Burton

Voluntary Corrective Action Plan for a Solid Waste Management Unit at TA-33

33-007(c)

Field Unit 3

Environmental Restoration Project

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A Department of Energy
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VOLUNTARY CORRECTIVE ACTION PLAN

SOLID WASTE MANAGEMENT UNIT 33-007(c)

1.0 INTRODUCTION

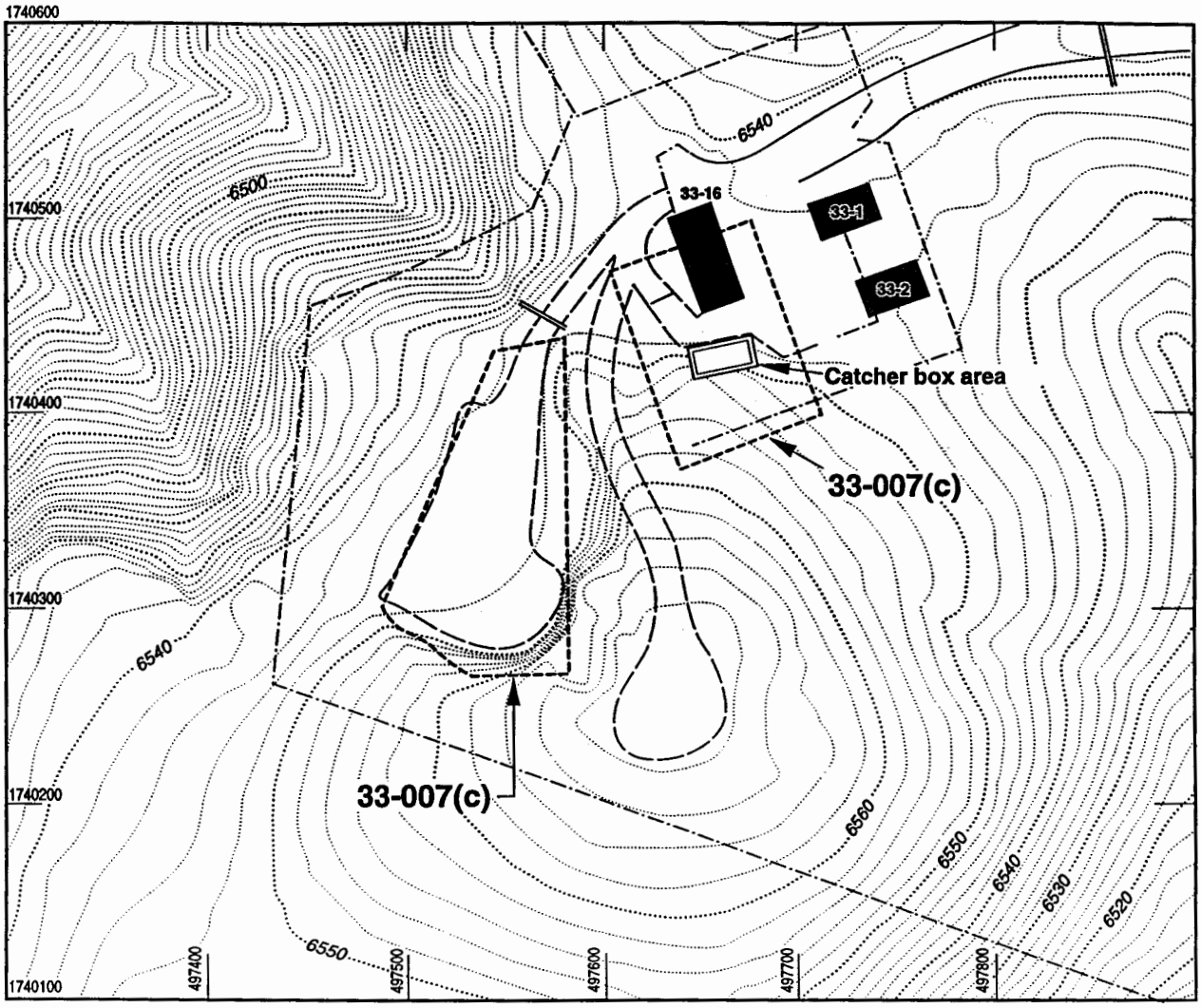
This document describes the pilot project and voluntary corrective action (VCA) for solid waste management unit (SWMU) 33-007(c). SWMU 33-007(c) is listed in Table A of the Hazardous and Solid Waste Amendments (HSWA) Module of Los Alamos National Laboratory's (LANL's) Resource Conservation and Recovery Act (RCRA) Part B Operating Permit (EPA 1990, 0306).

The objective of the pilot project is to assess the capabilities of the Segmented Gate System™ (SGS) and containerized vat leach system (CVL) to remediate radioactively contaminated soils. The SGS developed by Thermo Nuclean was used on-site in April and May 1996 to assay and sort uranium-contaminated soil into contaminated and clean components. The CVL system was developed by LANL to leach uranium from the contaminated component. The pilot project is discussed in Section 3.0 of this document. Waste management is described in Section 4.0 of this document.

A VCA is proposed to determine if the SWMU 33-007(c) catcher boxes were remediated in the process of conducting the pilot project. The clean soil component from the separation process was returned to the catcher box site. As part of the VCA, a verification sampling and analysis plan is proposed in Section 5.0.

1.1 Site Type and Description

Area 6 at Technical Area (TA) 33 was developed in 1948 for initiator experiments. Shot pads were located within and around gun building TA-33-16, originally TA-33-6. Military guns were stationed and fired from the pads. The SWMU 33-007(c) catcher boxes were located approximately 25 ft south of TA-33-16 and were built of timbers in two sections, each about 6 ft on a side. The catcher boxes were filled with soil, wood chips, and vermiculite (LANL 1992, 0784). Figure 1 shows the location of the catcher boxes at SWMU 33-007(c).



Sources: FIMAD 1993, G101009, G101010, G101476
Modified by: cARTography by A. Kron 1/26/95

Permanent structure
Paved road
Unimproved road/trail
Fence
Storm drain/culvert
SWMU boundary

0 50 100 ft

Contour interval = 2 ft

N

Fig. 1.1-1. Area 6, showing the location of the SWMU 33-007(c) catcher boxes.

1.1.1 Operational History

TA-33-16 housed an air gun as well as electronic equipment to measure neutron production in gun-type initiators containing beryllium and polonium-210. Experimental shots may have contained uranium, lead, and beryllium. Compressed air or propellants were used to fire the guns. Non-exploding projectiles made of steel, miscellaneous alloys, and natural uranium were fired into catcher boxes. Shots were discontinued at Area 6 in 1955 (LANL 1992, 0784).

1.1.2 COPCs and Rationale for Proposed Remedial Action

Chunks of corroded uranium metal were uncovered during RCRA Facility Investigation (RFI) sampling. Concentrations (6 770 and 218 mg/kg) of uranium were found above the screening action level (SAL) of 29 mg/kg. Inorganics were detected above LANL and TA-33 background upper tolerance limits.

A multiple chemical evaluation, calculated at 0.287, eliminated lead, nickel, silver, and zinc as chemicals of potential concern (COPCs) because the additive effect is less than one. This indicates that the estimated volume of 240 yd^3 of soil does not contain sufficient contamination to present an inorganic hazard.

Uranium is the only contaminant of potential concern at this site. In April and May 1996, a pilot project removed the soil from the catcher boxes and separated uranium-contaminated soil using the SGS and CVL processes. This activity, if successful, will be considered a final remedy to prevent contaminant exposure and migration at the site.

2.0 SITE CHARACTERIZATION PRIOR TO REMOVAL

RFI sampling was performed between May and August 1994. The field activities implemented at the site included selection of sampling locations, land, geophysical, and screening surveys, and field sampling activities. These activities are addressed in Section 1.3 of the September 1995 RFI Report (Environmental Restoration Project 1995, 1265).

2.1 RFI Information/Other Decision Data

During the 1994 RFI Phase I sampling, trenching was conducted to determine the existence of contamination in soils within catcher boxes at SWMU 33-007(c). The exterior faces of the boxes were dismantled with a backhoe and trenches were excavated into the soil within the eastern and western catcher boxes. The western catcher box contained oxidized uranium in a pocket approximately 1 ft in diameter. Its location within the trench was 3 ft inward from the toe of the

trench and 2 ft above ground surface. Radioactivity in this contaminated zone was as high as 13 000 counts per minute (cpm) using a direct reading beta/gamma instrument.

Another pocket of oxidized uranium was found between the eastern and the western catcher boxes. Radioactivity in this slightly larger contaminated zone was as high as 135 000 cpm beta/gamma.

Eight soil samples were collected from the excavated areas and analyzed for uranium. Two samples contained elevated uranium (216 and 6 770 mg/kg). Remaining samples contained 2 to 6 mg/kg uranium, indicating that uranium contamination is heterogeneously distributed.

Because isolated pockets of uranium were found within the catcher boxes, the trenches were backfilled and tarps were placed over the area to prevent runoff and migration. As part of a 1995 interim action, the catcher boxes were covered with 12 ml high density polyethylene to prevent erosion of contaminated soil (Environmental Restoration Project 1996, 02-114).

2.2 Nature and Extent of Contamination

RFI sampling indicates that uranium was the only contaminant of concern at the site and was located within the catcher boxes.

3.0 PROPOSED REMEDY

3.1 Description of the Pilot Project

3.1.1 Introduction

From April through September 1996, the pilot project used two systems to assay, sort, and extract uranium from large volumes of soil. Thermo Nuclean's SGS was used at the site to assay and sort uranium-contaminated soil into contaminated and clean components. LANL's CVL system was used to leach uranium from the contaminated component. This pilot project assessed the capabilities of removing radioactive contamination from large volumes of soil to remediate sites and reduce the volume of radioactive waste. The outcome of the pilot project was the remediation of soils at PRS 33-007(c). Results from this work will be used to assess the cost-effectiveness of this approach for future work at similar sites.

3.1.2 SGS

The SGS was employed to demonstrate the capability of this technique to assay and separate heterogeneously contaminated soil into contaminated and clean components. Effectiveness of the SGS is influenced by soil characteristics such as soil density, radioactive species, radioactive concentrations, and contaminant distribution. Preliminary assaying techniques measured the soil characteristics to determine what fine adjustments were needed to operate the SGS for optimal results.

The SGS work was conducted on soils from PRS 33-007(c) catcher boxes. The SGS plant and the screening plant were set up near building TA-33-16. Planning and setup of operations were coordinated with the facility manager at TA-33. Thermo Nuclean personnel operated the SGS. ICF Kaiser personnel supervised on-site activities and collected samples for off-site analysis. Setup and preliminary SGS work took approximately one week and SGS sorting activities lasted approximately two weeks.

The SGS work entailed assaying and sorting approximately 200 yd3 of uranium-contaminated soil from the catcher boxes. Larger rocks and organic material were separated from soil and screened for radioactivity, then returned to the original catcher box site. During separation of large items from soil, experimental objects were found. This extraneous material was not returned to the catcher boxes. It will be characterized and disposed of appropriately.

At the SGS plant, the soil was assayed and sorted into contaminated and clean components. The contaminated soil was directed into 1 yd3 leaching containers and hauled to the CVL setup for leaching operations. The clean soil was deposited into a large pile on plastic matting until it was transported back to its original site.

3.1.3 CVL

The CVL system was a scaled-up pilot study employed to determine the capability of the technique to leach uranium from soil on-site. Previous experiments had been conducted in the laboratory. The effectiveness of the CVL is influenced by soil characteristics such as particle size fraction, organic content, radioactive species, and radioactive concentrations. These soil characteristics were determined prior to initiating the CVL pilot study.

The CVL was set up adjacent to the catcher boxes and building TA-33-16. LANL personnel operated the system. ICF Kaiser personnel supervised on-site activities and collected samples for off-site analysis. Setup of the CVL lasted approximately two weeks. Experimental leaching activities are expected to last approximately seven months.

Contaminated soil was transported by conveyor belt at the SGS plant and placed into 1 yd^3 woven fabric containers with plastic liners. A solution of carbonate/bicarbonate reagent was sprayed into the containers in a continuous, uniform fashion. The solution percolated through the soil and drained into a piping gallery. The leachate then drained to a sump where the sediment settled out. Sediment-free solution containing uranium was recycled through the system. The uranium solution may be sent through ion exchange columns to extract uranium.

3.2 Cleanup Requirements

The approach used in deriving the target value for residual uranium in soil was in accordance with the methodology presented in Department of Energy (DOE) Order 5400.5. Modeling calculations using the Residual Radioactive (RESRAD) computer code determined concentrations of residual uranium acceptable to meet regulatory requirements of current DOE Order 5400.5 dose limit of 25 mrem/yr (for a single source) and proposed Environmental Protection Agency (EPA) dose limit of 15 mrem/yr.

RESRAD calculations assumed a recreational scenario for a trail user or picnicker exposed for typical recreational time periods (Annex 7.1). In the most conservative case, in order for the picnicker not to exceed the proposed EPA dose limit, the total dose from all uranium isotopes in the soil must be reduced below 15 mrem/yr. Therefore, the SGS and CVL procedures must be capable of detecting and removing uranium contamination for this most conservative scenario.

Single radionuclide soil guidelines were calculated for uranium-234, -235, and -238 assuming the picnicker scenario. A basic radiation dose limit of 15 mrem/year was set for each isotope. Results are shown in Table 3.2-1.

TABLE 3.2-1

SINGLE RADIONUCLIDE SOIL GUIDELINES

ISOTOPE	GUIDELINE
Uranium-234	114 pCi/g
Uranium-235	72 pCi/g
Uranium-238	116 pCi/g

Because the SGS detects total radionuclide concentration as low as 30 pCi/g, it was determined that the SGS has the capability of detecting uranium below levels of concern.

To determine if residual uranium at the site meets EPA guidelines, ten confirmatory samples will be collected from the SGS clean pile and analyzed for isotopic uranium. The 0.95 upper confidence bound (UCB) for the mean concentration of each isotope in the SGS clean pile will be calculated.

The reasonable maximum dose based on these UCBs will be calculated as

$$15 \sum U_i/U_{gi} ,$$

where U_i is the UCB for the ith isotope and U_{gi} is the guideline for the ith isotope from Table 3.2-1. If this reasonable maximum dose is less than 15 mrem/year, the site will meet EPA guidelines.

3.3 Post Soil Remediation Treatment/Site Restoration

All clean soil from the pilot project will be returned to its original location. In the summer, native grass seed will be spread along the surface of the returned soil. Geo-textile Jute Mat™ will be placed on top of the seed along this entire surface to keep the seed in place. If summer rains are insufficient, soaker hoses will be placed along the surface of the Jute MatTM.

4.0 WASTE MANAGEMENT

All clean soil will be returned to the catcher box site. It is anticipated that all soil will meet cleanup levels. All large material rejected by the SGS was screened for radioactivity. No contamination was found, and natural material (rocks) was returned to the original site.

During excavation of the catcher boxes, 56 experimental projectiles were discovered. The projectiles were designed to hold experimental devices. They did not contain explosives and were not intended to explode. The projectiles are solid cylinders containing cavities equipped with end caps. Most are small (approximately 2.5 x 12 in.) or large (approximately 4 x 22 in.). Some projectiles have ruptured and some contain uranium parts.

4.1 Estimated Types and Volumes of Waste (Including VCA Waste)

Table 4.1-1 lists the types and volumes of waste estimated at SWMU 33-007(c).

TABLE 4.1-1

ESTIMATE OF WASTE TYPE AND VOLUME AT SWMU 33-007(c)

ITEM	WASTE TYPE	VOLUME
Investigation waste/personal protection equipment	Municipal refuse	1 yd^3
Bicarbonate solution	Radioactive liquid	15 gal.
Ion exchange resins	Radioactive solid	15 gal.
Projectiles	Recyclable metals	0.10 yd^3
	Radioactive	0.05 yd^3
	Mixed	0.01 yd^3
	Hazardous	0.01 yd^3

4.2 Method of Management and Disposal

The projectiles will be managed as follows.

- All projectiles will undergo radiography to determine if they contain experimental devices and if uranium is present.
- Projectiles free of uranium will be sectioned to determine if hazardous metals are present. If no such metals are found, the projectiles will be sent to a contract recycle firm.
- Projectiles containing hazardous metals will be sent to an approved facility for disposal.
- Projectiles containing uranium will be disposed of as radioactive waste.
- Projectiles containing both hazardous metals and uranium will be disassembled and segregated into hazardous and radioactive wastes.

5.0 VCA PLAN

5.1 Problem Definition

Data collected under this verification plan will be used to determine whether the uranium extraction pilot project at SWMU 33-007(c) resulted in completion of all necessary corrective actions at the site. The decision rule is as follows.

> If results show that uranium concentrations have been reduced below risk-based levels, the SWMU will be recommended for no further action.

5.2 Sampling and Analysis Design

5.2.1 Sampling

One sample will be collected from each SGS clean pile and one from the CVL clean pile. These samples will be splits of the evaluation samples described in the pilot project plan (Section 3.1.10). After excavation and soil processing have been completed and prior to backfilling or site restoration, one sample will be collected from the area of each catcher box in the exposed face of the slope on which the catcher boxes were built. These two samples will be biased toward the center of the catcher boxes, aligned with the former location of the gun bores. At least one, and a maximum of two, additional samples will also be collected beneath observed pockets of uranium contamination in the catcher box material, provided the area is not paved.

All samples will be analyzed for uranium isotopes.

5.2.2 Data Use

Results will be compared with background levels and may be combined with other data from RFI investigations of PRS 33-007(c) to evaluate residual risk associated with this site.

5.2.3 Assumptions

This design assumes that material from the clean piles will be returned to the site. It also assumes that pile samples selected for evaluation purposes will be representative of the material in these piles, rather than being biased or judgmentally selected using some special processing considerations. If evaluation samples are biased by some consideration that would invalidate their use for risk assessment, independent samples will be selected in place of the proposed splits.

5.2.4 Data Quality

The contract laboratories will provide standard quality control measurements (surrogates, blanks, check standards, matrix spikes, etc., as specified by the analytical procedures requested) and will supply complete analytical data packages supporting the reported results. No special handling is required beyond good laboratory practices and standard field procedures.

5.3 Sampling Plan Implementation

5.3.1 Field Methods

Surveys will include mapping within the catcher box area to record sample locations. No clean piles will be surveyed.

5.3.2 Sampling

Samples will be collected according to LANL-ER-SOP-06.09, R0, ICN7, Spade and Scoop Method for Collection of Soil Samples (LANL 1993, 0875). The final two samples will be collected at 0–6 in. depth measured perpendicular to the exposed surface, which may be vertical or at least sloped. Samples will be handled through the LANL Environmental Restoration (ER) sample management office (SMO) and analyzed through ER Project contracts.

5.3.3 Laboratory Analyses

Uranium isotopes will be analyzed by alpha spectrometry described in the LANL ER Quality Assurance Project Plan (Environmental Restoration Project 1996, 1292).

5.3.4 Sample Handling, Packaging, and Shipping

Samples will be handled, packaged, and shipped in accordance with the latest revisions of the applicable LANL ER Project standard operating procedures (SOPs): LANL-ER-SOP-01.01, General Instructions for Field Investigations, LANL-ER-SOP-01.02, Sample Containers and Preservation, LANL-ER-SOP-01.03, Handling, Packaging, and Shipping of Samples, LANL-ER-SOP-01.04, Sample Control and Field Documentation, and LANL-ER-SOP-01.05, Field Quality Control Samples (LANL 1993, 0875). Samples will be submitted to off-site contract analytical laboratories through the ER sample management office under the current statement of work.

5.3.5 Schedule

All SGS and CVL VCA samples will be collected and analyzed by August 30, 1996. It is expected that experimental work on the CVL will continue until December 1996.

5.4 Data Assessment

5.4.1 Verification

Data packages will be checked for completeness and reported deficiencies by routine data verification and validation procedures (Environmental Restoration Project 1995, 1292). Focused validation will be performed only if routine validation indicates possible problems with analytes of concern.

Assuming that clean pile samples are splits as proposed, uranium results from the split sample pairs will be compared to provide a measure of the homogeneity of the material.

5.4.2 Transmittal of Results

Field data will be collected and documented in field notebooks and field sample collection logs. Additionally, required field data will be entered in the ER 4th Dimension (4-D™) electronic field database. This electronic record will be uploaded to the Facility for Information, Management, Analysis and Display (FIMAD) at the conclusion of the sampling season.

Analytical results will be returned to the SMO from off-site contract analytical laboratories. Complete data packets, adequate to support focused validation if necessary, will be provided. Data will be uploaded into the FIMAD database (Environmental Restoration Project 1996, 1292).

5.5 Administration

5.5.1 Task Organization

Task organization, training, records, and oversight are detailed in the field implementation plan. A field summary report will be prepared following the field activities and will be submitted to the ER Records Processing Facility (RPF). Field data will be preserved in a 4-D™ database and provided to FIMAD. The analytical laboratories will prepare electronic deliverables and hard copy reports of the results. Data from the pilot project evaluation samples from both SGS and CVL will be made available to the ER Project.

6.0 ESTIMATED TIME TO COMPLETE THE ACTION AND UNCERTAINTIES

The start date for the SGS was April 1, 1996. The SGS process ended May 14, 1996. Verification samples were collected May 8 through 13. The start date for the CVL system was May 8, 1996. Verification samples were collected in July 1996. Experimental work for the CVL process is expected to end in December 1996.

7.0 ANNEXES

7.1 Risk-Based Cleanup Level Assumptions and Calculations

RESRAD calculations for a picnic scenario follow this page.

