. Location of the surface disposal area (36-006).

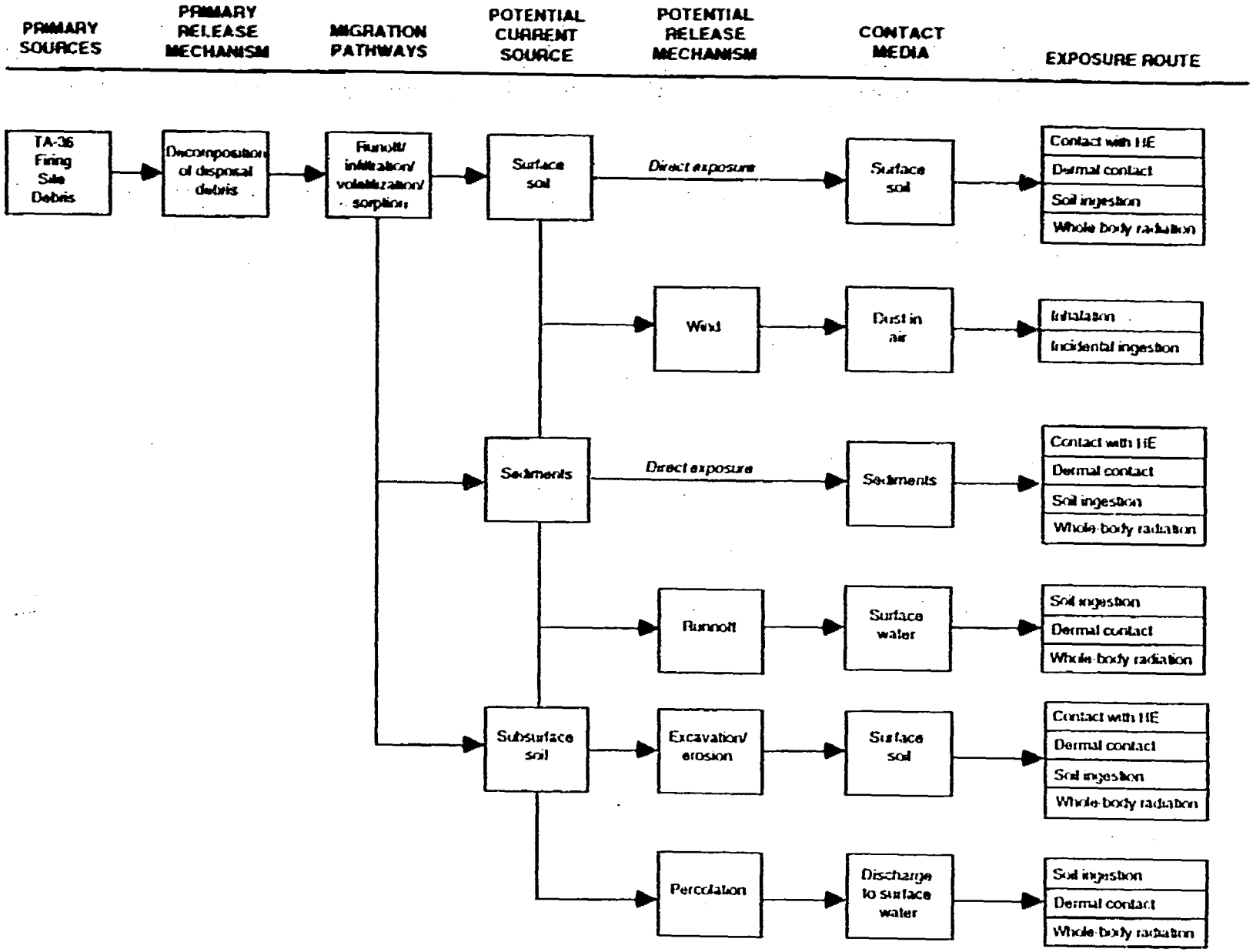

Figure 2-1. Conceptual exposure model for Surface Disposal Area (PRS 36-006)

These contaminants include solid and liquid explosive residues, DU, barium, beryllium, lead, and mercury (Henke and Van Marter 1993, 13-0093; Kelkar 1992, 13-0052; LANL 1990, 0145). The area is immediately adjacent to PRS 36-004(a) (Eenie Firing Site) and also within the hazardous radii of three other active firing sites, thus, the site continues to receive debris as a result of aerial dispersion of the firing test detonations (Figure 1-1). However, any contamination attributable to the site would have resulted from releases from hazardous or radioactive materials historically disposed in the pile.

Sampling has been performed downstream of the site in Potrillo Canyon drainage channel. Initial sediment sampling results revealed total uranium concentrations ranging from 1.3 to 60.9 ppm (Becker 1991, 0699). Additional sediment sampling was performed in 1994. Samples were obtained from the drainage channel immediately downstream of the hazardous radii of the active firing sites PRS 36-004 (a), (b), and (c). Analytical results from this sampling effort will be available in 1995.

