TA-14

Los Alamos National Laboratory

UNIVERSITY OF CALIFORNIA

Environmental Restoration

Environmental Restoration Project
MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

Date: November 18, 1996
Refer to: EM/ER:96-595

5250.1

Mr. Ted Taylor
Los Alamos Area Office
US Department of Energy, MS A316
Los Alamos, NM 87544

SUBJECT: FINAL VCA PLAN FOR TA-14, PRS 14-003 ACTIVITIES

Dear Ted:

Enclosed for your records please find two copies of the final Voluntary Corrective Action (VCA) Plan for Technical Area 14, Potential Release Site 14-003 activities. The activities are planned for completion in Fiscal Year 1997.

Your Field Project Coordinator participated in developing and reviewing this plan. The VCA Checklist and Field Authorization Form have been completed and signed and are included in the enclosed plan.

Informational copies of this VCA Plan are being distributed to the regulators.

If you have any questions, please call Gene Gould at (505) 667-0402 or Everett Trollinger at (505) 667-5801. Thank you for your cooperation in this matter.

Sincerely,

Jorg Jansen
Program Manager

JJ/bp

Attachment 14

Enclosure: (1) Final VCA Plan for TA-14, PRS 14-003

3849

Cy (w/ encs.):
S. Anderson, NMED-AIP, MS J993
S. Dinwiddie, NMED-HRMB
B. Garcia, NMED-HRMB
G. Gould, ESA-EPE, MS G787
D. Griswold, AL-ERD, MS A906
[redacted]
M. Leavitt, NMED-GWQB
N. Naraine, DOE-HQ, EM-453
D. Neleigh, EPA, R.6, 6PD-N (2 copies)
C. Rodriguez, CIO, MS M707
G. Saums, NMED-SWQB
E. Trollinger, LAAO, MS A316
N. Weber, NMED-AIP, MS J993
J. White, ESH-19, MS K490
S. Yanicak, NMED-AIP, MS J993
RPF, MS M707

Cy (w/o encs.):
T. Baca, EM, MS J591
D. Bradbury, EM/ER, MS M992
T. Glatzmaier, DDEES/ER, MS M992
D. McInroy, EM/ER, MS M992
J. Levings, AL-ERD, MS A906
W. Spurgeon, DOE-HQ, EM-453
J. Vozella, LAAO, MS A316
K. Zamora, LAAO, MS A316
EM/ER File, MS M992

Voluntary Corrective Action Plan for

Potential Release Site 14-003 Burn Area

55250.2

Field Unit 2

Environmental Restoration Project

November 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-3984

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Site Type and Description of PRS 14-003 1
1.1.1 Operational History 1
1.1.2 COPCs and Rationale for Proposed Remedial Action 1

2.0 SITE CHARACTERIZATION 2
2.1 RFI Information/Other Decision Data 2
2.1.1 Data Quality Evaluation 2
2.1.2 Sampling Results 4
2.2 Nature and Extent of Contamination 7

3.0 PROPOSED REMEDY FOR PRS 14-003 BURN AREA 7
3.1 Description of the Proposed Remedial Action 7
3.2 Basis for Cleanup Levels 8
3.3 Site Restoration 10

4.0 WASTE MANAGEMENT 10
4.1 Estimated Types and Volumes of Waste 10
4.2 Method of Management and Disposal 11

5.0 DESCRIPTION OF CONFIRMATORY/VERIFICATION SAMPLING 11

6.0 ESTIMATED TIME TO COMPLETE THE ACTION AND UNCERTAINTIES 12

7.0 ANNEXES 14

8.0 REFERENCES 34

VOLUNTARY CORRECTIVE ACTION PLAN FOR POTENTIAL RELEASE SITE 14-003 - BURN AREA

1.0 INTRODUCTION

The potential release site (PRS) at Los Alamos National Laboratory (the Laboratory/LANL) addressed in this voluntary corrective action (VCA) plan is located within LANL's TA-14, known as Q-site.

1.1 Site Type and Description of PRS 14-003

TA-14 was established in 1944 by LANL's Explosives Division (X Division) for close observation of small explosive charges. The burn area consists of a former trash burning area, partly enclosed by a horseshoe-shaped dirt berm, that was used for burning of debris remaining from experimental test shots conducted at TA-14. The burn area is 300 ft northeast of TA-14-5 at the end of an abandoned paved road which curves around the east end of the PRS. It consists of a level, 5-ft x 20-ft grassy area enclosed on three sides by a 3-ft high dirt berm, open on the east toward the end of the asphalt road. The floor of the burn area is soil, which covers most of the remaining debris. No drainage paths exit the PRS due to the surrounding berm and road, though beyond the paving to the east is a shallow gully that drains southeastward to Cañon de Valle. Contamination exceeding screening action level (SALs) is present in the soil of the burn area for HE and metals; therefore this PRS has been proposed for a VCA.

1.1.1 Operational History

The history of PRS 14-003 is discussed in detail in Section 5.6.2 of the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) work plan (LANL 1994, 1156). The site was used during the 1950s for burning of firing site debris and HE-contaminated items, leaving noncombustible residuals that include uranium and various other metals.

1.1.2 COPCs and Rationale for Proposed Remedial Action

Two samples were collected from the surface soil (6-12 in.) in the center of the berm. The results of the RFI screening assessment of these samples indicate 10 inorganic chemicals of potential concern (COPCs) have been identified that are human health concerns. Four analytes (antimony, silver, zinc, and total uranium as a nonradionuclide) were retained based on the MCE. Four analytes (barium, cadmium, copper, and lead) were retained as COPCs because they exceeded their respective SALs. Two analytes (arsenic and manganese) were retained as COPCs because they exceeded their respective UTLs, which are greater than their SALs. Three high explosives were retained as COPCs: 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene because they had no SAL, and RDX, which exceeded its SAL. Removal of the noncombustible material and contaminated soil from the flat area within the berm, followed by field screening/testing of the subsoil in the excavation and the berm itself, will provide an effective cleanup of this relatively low-level contamination.

Potential ecological risk associated with residual contamination remaining at each PRS in this VCA at the conclusion of the VCA will be screened against Toxicity Reference Values. If a PRS passes the screening, a VCA Report will be prepared, and the PRS will be recommended for No Further Action. For PRSs that do not pass the screening, they will be evaluated as part of the Ecological Exposure Unit (EEU) of which they are a part. For PRSs that do not pass the screening, a VCA Report will be prepared following the completion of further ecological evaluation on an EEU basis.

2.0 SITE CHARACTERIZATION

The burn area is estimated to contain up to 30 cubic yards of material, which includes the flat inner area plus the surrounding berm. The surrounding area is grass and dirt. The extent of contamination is contained within the berm.

2.1 RFI Information/Other Decision Data

A previous investigation of the burn area was conducted as part of Problem 2 of the LANL Sampling and Analysis Data Document (DOE 1989, 0271). Sampling Request LA208 indicates that three samples taken of surface soil (0-6 in. depth) at the TA-14 "trash pile" burn location contained metals with the following maximum values: barium, 92.2 mg/kg; beryllium, 0.7 mg/kg; copper, 39.5 mg/kg; and zinc, 44.7 mg/kg. Two samples each contained chromium (7.6 and 5.2 mg/kg), and only one had mercury (0.29 mg/kg) plus nickel (5.1 mg/kg). A gamma screen found 610 pCi/kgW of ^{137}Cs (cesium). It should be noted, however, that this draft document received general criticism by reviewers and was not recommended for citation. Specific criticisms are not available, so validity of these particular data are not known. However, a comparison of the above metals concentrations indicates that they are not greater than the current SALs used in the screening assessment.

The Phase I RFI was conducted in July 1995. The objective of RFI sampling was to determine whether COPCs were present in the burn area. Two samples were collected of near-surface soil at a depth of 0-12 in. using the hand auger technique (LANL-ER-SOP 6.10, see Annex 7.4). Annex 7.3 shows the sample locations at this PRS and the area of suspected contamination. HE spot tests of surface soil were conducted at each of the two sample locations prior to any intrusive activities; these showed negative results. Radiological screening of soil samples also revealed no elevated levels. Lab analyses conducted were gamma spectroscopy (including total uranium content), high explosives (HE), semivolatile organic compounds (SVOCs), and target analyte list (TAL) metals.

2.1.1 Data Quality Evaluation

The QA/QC data associated with the investigation at PRS 14-003 (inorganics, semivolatile organics, high explosives, and radionuclides) indicated that a majority of the sample analytical data (≈95%) were acceptable and defensible (Table 2.1.1-1). The QA/QC mechanisms were generally effective in ensuring the reliability of measured data within expected limits of sampling and analytical error. Of the approximately 600 pieces of analytical data, ≈40% were qualified as either UJ or J. Of the J qualified data approximately one-eighth were not used in the screening assessment because of QA/QC problems.

Inorganics. Several inorganic analytes were J qualified because the sample values were less than the estimated quantitation limits (EQL). These estimated values have a high degree of uncertainty because the results cannot be accurately distinguished from instrument "noise" levels. As a result, the data should be used with caution because they cannot be accurately quantified. The inorganic analytes affected in this manner include antimony, beryllium, chromium, cobalt, nickel, selenium, thallium, and vanadium. These inorganics also had matrix spike/matrix spike duplicates outside of acceptable limits. These data are qualified as UJ, but their usability is unaffected because the other QC samples were all within control limits.

Several inorganic analytes were found to be present in the laboratory blank. The sample values for these analytes were not greater than 5X the blank values, and were therefore not qualified and are considered to be usable as reported.

