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# Statement of Basis Approval of No Further Action Volume 1 of 30 January 2000 ER Site 22 Operable Unit 1334 Round 2

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**Statement of Basis  
Approval of No Further Action  
Volume 1 of 30**

**January 2000**

**ER Site 22  
Operable Unit 1334  
Round 2**

(RCRA Permit No. NM5890110518)

NFA Originally Submitted August 28, 1995  
NOD Originally Submitted October 1996

**Environmental  
Restoration  
Project**



**United States Department of Energy  
Albuquerque Operations Office**

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# 1. Introduction

## 1.1 ER Site Identification Number and Name

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a confirmatory sampling no further action (NFA) decision for Environmental Restoration (ER) Site 22, Storage/Burn Area, Operable Unit (OU) 1334. ER Site 22, formerly included in OU 1266, was identified in the Hazardous and Solid Waste Amendment (HSWA) Module IV [Environmental Protection Agency (EPA August 1993)] of the SNL/NM Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Facility Permit (NM5890110518) (EPA August 1992).

## 1.2 SNL/NM Confirmatory Sampling NFA Process

This proposal for a determination of a confirmatory sampling NFA decision has been prepared using the criteria presented in Section 4.5.3 of the SNL/NM Program Implementation Plan (PIP) (SNL/NM February 1995). Specifically, this proposal will "contain information demonstrating that there are no releases of hazardous waste (including hazardous constituents) from solid waste management units (SWMU) at the facility that may pose a threat to human health or the environment" [as proposed in the Code of Federal Regulations (CFR) Section 40 Part 264.51(a)(2)] (EPA July 1990). The HSWA Module IV contains the same requirements for an NFA demonstration:

Based on the results of the RFI (RCRA Facility Investigation) and other relevant information, the Permittee may submit an application to the Administrative Authority for a Class III permit modification under 40 CFR 270.42(c) to terminate the RFI/CMS (corrective measures study) process for a specific unit. This permit modification application must contain information demonstrating that there are no releases of hazardous waste including hazardous constituents from a particular SWMU at the facility that pose threats to human health and/or the environment, as well as additional information required in 40 CFR 270.42(c) (EPA August 1993).

If the available archival evidence is not considered convincing, SNL/NM performs confirmatory sampling to increase the weight of the evidence and allow an informed decision on whether to proceed with the administrative-type NFA or to return to the site characterization program for additional data collection (SNL/NM February 1995).

The EPA acknowledged that the extent of sampling required may vary greatly, stating that:

...[T]he agency does not intend this rule (the second codification of HSWA) to require extensive sampling and monitoring at every SWMU...Sampling is generally required only in situations where there is insufficient evidence on which to make an initial release determination. ...[T]he actual extent of sampling will vary...depending on the amount and quality of existing information available (EPA December 1987).

In requesting a confirmatory sampling NFA decision for ER Site 22, Storage/Burn Area, this proposal is using existing administrative/archival information and the results of confirmatory sampling conducted in December 1994 to satisfy the permit requirements. Appendix A presents the sampling and analysis plan that was implemented. This unit is eligible for an administrative NFA proposal based on one or more of the following criteria taken from the RCRA Facility Assessment (RFA) Guidance (EPA October 1986):

- Criterion A: The unit has never contained constituents of concern
- Criterion B: The unit has design and/or operating characteristics that effectively prevent releases to the environment
- Criterion C: The unit clearly has not released hazardous waste or constituents into the environment

Specifically, ER Site 22 is being proposed for a confirmatory sampling NFA decision because the site clearly has not released hazardous waste or constituents into the environment (Criterion C).

### ***1.3 Local Setting***

SNL/NM occupies 2,829 acres of land owned by the Department of Energy (DOE) with an additional 14,920 acres of land provided by land-use permits with Kirtland Air Force Base (KAFB), the United States Forest Service (USFS), the State of New Mexico, and the Isleta Indian Reservation. SNL/NM has been involved in nuclear weapons research, component development, assembly, testing, and other nuclear activities since 1945.

ER Site 22 (Figure 1-1) lies on unassigned federally-owned land controlled by KAFB which is located on the western flank of Optical Range Hill between two arroyo channels. The site covers less than 0.1 acres of land at a mean elevation of 5,890 feet above sea level (SNL/NM April 1994).

ER Site 22 lies on thin alluvial deposits correlated to the Salas Complex, with permeabilities ranging from 0.6 to 2.0 inches per hour (USDA June 1977). The geologic and hydrologic conditions at ER Site 22 are expected to be similar to those measured at the Optical Range Well (approximately one-half mile southeast), because both locations lie to the east of Coyote Fault and its associated splays. Geologic information obtained from the lithologic log compiled for the Optical Range Well indicates that the local area is covered with 20 to 40 feet of proximal to mid-fan alluvial deposits underlain by Precambrian granite. The alluvial deposits at ER Site 22 appear to be thin and unconformably overlie a Precambrian metarhyolite. When the Optical Range Well was completed in 1987, the depth to ground water was measured at 150 feet (IT May 1994a). Depth to ground water at ER Site 22 is estimated to be 55 feet (IT May 1994a).

## **2. History of the SWMU**

### ***2.1 Sources of Supporting Information***

In preparation to request a confirmatory sampling NFA decision for ER Site 22, SNL/NM conducted a background archival study and collected soil samples to confirm that no release of hazardous constituents occurred. Background information sources included existing records and reports of site activity. Interviews were conducted with SNL/NM staff and contractors familiar with site operational history. The background archival study was completely documented and has provided traceable references that sustain the integrity of this proposal. The analytical results from the confirmatory samples verify that during the site operational history, hazardous waste or constituents clearly have not been released into the environment.

The following information sources, hierarchically listed with respect to assigned validity, were available for use in the evaluation of ER Site 22.

- One (1) analytical laboratory report related to confirmatory sampling
- One analytical laboratory report related to asbestos sampling
- One surface gamma radiation survey report
- One unexploded ordnance (UXO)/high explosive (HE) survey
- Four historical aerial photographs spanning 20 years
- Four interviews with four SNL/NM facility personnel (current and retired)
- Miscellaneous information sources, including the SNL/NM Geographic Information System and SNL/NM personnel correspondence (memorandums, letters, and notes)
- Photographs and field notes from several site inspections conducted by SNL/NM staff
- Field screening for organic vapors, dust, and radioactivity
- The Comprehensive Environmental Assessment and Response Program (CEARP) Phase I report (DOE September 1987) and CEARP records contained in the Environmental Operations Records Center
- The RFA report (EPA April 1987)
- Confirmatory sampling and analysis plan for ER Site 22



Using this information, a brief history of ER Site 22 and a discussion of all relevant evidence regarding past practices and releases at the site have been prepared and are presented in this proposal for a confirmatory sampling NFA decision.

## ***2.2 Previous Audits, Inspections, and Findings***

ER Site 22 was identified during investigations conducted under the CEARP (DOE September 1987). The CEARP noted that the area contained one 55-gallon drum, several wooden pallets, and evidence of past burning. The regulatory disposition of the SWMU was uncertain because of a lack of knowledge of the activities conducted or of the use of hazardous waste or constituents at the SWMU. Insufficient information also prevented calculating a Hazard Ranking System score for the SWMU.

Subsequent to the CEARP inspection, the EPA conducted an RFA. In the RFA report (EPA April 1987), this SWMU was relabeled a burn pit, although no burn pit could be found. The report mistakenly described the single 55-gallon drum identified in the CEARP investigation as several 55-gallon drums, and correctly identified the wooden pallets. However, the report included no information on waste streams and concludes that the potential for release is unknown because the materials handled at the site are unknown.

## ***2.3 Historical Operations***

ER Site 22 (Figure 2-1) is a small, irregularly shaped fenced area, approximately 50 by 50 feet (Figure 2-2a). The approximately 3-foot-high, five-strand barbed-wire fence is in poor condition. No signs or placards appear on the fence, with the exception of the ER site posting. The area inside the fence contains one empty 55-gallon drum, several wooden pallets, charcoal, and scraps of fiberboard. The top of the drum has been cut off, and the bottom of the drum is discolored from heat, indicating the drum may have been used as a fire barrel. Charcoal is scattered on the south side of the fenced area (Figure 2-2b). The wooden pallets show evidence of past burning, but no burn pit is visible at the SWMU. It appears that the only burning that took place at the site was a small wood fire in the drum. A utility right-of-way cuts the southwest corner of the site and consists of overhead power lines and an underground fiber-optic cable.

The physical appearance of this SWMU suggests that it may have been a storage or staging area. The project for which this SWMU was constructed is not known. No documentation on this SWMU has been found, and none of the current or former SNL/NM personnel interviewed have provided any information about the SWMU (22-15, 22-16). It is unknown what waste materials, if any, may have been associated with the SWMU, because the nature of the SWMU has not been confirmed.

A historical aerial photograph interpretation study indicates that no man-made features were evident in the vicinity of ER Site 22 in 1971 (USGS 1971). However, a historical aerial photograph taken in 1975 (USGS 1975) shows both an east-west oriented road that passes

near the ER Site 22 area and a faint clear-cut area just north of the road that may be ER Site 22. A 1983 historical aerial photograph shows a single utility pole adjacent to the site (USDA 1983). The location of ER Site 22 along the utility right-of-way suggests that the site may have been associated with the development of a power line to the Optical Range.

### **3. Evaluation of Relevant Evidence**

#### ***3.1 Unit Characteristics***

ER Site 22 contains one empty 55-gallon drum, several wooden pallets, charcoal, and scraps of fiberboard (Figures 2-1, 2-2a, and 2-2b). The purpose of this unit is not known, but the materials present suggest the SWMU was used as a storage or staging area for local construction activities.

#### ***3.2 Operating Practices***

There are no records on operating practices at ER Site 22. It is unknown whether hazardous materials or wastes were managed or contained at ER Site 22. The top of the 55-gallon drum has been cut off and the bottom of the drum is discolored from heat, possibly indicating the drum was used as a fire barrel. Charcoal is scattered on the south side of the fenced area and the wooden pallets show evidence of past burning, but no burn pit is visible at the SWMU.

#### ***3.3 Presence or Absence of Visual Evidence***

There is no visual evidence at ER Site 22 indicating that the site released hazardous waste or constituents into the environment.

#### ***3.4 Results of Previous Sampling/Surveys***

##### ***3.4.1 Surface-Soil Sampling***

This SWMU had been scheduled for supplementary reconnaissance sampling under the CEARP, but it appears this sampling was never performed as no analytical data have been identified.

##### ***3.4.2 UXO/HE Survey***

In January 1994, KAFB Explosive Ordnance Division (EOD) conducted a visual survey for UXO/HE on the ground surface at the site. No live UXO/HE or UXO/HE debris was found (22-20).