2.2 Potential Pathways and Exposure Routes

The Surface Disposal Area is located within Potrillo Canyon extending from the mesa top to the canyon floor. The debris is abutted against the canyon wall and generally follows the slope of the wall. Release of PCOCs resulting from the erosion of the debris by surface water runoff is the most likely release mechanism. Migration of the PCOCs could then occur as fine particles of the eroded material or as contaminants subsequently adsorbed to soil particles. Because of the steep slope of the canyon wall, surface water runoff would allow migration of PCOCs to the Potrillo drainage channel. PCOCs would likely accumulate in sedimentation catchment areas within the drainage pathway. Subsurface migration from percolation could also occur in minor amounts. Wind dispersion of soil (as dust) is unlikely to be a significant migration pathway for the PCOCs associated with the debris pile.

Because the Surface Disposal Area is located within the controlled area of the Laboratory, potential human receptors are currently limited to onsite maintenance workers. Possible future receptors of surface contamination are postulated on the basis of recreational scenario. Using this scenario, hikers could come in contact with contaminated media on the slope. Contaminants of concern could be transported downstream via surface water migration and thus potentially expose hikers and campers in uncontrolled areas of the Laboratory.

3.0 REMEDIATION DECISIONS AND INVESTIGATION OBJECTIVES

The Surface Disposal Area is an abandoned site adjacent to the Eenie firing pad and within the hazardous radii of three additional TA-36 active firing sites. It is likely that the site continues to receive debris as a

result of aerial dispersion of explosives testing. The objective of this RFI sampling is to determine if contaminants are present in soil and sediments that are associated with the abandoned solid waste debris. If contaminants of concern are identified above screening action levels, further investigations may be needed to assess the extent of contamination and to develop further corrective action strategies. Sampling performed at that time would be conducted to confirm that the contaminants originated from the debris materials that compose the Surface Disposal Area and not as a result of the site serving as a structural catchment for explosive residues from the ongoing firing site detonations. If RFI sampling indicates that PCOCs are below screening action levels, no further action (NFA) for the Surface Disposal Area, as a separate PRS from the firing sites, will be proposed.

4.0 DATA NEEDS AND DATA QUALITY OBJECTIVES

The objective of the reconnaissance sampling of the Surface Disposal Area is to determine if contaminants attributable to the debris are present in surface and subsurface soils. Offsite migration of the contaminants will also be assessed. Data gathered will be compared to screening action levels to determine if contaminants are present at levels of concern. Contaminants that may be present are solid and liquid explosive residues, metals, and DU.

The most likely release mechanism for PCOCs is by erosion of the debris via surface water runoff and subsequent migration by adsorption to soil or as fine particles of the debris material along surface drainage pathways. Soil and sediment samples will be collected at points where potential contaminant concentrations are most likely to be highest. Due to the steep slope of the canyon wall, accumulation of eroded debris and PCOCs adsorbed to soils and sediments in the upper portion of the pile is not likely. Therefore, soil samples will be collected from points at the base of the debris pile. To assess if contaminants are migrating offsite, a sediment sample will be collected immediately adjacent to the Surface Disposal Area in the first sediment catchment from the site.

The subsurface migration pathway, a second, less significant potential pathway, will be assessed. The debris pile lies against the northfacing Canyon wall. The general lithology of the canyon wall consists of thin soil deposits overlying the less permeable Bandelier Tuff. The soil/tuff contact roughly parallels the slope of the canyon wall with a thickening of the soil strata in the canyon floor. As a consequence of the permeability discontinuity between the soil and tuff strata, the interface serves as a preferential subsurface pathway. Thus, the most likely subsurface migration scenario would occur from percolation of PCOCs into the surface soils lining the wall followed by migration along the soil/tuff interface towards the canyon floor. The greatest potential for accumulation of contaminants in the subsurface is at the base of the debris pile along the soil/tuff interface.

In addition, a surface soil sample will be collected upgradient to the debris pile to assess the influence of the active firing sites to the area.

5.0 SAMPLING AND ANALYSIS PLAN

The sampling and analysis plan will describe field screening and sampling that will be conducted, as well as the laboratory analyses that will be performed offsite.

5.1 Land Survey

A land survey will be performed in accordance with the LANL Survey Manual (LANL 1992, 13-0096). The surveyed location points will be logged on 2-ft-interval contour maps and the information transferred to the Facility for Information Management, Analysis, and Display (FIMAD).

5.2 Health and Safety Screening

Field screening will be used to monitor potential hazards, and health and safety conditions for on-site workers. Portable field instruments will be used to screen all samples for gross alpha, beta, and gamma; a field-portable flame-ionization detector and/or photo-ionization detector will be used to screen for volatile organic compounds; a field spot-test kit will be used to screen for explosives. All samples will be screened for explosives.

5.3 Sampling

A total of five sample locations will be designated for this reconnaissance investigation of the Surface Disposal Area (Table 5-1). Two biased surface soil sample locations within the main disposal area will be chosen. These sample areas will be obtained by using best professional judgment to select five preliminary locations for field screening. The preliminary locations will be screened for explosives (spot test), gross alpha, beta, and gamma (gross radiation detector), and relevant metals (Laser-Induced Spectroscopy, LIBS). The two preliminary locations exhibiting the highest positive screening results will then be sampled for laboratory analysis. If no field indicators are found, samples will be obtained using best professional judgment to determine the locations most likely to receive contaminants. Surface samples will be obtained from a depth of no greater than 6 in. One subsurface soil sample will be collected from the surface soil sample location which exhibits the greatest potential to have received contaminants.

