Los Alamos National Laboratory

UNIVERSITY OF CALIFORNIA

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

Date: May 16, 1996
Refer to: EM/ER:96-277

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

SUBJECT: FINAL VOLUNTARY CORRECTIVE ACTION (VCA) PLAN FOR ACTIVITIES AT TECHNICAL AREA (TA) 15, POTENTIAL RELEASE SITE (PRS) 15-004(b)

Dear Ted:

Enclosed for your records please find a copy of the final VCA Plan for activities in TA-15, PRS 15-004(b). This activity is planned for completion in Fiscal Year 1996.

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 also 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
Environmental Restoration

JJ/el

Enclosures: Final VCA Plan for TA-15, PRS 15-004(b)
VCA Checklist and Field Work Authorization Form

3923

Barbara —
Ron K —
Stu —

RECEIVED
MAY 1996

Cy (w/encs.):
S. Anderson, NMED-AIP, MS J993
G. Gould, ESA-DE, MS G787
B. Garcia, NMED-HRMB
D. Griswold, ERD, AL, MS A906
J. Harry, EM/ER, MS M992
B. Hoditschek, NMED-HRMB
R. Kern, NMED-HRMB
N. Naraine, EM-453, DOE-HQ
D. Neleigh, EPA, R.6, 6PD-N (2 copies)
M. Shaner, CIO, MS A117 (5 copies)
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
G. Rael, ERD, AL, MS A906
W. Spurgeon, EM-453, DOE-HQ
J. Vozella, LAAO, MS A316
EM/ER File, MS M992

Voluntary Corrective Action Plan for

Potential Release Site 15-004(b) Firing Site A

Field Unit 2

Environmental Restoration Project

May 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-1016

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Site Type and Description 1

1.1.1 Operational History 1

1.1.2 COPCs and Rationale for Proposed Remedial Action 1

2.0 SITE CHARACTERIZATION 1

2.1 RFI Information/Other Decision Data 1

2.1.1 Data Quality Evaluation 2

2.1.2 RFI Sampling Results 2

2.2 Nature and Extent of Contamination 3

3.0 PROPOSED REMEDY FOR PRS 15-004(b) FIRING SITE A 3

3.1 Description of the Proposed Remedial Action 3

3.2 Basis for Cleanup Levels 4

3.3 Site Restoration 4

4.0 WASTE MANAGEMENT 5

4.1 Estimated Types and Volumes of Waste 5

4.2 Method of Management and Disposal 5

5.0 DESCRIPTION OF CONFIRMATORY/VERIFICATION SAMPLING 6

6.0 ESTIMATED TIME TO COMPLETE THE ACTION AND UNCERTAINTIES 7

ANNEXES 8

REFERENCE 21

VOLUNTARY CORRECTIVE ACTION PLAN FOR POTENTIAL RELEASE SITE 15-004(b) FIRING SITE A

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 in TA-15, which was established in the mid-1940s for explosives experiments.

1.1 Site Type and Description

PRS 15-004(b) was the site of a small firing site, which has been inactive since 1953. The firing site was decommissioned in 1967, and the area was regraded at that time. PRS 15-004(b) is an open field located north of Building 15-183.

1.1.1 Operational History

PRS 15-004(b), Firing Site A, was used to test explosives from approximately 1945 until 1953. Minimal information is available on the total quantities of hazardous materials used. However, interviews conducted with experimenters who formerly worked at the site indicate that natural uranium, beryllium, lead (Pb), mercury, and high explosives (HEs) were used.

1.1.2 COPCs and Rationale for Proposed Remedial Action

Field investigations were conducted during the 1994 summer sampling campaign, and additional X-Ray Fluorescence (XRF) sampling was conducted during the summer and fall of 1995. These results show elevated levels of lead in the soil above the PRG of 1000 mg/kg at two locations.

2.0 SITE CHARACTERIZATION

After the analytical results were returned from the 1994 sampling campaign, and elevated readings of lead were seen, additional samples were collected for XRF analysis to define the extent of contamination within the PRS. Figure 1 in Annex 7.3 shows the 1994 sampling locations.

A photo of the area from the 1950s was found during fall of 1995. This photo showed the location of the firing sites to be approximately 30 ft west of the location shown in the OU 1086 RFI Work Plan. The original grid was 400 ft^2. Based on the photo, a new grid that extends to the north and west 120 ft has been surveyed. Additional surface and subsurface sampling will be conducted prior to the VCA, and screening will be done using either an XRF or a Laser-Induced Breakdown Spectroscopy (LIBS) instrument. The subsurface samples will be collected at the new projected locations of the firing sites.

2.1 RFI Information/Other Decision Data

An aerial radiological survey conducted in 1982 by EG&G (Fritzsche 1989, 10-0033) did not detect radionuclides at levels above background of 10 pCi/m^2.

Surface soil samples were collected and analyzed for the Sanitary Wastewater System Consolidation (SWSC) project (Fresquez 1991, 10-0003). Gross alpha, beta, and gamma activities were found at background levels, and toxicity characteristic leaching procedure (TCLP) metals were below U.S. Environmental Protection Agency (EPA) guidelines. Also, no

semivolatile organic compounds (SVOCs) were detected. Total beryllium and uranium levels were at approximately background levels.

2.1.1 Data Quality Evaluation

The quality assurance/quality control (QA/QC) data associated with the investigation at PRS 15-004(b) (inorganics, radionuclides, total uranium, and high explosives) indicated that a majority of the sample analytical data (≈93%) were acceptable and defensible. The QA/QC mechanisms were generally effective in ensuring the reliability of measured data within the expected limits of sampling and analytical error. Of the approximately 190 pieces of analytical data, approximately 27% were qualified as estimated undetected (UJ) or estimated (J), and approximately 7% were not used in the screening assessment due to QA/QC problems. The QC problems for the data collected at this PRS are summarized in Table 7.2-1.

Several of the inorganic analytes that had percent recoveries in the blind QC sample were outside the control limits (75-125%) for five samples. These data are qualified as UJ or J, but the usability of the results is unaffected. These data are valid because the recoveries were either within reasonable limits (>50<75%) or were biased high. In addition, the 28-day holding time for mercury analysis was exceeded for one sample. This resulted in the qualification of the mercury result as UJ, but the usability is unaffected. The mercury data are valid because the holding time was exceeded by only a few days, and the samples were refrigerated until analyzed.

Total uranium in five samples had percent recovery of the matrix spike analysis outside the acceptance limits (75-125%), while the total uranium in another sample had percent recovery in the blind QC sample outside the acceptance limit (75%-125%). The data are qualified as J, but the usability is unaffected. These data are valid because the matrix spike recovery was biased high, the blind QC recovery was within reasonable limits (>50<75%), and the analyte was detected above background UTL and was more than a factor of 2 below the SAL.