Organics. 2,4,6-Trinitrotoluene, 2,4-dinitrotoluene, and sym-trinitrobenzene in one sample and di-n-butyl phthalate and RDX in the other sample were J qualified because the sample values were less than EQLs. These estimated values have a high degree of uncertainty because the results cannot be accurately

TABLE 2.1.1-1
DATA QUALITY EVALUATION FOR PRS 14-003 SAMPLES

SUITE	BATCH NUMBER	COMMENTS
Inorganics	69122 (two samples)[1]	Thallium (two samples)[2], antimony, beryllium, chromium, cobalt, nickel, selenium, and vanadium (one sample) are J qualified because the sample values are less than the estimated quantitation limits (EQL). The analytes are considered to be estimated because the results cannot be accurately distinguished from instrument "noise" levels. As a result, the data should be used with caution in the screening assessment.
		Antimony, cadmium, and nickel (one sample) had matrix spike/matrix spike duplicates outside of acceptable limits. Data are J qualified and are usable because the other QC samples were within control limits.
		Barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc (two samples) were detected in the laboratory blank. Sample values were greater than 5X the blank values and are usable as reported.
SVOC	69207 (two samples)	Di-n-butyl phthalate (one sample) is J qualified the sample value is between less than the EQL. The analyte is considered to be estimated because the results cannot be accurately distinguished from instrument "noise" levels. As a result, the data should be used with caution in the screening assessment.
		2-Chlorophenol, 4-nitrophenol, and phenol (two samples) had a laboratory control sample (LCS) below the lower established limit (75%). Data are qualified as UJ and are usable because the recoveries are sufficient to detect and quantify the analytes if present.
		All SVOCs for one sample had surrogate recoveries outside of the established limits. Data are qualified as UJ or J and are usable because the data are biased high.
HE	69174 (two samples)	RDX, 2,4,6-trinitrotoluene, 2,4-dinitrotoluene, and sym-trinitrobenzene (one sample each) are J qualified because the sample values are less than the EQLs. The analytes are considered to be estimated because the results cannot be accurately distinguished from instrument "noise" levels. As a result, the data should be used with caution in the screening assessment.
		2-Amino-4,6-dinitrotoluene,4-amino-2,6-dinitrotoluene, nitrobenzene,o-,p-nitrotoluenes (two samples) had LCS recoveries below the lower established limit (75%). Data qualified as UJ and are usable because the recoveries were less than 5% below the limit of 75% so that the analytes would be detected and quantified if present.

[1] Number in parenthesis is the total number of samples in each batch for this PRS.
[2] Number in parenthesis is the number of samples per analyte and batch that had a QC problem.

distinguished from instrument "noise" levels. As a result, the data should be used with caution because they cannot be accurately quantified.

Both samples had a laboratory control sample that had recoveries for three semivolatiles below the lower established limit (75%); the recoveries were between 50 % and 75%, which indicates that laboratory performance may result in data that are biased low. The data were qualified as UJ and are usablebecause the recoveries are sufficient to detect and quantify the analytes if present and does not affect the data comparison. In addition, one semivolatile sample had recoveries for two surrogates outside of established limits. All of the data for this sample were qualified as UJ, and the usability was unaffected because the data are biased high.Both samples had a laboratory control sample for five high explosive analytes that were below the established lower limit (75%). The data were qualified as UJ or J and are usable because the recoveries were less than 5% below the limit of 75% so that the analytes would be detected and quantified if present. The low bias does not affect the data comparison.

Radionuclides. There were no QA/QC problems associated with the radionuclide data from this PRS.

2.1.2 Sampling Results

Annex 7.2 presents all of the analytical data collected at PRS 14-003 as part of the RFI. The reported values for both detected and undetected chemicals are compared against the respective background upper tolerance limits (UTLs) and SALs. A data comparison table of detected concentrations greater than background UTLs and SALs is also provided in this Annex. Based upon a review of the sampling data, the results are summarized as follows:

- Thirteen inorganics were detected above background UTLs (Table 2.1.2-1). These inorganics included antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, total uranium (nonradionuclide), and zinc.

- Six analytes—antimony, mercury, nickel, silver, total uranium, and zinc—had concentrations below their respective SALs and were submitted to multiple chemical evaluation (MCE) for noncarcinogenic effects (Table 2.1.2-2). The sum of the maximum normalized concentrations was 1.9908, which was greater than the target value of one, indicating adverse health effects are likely. Therefore, antimony, silver, zinc, and total uranium were retained as COPCs (Table 2.1.2-2). Chromium, a carcinogen, was the only chemical in this effects category below its SAL, and so it was not eligible for inclusion to the MCE; therefore, it was not retained as a COPC.

    - Four analytes—barium, cadmium, copper, and lead—were detected above their SALs, and were retained as COPCs (Table 2.1.2-1 and Table 2.1.2-5).

    - Two analytes—arsenic and manganese—were retained as COPCs because they exceeded their respective UTLs, which are greater than their SALs.

    - The radionuclides—total uranium (depleted), uranium-235, and uranium-238—were detected above their background UTLs (Table 2.1.2-3), but were below their respective SALs. The two isotopes of uranium are progeny products of total uranium; therefore, the detected concentration of total uranium was used in place of the two isotopes, a more conservative approach. Total uranium was not submitted to an MCE because it was the only analyte in the radionuclide effects category and was eliminated as a COPC.

    - Three organic analytes—2-amino-4,6-dinitrotoluene; 4-amino-2,6- dinitrotoluene and RDX (a carcinogen)—were detected and submitted for SAL comparison (Table 2.1.2-4). 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene had no SAL, and RDX exceeded its SAL; therefore, all three were retained as COPCs (Table 2.1.2-6).

TABLE 2.1.2-1
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 14-003

Sample ID	Depth (in.)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)
LANL UTL	N/A	1.0	7.82	315	2.7	19.3
SAL	N/A	31	0.38	5,300	38	210
0214-95-0120	6-12	27.6	7.5	10,300	69	22.8
0214-95-0121	6-12	1.51	11.1	929	1.27	24.5

SampleID	Depth (in.)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)
LANL UTL	N/A	30.7	23.3	714	0.1
SAL	N/A	2,800	400	380	23
0214-95-0120	6-12	46,200	5,380	3,910	0.1
0214-95-0121	6-12	1,400	13,100	715	0.08

Sample ID	Depth (in.)	Nickel (mg/kg)	Silver (mg/kg)	Total Uranium (mg/kg)	Zinc (mg/kg)
LANL UTL	N/A	15.2	1.61	5.45	50.8
SAL	N/A	1,500	380	230	23,000
0214-95-0120	6-12	18.4	167	64.2	8,040
0214-95-0121	6-12	33.7	30.7	2.58	479

N/A = Not Applicable
ND = Not Detected

TABLE 2.1.2-2
MULTIPLE CHEMICAL EVALUATION - PRS 14-003

ANALYTE	MAXIMUM NORMALIZED CONCENTRATIONS	
	SOIL-NONCARCINOGENIC	
	Maximum	Maximum Sample 0214-95-0120
Antimony*	0.8903	0.8903
Mercury	0.0200	0.0200
Nickel	0.0225	0.0123
Silver	0.4395	0.4395
Zinc	0.3496	0.3496
Total Uranium	0.2791	0.2791
Total	2.1177	1.9908

*Analytes set in bold typeface are those that are identified as COPCs.

TABLE 2.1.2-3
RADIONUCLIDES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 14-003

Sample ID	Depth (in.)	Total Uranium (mg/kg)	Uranium-235 (pCi/g)	Uranium-238 (pCi/g)
LANL UTL	N/A	5.45	0.08	1.82
SAL	N/A	130	10	67
0214-95-0120	6-12	64.2	1.15	14.4

N/A = Not Applicable

TABLE 2.1.2-4
ORGANICS WITH CONCENTRATIONS GREATER THAN EQLS FOR PRS 14-003

Sample ID	Depth (in.)	2-Amino-4,6-Dinitrotoluene (mg/kg)	4-Amino-2,6-Dinitrotoluene (mg/kg)	RDX (mg/kg)
SAL	N/A	No SAL	No SAL	4
EQL	N/A	0.188*	0.188*	0.75*
0214-95-0120	6-12	2.72	2.9	2680
0214-95-0121	6-12	0.19	0.25	ND

N/A = Not Applicable
* = MDL not EQL

TABLE 2.1.2-5
PRS 14-003 INORGANICS IN SOIL THAT EXCEED SALS

SAMPLE ID	LOCATION ID	DEPTH (in.)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)
SAL	N/A	N/A	0.38	5300	38
0214-95-0120	14-1093	6-12	7.5	10300	69
0214-95-0121	14-1094	6-12	11.1	929	1.27

N/A = Not Applicable

SAMPLE ID	LOCATION ID	DEPTH (in.)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)
SAL	N/A	N/A	2800	400	380
0214-95-0120	14-1093	6-12	46200	5380	3910
0214-95-0121	14-1094	6-12	1400	13100	715

TABLE 2.1.2-6
PRS 14-003 ORGANICS IN SOIL THAT EXCEED SALS

SAMPLE ID	LOCATION ID	DEPTH (in.)	2-Amino-4,6-Dinitrotoluene (mg/kg)	4-Amino-2,6-Dinitrotoluene (mg/kg)	RDX (mg/kg)
SAL	N/A	N/A	No SAL	No SAL	4
0214-95-0120	14-1093	6-12	2.72	2.9	2680
0214-95-0121	14-1094	6-12	0.19	0.25	ND

N/A = Not Applicable
ND = Not Detected

The results of the RFI screening assessment indicate 10 inorganic COPCs have been identified for human health concerns. Four analytes (antimony, silver, zinc, and total uranium as a nonradionuclide) were retained based on the MCE. Six analytes (arsenic, barium, cadmium, copper, lead, and manganese) were retained as COPCs because they exceeded their respective SALs.

Three organic COPCs—2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and RDX—have been retained because they either had no SALs or exceeded SAL.

Elevated concentrations of high explosives—2-amino-4,6-dinitrotoluene; 4-amino-2,6-dinitrotoluene, and RDX—have been detected in the surface soil, and were retained based on the SAL comparison. 2-

amino-4,6-Dinitrotoluene and 4- amino-2,6-dinitrotoluene are environmental degradation products of TNT. However, no TNT was detected onsite, and the concentrations of 2- amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene are so low (i.e., <3 mg/kg) that it is highly speculative that they are onsite. These analytes will not be considered further.

COPC SUMMARY:

Inorganic COPC: antimony, arsenic, barium, cadmium, copper, lead, manganese, silver, total uranium, and zinc.

Organics COPC: 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and RDX.

In total, 13 COPCs have been identified from the RFI screening assessment.