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Dose Conversion Factor (and Related) Parameter Summary
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Menu	Parameter	Current Value	Default	Parameter Name
B-1	Dose conversion factors for inhalation, mrem/pCi:			
B-1	Ac-227+D	6.720E+00	6.720E+00	DCF2(1)
B-1	Pa-231	1.280E+00	1.280E+00	DCF2(2)
B-1	Pb-210+D	2.320E-02	2.320E-02	DCF2(3)
B-1	Ra-226+D	8.600E-03	8.600E-03	DCF2(4)
B-1	Th-230	3.260E-01	3.260E-01	DCF2(5)
B-1	U-234	1.320E-01	1.320E-01	DCF2(6)
B-1	U-235+D	1.230E-01	1.230E-01	DCF2(7)
B-1	U-238+D	1.180E-01	1.180E-01	DCF2(8)
D-1	Dose conversion factors for ingestion, mrem/pCi:			
D-1	Ac-227+D	1.480E-02	1.480E-02	DCF3(1)
D-1	Pa-231	1.060E-02	1.060E-02	DCF3(2)
D-1	Pb-210+D	7.270E-03	7.270E-03	DCF3(3)
D-1	Ra-226+D	1.330E-03	1.330E-03	DCF3(4)
D-1	Th-230	5.480E-04	5.480E-04	DCF3(5)
D-1	U-234	2.830E-04	2.830E-04	DCF3(6)
D-1	U-235+D	2.670E-04	2.670E-04	DCF3(7)
D-1	U-238+D	2.690E-04	2.690E-04	DCF3(8)
D-34	Food transfer factors:			
D-34	Ac-227+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(1,1)
D-34	Ac-227+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,2)
D-34	Ac-227+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	2.000E-05	2.000E-05	RTF(1,3)
D-34				
D-34	Pa-231 , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(2,1)
D-34	Pa-231 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	5.000E-03	5.000E-03	RTF(2,2)
D-34	Pa-231 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(2,3)
D-34				
D-34	Pb-210+D , plant/soil concentration ratio, dimensionless	1.000E-02	1.000E-02	RTF(3,1)
D-34	Pb-210+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	8.000E-04	8.000E-04	RTF(3,2)
D-34	Pb-210+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	3.000E-04	3.000E-04	RTF(3,3)
D-34				
D-34	Ra-226+D , plant/soil concentration ratio, dimensionless	4.000E-02	4.000E-02	RTF(4,1)
D-34	Ra-226+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,2)
D-34	Ra-226+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	1.000E-03	1.000E-03	RTF(4,3)
D-34				
D-34	Th-230 , plant/soil concentration ratio, dimensionless	1.000E-03	1.000E-03	RTF(5,1)
D-34	Th-230 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	1.000E-04	1.000E-04	RTF(5,2)
D-34	Th-230 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	5.000E-06	5.000E-06	RTF(5,3)
D-34				
D-34	U-234 , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(6,1)
D-34	U-234 , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(6,2)
D-34	U-234 , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(6,3)
D-34				
D-34	U-235+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(7,1)
D-34	U-235+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(7,2)
D-34	U-235+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(7,3)
D-34				

Dose Conversion Factor (and Related) Parameter Summary (continued)
File: DOSFAC.BIN

Menu	Parameter	Current Value	Default	Parameter Name
D-34	U-238+D , plant/soil concentration ratio, dimensionless	2.500E-03	2.500E-03	RTF(8,1)
D-34	U-238+D , beef/livestock-intake ratio, (pCi/kg)/(pCi/d)	3.400E-04	3.400E-04	RTF(8,2)
D-34	U-238+D , milk/livestock-intake ratio, (pCi/L)/(pCi/d)	6.000E-04	6.000E-04	RTF(8,3)
D-5	Bioaccumulation factors, fresh water, L/kg:			
D-5	Ac-227+D , fish	1.500E+01	1.500E+01	BIOFAC(1,1)
D-5	Ac-227+D , crustacea and mollusks	1.000E+03	1.000E+03	BIOFAC(1,2)
D-5				
D-5	Pa-231 , fish	1.000E+01	1.000E+01	BIOFAC(2,1)
D-5	Pa-231 , crustacea and mollusks	1.100E+02	1.100E+02	BIOFAC(2,2)
D-5				
D-5	Pb-210+D , fish	3.000E+02	3.000E+02	BIOFAC(3,1)
D-5	Pb-210+D , crustacea and mollusks	1.000E+02	1.000E+02	BIOFAC(3,2)
D-5				
D-5	Ra-226+D , fish	5.000E+01	5.000E+01	BIOFAC(4,1)
D-5	Ra-226+D , crustacea and mollusks	2.500E+02	2.500E+02	BIOFAC(4,2)
D-5				
D-5	Th-230 , fish	1.000E+02	1.000E+02	BIOFAC(5,1)
D-5	Th-230 , crustacea and mollusks	5.000E+02	5.000E+02	BIOFAC(5,2)
D-5				
D-5	U-234 , fish	1.000E+01	1.000E+01	BIOFAC(6,1)
D-5	U-234 , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(6,2)
D-5				
D-5	U-235+D , fish	1.000E+01	1.000E+01	BIOFAC(7,1)
D-5	U-235+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(7,2)
D-5				
D-5	U-238+D , fish	1.000E+01	1.000E+01	BIOFAC(8,1)
D-5	U-238+D , crustacea and mollusks	6.000E+01	6.000E+01	BIOFAC(8,2)

Site-Specific Parameter Summary

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R011	Area of contaminated zone (m**2)	1.500E+03	1.000E+04	---	AREA
R011	Thickness of contaminated zone (m)	3.000E+00	2.000E+00	---	THICK0
R011	Length parallel to aquifer flow (m)	1.000E+02	1.000E+02	---	LCZPAQ
R011	Basic radiation dose limit (mrem/yr)	1.500E+01	3.000E+01	---	BRDL
R011	Time since placement of material (yr)	0.000E+00	0.000E+00	---	TI
R011	Times for calculations (yr)	1.000E+00	1.000E+00	---	T(2)
R011	Times for calculations (yr)	3.000E+00	3.000E+00	---	T(3)
R011	Times for calculations (yr)	1.000E+01	1.000E+01	---	T(4)
R011	Times for calculations (yr)	3.000E+01	3.000E+01	---	T(5)
R011	Times for calculations (yr)	1.000E+02	1.000E+02	---	T(6)
R011	Times for calculations (yr)	3.000E+02	3.000E+02	---	T(7)
R011	Times for calculations (yr)	1.000E+03	1.000E+03	---	T(8)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(9)
R011	Times for calculations (yr)	not used	0.000E+00	---	T(10)
R012	Initial principal radionuclide (pCi/g): U-234	1.000E+00	0.000E+00	---	S1(6)
R012	Initial principal radionuclide (pCi/g): U-235	1.000E+00	0.000E+00	---	S1(7)
R012	Initial principal radionuclide (pCi/g): U-238	1.000E+00	0.000E+00	---	S1(8)
R012	Concentration in groundwater (pCi/L): U-234	not used	0.000E+00	---	W1(6)
R012	Concentration in groundwater (pCi/L): U-235	not used	0.000E+00	---	W1(7)
R012	Concentration in groundwater (pCi/L): U-238	not used	0.000E+00	---	W1(8)
R013	Cover depth (m)	0.000E+00	0.000E+00	---	COVER0
R013	Density of cover material (g/cm**3)	not used	1.500E+00	---	DENSCV
R013	Cover depth erosion rate (m/yr)	not used	1.000E-03	---	VCV
R013	Density of contaminated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSCZ
R013	Contaminated zone erosion rate (m/yr)	1.000E-03	1.000E-03	---	VCZ
R013	Contaminated zone total porosity	4.000E-01	4.000E-01	---	TPCZ
R013	Contaminated zone effective porosity	2.000E-01	2.000E-01	---	EPCZ
R013	Contaminated zone hydraulic conductivity (m/yr)	4.400E+02	1.000E+01	---	HCCZ
R013	Contaminated zone b parameter	4.050E+00	5.300E+00	---	BCZ
R013	Humidity in air (g/cm**3)	not used	8.000E+00	---	HUMID
R013	Evapotranspiration coefficient	9.990E-01	5.000E-01	---	EVAPTR
R013	Precipitation (m/yr)	4.800E-01	1.000E+00	---	PRECIP
R013	Irrigation (m/yr)	0.000E+00	2.000E-01	---	RI
R013	Irrigation mode	overhead	overhead	---	IDITCH
R013	Runoff coefficient	5.200E-01	2.000E-01	---	RUNOFF
R013	Watershed area for nearby stream or pond (m**2)	2.700E+07	1.000E+06	---	WAREA
R013	Accuracy for water/soil computations	1.000E-03	1.000E-03	---	EPS
R014	Density of saturated zone (g/cm**3)	1.600E+00	1.500E+00	---	DENSAQ
R014	Saturated zone total porosity	3.000E-01	4.000E-01	---	TPSZ
R014	Saturated zone effective porosity	3.000E-01	2.000E-01	---	EPSZ
R014	Saturated zone hydraulic conductivity (m/yr)	1.000E+02	1.000E+02	---	HCSZ
R014	Saturated zone hydraulic gradient	2.000E-02	2.000E-02	---	HGWT
R014	Saturated zone b parameter	4.050E+00	5.300E+00	---	BSZ
R014	Water table drop rate (m/yr)	3.000E-01	1.000E-03	---	VWT
R014	Well pump intake depth (m below water table)	1.000E+01	1.000E+01	---	DWIBWT
R014	Model: Nondispersion (ND) or Mass-Balance (MB)	ND	ND	---	MODEL
R014	Well pumping rate (m**3/yr)	2.500E+02	2.500E+02	---	UW

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R015	Number of unsaturated zone strata	not used	1	---	NS
R015	Unsat. zone 1, thickness (m)	not used	4.000E+00	---	H(1)
R015	Unsat. zone 1, soil density (g/cm**3)	not used	1.500E+00	---	DENSUZ(1)
R015	Unsat. zone 1, total porosity	not used	4.000E-01	---	TPUZ(1)
R015	Unsat. zone 1, effective porosity	not used	2.000E-01	---	EPUZ(1)
R015	Unsat. zone 1, soil-specific b parameter	not used	5.300E+00	---	BUZ(1)
R015	Unsat. zone 1, hydraulic conductivity (m/yr)	not used	1.000E+01	---	HCUZ(1)
R016	Distribution coefficients for U-234				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(6)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(6,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(6)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.587E-07	ALEACH(6)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(6)
R016	Distribution coefficients for U-235				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(7)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(7,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(7)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.587E-07	ALEACH(7)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(7)
R016	Distribution coefficients for U-238				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(8)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(8,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(8)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.587E-07	ALEACH(8)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(8)
R016	Distribution coefficients for daughter Ac-227				
R016	Contaminated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCC(1)
R016	Unsaturated zone 1 (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCU(1,1)
R016	Saturated zone (cm**3/g)	2.000E+01	2.000E+01	---	DCNUCS(1)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	2.392E-06	ALEACH(1)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(1)
R016	Distribution coefficients for daughter Pa-231				
R016	Contaminated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCC(2)
R016	Unsaturated zone 1 (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCU(2,1)
R016	Saturated zone (cm**3/g)	5.000E+01	5.000E+01	---	DCNUCS(2)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	9.587E-07	ALEACH(2)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(2)
R016	Distribution coefficients for daughter Pb-210				
R016	Contaminated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCC(3)
R016	Unsaturated zone 1 (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCU(3,1)
R016	Saturated zone (cm**3/g)	1.000E+02	1.000E+02	---	DCNUCS(3)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	4.797E-07	ALEACH(3)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(3)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R016	Distribution coefficients for daughter Ra-226				
R016	Contaminated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCC(4)
R016	Unsaturated zone 1 (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCU(4,1)
R016	Saturated zone (cm**3/g)	7.000E+01	7.000E+01	---	DCNUCS(4)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	6.850E-07	ALEACH(4)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(4)
R016	Distribution coefficients for daughter Th-230				
R016	Contaminated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCC(5)
R016	Unsaturated zone 1 (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCU(5,1)
R016	Saturated zone (cm**3/g)	6.000E+04	6.000E+04	---	DCNUCS(5)
R016	Leach rate (/yr)	0.000E+00	0.000E+00	8.000E-10	ALEACH(5)
R016	Solubility constant	0.000E+00	0.000E+00	not used	SOLUBK(5)
R017	Inhalation rate (m**3/yr)	1.840E+04	8.400E+03	---	INHALR
R017	Mass loading for inhalation (g/m**3)	4.500E-04	2.000E-04	---	MLINH
R017	Dilution length for airborne dust, inhalation (m)	3.000E+00	3.000E+00	---	LM
R017	Exposure duration	9.000E+00	3.000E+01	---	ED
R017	Shielding factor, inhalation	4.000E-01	4.000E-01	---	SHF3
R017	Shielding factor, external gamma	7.000E-01	7.000E-01	---	SHF1
R017	Fraction of time spent indoors	0.000E+00	5.000E-01	---	FIND
R017	Fraction of time spent outdoors (on site)	1.250E-01	2.500E-01	---	FOTD
R017	Shape factor flag, external gamma	1.000E+00	1.000E+00	1 shows circular AREA.	FS
R017	Radii of shape factor array (used if FS = -1):				
R017	Outer annular radius (m), ring 1:	not used	5.000E+01	---	RAD_SHAPE(1)
R017	Outer annular radius (m), ring 2:	not used	7.071E+01	---	RAD_SHAPE(2)
R017	Outer annular radius (m), ring 3:	not used	0.000E+00	---	RAD_SHAPE(3)
R017	Outer annular radius (m), ring 4:	not used	0.000E+00	---	RAD_SHAPE(4)
R017	Outer annular radius (m), ring 5:	not used	0.000E+00	---	RAD_SHAPE(5)
R017	Outer annular radius (m), ring 6:	not used	0.000E+00	---	RAD_SHAPE(6)
R017	Outer annular radius (m), ring 7:	not used	0.000E+00	---	RAD_SHAPE(7)
R017	Outer annular radius (m), ring 8:	not used	0.000E+00	---	RAD_SHAPE(8)
R017	Outer annular radius (m), ring 9:	not used	0.000E+00	---	RAD_SHAPE(9)
R017	Outer annular radius (m), ring 10:	not used	0.000E+00	---	RAD_SHAPE(10)
R017	Outer annular radius (m), ring 11:	not used	0.000E+00	---	RAD_SHAPE(11)
R017	Outer annular radius (m), ring 12:	not used	0.000E+00	---	RAD_SHAPE(12)
R017	Fractions of annular areas within AREA:				
R017	Ring 1	not used	1.000E+00	---	FRACA(1)
R017	Ring 2	not used	2.732E-01	---	FRACA(2)
R017	Ring 3	not used	0.000E+00	---	FRACA(3)
R017	Ring 4	not used	0.000E+00	---	FRACA(4)
R017	Ring 5	not used	0.000E+00	---	FRACA(5)
R017	Ring 6	not used	0.000E+00	---	FRACA(6)
R017	Ring 7	not used	0.000E+00	---	FRACA(7)
R017	Ring 8	not used	0.000E+00	---	FRACA(8)
R017	Ring 9	not used	0.000E+00	---	FRACA(9)
R017	Ring 10	not used	0.000E+00	---	FRACA(10)
R017	Ring 11	not used	0.000E+00	---	FRACA(11)
R017	Ring 12	not used	0.000E+00	---	FRACA(12)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R018	Fruits, vegetables and grain consumption (kg/yr)	not used	1.600E+02	---	DIET(1)
R018	Leafy vegetable consumption (kg/yr)	not used	1.400E+01	---	DIET(2)
R018	Milk consumption (L/yr)	not used	9.200E+01	---	DIET(3)
R018	Meat and poultry consumption (kg/yr)	not used	6.300E+01	---	DIET(4)
R018	Fish consumption (kg/yr)	not used	5.400E+00	---	DIET(5)
R018	Other seafood consumption (kg/yr)	not used	9.000E-01	---	DIET(6)
R018	Soil ingestion rate (g/yr)	7.000E+01	3.650E+01	---	SOIL
R018	Drinking water intake (L/yr)	not used	5.100E+02	---	DWI
R018	Contamination fraction of drinking water	not used	1.000E+00	---	FDW
R018	Contamination fraction of household water	0.000E+00	1.000E+00	---	FHHW
R018	Contamination fraction of livestock water	not used	1.000E+00	---	FLW
R018	Contamination fraction of irrigation water	not used	1.000E+00	---	FIRW
R018	Contamination fraction of aquatic food	not used	5.000E-01	---	FR9
R018	Contamination fraction of plant food	not used	-1	---	FPLANT
R018	Contamination fraction of meat	not used	-1	---	FMEAT
R018	Contamination fraction of milk	not used	-1	---	FMILK
R019	Livestock fodder intake for meat (kg/day)	not used	6.800E+01	---	LFI5
R019	Livestock fodder intake for milk (kg/day)	not used	5.500E+01	---	LFI6
R019	Livestock water intake for meat (L/day)	not used	5.000E+01	---	LWI5
R019	Livestock water intake for milk (L/day)	not used	1.600E+02	---	LWI6
R019	Livestock soil intake (kg/day)	not used	5.000E-01	---	LSI
R019	Mass loading for foliar deposition (g/m**3)	not used	1.000E-04	---	MLFD
R019	Depth of soil mixing layer (m)	1.500E-01	1.500E-01	---	DM
R019	Depth of roots (m)	not used	9.000E-01	---	DROOT
R019	Drinking water fraction from ground water	1.000E+00	1.000E+00	---	FGWDW
R019	Household water fraction from ground water	not used	1.000E+00	---	FGWHH
R019	Livestock water fraction from ground water	1.000E+00	1.000E+00	---	FGWLW
R019	Irrigation fraction from ground water	not used	1.000E+00	---	FGWIR
C14	C-12 concentration in water (g/cm**3)	not used	2.000E-05	---	C12WTR
C14	C-12 concentration in contaminated soil (g/g)	not used	3.000E-02	---	C12CZ
C14	Fraction of vegetation carbon from soil	not used	2.000E-02	---	CSOIL
C14	Fraction of vegetation carbon from air	not used	9.800E-01	---	CAIR
C14	C-14 evasion layer thickness in soil (m)	not used	3.000E-01	---	DMC
C14	C-14 evasion flux rate from soil (1/sec)	not used	7.000E-07	---	EVSN
C14	C-12 evasion flux rate from soil (1/sec)	not used	1.000E-10	---	REVSN
C14	Fraction of grain in beef cattle feed	not used	8.000E-01	---	AVFG4
C14	Fraction of grain in milk cow feed	not used	2.000E-01	---	AVFG5
STOR	Storage times of contaminated foodstuffs (days):				
STOR	Fruits, non-leafy vegetables, and grain	not used	1.400E+01	---	STOR_T(1)
STOR	Leafy vegetables	not used	1.000E+00	---	STOR_T(2)
STOR	Milk	not used	1.000E+00	---	STOR_T(3)
STOR	Meat and poultry	not used	2.000E+01	---	STOR_T(4)
STOR	Fish	not used	7.000E+00	---	STOR_T(5)
STOR	Crustacea and mollusks	not used	7.000E+00	---	STOR_T(6)
STOR	Well water	not used	1.000E+00	---	STOR_T(7)
STOR	Surface water	not used	1.000E+00	---	STOR_T(8)
STOR	Livestock fodder	not used	4.500E+01	---	STOR_T(9)

Site-Specific Parameter Summary (continued)

Menu	Parameter	User Input	Default	Used by RESRAD (If different from user input)	Parameter Name
R021	Thickness of building foundation (m)	not used	1.500E-01	---	FLOOR
R021	Bulk density of building foundation (g/cm**3)	not used	2.400E+00	---	DENSFL
R021	Total porosity of the cover material	not used	4.000E-01	---	TPCV
R021	Total porosity of the building foundation	not used	1.000E-01	---	TPFL
R021	Volumetric water content of the cover material	not used	5.000E-02	---	PH2OCV
R021	Volumetric water content of the foundation	not used	3.000E-02	---	PH2OFL
R021	Diffusion coefficient for radon gas (m/sec):				
R021	in cover material	not used	2.000E-06	---	DIFCV
R021	in foundation material	not used	3.000E-07	---	DIFFL
R021	in contaminated zone soil	2.000E-06	2.000E-06	---	DIFCZ
R021	Radon vertical dimension of mixing (m)	2.000E+00	2.000E+00	---	HMIX
R021	Average annual wind speed (m/sec)	3.000E+00	2.000E+00	---	WIND
R021	Average building air exchange rate (1/hr)	not used	5.000E-01	---	REXG
R021	Height of the building (room) (m)	not used	2.500E+00	---	HRM
R021	Building interior area factor	not used	0.000E+00	code computed (time dependent)	FAI
R021	Building depth below ground surface (m)	not used	-1.000E+00	code computed (time dependent)	DMFL
R021	Emanating power of Rn-222 gas	2.500E-01	2.500E-01	---	EMANA(1)
R021	Emanating power of Rn-220 gas	not used	1.500E-01	---	EMANA(2)

Summary of Pathway Selections

Pathway	User Selection
1 -- external gamma	active
2 -- inhalation (w/o radon)	active
3 -- plant ingestion	suppressed
4 -- meat ingestion	suppressed
5 -- milk ingestion	suppressed
6 -- aquatic foods	suppressed
7 -- drinking water	suppressed
8 -- soil ingestion	active
9 -- radon	active

Contaminated Zone Dimensions		Initial Soil Concentrations, pCi/g	
Area:	1500.00 square meters	U-234	1.000E+00
Thickness:	3.00 meters	U-235	1.000E+00
Cover Depth:	0.00 meters	U-238	1.000E+00

Total Dose TDOSE(t), mrem/yr
Basic Radiation Dose Limit = 15 mrem/yr
Total Mixture Sum M(t) = Fraction of Basic Dose Limit Received at Time (t)

t (years):	0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
TDOSE(t):	4.680E-01	4.680E-01	4.681E-01	4.685E-01	4.705E-01	4.812E-01	5.161E-01	6.389E-01
M(t):	3.120E-02	3.120E-02	3.121E-02	3.124E-02	3.137E-02	3.208E-02	3.440E-02	4.259E-02

Maximum TDOSE(t): 6.389E-01 mrem/yr at t = 1.000E+03 years

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.693E-05	0.0001	1.268E-01	0.2709	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.476E-03	0.0053
U-235	8.702E-02	0.1859	1.182E-01	0.2525	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.336E-03	0.0050
U-238	1.548E-02	0.0331	1.133E-01	0.2422	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.354E-03	0.0050
Total	1.025E-01	0.2191	3.583E-01	0.7656	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.166E-03	0.0153

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 0.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.293E-01	0.2763
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.075E-01	0.4434
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-01	0.2803
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.680E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.693E-05	0.0001	1.268E-01	0.2709	2.331E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.476E-03	0.0053
U-235	8.702E-02	0.1859	1.182E-01	0.2525	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.338E-03	0.0050
U-238	1.548E-02	0.0331	1.134E-01	0.2422	2.277E-19	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.354E-03	0.0050
Total	1.025E-01	0.2191	3.583E-01	0.7656	2.331E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.168E-03	0.0153

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.293E-01	0.2763
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.075E-01	0.4434
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-01	0.2803
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.680E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.695E-05	0.0001	1.268E-01	0.2709	2.097E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.476E-03	0.0053
U-235	8.702E-02	0.1859	1.182E-01	0.2526	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.343E-03	0.0050
U-238	1.548E-02	0.0331	1.134E-01	0.2421	5.940E-18	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.354E-03	0.0050
Total	1.025E-01	0.2191	3.584E-01	0.7656	2.097E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.173E-03	0.0153

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+00 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.293E-01	0.2763
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.076E-01	0.4435
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-01	0.2802
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.681E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.718E-05	0.0001	1.268E-01	0.2707	2.328E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.477E-03	0.0053
U-235	8.703E-02	0.1858	1.186E-01	0.2531	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.360E-03	0.0050
U-238	1.548E-02	0.0330	1.134E-01	0.2419	2.200E-16	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.354E-03	0.0050
Total	1.026E-01	0.2189	3.588E-01	0.7658	2.328E-11	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.190E-03	0.0153

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.293E-01	0.2761
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.080E-01	0.4439
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-01	0.2800
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.685E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	4.917E-05	0.0001	1.269E-01	0.2697	2.088E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.477E-03	0.0053
U-235	8.708E-02	0.1851	1.204E-01	0.2559	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.424E-03	0.0052
U-238	1.548E-02	0.0329	1.134E-01	0.2409	5.927E-15	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.354E-03	0.0050
Total	1.026E-01	0.2181	3.606E-01	0.7665	2.088E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.255E-03	0.0154

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+01 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.294E-01	0.2750
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.099E-01	0.4461
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-01	0.2788
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.705E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	7.133E-05	0.0001	1.270E-01	0.2640	2.292E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.481E-03	0.0052
U-235	8.739E-02	0.1816	1.303E-01	0.2707	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.723E-03	0.0057
U-238	1.548E-02	0.0322	1.134E-01	0.2356	2.174E-13	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.354E-03	0.0049
Total	1.029E-01	0.2139	3.707E-01	0.7704	2.292E-09	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	7.558E-03	0.0157

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.296E-01	0.2693
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.204E-01	0.4580
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.312E-01	0.2727
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	4.812E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	2.596E-04	0.0005	1.275E-01	0.2471	1.998E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.497E-03	0.0048
U-235	8.843E-02	0.1713	1.625E-01	0.3148	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.656E-03	0.0071
U-238	1.548E-02	0.0300	1.134E-01	0.2198	5.727E-12	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.355E-03	0.0046
Total	1.042E-01	0.2018	4.034E-01	0.7817	1.999E-08	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	8.508E-03	0.0165

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 3.000E+02 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.303E-01	0.2524
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.545E-01	0.4932
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.313E-01	0.2543
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	5.161E-01	1.0000

*Sum of all water independent and dependent pathways.