The 40-day analytical holding time for high explosive analysis for one sample was exceeded by several months. As a result, the high explosives data are qualified as unusable (R). The data usability is affected and the results are not used in the screening assessment.

2.1.2 RFI Sampling Results

The LANL Facility for Information Management, Analysis, and Display (FIMAD) contains results of samples collected from PRS 15-004(b), Firing Site A, as part of the RFI. Analyses were conducted for total U, Pb, and Be in accordance with the OU 1086 RFI Work Plan. The reported values (detected and undetected) are compared with the respective background UTLs and SALs. Data comparison tables of detected concentrations greater than background UTLs and SALs are provided in Annex 7.2. Based upon a review of the sampling data, the results are summarized as follows:

- Six inorganics — barium, cadmium, copper, lead, mercury, and uranium as an inorganic — were detected at concentrations above background UTLs in the soil samples collected from the firing site. Five inorganics — barium, cadmium, copper, mercury, and uranium as an inorganic — were below their SALs and were submitted to the MCE for noncarcinogenic effects. The total normalized screen was 0.6569, which is less than the target value of one, indicating that potential adverse health effects are unlikely. These five chemicals were eliminated as COPCs. Lead was detected at concentrations above its SAL (400 mg/kg) at several sampling locations. Concentrations ranged from 782-921 mg/kg. This inorganic was retained as a COPC at this PRS.

- One radionuclide, depleted uranium, had a concentration detected above its background UTL, but below its SAL of 130 mg/kg in the soil. Since uranium was the only chemical in the radionuclide effects category, it was not submitted to the MCE and, therefore, was eliminated as a COPC.
- Additional XRF sampling northward of Firing Site A has revealed lead concentrations above those of the SAL. The highest value obtained was 1593 mg/kg, which is above the PRG of 1000 mg/kg (Section 3.2).

The results of the RFI investigation indicate that lead is present at elevated concentrations that exceed its SAL and PRG. The PRG has been established by VIEPA (EPA 1995). Additional sampling is necessary to determine the boundaries and extent of the lead contamination. This will be done using XRF or LIBS screening analyses as part of the proposed VCA at this site.

2.2 Nature and Extent of Contamination

The locations of high lead concentrations were determined by analytical methods and XRF screening; any additional locations will be determined by either XRF or LIBS screening. A grid with 20-ft spacing has been set up at the site for the screening. If any elevated levels are found, additional sampling will be conducted in that area and submitted to the analytical lab.

Based on previous sampling in the area, contamination does not exist below a 6-inch depth.

3.0 PROPOSED REMEDY FOR PRS 15-004(b) FIRING SITE A

3.1 Description of the Proposed Remedial Action

This remedial action consists of field screening the area for Pb, and removing a few inches of surface soil if the Pb levels exceed cleanup criteria. This PRS is easily accessible, with a paved surface on one side and a flat field on the remaining sides. It is located at TA-15, a few hundred yards southeast of Building R-183. There are no fences, trenches, etc., that would impede access to the site.

To implement the remedy, the following plan will be used. After appropriate health and safety screening (see Annex 7.6), the surface and subsurface soil in the area will be screened on a 5-ft grid using either a LIBS instrument or an XRF for the presence of Pb above cleanup criteria. Survey markers will be used to delineate areas exceeding cleanup criteria.

If practical (i.e., there are less than 10 areas of 1 ft or less in diameter), the soil will be hand-shoveled and placed in 55-gallon drums. If hand removal is not practical, then a front-end loader with a 6-7 ft bucket will be used to remove the soil. The contaminated surface soil will be scraped down 6 inches, removed, and placed in 55-gallon drums. As the soil is placed in the drums representative samples of the soil will be placed in a stainless-steel bowl so that, when the drum is filled, a representative composite sample of the contents of each drum will exist in the bowl. The contents of the bowl will be homogenized by hand with a stainless-steel spoon and placed in the appropriate containers for waste characterization analysis, as detailed in Section 4.

This effort will take place within the explosives corridor of the lab, so, as a contingency during the soil removal, any visible pieces of HE will be collected in a separate container. When the soil removal task is finished, representatives of the LANL using group, DX-4, will be notified so that they can remove the HE. Similarly, visible pieces of depleted uranium (DU), or soil chunks identified by field radiation screening as being contaminated, will be collected in a separate container and managed as low-level radioactive waste. However, neither of these two contaminants has been previously identified at this site.

During excavation of the soil, dust suppression will be implemented using hand-held water sprayers. Application of water will be limited, will not result in runoff, and will not generate a dual-phase (water and soil) waste.

When the suspect soil is completely removed, the area will be re-surveyed for lead contamination. Confirmatory samples will be collected and sent to a fixed laboratory to document achievement of the stated cleanup criteria (see Section 5.0).

Upon completion of the soil removal and confirmatory sampling, tools and equipment will be decontaminated. The decon fluid will be stored in bung-top 55-gallon drums, it will be sampled for waste characterization and disposed of accordingly. Personal protective equipment (PPE) will be cleaned, or uncleanable portions cut out and disposed of as waste. All drums will be stored on-site, on pallets, in an approved storage location. The drums will be covered by plastic until the results of the waste characterization are received; then a final disposition for the drums will be determined.

3.2 Basis for Cleanup Levels

PRS 15-004(b) lies within current LANL facility boundaries and is remote from public access roads. In the foreseeable future, the land is anticipated to be used exclusively for Laboratory operations (i.e., industrial land use). Identification of the COPCs considered for this VCA was based on simple comparisons of the Phase I RFI analytical data with background UTLs and SALs. As indicated in Section 2.1.1 of this plan, the analytical and XRF screening results found that lead is the only COPC detected in the soil at this site.

For those COPCs retained from the human health screening assessment, site-specific cleanup goals or Preliminary Remediation Goals (PRGs) are calculated based on the expected land use at the site, i.e., an industrial exposure scenario. In general, site-specific PRGs are calculated using the modified EPA equations and Laboratory site-specific input parameters. The human health risk-based cleanup level for lead in soil is based on information obtained from EPA Region VI (EPA 1995). LANL has adopted a PRG for lead of 1000 mg/kg for an industrial exposure scenario (Table 3.2-1). This soil PRG considers the fetal effects when a pregnant female adult worker is exposed; this is the reasonable maximum-exposed individual for this VCA.

A multiple chemical PRG risk analysis may be conducted, when applicable to the site, to determine whether cumulative risk exists when two or more chemical concentrations are below their respective PRGs. Because only one chemical was detected above its SAL or PRG at this site, a cumulative risk analysis was not performed.

TABLE 3.2-1
PRGs FOR PRS 15-004(b)

COPC	Sample Value (mg/kg)	PRG (mg/kg)	Rationale
Lead	1593[1]	1000	Based on EPA Region VI guidance.

[1] Value obtained from XRF screening samples.