##### ***3.4.3 Gamma Radiation Survey***

In February 1994, RUST Geotech Inc. conducted a surface gamma radiation survey at the site. The survey used a scintillometer containing a sodium-iodide detector to measure gamma

radiation. No anomalies were detected above the background readings of 10 to 13 microrentgen per hour (RUST Geotech Inc. December 1994).

#### ***3.4.4 Asbestos Survey***

Bulk fiberboard found at the site was sampled on October 5, 1994, and analyzed to determine if it contains asbestos. Test results indicate that there is no asbestos in the fiberboard (22-22).

### ***3.5 Assessment of Gaps in Information***

There is an absence of definitive records stating that hazardous waste or constituents were ever handled, stored, or disposed of at ER Site 22. However, recent ER Project interviews, historical aerial photographs, negative results for the UXO/HE and gamma radiation surveys, and the laboratory analyses of confirmatory surface-soil samples collected in December 1994 fill the data gap arising from the insufficient or incomplete archival records. The physical and chemical data indicate that the site never contained hazardous waste or constituents.

### ***3.6 Confirmatory Sampling***

Soil samples were collected at six sample locations at two depth intervals; three background locations (22-001 to 22-003) and three on-site locations (22-004 to 22-006) as listed in Table 3-1. Field screening for organic vapors and radiological activity was performed at the sampling locations during the sampling activities. All sample locations were land surveyed using a Global Positioning System to an accuracy of  $\pm 2$  ft. Sampling equipment and sample collection containers were swipe sampled for removable radiological contamination to release the equipment from the site.

#### ***3.6.1 Field Screening***

During soil sampling activities at ER Site 22, field screening measurements were taken at all soil sampling locations. The field screening was conducted in accordance with the methodologies prescribed in the sampling and analysis plan (Appendix A). The field screening was performed with a photoionization detector (PID) for organic vapors and a Geiger-Mueller (G-M) beta-gamma pancake probe and sodium-iodide scintillation detector for radionuclides.

##### ***3.6.1.1 Organic Vapor***

###### **Organic Vapor**

A PID monitor was used to monitor for the presence of organic (and some inorganic) vapor in air. The field screening locations are shown in Figure 3-1, and the field screening measurements are listed in Table 3-2. The background reading on the PID during the field screening for organic vapor was 0.3 parts per million (ppm). There were no detectable organic vapors at sample locations 22-002 through 22-005. The field screening measurement recorded at sample location 22-006 was at background (0.3 ppm) in the 0- to 6-inch interval. Organic vapor was detected at the background sample location 22-001 at 0.6 to 0.7 ppm in

the 0- to 6-inch interval. Organic vapor detected by the PID monitor during sampling activities never exceeded the action level of 5.0 ppm that would trigger collection of a soil sample for volatile organic compound (VOC) analysis.

### *3.6.1.2 Radioactivity*

Radiological screening was performed at all sampling locations shown in Figure 3-1. The field screening was performed with a G-M beta-gamma pancake probe and sodium-iodide scintillation detector in accordance with the methodologies prescribed in the sampling and analysis plan (Appendix A). Background beta-gamma activity was recorded at 12,800 counts per minute (cpm). Activities at both the background sample locations and on-site sample locations ranged from 9,830 to 10,600 cpm. In addition, these activities never exceeded the action level of background plus 2 standard deviations that would trigger collection of a soil sample for radionuclide analyses.

### *3.6.2 Laboratory Analytical Results for Soil Samples*

A total of 12 soil samples and one duplicate sample were collected and analyzed to support the NFA proposal for ER Site 22. The samples were collected from three background locations and three on-site locations at the 0- to -6-inch and 18 to 24-inch depth intervals (Figure 3-1) in accordance with the methodologies prescribed in Appendix A. The samples are identified as shown in Table 3-1.

Analytical results obtained from the confirmatory sampling are summarized in Tables 3-2, 3-3, and 3-4. The analytical data packages along with Quality Assurance/Quality Control (QA/QC) documentation are readily available and can be viewed in the SNL/NM Environmental Operations Records Center. The analytical fractions and corresponding analytical laboratory used to perform analyses on each fraction include:

- Metals, semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs)—Quanterra Inc. Laboratory, Arvada, Colorado
- Gamma spectroscopy—SNL/NM Department 7715 Laboratory
- Isotopic thorium and isotopic uranium by alpha spectroscopy—TMA/Eberline Albuquerque Laboratory

The background samples were analyzed for metals by EPA Methods 6010/7000 Series, gamma-emitting radionuclides by gamma spectroscopy and isotopic thorium and isotopic uranium by alpha spectroscopy. On-site samples were analyzed for metals by EPA Methods 6010/7000 Series, SVOCs by EPA Method 8270, and PCBs by EPA Method 8080. Because no VOC or elevated radiation levels were detected at any of the sampling locations during field screening activities, no VOC and radiological analyses were performed on the on-site samples in accordance with the sampling plan (Appendix A).

### *3.6.2.1 Metals Analyses*

Results from metals analyses are summarized in Table 3-2. All concentrations for the 0- to 6-inch and 18 to 24-inch depth on-site samples fall within or below the range for the background samples. Additionally, all background samples and on-site samples fall within or below the range for SNL/NM background levels (listed in Table 3-2), and are below the action levels (listed in Table 3-2).

### *3.6.2.2 Organic Compound Analyses*

#### Target Compound List SVOCs

Six on-site soil samples and one duplicate (18- to 24-inch depth) sample were analyzed for SVOCs using EPA Method 8270. SVOCs were not detected in any of these samples at the method detection limit. Phenol was detected with an estimated value of 3.0 micrograms per liter (µg/L) in the rinsate blank and is likely attributable to laboratory contamination.

#### Target Compound List PCBs

Six on-site soil samples and one duplicate sample (18 to 24-inch depth) were analyzed for PCBs using EPA Method 8080. The samples contained no detectable concentration of PCBs at the method detection limit.

### *3.6.2.3 Radiological Analyses*

#### Radionuclides (Gamma Spectroscopy and Alpha Spectroscopy)

All of the soil samples collected contained detectable gamma-emitting and alpha-emitting radionuclide activities. Detectable radionuclides included members of the uranium and thorium natural decay series, naturally occurring potassium-40, and cesium-137 (a fission product resulting from atmospheric testing of nuclear weapons). All measured activities fall within the background range for radionuclides in soil at the site and at SNL/NM (listed in Tables 3-3 and 3-4). Additionally, the activity ratios of the daughter nuclides to parents are approximately unity, indicating the decay chains are in secular equilibrium and naturally occurring (i.e., no anthropogenic source). Because all radiological screening results were within background measurements for on-site sample locations, no radiological analyses were performed on the on-site soil samples.

### *3.6.3 QC Summary*

Field and laboratory QC samples were analyzed so that data quality could be evaluated. The following subsections summarize the QC data and findings.

#### *3.6.3.1 Data Verification and Validation*

Verification and validation of chemical measurement data were performed in accordance with the SNL/NM Environmental Operations Center "Verification and Validation of Chemical and

Radiochemical Data" Revision 0 (TOP 94-03) (SNL/NM July 1994). Data validation was performed on the inorganic and organic data using Level 1, Level 2, and Level 3 checklists specified in the above procedure. Data validation was performed on the radiochemical data using Level 1 and Level 2 checklists.

### *3.6.3.2 Field QC Data*

Field QC samples submitted to the contract laboratory during sampling activities at ER Site 22 included one field duplicate sample and one equipment rinsate blank. The analytical laboratory prepared one matrix spike and one matrix spike duplicate from sample 22-S2-004-F. Results for the QC samples are discussed below.

#### Field Duplicate Sample

One duplicate soil sample (ER sample 22-S2-005-DU) was collected from the sample location 22-005 at the 18- to 24-inch interval. The duplicate sample was analyzed for the same chemical and radionuclide parameters as its counterpart. The results of the duplicate are consistent with its counterpart.

#### Equipment Rinsate Blank

One aqueous full-suite equipment rinsate blank sample was collected following completion of soil sampling and final equipment decontamination at ER Site 22. No metals, PCBs, or SVOCs were detected in the full-suite rinsate blank at levels above the reporting limit in the rinsate blank. The results obtained from analysis of the equipment rinsate blank sample indicates that decontamination procedures were effective and project samples were not cross-contaminated by the sampling equipment.

#### Matrix Spike Analysis

Matrix spike and matrix spike duplicate analyses were performed to assess sample matrix effects on analytical accuracy and in accordance with requirements of the sampling plan (Appendix A). The field team supervisor designated the soil sample SNLA021094-1 from sample location 22-004 at the 18-to -24-inch interval for matrix spike analysis on the Analysis Request/Chain of Custody Record that accompanied the samples to the contract laboratory. The matrix spike was performed for all fractions of the sample in accordance with approved laboratory procedures. Matrix spike results were reported in the laboratory analytical data report as percent recovery and relative percent difference (RPD) calculations. All analytes had RPD less than or equal to the acceptance limit of 20 percent.

### *3.6.4 Laboratory QC Data*

Laboratory QC samples were analyzed at the laboratories, and the data were included in the analytical reports with cross references to the corresponding ER samples. Laboratory QC data included organic surrogate spike, duplicate control sample, single control sample, and method blank analyses. For the chemical analyses, the analytical data sheets for each sample included



the nominal reporting limit for the parameters reported. QC excursions are discussed in the narrative to the Quanterra analytical report and are noted on the Level 2 and the Level 3 checklists and the narrative report.

#### Surrogate Spike Analyses

Sample SNLA021100-1, the aqueous rinsate blank, had unacceptable surrogate spike recoveries (i.e., equal to or less than 25 percent of the true value). This was attributed to matrix interferences by the laboratory. The results would not be expected to impact soil matrix environmental samples, and the soil samples are unaffected.

#### Laboratory QC Findings

Several laboratory QC findings relating to internal standard and control sample compound recoveries are discussed in the analytical report narrative and noted on the data review checklists. The findings either do not apply to the ER Site 22 soil sampling because no contaminants were reported or do not significantly affect data quality based upon the laboratory review and SNL/NM QA/QC review of the sample data and the entire set of QC data for the analytical batch.

Quantitation limits were less than applicable regulatory limits for most analyses. All investigative samples called for in the sampling plan (Appendix A) were collected and analyzed. Consequently, data completeness approached 100 percent. Laboratory QC results are acceptable.

In summary, QA/QC support data for these soil samples indicate that the samples meet Level III criteria.