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Independent Pathways (Inhalation excludes radon)

Radio-	Ground		Inhalation		Radon		Plant		Meat		Milk		Soil	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	2.183E-03	0.0034	1.292E-01	0.2022	1.961E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.631E-03	0.0041
U-235	9.202E-02	0.1440	2.746E-01	0.4298	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.898E-03	0.0108
U-238	1.547E-02	0.0242	1.136E-01	0.1778	1.920E-10	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	2.359E-03	0.0037
Total	1.097E-01	0.1717	5.173E-01	0.8097	1.963E-07	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.189E-02	0.0186

Total Dose Contributions TDOSE(i,p,t) for Individual Radionuclides (i) and Pathways (p)
As mrem/yr and Fraction of Total Dose At t = 1.000E+03 years

Water Dependent Pathways

Radio-	Water		Fish		Radon		Plant		Meat		Milk		All Pathways*	
Nuclide	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.	mrem/yr	fract.
U-234	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.340E-01	0.2097
U-235	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	3.735E-01	0.5846
U-238	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	1.314E-01	0.2057
Total	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	0.000E+00	0.0000	6.389E-01	1.0000

*Sum of all water independent and dependent pathways.

Dose/Source Ratios Summed Over All Pathways
Parent and Progeny Principal Radionuclide Contributions Indicated

Parent (i)	Product (j)	Branch Fraction	DSR(j,t) (mrem/yr)/(pCi/g) t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.292E-01	1.288E-01
U-234	Th-230	1.000E+00	0.000E+00	2.863E-06	8.590E-06	2.863E-05	8.589E-05	2.862E-04	8.574E-04	2.845E-03
U-234	Ra-226	1.000E+00	0.000E+00	2.503E-09	2.252E-08	2.500E-07	2.243E-06	2.467E-05	2.156E-04	2.168E-03
U-234	Pb-210	1.000E+00	0.000E+00	1.736E-12	4.615E-11	1.620E-09	3.787E-08	9.246E-07	1.180E-05	1.377E-04
U-234	DSR(j)		1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.294E-01	1.296E-01	1.303E-01	1.340E-01
U-235	U-235	1.000E+00	2.075E-01	2.075E-01	2.075E-01	2.075E-01	2.075E-01	2.075E-01	2.074E-01	2.073E-01
U-235	Pa-231	1.000E+00	0.000E+00	2.844E-05	8.532E-05	2.844E-04	8.529E-04	2.841E-03	8.503E-03	2.811E-02
U-235	Ac-227	1.000E+00	0.000E+00	2.270E-06	2.001E-05	2.069E-04	1.538E-03	1.007E-02	3.859E-02	1.381E-01
U-235	DSR(j)		2.075E-01	2.075E-01	2.076E-01	2.080E-01	2.099E-01	2.204E-01	2.545E-01	3.735E-01
U-238	U-238	1.000E+00	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.311E-01	1.311E-01
U-238	U-234	1.000E+00	0.000E+00	3.666E-07	1.100E-06	3.666E-06	1.100E-05	3.665E-05	1.099E-04	3.658E-04
U-238	Th-230	1.000E+00	0.000E+00	4.059E-12	3.653E-11	4.059E-10	3.652E-09	4.057E-08	3.648E-07	4.040E-06
U-238	Ra-226	1.000E+00	0.000E+00	2.445E-15	6.380E-14	2.363E-12	6.367E-11	2.340E-09	6.179E-08	2.123E-06
U-238	Pb-210	1.000E+00	0.000E+00	0.000E+00	1.062E-16	1.166E-14	8.405E-13	7.350E-11	3.092E-09	1.306E-07
U-238	DSR(j)		1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.313E-01	1.314E-01

Branch Fraction is the cumulative factor for the j'th principal radionuclide daughter: CUMBRF(j) = BRF(1)*BRF(2)* ... BRF(j).
The DSR includes contributions from associated (half-life 0.5 yr) daughters.

Single Radionuclide Soil Guidelines G(i,t) in pCi/g
Basic Radiation Dose Limit = 15 mrem/yr

Nuclide (i)	t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	1.160E+02	1.160E+02	1.160E+02	1.160E+02	1.159E+02	1.158E+02	1.152E+02	1.120E+02
U-235	7.229E+01	7.228E+01	7.225E+01	7.212E+01	7.146E+01	6.806E+01	5.893E+01	4.016E+01
U-238	1.143E+02	1.143E+02	1.143E+02	1.143E+02	1.143E+02	1.143E+02	1.143E+02	1.141E+02

Summed Dose/Source Ratios DSR(i,t) in (mrem/yr)/(pCi/g)
and Single Radionuclide Soil Guidelines G(i,t) in pCi/g
at tmin = time of minimum single radionuclide soil guideline
and at tmax = time of maximum total dose = 1.000E+03 years

Nuclide (i)	Initial pCi/g	tmin (years)	DSR(i,tmin)	G(i,tmin) (pCi/g)	DSR(i,tmax)	G(i,tmax) (pCi/g)
U-234	1.000E+00	1.000E+03	1.340E-01	1.120E+02	1.340E-01	1.120E+02
U-235	1.000E+00	1.000E+03	3.735E-01	4.016E+01	3.735E-01	4.016E+01
U-238	1.000E+00	1.000E+03	1.314E-01	1.141E+02	1.314E-01	1.141E+02

Individual Nuclide Dose Summed Over All Pathways
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	DOSE(j,t), mrem/yr t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.292E-01	1.288E-01
U-234	U-238	1.000E+00	0.000E+00	3.666E-07	1.100E-06	3.666E-06	1.100E-05	3.665E-05	1.099E-04	3.658E-04
U-234	DOSE(j):		1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.293E-01	1.292E-01
Th-230	U-234	1.000E+00	0.000E+00	2.863E-06	8.590E-06	2.863E-05	8.589E-05	2.862E-04	8.574E-04	2.845E-03
Th-230	U-238	1.000E+00	0.000E+00	4.059E-12	3.653E-11	4.059E-10	3.652E-09	4.057E-08	3.648E-07	4.040E-06
Th-230	DOSE(j):		0.000E+00	2.863E-06	8.590E-06	2.863E-05	8.589E-05	2.862E-04	8.577E-04	2.849E-03
Ra-226	U-234	1.000E+00	0.000E+00	2.503E-09	2.252E-08	2.500E-07	2.243E-06	2.467E-05	2.156E-04	2.168E-03
Ra-226	U-238	1.000E+00	0.000E+00	2.445E-15	6.380E-14	2.363E-12	6.367E-11	2.340E-09	6.179E-08	2.123E-06
Ra-226	DOSE(j):		0.000E+00	2.503E-09	2.252E-08	2.500E-07	2.243E-06	2.467E-05	2.157E-04	2.170E-03
Pb-210	U-234	1.000E+00	0.000E+00	1.736E-12	4.615E-11	1.620E-09	3.787E-08	9.246E-07	1.180E-05	1.377E-04
Pb-210	U-238	1.000E+00	0.000E+00	0.000E+00	1.062E-16	1.166E-14	8.405E-13	7.350E-11	3.092E-09	1.306E-07
Pb-210	DOSE(j):		0.000E+00	1.736E-12	4.615E-11	1.620E-09	3.787E-08	9.246E-07	1.180E-05	1.378E-04
U-235	U-235	1.000E+00	2.075E-01	2.075E-01	2.075E-01	2.075E-01	2.075E-01	2.075E-01	2.074E-01	2.073E-01
Pa-231	U-235	1.000E+00	0.000E+00	2.844E-05	8.532E-05	2.844E-04	8.529E-04	2.841E-03	8.503E-03	2.811E-02
Ac-227	U-235	1.000E+00	0.000E+00	2.270E-06	2.001E-05	2.069E-04	1.538E-03	1.007E-02	3.859E-02	1.381E-01
U-238	U-238	1.000E+00	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.312E-01	1.311E-01	1.311E-01

BRF(i) is the branch fraction of the parent nuclide.

Individual Nuclide Soil Concentration
Parent Nuclide and Branch Fraction Indicated

Nuclide (j)	Parent (i)	BRF(i)	S(j,t), pCi/g t= 0.000E+00	1.000E+00	3.000E+00	1.000E+01	3.000E+01	1.000E+02	3.000E+02	1.000E+03
U-234	U-234	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.996E-01	9.989E-01	9.962E-01
U-234	U-238	1.000E+00	0.000E+00	2.835E-06	8.505E-06	2.835E-05	8.504E-05	2.834E-04	8.499E-04	2.828E-03
U-234	S(j):		1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.997E-01	9.990E-01
Th-230	U-234	1.000E+00	0.000E+00	9.002E-06	2.701E-05	9.001E-05	2.700E-04	8.996E-04	2.695E-03	8.945E-03
Th-230	U-238	1.000E+00	0.000E+00	1.276E-11	1.148E-10	1.276E-09	1.148E-08	1.275E-07	1.147E-06	1.270E-05
Th-230	S(j):		0.000E+00	9.002E-06	2.701E-05	9.001E-05	2.700E-04	8.997E-04	2.697E-03	8.957E-03
Ra-226	U-234	1.000E+00	0.000E+00	1.950E-09	1.754E-08	1.947E-07	1.747E-06	1.921E-05	1.679E-04	1.689E-03
Ra-226	U-238	1.000E+00	0.000E+00	1.904E-15	4.969E-14	1.841E-12	4.958E-11	1.822E-09	4.812E-08	1.653E-06
Ra-226	S(j):		0.000E+00	1.950E-09	1.754E-08	1.947E-07	1.747E-06	1.921E-05	1.679E-04	1.690E-03
Pb-210	U-234	1.000E+00	0.000E+00	2.004E-11	5.328E-10	1.870E-08	4.372E-07	1.067E-05	1.363E-04	1.590E-03
Pb-210	U-238	1.000E+00	0.000E+00	0.000E+00	1.226E-15	1.347E-13	9.704E-12	8.486E-10	3.570E-08	1.508E-06
Pb-210	S(j):		0.000E+00	2.004E-11	5.328E-10	1.870E-08	4.373E-07	1.068E-05	1.363E-04	1.592E-03
U-235	U-235	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.997E-01	9.990E-01
Pa-231	U-235	1.000E+00	0.000E+00	2.116E-05	6.347E-05	2.116E-04	6.345E-04	2.113E-03	6.326E-03	2.092E-02
Ac-227	U-235	1.000E+00	0.000E+00	3.332E-07	2.937E-06	3.037E-05	2.258E-04	1.477E-03	5.665E-03	2.026E-02
U-238	U-238	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	9.999E-01	9.997E-01	9.990E-01

BRF(i) is the branch fraction of the parent nuclide.

7.5 Site-Specific Health and Safety Plan

The Site Specific Health and Safety Plan is attached at the end of this document.

7.6 Waste Characterization Strategy Form

The Waste Characterization Strategy Form follows this page.

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CHARACTERIZATION STRATEGY FORM

OU Number	PRS/SWMU Numbers	Title
OU 1122	33-007(c)	Pilot Project

Name: Linda Fluk	**Date:** 02/20/96
FPL: Brad Martin	**WMC:** Lynn Kidman
Type of Activity: Pilot Project	

Site Description: PRS 33-007(c) was developed in 1948 for initiator experiments. TA-33-16 (originally TA-33-6) housed an air gun and electronic equipment to measure neutron production in "gun-type" initiators containing beryllium and polonium-210. Military guns were stationed and fired from concrete pads adjacent to TA-33-16. Projectiles were fired at targets placed in front of catcherboxes. The targets contained natural uranium, the projectiles contained lead metal, and Beryllium was contained in the initiators. Shots were discontinued in 1955.

Investigation or Remediation Waste Description and Volume Estimate:

Previous Investigation:

A 1994 Phase I investigation was conducted at PRS 33-007(c). Eight soil samples were collected from within the catcherboxes. These samples were analyzed for uranium and inorganic constituents (based on knowledge of site operations). Analytical results are presented in attachment 1. Uranium was the only contaminant present above SALs and the only contaminant which is anticipated to affect characterization of the waste.

Remediation (VCA) Activities:

Three processes will be used to remediate approximately 200 cy of soil. The first process is screening of the catcherbox material for rocks and metal debris. The second process is the Segmented Gate System (SGS) which will assay and sort uranium-contaminated soil to the criteria for allowable residual concentrations of radionuclides (criteria). Soil passing this criteria will be returned to the site. The Containerized Vat Leach (CVL) system is the third process that will leach uranium from the soil failing the criteria. A bicarbonate/carbonate solution will be used to mobilize the uranium into solution. This solution will then be directed to ion exchange columns where the uranium will be adsorbed onto resins. The wastes associated with this activity are the residual , exchange resins, decontamination liquids, and pieces of metal debris. All rocks and soil will be returned to the site once the criteria have been met.

Waste Estimates:

Remediation activities at this PRS will result in the following estimated volumes of waste:

- 300 gallons of decontamination liquids (non-radioactive, non-hazardous)
- 15 gallons of spent bicarbonate/carbonate solution (non-radioactive, non-hazardous);
- 2.0 cf of metal debris (expected to be non-hazardous, non-rad but could also be haz, mixed or rad); and
- 1 cy of resins from the exchange columns (low-level radioactive solid waste).

Characterization Strategy:

Strategy Description:

OU Number	PRS/SWMU Numbers	Title
OU 1122	33-007(c)	Pilot Project

Samples of the spent bicarbonate/carbonate solution ,decontamination liquids, and exchange resins will be analyzed for gross alpha, beta, and gamma in the rad van. Radioactivity of the metal debris will be determined using field instruments. If radioactivity for any waste is above CST criteria, isotopic analyses will be performed. A sample of the spent bicarbonate/carbonate solution will be submitted for total metals analysis. A sample of the exchange resins will be submitted for TCLP metals analysis. The metal debris will be analyzed with the XRF for lead. Wastes will be placed in 55 gallon drums. Radioactive waste will be stored in a Radioactive Material Holding Area until it is disposed. If haz or mixed waste is generated, an SAA will be established

Preliminary RCRA Determination:

☑ No 90-Day Storage Requirement (non-RCRA)
Waste will be suspect for radioactivity only.

☐ 90-Day Storage Requirement (RCRA)

Analyte Suite: metal

Analyte Category	Analytical Method	Direct Sampling of Containerized Waste	Acceptable Knowledge		
			Existing Information		Data from Site Characterization
			Present	Absent	
Volatile Compounds	8260	☐	☐	☑	☐
Semi-Volatile Compounds	8270	☐	☐	☑	☐
Organic Pesticides and PCBs		☐	☐	☑	☐
Inorganic Compounds	XRF	☑	☐	☑[1]	☐
Total Metals	6010	☐	☐	☐	☐
High Explosive Compounds	8330	☐	☐	☐	☐
Gross Alpha		☑[2]	☑	☐	☐
Gross Beta		☑[2]	☑	☐	☐
Gross Gamma		☑[2]	☑	☐	☐
Tritium*		☐	☐	☑	☐
Asbestos		☐	☐	☐	☐
TCLP	SW 846	☐	☐	☐	☐
Metals	SW 846	☐	☐	☐	☐
Organics	SW 846	☐	☐	☐	☐
Pesticides, herbicides, fungicides	SW 846	☐	☐	☐	☐
Isotopic Plutonium	HASL 300, Pu-06	☐	☐	☑	☐

1 absent at characteristic levels in soil but lead debris may be present
2 surface contamination evaluated with field instruments
* Tritium results will be presented as backup with the WPF.

Analyte Suite: spent bicarbonate/carbonate solution

Analyte Category	Analytical Method	Direct Sampling of Containerized Waste	Acceptable Knowledge		
			Existing Information		Data from Site Characterization
			Present	Absent	
Volatile Compounds	8260	☐	☐	☑	☐
Semi-Volatile Compounds	8270	☐	☐	☑	☐
Organic Pesticides and PCBs		☐	☐	☑	☐
Inorganic Compounds	XRF	☐	☐	☑	☐
Total Metals	6010	☑	☐	☑	☐
High Explosive Compounds	8330	☐	☐	☑	☐
Gross Alpha		☑[1]	☑	☐	☐
Gross Beta		☑[1]	☑	☐	☐
Gross Gamma		☑[1]	☑	☐	☐
Tritium*		☐	☐	☑	☐
Asbestos		☐	☐	☐	☐
TCLP	SW 846	☐	☐	☐	☐
Metals	SW 846	☐	☐	☐	☐
Organics	SW 846	☐	☐	☐	☐
Pesticides, herbicides, fungicides	SW 846	☐	☐	☐	☐
Isotopic Plutonium	HASL 300	☐	☐	☑	☐

Analyte Suite: exchange resins

Analyte Category	Analytical Method	Direct Sampling of Containerized Waste	Acceptable Knowledge		
			Existing Information		Data from Site Characterization
			Present	Absent	
Volatile Compounds	8260	☐	☐	☑	☐
Semi-Volatile Compounds	8270	☐	☐	☑	☐
Organic Pesticides and PCBs		☐	☐	☑	☐
Inorganic Compounds	XRF	☐	☐	☑	☐
Total Metals	6010	☐	☐	☑	☐
High Explosive Compounds	8330	☐	☐	☑	☐
Gross Alpha		☑[1]	☑	☐	☐
Gross Beta		☑[1]	☑	☐	☐
Gross Gamma		☑[1]	☑	☐	☐
Tritium*		☐	☐	☑	☐
Asbestos		☐	☐	☐	☐
TCLP	SW 846	☐	☐	☐	☐
Metals	SW 846	☑	☐	☐	☐
Organics	SW 846	☐	☐	☐	☐
Pesticides, herbicides, fungicides	SW 846	☐	☐	☐	☐
Isotopic Plutonium	HASL 300	☐	☐	☑	☐

1 rad van analysis

* Tritium results will be presented as backup with the WPF.

Analyte Suite: decon liquid

Analyte Category	Analytical Method	Direct Sampling of Containerized Waste	Acceptable Knowledge		
			Existing Information		Data from Site Characterization
			Present	Absent	
Volatile Compounds	8260	☐	☐	☑	☐
Semi-Volatile Compounds	8270	☐	☐	☑	☐
Organic Pesticides and PCBs		☐	☐	☑	☐
Inorganic Compounds	XRF	☐	☐	☑	☐
Total Metals	6010	☐	☐	☑	☐
High Explosive Compounds	8330	☐	☐	☑	☐
Gross Alpha		☑[1]	☑	☐	☐
Gross Beta		☑[1]	☑	☐	☐
Gross Gamma		☑[1]	☑	☐	☐
Tritium*		☐	☐	☑	☐
Asbestos		☐	☐	☐	☐
TCLP	SW 846	☐	☐	☐	☐
Metals	SW 846	☐	☐	☐	☐
Organics	SW 846	☐	☐	☐	☐
Pesticides, herbicides, fungicides	SW 846	☐	☐	☐	☐
Isotopic Plutonium	HASL 300, Pu-06	☐	☐	☑	☐

1 rad van analysis

* Tritium results will be presented as backup with the WPF.

Signatures:

ER Waste Management Coordinator

Waste Management Representative 5/8/96

Form Author

7.7 VCA Checklist and Fieldwork Authorization Form

The VCA Checklist and Fieldwork Authorization Form follows this page.

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Voluntary Corrective Action (VCA)
Checklist and Field Work Authorization Form

PRS No. 33-007(c) **HSWA or AOC**

X COPC(s) defined.

X Nature and extent defined or field screening method available to guide where not defined.

X Remedy is obvious.

X Time for removal is less than 6 months.

X Remedy is final.

X Land use assumptions straightforward.

X Treatment, Storage, Disposal Facilities are available for waste type and volume.

X Cleanup cost is reasonable for the planned action, and meets accelerated decision logic criterion for decision to proceed with VCA.

Explain criteria not checked above._____

Through reviewing the above criteria associated with this site, I believe that a VCA is the appropriate Accelerated Cleanup approach.

FPL _____ Date 7/9/96

FPC Joseph A. Moser Date 7/11/96

The undersigned have reviewed the final plan and believe that it fully satisfies the appropriate Accelerated Cleanup approach.

FPL _____ Date 8/26/96

FPC Joseph Moser Date 09/03/96

Through reviewing the VCA Plan, for site(s) 33-007(c), and believing that the above criteria have been met, I authorize the fieldwork to proceed.

DOE ER Program Manager _____ Date 9/3/96

EM/ER:95-PCT-029-R1

7.8 Cost Estimate

Cost estimates for SWMU 33-007(c) are shown in Table 7.8-1.

TABLE 7.8-1

SWMU 33-007(c) COST PROJECTIONS

ACTIVITY	COST
Pre-Field Activities (field preparation and plan development)	$15 000
Field Activities	$190 000
Waste Management Disposal	$3 000
Sampling/Analytical	$2 000
Post-Field Activities and Report	$15 000
Total Estimated Cost	$224 000

8.0 REFERENCES

EPA (US Environmental Protection Agency), April 10, 1990. Module VIII of RCRA Permit No. NM0890010515, EPA Region VI, issued to Los Alamos National Laboratory, Los Alamos, New Mexico, effective May 23, 1990, EPA Region VI, Hazardous Waste Management Division, Dallas, Texas. **(EPA 1990, 0306)**

Environmental Restoration Project, September 29, 1995. "RFI Report for TA-33, PRSs 33-003(a), 33-004(a), 33-007(c), 33-009, 33-011(d), 33-013, 33-016, 33-017 and Revised Sampling Plans for PRSs 33-003(b), 33-004(k), 33-008(a), 33-008(b), C-33-001, C-33-002," Los Alamos National Laboratory Report LA-UR-95-3625, Los Alamos, New Mexico. **(Environmental Restoration Project 1995, 1265)**

Environmental Restoration Project, February 1996. Interim Action Report for Potential Release Site 33-007(c), Los Alamos National Laboratory Report LA-UR-96-710, Los Alamos, New Mexico. **(Environmental Restoration Project 1996, 02-114)**

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1122," Los Alamos National Laboratory Report LA-UR-92-925, Los Alamos, New Mexico. **(LANL 1992, 0784)**

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

LANL (Los Alamos National Laboratory), March 1996. "Quality Assurance Project Plan Requirements for Sampling and Analysis," Los Alamos National Laboratory Report LA-UR-96-441, Los Alamos, New Mexico. **(LANL 1996, 1292)**

LANL ER PROJECT
SITE-SPECIFIC HEALTH AND SAFETY PLAN (SSHASP)

Project Title Pilot Study of Uranium Separation Process (SGS) and Containerized Vat Leach (CVL).