3.3 Site Restoration

When confirmation sample results verify that the site has been remediated in accordance with this plan, the excavated area will be returned to the approximate original grade and revegetated. Backfill material will consist of clean material obtained from the Laboratory maintenance contractor.

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	< 1 55-gal. drum
Contaminated soils	solid - hazardous	10 drums (55-gal. each)
Decon waste	liquid - potential hazards	< 25 gallons

A Characterization Strategy Form (CSF) has been approved by LANL's CST-5 and ESH-19. This CSF describes 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 lead above the toxicity characteristic (TC) screening level. The TC screening level is determined by Table 2, "Maximum Concentration Levels for Determining ER Project Waste Toxicity Characteristic" (LANL 1995). It is anticipated that a maximum of ten 55-gallon drums will be filled with this soil. They will be managed as potential Resource Conservation Recovery Act (RCRA) waste. The drums will be sealed and stored at this PRS until the laboratory analyses are completed for each drum. A final RCRA determination will be made after soil sample results are evaluated. After characterization, each drum will be disposed of as appropriate for RCRA, mixed, radioactive, or non-hazardous waste.

A composite of the soil in each drum will be analyzed for TCLP metals, isotopic uranium, and HE. Field screening for TC metals will be performed by LIBS to minimize the volumes of soil placed in the drums. Alpha, beta, and gamma radiation will be measured by hand-held instruments, and HE will be screened using a field spot test.

Initially, visibly contaminated PPE and sampling equipment will be considered potential RCRA waste. Visibly uncontaminated items will be considered non-hazardous or radioactive waste, depending on the field screening results. The volume generated is expected to be less than 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 25 gallons will be generated. The decontamination liquids will be classified as RCRA, mixed, or non-hazardous waste, based on the analytical results of the liquid grab sample. This sample will be analyzed for TCLP metals, HE, and isotopic uranium.

4.2 Method of Management and Disposal

Waste soil removed from the PRS will be stored/handled in accordance with the generator requirements in 20 New Mexico Administrative Code (NMAC). This soil will be stored at the PRS; in a less-than-90-day storage area, a maximum of ten drums is anticipated. After the analytical results are known for the soil in each drum, it will be disposed as RCRA, radioactive, or non-hazardous waste, depending on the hazard classification.

Visibly contaminated PPE and sampling equipment will be segregated and managed as potential RCRA waste. The total volume expected is less than one 55-gallon drum. This waste will be stored in a less-than-90-day storage area until the soil analyses are completed, then disposed of according to the highest level of RCRA, mixed, or radioactive wastes it contains.

Decontamination liquids will be managed as potential RCRA waste. They will be stored in a less-than-90-day storage area. The analysis of a liquid grab sample will be used to determine its final hazard classification of these liquids.

LANL's CST-5 personnel will aid in determining the final disposal sites for this waste and will verify the availability of treatment, storage, and disposal (TSD) space needed.

5.0 DESCRIPTION OF CONFIRMATORY/VERIFICATION SAMPLING

Field screening, using either a LIBS or an XRF instrument, will occur during the remediation of this site. The field screening results will direct the remediation efforts so that no soil containing more than 1000 ppm of lead is expected to remain after the cleanup is completed. Confirmatory samples will be sent to a fixed laboratory to verify that the average concentration across the site is below the 1000 ppm lead threshold.

Based on the guidance set forth in the EPA's "Methods for Evaluating the Attainment of Cleanup Standards Volume 1: Soils and Solid Media," (EPA 1989, 0794) six samples are needed to verify that the remediation goal has been attained. Following the remediation, these samples will be collected from the nodes of a grid that bisects the area from north to south and trisects from east to west. These samples will be sent to a fixed laboratory for target analyte list (TAL) metals (EPA 1992, 1207).

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.

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

$$n = 344^2 \left\{ \frac{0.842 + 1.282}{300} \right\}^2$$

$$n = 6$$

Notation:

Cs The cleanup standard relevant to the sample area and the contaminant being tested.

μ The value of the mean contaminant concentration for the site.

μ_1 The value of the mean contaminant concentration for which the false negative rate is to be controlled.

σ The standard deviation of the contaminant concentrations at the site.

β The false negative rate, i.e., the probability that the sample area will be declared "dirty" when it is actually "clean."

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

n The desired sample size for statistical calculations.

6.0 ESTIMATED TIME TO COMPLETE THE ACTION AND UNCERTAINTIES

This VCA is estimated to be completed within 5 days. The estimate is based upon a one-day mobilization, two days to survey the site with XRF or LIBS, one day to complete the soil removal and collect confirmatory samples, and one day to complete demob/sample shipping, etc. The analytical results from the waste characterization are expected to be received within 30 days, and waste removal is expected to be completed within another 30 days. The total time frame from mobilization to removal of waste is, thus, estimated to be about 65 days.

There are few uncertainties with this cleanup, other than the exact number of "hot spots" or the volume of contaminated surface soil. The amount of waste will be easily identified after field screening. Any heavy equipment necessary will be obtained from the Laboratory maintenance contractor. A drum loader will also be necessary. For the less than 10-drum total waste estimate, adequate TSD capacity should exist. If, during the course of the removal, the waste volume exceeds 200% of the 10-drum estimate, the effort will be stopped and reevaluated.

ANNEXES

Annex 7.1
Risk-Based Cleanup Level Assumptions and Calculations

Under the industrial/commercial exposure scenario, a pregnant female adult worker is the reasonable maximum individual.

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 (EPA 1995). This soil PRG considers the fetal effects when a pregnant worker is exposed.

Annex 7.2
Results of Quality Assurance/Quality Control Activities

TABLE 7.2-1
DATA QUALITY EVALUATION FOR PRS 15-004(b) SAMPLES

Suite	Request Number	Comments
Inorganics	18454 (five samples)	Aluminum, arsenic, chromium, lead, manganese, nickel, thallium, and vanadium in each sample had percent recoveries in the blind QC sample below the lower control limit (<75%). Data are qualified as UJ if the sample results are <EQL and as J if the sample result is >EQL. Beryllium in each sample had percent recoveries in the blind QC sample above the upper control limit (>125). Data are not qualified if the sample results are <EQL and are qualified as J if the sample result is >EQL. The data usability is not affected. Data are valid because the recoveries for those analytes below the lower control limit were within reasonable limits (>50<75%) and were detected either below background UTLs or by more than a factor of two below their SALs. Data for beryllium are valid because the recovery was biased high.
	20296 (one sample)	The mercury holding time (28 days) for this sample was exceeded. The sample result is qualified as UJ and the data usability is not affected. Data are valid because the holding time was exceeded by only a few days and the sample was refrigerated so that the transformation and volatilization of mercury was not significant.
Radionuclides	18880 (five samples)	Total uranium in each sample had percent recovery of the matrix spike analysis above the upper acceptance limit (>125%). Data are qualified as J and usability is unaffected. Data are valid because the recovery is biased high.
	20326 (one sample)	Total uranium in this sample had percent recovery in the blind QC sample below the lower acceptance limit (<75%). Data are qualified as J and usability is unaffected. Data are valid because the recovery was within reasonable limits (>50<75%) and the matrix spike recovery was acceptable. The analyte was detected above background but was more than a factor of two below the SAL.
HE	18303 (one sample)	The 40 day analytical holding time for all HE analyses for this sample was exceeded by 150 days. Data are qualified as R (unusable). Data usability affected and data are not used in the screening assessment.