TABLE 5-1

SUMMARY OF SAMPLING AND ANALYSES FOR 36-006 SURFACE DISPOSAL AREA

Description	Sampled Media	Samples						Field Screening						Laboratory Analyses											
		Structure		Surface		Subsurface																			
	soil/sediments	primary	duplicate	primary	duplicate	primary	duplicate	Beta-gamma	Alpha	Organic Vapor	Combustible gas/oxygen	Explosives (Spot Test)	Laser-Induced Breakdown Spectroscopy "LIBS"**	Gross gamma	Gamma spectroscopy	Total uranium	Isotopic uranium	Plutonium	Metals (SW 6010/7000)*	Mercury	Cyanides	VOCs (SW 8260)*	SVOCs (SW 8270)*	Explosives (SW 8330)*
Surface Disposal Area	x			2	1			x	x	x		x	x				x		x	x		x	x	x
Surface Disposal Area	x					1		x	x	x		x					x		x	x		x	x	x
Offsite Location	x			1				x	x	x		x	x				x		x	x		x	x	x
Drainage Channel	x			1				x	x	x		x					x		x	x		x	x	x
Debris	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.
** : The Standard Operating Procedure will be established prior to use in this sampling effort.

It is recognized that the surface soil sample locations may not adequately define the appropriate location for biased sampling of the subsurface. Therefore, visual indicators and best professional judgment will be utilized to confirm the subsurface soil sample location.

The Potrillo Canyon drainage channel will be sampled at the first sediment trap from the Surface Disposal Area. The sediment sample location will be based on field indicators and proximity to the site.

The final sample location will be collected upgradient from the observed potential contamination of the Surface Disposal Area within the hazardous radii of the active firing sites. A surface soil sample will be obtained from this offsite location to evaluate contamination originating from the active firing sites. The sample location will be chosen by the initial selection of three preliminary sample locations using visual indicators. The preliminary locations will be field screened as described above. The preliminary location exhibiting the highest positive field screening results will then be sampled for laboratory analysis.

Surface samples will be collected in accordance with protocols established in LANL-ER-SOP-6.09, Spade and Scoop Method for Collection of Soil Samples (LANL 1992, 0688). Subsurface soil samples will be collected using protocols established in LANL-ER-SOP-06.10 Hand Auger and Thin-Wall Tube Sampler (LANL 1992, 0688). To minimize safety risks, additional techniques may be implemented such as the use of a titanium auger or the saturation of the sample location with water during sampling activities.

5.4 Laboratory Analyses

Samples will be analyzed for metals/mercury (in accordance with EPA Method SW 6010/7000), VOCs (in accordance with EPA Method 8260), semivolatile organic compounds (in accordance with EPA Method 8270), explosives (in accordance with EPA SW 826, HPLC), and isotopic uranium. If a field laboratory is available and meets quality assurance/control criteria, these samples may be analyzed onsite. Otherwise, an off-site analytical laboratory will be used.

REFERENCES

Becker, N. 1991: "Influence of Hydraulic and Geomorphology Components of a Semi-Arid Watershed on Depleted Uranium Transport," a thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Civil and Environmental Engineering) at the University of Wisconsin, Madison, Wisconsin. (Becker 1991, 0699)

Henke, M.D., and Van Marter, J.B., February 23, 1993. "Meeting with J.W. Straight/R.H. Lucht," Los Alamos National Laboratory Memorandum MEE4-93-44, ER ID Number 14984, Los Alamos, New Mexico. (Henke and Van Marter 1993, 13-0093)

Kelkar, S., June 1992. "Meeting with Bill Davis." Los Alamos National Laboratory Memorandum EES-4-92-191, ER ID Number 12467, Los Alamos, New Mexico. (Kelkar 1992, 13-0052)

Los Alamos National Laboratory, November 1990. "Solid Waste Management Unit Report," Los Alamos National Laboratory Report, Vol. 3, TA-26 through TA-50, Los Alamos, New Mexico. (LANL 1990, 0145)

Los Alamos National Laboratory ER- SOP-6.09, "Spade and Scoop Method for Collection of Soil Samples," (LANL 1992, 0688)

Los Alamos National Laboratory ER-SOP-06.10, "Hand Auger and Thin-Wall Tube Sampler," (LANL 1992, 0688)

SAMPLING AND ANALYSIS PLAN

PRS 36-004(d), SKUNK WORKS

LOS ALAMOS NATIONAL LABORATORY
Los Alamos, New Mexico

Prepared by: ICF KAISER ENGINEERS
Los Alamos, New Mexico
January 27, 1995

CONTENTS

1.0 DESCRIPTION AND HISTORY 1

2.0 CONCEPTUAL EXPOSURE MODEL 4

- 2.1 Nature and Extent of Contamination at Skunk Works 4
- 2.2 Potential Pathways and Exposure Routes 6