2.2 Nature and Extent of Contamination

Only the floor of the burn area has been sampled. The inner surface of the dirt berm has not been sampled for residues that may have coated it due to smoke, but the elevated, inclined surface would have been subjected to slope wash from precipitation for about three decades. It is believed that penetration of smoke residue into the soil of the berm would be limited by washing of this material onto the pit floor. The lack of an exit route for water from the burn area (except for very high rainfalls sufficient to fill the depression and cross the road) leads us to believe that contamination is probably primarily restricted to the floor of the burn area. No depth information is available for penetration of contaminants below the surface soil, thus real-time laser induced beam spectroscopy (LIBS) sampling will be employed during soil excavation. Likewise, no information exists for the walls of the berm, and LIBS screening will be used for this area as well.

3.0 PROPOSED REMEDY FOR PRS 14-003 - BURN AREA

3.1 Description of the Proposed Remedial Action

The proposed remedial action consists of field screening the soil followed by its removal. The soil in the burn area will be excavated until subsoil COPC inorganic concentrations are below preliminary remediation goal (PRGs), based on LIBS readings. If metals in the soil of the surrounding dirt berm are shown by the same technique to be below PRGs, the berm material will be used to fill the excavation, which will then be regraded and reseeded. Prior to filling the excavation, at least one sample from the berm will be sent for fixed lab analysis.

After appropriate health and safety screening (see Annex 7.6), the soil in the bottom of the berm will be excavated to a depth of 12 in. using a backhoe equipped with a safety shield. A single person will enter the shallow excavation to perform field screening of the remaining soil using the LIBS, the HE spot test, and the Eberline beta/gamma meter for radiation. If field screening indicates inorganics present above PRGs, or HE or radiation, the excavation will continue. The removed soil will be placed in B-25 boxes. Representative portions of the soil will be placed in a plastic bowl, so that, after all the soil is in the B-25 box, a representative composite of the contents of the box will be in the bowl. The contents of the bowl will be homogenized by hand, with a plastic spoon to reduce the possibility of sparking, and then placed in appropriate containers for waste characterization sampling, as detailed in Section 4.0. This procedure will continue until soil screening indicates levels below the PRGs. A similar procedure will be used for the berm, beginning at the face of the berm that was open to the burn area and working toward the outside face.

As currently configured, the LIBS has detection limits for barium, lead, and manganese below the PRGs: barium, LIBS detection limit 300 ppm, PRG 7,680 ppm; lead, LIBS detection limit 30 ppm, PRG 1,000

ppm; manganese, LIBS detection limit 200 ppm, PRG 504 ppm. For arsenic, the LIBS detection limit is currently 200 ppm, while the PRG is 2.1 ppm. For cadmium, the LIBS detection limit is 80 ppm, while the PRG is 25.2 ppm. Based upon the Field Unit's experience with field screening using x-ray fluorescence (XRF) during the summer of 1995, XRF will not be fast enough nor accurate enough to use as a screening technique for arsenic or cadmium. Thus, the screening for metals will be based upon those with detection limits below the PRGs, and will rely on the similar mobility of metals in soil to infer that cleanup for barium, lead, and manganese will be sufficient for arsenic or cadmium.

Although the HE spot test screening performed during the Phase I work in the pit did not reveal any positive HE, traces of HE residues were detected in the laboratory analyses. Thus, the soil removal activity will proceed as if HE were present. A knowledgeable Laboratory X Division representative will be onsite at all times during the excavation to help spot HE and to offer advise. Any visible pieces of HE will be collected and placed in a separate container and managed as hazardous waste. Similarly, the Phase I activities did not reveal any radiation above background in the pit, nor was any evidence of depleted uranium (DU) seen. If DU chunks are seen, they will be collected and placed in a separate container and managed as low-level radioactive waste.

During the soil removal, dust suppression will be performed using hand-held water sprayers. Application of water will be limited and will not result in runoff, or in the generation of a dual phase (water and soil) waste. The application of water will also serve as an additional safety factor to reduce problems with any HE.

Upon completion of the soil removal, tools and equipment will be decontaminated, and the decon fluid will be stored in bung-top 55-gallon drums, sampled for waste characterization, and disposed of accordingly. Personal protective equipment (PPE) will be cleaned, or uncleanable portions will be cut out and disposed of as waste. All drums will be stored on-site on pallets and will be covered by plastic sheets in a less-than-90-day storage area until the results of the waste characterization are received. The B-25 boxes will be stored on-site as well. When the results of the characterization are complete, the final disposition of the waste will be determined.

The LANL Spill or Site-Specific Prevention, Control, and Countermeasures (SPCC) Plan, the Stormwater Plan, and Air Pollution Control Procedures will be followed.

3.2 Basis for Cleanup Levels

PRS 14-003 lies within DOE-owned land and is removed from public access roads. The anticipated future land use is expected to be exclusively for Laboratory operations (i.e., industrial land use only).

For those COPCs retained from the human health screening assessment, site-specific cleanup goals or PRGs will be calculated based on the expected land use at the site. Site-specific PRGs have been calculated using the modified Environmental Protection Agency (EPA) equations and Los Alamos National Laboratory site-specific input parameters presented in Annex 7.1. The derivation of human health risk-based cleanup levels for this VCA is based on a nonintrusive industrial exposure scenario using Laboratory-specific default parameters for a generic worker. These default exposure parameters assume an exposure frequency of 250 days per year and a duration of 25 years. Exposure routes considered in the calculations of the PRGs include incidental ingestion and inhalation of contaminated soil.

Site-specific PRGs for the COPCs retained at this site are presented in Table 3.2-1. Typically, the Laboratory derives PRGs assuming an acceptable level of risk of 1E-06 for carcinogens, and a hazard index of one for noncarcinogens. This conservative approach is adopted to account for the presence of multiple constituents. With this approach, the residual risk remaining at the site following remediation will be within the acceptable risk range of 1E-04 to 1E-06 for carcinogens and less than a hazard index of one

for noncarcinogens. The equations and assumptions used in the calculation of the PRGs are presented in Annex 7.1. The derivation of the PRG for total uranium was done using residual radioactive material (RESRAD) version 5.6.1 and is based on an exposure of 15 mrem/yr. The assumptions and results of the RESRAD run for this plan are also presented in Annex 7.1.

The PRG for lead in soil of 1,000 ppm has been adopted by the Laboratory for an industrial exposure scenario based on information obtained from EPA Region VI. This soil PRG considers the fetal effects when a pregnant worker is exposed. Under the industrial/commercial exposure scenario, a pregnant female adult worker is the reasonable maximum exposed individual.

Comparison of the inorganic COPCs that exceeded SAL with their site-specific PRGs indicated that arsenic, barium, cadmium, lead, and manganese exceeded both the SAL and the PRG. The remaining analyte, copper, exceeded only the SAL and not the PRG. One organic, RDX, was detected at a concentration of 2680 mg/kg, and is a factor of 51.5 greater than its PRG of 52 mg/kg.

In addition, a multiple chemical PRG risk analysis is conducted for exposure to the following effects categories where applicable to the site—residual radioactivity, carcinogenic risk, and noncarcinogenic health hazard—when two or more confirmatory chemical concentrations are at or below their respective PRGs within one or more of the aforementioned classes/categories (Annex 7.1). The cumulative hazard index for the four noncarcinogenic COPCs (antimony, copper, silver, and zinc) was determined by adding together the fractional contribution (i.e., the maximum site concentration/PRG) for each chemical and

TABLE 3.2-1
SITE-SPECIFIC PRGS FOR PRS 14-003

COPC	Sample Value (mg/kg)	PRG[1] (mg/kg)	Rationale
Antimony	27.6	818	Noncarcinogen; based on hazard index of 1
Arsenic	11.1	2.15	Carcinogen; based on 1E-06 acceptable risk. Risk level of 1E-06 creates a cleanup level lower than background of 7.82 mg/kg
Barium	10,300	7,680	Noncarcinogen; based on hazard index of 1
Cadmium	69	25.2	Carcinogen; based on 1E-06 acceptable risk
Copper	46,200	81,800	Noncarcinogen; based on hazard index of 1
Lead	5,380	1,000	Based on EPA Region VI guidance
Manganese	3,910	504	Noncarcinogen; based on hazard index of 1
Silver	167	10,200	Noncarcinogen; based on hazard index of 1
Total Uranium	64.2	378	Radionuclide; based on a dose of 15 mrem/yr.
Zinc	8,040	613,000	Noncarcinogen; based on hazard index of 1
RDX	2,680	52	Carcinogen; based on 1E-06 acceptable risk

[1] Based on nonintrusive industrial exposure scenario
Shaded areas and bolding indicates chemicals exceeding PRG

comparing it against the target hazard index of one. The multiple chemical PRG hazard index level at this site is 0.6280, which is below the target index of one. Based on this additional analysis, these inorganics are eliminated as COPCs.

3.3 Site Restoration

Clean fill or, if possible, the berm material, will be used to fill the excavation. The site will then be regraded and reseeded.

4.0 WASTE MANAGEMENT

4.1 Estimated Types and Volumes of Waste

Wastes expected to be generated during the VCA work at this PRS include the following:

Item	Waste Type	Anticipated Volume
Sampling Waste/PPE	solid - potential hazards	One 55-gallon drum
Contaminated soils	solid - hazardous	15 cubic yards
Decon Waste	liquid - potential hazards	Less than three 55-gal. drums

A Characterization Strategy Form (CSF) has been approved by Groups CST-5 and ESH-19. The CSF described the waste characterization/strategy requirements and all the uncertainties in the determination of the waste types and volumes summarized below.

The waste consists of soil contaminated with barium, cadmium, lead, and silver above the toxicity characteristic (TC) screening level and uranium above its background UTL. RDX was detected at a low level. The TC screening level is determined by Table 2, "Maximum Concentration Levels for Determining ER Project Waste Toxicity Characteristic". It is anticipated that a maximum of six B-25 boxes (3 cubic yards each) will be filled with this soil. It will be managed as potential Resource Conservation Recovery Act (RCRA) mixed waste. The B-25 boxes will be sealed and stored at this PRS until the laboratory analyses are completed. A final RCRA determination will be made after soil sample results are evaluated. After characterization, the drums will be disposed of as appropriate for RCRA, mixed, radioactive, or nonhazardous waste.