TABLE 7.2-2
INORGANICS DETECTED ABOVE BACKGROUND UTL AT PRS 15-004(b)

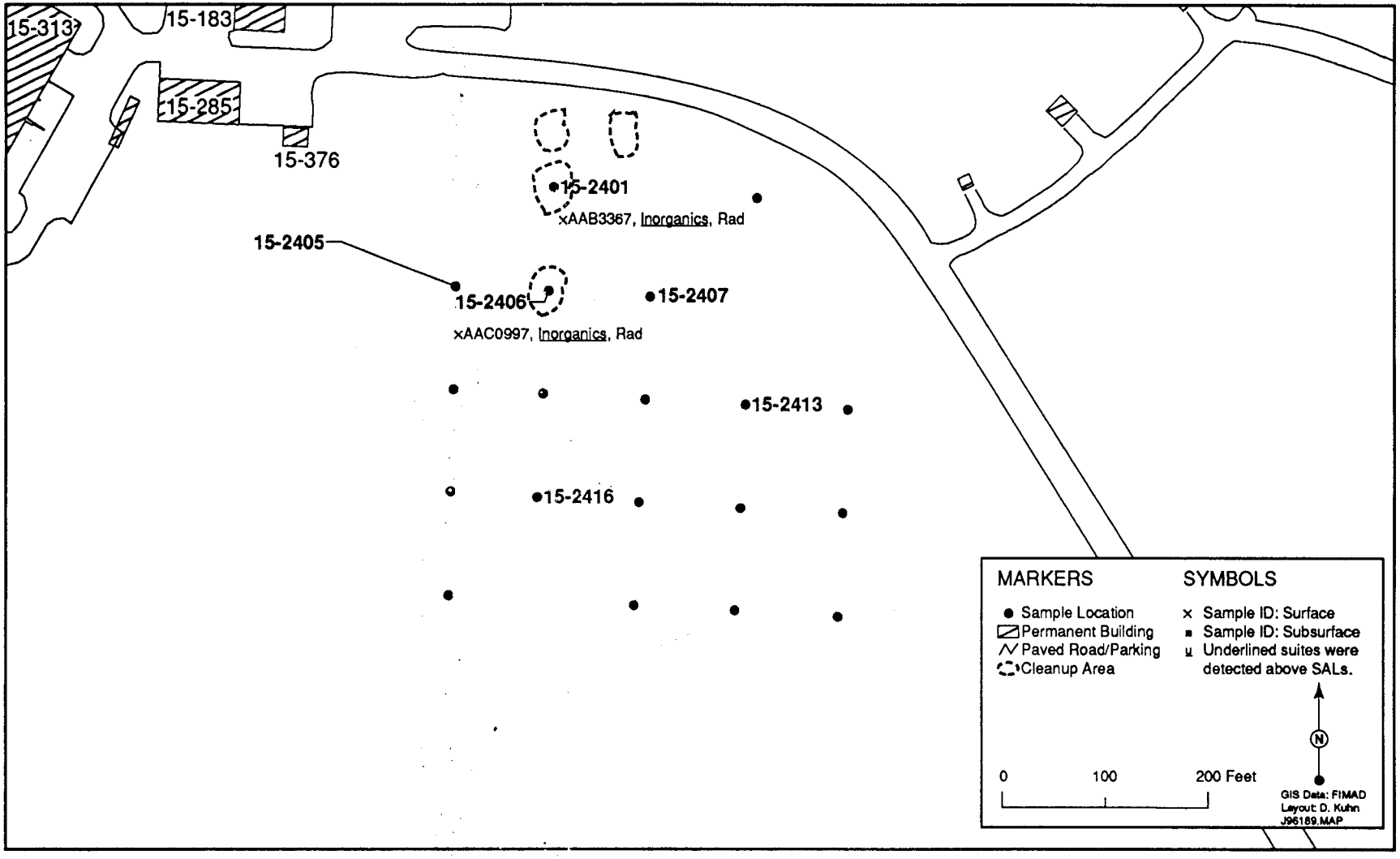
Sample ID	Depth (in.)	Barium (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Uranium (mg/kg)
LANL UTL	NA	315	2.7	30.7	23.3	0.1	5.45
SAL	NA	5300	38	2800	400	23	230/130*
AAB3349	18-24	244	ND	9.3	921	ND	3.6
AAB3351	0-6	378	ND	30.1	104	ND	6.3
AAB3367	0-5	1260	5.3	184	782	0.32	6.4
AAB3371	0-6	558	ND	56.1	35.9	ND	20.8
AAB3372	18-24	237	ND	9.9	37.7	ND	4.1
AAC0997	0-6	1550	4.5	338	921	ND	8.82

NA = not applicable; ND = not detected; * SALs for uranium are for systemic (230) and radionuclide effects (130), respectively

TABLE 7.2-3
MULTIPLE CHEMICAL EVALUATION - PRS 15-004(b)

ANALYTE	MAXIMUM NORMALIZED CONCENTRATIONS
SOIL-NONCARCINOGENIC	
Barium	0.2924
Cadmium	0.1395
Copper	0.1207
Mercury	0.0139
Uranium	0.0904
TOTAL	0.6569

Annex 7.3
Site Map



PRS 15-004(b), VCA.

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

This Site-Specific Health and Safety Plan (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 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 (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 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 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 that it 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. When 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 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 upon by all the 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 Division
ESA-DE Design Engineering Support Group

To/MS: Memo To The File
From/MS: T. E. Gene Gould, G787
Phone/FAX: 7-0402/5-1976
Date: February 16, 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 15-004(b).

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1086/FU2	15-004(b)	Firing site A-B
Waste Types: Soil, sampling waste/PPE, and decon. waste (liquid)		

Completed By: J. W. Heyser	Date: 3/25/96
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.)

Soil will be removed by hand digging and put in 55 gallon drums. Field screening data of 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):

Initial construction at TA-15 was completed in 1944. Firing sites A and B were among the first to be used. These were small firing sites, located approximately 200 ft apart, and were used from approximately 1945 to 1952. Natural uranium rather than depleted uranium was used a few kilograms at a time. Small amounts of HE (10 to 20 lbs) and metals (presumably beryllium, lead and mercury) were also used (RFI Work Plan for OU 1086, June 1993). An aerial photographic survey conducted in 1958 showed only a small area around these firing sites to be cleared of vegetation, suggesting that the tests were small. Both sites were decommissioned and the land was regraded in 1967. Before decommissioning, two structures associated with these sites were surveyed and found to contain no detectable levels of either radioactive materials or HE.