TA(s) 33-007 (c)

This plan addresses the health and safety criteria to be followed during investigation, remediation or decommissioning activities associated with the Environmental Restoration (ER) Project at the Los Alamos National Laboratory (LANL)

Reviewed and Approved by:

Signature	Name/Title	Company	Date
	Bill Brazile	LANL ESH-5	3/28/96
Field Unit Health and Safety (HS) Representative			
	Pat LaFrate	LANL ESH-1	3/29/96
Health Physics Operations (ESH-1)			
	Brad Martin	LANL CST -18	3/29/96
FTM/DPL or FTL/JS (optional at discretion of FPL			
	Peter Bussolini	LANL NIS-33/35	3/26/96
Technical Area (TA) Representative (Facility Management or HS Professional)			
	Lynn Kidman	ICF-Kaiser Engineers	
Field Project Leader (FPL)			

Concurrence by:

Signature	Name/Title	Company	Date
	Clark Judy	Morrison Knudsen	3-29-96
Subcontractor Management			
	Ivan Wachter	ICF-Kaiser Engineers	3/26/96
Subcontractor HS Representative			
- See Following Page -	Mike Dillon	Thermo Nuclean	
Subcontractor Management			

The comments of the above reviewers have been incorporated as stipulated, or resolved with written record and copy to the respective reviewer.				
David Dixson	MK	3/29/96	M767	662-7300
Plan Prepared by Name/Signature	Group	Date	Mailstop	Phone

423-481-0603

LANL ER PROJECT
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Field Unit Health and Safety (HS) Representative			
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Health Physics Operations (ESH-1)			
	Brad Martin	LANL CST -18	
FTM/DPL or FTL/JS (optional at discretion of FPL			
	Peter Bussolini	LANL NIS-33/35	
Technical Area (TA) Representative (Facility Management or HS Professional)			
	Lynn Kidman	ICF-Kaiser Engineering	
Field Project Leader (FPL)			

Concurrence by:

Signature	Name/Title	Company	Date
	Clark Judy	Morrison Knudsen	
Subcontractor Management			
	Ivan Wachler	ICF-Kaiser Engineering	
Subcontractor HS Representative			
	Mike Dillon	Thermo Nuclean	3-27-96
Subcontractor Management			

The comments of the above reviewers have been incorporated as stipulated, or resolved with written record and copy to the respective reviewer.

Plan Prepared by Name/Signature	Group	Date	Mailstop	Phone
David Dixson	MK		M767	662-7300

LANL ER PROJECT
SITE-SPECIFIC HEALTH AND SAFETY PLAN (SSHASP)

Project Title Pilot Study of Uranium Separation Process (SGS) and Containerized Vat Leach (CVL).

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Signature	Name/Title	Company	Date
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Field Unit Health and Safety (HS) Representative			
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	Brad Martin	LANL CST -18	
FTM/DPL or FTL/JS (optional at discretion of FPL			
Peter L. Bussolini	Peter Bussolini	LANL NIS-33/35	3-;
Technical Area (TA) Representative (Facility Management or HS Professional)			
	Lynn Kidman	ICF-Kaiser Engineering	
Field Project Leader (FPL)			
	Clark Judy	Morrison Knudsen	
Subcontractor Management			
	Ivan Wachler	ICF-Kaiser Engineering	
Subcontractor HS Representative			
[Other specify]			

The comments of the above reviewers have been incorporated as stipulated, or resolved with written record and copy to the respective reviewer.

Plan Prepared by Name/Signature	Group	Date	Mailstop	Phone
David Dixson	MK		M767	662-7300

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LIST OF ACRONYMS and ABBREVIATIONS

ACGIH ..... American Conference of Governmental Industrial Hygienists
ALARA ..... As Low As Reasonably Achievable
AL ..... Action Level
ANSI ..... American National Standards Institute
APR ..... Air-Purifying Respirator
AR ..... Administrative Requirements
ATM ..... Atmosphere
°C ..... Degrees Centigrade
CFR ..... Code of Federal Regulations
CGI ..... Combustible Gas Indicator
CP ..... Competent Person
CPR ..... Cardiopulmonary Resuscitation
CRZ ..... Contamination Reduction Zone
CVL ..... Containerized Vat Leach
DAC ..... Derived Air Concentration
dBA ..... Decibels (A-Weighted Scale)
DOE ..... U.S. Department of Energy
DOT ..... U.S. Department of Transportation
DPL ..... Decommissioning Project Leader
EPA ..... U.S. Environmental Protection Agency
ER ..... Environmental Restoration
ESH ..... Environmental, Safety and Health
ESH-1 ..... Health Physics Operations Group
ESH-2 ..... Occupational Medicine Group
ESH-5 ..... Industrial Hygiene and Safety Group
ESH-12 ..... Policy and Program Analysis Group
eV ..... Electron Volts
EZ ..... Exclusion Zone
°F ..... Degrees Fahrenheit
Fibers/cc ..... Fibers Per Cubic Centimeter
FID ..... Flame Ionization Detector
FPL ..... Field Project Leader
FTL ..... Field Team Leader
FTM ..... Field Team Manager
GET ..... General Employee Training
HASP ..... Health and Safety Plan
HAZWOPER ..... Hazardous Waste Operations
HEPA ..... High Efficiency Particulate Air
HPT ..... Health Protection Technician

HS ..... Health and Safety
IARC ..... International Agency for Research on Cancer
IDLH ..... Immediately Dangerous to Life or Health
IHT ..... Industrial Hygiene Technician
IP ..... Ionization Potential
JS ..... Job Superintendent
LAMC ..... Los Alamos Medical Center
LANL ..... Los Alamos National Laboratory
LEL ..... Lower Explosive Limit
LP ..... Laboratory Procedure
ug/Kg ..... Micrograms Per Kilogram
mg/m^3 ..... Milligrams Per Cubic Meter
mm ..... Millimeters
MSDS ..... Material Safety Data Sheet
MUC ..... Maximum Use Concentration
NIOSH ..... National Institute for Occupational Safety and Health
NRR ..... Noise Reduction Rating
OSHA ..... Occupational Safety and Health Administration
PAH ..... Polycyclic Aromatic Hydrocarbons
PEL ..... Permissible Exposure Limit
PF ..... Protection Factor
PID ..... Photoionization Detector
PNA ..... Polynuclear Aromatics
PPE ..... Personal Protective Equipment
PRS ..... Potential Release Site
RCT ..... Radiological Control Technician
RMMA ..... Radioactive Materials Management Area
RSP ..... Radiological Screening Personnel
RWP ..... Radiological Work Permit
SC ..... Spill Containment
SLM ..... Sound Level Meter
SOP ..... Standard Operating Procedures
SSHASP ..... Site-Specific Health and Safety Plan
SSO ..... Site Safety Officer
SUP ..... Supervisor
SWMU ..... Solid Waste Management Unit

SWP ..... Special Work Permit
SZ ..... Support Zone
TA ..... Technical Area
TLD ..... Thermoluminescent Dosimeter
TLV ..... Threshold Limit Value
TWA ..... 8-Hour Time-Weighted Average

1.0 INTRODUCTION

This Site-Specific Health and Safety Plan (SSHASP) has been developed for the Environmental Restoration (ER) Project at the Los Alamos National Laboratory (LANL) to comply with applicable federal and state occupational health and safety (HS) requirements, including those of the U.S. Department of Energy (DOE). The DOE requires LANL to comply with the federal Occupational Safety and Health Administration (OSHA) requirements, although operations at LANL are not subject to the jurisdiction of OSHA. The ER Project has developed a generic Health and Safety Plan, the ER Project HASP, which establishes HS information and requirements applicable to ER field operations project wide. In addition to the HASP, this SSHASP establishes site-specific HS information and requirements applicable to the scope of work described in Section 2.

ER participants are responsible for conducting work in accordance with applicable regulations. The term "ER participants" refers to anyone performing ER work, including LANL, subcontractors to LANL and their lower-tier contractors, consultants, and agents. In some cases in this document, LANL has chosen to invoke OSHA and LANL requirements which ordinarily may not apply to ER field operations (e.g., OSHA's general industry standards in Part 1910 of Title 29 of the Code of Federal Regulations [29 CFR 1910]). These choices were made on a case-by-case basis to maintain consistency with LANL's ALARA policy and to clarify LANL's expectations with regard to interpretable requirements of the multiple agencies governing ER work. Where there is concern that implementation of work orders or HS requirements would conflict with contract terms, or could unreasonably compromise the safety or health of an individual or the environment, such concerns should be brought to the attention of the Contract Administrator and the Field Unit HS Representative immediately. Failure to comply with terms of HS plans may constitute cause to stop activity or for issuance of a stop work order as specified in Section 3.4.2 of the HASP without cost or penalty to LANL.

This SSHASP shall be reviewed and approved in accordance with Section 1.2 of the HASP. Once this SSHASP has been approved, revisions will be tracked using a SSHASP modification form (Appendix B of the HASP) per Section 1.3 of the HASP. Modifications to this SSHASP may require a change to the terms or scope of a subcontract. Completion of a SSHASP modification form is <u>not</u> the means for modifying the scope or terms of the project contract. To modify a contract, the Subcontractor shall notify the Contract Administrator and Field Unit HS Representative under the changes clause and shall not proceed with the change until a change order has been mutually agreed between the parties, or unless unilateral direction is given by the Contract Administrator.

2.0 BACKGROUND INFORMATION

Project Title: Uranium Separation Process and Containerized Vat Leach		
TA: 33-007 (c)		
Objective: Pilot study to assess procedures to assay, sort, and extract uranium contamination from large volumes of soil to remediate the site and reduce the volume of radioactive waste. The outcome of this project is the remediation of soils at PRS 33-007 (c), TA-33.		
Classification of Work: EXPEDITED CLEAN-UP: X		
SITE CHARACTERIZATION: To assess clean up and assay criteria		
Non-intrusive -Clearing and leveling site.	Limited Intrusive - Hand Augering or Surface Sampling	Intrusive - Trenching or Excavation

TABLE 2-1
SITE DESCRIPTION(S)

The site was developed in the mid-1940's for initiator experiments. The facility housed air guns as well as electronic equipment to measure neutron production in "gun type" initiators containing beryllium and polonium-210. Military guns were stationed and fired from concrete pads within and adjacent to TA-33-16. Projectiles were fired at targets placed in front of barricades. These targets contained natural uranium. The targets are the source of the uranium contamination found at the PRS. These activities ceased in the mid-1950's.

The following table describes site facilities and physical features. For a current site facility map refer to Appendix A. The site map illustrates the location, approximate size of the PRS (e.g., boundaries, distances to landmarks, and dimensions or acreage), and critical adjacent structures and/or facilities that might be influenced by field operations.

The following table also lists chemical substances presumed to exist at the site. The presumptions are based on process knowledge and sampling results. The highest known data values determined through sample analysis as are listed in Appendix B.

	SITE(s)		
DESCRIPTOR	33-007(c)	N/A	NA
	Characteristics		
Adjacent Facilities/Structures			
Roads/Highways	X		
Building/Foundation	X		
Above Ground Storage Tank	--		
UST	--		
Below Ground Utilities:			
Electric	X		
Cable	--		
Gas	--		
Phone	--		
Water	--		
Sewer	--		
Other *[specify]*:	--		
Above Ground and Overhead Electric:	--		
£ 50 kV	X		
≥ 50 kV	--		
> 345 kV	--		
Other *[specify]*:	--		

	SITE (s)		
DESCRIPTOR	33-007(c)		NA
Topography			
Canyon Bottom	--		
Canyon Slopes *[enter approx. % grade]*	--		
Mesa Top	X		
Rolling Hills	--		
Meadow	X		
Streams	--		
Other *[specify]*:	--		
Pathways of Uncontrolled Release Dispersion	*[for land and water indicate direction, e.g., N, NE, etc.]*		
Land	N		
Air	S-SE(winter) & N-NW(summer)		
Water	--		
Emergency Accessibility			
Land	X		
Air	X		
Water	--		
Previous Onsite Facilities/Operations	*[where applicable indicate spatial dimensions]*		
Research	X		
Facility Production	X		
Firing Site	X		
Previous ER Information and/or. Data Available			
Knowledge of Process	X		
Initial Scoping/ Reconnaissance	X		
Phase I	X		
Phase II	--		
Analytical Data (validated)	X		
Expedited Clean-up	X		
	Previous Substances Used, Disposed, Detected or Suspected		
High Explosives (HE)	HE is an ever present contaminant but previous sampling at the site did not detect any such materials or chemicals.		
Not applicable	X		

	SITE (s)		
DESCRIPTOR	33-007(c)		NA
Radionuclides	[i.e.. isotopes]		
Uranium	X		
Polonium-210	X		
CORROSIVE ACIDS/BASES			
Not applicable	X		
HALOGENS			
Not applicable	X		
METALS			
Beryllium	X		
Lead	X		
Nickel	X		
Silver	X		
Zinc	X		
MINERALS *[indicate %]*			
Not applicable	X		
ORGANICS			
ACIDS			
Not applicable	X		
ALCOHOLS			
Not applicable	X		
ALDEHYDES			
Not applicable	X		
GASES			
Not applicable	X		
HYDROCARBONS (Halogenated)			
Not applicable	X		
HYDROCARBONS (Non-Halogenated)			
Not applicable	X		
HYDROCARBONS			

	SITE (s)		
DESCRIPTOR	33-007(c)		NA
(Petroleum Based)			
Not applicable	X		
KETONES			
Not applicable	X		
PESTICIDES			
Not applicable	X		
PCBs			
Not applicable	X		
OTHER			
Not applicable	X		

TABLE 2-2 SCOPE OF WORK			
The following is a brief description of tasks and associated sub-tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7:Revegetation; Task 8: Demobilization; Task 9: Incident Response.			
Task ID	**Task Description**	**Site ID**	**Anticipated Dates/Duration**
Task 1 - Mobilization & Site Preparation	The task objectives are to establish the radiological classification areas, clearing and grubbing the site, install service roads, mobile trailers, sanitation facilities, locate and position separation system and CVL area, stage equipment and supplies. The objective of the task is achieved through the following sub-tasks: 1A **Utility Survey:** A utility survey will be conducted prior to work at each site. This type of survey is considered non-intrusive 1B **Rad. Control Areas:** Set up of site control boundaries by placing lath wood stakes, stringing barrier tape, placing appropriate signs, and positioning decontamination supplies. 1C **Clearing and Grubbing:** Utilization of hand and power tools to clear surface brush. Activities may range from the use of chain saws to hedge clippers in the removal surface brush. Front loader and hand shoveling in limited intrusive activities to level site. 1D **Heavy Equipment Operation:** The position and staging of heavy equipment (front loader, dump truck, and forklift) at the site for the purpose of unloading the SGS: conveyor, hopper, and gate system, and placing empty containers for the CVL. 1E **Stage Supplies:** Placement of sanitation facilities and placement of storage facilities for supplies and equipment. 1F **Stage SGS and CVL:** Positioning the necessary testing and clean-up equipment to conduct the clean-up activity at the site.	33-007(c)	April 1 - 3,1996

Task ID	Task Description	Site ID(s)	Anticipated Dates/Duration
Task 2 - Field Screening & Sampling	The task objectives are: exposure monitoring using real-time and integrated monitoring equipment to monitor employee exposures to radiological, chemical, physical and safety hazards; collection of soil samples for the purpose of assaying the samples by gamma spectral analysis to further fine tune the separation system operations at the site; and determine soil characteristics to make fine adjustments to operate the CVL system. The objective of the task is achieved through the following sub-tasks: 2A **Exposure Monitoring:** Use of real-time and integrated monitoring equipment such as TLD badges, Fidler instrument systems, real-time aerosol monitors, noise exposure monitors, meteorological monitors, and personal sampling monitors to monitor employee exposures to radiological, chemical, physical and safety hazards. 2B **Soil Sampling:** Screening and sampling of soils contained for the purpose of assaying and preparation of samples for shipment and analysis.	33-007(c)	April 1 - 30, 1996
Task 3 - Excavation	This task objective is the collection and staging of non-homogeneous contaminated soil for separation of soil into contaminated and clean components. The task will require the use of a front loader for the collection of soils and delivery of soils to the separation system. Prior to initiating this task, hazards will be reassessed using information obtained during previous pilot studies and mockup separation tests. The objective of the task is achieved through the following that may occur concurrently: 3A **Excavating:** This task will require an excavation permit. Approximately 200 cubic yards of component material will be excavated from each catcherbox site using a front loader. The operator of the front loader will be an employee of Thermo Nuclean. 3B **Transportation:** Material excavated will be placed in a dump truck that will deliver the material and dump on to a high density polyethylene (HDPE) matting to help contain the spread of contamination for first stage- separation. The dump truck will be operated by an employee of Thermo Nuclean. 3C **Heavy Equipment Operation:** The segregated materials will either be returned to catcherboxes, waste handling area, or delivered for additional processing. All uncontaminated components will be collected by the front loader, placed back into a dump truck, and returned back to the catcherboxes. Contaminated non-soil components will be collected and delivered to the waste storage area either by hand or front loader. Contaminated soil components will be delivered to the second stage-separation (SGS) staging area by front loader. This will be conducted by Thermo Nuclean.	33-007(c)	April 3 - 30, 1996

Task ID	Task Description	Site ID(s)	Anticipated Dates/Duration
	3D Equipment Maintenance and Repair: May involve use of solvents, fuels, compressed/flammable gases during cleaning and/or welding operations. **3E Completion of Excavation Closure:** As uncontaminated soil is returned to catcherboxes and deposited, the stock pile will be returned back to grade and leave no open excavation. This will be accomplished using a front loader operated by Thermo Nuclean.		
Task 4 - Separation Processing System	This task objective is the separation of non-homogeneous material into contaminated and clean components. This task will consist of two levels of separation. The first stage-separation will be the initial screening of large debris that is either contaminated or uncontaminated from the homogenous sized soil material. The second stage-separation will be the separation of contaminated from uncontaminated soil material. This second stage-separation will involve the use of the Thermo Nuclean - Segmented Gate System (SGS)®. This system includes a hopper, conveyor system, radiation detectors and computer controls that separate the contaminated soil component from the uncontaminated while the soil is transported on a conveyor belt. The objective of the task is achieved through the following sub-tasks: **4A First stage-separation:** Larger rock and organic material will be screened while on the HDPE matting. If clean, the materials will be delivered back to the catcherboxes. Large and contaminated material will be characterized and disposed of properly. The contaminated small component material will prepared for second stage-separation. This task will be labor intensive using "direct-frisking" instrumentation . The task will be completed by Thermo Nuclean. **4B Second stage-separation:** Contaminated material will be delivered to the SGS hopper and processed through the SGS. Two waste streams will evolve: one equal to and below the contamination criteria of 30 piC/gram and the other will be greater than the criteria. **4B.1: Heavy Equipment Operation:** Thermo Nuclean will have an operator operating a front loader to deliver product to the SGS hopper. The uncontaminated product to be collected, placed in the bed of a dump truck, and delivered back to the catcherboxes. The contaminated product will be collected and delivered to the CVL area for further processing.	33-007(c)	April 3 - 30, 1996

Task ID	Task Description	Site ID(s)	Anticipated Dates/Duration
	4B.2: Segmented Gate System Operation: Thermo Nuclean will operate the SGS. The SGS is a separation system consisting of a feed hopper, feed conveyor, radiation detectors, counting conveyor, segmented gates, and a central data processing center. The data processing center is in the back of a moving van. Soil samples will collected of the waste for analysis. **4B.3: Uncontaminated Soil Handling:** Soil will be discharged from the SGS on to a HDPE matting where the material will be collected with a front loader and transported by a dump truck back to the catcherboxes and used as backfill for the excavations. **4B.4: Contaminated Soil Handling:** Soil will be discharged from the SGS on to HDPE matting where it will be collected either into 55 gallon drums or stockpiled on the HDPE matting. This material will be delivered to the CVL area for further processing. The material contained in 55 gallon drums will be either transported by forklift or in the bucket of the front loader. The material stockpiled will be transported in the bucket of the front loader.		
Task 5 - Container Handling	This task objective is on-site coordination of waste management, including identification, handling, transport, and disposition of contaminated and clean components. This task may occur simultaneous as Tasks 4 or 6 are occurring. The objective of the task is achieved through the following sub-tasks: **5A Containing and Labeling of Uncontaminated Soil and Contaminated Soil Settleable Solids, and Ion Exchangers :** All contaminated soil stockpiled on site will be covered with 6 mil sheeting, the sheeting will be securely fixed to the ground and labeled as such at the close of each workday. All contaminated soil, settleable solids, and ion exchangers containerized will have labels affixed to the outside of the container warning of the appropriated hazards or concerns as the material is accumulated in the containers.	33-007(c)	April 1 - 30, 1996

Task ID	Task Description	Site ID(s)	Anticipated Dates/Duration
	All uncontaminated soil stockpiled on site will be covered with 6 mil sheeting, the sheeting will be securely fixed to the ground, and labeled as such at the close of each workday. All uncontaminated soil containerized will have labels affixed to the outside of the container warning of the appropriated hazards or concerns as the material is accumulated in the containers. 5B **Transporting Contaminated Soil Containers for Temporary/Permanent Storage:** Containers shall be transported to the storage site by either a forklift with the proper lifting and transportation devise, or with properly rated lifting straps attached to a certified and designed front loader bucket within the allowable lift rating. A forklift is the preferred equipment. However, if the terrain is unstable or unleveled, a front loader will likely be used. 5C **Transporting Uncontaminated Soil for Temporary/Permanent Disposal:** Temporary containers of uncontaminated soil may be emptied to a central stockpile, or the temporary central accumulative stockpile of uncontaminated soil generated from the project will transported by front loader to the catcherboxes for permanent disposal in the excavation pits. 5D **Containing and Labeling of Uncontaminated and Contaminated Rinsate:** All contaminated liquid or semi-solid rinsate containerized will have labels affixed to the outside of the container warning of the appropriated hazards or concerns as the material is accumulated in the containers. Uncontaminated liquid or semi-solids will be re-solidified with backfill material.		
Task 6 - Containerized Vat Leaching	This task objective is demonstrating the method of removing uranium from a contaminated soil component by leaching the uranium-soil mixture with a bicarbonate-carbonate solution. The procedure results in a selective dissolution of uranium (U^{+6}). This task is the third stage-separation where contaminated soil constituents are concentrated. The objective of the task is achieved through the following sub-tasks: 6A **CVL:** The CVL system will be operated by LANL employees and ICF-KE employees who will collect samples of effluent for off-site analysis. Stockpiled contaminated soil will be placed in one cubic yard cone shaped containers. A solution of carbonate/bicarbonate reagent will be sprayed on this soil. The leachate will drain from the bottom of the container into a piping gallery. After passing through the pipe gallery, this effluent will feed into a reservoir where the sediments may settle out. The sediment-free solution will be collected and passed through an ion exchange column, then recycle through the system, and be disposed of at the end of the process as discharge effluent. Samples will be collected for off-site analysis of the	33-007(c)	April 8 - 30, 1996

Task ID	Task Description	Site ID(s)	Anticipated Dates/Duration
	discharge effluent and settleable solid.		
	6A.1: Heavy Equipment: Use of a forklift or front loader to lift, transport, or position the cone shaped containers. Use in the movement of containerized settleable solids, semi-solids, and liquids to temporary and permanent storage facilities.		
Task 7 - Revegetation	This task objective is to stabilize and re-establish natural vegetation on the site. The activity will utilize heavy equipment to recontour the site to a more natural and stable setting that will support the growth of natural flora through the initial establishment of gramma and fica plant species. **7A Backfill:** Use of heavy equipment and hand tools to backfill with soil at each site. **7B Recontour:** Use of heavy equipment and hand tools to recontour the backfill material to the surrounding topographic conditions. **7C Reseed-Regeneration:** Use of hand tools to scarify the soil surface and reseed and fertilize the site or allow for natural regeneration of the site.	**33-007(c)**	**April 30, 1996**
Task 8 - Demobilization/Decontamination	The task objectives are removal of established radiological classification areas, scarification of installed service roads, removal of perimeter security fencing, mobile trailers, electrical power, telephone lines, sanitation facilities, removal of the separation system and CVL area, removal of all equipment and supplies. Associated sub-tasks to complete the objective include: **8A Equipment Decontamination:** Use of pressurized and/or steam cleaning solutions (aqueous), and possibly methanol (non-pressurized) to clean potentially/actually contaminated equipment before exiting the EZ. **8B Personnel Decontamination:** Use of cleaning solutions (aqueous) to clean potential/actual contamination before exiting the EZ. **8C Mobilization/Demobilization:** The removal of established radiological classification areas, removal of mobile trailers and sanitation facilities, relocating separation system and CVL area, and removing equipment and supplies.	**33-007(c)**	**April 29, 1996**
Task 9 - Incident Response	This task objective is to respond to an incident (i.e., rendering first-aid/CPR, hazardous substance release, fire, and spill containment), and the sub-tasks will be performed as necessary and in accordance with Sections 7, 9 and 10 of the HASP and this SSHASP. The objective of the task is achieved through the following sub-tasks:	**33-007(c)**	**April 1 - 30, 1996**

Task ID	Task Description	Site ID(s)	Anticipated Dates/Duration
	9-A First-aid/CPR **9-B Fire Fighting** **9-C Incident Response** *[in accordance with 29 CFR 1926.65(q)(6)(ii)* **9-D Spill Containment** *[in accordance with 29 CFR 1926.65(q)(6)(ii)*		

3.0 ORGANIZATION, RESPONSIBILITIES and AUTHORITY

Definition of HS roles, responsibilities, authorities, and lines of communication for key personnel identified below are defined in Section 3 of the HASP.