A composite sample of the soil in each B-25 box will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals, isotopic and total uranium, VOCs, SVOCs, and HE. Alpha, beta, and gamma radiation will be measured by hand-held instruments, and HE will be screened using a field spot test. Field screening for TCLP metals will be performed by LIBS to minimize the volume of soil placed in the B-25 boxes.

Initially, visibly contaminated PPE and sampling equipment will be considered potential RCRA mixed waste. Visibly uncontaminated items will be considered nonhazardous radioactive waste, depending on the field screening results. The volume generated is expected to be one 55-gallon drum. PPE/sampling equipment will be placed in sealed plastic bags, then placed inside a 55-gallon drum; it will not be directly sampled.

Decontamination liquids consist of Liquinox® detergent, tap water, and distilled water. It is anticipated that a total volume of less than three drums will be generated. The decontamination liquids will be classified as RCRA, mixed, radioactive, nonhazardous waste, based on the analytical results of a liquid grab sample. This sample will be analyzed for TCLP metals, HE, VOCs, SVOCs, and isotopic and total uranium.

4.2 Method of Management and Disposal

Waste soil will be stored/handled in accordance with 20 New Mexico Administrative Code (NMAC) Generator Requirements and/or DOE Order 5820.2A (Radioactive Waste Management) requirements. Wastes will be stored at this PRS in a less-than-90-day storage area or permitted storage facility until chemical analyses are completed. A final RCRA determination will be made after the soil sample results are evaluated. This waste will then be disposed of as RCRA, mixed waste, radioactive waste, or nonhazardous waste.

Visibly contaminated PPE and sampling equipment will be segregated and managed as RCRA mixed waste. The total volume expected is one 55-gallon drum. The PPE/sampling equipment will be placed in sealed plastic bags inside the 55-gallon drum. This waste will be disposed of in a manner similar to that which would be used for the B-25 box containing the highest level of RCRA, mixed, or radioactive wastes because of the difficulties of sampling PPE.

Decontamination liquids will be managed as potential RCRA mixed waste. They will be stored in a less-than-90-day storage area. The liquids will be segregated, labeled with the PRS number, and placed inside 55-gallon drums. The analytical results of the grab liquid sample will be used to determine the final hazard classification and disposal location of the liquid.

CST-5 and ESH-19 personnel will aid in the determination of the final disposal location for the waste and verify the availability of treatment, storage, or disposal (TSD) space, if it is needed. Off-site disposal of mixed waste will require further analyses to meet the waste acceptance criteria of Envirocare, a Utah mixed-waste disposal facility. These additional analyses will be performed after the mixed waste status of soil in the B-25 boxes is verified by the fixed laboratory results.

5.0 DESCRIPTION OF CONFIRMATORY/VERIFICATION SAMPLING

The proposed remedial action for this PRS is to remove all of the soil and other loose media from the burn area that is contaminated with inorganics, HE or radioactivity. This will be accomplished by excavating the soil and field screening it to ensure that all contaminated material is removed. The endpoint of this remedial action will be when no remaining soil has field screening results above the PRGs.

Field screening using either a LIBS or XRF instrument will occur during the remediation of this site. The field screening results will direct the remediation efforts in such a way that soil containing more than 1,000 parts per million of lead is not expected to remain after the completion of the cleanup. Confirmatory samples will be sent to a fixed laboratory to verify that the average concentration across the site is at or below 1,000 ppm lead, 7,680 ppm barium, 25.2 ppm cadmium, and 52 ppm RDX. Comparisons to LANL background will be conducted for manganese and arsenic to determine whether they have been cleaned to within the normal background range for similar areas. The comparison to background is necessary because the PRGs calculated for these two analytes are less than their respective LANL background UTLs. Comparisons will be made with the UTLs, and with the full background data sets using the statistical comparison techniques described in "Application of LANL Background Data to ER Project Decision-Making Part I: Inorganics" (Ryti et al. 1996, 1298).

Based on the guidance set forth in EPA's "Methods for Evaluating the Attainment of Cleanup Standards Volume 1: Soils and Solid Media," 12 samples are needed to verify that the remediation goal has been attained (see following calculations). These samples will be collected, following remediation, from the centers of a 5 ft grid located in the burn area. These samples will be sent to a fixed laboratory for TAL metals, HE, and total uranium.

Determination of Sample Size for Verification Sampling and Analysis Plan

The following calculations reflect guidance provided in EPA's "Methods for Evaluating the Attainment of Cleanup Standards Volume 1: Soils and Solid Media," Chapter 6, "Determining Whether the Mean Concentration of the Site is Less than a Cleanup Standard."

Notation:

Cs The cleanup standard relevant to the sample area and the contaminant being tested. This level is 1,000 ppm for lead at this site.

μ_1 The value of the mean contaminant concentration for which the false negative rate is to be controlled. This value is set at 800 ppm for this site.

σ The standard deviation of the contaminant concentrations at the site. In lieu of data on the distribution of lead that will remain at the site after remediation, it is assumed that lead will be distributed normally ranging from a minimum of 50 ppm to a maximum of 1950 ppm, with a mean of 1,000 ppm. A rough rule-of thumb for normal distributions that the standard deviation of the data is approximately one-sixth of the range gives $\sigma = 317$.

β The false negative rate, i.e., the probability that the sample area will be declared "dirty" when it is actually "clean". β is set at 0.20 for this site, implying power of 0.80.

α The false positive rate, i.e., the probability that the sample area will be declared "clean" when it is actually "dirty." α is set at 0.10 for this site.

n The desired sample size for statistical calculations.

$$\mathbf{n} = \hat{\sigma}^2 \left\{ \frac{\mathbf{z}_{1-\beta} + \mathbf{z}_{1-\alpha}}{\mathbf{C_s} - \mu_1} \right\}^2$$

$$\mathbf{n} = 317^2 \left\{ \frac{0.842 + 1.282}{200} \right\}^2$$

$$\mathbf{n} = 12$$

Verification sampling will consist of the collection of 12 surface samples from the centers of a 5 ft grid located in the burn area. This sample pattern will have a 90% probability of finding any remaining hot spots of radius 3 ft or greater (Gilbert 1987, 0312). Samples will be analyzed for TAL metals, HE, by gamma scan, and for total uranium.

6.0 ESTIMATED TIME TO COMPLETE THE ACTION AND UNCERTAINTIES

The estimated time required to complete the VCA is five days. This estimate is based upon a one-day mobilization, three days to complete the removal, and one day to complete demobilization and sample shipping, etc. The analytical results from the waste characterization are expected to be received within 30 days, and waste removal is expected within another 30 days. The total estimated timeframe, from mobilization to removal of waste, is about 60 days.

There are few uncertainties with this cleanup. The amount of waste is easily identifiable. The only heavy equipment necessary is a drum loader, backhoe, and forklift to move the B-25 boxes. For the 15 cubic yard soil hazardous total waste estimate, adequate TSD capacity should exist. If, during the course of the removal, the waste volume exceeds 200% of the estimate, the effort will be stopped and re-evaluated.

7.0 ANNEXES

ANNEX 7.1
RISK-BASED CLEANUP LEVEL ASSUMPTIONS AND CALCULATIONS

Equation 1: Direct Exposures to Carcinogenic Constituents in Industrial Soil

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

Where:

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

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

BW_a = Body weight, adult (kg)
Considered to be 70 kg (EPA 1991, 0746)

AT_c = Averaging Time - cancer (years)
Considered to be 70 years (EPA 1991, 0746)

EF_o = Exposure Frequency - occupational (d/y)
Considered to be 250 d/y (EPA 1991, 0302)

ED_o = Exposure duration - occupational (years)
Considered to be 25 years (EPA 1991, 0746)

IRS_o = Soil ingestion - occupational (mg/day)
Considered to be 50 mg/day (EPA 1991, 0746)

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

IRA_a = Inhalation rate - adult (mg/day)
Considered to be 20 m^3/day (EPA 1991, 0746)

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

Vf_s = Volatilization factor for soil (mg/kg)
Considered to be zero for chemicals with MW> 200 g/mole and Henry's Law Constant $<10^{-5}$ atm-m^3/mole

PEF = Particulate emission factor (mg/kg)
Considered to be $1.11 \times 10^{+7}$ (m^3/kg) (LANL 1993, 1017).

Equation 2: Direct Exposures to Noncarcinogenic Constituents in Industrial Soil

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

Where:

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

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

BW_a = Body weight, adult (kg)
Considered to be 70 kg (EPA 1991, 0746)

ED_o = Exposure duration - occupational (years)
Considered to be 25 years (EPA 1991, 0746)

EF_o = Exposure Frequency - occupational (d/y)
Considered to be 250 d/y (EPA 1991, 0302)

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

IRS_o = Soil ingestion - occupational (mg/day)
Considered to be 50 mg/day (EPA 1991, 0746)

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

IRA_a = Inhalation rate - adult (mg/day)
Considered to be 20 m^3/day (EPA 1991, 0746)

VF_s = Volatilization factor for soil (mg/kg)
Considered to be zero for chemicals with MW> 200 g/mole and Henry's Law Constant <10^{-5} atm-m^3/mole

PEF = Particulate emission factor (mg/kg)
Considered to be 1.11 x 10^{+7} (m^3/kg) (LANL 1993, 1017)

TABLE 7.1-1
SPREADSHEET FOR CALCULATING PRGs FOR COMMERCIAL/INDUSTRIAL SOIL EXPOSURE

Chemical	Oral Reference Dose (RfD) (mg/kg/day)	Oral Absorption Factor	Oral Slope Factor $(mg/kg/day)^{-1}$	Inhalation RfD (mg/kg/day)	Inhalation Slope Factor $(mg/kg/day)^{-1}$
Antimony	4E-04	0.1	NA	NA	NA
Arsenic	3E-04	0.95	1.8E+00	NA	1.51E+01
Barium	7E-02	0.05	NA	1.43E-04	NA
Cadmium	5E-04	0.07	NA	NA	6.3E+00
Copper	4E-02	0.97	NA	NA	NA
Lead	See Section 3.2				
Manganese	5E-03	0.03	NA	1.43E-05	NA
Silver	5E-03	0.1	NA	NA	NA
RDX	3E-03	1	1.1E-01	NA	NA
Total Uranium	Calculated using RESRAD				
Zinc	3E-01	0.8	NA	NA	NA