Other information regarding the total quantities of hazardous materials used at these firing sites is minimal. The aerial radiological survey conducted in 1982 by EG&G did not detect radioactivity above background levels of selected gamma-emitting radionuclides. Surface soil samples were later taken and analyzed in a laboratory for the Sanitary Wastewater System Consolidation project. The findings were as follows: gross alpha, beta, and gamma radiation was at background levels; TCLP metals were below EPA TC screening levels and no SVOCs were detected; total beryllium and uranium levels were approximately at background levels (RFI Work Plan for OU 1086, June 1993).

Previous Investigation Analytical Results: (Attach copy of analytical methods and results above background levels)

The soil at these firing sites was sampled in 1994, in accordance with the Phase I sampling plan in the RFI Work Plan for OU 1086. Analyses were performed for metals, gamma spectroscopy, total uranium, and HE. Analyses for organic chemicals were not conducted based upon prior knowledge of the site. Lead was found above background concentrations in seven soil samples and above the TC screening level in three samples. Barium, cadmium, copper and mercury were above their UTLs, but below the TC limits. Total uranium was at its UTL level. No other radionuclides exceeded background UTLs. HE was not detected. During the summer of 1995 XRF field screening for lead was performed to better define the areas of concern at the A-B site. An additional location north of Firing Site A had lead levels exceeding the TC screening level.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1086/FU2	15-004(b)	Firing site A-B
Specific Waste Stream: Soil		

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

Waste Type Description: Soil
Potential Regulatory Status: RCRA mixed waste
Volume Estimate: 10 55-gal. drums
Waste Packaging: 55-gal. drum

Characterization Strategy:
Description of Strategy:

One representative sample will be taken from each 55-gal. drum of soil. The soil will be analyzed for TCLP metals, isotopic uranium, and HE. Visible pieces of HE and DU will be segregated and disposed of as hazardous or radioactive waste, respectively. Field screening will be used to segregate contaminated soil from non-contaminated soil. LIBS (Laser Induced Breakdown Spectroscopy) will be used to screen for TC metals; 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 sample will be collected from each 55-gal. drum of waste. One composite sample is considered to be representative of the waste due to the small amount of waste in each drum. Composite samples were selected because the waste is considered to be fairly homogenous based on field observation. The composite sample will consist of at least three but no more than ten subsamples. Each drum of soil will be analyzed for TCLP metals, isotopic uranium, and HE.

- 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
1086/FU2	15-004(b)	Firing site A-B
Specific Waste Stream: soil		

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		No		X	
Semi-Volatile Constituents		No		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	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
1086/FU2	15-004(b)	Firing site A-B
Specific Waste Stream: soil		

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-ing	Yes	X		
Gross Beta	"	Yes	X		
Gross Gamma	"	Yes	X		
Tritium[3]		No		X	
Gamma Spectroscopy		Yes		X	
Isotopic Plutonium		No		X	
Total Plutonium		No		X	
Isotopic Uranium	HASL 300	Yes	X		
Total Uranium		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
1086/FU2	15-004(b)	FIRING SITE A-B
Waste Types: soil		

Preliminary RCRA Determination Soil	
____	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 wastes will be managed as potential RCRA waste and will be 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
1086/FU2	15-004(b)	Firing site A-B
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 waste or 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 less than 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.

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, 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	Title
1086/FU2	15-004(b)	Firing site A-B
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		No		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.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1086/FU2	15-004(b)	Firing site A-B
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
1086/FU2	15-004(b)	Firing site A-B
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
1086/FU2	15-004(b)	Firing site A-B
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 25 gallons.
Waste Packaging: The liquid will be placed inside a 55-gallon drum.

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, HE, and isotopic uranium. A grab sample was selected because the waste is expected to be homogeneous. One sample per waste stream was considered sufficient because of the small volume of the waste stream (less than 25 gallons).

- 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
1086/FU2	15-004(b)	Firing site A-B
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		No		X	
Semi-Volatile Constituents		No		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	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.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1086/FU2	15-004(b)	Firing site A-B
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		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.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1085/FU2	15-004(b)	Firing site A-B
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
1086/FU2	15-004(b)	FIRING SITE A-B
Waste Types: Soil, 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 below background and therefore the waste would not be expected to be classified as radioactive waste.

CHARACTERIZATION STRATEGY FORM

OU Number/FU	PRS/SWMU Number	Title
1086/FU2	15-004(b)	FIRING SITE A-B
Waste Types: Soil, sampling equipment and PPE, and decon. liquids		

Signatures:

ER Project Representative Larry Marson 4/3/96

Waste Management Representative [illegible] 4/1/96

Form Author James M. Heyser 4/3/96

RS	Sample	Analyte	Location	Begin Depth	End Depth	Depth Units	Mat	Sym	Value	BKGD Level	Sal Level	Units	Field Code	Code	EPA Qual	Technique	Request	Report	Suite
5-004(b)	AAB3349	Aluminium	15-2405	18	24	I	SS		22000	38700		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Barium	15-2405	18	24	I	SS		244	315	5600	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Beryllium	15-2405	18	24	I	SS		1.5	1.95		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Calcium	15-2405	18	24	I	SS		2590	6120		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Chromium	15-2405	18	24	I	SS		11.3	19.3		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Copper	15-2405	18	24	I	SS		9.3	30.7	3000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Iron	15-2405	18	24	I	SS		16800	21300		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Lead	15-2405	18	24	I	SS		22	23.3	400	MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3349	Magnesium	15-2405	18	24	I	SS		2870	4610		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Manganese	15-2405	18	24	I	SS		465	714	11000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Potassium	15-2405	18	24	I	SS		2670	3410		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Uranium	15-2405	18	24	I	SS		3.6	5.45		MG/KG			J	ICPMS	18880	30887	RAD
5-004(b)	AAB3349	Vanadium	15-2405	18	24	I	SS		26.4	41.9	560	MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3349	Zinc	15-2405	18	24	I	SS		37	50.8	24000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Aluminium	15-2405	0	6	I	SS		13400	38700		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Arsenic	15-2405	0	6	I	SS		3.1	7.82		MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3351	Barium	15-2405	0	6	I	SS		378	315	5600	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Beryllium	15-2405	0	6	I	SS		1.2	1.95		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Calcium	15-2405	0	6	I	SS		2040	6120		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Chromium	15-2405	0	6	I	SS		6.5	19.3		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Copper	15-2405	0	6	I	SS		30.1	30.7	3000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Iron	15-2405	0	6	I	SS		12100	21300		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Lead	15-2405	0	6	I	SS		104	23.3	400	MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3351	Magnesium	15-2405	0	6	I	SS		2060	4610		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Manganese	15-2405	0	6	I	SS		667	714	11000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Potassium	15-2405	0	6	I	SS		2510	3410		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Uranium	15-2405	0	6	I	SS		6.3	5.45		MG/KG			J	ICPMS	18880	30887	RAD
5-004(b)	AAB3351	Vanadium	15-2405	0	6	I	SS		20.7	41.9	560	MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3351	Zinc	15-2405	0	6	I	SS		33	50.8	24000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Aluminium	15-2401	0	5	I	SS		7790	38700		MG/KG	FD		J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Barium	15-2401	0	5	I	SS		1260	315	5600	MG/KG	FD			ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Cadmium	15-2401	0	5	I	SS		5.3	2.7	80	MG/KG	FD			ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Calcium	15-2401	0	5	I	SS		2300	6120		MG/KG	FD			ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Chromium	15-2401	0	5	I	SS		4.7	19.3		MG/KG	FD		J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Copper	15-2401	0	5	I	SS		184	30.7	3000	MG/KG	FD			ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Iron	15-2401	0	5	I	SS		9130	21300		MG/KG	FD			ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Lead	15-2401	0	5	I	SS		782	23.3	400	MG/KG	FD		J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3367	Magnesium	15-2401	0	5	I	SS		1720	4610		MG/KG	FD		J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Manganese	15-2401	0	5	I	SS		422	714	11000	MG/KG	FD			ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Mercury	15-2401	0	5	I	SS		0.32	0.1	24	MG/KG	FD			CVAA	18454	29315	INORGANIC
5-004(b)	AAB3367	Potassium	15-2401	0	5	I	SS		1620	3410		MG/KG	FD			ICPES	18454	29315	INORGANIC