TABLE 3-1

KEY PERSONNEL HAVING HS RESPONSIBILITY

Title	Name	Organization	Phone/Pager
Facility Contacts			
Facility Manager	Peter Bussolini	LANL	667-0370
TA Representative	Peter Bussolini	LANL	667-0370
Field Project Management			
Field Project Leader (FPL)	Brad Martin	LANL	667-6080
Alternate to FPL	Roy Michelotti	LANL	665-7444
Field Team Manager (FTM)	Lynn Kidman	ICF-KE	661-5227
Field Team			
Field Team Leader (FTL)	Linda Fluk	ICF-KE	661-5229
Alternate FTL	Peter Gram	ICF-KE	661-5207
Supervisor of Thermo Nuclean Personnel	Mike Dillon	Thermo Nuclean	345-3461
Site Safety Officer (SSO) (Level II - Required)	Dave Dixson (Level III)	MK	662-7300
Field Technicians(FT)	Ken Hansel Kristi Beguin	ICF-KE ICF-KE	661-5200 661-5200
IH Technician (IHT)	Not Applicable	---	---
Radiological Control Technician (RCT)	Marty Peiffer	LANL	667-0083
Health Protection Technician (HPT)	Not Applicable	---	---
Radiation Screening Personnel (RSP)	Linda Fluk & Dave Dixson	LANL	667-0083
Trenching/Excavation Competent Person (CP)	Dave Dixson	MK	662-7300
Trenching/Excavation - Registered Professional Engineer (PE)	Not Applicable	---	---
Confined Space Entry Supervisor	Dave Dixson	---	---
Other *[specify]*:	---	---	---
Support Personnel			
Field Unit HS Representative	Bill Brazile	ESH-5	665-5128
Other *[specify]*:	---	---	---
Alternate Personnel			
Alternate SSO	Ken McFadden (Level III) Linda Fluk (Level II)	MK ICF-KE	662-7300 661-5229
Alternate Health Physics Support: RSP	Dave Dixson (RSP) Linda Fluk (RSP) Kristi Beguin (RSP) Ken McFadden (RSP)	MK ICF-KE ICF-KE MK	662-7300 661-5229 661-5200 662-7300

4.0 HAZARD ANALYSIS

Provided in this section are the task-specific hazard analysis information and requirements in accordance with Section 4 of the HASP.

4.1 PROJECT PERSONNEL

The personnel identified below by role are expected to perform the task(s) indicated.

TABLE 4-1
PROJECT PERSONNEL BY TASK

The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

	TASK(s)																						
PERSONNEL ROLE	1	2	3	4	5	6	7	8	9														
FPL [includes alternate]	X							X	X														
FTM	X							X	X														
FTL	X	X	X	X	X	X	X	X	X														
SSO (level II)	X	X	X	X	X	X	X	X	X														
RCT	X	X		X		X		X	X	RCT shall be required for "free release" surveys that may be needed at site if the Health Physics action levels listed in Table 6-2 are exceeded while performing tasks at the site, and to survey and label any waste containers.													
RSP			X		X		X																
Sampler		X		X		X																	
Supervisor: Thermo-Nuclean (SGS)	X			X				X	X														
Supervisor: LANL (CVL)						X			X														
Heavy Equipment Operator: Front Loader & Dump Truck	X		X		X		X	X															
Laborer/Assistant	X	X	X	X	X		X	X															
Onsite Waste Management Coordinator					X																		
Heavy Equipment Operator: Forklift	X			X	X	X	X																
Competent Person: Trenching and excavation			X																				
Other *[specify]*																							

TABLE 4-2

HAZARDOUS SUBSTANCES OF OCCUPATIONAL HEALTH CONCERN

The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Mi. = Minor; Mo. = Moderate; S = Severe. (Negligible is not required). Refer to Appendix B and Section 4.3 - Hazard Assessment and Administrative and Engineering Controls for rationale and ranking means and methods.

Hazardous Chemical Products to be Used During Field Operations

The chemical products listed below are likely to be used for the tasks indicated, onsite or at satellite locations where field support operations occur. MSDSs for each product shall be kept readily available to users of these products, and shall be shared with other employer's employees onsite who may be affected by the hazardous products in accordance with 29 CFR 1926.65(b)(1)(iv) and (v) and 1926.65(i) and Section 4.2.2.3 of the HASP. It is LANL's policy that whenever feasible a less toxic product should be substituted for a more toxic product, especially for products having a carcinogen constituent.

	TASK(s)																						
	1	2	3	4	5	6	7	8	9														
Site Contaminants																							
Radionuclides *[indicate isotopes]*																							
Uranium	Mo	Mo	Mo	Mo	Mo	Mo			Mo														

4.3 HAZARD ASSESSMENT AND ADMINISTRATIVE AND ENGINEERING CONTROLS

Hazards included in this section are those expected to result in one of the hazard assessment ratings defined below and could pose an occupational health threat to workers performing the associated task(s). The hazard assessments and rationales are indicated below with the corresponding administrative and engineering controls for protection from and mitigation of the hazards.

Key to hazard assessment ratings:

	Mishap Probability			
Hazard Severity	**Likely to Occur**	**Probably will Occur**	**Possibly could Occur**	**Unlikely to Occur**
Catastrophic (i.e., death or life-threatening injury/illness from one encounter)	Imminent	Imminent	Serious	Minor
Major (i.e., significant injury/illness resulting in irreversible harm)	Imminent	Serious	Moderate	Minor
Minor (i.e., injury or illness resulting in reversible harm - not likely to threaten mobility, vision)	Serious	Moderate	Minor	Negligible
Negligible	Minor	Minor	Negligible	Negligible

TABLE 4-3

HAZARD ASSESSMENT and ADMINISTRATIVE and ENGINEERING (A&E) CONTROLS

Hazard	Task(s)	Hazard Assessment	Hazard Assessment Rationale	Administrative & Engineering (A&E) Controls (Prevention/Mitigation Measures)
Safety Hazards and Health Concerns				
HAND AND POWER TOOLS (including chain saw)	1	Negligible to Minor	Unlikely that mishap will occur since field members will assess operational concerns and be instructed about and familiar with safe use of tool. If a mishap did occur only minor harm resulting in reversible injury. However, in the event of a mishap with the chain saw, significant injury resulting in irreversible harm may occur	• Compliance with 29 CFR 1926 Subpart I • Wear PPE as specified in Section 7.0. • Have the operator of the chain saw read, review and understand the chain saw operational manual. (Have manual on-site and available while completing this activity). Have the operator demonstrate to the SSO an understanding of the chain sawing operation. • Address issue of slip hazards while walking around on wetted (muddy) soil. • Field personnel to remain at least 5 feet from all mesa top edges to avoid slipping or tripping over the edge. • During fueling or refueling of chain saw turn-off the saw. No open flames during fueling or refueling. No sparking items in the immediate area when fueling or refueling the chain saw.. • Material Safety Data Sheet (MSDS) to be kept on site for fuel used (per Table 4-2). • Avoid spilling fuel during the fueling or refueling of chain saw. In the event of spillage, shovel fuel/soil mixture into a disposable waste container. Rinse off soiled shovel head into the waste container and wipe off the shovel head. • In the event that the a person ignites him/herself, instruct the person to throw him/herself to the ground and roll around until the fire is extinguished. The field team members should be reminded that if someone is on-fire, tackle the person to the ground and roll them around until the fire is extinguished.
EXCAVATION/ TRENCHING	PERMIT REQUIRED for excavating/trenching > 1 foot; A&E controls shall be implemented in accordance with applicable LANL excavation permit (per LANL AR 1-12) and as specified below; contact Field Unit HS Representative to initiate permit process			

Hazard	Task(s)	Hazard Assessment	Hazard Assessment Rationale	Administrative & Engineering (A&E) Controls (Prevention/Mitigation Measures)
General	3	Negligible	Unlikely that mishap will occur since field members will not enter excavation greater than 4 feet. If a mishap did occur only minor harm resulting in reversible injury.	No personnel entry into trench/excavation Inspections by a competent person shall be made prior to start of work, as needed throughout shift and after every rain storm or other hazard increasing occurrence (29 CFR 1926.651) Appropriate engineering controls shall be implemented in accordance with 29 CFR 1926.651 whenever the stability of a structure adjoining an excavation may be endangered Excavated materials (spoils) shall be kept at least 2 ft. away from edge of excavation and personnel will remain at least 4 feet from the edge of all excavations below grade.
Underground utilities - elec./fire/explosion hazards	3	Negligible to Minor	Unlikely that mishap will occur since field members will have the utilities marked and if required lock-out and tag - out prior to any field activities that will include excavation either by hand or by heavy equipment operations. In the event of a mishap reversible harm to death could occur.	Estimated locations of utilities (i.e., sewer, telephone, gas, electric, water lines, etc.) shall be determined prior to excavating. Notify utility owners of intended work and request they demarcate on ground surface location(s) of underground utilities; have a field team member accompany utility owner rep. to identify intended excavation location(s) and to find out specifics of utility location(s). If utility owner cannot establish exact location of utility installation(s), excavating may proceed with caution and provided detection equipment or other acceptable means to locate utility installation(s) are used. As excavating operations approach estimated location of underground utility, exact location of the installation shall be determined by safe and acceptable means (i.e., using hand held excavating equipment). While excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard site personnel
Overhead utilities - electrical	1, 3, 4, 6, and 8	Minor	Possible that mishap will occur since equipment will be operating in an area of energized overhead power lines. If a mishap did occur harm resulting in irreversible injury.	Estimated locations of utilities (i.e., sewer, telephone, gas, electric, water lines, etc.) shall be determined prior to excavating. Notify utility owners of intended work; have a field team member accompany operator to identify intended excavation location(s) and to find out specifics of utility location(s). During stationery operation, minimum clearance between live lines and any part of equipment or load: 10 ft for lines rated 50 kV; 10 ft + 0.4 in. for each 1 kV over 50 kV, or twice the length of line insulator, whichever is greater. In transit with no load and boom lowered, min. clearance: voltages < 50 kV: 4 ft min voltages 50 kV< x ≤345 kV: 10 ft min voltages 345 kV< x ≤750 kV: 16 ft min While operations are occurring, operator shall be supported as necessary to safeguard site personnel from possible electrocution
Explosive/flammable environment	3	Minor	Unlikely that mishap will occur since items have not been identified associated with historical knowledge. If a mishap did occur death is possible.	Adequate precaution shall be taken (e.g., ventilation in compliance with 29 CFR 1926.55(b) and 29 CFR 1926.57) to prevent personnel exposure to an atmosphere containing flammable gas ≥10% of the lower flammable limit (LEL) of the gas
Cave-in/personnel entrapment	3	Minor	Unlikely that mishap will occur since field members will not enter excavation and the depth of excavation is minimal. If a mishap did occur death is possible	Field members will not be entering the excavations. However in the event that they do, trench/excavation ≥ 4 feet deep shall have a stairway, ladder, ramp, or other safe means of egress located so as to require no more than 25' of lateral travel by personnel in trench/excavation (e.g., 1 ladder for 25'<x£50' long trench) (29 CFR 1926.651)

Hazard	Task(s)	Hazard Assessment	Hazard Assessment Rationale	Administrative & Engineering (A&E) Controls (Prevention/Mitigation Measures)
Oxygen deficiency/ hazardous atmosphere	3	Minor	Unlikely that mishap will occur since field members will not enter excavation and the depth of excavation is minimal. If a mishap did occur death is possible.	Field members will not be entering the excavations. However in the event that they do, where an oxygen deficiency or a hazardous atmosphere could reasonably be expected to exist, the atmosphere in excavation/trench shall be tested prior to anyone entering excavation > 4 feet in depth; refer to Section 6
HEAVY EQUIPMENT /EQUIPMENT OPERATION				
General Controls	• Hoists, hooks, wires, ropes, slings, and rigging accessories shall be designed, installed, operated, inspected, and tested in accordance with applicable requirements of the DOE Handbook: Hoisting and Rigging (June 1995, DOE-HDBK-1090 -95), and with applicable sections of 29 CFR 1926.251 and Subpart N of 29 CFR 1926. - Hoists, hooks, wires, ropes, slings, and rigging accessories shall be inspected at the beginning of each shift in which they are to be used and as necessary during use to ensure safety. - Hoisting lines shall be inspected visually each day, and thoroughly at a minimum of 30-day intervals. - Anchors shall be pull-tested along an angle approximating the wind-guy working plane within 12 months prior to use; test shall be made at poundage determined by anchor location • Equipment must be leveled, anchored, and guyed in accordance with manufacturer's recommendations or where there are none, with API Specification 4E. • Pressure-hose connections shall be secured with safety chains or clamped to prevent whipping in the event of a break. • When engaged in work at a location 10 feet or more above the derrick floor or other working surface, the worker shall wear a safety belt with attached lanyard secured to the derrick, except during rig-up/rig-down when workers other than the rig operator shall stand clear. Safety belts, lifelines, and lanyards shall be used in accordance with 29 CFR 1926.104 and Section 7.			
Conveyors	4	Moderate	Possible that mishap could occur if conveyor not properly guarded. If mishap occur irreversible harm may arise	29 CFR 1926.555: • Means to stop motor shall be available at operator station. • Emergency stop switch shall be arranged so that the conveyor cannot be started again until actuating stop switch has been reset to running or "On" position. • Conveyor shall be guarded to prevent employee contact. from shafts, gears , and any moving part. • All crossovers shall be marked by suitable signs. • Conveyors shall be locked out or otherwise rendered inoperable, and tagged out with a "Do Not Operate" tag during repairs and when operation is hazardous to employee performing maintenance work. • All conveyors shall meet ANSI B20.1-1957
Pinch points and rotating parts	1, 2, 3, 4, 5, 6, and 7	Moderate	Possibly that mishap could occur. If mishap occur irreversible harm may arise	Heavy equipment shall be inspected for engineering controls in compliance with applicable sections of Subparts O of 29 CFR 1926 and 29 CFR 1910

Hazard	Task(s)	Hazard Assessment	Hazard Assessment Rationale	Administrative & Engineering (A&E) Controls (Prevention/Mitigation Measures)
Vehicle operation/ vehicular traffic accident	All	Moderate	Possibly that mishap would arise because of operator error. If a mishap did occur irreversible harm would arise.	Field team personnel exposed to vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflecting or high-visibility material Heavy equipment shall be inspected for engineering controls in compliance with applicable sections of Subparts O of 29 CFR 1926 and 29 CFR 1910
WELDING/CUTTING/ BRAZING	PERMIT REQUIRED; A&E controls shall be implemented in accordance with applicable LANL special work permit (SWP) per Section 4.2.2.12 of the HASP and as specified below for spark/flame-producing operations; contact Field Unit HS Representative to initiate permit process			
Fire/explosion/burn hazards when using compressed gases	3	Minor	Unlikely that a mishap will occur since only a trained and skilled welder will be completing the task. However in the event that a mishap will occur, irreversible injury through burns could occur.	Implement A&E controls per applicable permit and in accordance with Subpart J of 29 CFR 1926
ELECTRICAL	PERMIT REQUIRED; A&E controls shall be implemented in accordance with applicable requirements of Sections 4.2.2.1 and/or 4.2.2.8 of the HASP and as specified below for lockout/tagout of energized equipment; contact Field Unit HS Representative to initiate permit process			
Electrocution - working with energized equipment (e.g., generator)	4	Minor	Unlikely that mishap will occur. If mishap did occur then death is possible	Take preventative measures and identify and correct deficiencies in accordance with Subpart K of 29 CFR 1926 and Sections 4.2.2.1 and/or 4.2.2.8 of the HASP, as applicable
EQUIPMENT DECONTAMINATION				
Steam cleaner operation - burns	7	Negligible	Unlikely that a mishap will occur. In the event a mishap did occur, the steam temperature and pressure should not high enough to cause irreversible harm	Operator shall use PPE as specified in Section 7
Spread of contamination during equip. steam cleaning	7	Negligible	Unlikely that a mishap will occur. In the event a mishap did occur, the concentration of the contaminant should not generate an exposure significant enough to cause irreversible harm.	Install protective barrier(s) over/around steam cleaning decon unit to prevent migration of spray, especially on windy days
Wet wipe	7	Negligible	Unlikely that a mishap will occur. If mishap occurs reversible harm would arise.	Laborer shall use PPE as specified in Section 7
MISCELLANEOUS				
Falls from heights above 4'	3, 4, 5, and 6	Negligible	Unlikely that a mishap will occur while exiting or operating equipment. If mishap did occur the injury would be reversible	Compliance with 29 CFR 1926.500, and as necessary, use of PPE specified in Section 7 for fall protection
Fire/ explosion hazards while using compressed gas cylinders for instrument calibration	2	Negligible	Unlikely that a mishap will occur. If mishap occurs reversible harm would arise.	Handle cylinders with care (Refer to Safe Handling of Compressed Gases in Containers [CGA P-1-1984])
Sanitation	All	Negligible	Unlikely that a mishap will occur. If mishap occurs reversible harm would arise.	Showers and change rooms shall be provided on-site in the CRZ or SZ, and used by field team members working within EZ or CRZ, whenever the duration of hazardous waste operations (under 29 CFR 1926.65) will last ≥ 6 months. Showers shall meet requirements of 29 CFR 1926.51(f)(4). Change rooms shall meet requirements of 29 CFR 1926.51(l) At least one toilet shall be provided on site for ≤ 20 field team personnel unless transportation is readily available to nearby off-site toilet facilities

Hazard	Task(s)	Hazard Assessment	Hazard Assessment Rationale	Administrative & Engineering (A&E) Controls (Prevention/Mitigation Measures)
Uneven terrain, slips, trips, falls	All	Minor	Unlikely that a mishap will occur. If mishap occurs reversible harm would arise.	Use caution and be observant while moving in areas of potential concern; minimize threat of slick surfaces
Radiological Hazards				
Tritium	1, 2, 3, 4, and 6	Negligible	Unlikely that exposure to tritium contamination will occur since the contaminant with not identified in the site characterization nor is there process knowledge of it is use at this PRS.	Minimize exposure and maximize distance to source PERMIT REQUIRED; A&E controls shall be implemented in accordance with applicable LANL Radiological Work Permit (RWP); contact Field Unit ESH Representative to initiate permit process
Airborne levels of Known Radioactive Contaminants	1, 2, 3, 4, and 6	Negligible	Unlikely that mishap could occur because of the concentration in the soil. If a mishap did occur internal exposure to radioactive materials could occur.	First line of defense use of amended water for dust suppression, implement engineering controls [e.g., local ventilation in accordance with 29 CFR 1926.55(b), 1926.57], and/or other applicable chemical-specific standard (Table 2 of the HASP) to limit airborne levels of contaminants to below action levels set in Section 6. Refer also to Section 6, 7 and Appendix C of this SSHASP and to Sections 6 and 7 of the HASP
Alpha Radiation - Depleted Uranium	1, 2, 3, 4 5 and 6	Moderate	Probable that moderate exposure could occur because of the presence of alpha emitters as a site contaminant.	Minimize exposure and maximize distance to source PERMIT REQUIRED; A&E controls shall be implemented in accordance with applicable LANL Radiological Work Permit (RWP); contact Field Unit ESH Representative to initiate permit process
Beta/Gamma Radiation - Depleted Uranium	1, 2, 3, 4 5 and 6	Moderate	Probable that moderate exposure could occur because of the presence of beta/gamma emitters as a site contaminant.	Minimize exposure and maximize distance to source PERMIT REQUIRED; A&E controls shall be implemented in accordance with applicable LANL Radiological Work Permit (RWP); contact Field Unit ESH Representative to initiate permit process
High Explosives (HE) Hazards				
High Explosives (HE)	All	Negligible	Unlikely that a mishap will occur since HE was not identified at the site. However this site is in the HE corridor and in the event that a mishap did occur the concentrations, because of degradation, will render active HE amounts that would not generate irreversible hazards.	HE was not identified as a COPC. If suspect material is identified tested with an HE spot-test kit. If the results of the spot-test indicates HE is present, contact DX-16 to determine site-specific requirements (e.g., training, remote operations, etc.).
Biological Hazards				
General -rodents, insects, or snakes	All	Negligible	Unlikely that a mishap will occur since insects and snakes will be inactive and rodents will not be as populous nor have nesting sites been identified. If mishap occurs reversible harm would arise.	Refer to Table 1 of the HASP for information concerning various general hazards associated with occupational exposure to toxic and/or hazardous biological agents
Occupational Exposure to Bloodborne Pathogens	All	Negligible	Unlikely that a mishap will occur. If mishap occurs reversible harm would arise.	Refer to Table 1 and Section 4.2.2.2 of the HASP

Hazard	Task(s)	Hazard Assessment	Hazard Assessment Rationale	Administrative & Engineering (A&E) Controls (Prevention/Mitigation Measures)
Physical Health Hazards				
Excessive Noise	2, 3, 4, 5, and 6	Minor	Possible that exposure could occur. If mishap occurs reversible to irreversible harm would arise.	Whenever voice(s) must be raised to communicate between two or more persons located £ 3 feet of each other noise level likely exceeding PEL; conduct noise monitoring per Section 6; also refer to Section 4.2.2.7 of HASP for additional requirements
Chemical Health Hazards				
Chemical splashes - exposure to corrosives and/or substances toxic by skin absorption	6	Negligible	Possible that exposure to bicarbonate could arise. The mishap associated with exposure is negligible since bicarbonate is relatively inert unless in an acid condition.	PPE (chemical protective clothing and/or eye/face protection) shall be used as specified for the corresponding task(s)/site(s) in Section 7 Portable emergency: Eyewash/Shower Eyewash/Shower Emergency eyewashes and showers must be located within 10 seconds and not more than 100 feet of travel distance of any source of chemical splash that may be corrosive or moderately to severely irritating to body tissue. They must have a capacity to be able to provide continuous flushing for the duration of time necessary to sufficiently flush the most hazardous substance for which the device is being specified. They also shall be inspected and flushed at least weekly by the SSO or designee. Refer to ANSI Z358.1-1990 for further information. Field Team Personnel shall shower prior to leaving the CRZ or regulated/controlled area of contamination. Shower(s) shall be equipped with hot and cold water feeding a common discharge line. Waste waster shall be captured, contained, and tested and disposed according to the site-specific Waste Management Plan (Refer to *American National Standard for Sanitation in Places of Employment - Minimum Requirements* [ANSI Z4.1-1986])
Airborne Beryllium Dust - Toxic Metal based on process knowledge	1, 2, 3, 4, and 6	Negligible	Unlikely that mishap could occur since soil sample results did not identify any presence of beryllium. If a mishap did occur reversible harm would arise.	First line of defense use of amended water for dust suppression, implement engineering controls [e.g., local ventilation in accordance with 29 CFR 1926.55(b), 1926.57], and/or other applicable chemical-specific standard (Table 2 of the HASP) to limit airborne levels of contaminants to below action levels set in Section 6. Refer also to Section 6, 7 and Appendix C of this SSHASP and to Sections 6 and 7 of the HASP
Airborne Toxic Dust - Toxic Metals based on soil samples	1, 2, 3, 4, and 6	Negligible	Unlikely that mishap could occur because of the low concentrations in the soil. If a mishap did occur reversible harm would arise.	First line of defense use of amended water for dust suppression, implement engineering controls [e.g., local ventilation in accordance with 29 CFR 1926.55(b), 1926.57], and/or other applicable chemical-specific standard (Table 2 of the HASP) to limit airborne levels of contaminants to below action levels set in Section 6. Refer also to Section 6, 7 and Appendix C of this SSHASP and to Sections 6 and 7 of the HASP

Hazard	Task(s)	Hazard Assessment	Hazard Assessment Rationale	Administrative & Engineering (A&E) Controls (Prevention/Mitigation Measures)
Airborne Toxic Dust, - Uranium	1, 2, 3, 4, and 6	Moderate	Possible that mishap could occur because of the concentrations in the soil. If a mishap did occur reversible harm would arise. (Uranium oxide dust).	First line of defense use of amended water for dust suppression, implement engineering controls [e.g., local ventilation in accordance with 29 CFR 1926.55(b), 1926.57], and/or other applicable chemical-specific standard (Table 2 of the HASP) to limit airborne levels of contaminants to below action levels set in Section 6. If concentrations exceed SSHASP established action levels and engineering and administrative control are not affective, then project activities will cease and methodologies re-established before implementation of respiratory protection. Refer also to Section 6, 7 and Appendix C of this SSHASP and to Sections 6 and 7 of the HASP

5.0 SITE CONTROLS

In accordance with Section 5 of the HASP, the required site control measures are specified below for each task or group of tasks having different requirements. Any exceptions or deviations from requirements of the HASP are noted below. Site map(s) are provided in Appendix A to show where the following site control measures will be located. Since some zone or facility locations may change as site work progresses due to daily variability in site conditions and/or operations (e.g., wind or access), actual locations are to be explained to field team members by the SSO, or the FTL or JS during daily HS tailgate meetings and documented in the logbook kept by the SSO.