NA = Not Available

Chemical	Nonintrusive Industrial Soil Scenario (mg/kg)		
	Noncancer PRG	Cancer PRG	PRG (Lower of Two)
Antimony	8.18E+02	NA	8.18E+02
Arsenic	6.13E+02	2.15E+00	2.15E+00
Barium	7.68E+03	NA	7.68E+03
Cadmium	1.02E+03	2.52E+01	2.52E+01
Copper	8.18E+04	NA	8.18E+04
Lead	1.0E+03[1]		
Manganese	5.04E+02	NA	5.04E+02
RDX	6.18E+03	5.20E+01	5.20E+01
Silver	1.02E+04	NA	1.02E+04
Total Uranium	378 mg/kg (RESRAD; 15 mrem/yr)		
Zinc	6.13E+05	NA	6.13E+05

NA = Not Available

[1] Based on Region IV EPA level (EPA 1995)

Multiple Chemical PRG Analysis

Following cleanup operations, confirmatory sampling and analysis will be conducted for specific COPCs (when identified) or suspected suites of chemicals, when indicator PRGs are used. For sites where analytical data are not available, cleanup will be based on indicator PRG levels. Site-specific indicator chemical PRGs are used when analytical data are not available for a site. Existing information onsite activities is used to identify suspected chemicals of concern. Indicator PRGs are the most health conservative predictor of single-contaminant risk for each suite of chemicals (e.g., inorganics, organic high explosives, polycyclic aromatic hydrocarbons, semivolatiles, and volatiles).

If confirmatory sample concentrations are below their indicator PRG levels for all chemicals within a suite, the site will be considered to meet cleanup criteria. If confirmatory sample concentrations within a suite of chemicals are above the indicator PRG level for that suite, sample concentrations will be compared to background upper tolerance levels (UTLs). If sample concentrations are below their respective background UTLs, the site will be considered to meet cleanup criteria. Should sample concentrations exceed their respective background UTLs, chemical-specific PRGs will be developed for those chemicals.

A multiple chemical PRG risk analysis will be conducted for exposure to residual radioactivity, carcinogenic risk, and noncarcinogenic health hazard when two or more confirmatory chemical concentrations are at or below their respective PRGs within one or more or the aforementioned groups. Nonradioactive chemicals with both carcinogenic and noncarcinogenic toxicity criteria will be included in both the carcinogen and noncarcinogen groups. The multiple chemical PRG risk analysis will be estimated by summing the fractional contribution (i.e., site-specific concentration/PRG) of each chemical. The site-specific concentration will be based on the maximum or 95% upper confidence level (UCL) of the arithmetic mean. For exposure to residual radioactivity, the fractional contribution of each will be summed and multiplied by the 15 mrem/yr target exposure level:

Multiple PRG Exposure Level = $[(conc_x/PRG_x) + (conc_y/PRG_y) + (conc_z/PRG_z)] \times 15$ mrem/yr

If the multiple PRG risk is at or below the target exposure level of 15 mrem/yr, then the site will be considered to meet cleanup criteria for exposure to residual radioactivity.

For cancer risk estimates, the fractional contribution of each will be summed and multiplied by 10^{-6} target cancer risk:

Multiple PRG Risk = $[(conc_x/PRG_x) + (conc_y/PRG_y) + (conc_z/PRG_z)] \times 10^{-6}$

If the multiple PRG risk is at or below the target value of 10^{-4}, then the site will be considered to meet cleanup criteria for carcinogenic risk.

For noncancer hazard estimates, the fractional contribution of each will be summed and compared with a target hazard index of 1:

PRG Hazard Index = $[(conc_x/PRG_x) + (conc_y/PRG_y) + (conc_z/PRG_z)]$

If the PRG hazard index is at or below the target hazard index of 1, then the site will be considered to meet cleanup criteria for noncarcinogenic risk.

If the multiple PRG risk analysis for radionuclides, nonradioactive carcinogens, or noncarcinogens exceeds target values, further cleanup or characterization of the site may be warranted.

The Concentration Term

The maximum detected concentration will be used in the initial PRG risk analysis and multiple PRG risk analysis. Use of the maximum detected concentration provides the worst case analysis and is not considered to be representative of actual exposure concentrations. If maximum concentrations are at or below their respective PRG levels and multiple PRG risk analysis target levels are not exceeded, the site will be considered to meet cleanup criteria. If, however, use of maximum concentrations results in exceeding the target levels, a 95% UCL of the arithmetic mean will be calculated and used in the PRG analysis and multiple PRG risk analysis. The 95% UCL of the mean provides a conservative estimate of the mean concentration and accounts for uncertainties due to limited sampling. If possible, the 95% UCL of the mean will be calculated using sample concentration data gathered over the entire exposure unit for the industrial site. For exposure areas with limited data or extreme variability in the measured data, the 95% UCL of the mean may be greater than the maximum concentration. If this occurs, the maximum concentration will be used as the concentration term.

ANNEX 7.2
RFI ANALYTICAL RESULTS

TABLE 7.2-1
DATA QUALITY EVALUATION FOR PRS 14-003 SAMPLES

SUITE	BATCH NUMBER	COMMENTS
Inorganics	69122 (two samples)[1]	Thallium (two samples)[2], antimony, beryllium, chromium, cobalt, nickel, selenium, and vanadium (one sample) are J qualified and reported as detected although the sample values are between the estimated quantitation limits (EQL) and the method detection limits (MDLs). The analytes are considered to be undetected because the results cannot be accurately distinguished from instrument "noise" levels. As a result, the data usability for the analytes is affected and the values were not used in the screening assessment.
		Antimony, cadmium, and nickel (one sample) had matrix spike/matrix spike duplicates outside of acceptable limits. Data are J qualified and usability was unaffected; data are valid.
		Barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc (two samples) were detected in the laboratory blank. Sample values were greater than 5X the blank values and are considered to be valid; data usability unaffected.
SVOC	69207 (two samples)	Di-n-butyl phthalate (one sample) is J qualified and reported as detected although the sample value is between the EQL and the MDSLs. The analyte is considered to be undetected because the results cannot be accurately distinguished from instrument "noise" levels. As a result, the data usability for the analyte is affected and the values are not used in the screening assessment.
		2-Chlorophenol, 4-nitrophenol, and phenol (two samples) had a laboratory control sample outside of acceptable limits. Data qualified as UJ, but usability was unaffected; data are valid.
		All SVOCs for one sample had surrogate recoveries outside of the acceptable limits. Data were qualified UJ or J, but usability was unaffected; data are valid.
HE	69174 (two samples)	RDX, 2,4,6-trinitrotoluene, 2,4-dinitrotoluene, and sym-trinitrobenzene (one sample each) are J qualified and reported as detected although the sample values are between the EQL and MDLs. The analytes are considered to be undetected because the results cannot be accurately distinguished from instrument "noise" levels. As a result, the data usability for the analytes is affected and the values are not used in the screening assessment.
		2-Amino-4,6-dinitrotoluene,4-amino-2,6-dinitrotoluene, nitrobenzene,o,p-nitrotoluenes (two samples) had a laboratory control sample outside of acceptable limits. Data qualified as UJ, but usability was unaffected; data are valid.

[1] Number in parenthesis is the total number of samples in each batch for this PRS.
[2] Number in parenthesis is the number of samples per analyte and batch that had a QC problem.

TABLE 7.2-2
INORGANICS WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 14-003

Sample ID	Depth (in.)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)
LANL UTL	N/A	1.0	7.82	315	2.7	19.3
SAL	N/A	31	0.38	5300	38	210
0214-95-0120	6-12	27.6	7.5	10300	69	22.8
0214-95-0121	6-12	1.51	11.1	929	1.27	24.5

Sample ID	Depth (in.)	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)
LANL UTL	N/A	30.7	23.3	714	0.1
SAL	N/A	2800	400	380	23
0214-95-0120	6-12	46200	5380	3910	0.1
0214-95-0121	6-12	1400	13100	715	0.08

Sample ID	Depth (in.)	Nickel (m g/kg)	Silver (mg/kg)	Total Uranium (mg/kg)	Zinc (mg/kg)
LANL UTL	N/A	15.2	1.61	5.45	50.8
SAL	N/A	1500	380	230	23000
0214-95-0120	6-12	18.4	167	64.2	8040
0214-95-0121	6-12	33.7	30.7	2.58	479

N/A = Not Applicable
ND = Not Detected

TABLE 7.2-3
MULTIPLE CHEMICAL EVALUATION - PRS 14-003

ANALYTE	MAXIMUM NORMALIZED CONCENTRATIONS	
SOIL-NONCARCINOGENIC		
	Maximum	Maximum Sample 0214-95-0120
Antimony*	0.8903	0.8903
Mercury	0.0200	0.0200
Nickel	0.0225	0.0123
Silver	0.4395	0.4395
Zinc	0.3496	0.3496
Total Uranium	0.2791	0.2791
Total	2.1177	2.0994

*Analytes set in bold typeface are those that are identified as COPCs.