S	Sample	Analyte	Location	Begin Depth	End Depth	Depth Units	Mat	Sym	Value	BKGD Level	Sal Level	Units	Field Code	Code	EPA Qual	Technique	Request	Report	Suite
5-004(b)	AAB3367	Uranium	15-2401	0	5	I	SS		6.4	5.45		MG/KG	FD		J	ICPMS	18880	30887	RAD
5-004(b)	AAB3367	Vanadium	15-2401	0	5	I	SS		17.7	41.9	560	MG/KG	FD		J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3367	Zinc	15-2401	0	5	I	SS		37.9	50.8	24000	MG/KG	FD			ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Aluminium	15-2407	0	6	I	SS		8130	38700		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Arsenic	15-2407	0	6	I	SS		2.4	7.82		MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3371	Barium	15-2407	0	6	I	SS		558	315	5600	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Calcium	15-2407	0	6	I	SS		2360	6120		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Chromium	15-2407	0	6	I	SS		5.2	19.3		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Copper	15-2407	0	6	I	SS		56.1	30.7	3000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Iron	15-2407	0	6	I	SS		9210	21300		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Lead	15-2407	0	6	I	SS		35.9	23.3	400	MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3371	Magnesium	15-2407	0	6	I	SS		1800	4610		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Manganese	15-2407	0	6	I	SS		425	714	11000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Potassium	15-2407	0	6	I	SS		1730	3410		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Uranium	15-2407	0	6	I	SS		20.8	5.45		MG/KG			J	ICPMS	18880	30887	RAD
5-004(b)	AAB3371	Uranium	15-2407	0	6	I	SS		16.9	5.45		MG/KG		D	J	ICPMS	18880	30887	RAD
5-004(b)	AAB3371	Vanadium	15-2407	0	6	I	SS		18.3	41.9	560	MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3371	Zinc	15-2407	0	6	I	SS		47.3	50.8	24000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Aluminium	15-2407	18	24	I	SS		17700	38700		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Arsenic	15-2407	18	24	I	SS		4.6	7.82		MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3372	Barium	15-2407	18	24	I	SS		237	315	5600	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Beryllium	15-2407	18	24	I	SS		1.4	1.95		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Calcium	15-2407	18	24	I	SS		2340	6120		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Chromium	15-2407	18	24	I	SS		10.3	19.3		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Copper	15-2407	18	24	I	SS		9.9	30.7	3000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Iron	15-2407	18	24	I	SS		15700	21300		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Lead	15-2407	18	24	I	SS		37.7	23.3	400	MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3372	Magnesium	15-2407	18	24	I	SS		2490	4610		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Manganese	15-2407	18	24	I	SS		527	714	11000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Potassium	15-2407	18	24	I	SS		2290	3410		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Uranium	15-2407	18	24	I	SS		4.1	5.45		MG/KG			J	ICPMS	18880	30887	RAD
5-004(b)	AAB3372	Vanadium	15-2407	18	24	I	SS		27.3	41.9	560	MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3372	Zinc	15-2407	18	24	I	SS		35.7	50.8	24000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Aluminium	15-2416	18	24	I	SS		20400	38700		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Barium	15-2416	18	24	I	SS		234	315	5600	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Beryllium	15-2416	18	24	I	SS		1.5	1.95		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Cadmium	15-2416	18	24	I	SS		0.07	2.7	80	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Calcium	15-2416	18	24	I	SS		2480	6120		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Chromium	15-2416	18	24	I	SS		9.8	19.3		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Copper	15-2416	18	24	I	SS		8.6	30.7	3000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Iron	15-2416	18	24	I	SS		15400	21300		MG/KG				ICPES	18454	29315	INORGANIC