#### *3.6.5 Nonconformances/Variations to Sampling and Analysis Plan*

A nonconformance is an unplanned and unintended deviation from the established sampling and analysis plan or procedures. Several nonconformances/variances occurred during field soil sample collection activities at ER Site 22 in December 1994. A field blank sample was not collected during sampling activities at ER Site 22. As outlined in the SNL/NM Generic Quality Assurance Project Plan (Appendix F of the Program Implementation Plan [SNL/NM February 1995]), one field blank will be collected for every 20 environmental samples collected. Because no contaminants were detected above their respective reporting limits in the equipment rinsate sample or soil samples, not collecting the field blank will not adversely affect the overall sampling program.

No PID field screening measurements were taken at sample locations 22-004 and 22-005 at the 18- to 24-inch depth interval. In addition, a radiological screening measurement was not obtained from sample location 22-006 at the 18- to 24-inch depth interval. Because field screening measurements were taken at all of these sample locations at the 0- to 6-inch depth interval for organic vapor and radiological activity, these nonconformances will not adversely affect the overall sampling program.

One analytical laboratory reported several nonconformances during sample analysis; however, the validity of analytical results was not adversely affected.

### ***3.7 Rationale for Pursuing a Confirmatory Sampling NFA Decision***

SNL/NM is proposing an administrative NFA decision for ER Site 22 because the SWMU clearly has not released hazardous waste or constituents to the environment (Criterion C). The site consists of a 55-gallon drum with the top cut off, several wooden pallets, some fiberboard pieces, and some burned wood and charcoal. There are no materials present that suggest hazardous waste or constituents were ever handled or managed at this site.

The site first appeared as a clear-cut area on a 1975 historical aerial photograph (USGS 1975). An inspection conducted under the CEARP in 1985 noted the area contained one 55-gallon drum, several wooden pallets, and evidence of past burning. Subsequent to the CEARP inspection, the EPA conducted an RFA. The RFA report refers to the site as a burn pit, but no burn pit is located on the site. The only evidence that burning took place is the appearance of the drum and the charcoal pieces on the ground beside the drum which suggests that it was used as a burn barrel. No additional information concerning past uses of the SWMU has been found. However, there is no physical evidence that suggests site activities generated hazardous waste constituents.

In January 1994, a UXO/HE survey conducted by KAFB EOD found no live UXO/HE or UXO/HE debris at the site (22-20). In February 1994, a surface gamma radiation survey of the site was performed, and no activity was found above the background levels (RUST Geotech Inc. December 1994). Confirmatory sampling of surface soils was conducted in December 1994 to determine whether hazardous waste or constituents have been released into the environment. The results of the sampling show that constituents of concern have not been released to the environment.

Therefore, based on archival information and analytical results from confirmatory sampling, ER Site 22 is recommended for an administrative NFA decision because the site clearly has not released hazardous waste or constituents into the environment (Criterion C).

## **4. Conclusion**

Based upon the evidence cited above, no potential remains for a release of hazardous waste (including hazardous constituents) which may pose a threat to human health or the environment. Therefore, ER Site 22 is recommended for an NFA determination.

## **5. References**

### ***5.1 ER Site References***

Section 5.1 contains a comprehensive bibliographical list of the documents relating to ER Site 22. This list is arranged numerically by the numbers assigned to each document.

ER Site Reference Number	Reference
22-2.	Sandia National Laboratories/New Mexico (SNL/NM), November 1993. "Environmental Restoration Program Information Sheet," Storage/Burn Area Site (West of DEER), Sandia National Laboratories, Albuquerque, New Mexico.
22-3.	Department of Energy (DOE), Albuquerque Operations Office, [n.d.]. Environmental Restoration and Waste Management Five-Year Plan Activity Data Sheet (Predecisional Draft), ER-SA-5, OU 1266, SA-0629, Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.
22-4.	Sandia National Laboratories/New Mexico (SNL/NM), October 1989. Environmental Operations Record Center Record Number ER/1334 002/94-001.
22-5.	Sandia National Laboratories/New Mexico (SNL/NM), October 1989. Environmental Operations Record Center Record Number ER/1334 022/94-002.
22-6.	Sandia National Laboratories/New Mexico (SNL/NM), October 1989. Environmental Operations Record Center Record Number ER/1334 022/94-003.
22-7.	Sandia National Laboratories/New Mexico (SNL/NM), October 1989. Environmental Operations Record Center Record Number ER/1334 022/94-004.
22-8.	Sandia National Laboratories/New Mexico (SNL/NM), October 1989. Environmental Operations Record Center Record Number ER/1334 022/94-005.
22-9.	Sandia National Laboratories/New Mexico (SNL/NM), November 1989. Environmental Operations Record Center Record Number ER/1334 022/94-006.
22-10.	Sandia National Laboratories/New Mexico (SNL/NM), [n.d.]. Site 22 Drawings, Albuquerque, New Mexico.
22-11.	Sandia National Laboratories/New Mexico (SNL/NM), July 1985. Site 22 Photographs, TSO File SA-0333-01, Albuquerque, New Mexico.
22-12.	Lojek, C. Field Activity Daily Log, Site 22 Storage/Burn Area (West of Deer), Sandia National Laboratories, Albuquerque, New Mexico. July 21, 1993.
22-13.	Lojek, C., and M. Young. Field Activity Daily Log, Schoolhouse Mesa OU 1334 RFI, Tour of North and South Coyote Test Field, Sandia National Laboratories, Albuquerque, New Mexico. January 27, 1993.
22-14.	Sandia National Laboratories/New Mexico (SNL/NM), July 1993. OU 1334—Site 22 Photographs, Albuquerque, New Mexico.
22-15.	Sandia National Laboratories/New Mexico (SNL/NM), February 1994. Environmental Operations Record Center Record Number ER/1334 022/94-007.

- 22-16. Sandia National Laboratories/New Mexico (SNL/NM), May 1993. Environmental Operations Record Center Record Number ER/1334 022/94-008.
- 22-17. Sandia National Laboratories/New Mexico (SNL/NM), [n.d.]. Environmental Operations Record Center Record Number ER/1334 022/94-009.
- 22-18. Reference removed/not applicable to site.
- 22-19. Sandhaus, D. Memorandum to C. Lojek, Sandia National Laboratories/New Mexico, March 21, 1994.
- 22-20. Young, M. Memorandum to Distribution, Sandia National Laboratories/New Mexico. April 15, 1994.
- 22-22. Babb, K., Memorandum to D. Sandhaus, Sandia National Laboratories/New Mexico, October 20, 1994.

## **5.2 Reference Documents**

Department of Energy (DOE) September 1987, Albuquerque Operations Office, Environmental Safety and Health Division, Environmental Program Branch. Draft "Comprehensive Environmental Assessment and Response Program (CEARP) Phase I: Installation Assessment, Sandia National Laboratories, Albuquerque," Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

DOE, see Department of Energy.

EPA, see U.S. Environmental Protection Agency.

FR, see Federal Register Volume 55, NO. 145, July 27, 1990 Proposed Rules.

IT, see IT Corporation.

International Technology Corporation (IT), May 1994a. "Hydrogeology of the Central Coyote Test Area OU 1334," IT Corporation, Albuquerque, New Mexico.

International Technology Corporation (IT), May 1994b. "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project, Phase II: Interim Report," prepared by IT Corporation for Sandia National Laboratories, Albuquerque, New Mexico.

RUST Geotech Inc., December 1994. "Sandia Surface Radiological Surveys Report," RUST Geotech Inc. Technical Support Program for Sandia National Laboratories, Albuquerque, New Mexico.

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SNL/NM, see Sandia National Laboratories/New Mexico (SNL/NM).

USDA, see United States Department of Agriculture.

United States Department of Agriculture (USDA), June 1977, "Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico," Soil Conservation Service, U.S. Department of Agriculture, 101 pp.

United States Environmental Protection Agency (EPA), December 1994. Draft Soil Screening Guidance Quick Reference Fact Sheet, EPA/540/R-94/101 PB95-963529, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, DC.

United States Environmental Protection Agency (EPA), August 26, 1993. Module IV of RCRA Permit No. NM 58901105189. EPA Region 6, issued to Sandia National Laboratories, Albuquerque, New Mexico.

United States Environmental Protection Agency (EPA), August 1992. Hazardous Waste Management Facility Permit No. NM5890110518, EPA Region 6, issued to Sandia National Laboratories, Albuquerque, New Mexico.

United States Environmental Protection Agency (EPA), July 1990. "Corrective Action for Solid Waste Management Units (SWMU) at Hazardous Waste Management Facilities, Proposed Rule," *Federal Register*, Vol. 55, Title 40, Parts 264, 265, 270, and 271.

Environmental Protection Agency (EPA), December 1987. "Hazardous Waste; Codification Rule for 1984 RCRA Amendments; Final Rule," *Federal Register*, Vol. 52, Title 40, Parts 144, 264, 265, 270, and 27, Environmental Protection Agency, Washington, DC.

United States Environmental Protection Agency (EPA), April 1987. "Final RCRA Facility Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico," Contract No. 68-01-70389. EPA Region 6.

United States Environmental Protection Agency (EPA), October 1986. "RCRA Facility Assessment Guidance," EPA/530-86-053, PB87-107769, Washington, DC.

### **5.3 *Aerial Photographs***

United States Department of Agriculture (USDA), 1983. Aerial Photograph, 61030-1382-173, Albuquerque, New Mexico.