TABLE 7.2-4
RADIONUCLIDES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 14-003

Sample ID	Depth (in.)	Total Uranium (mg/kg)	Uranium-235 (pCi/g)	Uranium-238 (pCi/g)
LANL UTL	N/A	5.45	0.08	1.82
SAL	N/A	130	10	67
0214-95-0120	6-12	64.2	1.15	14.4

N/A = Not Applicable

TABLE 7.2-5
ORGANICS WITH CONCENTRATIONS GREATER THAN EQLS FOR PRS 14-003

Sample ID	Depth (in.)	2-Amino-4,6-Dinitrotoluene (mg/kg)	4-Amino-2,6-Dinitrotoluene (mg/kg)	RDX (mg/kg)
SAL	N/A	No SAL	No SAL	4
EQL	N/A	0.188*	0.188*	0.75*
0214-95-0120	6-12	2.72	2.9	2680
0214-95-0121	6-12	0.19	0.25	ND

N/A = Not Applicable
* = MDL not EQL

TABLE 7.2-6
PRS 14-003 INORGANICS IN SOIL THAT EXCEED SALS

SAMPLE ID	LOCATION ID	DEPTH (in.)	ARSENIC (mg/kg)	BARIUM (mg/kg)	CADMIUM (mg/kg)
SAL	N/A	N/A	0.38	5300	38
0214-95-0120	14-1093	6-12	7.5	10300	69
0214-95-0121	14-1094	6-12	11.1	929	1.27

N/A = Not Applicable

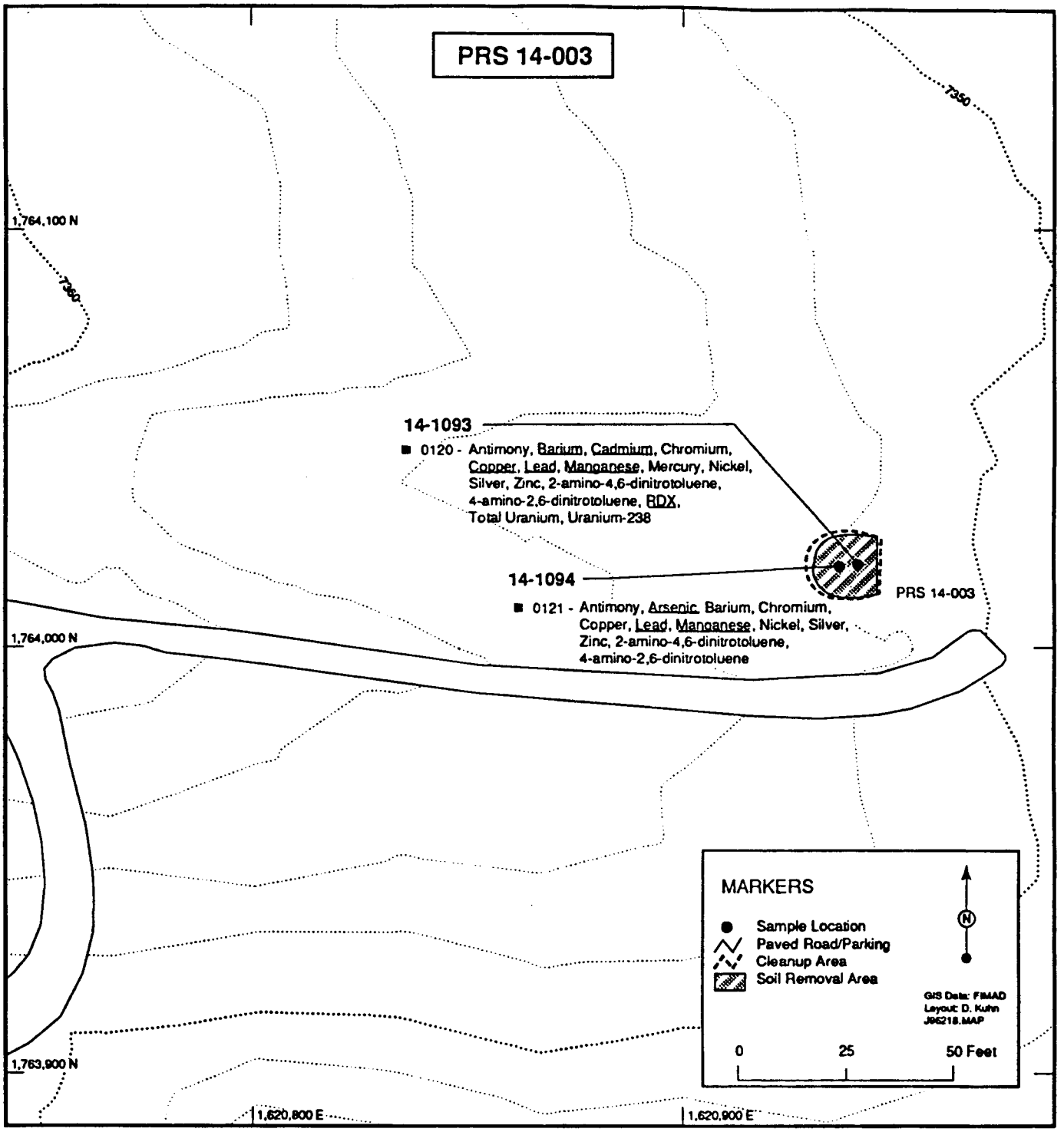
SAMPLE ID	LOCATION ID	DEPTH (in.)	COPPER (mg/kg)	LEAD (mg/kg)	MANGANESE (mg/kg)
SAL	N/A	N/A	2800	400	380
0214-95-0120	14-1093	6-12	46200	5380	3910
0214-95-0121	14-1094	6-12	1400	13100	715

TABLE 7.2-7
PRS 14-003 ORGANICS IN SOIL THAT EXCEED SALS

SAMPLE ID	LOCATION ID	DEPTH (in.)	2-Amino-4,6-Dinitrotoluene (mg/kg)	4-Amino-2,6-Dinitrotoluene (mg/kg)	RDX (mg/kg)
SAL	N/A	N/A	No SAL	No SAL	4
0214-95-0120	14-1093	6-12	2.72	2.9	2680
0214-95-0121	14-1094	6-12	0.19	0.25	ND

N/A = Not Applicable
ND = Not Detected

ANNEX 7.3
SITE MAP


PRS 14-003
7350
1,764,100 N
7360
14-1093
■ 0120 - Antimony, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Silver, Zinc, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, RDX, Total Uranium, Uranium-238
14-1094
■ 0121 - Antimony, Arsenic, Barium, Chromium, Copper, Lead, Manganese, Nickel, Silver, Zinc, 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene
PRS 14-003
1,764,000 N
1,763,900 N
1,620,800 E
1,620,900 E
MARKERS
Sample Location
Paved Road/Parking
Cleanup Area
Soil Removal Area
N
GIS Data: FIMAD
Layout: D. Kuhn
J95218.MAP
0
25
50 Feet

ANNEX 7.4
IMPLEMENTATION SOPS

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

ANNEX 7.5
QUALITY ASSURANCE PLAN

See Quality Program Plan and Quality Assurance Project Plan for Environmental Restoration, February 1995 revision, Los Alamos National Laboratory.

ANNEX 7.6
SITE-SPECIFIC HEALTH AND SAFETY PLAN

Prior to initiation of any work, a completed Site Specific Health and Safety Plan (SSHASP) will be approved by LANL representatives.

The SSHASP will be developed for the Environmental Restoration (ER) Project at LANL to comply with applicable federal and state occupational health and safety (HS) requirements, including those of the US Department of Energy (DOE). The DOE requires the Laboratory to comply with the federal Occupational Safety and Health Administration (OSHA) requirements, even though operations at the Laboratory are not subject to the jurisdiction of OSHA. The ER Project has developed a generic Health and Safety Plan, the ER Project Health and Safety Plan (HASP), which establishes HS information and requirements applicable to ER field operations projectwide. The 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 Laboratory personnel, subcontractors to the Laboratory and their lower-tier contractors, consultants, and agents. In some cases within this document, the Laboratory has chosen to invoke OSHA and Laboratory requirements that 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 as low as reasonably achievable (ALARA) policy and to clarify the Laboratory'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 that they could unreasonably compromise the safety or health of an individual or the environment, such concerns should immediately be brought to the attention of the Contract Administrator and the Field Unit HS Representative. Failure to comply with terms of HS plans may constitute cause to stop an activity or to issue a stop work order, as specified in Section 3.4.2 of the HASP, without cost or penalty to the Laboratory.

This SSHASP shall be reviewed and approved in accordance with Section 1.2 of the HASP. When 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 result in a change to the terms or scope of a subcontract. Completion of an 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 make the change until a change order has been mutually agreed upon by all parties, or unless unilateral direction is given by the Contract Administrator.

The SSHASP will be presented in a format similar to this example:

1.0 Introduction

2.0 Background Information

Table 2-1 Site Description(s)
Table 2-2 Scope of Work

3.0 Organization, Responsibilities and Authority

4.0 Hazard Analysis
4.1 Personnel by Task
4.2 Hazard Substances of Occupational Health Concern
4.3 Hazard Assessment and Administrative/Engineering Controls

5.0 Site Controls

6.0 Exposure Monitoring and Corresponding Actions
6.1 Direct-Reading Monitoring
6.2 Personal Dosimetry
6.3 Area Sampling

7.0 Personal Protective Equipment

8.0 Decontamination

9.0 Emergency/Incident Action Plan

10.0 Training

11.0 Medical Surveillance

12.0 Quality Control and Quality Assurance (QC/QA)

13.0 Recordkeeping

Appendixes

A Map(s) of Site Locations and Site Control Zones/Facilities

B Hazardous Substance - Hazard Assessment

C Chemical, Physical, and Toxicological Properties of Hazardous Chemical Substances

D Emergency Contacts and Route(s) to Medical Services

ANNEX 7.7
WASTE MANAGEMENT CHECKLIST

Los Alamos
NATIONAL
LABORATORY
memorandum

Engineering Sciences and Applications
ESA-EPE, Energy and Process Engineering

To/MS: Memo To The File
From/MS: T. E. Gene Gould, ESA-EPE, G787
Phone/FAX: 7-0402/5-1976
Date: April 17, 1996

SUBJECT: CHARACTERIZATION STRATEGY FORM

Based on my review of available information and my professional judgment, it is not necessary to sample for tritium because it is not a potential contaminant at PRS 14-003.