TABLE 5

SITE CONTROL MEASURES

The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

CONTROL	TASK(S)																						
MEASURES	1	2	3	4	5	6	7	8	9														
Exclusion Zone (EZ)	Per 29 CFR 1910 Subpart Z - Uranium																						
Not applicable					X			X															
Soil Contamination Area	X	X	X	X		X	X		X	* Area classification based on ESH-1 recommendations. If monitoring results show that the separation process was successful, no EZ will be required for Task 7.													
Regulated Area (per Table 3 of HASP)																							
Centralized location		X	X	X		X																	
Localized at work site		X	X	X		X																	
Negatively pressurized																							
Demarcated by:																							
Suitable material	X	X	X	X			X		X														
Fence																							
Security Access																							
Enclosed structure						X																	
Other *[specify]*																							

CONTROL MEASURES	TASK(s) 1	2	3	4	5	6	7	8	9														
Posting(s): Per LANL LS 107-02.2, "Radiological Posting", "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP). Description(s): All radiation posting shall be supplied by and posted by ESH-1.																							
Contamination Reduction Zone (CRZ)	Per 29 CFR 1910 Subpart Z - Uranium																						
Not applicable	X				X																		
Radiological Buffer Area																							
Centralized location		X	X	X		X	X	X	X	* If monitoring results show that the separation process was successful, no EZ will be required for Task 7.													
Localized at work site																							
Negatively Pressurized																							
Demarcated by:																							
Suitable material	X	X							X														
Fence																							
Security Access																							
Enclosed Structure																							
Other *[specify]:*																							
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify:* Description(s): All radiation posting shall be supplied by and posted by ESH-1.																							
Support Zone (SZ)	Per 29 CFR 1910 Subpart Z - Uranium																						
Not applicable																							
Controlled Area	X	X	X	X	X	X	X	X	X														
Centralized Location																							
Localized at work site																							
Demarcated by:																							
Unnecessary	X	X	X	X	X	X	X	X	X														
Cones																							
Barrier Tape																							
Fence																							
Security Access																							

CONTROL MEASURES	TASK(s) 1	2	3	4	5	6	7	8	9														
Other *[specify]:*																							
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*: Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.																							
Equipment Staging Area	Per 20 CFR 1910 Subpart Z - Uranium																						
Not applicable			X	X		X																	
Located at work site in SZ	X	X			X		X	X	X														
Centralized location *[specify where]*																							
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*: Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.																							
Equipment Decon Pad/Facility	Per 29 CFR 1910 - Subpart Z - Uranium																						
Not applicable								X	X														
Radiological Control Area	X	X	X	X	X	X	X			* If monitoring results show that the separation process was successful, no EZ will be required for Task 7.													
Located at work site EZ																							
Located at work site CRZ	X	X	X	X	X	X	X																
Centralized location																							
Demarcated by:																							
Unnecessary																							
Suitable material	X	X	X	X	X	X	X																
Fence																							
Security Access																							
Other *[specify]:*																							
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*: Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.																							
Temporary Waste Storage Area																							
Not applicable	X				X		X	X	X	: Not generating waste during these tasks													
Radiological Control Area		X	X	X		X																	

CONTROL MEASURES	TASK(s) 1	2	3	4	5	6	7	8	9														
Located onsite		X	X	X		X																	
Located off-site																							
Demarcated by:																							
Suitable material		X	X	X		X																	
Fence																							
Security Access																							
Other *[specify]:*																							

Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*:
Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.

Support Trailer(s)	*[Wherever "Not applicable" is checked below, provide the rationale in this box. If not applicable at all sites, say so here and provide rationale.]*																						
Not applicable																							
Located at work site in SZ	X	X	X	X	X	X	X	X	X														
Centralized location	X	X	X	X	X	X	X	X	X														
Access identified/limited by:																							
Unnecessary	X	X	X	X	X	X	X	X	X														
Fence																							
Security Access																							
Other *[specify]:*																							

Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*:
Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.

Mobile Laboratory																							
Not Applicable	X	X	X	X	X	X	X	X	X	: Note no mobile laboratory will be used in this project.													
Radiological Control Area																							
Radioactive Material Management Area (RMMA)																							
Located at work site SZ																							
Centrally located																							
Access identified/limited by:																							

CONTROL MEASURES	TASK(s) 1	2	3	4	5	6	7	8	9														
Unnecessary																							
Fence																							
Security Access																							
Other *[specify]:*																							
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*: Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.																							
Hand Wash Facility	Per 29 CFR 1910 Subpart Z - Uranium																						
Not Applicable					X		X	X	X														
Located onsite in SZ	X	X	X	X		X																	
Centrally located	X	X	X	X		X																	
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*: Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.																							
Toilet Facility	Per 29 CFR 1926.65(n) and 1926.51																						
Not Applicable																							
Portable located onsite in SZ																							
Located off-site Bldg. 33-2	X	X	X	X	X	X	X	X	X														
Shower Facility	Per 29 CFR 1926.65(n) and 1926.51																						
Not applicable	X	X	X	X	X	X	X	X	X														
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify*: Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.																							
Clothing Change Facility	Per 29 CFR 1926.65(n) and 1926.51																						
Not applicable																							
Required for personnel decon																							
Optional for personnel comfort	X	X	X	X	X	X	X	X	X														
Located at work site SZ	X	X	X	X	X	X	X	X	X														
Centrally located	X	X	X	X	X	X	X	X	X														

CONTROL MEASURES	TASK(s) 1	2	3	4	5	6	7	8	9														
Access identified/limited by:																							
Unnecessary	X	X	X	X	X	X	X	X	X														
Structured containment																							
Other *[specify]:*																							
Posting(s): Per LANL LS 107-02.2, "Radiological Posting" Per Subpart G of 29 CFR 1926 Other Chemical-Specific Standard (Table 2 of the HASP); *specify:* Description(s): All radiation posting shall be supplied by and posted by ESH-1. ESH-1 will assist in posting proper signage based on intended use, initial and periodic radiological screening results, and materials stored in the zone.																							
Wind Direction Indicator(s)	Shall be located onsite where readily visible to field team members (e.g., atop equipment mast/derrick). *[Wherever "Not applicable" is checked below, provide the rationale in this box. If not applicable at all sites, say so here and provide rationale.]*																						
Not Applicable																							
Located *[specify where if fixed location, ; or indicate if variable location]*																							
Flag attached to lath	X	X	X	X	X	X	X	X	X														
Anemometer																							
Other *[specify]:*																							
Other *[specify]:*																							

6.0 EXPOSURE MONITORING AND CORRESPONDING ACTIONS

In accordance with Section 6 of the HASP, personnel exposure monitoring requirements, action levels, and the corresponding actions to be taken are specified in the tables in this section (Tables 6-1, 6-2, and 6-3) for each task or group of tasks having different requirements.

6.1 DIRECT-READING INSTRUMENTS

Requirements for exposure monitoring using direct-reading instruments and the corresponding action levels and response actions are specified in Table 6-1 for each task or group of tasks having different requirements, action levels or responses. These requirements, levels, and actions are set in accordance with Section 6 of the HASP. Any exceptions or deviations from requirements of the HASP are noted where applicable.

TABLE 6-1
DIRECT-READING INSTRUMENT REQUIREMENTS

Hazardous Condition/ Substance	Task(s)	Instrument	Procedure	Location and Frequency of Monitoring	Action Level(s)	Response Action(s)	Action Level Rationale
HEALTH PHYSICS							
Radiation Gross a and gross-b/g contamination	All	b/g Eberline ESP-1 with HP-260 probe or equiv. a -Ludlum 139 with air proportional probe or equiv. b/g Eberline RO - 2 or equivalent dose rate meter.	Per LANL RadCon Manual and training ESH-1 procedures, ER addendums and radiological surveillance authorization agreement (RSAA)	Surface Sampling/Excavations: Excavated soil, ground surface prior to disturbance, and excavated soil/material Personnel: Prior to exiting EZ or CRZ Equipment: Prior to decon and for release Non-intrusive Activities: Ground surface near source (as applicable based on potential for soil contamination)	At Background	Dedicated field team member trained in ESH-1 procedures performs surveys (soil, core, personnel, etc.) Increased intermittent ESH-1 coverage Large area swipes for a (2000 cm^2) counted using field alpha screening instrument; direct frisk for b/g	Standard levels set by ESH-1
					If > Background and a < 500 cpm/probe area, or If > Background and b/g < 5,000 cpm/probe area, or If < 5 mR/h	Notify ESH-1 of elevated readings Dedicated field team member trained in ESH-1 procedures performs surveys (soil, core, personnel, etc.) Increased intermittent ESH-1 coverage a swipes counted using Ludlum 2000 tray counter or equiv.; direct frisk for b/g	Standard levels set by ESH-1

					If > 5 mR/h, or If a > 500 cpm/probe area, or If b/g > 5,000 cpm/probe area Any smearable contamination on equipment and/or material and any detectable activity on personnel above No Detectable Activity, "NDA"	Work may only proceed according to approved RWP and with full-time onsite ESH-1 technician (or equiv.) in accordance with Sections 3.2.4 and 3.3.4 of the HASP.	Standard levels set by ESH-1

Hazardous Condition/ Substance	Task(s)	Instrument	Procedure	Location and Frequency of Monitoring	Action Level(s)	Response Action(s)	Action Level Rationale
PHYSICAL CONDITIONS							
Noise	2, 3, 4, 5, and 6	Noise level meter	ER Project Manual for Site HS Activities	Only monitor non-LANL employees; contact Field Unit HS Rep. if LANL employees need monitoring Noise measurements required when voice must be raised to communicate between two persons located £ 3 feet of each other; monitor hearing zone(s) of employees affected by excessive noise 1st day of occurrence & whenever operations change warranting monitoring: initial measurement and at 30 minute intervals while excessive noise condition persists	85 dBA (~~Non-~~LANL employees only) 80 dBA (Hearing Conservation Program - LANL employees only) 84 dBA (Hearing protection required - LANL employees only)	≥ Action Level: Implement appropriate engineering control(s) per Table 4-3; if unable to lower noise levels below AL, demarcate/post zones of excessive noise and limit access only to employees having sufficient hearing protection training, medical surveillance, and hearing protection per this SSHASP	OSHA 29 CFR 1910.95 for non-LANL employees Per DOE and LANL requirements for LANL employees
PHYSICAL CONDITIONS							
Illumination	Not applicable for activity.						
Heat/Cold Stress	Not applicable for activity. Tasks will be completed during spring.						
INDUSTRIAL HYGIENE							
Total Airborne Dust	All Tasks	Mini-ram	ER Project Manual for Site HS Activities	Excavation/Trenching: Continuously near point(s) of excavation; periodically in employees' breathing zones, & downwind/ upwind as needed to characterize source/dispersion	1.85 mg/m³ (Concentration based on Marlowe document calculation)	≥ action level (AL) in employee breathing zone implement dust suppression methods to control dust levels below AL If unable to lower levels below AL, demarcate/post zones of excessive exposure and limit access only to employees having sufficient chemical-specific PPE, training, and medical surveillance per this SSHASP	Is based on the elevated uranium concentrations in the soil. The assumption is if this Action level is exceeded then the PEL for uranium may be exceeded. This is the first line of defense before initiating more contaminant specific monitoring.

6.2 PERSONAL DOSIMETRY

Requirements for personal dosimetry and the corresponding action levels and response actions are specified in Table 6-2 for each task or group of tasks having different requirements, action levels or responses. These requirements, levels, and actions are set in accordance with Section 6 of the HASP and with the chemical-specific standards listed in Table 2 of the HASP. Any exceptions or deviations from requirements of the HASP are noted where applicable.

TABLE 6-2
PERSONAL DOSIMETRY REQUIREMENTS

HEALTH PHYSICS (RADIATION) *[Refer to Section 6 of the HASP.]*

Hazardous Substance/ Condition	Task(s)	Action Level(s)	Dosimetry Requirement	Action Level(s) Rationale
Internal Sources of Radiation Exposure	All	Potential to exceed 100 mREM/year dose limit	In Vitro and In Vivo bioassays - Uranium and tritium bioassays may be required if conditions warrant and shall be specified by ESH -1/ESH -12 in the RWP.	10 CFR 835
External Sources of Radiation Exposure	All	Potential to exceed 100 mREM/year dose limit	Monthly TLD Badge	10 CFR 835
Uranium	All	Potential to exceed 100 mREM/year dose limit	In Vivo bioassays - Uranium bioassays may be required if conditions warrant and shall be specified by ESH - 1/ESH -12 in the RWP.	10 CFR 835
Tritium	All	Potential to exceed 100 mREM/year dose limit	Tritium bioassays may be required if conditions warrant and shall be specified by ESH -1/ESH -12 in the RWP.	10 CFR 835

Hazardous Condition	Task (s)	Procedure	Instrument/ Supplies	Action Level(s)	Action Level Rationale	Response Action(s)
Noise	In the hearing zone of employees incurring excessive noise levels per Table 6-1 monitoring	ER Project *Manual for Site HS Activities*	Personal noise dosimeter(s)	Refer to Table 6-1		
INDUSTRIAL HYGIENE (CHEMICALS)						
Respirable Dust	All	NIOSH 7602/7500	Air sampling pumps and filter cassettes	When Total Airborne Dust level of 1.85 mg/m^3 is exceeded.	> or = 0.05 mg/m^3 OSHA PEL for uranium. Measurement method for uranium not available	Stop work, institute engineering controls, respiratory protection, source containment per RWP.

6.3 AREA SAMPLING

Requirements for area sampling and the corresponding action levels and response actions are specified in Table 6-3 for each task or group of tasks having different requirements, action levels or responses. These requirements, levels, and actions are set in accordance with Section 6 of the HASP. Any exceptions or deviations from requirements of the HASP are noted where applicable. Note that the requirements of this table only pertain to occupational exposure monitoring. Environmental sampling requirements, if any, to evaluate spread of contamination to off-site locations should be provided in a site-specific document separate from this SSHASP.

TABLE 6-3
AREA SAMPLING REQUIREMENTS

Hazardous Condition/ Task(s)	Task(s)	Instrument/ Supplies	Location and Duration of Monitoring	Sampling/ Analytical Method	Action Level(s)/ Rationale	Response Action(s)
HEALTH PHYSICS (AIRBORNE RADIATION)						
Gross a and b/g contamination	All	Low Volume Air Sampler with filter cassette	Downwind during initial soil backhoe operations, during initial excavation activities, and during initial soil separation operations.	RWP per Section 6 of the HASP and ESH-1-05-02, "Air Monitoring Procedure" and ER addendums.	10% DAC/ 10 CFR 835	Stop work, contact ESH-1, initiate an RWP
INDUSTRIAL HYGIENE (CHEMICALS)						
Total Airborne Dust	All	Miniram	Down Wind during all activities	ER Project *Manual for Site HS Activities*	1.85 mg/m3 (Based on Marlowe document calculation).	Stop work, institute engineering controls, respiratory protection, source containment per RWP.

7.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

In accordance with Section 7 of the HASP, PPE requirements are specified below for each task or group of tasks having different requirements. Only personnel who are trained and qualified to use the equipment in accordance with Section 7 of the HASP and Section 10 of the HASP and SSHASP are allowed to use the equipment specified. Any exceptions or deviations from requirements of these sections are noted below.

TABLE 7

PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

PPE	TASK(s)																						
REQUIREMENTS	1	2	3	4	5	6	7	8	9														
Head	(per 29 CFR 1910.135, ANSI Z89.1-1986, or Z89.2 for electrical shock protection). No hard hat liners unless ANSI approved and affixes to the hard hat cage.																						
Cap										Cap is not required but may be worn for protection from the sun when outside the CRZ.													
Hard Hat	X	X	X	X	X	X	X	X	X	Project requires the wearing of hard hat whenever in CRZ & EZ regardless of the presence of an overhead hazard. Front loaders will be used onsite.													
Eyes	(per 29 CFR 1910.133, ANSI Z87.1-1989) Not applicable *[provide rationale]*																						
Safety Glasses (with side-shields)	X	X	X	X	X	X	X	X	X														
Body																							
Coveralls	X	X	X	X	X	X	X	X	X	To be laundered.													
Cotton	X	X	X	X	X	X	X	X	X														
Welding/Clearing:																							
Chaps	X									Use during chain saw brush clearing activity.													
TRAFFIC ATTIRE:																							
Orange Vest	X						X																
OTHER: *[specify]*																							

PPE	TASK(s)																						
REQUIREMENTS	1	2	3	4	5	6	7	8	9														
Hands	(per 29 CFR 1910.137 and 138, ASTM D 120-87)																						
INNER GLOVES:																							
None	X				X		X	X															
Latex		X	X	X		X			X														
OUTER GLOVES:																							
Nitrile ≥ 12" lgth & 0.01" thick		X	X	X		X			X														
Leather	X				X		X	X															
Other *[specify]*:																							
Feet	(per 29 CFR 1910.136, ANSI Z41-1991)																						
SHOES / BOOTS																							
Steel-toed	X	X	X	X	X	X	X	X	X	* ANSI Z41-1991													
BOOT COVERS:																							
None					X		X	X															
Latex/Polyurethane	X	X	X	X		X			X														
Ears	(per 29 CFR 1910.95, ANSI Z87.1-1989)																						
Plugs *[specify NRR]*:	X	X	X	X	X	X	X	X	X														
Fall Protection	(per 29 CFR 1926.20, 27(d)(5), 104, 105, 250(b)2, 451(i)(8) and (p)(9), 500(g)(1-6), 951(b))																						
Not Required	Not applicable: Unless working at heights greater than 4 feet above surface grade.																						

8.0 DECONTAMINATION

In accordance with Section 8 of the HASP, personnel and/or equipment decontamination requirements are specified below for each task or group of tasks having different requirements. Any exceptions or deviations from Section 8 of the HASP are noted below.

TABLE 8
PERSONNEL AND EQUIPMENT DECONTAMINATION

The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Personnel and Environmental Monitoring Equipment (EME)

Not applicable; rationale:

DECON	TASK(s)																						
REQUIREMENTS	1	2	3	4	5	6	7	8	9														
Option 1 - Standard Approach Level D																							
Not applicable																							
Wash Soap - [Alconox for boots and gloves)	X	X	X	X	X	X	X	X	X														
Aqueous Rinse	X	X	X	X	X	X	X	X	X														
PPE to be Disposed		X	X	X	X	X	X	X	X	* Dispose of inner liner gloves and towelette wipes.													
PPE to be Laundered[1,8]	X	X	X	X	X	X	X	X	X														
Other *[specify]*:																							

Modifications to Model Decon Procedures: A. Isopropylalcohol wet wipe of sample container taken from the Soil Contamination Area B. PPE laundered will be for field team cotton coveralls.

Sampling and Heavy Equipment

Not applicable; rationale:
Per LANL-ER-SOP-1.08
Other Procedure: *[Provide a description of intended decon facility layout, procedures and equipment/supplies in this Section of the SSHASP and/or an Appendix. Also provide rationale.]*

DECON	TASK(s)																						
REQUIREMENTS	1	2	3	4	5	6	7	8	9														
Sample Decon																							
Not applicable	X				X		X	X	X	Samples will not be collected in association with this task.												
Centralized Location		X	X	X		X																	
Localized at work site in CRZ		X	X	X		X																	

1 Laundry Management notified per Section 8.2.2 of the HASP.

DECON REQUIREMENTS	TASK(s) 1	2	3	4	5	6	7	8	9														
Wash Soap - Alconox		x	x	x		x																	
Aqueous Rinse		x	x	x		x																	
Other *[specify]*:																							
Exceptions to and/or deviations from LANL-ER-SOP-1.08 (if any, describe and provide rationale):																							
Sampling Equipment Decon																							
Not applicable	x				x		x	x	x	Samples will not be collected in association with this task.													
Centralized Location		x	x	x		x																	
Wash Soap - Alconox		x	x	x		x																	
Aqueous Rinse		x	x	x		x																	
Other *[specify]*:																							
Exceptions to and/or deviations from LANL-ER-SOP-1.08 (if any, describe and provide rationale):																							
Heavy Equipment Decon																							
Not applicable		x						x		Heavy equipment not used to support these tasks.													
Centralized Location	x						x																
Localized at work site in EZ			x	x	x	x			x														
Wash Soap - pressurized system as needed or a simple wet wipe.	x		x	x	x	x	x		x														
Aqueous Rinse - pressurized system as needed, or simple wet wipe	x		x	x	x	x	x		x														
Rinse Solvent - *[specify type and %]*																							
Other *[specify]*:																							
Exceptions to and/or deviations from LANL-ER-SOP-1.08 (if any, describe and provide rationale):																							

9.0 EMERGENCY/INCIDENT ACTION PLAN

Incident/emergency action requirements, equipment, and supplies are specified below for each task or group of tasks having different requirements. Response to an incident or emergency shall occur according to Section 9 of the HASP and this section. Any exceptions or deviations from requirements of the HASP are noted below.