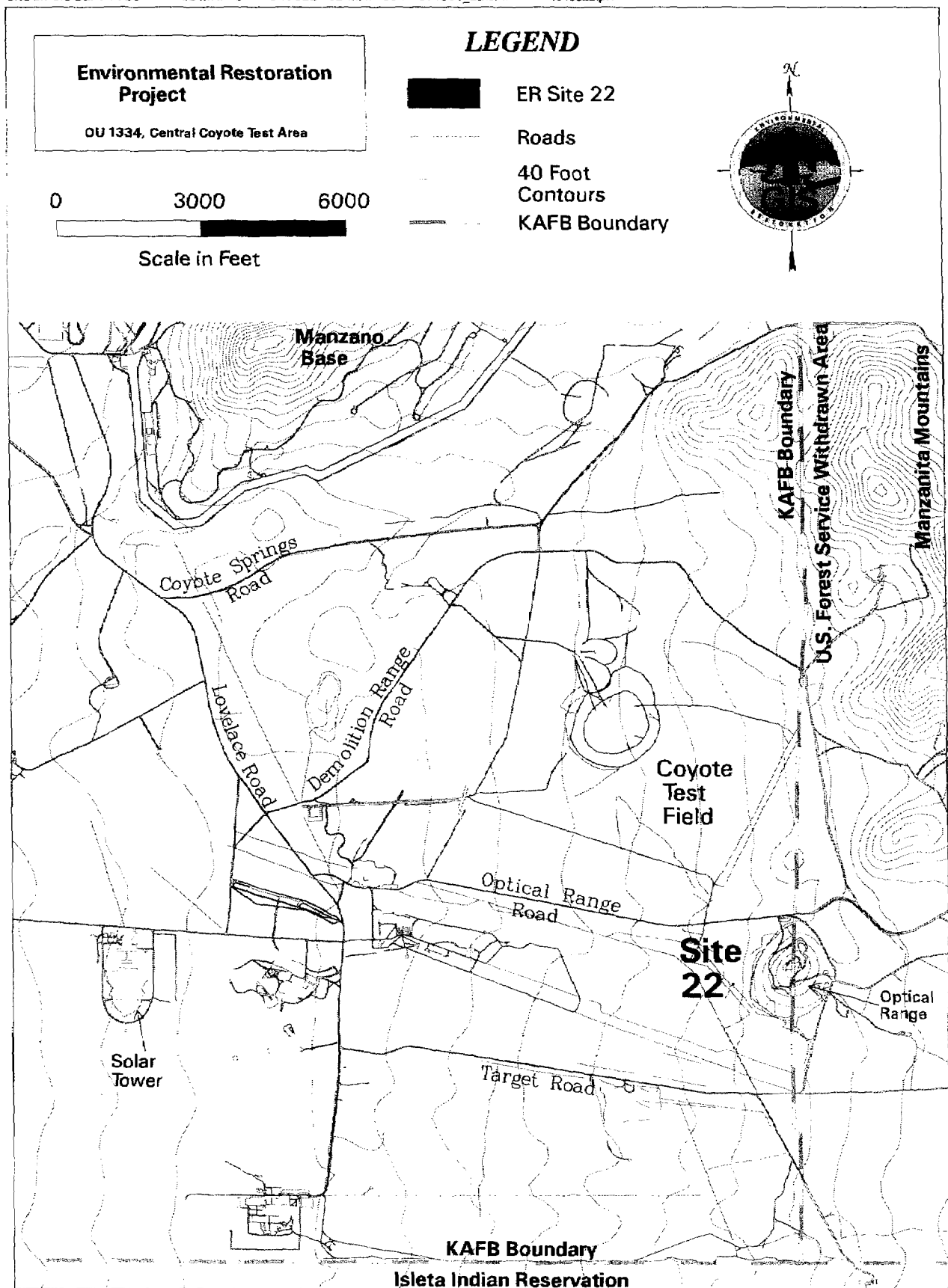
United States Geological Survey (USGS), 1975. Aerial Photograph, VDRE-3-112, Albuquerque, New Mexico.

United States Geological Survey (USGS), 1971. Aerial Photograph, EXG-2-280, Albuquerque, New Mexico.

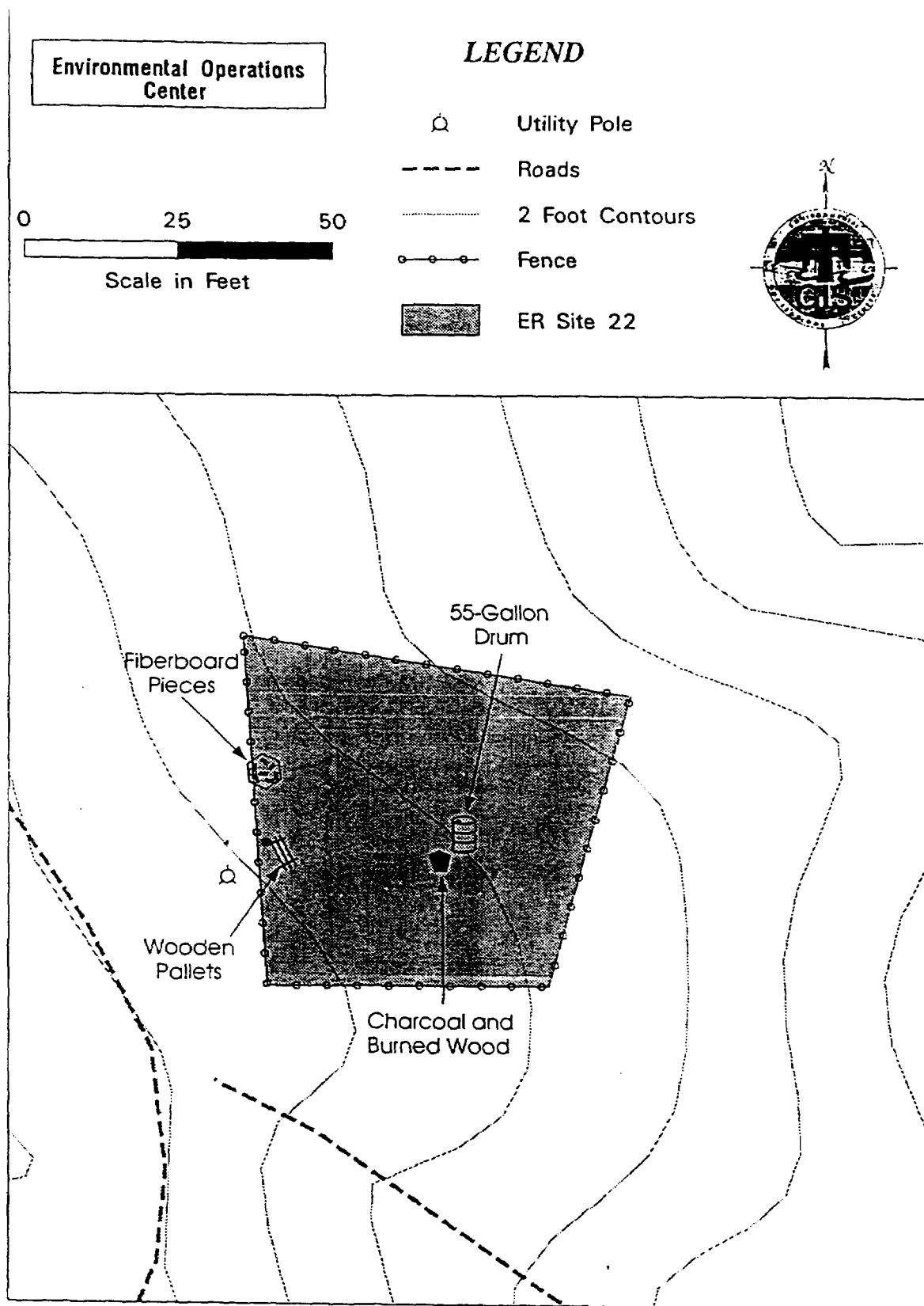
USDA, see United States Department of Agriculture.

USGS, see United States Geological Survey.