3.0 REMEDIATION DECISIONS AND INVESTIGATION OBJECTIVES 6

4.0 DATA NEEDS AND DATA QUALITY OBJECTIVES 7

5.0 SAMPLING AND ANALYSIS PLAN 7

- 5.1 Land Survey 7
- 5.2 Health and Safety Screening 7
- 5.3 Sampling 8
- 5.4 Laboratory Analyses 10

REFERENCES 11

List of Figures

Figure 1-1 Location of Skunk Works and Surrounding Firing Sites 2

Figure 1-2 Present Day Skunk Works 3

Figure 2-1 Conceptual Exposure Model for PRS 36-004(D) Skunk Works 5

List of Tables

Table 5-1 Summary Of Sampling And Analyses For PRS 36-004(d) Skunk Works 9

SAMPLING AND ANALYSIS PLAN FOR PRS 36-004(d), SKUNK WORKS, INACTIVE FIRING SITE

1.0 DESCRIPTION AND HISTORY

The Skunk Works, which is part of PRS 36-004(d), is an abandoned firing site located at the east end of a small side canyon that juts west off the north edge of Potrillo Canyon (Figures 1-1 and 1-2). The site is approximately 2300 ft upstream and west of the active Lower Slobbovia firing site. The location consists of two 1950s-vintage wood buildings, TA-36-44 and TA-36-45, that were declared abandoned in 1963. The two buildings are located approximately 800 feet due south of the hairpin curve of Potrillo Drive and sit at the foot of the north wall of the side canyon. The buildings, which were moved from TA-15 to TA-36 in early 1954 were previously designated TA-15-107 and TA-15-136, respectively. A 1983 memo indicates that while at TA-15 ^{238}U was handled in both buildings. At TA-36, the buildings were used for storing spare equipment and as a shelter during detonation experiments. There has been no reported use or handling of radioactive materials at Skunk Works.

The number of buildings that were located at Skunk Works is unclear. Aerial photo #487, taken in November 1958, shows a dirt track heading east from these buildings to a small shed. A November 1986 aerial photo (CN 87 548) also shows a later, third building adjacent to and south of the dirt access road that curves around the original two structures. This small building was not numbered until July 1989, when it appears as storage building TA-36-132 on sheet 5 of drawing ENG-R 5118. According to personnel who worked at the site the structure was actually a trailer used for storage, primarily of foam shapes and shot windows, and was removed about 1991. The shed was absent on drawing ENG-R 5118, Rev 19 (March 1991).

Several hundred experiments may have been performed during an approximately one year period in 1957 or 1958. The majority of experiments used microwave measurements to analyze explosion temperatures. These experiments were performed by detonating aluminum or copper waveguides filled with explosives. Test shots were done on the ground since only small quantities of explosives were used (the largest shot fired used 0.5 to 0.75 lb of explosives); therefore, no firing pad was needed. The firing area was located 5 feet west of TA-36-45 (the westernmost building), and shots were detonated from TA-36-44. A metal plate was used to shield Building TA-36-45, and sand bags were used to contain shot fragments.