RS	Sample	Analyte	Location	Begin Depth	End Depth	Depth Units	Mat	Sym	Value	BKGD Level	Sal Level	Units	Field Code	Code	EPA Qual	Technique	Request	Report	Suite
5-004(b)	AAB3376	Lead	15-2416	18	24	I	SS		17.5	23.3	400	MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3376	Magnesium	15-2416	18	24	I	SS		2630	4610		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Manganese	15-2416	18	24	I	SS		497	714	11000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Potassium	15-2416	18	24	I	SS		2760	3410		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Uranium	15-2416	18	24	I	SS		3.5	5.45		MG/KG			J	ICPMS	18880	30887	RAD
5-004(b)	AAB3376	Vanadium	15-2416	18	24	I	SS		25.6	41.9	560	MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3376	Zinc	15-2416	18	24	I	SS		33.7	50.8	24000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3385	Copper	RINSATE				W		41		1300	UG/L	EB			ICPES	18685	27550	INORGANIC
5-004(b)	AAB3385	Lead	RINSATE				W		4		50	UG/L	EB			ICPMS	18685	27912	INORGANIC
5-004(b)	AAB3385	Sodium	RINSATE				W		130			UG/L	EB			ICPES	18685	27550	INORGANIC
5-004(b)	AAB3385	Zinc	RINSATE				W		36		10000	UG/L	EB			ICPES	18685	27550	INORGANIC
5-004(b)	AAB3497	Aluminium	15-2416	0	6	I	SS		13700	38700		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Arsenic	15-2416	0	6	I	SS		3.1	7.82		MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3497	Barium	15-2416	0	6	I	SS		220	315	5600	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Beryllium	15-2416	0	6	I	SS		1.2	1.95		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Calcium	15-2416	0	6	I	SS		2070	6120		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Chromium	15-2416	0	6	I	SS		8.2	19.3		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Copper	15-2416	0	6	I	SS		8.8	30.7	3000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Iron	15-2416	0	6	I	SS		11800	21300		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Lead	15-2416	0	6	I	SS		28.3	23.3	400	MG/KG			J	GFAA	18454	29315	INORGANIC
5-004(b)	AAB3497	Magnesium	15-2416	0	6	I	SS		2050	4610		MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Manganese	15-2416	0	6	I	SS		473	714	11000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Potassium	15-2416	0	6	I	SS		2720	3410		MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Uranium	15-2416	0	6	I	SS		8.4	5.45		MG/KG			J	ICPMS	18880	30887	RAD
5-004(b)	AAB3497	Vanadium	15-2416	0	6	I	SS		19.7	41.9	560	MG/KG			J	ICPES	18454	29315	INORGANIC
5-004(b)	AAB3497	Zinc	15-2416	0	6	I	SS		27.4	50.8	24000	MG/KG				ICPES	18454	29315	INORGANIC
5-004(b)	AAC0921	Actinium-228	15-2413	0	6	I	SS		1.56			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0921	Actinium-228	15-2413	0	6	I	SS		1.838			PCI/G		D		G	20326	35641	RAD
5-004(b)	AAC0921	Aluminium	15-2413	0	6	I	SS		17600	38700		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0921	Americium-241	15-2413	0	6	I	SS	-	0.033		17	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0921	Arsenic	15-2413	0	6	I	SS		4.4	7.82		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0921	Barium	15-2413	0	6	I	SS		277	315	5600	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0921	Beryllium	15-2413	0	6	I	SS		1.4	1.95		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0921	Bismuth-211	15-2413	0	6	I	SS		4.161			PCI/G		D		G	20326	35641	RAD
5-004(b)	AAC0921	Bismuth-211	15-2413	0	6	I	SS		3.87			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0921	Bismuth-212	15-2413	0	6	I	SS	-	1.02			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0921	Bismuth-212	15-2413	0	6	I	SS		1.69			PCI/G		D		G	20326	35641	RAD
5-004(b)	AAC0921	Bismuth-214	15-2413	0	6	I	SS		1.4			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0921	Bismuth-214	15-2413	0	6	I	SS		1.401			PCI/G		D		G	20326	35641	RAD
5-004(b)	AAC0921	Cadmium	15-2413	0	6	I	SS		1.4	2.7	80	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0921	Calcium	15-2413	0	6	I	SS		2730	6120		MG/KG				ICPES	20296	34914	INORGANIC

PRS	Sample	Analyte	Location	Begin Depth	End Depth	Depth Units	Mat	Sym	Value	BKGD Level	Sal Level	Units	Field Code	Code	EPA Qual	Technique	Request	Report	Suite
15-004(b)	AAC0921	Cerium-144	15-2413	0	6	I	SS		0.191		64	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Cesium-134	15-2413	0	6	I	SS	-	0.442		1.8	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Cesium-137	15-2413	0	6	I	SS		0.266	1.4	4	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Cesium-137	15-2413	0	6	I	SS		0.2466	1.4	4	PCI/G		D		G	20326	35641	RAD
15-004(b)	AAC0921	Chromium	15-2413	0	6	I	SS		13.2	19.3		MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Cobalt-57	15-2413	0	6	I	SS	-	0.0511		40	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Cobalt-60	15-2413	0	6	I	SS		0.0135		0.9	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Copper	15-2413	0	6	I	SS		12.8	30.7	3000	MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Iron	15-2413	0	6	I	SS		17600	21300		MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Lead	15-2413	0	6	I	SS		55.2	23.3	400	MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Lead-210	15-2413	0	6	I	SS		0.402			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Lead-211	15-2413	0	6	I	SS	-	621			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Lead-212	15-2413	0	6	I	SS		1.84			PCI/G		D		G	20326	35641	RAD
15-004(b)	AAC0921	Lead-212	15-2413	0	6	I	SS		1.92			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Lead-214	15-2413	0	6	I	SS		1.508			PCI/G		D		G	20326	35641	RAD
15-004(b)	AAC0921	Lead-214	15-2413	0	6	I	SS		2.42			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Magnesium	15-2413	0	6	I	SS		2620	4610		MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Manganese	15-2413	0	6	I	SS		681	714	11000	MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Manganese-54	15-2413	0	6	I	SS		0.0358		3.4	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Nickel	15-2413	0	6	I	SS		11.7	15.2	1600	MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Potassium	15-2413	0	6	I	SS		3460	3410		MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0921	Potassium-40	15-2413	0	6	I	SS		20.2	28.6	12	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Potassium-40	15-2413	0	6	I	SS		20.13	28.6	12	PCI/G		D		G	20326	35641	RAD
15-004(b)	AAC0921	Protactinium-231	15-2413	0	6	I	SS		3.04			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Protactinium-234M	15-2413	0	6	I	SS		4.56			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Radium-223	15-2413	0	6	I	SS		0.323			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Radium-224	15-2413	0	6	I	SS		5.05			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Radium-226	15-2413	0	6	I	SS		3.826		5	PCI/G		D		G	20326	35641	RAD
15-004(b)	AAC0921	Radium-226	15-2413	0	6	I	SS		2.63		5	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Radon-219	15-2413	0	6	I	SS		0.249			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Ruthenium-106	15-2413	0	6	I	SS	-	2.56		14	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Sodium-22	15-2413	0	6	I	SS		0.029		1.3	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Thallium-208	15-2413	0	6	I	SS		0.5564			PCI/G		D		G	20326	35641	RAD
15-004(b)	AAC0921	Thallium-208	15-2413	0	6	I	SS		0.64			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Thorium-227	15-2413	0	6	I	SS		24.3			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Thorium-234	15-2413	0	6	I	SS		3.19			PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Thorium-234	15-2413	0	6	I	SS		2.971			PCI/G		D		G	20326	35641	RAD
15-004(b)	AAC0921	Uranium	15-2413	0	6	I	SS		4.22	5.45		MG/KG		D		KPA	20326	35661	RAD
15-004(b)	AAC0921	Uranium	15-2413	0	6	I	SS		4.3	5.45		MG/KG			J	KPA	20326	35661	RAD
15-004(b)	AAC0921	Uranium-235	15-2413	0	6	I	SS	-	0.0763	0.084	18	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0921	Vanadium	15-2413	0	6	I	SS		29.5	41.9	560	MG/KG				ICPES	20296	34914	INORGANIC