**Figure 1-1**  
**Location of ER Site 22, Storage/Burn Area**

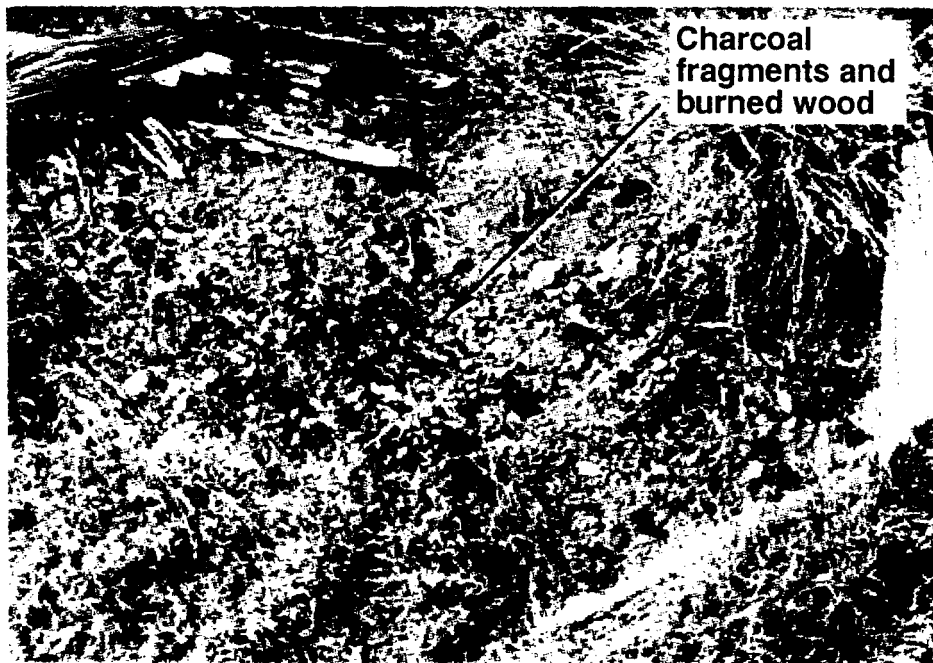


301462 86 03/cw A39

Figure 2-1  
ER Site 22, Storage/Burn Area

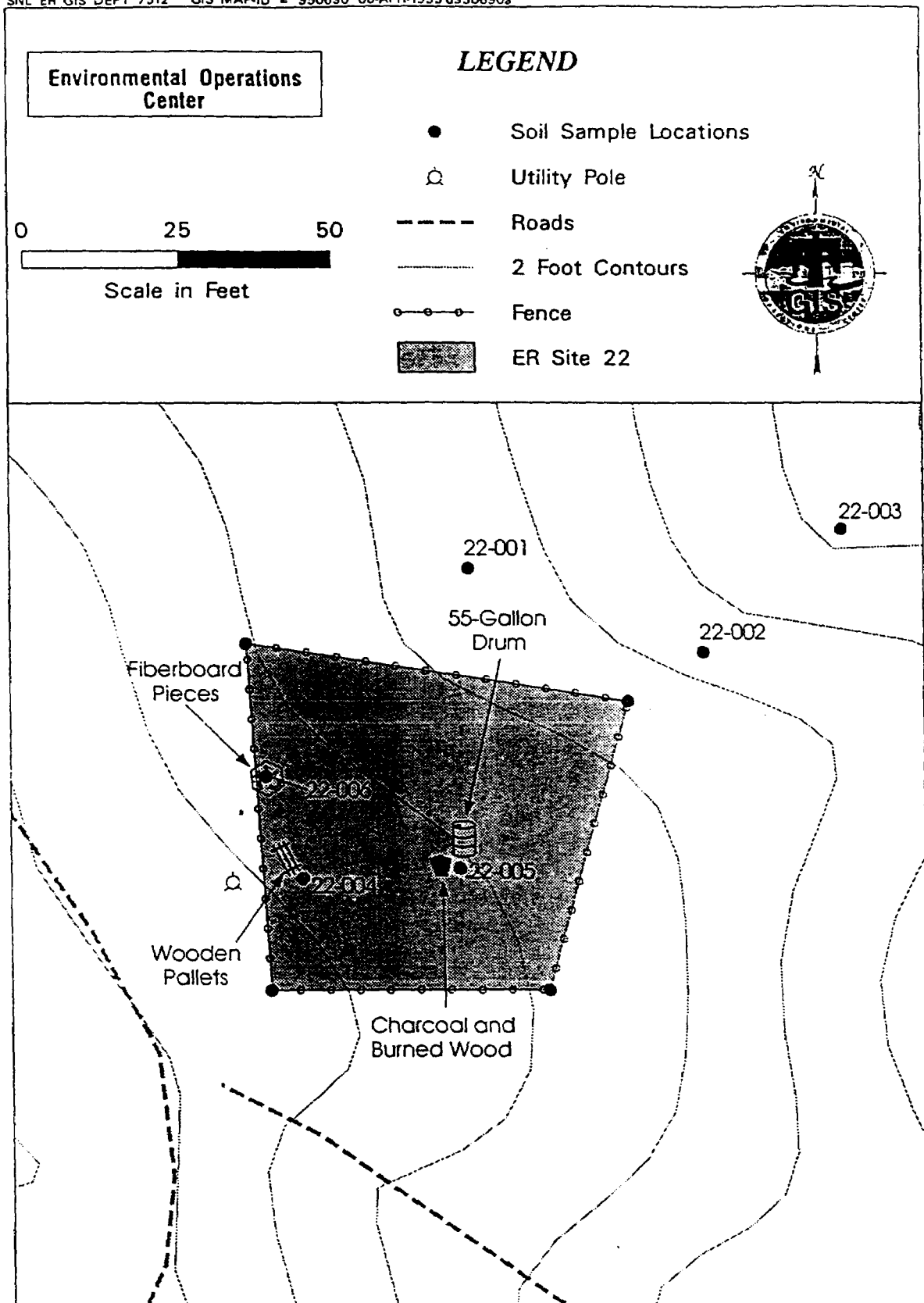


**Figure 2-2a.** Photograph of ER Site 22. The 55-gallon drum is located within the fenced area. View is to the northeast.



**Figure 2-2b.** Photograph of ER Site 22 showing charcoal fragments and burned wood.

**Figure 2-2**  
**ER Site 22 Photographs**



301462 86 03/cw A38

Figure 3-1. Sample Locations at ER Site 22

Table 3-1  
Summary of Soil Samples Collected at ER Site 22, SNL/NM

Sample Location	ER Sample ID	Sample Type	Sample Depth	SMO Laboratory ID	Analyses Performed
22-001	22-S1-001-F	Background	0-6 in.	SNLA021087-1 SNLA021087-2 SNLA021087-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
	22-S2-001-F	Background	18-24 in.	SNLA021088-1 SNLA021088-2 SNLA021088-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
22-002	22-S1-002-F	Background	0-6 in.	SNLA021089-1 SNLA021089-2 SNLA021089-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
	22-S2-002-F	Background	18-24 in.	SNLA021090-1 SNLA021090-2 SNLA021090-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
22-003	22-S1-003-F	Background	0-6 in.	SNLA021091-1 SNLA021091-2 SNLA021091-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
	22-S2-003-F	Background	18-24 in.	SNLA021092-1 SNLA021092-2 SNLA021092-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
22-004	22-S1-004-F	On-site	0-6 in.	SNLA021093-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-004-F (MS/MSD)	On-site	18-24 in.	SNLA021094-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
22-005	22-S1-005-F	On-site	0-6 in.	SNLA021095-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-005-F	On-site	18-24 in.	SNLA021096-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-005-DU	On-site (Duplicate)	18-24 in.	SNLA021097-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080

Table 3-1 (Concluded)  
Summary of Soil Samples Collected at ER Site 22, SNL/NM

Sample Location	ER Sample ID	Sample Type	Sample Depth	SMO Laboratory ID	Analyses Performed
22-006	22-S1-006-F	On-site	0-6 in.	SNLA021098-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-006-F	On-site	18-24 in.	SNLA021099-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
22-007	22-RB-007	Rinsate Blank	Surface	SNLA021100-1, -2, and -3	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080



Table 3-2  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-001 22-S1-001-F SNLA021087-1 Background 0-6 inches 12/09/94	22-001 22-S2-001-F SNLA021088-1 Background 18-24 inches 12/09/94	22-002 22-S1-002-F SNLA021089-1 Background 0-6 inches 12/09/94	22-002 22-S2-002-F SNLA021090-1 Background 18-24 inches 12/09/94
	Action Level <sup>a</sup>	Background Level <sup>b</sup>				
<u>Volatile Organics</u> Field Screening Results	5 ppm <sup>c</sup>	0.3 ppm <sup>c</sup>	0.6-0.7 ppm	0 ppm	0 ppm	0 ppm
<u>Radionuclides</u> Field Screening Results <sup>d</sup>	Background plus 2 standard deviations <sup>c</sup>	NE	9,930 cpm	10,200 cpm	10,000 cpm	10,400 cpm
<u>Metals</u> (Method 6010/7000 series), mg/kg						
Arsenic (6010)	20	NE	5.1	3.2	2.9	3.5
Barium (6010)	6,000	0.13-730	102	91.3	93.2	511
Beryllium (6010)	20 <sup>e</sup>	0.1-1.1	0.69	0.43	0.32	0.43
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	10.0	6.4	4.3	6.1
Lead (6010)	400 <sup>g</sup>	1.0-110.0	9.0	3.6 J	3.5 J	3.3 J
Mercury (7471)	20	NE	ND<0.10	ND<0.10	ND<0.10	ND<0.10
Selenium (6010)	400	NE	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Silver (6010)	400	0.05-10.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
<u>Semivolatile Organics</u> (Method 8270/TCL) µg/kg or µg/L (water)	NA	NA	NA	NA	NA	NA
<u>Polychlorinated Biphenyls</u> (Method 8080/TCL) µg/kg or µg/L (water)	0.000090	NA	NA	NA	NA	NA

Table 3-2 (Continued)  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-003 22-S1-003-F SNLA021091-1 Background 0-6 inches 12/09/94	22-003 22-S2-003-F SNLA021092-1 Background 18-24 inches 12/09/94	22-004 22-S1-004-F SNLA021093-1 On Site 0-6 inches 12/09/94	22-004 22-S2-004-F (MS/MSD) SNLA021094-1 On Site 18-24 inches 12/09/94
	Action Level <sup>a</sup>	Background Level <sup>b</sup>				
<u>Volatile Organics</u> Field Screening Results	5 ppm <sup>c</sup>	0.3 ppm <sup>c</sup>	0 ppm	0 ppm	0 ppm	NF
<u>Radionuclides</u> Field Screening Results <sup>d</sup>	Background plus 2 standard deviations <sup>c</sup>	NE	10,200 cpm	9,830 cpm	10,600 cpm	10,400 cpm
<u>Metals</u> (Method 6010/7000 series), mg/kg						
Arsenic (6010)	20	NE	2.8	2.7	1.5	1.9
Barium (6010)	5,000	0.13-730	69.2	84.3	45.6	79.8
Beryllium (6010)	20 <sup>e</sup>	0.1-1.1	0.51	0.36	0.29	0.36
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	6.5	4.9	3.1	4.6
Lead (6010)	400 <sup>g</sup>	1.0-110.0	4.8 J	4.3 J	5.4	ND<5.0
Mercury (7471)	20	NE	ND<0.10	ND<0.10	ND<0.10	ND<0.10
Selenium (6010)	400	NE	ND<0.50	ND<0.54	ND<0.50	ND<0.50
Silver (6010)	400	0.05-10.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
<u>Semivolatile Organics</u> (Method 8270/TCL) µg/kg or µg/L (water)	NA	NA	NA	NA	ND	ND
<u>Polychlorinated Biphenyls</u> (Method 8080, TCL) µg/kg or µg/L (water)	0.000090	NE	NA	NA	ND	ND

Table 3-2 (Continued)  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-005 22-S1-005-F SNLA021095-1 On Site 0-6 inches 12/09/94	22-005 22-S2-005-F SNLA021096-1 On Site 18-24 inches 12/09/94	22-005 22-S2-005-DU SNLA021097-1 On Site 18-24 inches 12/09/94
	Action Level <sup>a</sup>	Background Level <sup>b</sup>			
Volatile Organics Field Screening Results	5 ppm <sup>c</sup>	0.3 ppm <sup>c</sup>	0 ppm	NF	NF
Radionuclides Field Screening Results <sup>d</sup>	Background plus 2 standard deviations <sup>c</sup>	NE	10,200 cpm	10,400 cpm	10,400 cpm
<u>Metals</u> (Method 6010/7000 series), mg/kg					
Arsenic (6010)	20	NE	2.0	2.0	1.9
Barium (6010)	6,000	0.13-730	78.1	83.1	78.8
Beryllium (6010)	20 <sup>c</sup>	0.1-1.1	0.36	0.29	0.40
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<0.50	ND<0.50
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	4.4	3.6	4.2
Lead (6010)	400 <sup>g</sup>	1.0-110.0	7.6	4.0 J	4.2 J
Mercury (7471)	20	NE	ND<0.10	ND<0.10	ND<0.10
Selenium (6010)	400	NE	ND<0.50	ND<0.50	ND<0.50
Silver (6010)	400	0.05-10.0	ND<1.0	ND<1.0	ND<1.0
Semivolatile Organics (Method 8270/TCL) µg/kg or µg/L (water)	NA	NA	ND	ND	ND
Polychlorinated Biphenyls (Method 8080/TCL) µg/kg or µg/L (water)	0.000090	NE	ND	ND	ND

Table 3-2 (Concluded)  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-006 22-S1-006-F SNLA021098-1 On Site 0-6 inches 12/09/94	22-006 22-S2-006-F SNLA021099-1 On Site 18-24 inches 12/09/94	22-007 22-FB-007 SNLA021100-1, -2, -3 Rinsate Blank RB 12/09/94
	Action Level <sup>a</sup>	Background Level <sup>b</sup>			
<u>Volatile Organics</u> Field Screening Results	5 ppm <sup>c</sup>	0.3 ppm <sup>c</sup>	0 ppm	0.3 ppm	0 ppm
<u>Radionuclides</u> Field Screening Results <sup>d</sup>	Background plus 2 standard deviations	NE	10,300 cpm	NA	NA
<u>Metals</u> (Method 6010/7000 series), mg/kg or mg/L					
Arsenic (6010)	20	NE	2.4	2.6 J	ND<0.010
Barium (6010)	6,000	0.13-730	82.1	236	ND<0.010
Beryllium (6010)	20 <sup>e</sup>	0.1-1.1	0.51	0.28 J	ND<0.0020
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<1.0	ND<0.0050
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	7.8	5.9	ND<0.010
Lead (6010)	400 <sup>g</sup>	1.0-110.0	5.9	ND<10.0	ND<0.0030
Mercury (7471)	20	NE	ND<0.10	ND<0.10	NA
Selenium (6010)	400	NE	ND<0.50	ND<1.0	ND<0.0050
Silver (6010)	400	0.05-10.0	ND<1.0	ND<2.0	ND<0.010
<u>Semivolatile Organics</u> (Method 8270/TCL) µg/kg or µg/L (water)					
Phenol	50,000,000	NE	ND	ND	10
<u>Polychlorinated Biphenyls</u> (Method 8080/TCL) µg/kg or µg/L (water)	0.000090	NE	ND	ND	ND

Notes

<sup>a</sup>Reference: SNL/NM June 1994.