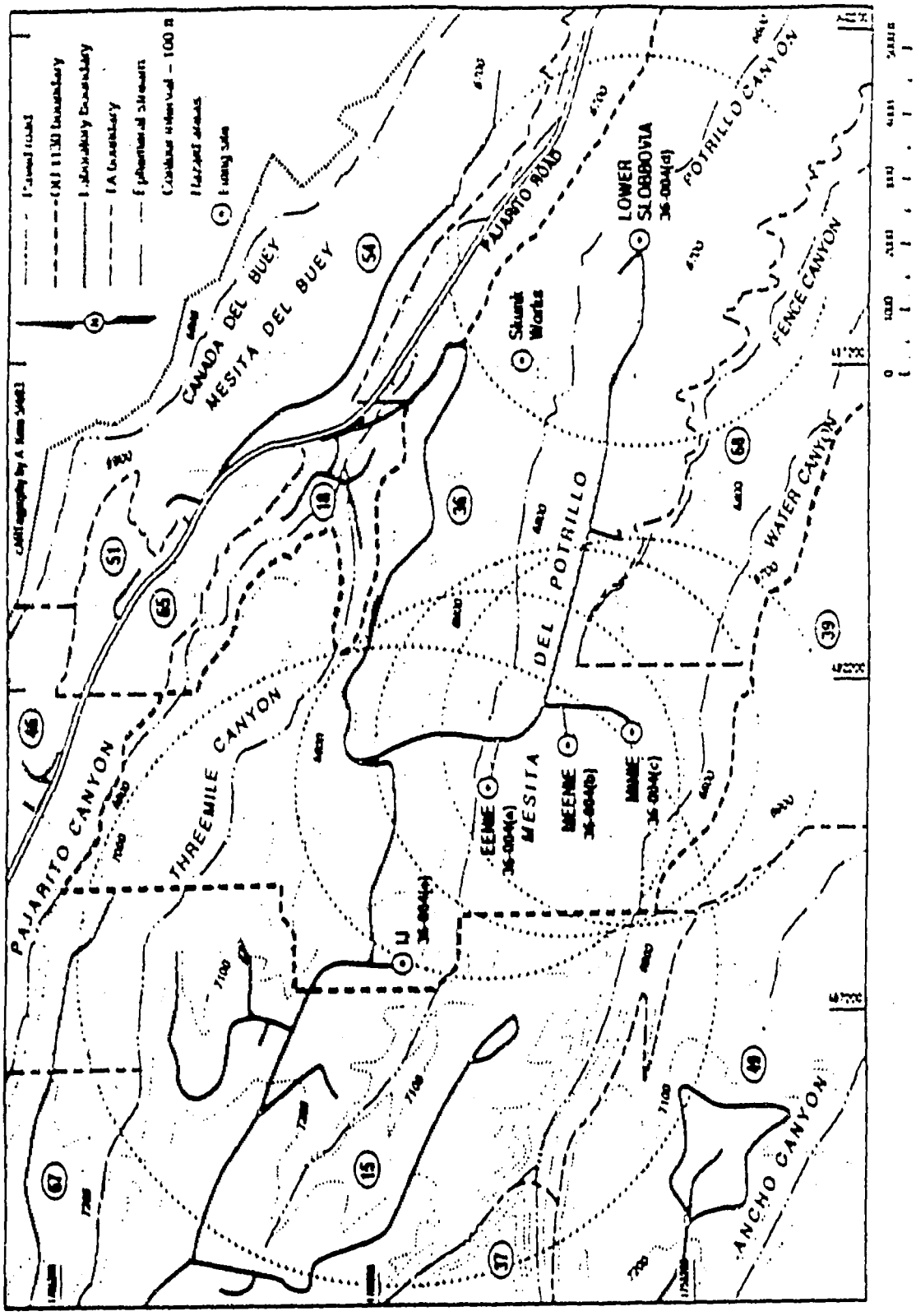

Figure 1-1. Location of Skunk Works and surrounding firing sites.

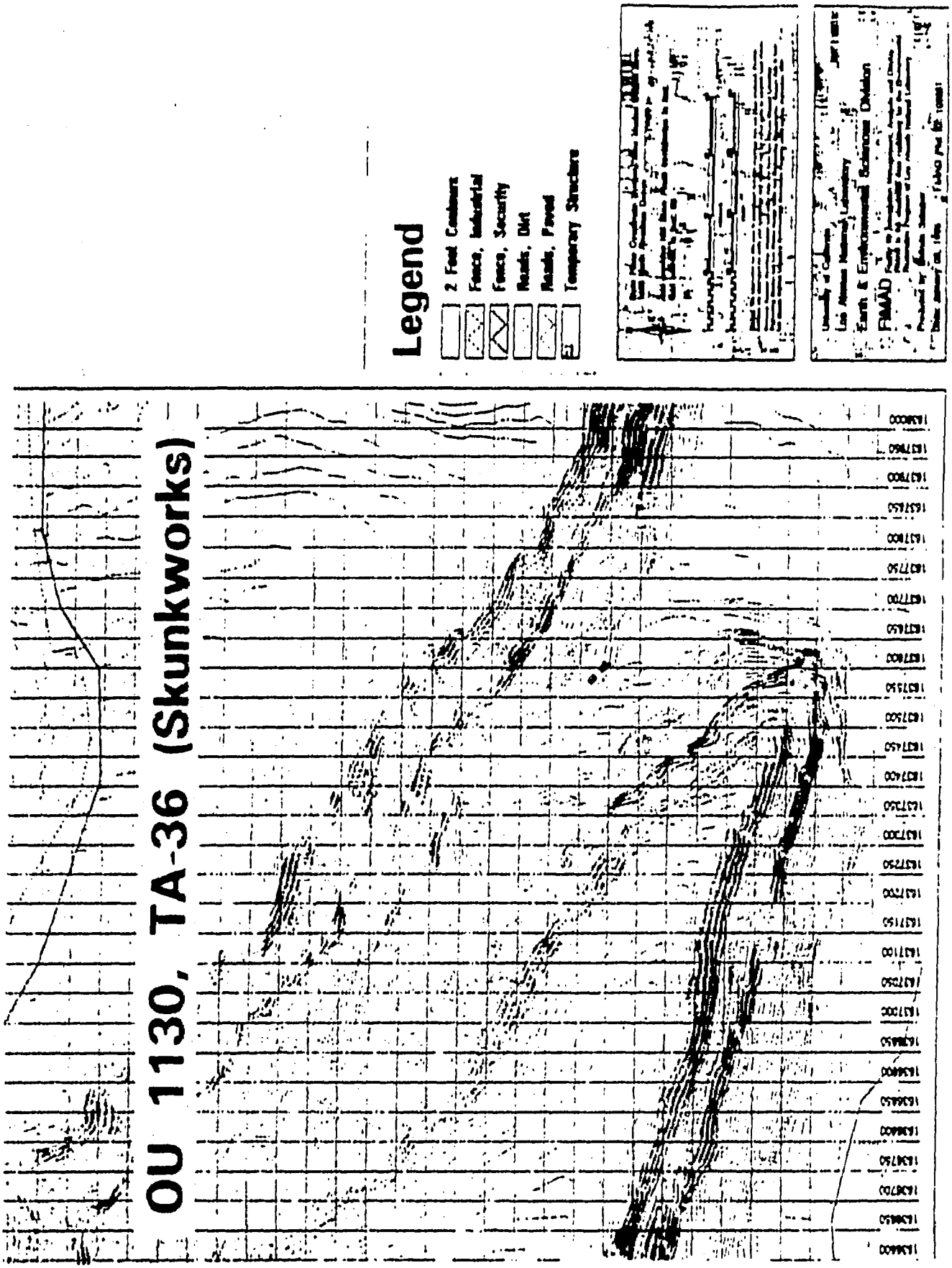

Figure 1-2. Present day Skunk Works.