TEG/nr

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Waste Types: Soil and debris, sampling waste/PPE, and decon. waste (liquid)		

Completed By: J. W. Heyser	Date: April 29, 1996
FPL: T. E. Gene Gould	WMC: Bob Catherwood, ESA-EPE
Type of Activity (site investigation, EC, etc.): VCA	

Description of the Activity (e.g., drilling, surface sampling, excavation and recontouring, soil washing, etc.)
Excavate soil using a front-end loader and backhoe. The soil will be put in B25 or equivalent waste disposal boxes. Field screening data for TC metal concentrations obtained by LIBS (Laser Induced Breakdown Spectroscopy) will be used to determine the boundaries of the cleanup area

Acceptable Knowledge
Site Description, Site History, and Historical Waste Generating Processes or Activities: (Include dates for site history):
PRS 14-003 was used in the 1950s as a trash burning area. This site still has a plainly visible semicircular earthen berm structure. Trash disposal involved burning HE-contaminated items. Residuals from trash burning may have included barium, lead, uranium, and other contaminates. The burn pit now consists of a 4-ft-high horseshoe rim of dirt and an open area facing east. A paved road leading to the berm area from TA-14-6 is clearly visible. The burn area is level and contains no drainage paths. HE-contaminated combustible and noncombustible materials were disposed of here as is evident from several charred but unburned items (wood and wires) that are still present (RFI Work Plan for OU 1085, May 1994).

Previous Investigation Analytical Results: (Attach copy of analytical methods and results above background levels)
On July 10, 1995 two subsurface samples (6 - 12 in.) were taken during the Phase I investigation. These were analyzed by gamma scan plus uranium, and for HE, TAL metals, and SVOCs. Field screening was also performed for HE (using a spot test), radioactivity (by a Ludlum model 2221 scaler/ratemeter), and metals (by XRF). No positive HE results or elevated radiation readings were obtained by field screening. XRF analyses detected elevated lead. In the laboratory analyses; barium, cadmium, lead, and silver were above the TC screening levels. Arsenic, chromium, copper, manganese, mercury, nickel, and zinc were above background UTL levels. HE products including RDX were detected at low levels (See attached analyses). Total uranium was above its background UTL in one sample.

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: Soil and burn debris		

Waste Description
Description of Waste Type, Contaminants, Volume Estimate, and Waste Packaging:

Waste Type Description: Soil and debris
Potential Regulatory Status: RCRA mixed waste
Volume Estimate: 15 cu. Yd.
Waste Packaging: Six B25 boxes (3 cu. yds per box)

Characterization Strategy:
Description of Strategy:

One representative soil sample will be taken from each B25 box as it is filled. The soil will be analyzed for TCLP metals, isotopic and total uranium, VOCs, SVOCs, and HE. Visible pieces of HE and DU will be segregated and disposed of separately as hazardous or radioactive wastes, respectively. Unburned debris (mostly consisting of wood and electrical wires) will be segregated from the soil. Field screening will be used to segregate contaminated soil from non-contaminated soil. LIBS (Laser Induced Breakdown Spectroscopy) or XRF will be used to screen for TC metals including lead and uranium; alpha, beta and gamma radiation will be measured by hand-held instruments; and HE will be detected by a field spot test.

Waste Sampling*: (If sampling will be used, indicate how many grab or composite samples will be collected per container or volume of waste and whether the waste is considered homogeneous or heterogeneous. Be sure to collect enough samples to provide an average concentration of constituents.)

One composite soil sample will be collected from each B25 box. Composite samples were selected because the waste soil is considered to be fairly homogenous. The composite sample will consist of at least three but no more than ten subsamples and will meet the acceptance criteria of the disposal facility. Small pieces of intact debris can not be easily sampled so they will be assumed to contain the same level of hazardous materials and/or radioactivity as the surrounding soil.

- Grab sampling is appropriate for wastes that are fairly homogeneous, such as liquid wastes.
- Composite sampling is appropriate for wastes that are heterogeneous, such as soil, sediment, and debris. A composite sample should consist of no more than 10 subsamples.
- A sample of homogeneous or heterogeneous waste collected for VOC analysis should consist of a grab sample rather than a composite sample.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: Soil and debris		

Analytical Strategy:

Analyte Category	Analytical Method	May be Present (yes, no, unk)	Direct Sampling of Containerized Waste[1]	Acceptable Knowledge[1]	
				Existing Information[2]	Data from Proposed Site Characterization
Volatile Organic Constituents	SW 846 8260	Unk	X		
Semi-Volatile Constituents	SW 846 8270	Yes	X		
Organic Pesticides		No		X	
Organic Herbicides		No		X	
Pesticides & PCBs		No		X	
PCBs		No		X	
Total Metals	SW 846 6010, 7471	Yes		X JH	~~X~~
Total Cyanide		No		X	
Other Inorganic Constituents (specify)		No		X	
High Explosive Constituents	SW 846 8330	Yes	X		
Asbestos		No		X	
TPH		No		X	

1 Provide only one "X" per row to indicate how the waste will be characterized for the materials in each analyte category.
2 Existing Information includes process knowledge and previous analytical results.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: Soil and debris		

Analyte Category	Analytical Method	May be Present (yes, no, unk)	Direct Sampling of Containerized Waste[1]	Acceptable Knowledge[1]	
				Existing Information[2]	Data from Proposed Site Characterization
TCLP Metals	SW 846 1311, 6010, 7470	Yes	X		
TCLP Organics		No		X	
TCLP Pesticides and herbicides		No		X	
Gross Alpha	Field screen	Yes	X		
Gross Beta	"	Yes	X		
Gross Gamma	"	Yes	X		
Tritium[3]		No		X	
Gamma Spectroscopy		~~No~~ Yes	(U only)	X	
Isotopic Plutonium		No		X	
Total Plutonium		No		X	
Isotopic Uranium	HASL 300	Yes	X		
Total Uranium	KPA	Yes	X		
Strontium-90		No		X	
Americium-241		No		X	

[3] If tritium is not expected to be in the waste and the waste will not be sampled for tritium, attach a tritium statement signed by the FPL stating that based on a review of the available information and professional judgment, it is not necessary to sample for tritium at this site because there is no potential for the waste to contain added tritium due to DOE operations.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Waste Types: Soil and debris		

Preliminary RCRA Determination	
____	Non-RCRA: (No 90-Day Storage Requirement) Describe how waste will be stored/handled:
__X__	RCRA: (90-Day Storage Requirement) Waste will be stored/handled in accordance with 20 NMAC Generator Requirements. Soil and debris will be managed as potential RCRA waste and stored in a less-than-90-day storage area. A final RCRA determination will be made after the soil sample results are evaluated.

OU Number/FU	PRS SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: PPE and Sampling Equipment		

Waste Description
Description of Waste Type, Contaminants, Volume Estimate, and Waste Packaging:

Waste Type Description: PPE & sampling equipment
Potential Regulatory Status: Visibly contaminated items will be considered RCRA, mixed, radioactive, or non-hazardous waste (depending on the radiological field screening results of the soil removed). Visibly uncontaminated items will be considered non-hazardous or radioactive waste (depending on the radiological field screening results).
Volume Estimate: The volume generated will be one 55-gal. drum.
Waste Packaging: The PPE will be placed in sealed plastic bags that will be then placed inside the 55-gal. drum.

Characterization Strategy:
Description of Strategy:

If possible, the PPE/sampling equipment will be decontaminated prior to disposal. After decontamination the PPE/sampling equipment will be field screened for gross alpha, gross beta and gross gamma radiation in accordance with LANL-ER-SOP-10.07, "Field Monitoring for Surface and Volume Radioactivity Levels." Gross alpha radiation will be screened using an alpha probe, gross beta radiation will be screened using a beta/gamma probe, and gross gamma radiation will be screened using a Ludlum Model 2221 Scaler/Ratemeter with a Ludlum Model 44-10 2" x 2" Gamma Scintillator (SPA-3), which is equivalent to micro-R.

The waste will be inspected to determine if there is any visible contamination. If it is not visibly contaminated and does not have readings above background radioactivity, it will be placed in plastic bags, segregated by PRS, and disposed of as non-hazardous waste after completing a waste profile form.

If the PPE/sampling equipment is not decontaminated or if decontamination is not effective, the contaminated piece(s) will be placed in separate plastic bags, and segregated by PRS. Each plastic bag will be labeled with the PRS number. The contaminated items will be characterized to determine their RCRA and radioactivity status based on the analytical results of soil samples associated with this PRS (See Analyte Suite section of this form). The PPE/sampling equipment will be assumed to have a similar level of contamination as the highest levels reported for a single soil sample from this PRS.

Waste Sampling*: (If sampling will be used, indicate how many grab or composite samples will be collected per container or volume of waste and whether the waste is considered homogeneous or heterogeneous. Be sure to collect enough samples to provide an average concentration of constituents.)

The PPE/sampling equipment will not be directly sampled, but will be characterized as described above.

- Grab sampling is appropriate for wastes that are fairly homogeneous, such as liquid wastes.
- Composite sampling is appropriate for wastes that are heterogeneous, such as soil, sediment, and debris. A composite sample should consist of no more than 10 subsamples.
- A sample of homogeneous or heterogeneous waste collected for VOC analysis should consist of a grab sample rather than a composite sample.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	
1085/FU2	14-003	Burn area
Specific Waste Stream: PPE and sampling equipment		

Analytical Strategy:

Analyte Category	Analytical Method	May be Present (yes, no, unk)	Direct Sampling of Containerized Waste[4]	Acceptable Knowledge[1]	
				Existing Information[5]	Data from Proposed Site Characterization
Volatile Organic Constituents		No		X	
Semi-Volatile Constituents		Yes			X
Organic Pesticides		No		X	
Organic Herbicides		No		X	
Pesticides & PCBs		No		X	
PCBs		No		X	
Total Metals		Yes			X
Total Cyanide		No		X	
Other Inorganic Constituents (specify)		No		X	
High Explosive Constituents		Yes			X
Asbestos		No		X	
TPH		No		X	

[4] Provide only one "X" per row to indicate how the waste will be characterized for the materials in each analyte category.
[5] Existing Information includes process knowledge and previous analytical results.