<sup>b</sup>Reference: IT May 1994b.

<sup>c</sup>Action level triggers collection of soil samples for that fraction.

<sup>d</sup>Radiological screening performed with sodium-iodide scintillation detector.

<sup>e</sup>Action level obtained from FR, July 27, 1990, Proposed Rule for 40 CFR Part 264.

<sup>f</sup>Action level is for chromium (VI).

<sup>g</sup>Reference: EPA December 1994.

Table 3-3  
Summary of Gamma Spectroscopy Results,  
ER Site 22 Background Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-001 22-S1-001-F SNLA021087-3 Background 0-6 inches 12/09/94		22-001 22-S2-001-F SNLA021088-3 Background 18-24 inches 12/09/94		22-002 22-S1-002-F SNLA021089-3 Background 0-6 inches 12/09/94	
	Action Level <sup>a</sup>	Background Level <sup>b</sup>						
Parameters Detected, units	(pCi/g)	(pCi/g)	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA
Radionuclides, Gamma Spectroscopy <sup>c</sup>								
Uranium-238	NE	0.0033-2.065	ND	0.444	ND	0.354	ND	0.359
Thorium-234	NE	0.324-3.0	ND	0.445	ND	0.355	ND	0.360
Uranium-234	NE	0.8-1.0	ND	6.64	ND	5.72	ND	5.45
Radium-226	NE	0.5-2.09	1.83 $\pm$ 0.644	—	1.02 $\pm$ 0.514	—	0.895 $\pm$ 0.447	—
Lead-214	NE	0.29-1.13	0.568 $\pm$ 0.0845	—	0.490 $\pm$ 0.0688	—	0.486 $\pm$ 0.0580	—
Bismuth-214	NE	0.27-1.4	0.492 $\pm$ 0.0798	—	0.515 $\pm$ 0.0584	—	0.424 $\pm$ 0.0651	—
Lead-210	NE	0.3-12.0	ND	1.60	ND	1.20	1.03 $\pm$ 1.18	—
Thorium-232	NE	0.23-1.20	1.20 $\pm$ 0.158	—	0.784 $\pm$ 0.135	—	0.827 $\pm$ 0.145	—
Radium-228	NE	0.45-1.05	1.20 $\pm$ 0.158	—	0.784 $\pm$ 0.135	—	0.827 $\pm$ 0.145	—
Actinium-228	NE	NE	1.08 $\pm$ 0.143	—	0.708 $\pm$ 0.122	—	0.747 $\pm$ 0.131	—
Thorium-228	NE	NE	1.12 $\pm$ 0.0648	—	0.762 $\pm$ 0.0506	—	0.758 $\pm$ 0.0480	—
Radium-224	NE	0.43-0.97	3.05 $\pm$ 0.825	—	0.790 $\pm$ 0.641	—	2.49 $\pm$ 0.638	—
Lead-212	NE	0.1-1.4	1.13 $\pm$ 0.0651	—	0.765 $\pm$ 0.0509	—	0.761 $\pm$ 0.0482	—
Bismuth-212	NE	0.414-2.7	0.977 $\pm$ 0.372	—	ND	0.204	0.504 $\pm$ 0.289	—
Thallium-208	NE	NE	1.03 $\pm$ 0.119	—	0.646 $\pm$ 0.107	—	0.676 $\pm$ 0.0933	—
Uranium-235	NE	0.05-0.18	ND	0.0394	ND	0.0308	ND	0.0302
Thorium-231	NE	NE	ND	—	ND	0.251	ND	0.254

Table 3-3 (Continued)  
Summary of Gamma Spectroscopy Results,  
ER Site 22 Background Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth Sample Date:			22-001 22-S1-001-F SNLA021087-3 Background 0-6 inches 12/09/94		22-001 22-S2-001-F SNLA021088-3 Background 18-24 inches 12/09/94		22-002 22-S1-002-F SNLA021089-3 Background 0-6 inches 12/09/94	
	Action Level <sup>a</sup>	Background Level <sup>b</sup>						
Parameters Detected, units	(pCi/g)	(pCi/g)	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA
Protactinium-231	NE	NE	ND	1.03	ND	0.875	ND	0.854
Actinium-227	NE	NE	ND	1.12	ND	0.950	ND	0.946
Thorium-227	NE	NE	ND	0.168	ND	0.146	ND	0.139
Americium-241	NE	NE	ND	0.110	ND	0.0848	ND	0.0916
Neptunium-237	NE	NE	ND	0.187	ND	0.144	ND	0.149
Protactinium-233	NE	NE	ND	0.0466	ND	0.0404	ND	0.0431
Thorium-229	NE	NE	ND	0.0847	ND	0.0700	ND	0.0702
Cesium-137	NE	0.004-10.1	0.107 $\pm$ 0.0371	—	ND	0.0200	0.108 $\pm$ 0.0288	—
Potassium-40	NE	0.192-31.0	20.5 $\pm$ 0.887	—	18.3 $\pm$ 0.768	—	18.3 $\pm$ 0.767	—



Table 3-3 (Continued)  
Summary of Gamma Spectroscopy Results  
ER Site 22 Background Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-002 22-S2-002-F SNLA021090-3 Background 18-24 inches 12/09/94		22-003 22-S1-003-F SNLA021091-3 Background 0-6 inches 12/09/94		22-003 22-S2-003-F SNLA021092-3 Background 18-24 inches 12/09/94	
	Action Level <sup>a</sup>	Background Level <sup>b</sup>						
Parameters Detected, units	(pCi/g)	(pCi/g)	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA
Radionuclides, Gamma Spectroscopy <sup>c</sup>								
Uranium-238	NE	0.0033–2.065	ND	0.339	ND	0.372	ND	0.351
Thorium-234	NE	0.324–3.0	ND	0.340	ND	0.373	ND	0.352
Uranium-234	NE	0.8–1.0	ND	5.74	6.37 $\pm$ 5.15	—	ND	5.80
Radium-226	NE	0.5–2.09	1.43 $\pm$ 0.514	—	1.11 $\pm$ 0.502	—	1.05 $\pm$ 0.463	—
Lead-214	NE	0.29–1.13	0.607 $\pm$ 0.0708	—	0.544 $\pm$ 0.0637	—	0.476 $\pm$ 0.0598	—
Bismuth-214	NE	0.27–1.4	0.502 $\pm$ 0.0609	—	0.458 $\pm$ 0.0587	—	0.481 $\pm$ 0.0729	—
Lead-210	NE	0.3–12.0	ND	1.27	ND	1.27	ND	1.36
Thorium-232	NE	0.23–1.20	0.884 $\pm$ 0.135	—	1.14 $\pm$ 0.141	—	0.905 $\pm$ 0.132	—
Radium-228	NE	0.45–1.05	0.884 $\pm$ 0.135	—	1.14 $\pm$ 0.141	—	0.905 $\pm$ 0.132	—
Actinium-228	NE	NE	0.798 $\pm$ 0.122	—	1.03 $\pm$ 0.127	—	0.816 $\pm$ 0.119	—
Thorium-228	NE	NE	0.701 $\pm$ 0.0446	—	0.888 $\pm$ 0.0504	—	0.809 $\pm$ 0.0505	—
Radium-224	NE	0.43–0.97	2.40 $\pm$ 0.513	—	0.690 $\pm$ 0.716	—	ND	—
Lead-212	NE	0.1–1.4	0.705 $\pm$ 0.0448	—	0.892 $\pm$ 0.0506	—	0.812 $\pm$ 0.0507	—
Bismuth-212	NE	0.414–2.7	0.454 $\pm$ 0.271	—	0.536 $\pm$ 0.257	—	0.540 $\pm$ 0.189	—
Thallium-208	NE	NE	0.678 $\pm$ 0.104	—	0.850 $\pm$ 0.0871	—	0.704 $\pm$ 0.0877	—

Table 3-3 (Concluded)  
Summary of Gamma Spectroscopy Results  
ER Site 22 Background Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-002 22-S2-002-F SNLA021090-3 Background 18-24 inches 12/09/94		22-003 22-S1-003-F SNLA021091-3 Background 0-6 inches 12/09/94		22-003 22-S2-003-F SNLA021092-3 Background 18-24 inches 12/09/94	
	Action Level <sup>a</sup>	Background Level <sup>b</sup>						
Parameters Detected, units	(pCi/g)	(pCi/g)	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA
Uranium-235	NE	0.05–0.18	ND	0.0310	ND	0.0301	ND	0.0299
Thorium-231	NE	NE	ND	0.248	ND	—	ND	—
Protactinium-231	NE	NE	ND	0.825	ND	0.842	ND	0.822
Actinium-227	NE	NE	ND	0.904	ND	0.928	ND	0.917
Thorium-227	NE	NE	ND	0.128	ND	0.144	ND	0.135
Americium-241	NE	NE	ND	0.0878	ND	0.0877	ND	0.0947
Neptunium-237	NE	NE	ND	0.153	ND	0.154	ND	0.152
Protactinium-233	NE	NE	ND	0.0420	ND	0.0401	ND	0.0418
Thorium-229	NE	NE	ND	0.0652	ND	0.0694	ND	0.0709
Cesium-137	NE	0.004–10.1	ND	0.0194	0.0636 $\pm$ 0.0255	—	ND	0.0185
Potassium-40	NE	0.192–31.0	17.1 $\pm$ 0.751	—	20.7 $\pm$ 0.746	—	19.8 $\pm$ 0.775	—

Notes

<sup>a</sup>SNL/NM action level not established.

<sup>b</sup>IT Corporation May 1994b.

<sup>c</sup>Gamma Spectroscopy analyses performed. An activity ratio of approximately one (1) for the daughter/parent isotope ratio indicates the isotope is naturally occurring. Anthropogenic isotope sources would disturb the secular equilibrium of the decay chain, resulting in activity ratios that are greater than 1.