Liquid, solid, and gaseous explosives were used for the tests. The liquid explosive, tetranitromethane, was tightly controlled and used in small amounts. After being diluted with benzene, the tetranitromethane, was transferred from a bottle into the waveguides by means of a remotely operated valve. This was done outside, so no fume hood or artificial ventilation was needed (the chemicals' high volatility implies that a closed system was used for this transfer). It is estimated that only 5 gallons of this material was used, since fewer than two dozen of these liquid explosive shots were executed. Solid high explosives (HE), including Composition B3, were used in the detonators and boosters. Because explosives and detonators were stored and obtained daily at Lower Slobbovia, no magazine was needed at Skunk Works. Gaseous-explosive shots were conducted using oxygen and acetylene, but no radioactive materials, beryllium, or solvents were used at Skunk Works.

Most of the other equipment used at the site, including instrumentation and shot initiation equipment, was electrical in nature. Lead-acid batteries were used to power the associated equipment during experiments. A 4-ft by 8-ft (east-west) covered pit approximately 15 feet north of the northeast corner of Building TA-36-44 was used to contain the spent lead-acid batteries. The batteries have since been removed.

2.0 CONCEPTUAL EXPOSURE MODEL

The conceptual exposure model for the Skunk Works (Figure 2-1) describes historical sources of contamination, migration pathways and conversion mechanisms, potential current sources and release mechanisms, receptor contact media, and exposure routes for released contaminants. These are described in the following sections.

2.1 Nature and Extent of Contamination at Skunk Works

There has been no reported sampling at Skunk Works; therefore, no explicit information on general site contamination exists. Samples were collected in the Potrillo Canyon drainage during the Summer of 1994 both upstream (west) and downstream (east) of the Skunk Works; sample analytical results are pending. The potential contaminants of concern (PCOCs) are likely to include tetranitromethane, benzene, solid HE including Composition B3, HE residuals and degradation products, and lead and other metals. No radioactive PCOCs are expected at the Skunk Works since no radioactive materials were used or handled there.