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: PPE and sampling equipment		

Analyte Category	Analytical Method	May be Present (yes, no, unk)	Direct Sampling of Containerized Waste[1]	Acceptable Knowledge[1]	
				Existing Information[2]	Data from Proposed Site Characterization
TCLP Metals		Yes			X
TCLP Organics		No		X	
TCLP Pesticides and herbicides		No		X	
Gross Alpha	Field Screen-ing	Yes	X		
Gross Beta	"	Yes	X		
Gross Gamma	"	Yes	X		
Tritium[6]		No		X	
Gamma Spectroscopy		Yes		X	
Isotopic Plutonium		No		X	
Total Plutonium		No		X	
Isotopic Uranium		Yes			X
Total Uranium		Yes		X	
Strontium-90		No		X	
Americium-241		No		X	

6 If tritium is not expected to be in the waste and the waste will not be sampled for tritium, attach a tritium statement signed by the FPL stating that based on a review of the available information and professional judgment, it is not necessary to sample for tritium at this site because there is no potential for the waste to contain added tritium due to DOE operations.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: PPE and sampling equipment		

Preliminary RCRA Determination PPE and sampling equipment
__X__ Non-RCRA: (No 90-Day Storage Requirement) Describe how waste will be stored/handled: Visibly uncontaminated items will be segregated and managed as non-RCRA waste.
__X__ RCRA: (90-Day Storage Requirement) Waste will be stored/handled in accordance with 20 NMAC Generator Requirements. Visibly contaminated items will be segregated, managed as potential RCRA waste, and stored in a less-than-90-day storage area. A final RCRA determination will be made after the soil sample results are evaluated.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: Decontamination liquids		

Waste Description

Description of Waste Type, Contaminants, Volume Estimate, and Waste Packaging:

Waste Type Description: Decontamination liquids consist of Liquinox(R) detergent, tap water and distilled water.
Potential Regulatory Status: RCRA or mixed waste.
Volume Estimate: A total volume of less than three 55-gal. drums.
Waste Packaging: The liquid will be placed inside the 55-gal. drums.

Characterization Strategy:

Description of Strategy:

The decontamination liquids will be characterized for RCRA based on the results of an analysis of a grab liquid sample. The decontamination liquids from this PRS will be segregated, placed in a separate drum and labeled with the PRS number.

Waste Sampling*: (If sampling will be used, indicate how many grab or composite samples will be collected per container or volume of waste and whether the waste is considered homogeneous or heterogeneous. Be sure to collect enough samples to provide an average concentration of constituents.)

One grab sample of the decontamination liquids will be analyzed for TCLP metals, VOCs, SVOCs, HE, and isotopic and total uranium from each 55-gal. drum. A grab sample was selected because the waste is expected to be homogeneous. One grab sample was considered sufficient because of the small volume.

- Grab sampling is appropriate for wastes that are fairly homogeneous, such as liquid wastes.
- Composite sampling is appropriate for wastes that are heterogeneous, such as soil, sediment and debris. A composite sample should consist of no more than 10 subsamples.
- A sample of homogeneous or heterogeneous waste collected for VOC analysis should consist of a grab sample rather than a composite sample.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: Decontamination liquids		

Analytical Strategy:

Analyte Category	Analytical Method	May be Present (yes, no, unk)	Direct Sampling of Containerized Waste[7]	Acceptable Knowledge[1]	
				Existing Information[8]	Data from Proposed Site Characterization
Volatile Organic Constituents	SW 846 8260	Unk	X		
Semi-Volatile Constituents	SW 846 8270	Yes	X		
Organic Pesticides		No		X	
Organic Herbicides		No		X	
Pesticides & PCBs		No		X	
PCBs		No		X	
Total Metals	SW 846 6010, 7471	Yes	X		
Total Cyanide		No		X	
Other Inorganic Constituents (specify)		No		X	
High Explosive Constituents	SW 846 8330	Yes	X		
Asbestos		No		X	
TPH		No		X	

7 Provide only one "X" per row to indicate how the waste will be characterized for the materials in each analyte category.
8 Existing Information includes process knowledge and previous analytical results.

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: Decontamination liquids		

Analyte Category	Analytical Method	May be Present (yes, no, unk)	Direct Sampling of Containerized Waste[1]	Acceptable Knowledge[1]	
				Existing Information[2]	Data from Proposed Site Characterization
TCLP Metals	SW 846, 1311, 6010, 7471	Yes	X		
TCLP Organics		No		X	
TCLP Pesticides and herbicides		No		X	
Gross Alpha		Yes			X
Gross Beta		Yes			X
Gross Gamma		Yes			X
Tritium[9]		No		X	
Gamma Spectroscopy		Yes		X	
Isotopic Plutonium		No		X	
Total Plutonium		No		X	
Isotopic Uranium	HASL 300	Yes	X		
Total Uranium	KPA	Yes	X		
Strontium-90		No		X	
Americium-241		No		X	

[9] If tritium is not expected to be in the waste and the waste will not be sampled for tritium, attach a tritium statement signed by the FPL stating that based on a review of the available information and professional judgment, it is not necessary to sample for tritium at this site because there is no potential for the waste to contain added tritium due to DOE operations.

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Specific Waste Stream: Decontamination liquids		

Preliminary RCRA Determination Decon. liquids
____ Non-RCRA: (No 90-Day Storage Requirement) Describe how waste will be stored/handled:
___X_ RCRA: (90-Day Storage Requirement) Waste will be stored/handled in accordance with 20 NMAC Generator Requirements. Decontamination liquids will be managed as potential RCRA waste and stored in a less-than-90-day storage area. A final RCRA determination will be made after the liquid grab sample results are evaluated.

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area

Waste Types: Soil and debris, sampling waste/PPE, and decon. waste (liquids)

Potential Contaminants

Potential RCRA Wastes:

Based on available information, indicate whether the waste could potentially be any of the following or be derived-from or mixed-with listed waste, as defined in 40 CFR, Part 261, or contain F-listed waste (contained-in policy for environmental media):

	Yes	No	Unknown
F-listed solvent waste (F001-F005):		X	
F-listed plating waste (F006-F012):		X	
F-listed landfill leachate waste (F039):		X	
K-listed HE waste (K044-K046):		X	
K-listed ink formulation waste (K086):		X	
U-listed waste (Section 261.33):		X	
P-listed waste (Section 261.33):		X	
Ignitable waste (Section 261.21):		X	
Corrosive waste (Section 261.22):		X	
Reactive waste (Section 261.23):		X	
TC waste (VOCs) (Section 261.24):		X	
TC waste (SVOCs) (Section 261.24):		X	
TC waste (Pesticides/Herbicides) (Section 261.24):		X	
TC waste (Metals) (Section 261.24):	X		

Potential Radionuclides: (A radiological specialist should complete this after reviewing site history, etc.)

John Mann, a certified health physicist, reviewed the site history and the Phase I data to identify radionuclides that could be present in the waste. Based on his review, U-235 and U-238 are expected to be present in the waste at levels around or above their background UTL levels and therefore the waste may be radioactive waste depending on its uranium level.

CHARACTERIZATION STRATEGY FORM

Number/FU	PRS/SWMU Number	Title
1085/FU2	14-003	Burn area
Waste Types: Soil and debris, sampling waste/PPE, and decon. waste (liquid)		

Signatures:

ER Project Representative Larry Macarson 5/3/97

Waste Management Representative Mary Jane Wrinkle 5/2/96

Form Author James N. Heiser 5/2/96

ANNEX 7.8
VCA CHECKLIST AND FIELD WORK AUTHORIZATION FORM

Voluntary Corrective Action (VCA) Checklist and Fieldwork Authorization Form

PRS No. 14-003 HSWA or AOC

√ COPC(s) defined.

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

√ Remedy is obvious.

√ Time for removal is less than 6 months.

√ Remedy is final.

√ Land use assumptions straightforward.

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

★ √ 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. ANY DEVIATIONS FROM THE BASELINE PLANNED COSTS WILL BE DISCUSSED WITH FU 2'S DOE REPRESENTATIVE

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

FPL _____ Date 5/1/96

FPC _____ Date 5-2-96

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

FPL _____ Date 10/11/96

FPC _____ Date 11-07-96

Through reviewing the VCA Plan, for site(s) 14-003 and believing that the above criteria have been met, I authorize the fieldwork to proceed.

DOE ER Program Manager _____ Date 11/7/96

ANNEX 7.9
COST ESTIMATE

The total cost for this VCA is projected to be $132,000. (A detailed cost breakdown will be provided in the final report.)

BUDGET

Activity	$ Amount
Plan Development	28,000
Mobilization	7,700
Cleanup	36,000
Verification Sampling	4,500
Waste Disposal	40,000
Field Screening	1,500
Demobilization/restore site	2,300
Reporting	12,000
Total Estimated Cost	$132,000

8.0 REFERENCES

DOE (US Department of Energy), November 1989. "Los Alamos National Laboratory Sampling and Analysis Data Document" (draft), DOE Environmental Survey and Idaho National Engineering Laboratory. (DOE 1989, 0271)

EPA (US Environmental Protection Agency), March 25, 1991. 'Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance "Standard Default Exposure Factors," Interim Final,' OSWER Directive 9285.6-03, Office of Emergency and Remedial Response, Toxics Integration Branch, Washington, DC. (EPA 1991, 0746)

EPA (US Environmental Protection Agency), December 1991. "Risk Assessment Guidance for Superfund, Volume I—Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals)," Interim, EPA/540/R-92/003, Publication 9285.7-01B, Office of Research and Development, Washington, DC. (EPA 1991, 0302)

EPA (US Environmental Protection Agency), July 1989. " Identification and Listing of Hazardous Waste," Code of Federal Regulations, Protection of Environment, Title 40, Part 261, Washington, DC. (EPA 1989, 0092)

Gilbert, R. O., 1987. Statistical Methods for Environmental Pollution Monitoring, Van Nostrand Reinhold, New York, New York. (Gilbert 1987, 0312)

LANL (Los Alamos National Laboratory), May 1994. "RFI Work Plan for Operable Unit 1085," Los Alamos National Laboratory Report LA-UR-94-1033, Los Alamos, New Mexico. (LANL 1994, 1156)

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

Ryti, R., P. Longmire, and E. McDonald, March 29, 1996. "Application of LANL Background Data to ER Project Decision-Making, Part I: Inorganics," Los Alamos National Laboratory Report LA-UR-96-1534, Los Alamos, New Mexico. (Ryti et al. 1996, 1298)