In the event of an incident or emergency, the FTL or JS will function as the site emergency/incident coordinator, as necessary, and will arrange for immediate notification of LANL emergency response personnel to take control of the scene and/or arrange for immediate notification of appropriate authorities. Other key onsite incident/emergency response personnel are identified below. Only personnel who are trained and certified in accordance with Sections 7, 9, and 10 of the HASP and SSHASP are allowed to respond and use the equipment specified. Incident/emergency contacts and telephone numbers and a map indicating the route to the nearest hospital and medical clinic from each investigation site are included in Appendix D. Both these items shall be posted onsite where readily accessible to field team personnel. Site-specific muster areas shall be determined by the SSO prior to the start of field operations each day and shall be communicated to individuals onsite during the HS Tailgate meeting and as other individuals arrive at the site. Location(s) of muster areas may vary from day-to-day depending upon variable site operations and conditions, and shall be documented daily by the SSO or FTL.

TABLE 9 INCIDENT/EMERGENCY ACTION REQUIREMENTS
The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.
Incident Responders: LANL Emergency Management and Response (EM&R). **Communications:** Mobile phone located at the work site and operable at all times. **On-site Incident Response Equipment:** First-aid Kit and 10 lbs. ABC fire extinguisher. **First-Aid/CPR Provider(s):** David Dixson, SSO, Morrison-Knudsen. Ken McFadden, SSO, Morrison-Knudsen. Linda Fluk, FTL, ICF-KE.

	TASK(S)																						
REQUIREMENTS	1	2	3	4	5	6	7	8	9														
Communications																							
Two-way Radio																							
Cellular phone	X	X	X	X	X	X	X	X	X														
Pager																							
Air Horn(s) or auto mobile horn			X	X		X	X																
Other *[specify]*																							
Description of Air Horn Signals: Two long blasts mean to assemble in the muster area.																							
Hand/Body Signals																							
Description of Hand/Body Signals:																							
Site-Specific Restrictions:																							
Incident Response Equipment																							
Industrial first-aid kit[1]	X	X	X	X	X	X	X	X	X														
Biological pathogen and waste disposal kit[2]	X	X	X	X	X	X	X	X	X														
Antiseptic	X	X	X	X	X	X	X	X	X														
Cold compress	X	X	X	X	X	X	X	X	X														
Emergency decon solutions																							
Blanket																							
Splint materials																							
Stretcher(s)																							
Wire basket litter																							

1 The first-aid supplies shall be approved by a consulting physician and be kept in a weatherproof container. The contents are to be checked weekly and re-supplied by SSO or designee. Contents shall meet the *American National Standard Minimum Requirements for Industrial Unit-Type First-aid Kits* (ANSI Z308.1-1978).

2 This kit shall be kept in a weatherproof container. Contents are to be checked weekly and re-supplied by SSO or delegate. Contents shall include at least the following: *[specify]*

	TASK(s)																						
REQUIREMENTS	1	2	3	4	5	6	7	8	9														
Portable emergency eyewash[3] *See foot note*	X	X	X	X	X	X	X	X	X														
Transport Vehicle *[Required if emergency medical attention not within 4 minutes response time]*	X	X	X	X	X	X	X	X	X														
Other *[specify]:*																							
Fire Fighting Equipment																							
Not applicable																							
A:B:C fire extinguisher: 10 lb.	X	X	X	X	X	X	X	X	X														
Non-sparking tools	X	X	X	X	X	X	X	X	X														
Other *[specify]:*																							
Spill Containment Equipment																							
Not applicable	X	X	X	X	X	X	X	X	X														

9.1 ADJACENT FACILITIES OF CONCERN:

Building facilities in the region where this project is to occur include buildings 33-1, 33-2, and 33-16. These three building have been abandoned and left in place. The buildings have no occupants. The buildings do have active electrical services. None of the activities scheduled to occur shall impact the facilities. The only facilities occurring at the site that may affect the scheduled work are the overhead power lines.

[3] Emergency eyewashes or showers, if applicable, must be located within 10 seconds travel time and not more than 100 feet of travel distance of any source of chemical splash that may be corrosive or moderately to severely irritating to body tissue. They must have a capacity to be able to provide continuous flushing for the duration of time necessary to sufficiently flush the most hazardous substance for which the device is being specified (usually minimum of 15 minutes and 16 gallon capacity). They also shall be inspected at least weekly by the SSO or designee and flushed in accordance with manufacturer's recommendations. Refer to ANSI Z358.1-1990 for further information.

10.0 TRAINING

Training requirements are specified below by job title for each task or group of tasks having different requirements. Personnel shall be trained in accordance with Section 10 of the HASP and as specified below. Any exceptions or deviations from requirements of the HASP are noted below. Personnel performing the roles indicated below shall have completed and have current documentation of the training specified. The SSO, or the FTL or JS, shall verify that personnel have met the training requirements prior to authorizing individuals to enter controlled zones of the work site.

TABLE 10
TRAINING REQUIREMENTS

FPL: Field Project Leader; **FTM :** Field Project Manager; **FTL:** Field Team Leader; **SSO:** Site Safety Officer; **HEO:** Heavy Equipment/Equipment Operator; **RCT:** Radiological Control Technician and Health Protection Technician; **RSP:** Radiological Screening Person; **Labr:** Laborer; **CPTE:** Competent Person for Trenching & Excavation; **Smpl:** Sampler; **Sup:** Subcontractor Supervisor; **WMC:** Waste Management Coordinator; **FLO:** Forklift Operator.

(R = Read training; C = Classroom training; F = Field training; AN = As needed per the HASP or applicable regulatory requirement depending upon the intended duties of the personnel role)

Applicable Task(s): The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): **Task 1:** Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Training	Personnel Role																					
Requirement	FPL	FTM	FTL	SSO	Sup	RCT	RSP	Labr	CPTE	Smpl	HEO	WMC	FLO	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr
HASP	R	R	R	R	R	R	R	R	R	R	R	R	R									
SSHASP	R	R	R	R	R	R	R	R	R	R	R	R	R									
Pre- Job Start HS Briefing	AN	AN	C	C	C	C	C	C	C	C	C	C	C									
Daily HS Tailgate Mtg.	AN	AN	F	F	F	F	F	F	F	F	F	F	F									
TA-33 Orientation	AN	AN	R	R	R	R	R	R	R	R	R	R	R									
General Employee Training (GET) - LANL provided only *[Required for anyone on site >10 consecutive work days]*	C	C	C	C	C	C	C	C	-	C	C	-	-									

Applicable Task(s):																							
Training	Personnel																						
Requirement	FPL	FTM	FTL	SSO	Sup	RCT	RSP	Labr	CPTE	Smpl	HEO	WMC	FLO	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr
Employer's Hazard Communication Program [29 CFR 1926.59(e)]	R	R	R	R	R	R	R	R	R	R	R	R	R										
Conduct of Operations & Occurrence Reporting	R	R	R	R	R	R	R	R	R	R	R	R	R										
OSHA Rights & Responsibilities	R	R	R	R	R	R	R	R	R	R	R	R	R										
Health Physics Checklist Indoctrination	C	C	C	C	C	C	C	C	C	C	C	C	C										
Rad. Worker II	C	C	C	C	C	C	C	C	C	C	C	C	C										
40 hr. HAZWOPER	C	C	C	C	C	C	C	C	C	C	C	C	C										
24 hr. Supervised Fieldwork	F	F	F	F	F	F	F	F	F	F	F	F	F										
24 hr. HAZWOPER	C	C	C	AN	AN	AN	AN	-	-	AN	AN	-	-										
8 hr. Supervised Fieldwork	AN	AN	F	AN	AN	AN	AN	-	-	-	AN	-	-										
8 hr. Annual Refresher	C	C	C	C	C	C	C	C	C	C	C	C	C										
8 hr. HAZWOPER Supervisor	AN	AN	C	AN	AN	AN	AN	-	-	-	AN	-	-										
SSO	-	-	-	C/F	-	-	-	-	-	-	-	-	-										
Health Physics Personnel	-	-	-	-	-	C/F	C/F	-	-	-	-	-	-										
First-aid	-	-	C	C	AN	AN	AN	AN	AN	AN	AN	AN	-		* Only for CPR and First-aid providers listed in Section 9.0								
CPR	-	-	C	C	AN	AN	AN	AN	AN	AN	AN	AN	-		* Only for CPR and First-aid providers listed in Section 9.0								
PPE (per Section 7.1 of HASP)	AN	AN	AN	R	AN	AN	AN	AN	AN	AN	AN	-	AN										
Fire Extinguisher Use [per 29 CFR 1926.150(c)(1)(xi)]	-	-	R	R	R	AN	AN	AN	AN	AN	AN	-	AN										
Fire Fighting Equipment [29 CFR 1926.150]	-	-	R	R	R	AN	AN	AN	AN	AN	AN	AN	-										
Hearing Conservation [Per Section 4.2.2.7 of HASP]	-	-	R	R	R	AN	AN	AN	AN	AN	AN	AN	AN										
Plutonium Safety *[LANL]*	-	-	C	C	-	C	C	-	-	AN	-	-	-										
Tritium Safety *[LANL]*	AN	AN	C	C	AN	C	C	-	-	AN	AN	-	-										
Spot Test for High Explosives (HE) *[contact DX-16 at 7-4574]*	-	-	C	AN	AN	AN	AN	-	-	C	AN	-	-										

Applicable Task(s):																							
Training	Personnel																						
Requirement	FPL	FTM	FTL	SSO	Sup	RCT	RSP	Labr	CPTE	Smpl	HEO	WMC	FLO	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr
High Explosives (HE) Identification/Hazard Awareness Video *[contact DX-16 at 7-4574]*	AN	AN	C	C	C	C	C	C	C	-	C	C	-										
RCRA Training	AN	AN	C/F	C/F	-	-	-	-	-	-	AN	C/F	-										
DOT Training	AN	AN	AN	AN	-	-	-	-	-	-	AN	AN											
Sanitation *[29 CFR 1926.51]*	-	-	R	R	-	-	-	-	-	-	-	-	-										
Materials Handling, Storage, Use, Disposal *[29 CFR 1926.250 and 252]*	-	-	R	R	R	-	-	AN	AN	AN	R	R	R										
Signs, Signals, Barricades *[29 CFR 1926.200]*	-	-	R	R	R	-	-	AN	R	AN	R	-	R										
Traffic Flagging and Safety *[29 CFR 1926.201]*	-	-	AN	AN	AN	-	-	-	-	-	AN	-	AN										
Stairways, Ladders *[29 CFR 1926.1060(a) and 1053(b)(15) and 32(f)]*	-	-	AN	AN	AN	-	-	-	-	-	-	-	-										
Tools - Hand and Power *[29 CFR 1926.302(e)(1)]*	-	-	R	R	R	-	-	R	R	R	-	-	-										
Excavation/Trenching Competent Person *[29 CFR 1926.651(k)(1) and 32(f)]*	-	-	AN	AN	AN	-	-	-	AN	-	AN	-	-										
Excavation/Trenching Protective Systems Competent Person *[29 CFR 1926.652(a)(ii) and 32(f)]*	-	-	R	R	R	-	-	-	R	-	R	-	-										
Confined Space Entry *[per 29 CFR 1910.146(g)]*	-	-	R	AN	AN	-	-	AN	-	-	-	-	-										
Confined Space Entry Supervisor *[per 29 CFR 1910.146(g) and (j)]*	-	-	AN	AN	AN	-	-	AN	-	-	-	-	-										
Electrical Safety Awareness *[Subpart K of 29 CFR 1926]*	-	-	AN	AN	AN	-	-	AN	AN	AN	AN	-	-										
Lockout/Tagout (Booklet)	-	-	AN	AN	AN	-	-	AN	-	AN	AN	-	AN										

Applicable Task(s):																							
Training	Personnel																						
Requirement	FPL	FTM	FTL	SSO	Sup	RCT	RSP	Labr	CPTE	Smpl	HEO	WMC	FLO	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr	Othr
Lockout/Tagout Red Control of Hazardous Energy Sources [per 29 CFR 1926.416(a)(4) and 417(a) and 32(m)]	-	-	AN	AN	AN	-	-	AN	-	AN	AN	-	AN										
Motor Vehicles, Mechanized Equipment, and/or Material Handling Equipment *[specify equip. type and training requirement per Subparts O and W of 29 CFR 1926]*	-	-	R	R	R	-	-	R	AN	R	R	-	R										
Forklift Safety *[per 29 CFR 1910.178(l)]*	-	-	R	C/R	C/R	-	-	AN	-	-	-	-	C/R										
Crane & Rigging Operator Safety [ANSI B30]	-	-	AN	AN	AN	-	-	-	AN	-	AN	-	AN										
Crane & Rigging Safety *[29 CFR 1926.251, 406, 550(a)]*	-	-	AN	AN	AN	-	-	AN	AN	-	AN	-	AN										
Hoists *[29 CFR 1926.406, 552]*	-	-	AN	AN	AN	-	-	AN	AN	-	AN	-	AN										
Conveyors *[29 CFR 1926.555 and ANSI/ASME B20.1b5.2a]*	-	-	R	R	R	-	-	AN	-	-	R	-	-										
Welding and Cutting *[29 CFR 1926.350(d) and 351(d) and 354(a)]*	-	-	AN	AN	AN	-	-	AN	-	-	AN	-	-										
Bloodborne Pathogens *[29 CFR 1910.1030]*	-	-	C/R	C/R	-	-	-	-	-	-	-	-	-		* Only for CPR and First-aid providers listed in Section 9.0								
RSAA on File with ESH-1						C	C																
Other (specify):																							

11.0 MEDICAL SURVEILLANCE

The medical surveillance requirements of this section have been established in accordance with Section 11 of the HASP, unless noted otherwise below.

TABLE 11
MEDICAL SURVEILLANCE REQUIREMENTS

Hazard	Task(s)	Exposure Level Triggering Medical Surveillance Requirement	Requirement
Hazardous Waste Operations	All	Potential for exposure to hazardous substances or health hazards ≥ PELs or published exposure limits during HAZWOPER work	29 CFR 1926.65(f) for all people entering the EZ or CRZ.
Bloodborne Pathogens (Or Potentially Infectious Materials)	All	Any occupational exposure	29 CFR 1910.1030(f) only required for CPR and First-aid providers
Hearing Protection	3, 4, and 5	≥ 85 dBA	29 CFR 1910.95(g)
Uranium	2, 3, 4, 5, and 6	> 0.05 mg/m^3	29 CFR 1910 Subpart Z

12.0 QUALITY CONTROL & QUALITY ASSURANCE (QC/QA)

12.1 SITE INSPECTIONS

In accordance with Section 12 of the HASP, the FTL shall see that the following inspections are conducted and documented, and that appropriate actions are taken and documented to rectify identified deficiencies, if any.

TABLE 12 INSPECTION REQUIREMENTS		
Inspection	**Inspector**	**Task(s)**
Job Site, Material and Equipment (in accordance with 29 CFR 1926.20(b)(2))	SSO	All
General Sanitation (i.e., potable and non-potable water, toilets, washing facilities, eating and drinking areas, vermin control, and/or change rooms; in accordance with 29 CFR 1926.51)	SSO	All
Materials handling, storage, use and disposal (in accordance with 29 CFR 1926.250 and 252)	SSO	3, 4, 5, and 6
Signs, Signals and Barricades (in accordance with 29 CFR 1926.200)	SSO	3 thru 6
Motor vehicles and mechanized equip. (in accordance with Subpart O of 29 CFR 1926)	SSO and CP	3, 4, and 5
Material handling equipment (e.g., rubber-tired scraper, loader and dozers] equipped with rollover protective structures and overhead protection (in accordance with Subpart W of 29 CFR 1926)	SSO and CP	3, 5, and 6
Excavations/Trenches(per 29 CFR 1926.651(k))	SSO and CP	3
Excavations/Trenches Protective Systems (per 29 CFR 1926.652)	CP as required	3
PPE (Section 7 and 29 CFR 1926.95)	SSO and User	All
Fall Protection (per 29 CFR 1926.20(b)(2) and ANSI A10.14)	SSO and User if required	Not Applicable
Respiratory Protective Equipment (Section 7 and 29 CFR 1910.134(f))	User if required	4
Incident/emergency response equipment (prior to each use and at least monthly)	SSO	All
Fire fighting equipment (per 29 CFR 1926.150(a) and (c))	SSO	All
Derricks (e.g., drill rigs) and Cranes (in accordance with Table 4-3 and per 29 CFR 1926.550(a)(5),(6) and 406(a))	SSO or CP as required	Not Applicable
Rigging (in accordance with Table 4-3 and per 29 CFR 1926.251(a))	SSO or CP as required	Not Applicable
Personnel hoists (at least weekly, per 29 CFR 1926.552(c)(17)(iii) and 406(a))	SSO or CP as required	Not Applicable
Material hoists (in accordance with 29 CFR 1926.552(b) and 406(a))	SSO or CP as required	5
Conveyors (in accordance with 29 CFR 1926.555)	SSO or CP as required	3
Stairways and Ladders (in accordance with Subpart X of 29 CFR 1926)	SSO or CP as required	Not Applicable
Tools - hand and power (in accordance with Subpart I of 29 CFR 1926)	User and SSO	All
Welding and cutting equipment (in accordance with Subpart J of 29 CFR 1926)	SSO or CP as required	Not Applicable
Electrical equipment (per 29 CFR 1926.403(b) and/.or 416(f)(8))	SSO or CP as required	All
Scaffolding (in accordance with Subpart L of 29 CFR 1926)	SSO or CP as required	Not Applicable
Fork lifts (in accordance with 29 CFR 1910.178)	SSO or CP as required	5 and 6
Other (specify):		
SSO = Site Safety Officer (Level II); CP = Competent Person (per 29 CFR 1926.32(f) or (m))		

13.0 RECORDKEEPING

In addition to recordkeeping requirements of Section 13 of the HASP, the HS records specified below shall be completed in accordance with Section 13 of the HASP and kept onsite as indicated below.

TABLE 13-1
RECORD KEEPING REQUIREMENTS

This table identifies the records/forms to be filled out and/or maintained by the SSO or designee. The requirement reference and the requirement for keeping the records/forms on site are also identified.

Record/Form	Requirement Reference	Keep Onsite
HASP	HASP Section 1	X
SSHASP	HASP Section 1	X
Completed SSHASP Modification Forms	HASP Section 1	X
SSOs Daily Logbook	HASP Section 13.1	X
Documentation of Daily Calibration	HASP Section 6	X
Guidance Manuals for Exposure Limits	HASP Section 6	X
Direct-reading Monitoring Results	HASP Section 6 and Applicable Methods in the LANL ER Decommissioning Project H&S Activities Manual	X
Documentation of analytical laboratories sample analysis for industrial hygiene samples	HASP Section 6	X
Required Excavation and Hot Works Permits	HASP Section 4.2.2.12, 4.2.2.5 & 4.2.2.8	X
Equipment and Supplies Inspection Records	HASP Section 12.1	X
Daily Health and Safety Inspection Records	HASP Section 12.1	X
Documentation of Health and Safety Training	HASP Section 4.2.2.13, 7.1.6, and 10	
Documentation of Medical Surveillance	HASP Section 11	

APPENDIX A

MAP(S) OF SITE LOCATIONS, ADJACENT FACILITIES AND SITE CONTROL ZONES/FACILITIES

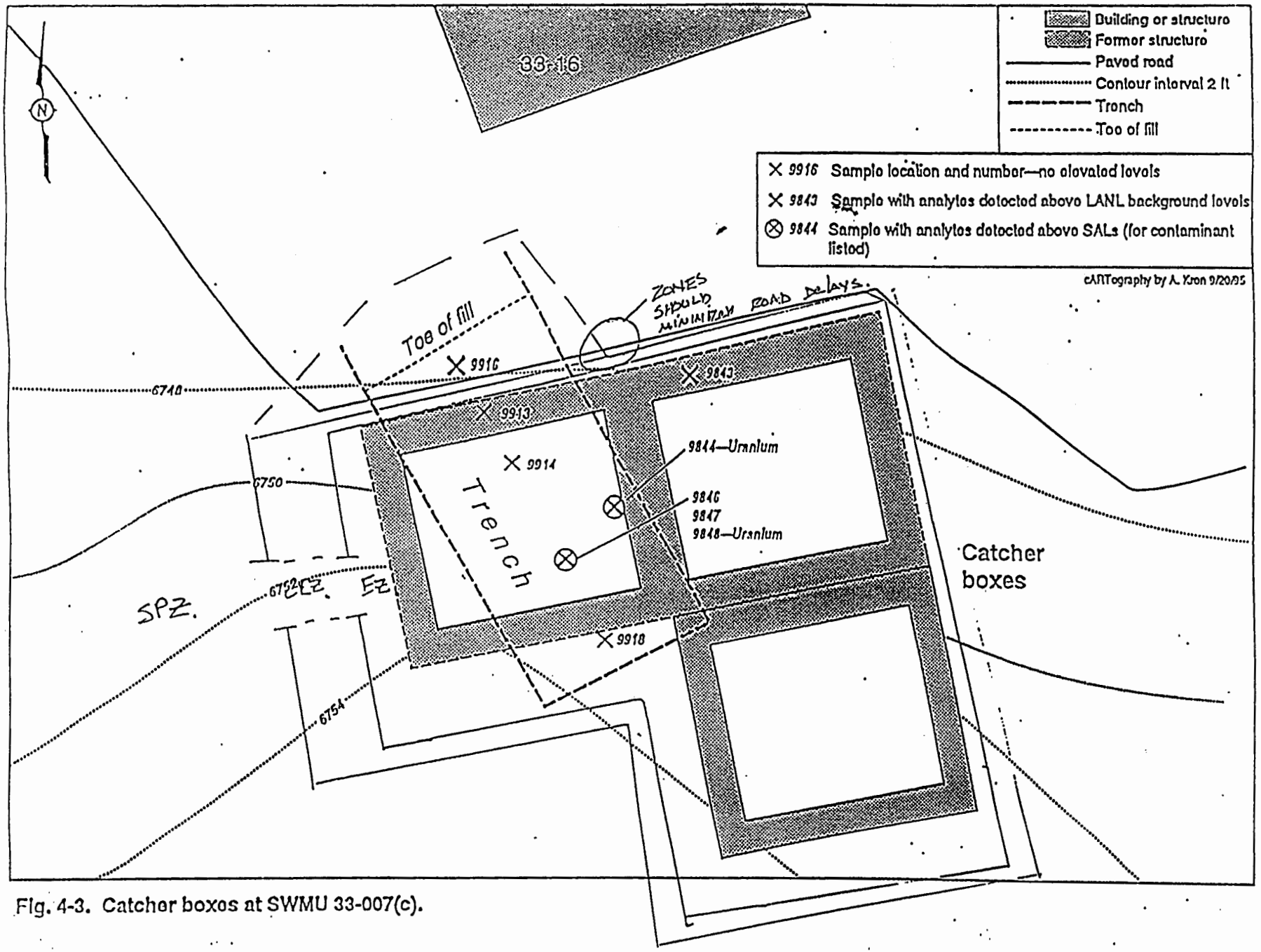


Fig. 4-3. Catcher boxes at SWMU 33-007(c).

APPENDIX B

HAZARDOUS SUBSTANCE - HAZARD ASSESSMENT

APPENDIX B
HAZARDOUS SUBSTANCE - HAZARD ASSESSMENT

This table includes a health hazard assessment, and associated rationales, of each chemical product and site contaminant listed in Table 2-1. This hazard assessment was completed in accordance with Section 4.1 of the HASP.