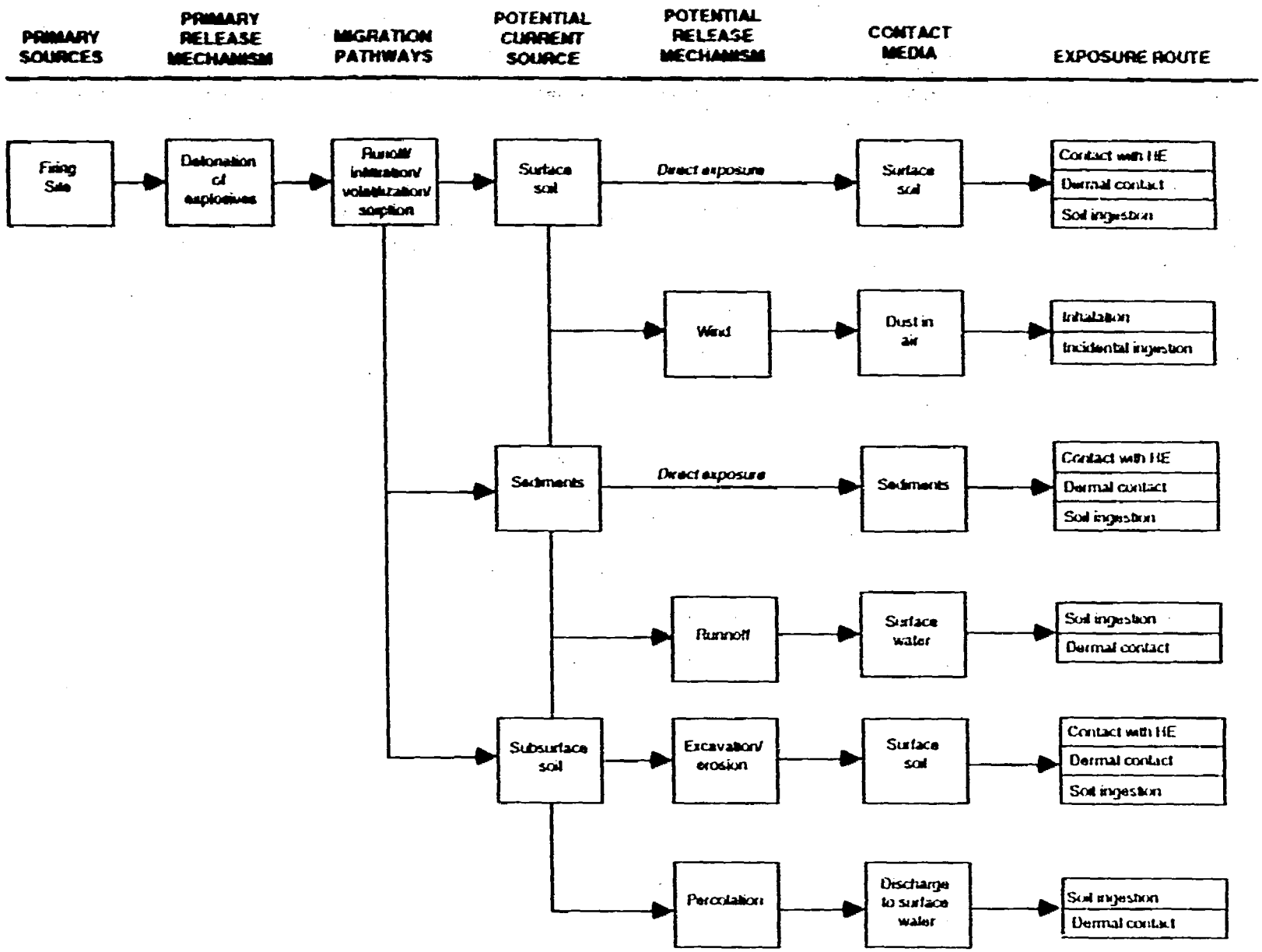

Figure 2-1. Conceptual exposure model for Skunk Works firing site.

2.2 Potential Pathways and Exposure Routes

Contamination due to firing activities is probably greatest near the firing point with concentrations decreasing with distance from the shot area. Although the test shots were contained within sand bags, contamination in the form of fine particles could have traveled outside the immediate firing area as a result of explosion-related air dispersion. Transport of contaminants to the nearby stream channel by soil erosion and dissolution in surface water runoff is also possible. This small drainage channel continues in a southeasterly direction, eventually merging with Potrillo Canyon. PCOCs are likely to accumulate in sediment catchment areas within the drainage channel. In addition, contaminants may have been leached into subsurface soils by percolating precipitation. Resuspension and transport by wind erosion may also play a minor role in contaminant migration from the firing area.

Discharge of acids and metal contaminants from spent batteries in the battery pit may have contaminated the soils lining the pit. Release of contaminants into the soils underlying the pit and contaminant migration through infiltration and lateral and vertical leaching may also have occurred.

Current potential human receptors are limited to on-site workers. Future human exposures could occur through contact with contaminated media including surface soils and runoff water. In addition, exposures could occur through excavation and/or erosion of subsurface soils or discharge of contaminated leachate to surface water.

3.0 REMEDIATION DECISIONS AND INVESTIGATION OBJECTIVES

The Skunk Works was officially abandoned in 1963, and no operations have been conducted there since that time. The area is within the hazard radius of the Lower Slobbovia firing site (located 2300 feet southeast of Skunk Works) and may continue to receive firing debris, shrapnel, and associated contaminants from experiments conducted at Lower Slobbovia.

If RFI sampling indicates that concentrations of PCOCs are below screening action levels, no further action (NFA) will be proposed for the Skunk Works. If measured concentrations exceed screening action levels, consideration will be given to a Phase II investigation and/or a baseline risk assessment.

4.0 DATA NEEDS AND DATA QUALITY OBJECTIVES

The primary data requirements of Phase I investigations at the Skunk Works are to determine if PCOCs are present above screening action levels at the locations of probable maximum contamination. At both the firing area and the battery pit, sampling will focus on the immediate contaminant source areas (i.e. the shot initiation point and the pit soils).

The dominate contaminant migration pathways will also be evaluated in Phase I to determine if surface water runoff and infiltration have resulted in contamination above screening action levels in the drainage channel or subsurface soils. Contamination due to surface water runoff is expected to concentrate in sediment catchments near the source areas; therefore, Phase I evaluation of the surface water runoff pathway will target sediment catchments immediately down drainage of the firing area and battery pit. Assessment of the subsurface pathway will focus on the soil /tuff interface directly underlying the locations of maximum probable contaminant values in the source areas. The soil/tuff interface is expected to accumulate infiltration derived contamination due to the marked permeability contrast between the subsurface soils and underlying Bandelier Tuff. If contamination is indicated at the soil/tuff interface horizon (either by visual indicators or field screening results) the data requirements will be extended to include the underlying tuff down to a depth of two feet.

5.0 SAMPLING AND ANALYSIS PLAN

The sampling and analysis plan will describe field screening and sampling that will be conducted, as well as the laboratory analyses that will be performed offsite.

5.1 Land Survey

A land survey will be performed in accordance with the LANL Survey Manual (LANL 1992, 13-0096). The surveyed location points will be logged on 2-ft-interval contour maps and the information transferred to the Facility for Information Management, Analysis, and Display (FIMAD).

5.2 Health and Safety Screening

Screening will be used to monitor potential hazards and health and safety conditions for on-site workers. Portable field instruments will be used to screen all samples for gross alpha, beta, and gamma, and a field-portable flame ionization detector (FID) and/or photo ionization detector (PID) will be used to screen for

volatile organic compounds (VOC). All samples will be visually inspected and field spot-tested explosives. Before taking any samples from the pit, the wooden cover will be removed, and the interior space of the pit will be screened for VOCs, combustible gases, and gross alpha, beta, and gamma radiation.