PS	Sample	Analyte	Location	Begin Depth	End Depth	Depth Units	Mat	Sym	Value	BKGD Level	Sal Level	Units	Field Code	Code	EPA Qual	Technique	Request	Report	Suite
5-004(b)	AAC0921	Zinc	15-2413	0	6	I	SS		41.7	50.8	24000	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Actinium-228	15-2406	0	6	I	SS		1.23			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Aluminium	15-2406	0	6	I	SS		7750	38700		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Americium-241	15-2406	0	6	I	SS	-	0.0724		17	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Arsenic	15-2406	0	6	I	SS		2.9	7.82		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Barium	15-2406	0	6	I	SS		1550	315	5600	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Bismuth-211	15-2406	0	6	I	SS		3.33			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Bismuth-212	15-2406	0	6	I	SS		0.816			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Bismuth-214	15-2406	0	6	I	SS		1.07			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Cadmium	15-2406	0	6	I	SS		4.5	2.7	80	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Calcium	15-2406	0	6	I	SS		2950	6120		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Cerium-144	15-2406	0	6	I	SS	-	0.392		64	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Cesium-134	15-2406	0	6	I	SS	-	0.0238		1.8	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Cesium-137	15-2406	0	6	I	SS		0.772	1.4	4	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Chromium	15-2406	0	6	I	SS		8.8	19.3		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Cobalt-57	15-2406	0	6	I	SS	-	0.0157		40	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Cobalt-60	15-2406	0	6	I	SS	-	0.373		0.9	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Copper	15-2406	0	6	I	SS		338	30.7	3000	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Iron	15-2406	0	6	I	SS		11200	21300		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Lead	15-2406	0	6	I	SS		921	23.3	400	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Lead-210	15-2406	0	6	I	SS		8.62			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Lead-211	15-2406	0	6	I	SS	-	311			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Lead-212	15-2406	0	6	I	SS		1.33			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Lead-214	15-2406	0	6	I	SS		1.12			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Magnesium	15-2406	0	6	I	SS		1760	4610		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Manganese	15-2406	0	6	I	SS		388	714	11000	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Manganese-54	15-2406	0	6	I	SS	-	0.0369		3.4	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Potassium	15-2406	0	6	I	SS		2100	3410		MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Potassium-40	15-2406	0	6	I	SS		20.8	28.6	12	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Protactinium-231	15-2406	0	6	I	SS		1.84			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Protactinium-234M	15-2406	0	6	I	SS		20.3			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Radium-223	15-2406	0	6	I	SS		0.153			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Radium-224	15-2406	0	6	I	SS		3.64			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Radium-226	15-2406	0	6	I	SS		4.08		5	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Radon-219	15-2406	0	6	I	SS		0.0242			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Ruthenium-106	15-2406	0	6	I	SS	-	1.31		14	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Selenium	15-2406	0	6	I	SS		1.4	1.7	400	MG/KG				ICPES	20296	34914	INORGANIC
5-004(b)	AAC0997	Sodium-22	15-2406	0	6	I	SS		0.0749		1.3	PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Thallium-208	15-2406	0	6	I	SS		0.406			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Thorium-227	15-2406	0	6	I	SS		30.6			PCI/G				G	20326	35641	RAD
5-004(b)	AAC0997	Thorium-234	15-2406	0	6	I	SS		4.45			PCI/G				G	20326	35641	RAD

PRS	Sample	Analyte	Location	Begin Depth	End Depth	Depth Units	Mat	Sym	Value	BKGD Level	Sal Level	Units	Field Code	Code	EPA Qual	Technique	Request	Report	Suite
15-004(b)	AAC0997	Uranium	15-2406	0	6	I	SS		8.82	5.45		MG/KG			J	KPA	20326	35661	RAD
15-004(b)	AAC0997	Uranium-235	15-2406	0	6	I	SS		0.4	0.084	18	PCI/G				G	20326	35641	RAD
15-004(b)	AAC0997	Vanadium	15-2406	0	6	I	SS		20.8	41.9	560	MG/KG				ICPES	20296	34914	INORGANIC
15-004(b)	AAC0997	Zinc	15-2406	0	6	I	SS		47.3	50.8	24000	MG/KG				ICPES	20296	34914	INORGANIC

Annex 7.8
VCA Checklist and Field Work Authorization Form

Voluntary Corrective Action (VCA)
Checklist and Fieldwork Authorization Form

PRS No. 15-004(b) 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._____

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 5/14/96

FPC _____ Date 5-14-96

Through reviewing the VCA Plan, for site(s) 15-004(b) and believing that the above criteria have been met, I authorize the fieldwork to proceed.

DOE ER Program Manager _____ Date 5/16/96

Annex 7.9
Cost Estimate

BUDGET

Plan Development	28,000
Mobilization	7,500
Cleanup	18,000
Verification Sampling	4,600
Lab Analyses/Waste Disposal	7,000
Field Screening	1,500
Demobilization/Restore Site	1,200
Reporting	12,000
Total Estimated Cost	79,800

REFERENCE

Environmental Restoration Project Assessments Council, March 28, 1995. "Statistical Comparisons to Background, Part I," Los Alamos National Laboratory Report LA-UR-95-1217, Los Alamos, New Mexico. (Environmental Restoration Project Assessments Council 1995, 1218)

EPA (US Environmental Protection Agency), February 1989. "Methods for Evaluating the Attainment of Cleanup Standards," Volume 1: Soils and Solid Media, EPA 230/02-89-042, National Technical Information Service, Springfield, Virginia. (EPA 1989, 0794)

EPA (US Environmental Protection Agency), July 1992. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Third Edition. Final Update 1, Office of Solid Waste and Emergency Response, Washington, D.C. (EPA 1992, 1207)

EPA (US Environmental Protection Agency), August 1995. "List of Deficiencies, LANL Class III Permit Modification, Six Expedited Cleanups." (EPA 1995)

Fresquez, P., January 3, 1991. "An Environmental Restoration Interim Action (ERIA) Reconnaissance Survey Over Areas Where Wastewater Collection Lines are Planned to Be Installed en Route to the New Sanitary Wastewater Systems Consolidation (SWSC)Treatment Plant at TA-46." Los Alamos National Laboratory memorandum HSE-8:91-8 to Distribution from Phil Fresquez (HSE-8), Los Alamos, New Mexico. (Fresquez 1991, 10-0003)

Fritzsche, A.E., September 1989, "An Aerial Radiological Survey of Technical Area 15 and Surroundings at Los Alamos National Laboratory," Los Alamos, New Mexico. (Fritzsche 1989, 10-0033)

LANL (Los Alamos National Laboratory), "RFI Work Plan for OU 1086," July 1993. (LANL 1993)

LANL, February 1995. "RCRA Waste Analysis Plan," Final Draft. (LANL 1995)