— = MDA not presented in analytical results.

Table 3-4  
Summary of Alpha Spectroscopy Results,  
ER Site 22 Background Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-001 22-S1-001-F SNLA021087-2 Background 0-6 inches 12/09/94		22-001 22-S2-001-F SNLA021088-2 Background 18-24 inches 12/09/94		22-002 22-S1-002-F SNLA021089-2 Background 0-6 inches 12/09/94	
	SNL/NM Action Level in Soil <sup>a</sup>	SNL/NM Back- ground Level in Soil <sup>b</sup>						
Parameters Detected, units	(pCi/g)	(pCi/g)	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA
<u>Radionuclides, Alpha Spectroscopy<sup>c</sup></u>								
Uranium 233/234	NE	0.05-1.0	$0.70 \pm 0.20$	0.080	$0.85 \pm 0.22$	0.057	$0.75 \pm 0.32$	0.33
Uranium 235	NE	0.05-0.18	$0.091 \pm 0.062$	0.075	$0.024 \pm 0.028$ U	0.042	$0.033 \pm 0.072$ U	0.17
Uranium 238	NE	NE	$0.52 \pm 0.16$ B	0.049	$0.66 \pm 0.18$ B	0.057	$0.62 \pm 0.27$ B	0.19
Thorium 230	NE	NE	$0.75 \pm 0.30$	0.16	$0.53 \pm 0.18$	0.088	$0.61 \pm 0.19$	0.14
Thorium 232	NE	0.23-1.20	$0.92 \pm 0.34$	0.16	$0.49 \pm 0.17$	0.076	$1.1 \pm 0.28$	0.11

Table 3-4 (Concluded)  
Summary of Alpha Spectroscopy Results,  
ER Site 22 Background Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-002 22-S2-002-F SNLA021090-2 Background 18-24 inches 12/09/94		22-003 22-S1-003-F SNLA021091-2 Background 0-6 inches 12/09/94		22-003 22-S2-003-F SNLA021092-2 Background 18-24 inches 12/09/94	
	SNL/NM Action Level in Soil <sup>a</sup>	SNL/NM Back- ground Level in Soil <sup>b</sup>						
Parameters Detected, units	(pCi/g)	(pCi/g)	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA
Radionuclides, Alpha Spectroscopy <sup>c</sup>								
Uranium 233/234	NE	0.05-1.0	$0.64 \pm 0.29$	0.16	$0.65 \pm 0.20$	0.094	$0.57 \pm 0.23$	0.15
Uranium 235	NE	0.05-0.18	$0.069 \pm 0.10$ U	0.16	$0.020 \pm 0.034$ U	0.068	$0.048 \pm 0.056$	0.044
Uranium 238	NE	NE	$0.67 \pm 0.30$ B	0.16	$0.79 \pm 0.23$ B	0.094	$0.77 \pm 0.27$ B	0.044
Thorium 230	NE	NE	$0.66 \pm 0.21$	0.075	$0.74 \pm 0.17$	0.086	$0.57 \pm 0.18$	0.065
Thorium 232	NE	0.23-1.20	$0.72 \pm 0.23$	0.089	$1.1 \pm 0.22$	0.083	$0.62 \pm 0.19$	0.030

Notes

<sup>a</sup>SNL/NM action level not established.

<sup>b</sup>Reference: IT May 1994b.

<sup>c</sup>Alpha Spectroscopy analyses performed.

B = A reagent blank associated with this sample had a result without a U flag and, after correcting for possible different aliquots, that result is greater than or equal to the MDA for this sample.

U = The result is less than the MDA.

## **APPENDIX A**

### **Confirmatory Sampling and Analysis Plan for ER Site 22**

## TABLE OF CONTENTS

1.0 DESCRIPTION AND HISTORY .....	1-1
2.0 PREVIOUS INVESTIGATIONS .....	2-1
3.0 CONCEPTUAL MODEL .....	3-1
3.1 Initial Conceptual Model .....	3-1
3.2 Existing Information on Nature and Extent of Contamination .....	3-1
3.3 Potential Contaminant Migration Pathways .....	3-1
3.4 Potential Public Health and Environmental Impacts .....	3-3
4.0 DATA NEEDS/DQOS .....	4-1
5.0 VOLUNTARY CORRECTIVE MEASURE FOR ER SITE 22 .....	5-1
6.0 SAMPLING PLAN .....	6-1
6.1 Sampling Plan Objectives and Technical Approach .....	6-1
6.2 Nonintrusive Surveys .....	6-1
6.3 Intrusive Sampling .....	6-1
6.4 Contingency Sampling .....	6-4
7.0 ANALYTICAL METHODS AND REQUIREMENTS .....	7-1
7.1 Analyte Lists .....	7-1
7.2 Analytical Methods .....	7-1
7.3 Site-Specific Requirements .....	7-2
7.4 QA/QC Requirements .....	7-2
8.0 INVESTIGATION DERIVED WASTE .....	8-1
9.0 REFERENCES .....	9-1
9.1 ER Site References .....	9-1
9.2 Reference Documents .....	9-1
9.3 Operating Procedures .....	9-2
9.4 Aerial Photographs .....	9-2

## LIST OF FIGURES

Figure		Page
1-1	Location and Site Map of ER Site 22, Storage/Burn . . . . .	1-2
3-1	Flow Diagram of Conceptual Model for ER Site 22 . . . . .	3-2
6-1	Decision Logic for Sampling Activities at ER Site 22 . . . . .	6-2
6-2	Sample Locations at ER Site 22 . . . . .	6-3

## LIST OF TABLES

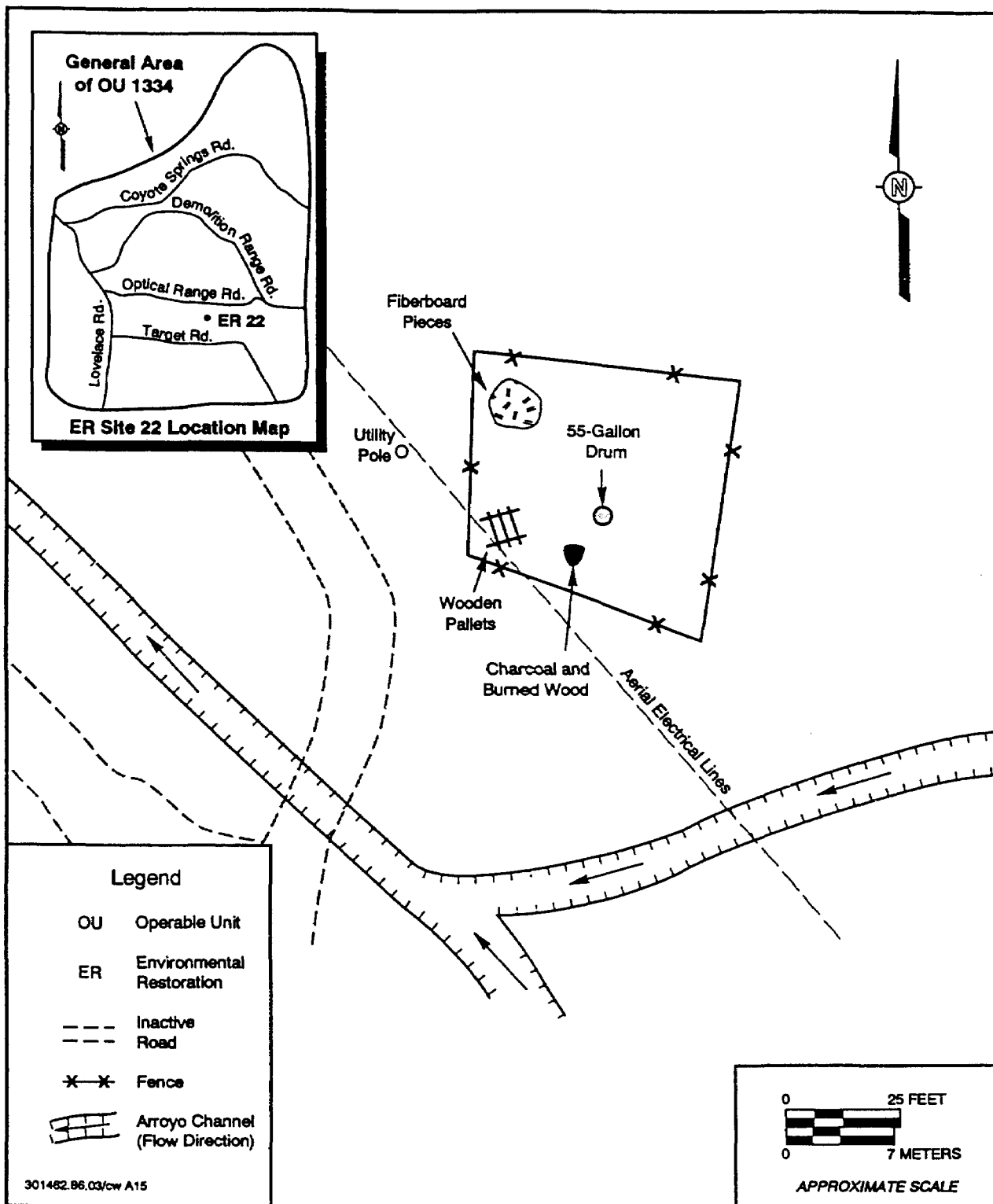
Table		Page
4-1	Summary of Data Requirements for Characterization of ER Site 22 . . . . .	4-1
7-1	ER Site 22 Summary of Nonintrusive and Intrusive Sampling . . . . .	7-3



## 1.0 DESCRIPTION AND HISTORY

Environmental Restoration (ER) Site 22 (Figure 1-1) is a small, irregularly shaped fenced area, approximately 50 feet (ft) by 50 ft. The approximately 6.0-ft-high, five-strand barbed-wire fence is in poor condition. No signs or placards appear on the fence, with the exception of the ER site posting. The area inside the fence contains one empty 55-gallon (gal) drum, several wooden pallets, charcoal, and scraps of fiberboard. The top of the drum has been cut off, and the bottom of the drum is discolored from heat, indicating the drum may have been used as a fire barrel. Charcoal is scattered on the south side of the fenced area. The wooden pallets show evidence of past burning, but no burn pit is visible at the solid waste management unit (SWMU). It appears that the only burning that took place at the site was a small wood fire inside the drum. A utility right-of-way that includes overhead power lines and an underground fiber-optic cable cuts the southwest corner of the site.

The physical description indicates that this SWMU may have been a storage or staging area. The project for which this SWMU was constructed is not known. No documentation on this SWMU has been found, and none of the current or former Sandia National Laboratories/New Mexico (SNL/NM) personnel interviewed have provided any information about the SWMU (22-15, 22-16). It is unknown what waste materials, if any, may have been associated with the SWMU, because the nature of the SWMU has not been confirmed.