5.3 Sampling

Three areas will be sampled at Skunk Works: the firing area where shots were detonated, the battery pit, and the near-by drainage channel. The sampling and analysis proposed for Skunk Works is presented in Table 5-1.

All sample locations associated with the Phase I sampling at Skunk Works will be biased on the basis of field screening, visual indicators of contamination, and/or best professional judgment. If no clear biasing criteria are observed in the field, random sample locations will be generated for the firing area and battery pit.

Field screening sampling of the firing area will be conducted by dividing the shot area into quadrants; a screening sample will be collected at the center of the area and from each quadrant. Visual indicators such as soil staining will be used to bias the actual screening sample location within each quadrant. The samples will be HE spot-tested, gross radiation screened using a pancake GM probe, and analyzed for metals contamination using Laser-induced breakdown spectroscopy (LIBS). A surface soil sample and a subsurface sample will be collected from the location of highest contamination. In addition, for the subsurface sample, if LIBS analysis does not indicate the presence of metal COCs, the metals aliquot will be omitted from the sample.

A similar screening strategy will be used at the battery pit. Screening samples collected from the bottom of the pit will be spot-tested for HE, analyzed for lead using LIBS, and pH tested. A surface soil sample (from the pit bottom) and a subsurface sample will be collected from the location of highest contamination. The metals aliquot will be omitted from the subsurface sample if LIBS analysis indicates lead is not present above screening action levels.

The drainage channel will be sampled at the first sediment catchment downstream from the firing area and battery pit. This is judged to be the most likely location in the drainage channel to be contaminated. LIBS analysis will be performed to determine if metals contamination is present; if the results are negative the metals aliquot will be omitted.

TABLE 5-1

SUMMARY OF SAMPLING AND ANALYSES FOR PRS 36-004(d) SKUNK WORKS

Description	Sampled Media	Samples							H & S Screening					Screening Analyses				Laboratory Analyses					
		Structure		Surface		Subsurface		Screening															
	soil/sediments	primary	duplicate	primary	duplicate	primary	duplicate		Beta-gamma	Alpha	Combustible gas/oxygen	Explosives (Spot Test)	Organic Vapor	Laser-Induced Breakdown Spectroscopy "LIBS"**	Explosives (Spot Test)	Soil pH (pH test kit)	alph-beta-gamma	Isotopic uranium	Metals (SW 6010/7000)*	Mercury	VOCs (SW 8260)*	SVOCs (SW 8270)*	Explosives (SW 8330)*
Firing area	x			1					x	x		x	x					?	x		x	x	x
Firing area	x					1			x	x	x	x	x					?	z		x	x	x
Firing area	x							5	x	x		x	x	x	x		x						
Battery pit	x			1					x	x		x	x					?	x		x	x	x
Battery pit	x					1	1		x	x	x	x	x					?	y		x	x	x
Battery pit	x							5	x	x	x	x	x	x	x	x							
Drainage channel	x			1					x	x		x	x	x				?	y,z		x	x	x
TA-36-44		x							x			x											
TA-36-45		x							x			x											

x : All samples.
y : If LIBS analysis indicates levels of lead are below SALS, the metals aliquot will not be submitted.
z : If LIBS screening indicates presence of copper and aluminum, the metals aliquot will be submitted.
? : If Buildings TA-36-44 and TA-36-45 have elevated radiation readings (above background), an aliquot for isotopic uranium will be submitted for each sampling location.
Note: Additional samples may be taken based on field surveys and observations.
* : Applicable EPA SW-846 methods.
** : The Standard Operating Procedure will be established prior to use in this sampling effort.

All surface samples will be collected from a depth of 0-6 in. The subsurface samples will be collected at the soil/tuff interface using a hollow-stem auger rig with a core barrel (or similar rig). Surface samples will be collected in accordance with protocols established in LANL-ER-SOP-06.09, Spade and Scoop method for Collection of Soil Samples (LANL 1992,0688). Core samples will be collected using protocols established in LANL-ER-SOP-06.24, Sample Collection from Split-Spoon Samplers and Shelby Tube Samplers (LANL 1993,0686).

TA-36-44 and TA-36-45 will be screened for radioactive contamination using portable field instruments. If contamination is found above background, an isotopic uranium aliquot will be added to all surface and subsurface samples.

5.4 Laboratory Analyses

Samples will be analyzed for metals (in accordance with EPA Method 6010 [EPA 1986, 0291]), VOCs (in accordance with EPA Method 8260 [EPA 1986, 0291]), semivolatile organic compounds (in accordance with EPA Method 8270 [EPA 1986, 0291]), and explosives (in accordance with EPA Method 8330 [EPA 1986, 0291]),. If a field laboratory is available and meets quality assurance/quality control criteria, these samples may be analyzed onsite. Otherwise, an off-site analytical laboratory will be used.

REFERENCES

Los Alamos National Laboratory ER- SOP-6.09, "Spade and Scoop Method for Collection of Soil Samples," (LANL 1992)

Los Alamos National Laboratory ER-SOP-6.24, "Sample Collection from Split-Spoon Samplers and Shelby Tube Samplers," (LANL 1993)