Tasks: The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Substance/	Maximum Data		Hazard Assessment Rating/Rationale
Synonym	Value	Location	
RADIOLOGICAL SUBSTANCES			
Process Knowledge			
Uranium - Isotope Form	Unknown	33-007(c)	Moderate Elemental uranium is present in the soil but isotopes were not detected and it is probable that contact could occur. In the event of contact, reversible harm would occur. OSHA: 0.05 mg/m^3
Polonium-210	Negligible	33-007(c)	Negligible Historical activities in TA-33 were associated with its use. Contact unlikely since polonium was not detected in soil because of decay rate of approx. 138 days and not activity has occurred in the last ten years at the site but reversible harm would occur if contacted.

Tasks: The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Substance/ Synonym	Maximum Data		Hazard Assessment Rating/Rationale
	Value	Location	
Tritium	Negligible	33-007(c)	Negligible Historical activities in TA-33 were associated with the generation of tritium. Contact unlikely since tritium generation was not associated with activities that occurred in this facility based on historical knowledge and field sample analysis but reversible harm would occur if vapor form was contacted. Skin contact and inhalation hazard. Low energy beta emitter. High affinity for water
Soil Sample Results			
Uranium	6770 mg/kg	33-007(c)	Moderate Uranium is present in the soil and it is probable that contact could occur. In the event of contact, reversible harm would occur. OSHA: 0.05 mg/m^3
Soil Gas Vapor Results			
None Available			
Air Monitoring or Sampling Results			
None Available			
Water Sample Results			

Tasks: The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Substance/	Maximum Data		Hazard Assessment Rating/Rationale
Synonym	Value	Location	
None Available			
CHEMICAL SUBSTANCES			
Process Knowledge			
Sodium Bicarbonate (Baking Soda)	Unknown	33-007(c)	Negligible Used as a leachate in CVL process. Mishap is unlikely to occur and reversible harm not likely to threaten bodily damage.
Iso-propyl-alcohol	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to decontaminate samples. NFPA Rating (Health: 1, Fire: 3, Reactivity: 0)
Acetone	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to decontaminate samples. NFPA Rating (Health: 1, Fire: 3, Reactivity: 0)
Alconox	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to decontaminate personnel.
Acetylene	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site (single cylinders) when repairs are required. Bottles will not be stored on-site. Only for use during welding operations.
Isobutylene	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to calibrate instrument.

Tasks: The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Substance/ Synonym	Maximum Data		Hazard Assessment Rating/Rationale
	Value	Location	
Oxygen	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site (single cylinders) when repairs are required. Bottles will not be stored on-site. Only for use during welding operations.
Gasoline	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to service equipment. NFPA Rating (Health: 1, Fire: 3, Reactivity: 0)
Diesel fuel	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to service equipment. NFPA Rating (Health: 0, Fire: 2, Reactivity: 0)
Motor Oil	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to service equipment. NFPA Rating (Health: 0, Fire: 1, Reactivity: 0)
Hydraulic Fluid	Unknown	33-007(c)	Negligible Only small quantities shall be brought on site and stored to service equipment. NFPA Rating (Health: 0, Fire: 1, Reactivity: 0)
Soil Sample Results			
None Available			
Soil Gas Vapor Results			
None Available			

Tasks: The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Substance/ Synonym	Maximum Data		Hazard Assessment Rating/Rationale
	Value	Location	
Air Monitoring or Sampling Results			
None Available			
Water Sample Results			
None Available			
TOXIC METALS			
Process Knowledge			
Beryllium	Unknown	33-007(c)	Negligible This metal was presumed to occur at the site based on historical knowledge . However, samples collected and analyzed did not determine the presence of the metal in the soil at the site. Therefore, it is unlikely that contact will occur.
Soil Sample Results			
Lead	160 mg/kg	33-007(c)	Negligible The concentration in the soil does not indicate that mishap or irreversible harm would occur if exposure to this concentration found in the soil. A total airborne dust concentration of 78 mg/m^3 is needed before the PEL for lead is approached. Action level for Total Airborne dust of this element based on the Marlowe document is: 78 mg/m^3

Tasks: The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Substance/ Synonym	Maximum Data		Hazard Assessment Rating/Rationale
	Value	Location	
Nickel	104 mg/kg	33-007(c)	Negligible The concentration in the soil does not indicate that mishap or irreversible harm would occur if exposure to this concentration found in the soil. A total airborne dust concentration of 36 mg/m^3 is needed before the PEL for nickel is approached. Action level for Total Airborne dust of this element based on the Marlowe document is: 36 mg/m^3
Silver	2 mg/kg	33-007(c)	Negligible The concentration in the soil does not indicate that mishap or irreversible harm would occur if exposure to this concentration found in the soil. A total airborne dust concentration of 1250 mg/m^3 is needed before the PEL for silver is approached. Action level for Total Airborne dust of this element based on the Marlowe document is: 1250 mg/m^3
Zinc	1200 mg/kg	33-007(c)	Negligible The concentration in the soil does not indicate that mishap or irreversible harm would occur if exposure to this concentration found in the soil. A total airborne dust concentration of 1042 mg/m^3 is needed before the PEL for zinc is approached. Action level for Total Airborne dust of this element based on the Marlowe document is: 1042 mg/m^3

Tasks: The following is a brief description of tasks to complete the expedited clean-up of site 33-007 (c): Task 1: Mobilization and Site Preparation; Task 2: Field Screening and Sampling; Task 3: Excavation; Task 4: Separation Process (SGS); Task 5: Container Handling; Task 6: Containerized Vat Leaching (CVL); Task 7: Revegetation; Task 8: Demobilization; Task 9: Incident Response.

Substance/	Maximum Data		Hazard Assessment Rating/Rationale
Synonym	Value	Location	
HIGH EXPLOSIVES			
Process Knowledge			
Specific Types Unknown	Unknown	33-007(c) in HE corridor	Negligible Contact with substance is unlikely during surface and sub-surface sampling since previous soil sample results did not detect the presence of HE but irreversible harm would result if contact was made.

Los Alamos
NATIONAL LABORATORY
memorandum
Chemical Science and Technology
Responsible Chemistry for America
Environmental Restoration Program/CST-18
Los Alamos, New Mexico 87545

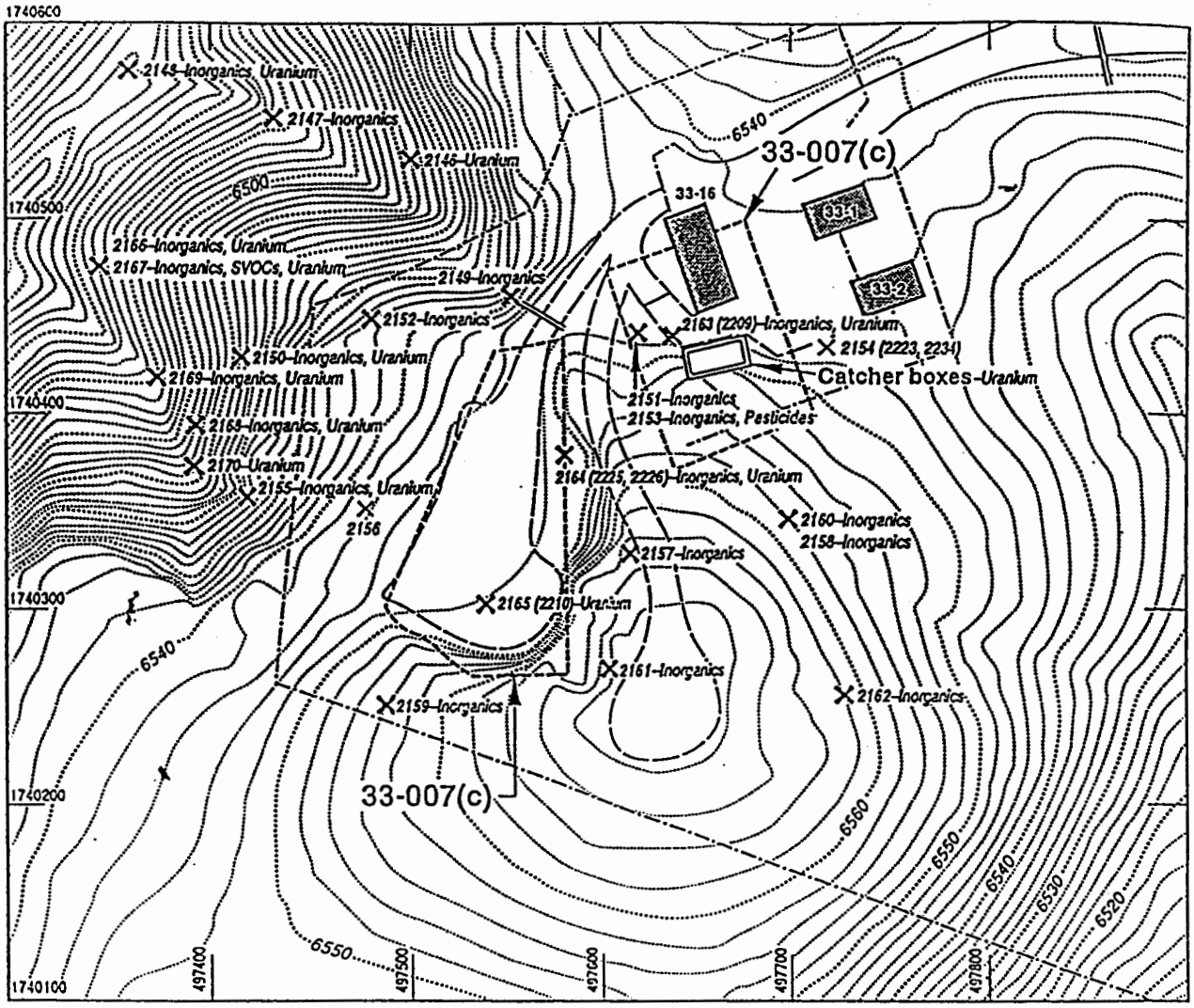
To/MS: Roy Michelotti, CST-18, MS E525
From/MS: Dorothy Hoard, CST-3, MS E525
Phone/FAX: 5-7769/5-4632
Symbol: CST-18/WTMST-96-01
Date: March 18, 1996

Analyses for High Explosives at SWMU 33-007(c)

A total of 31 samples were collected for the RFI Phase I investigation at Area 6, TA-33 of SWMU 33-007(c). Of these, 26 samples were analyzed for high explosives. Analyses were performed in June 1993 by S-Cubed Analytical Laboratories of San Diego, CA under the LANL Environmental Restoration Project sample delivery group request number 14664. Data validation indicated that all analyses met EPA criteria and all results are accepted as valid.

No high explosives were found above quantitation limits in any sample.

Distribution: CST-18 ER file



Sources: FIMAD 1993, G101009, G101010, G101476
Modified by: cARTography by A. Kron 1/26/95

Permanent structure
Paved road
Unimproved road/trail
Fence
Storm drain/culvert
PRS boundary

X 2154 Sample location and number—no elevated levels found
X 2164 Sample with PCOCs detected above LANL background levels
(2223, 2234) Duplicate samples are shown in parentheses

0 50 100 ft

Contour interval = 2 ft

N

Fig. 4-11. Area 6: PRS 33-007(c).

APPENDIX C

CHEMICAL, PHYSICAL, AND TOXICOLOGICAL REFERENCE MATERIALS TO BE MAINTAINED ON-SITE

CHEMICAL, PHYSICAL, AND TOXICOLOGICAL REFERENCE MATERIALS

THE FOLLOWING PHYSICAL, CHEMICAL, AND TOXICOLOGICAL REFERENCE MATERIALS SHALL BE MAINTAINED ON-SITE:

1. NIOSH POCKET GUIDE TO CHEMICAL HAZARDS.
2. ACGIH THRESHOLD LIMIT VALUES FOR CHEMICAL SUBSTANCES AND PHYSICAL AGENTS AND BIOLOGICAL EXPOSURE INDICES.
3. QUICK SELECTION GUIDE TO CHEMICAL PROTECTIVE CLOTHING.
4. DOT EMERGENCY RESPONSE GUIDEBOOK.

EMERGENCY CONTACTS AND PHONE NUMBERS

(post on-site in Support Zone)

(For Mobile Phone Numbers Dial 665-9800 then enter the pager number).

MEDICAL EMERGENCY/FIRE:

Los Alamos Fire Dept.....LANL phone: **911** Cellular phone: **667-7080**

HAZARDOUS RELEASE/SPILL:

LANL HAZMAT Team (EM&R).....**667-6211**

LANL Occupational Medicine Clinic (ESH-2).....**667-0660**
Los Alamos Medical Center Hospital.....**662-4201**
Security OS/Pro Force.....**667-6534**
Los Alamos Police.....**662-8224**
LANL Health and Safety - ESH-5.....**665-7221**
LANL Health Physics Operations- ESH-1.....**667-8366**
TA/Facility Manager: *Peter Bussolini*..... **667-0370**
TA/Facility Operations Rep.: *John Jennings*..... **667-0370**
FPL: *Brad Martin*.....**667-6080**
Alternate FPL: *Roy Michelotti*.....**665-7444**
FTM: *Lynn Kidman*.....**661-5200**
FTL: *Linda Fluk*.....**661-5229**
Field Unit HS Rep.: *Bill Brazile*.....**665-5128/104-6845**
Field Unit RCT Rep.: *Marty Peifer*.....**667-0083/104-6649**

Management Contacts:

Employer Thermo Nuclean Systems Contacts: Ed Bramlitt, TNS, 345-3461

Employer ICF Kaiser Engineering Contacts: Ivan Wachler, ICF-KE, 661-5211

EMERGENCY REPORTING INFORMATION:

When calling for emergency services, have the following information available to report:

- Site name/location/phone #
- Caller ID
- Nature of emergency
- Number of personnel involved
- Name and condition of affected employees
- Actions taken and assistance required

APPENDIX D

EMERGENCY CONTACTS
AND
ROUTE(S) TO MEDICAL SERVICES

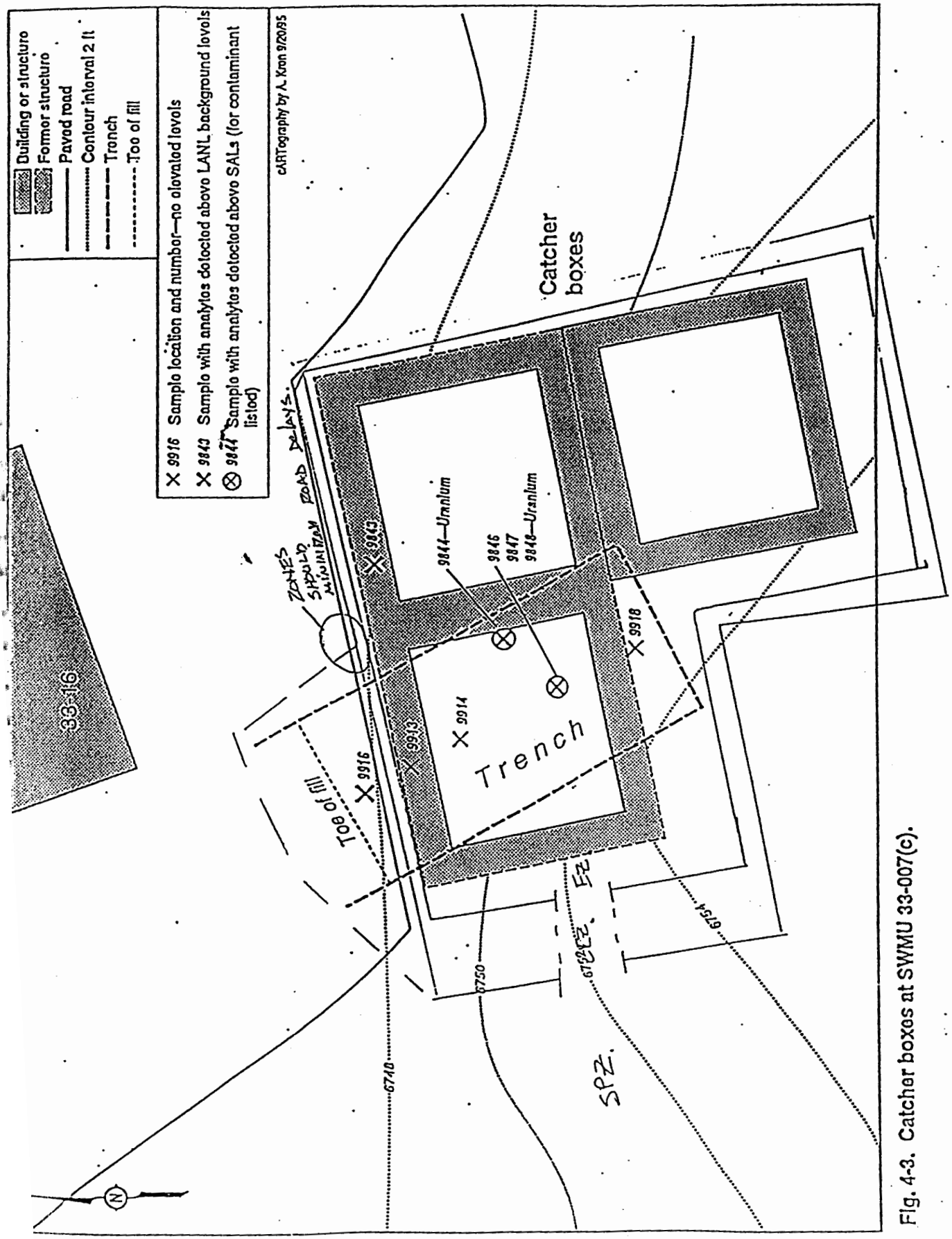
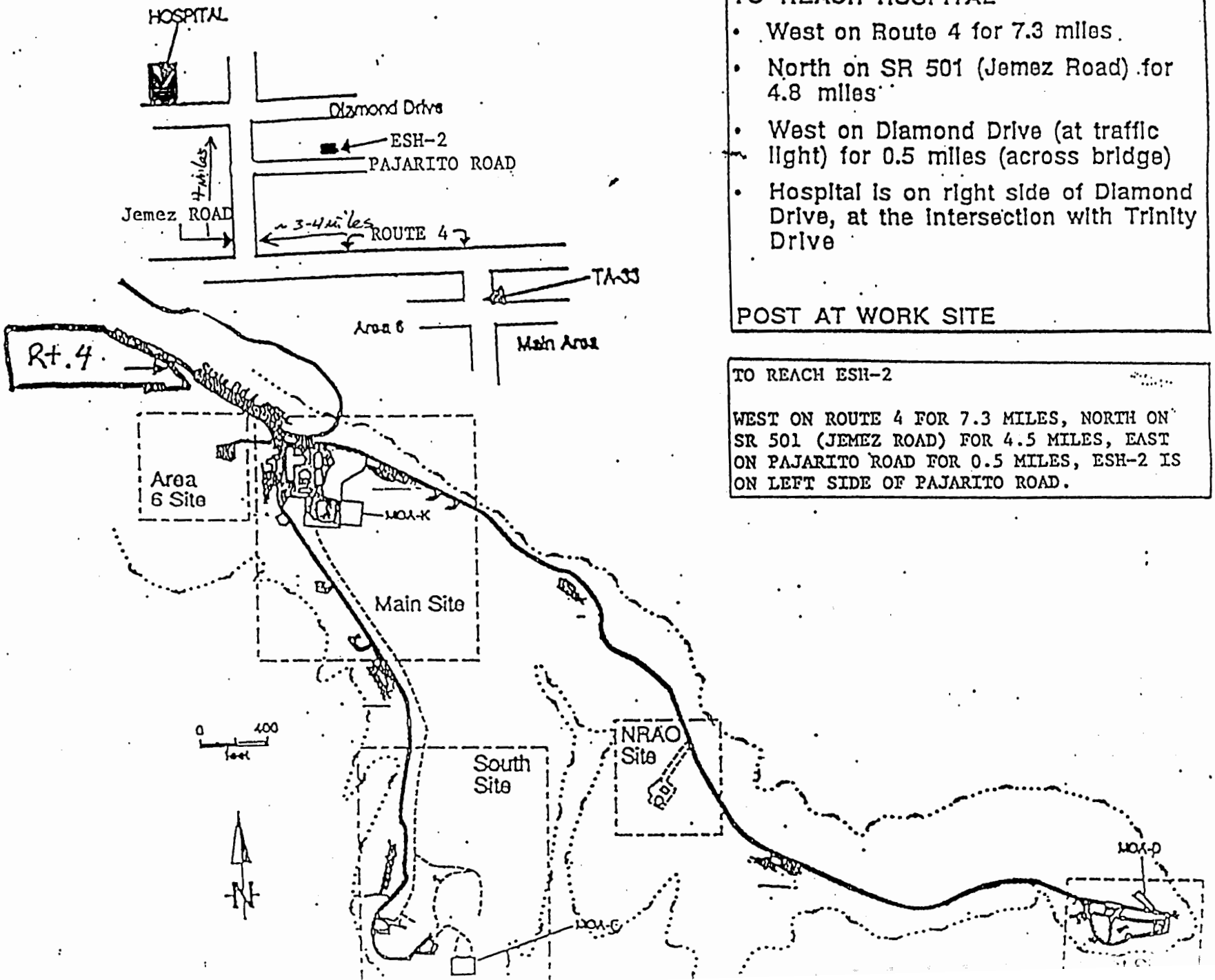


Fig. 4-3. Catcher boxes at SWMU 33-007(c).



TO REACH HOSPITAL

- West on Route 4 for 7.3 miles.
- North on SR 501 (Jemez Road) for 4.8 miles
- West on Diamond Drive (at traffic light) for 0.5 miles (across bridge)
- Hospital is on right side of Diamond Drive, at the intersection with Trinity Drive

POST AT WORK SITE

TO REACH ESH-2

WEST ON ROUTE 4 FOR 7.3 MILES, NORTH ON SR 501 (JEMEZ ROAD) FOR 4.5 MILES, EAST ON PAJARITO ROAD FOR 0.5 MILES, ESH-2 IS ON LEFT SIDE OF PAJARITO ROAD.

SSHASP ACKNOWLEDGMENT FORM

Project Title: Pilot Study of SGS and CVL Date: 4/1/96

TA(s): 33-007(C) SSHASP No.: 115

I acknowledge that I have read or have been briefed on the contents of this SSHASP in accordance with requirements of Sections 1.2 and 10.1.3 of the HASP.

Name	Title	Company	Z Number (or other photo ID)	Signature/Date
MANLY B. LEE	SR H.P. RCT TECH	THERMO NUTECH	115772	4-4-96
MIKE J. DILLON	SITE MGR.	THERMO NUCLEAR	585-60-1322	4-5-96
Joseph D. Cordova	clerk.	THERMO NUCLEAR	584-54-4971	
DAVID E. LAW	PLANT OPERATOR	THERMO NUCLEAR	YB2-64-7668	
LLOYD L. LANSFORD	OPER	THERMO NUCLEAR	585-28-9561	
Chuck Kellier	Project Mgr	Thermo NuCom	382-44-0404	
JAMES A. WOODS	INSTR. TECH	THERMO NUTECH	585066797	
DAVE DIXSON	S.S.O.	M-K	117232	
WILLIAM R. TURNEY	Post-Doc	CST-7	112765	
Ken Shisler	SSO	MK	114962	
C. Mason	PI/CVL	CST-7	082544	
JOHN J. GUENETTE	INSPECTOR	ICF-KE	069220	
Kristi Beguin	Sampler, Alt. SSO	ICF-KE	105685	