**Figure 1-1**  
**Location and Site Map of ER Site 22, Storage/Burn**

## 2.0 PREVIOUS INVESTIGATIONS

ER Site 22 was first listed as a potential release site based on the Comprehensive Environmental Assessment and Response Program (CEARP) interviews (DOE September 1987), which identified the SWMU as an area containing one 55 gal drum, several wooden pallets, and evidence of past burning. The regulatory disposition of the SWMU was uncertain because of a lack of knowledge regarding the activities conducted or recording the use of hazardous waste or constituents at the SWMU. Insufficient information also prevented calculating a Hazard Ranking System score for the SWMU.

Subsequent to the CEARP inspection, the U.S. Environmental Protection Agency (EPA) conducted a RCRA Facility Assessment (RFA). In the RFA report (EPA April 1987), this SWMU is relabeled a burn pit, although no burn pit could be found. The report mistakenly describes the single 55-gal drum identified in the CEARP investigation as several 55-gal drums and correctly identifies the wooden pallets. However, the report includes no information on waste streams and concludes that the potential for release is unknown because the materials handled at the site are unknown.

In January 1994 KAFB Explosive Ordnance Disposal conducted a surface unexploded ordnance (UXO) survey at the site. No live ordnance, ordnance debris, or unexpended HE was identified during this survey (22-20).

In February 1994, RUST Geotech Inc. conducted a surface radiation survey at the site. The survey used a scintillometer containing a sodium-iodide detector to measure gamma radiation. No anomalies were detected during this survey (RUST Geotech Inc. July 1994).

## **3.0 CONCEPTUAL MODEL**

### **3.1 Initial Conceptual Model**

Available data do not conclusively demonstrate the presence or absence of hazardous waste or constituents at ER Site 22. The initial conceptual model developed for ER Site 22 (Figure 3-1) consists of a fenced area containing fiberboard pieces, wooden pallets, a small pile of charcoal and burned wood, and a 55-gal drum with the top cut off. Past activities at the site are not documented, but aerial photographs show activity at the time of the construction of the Starfire Optical Range, and ER Site 22 may have been a staging area for utility installation (USDA 1983). Therefore, the potential presence of polychlorinated biphenyls (PCB) will be investigated. The current conditions at the site suggest wood was burned in the 55-gal drum. It is not known if other chemicals were stored or disposed of at the site; therefore, samples will also be analyzed for semivolatile organic compounds (SVOC) and metals.

### **3.2 Existing Information on Nature and Extent of Contamination**

Figure 1-1 shows the surficial distribution of nonhazardous debris at ER Site 22. The subsurface distribution of debris, if any, is unknown. There is no physical evidence that suggests the presence of hazardous constituents, and there is no documented record of burial activities at this site. The nature and extent of potential contaminants in the soil is unknown. However, no significant contamination is expected to be found. The fiberboard was tested to determine whether it contains asbestos and no asbestos was identified (Appendix A).

### **3.3 Potential Contaminant Migration Pathways**

Figure 3-1 illustrates the potential contaminant migration pathways of air, soil, and surface water, if constituents of concern (COC) are present at ER Site 22. Because scattered debris is subject to wind erosion and transport, air is a potential pathway. Soil near the scattered debris may contain COCs, and contact with such soil results in a direct exposure pathway. The surface-water pathway to receptors is viable because the site lies 50 ft north of an arroyo channel. The depth to ground water at this site is approximately 150 ft (SNL/NM October 1994) and is based on the depth to groundwater in the Starfire Optical Range well (approximately one-half mile southeast of ER Site 22). The limited precipitation, the low permeability of surface soils, and the low infiltration rates (SNL/NM February 1994), preclude ground water as a primary pathway.

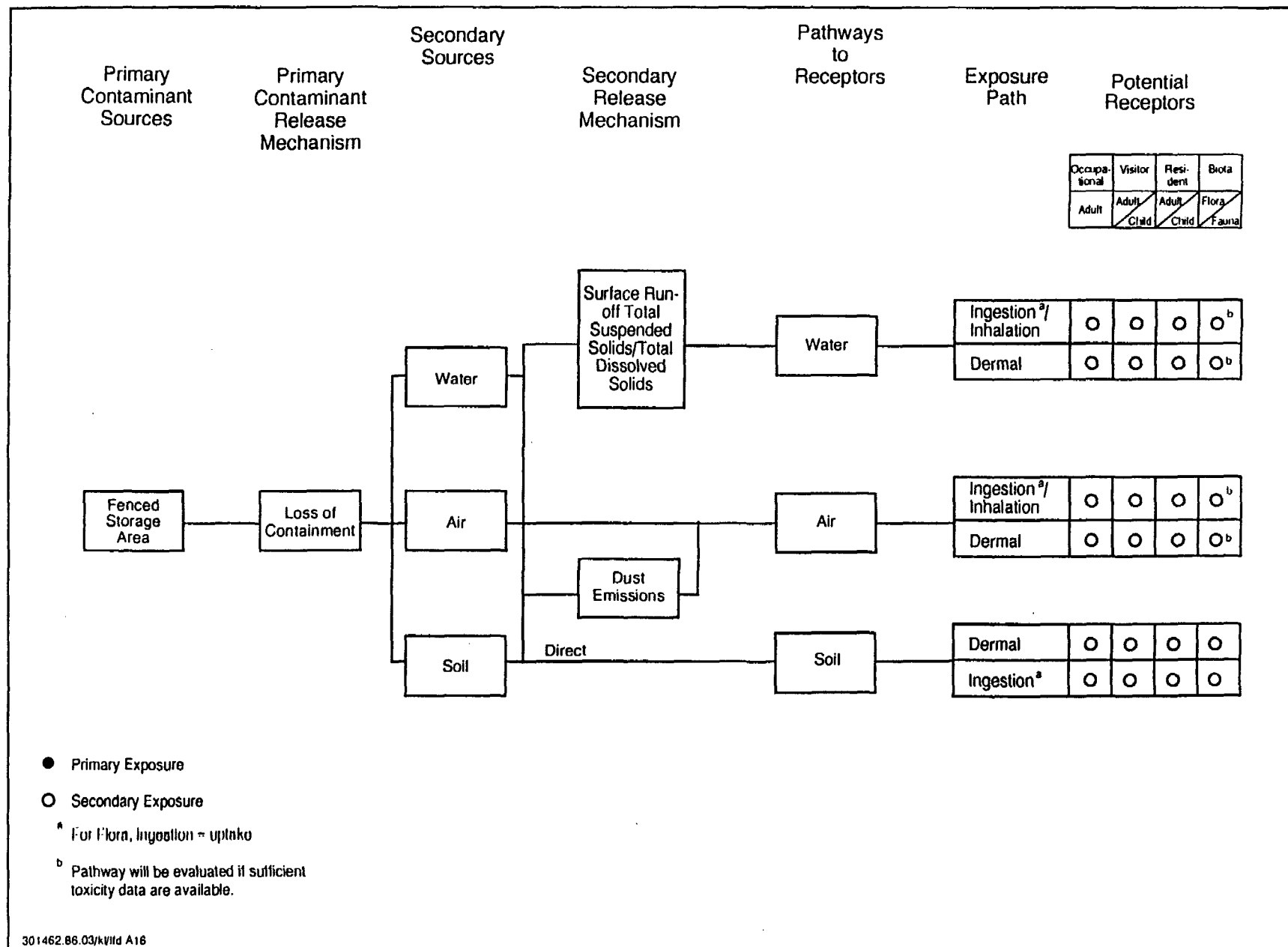


Figure 3-1  
Flow Diagram of Conceptual Model for ER Site 22

### **3.4 Potential Public Health and Environmental Impacts**

Public health and environmental impacts that may be associated with ER Site 22 (Figure 3-1) include ingestion/inhalation and dermal exposure to receptors through the air, soil, and surface-water pathways. Because hazardous materials are thought not to be present on the site, all exposure pathways are considered secondary.

## 4.0 DATA NEEDS/DQOS

The primary data need for ER Site 22 (Table 4-1) is to characterize the nature and considerations of possible COCs in the soil surrounding the scattered debris. Judgmental soil samples will be taken below the debris to determine whether past activities released COCs to the environment. If COCs are detected above action levels or background concentrations, the site will be investigated through an Operable Unit (OU) 1334 RCRA facility investigation (RFI) as described in the Program Implementation Plan (PIP) (SNL/NM February 1994) and in Chapter 4.0 of the RFI Work Plan (SNL/NM October 1994). There are no additional data needs for physical or environmental media characterization (e.g., permeability, geology, etc) at this site. To comply with National Environmental Policy Act (NEPA) requirements, cultural resource and sensitive species surveys were performed at the site in 1994 (IT August 1994).

**Table 4-1**  
**Summary of Data Requirements for Characterization of ER Site 22**

Data Type	Data Needs	Action
Source characterization	<ul style="list-style-type: none"><li>• Characterize site background for soil (metals and radionuclides)</li><li>• Characterize nature and extent of potential COCs in soil underlying fiberboard pieces, charcoal and burned wood, and 55-gal drum</li></ul>	<ul style="list-style-type: none"><li>• Collect shallow soil samples north of the site and analyze for metals and radionuclides</li><li>• Collect soil samples from under debris in fenced area and analyze for COCs listed in Table 7-1</li></ul>
Environmental characterization	<ul style="list-style-type: none"><li>• None</li></ul>	<ul style="list-style-type: none"><li>• None</li></ul>
Potential receptors	<ul style="list-style-type: none"><li>• Identify sensitive species</li></ul>	<ul style="list-style-type: none"><li>• Conduct sensitive species survey</li></ul>

ER = Environmental restoration.  
COC = Constituent of concern.  
gal = gallon.

## 5.0 VOLUNTARY CORRECTIVE MEASURE FOR ER SITE 22

The empty 55-gal drum, scrap wood (pallets), burned wood, and fiberboard will be removed from ER Site 22 as part of a voluntary corrective measure (VCM) (SNL/NM November 1994a).



## **6.0 SAMPLING PLAN**

Appendix G of the OU 1334 RFI Work Plan (SNL/NM October 1994) describes the specific technical approaches for performing unexploded ordnance (UXO)/high explosives (HE), radiological, and land surveys at ER sites. Quality control (QC) samples (including duplicates, matrix spikes, field blanks, trip blanks, and equipment rinsates) will be collected as specified in the generic Quality Assurance Project Plan (QAPjP) of the PIP (SNL/NM February 1994). Section 7.0 summarizes specific quality assurance (QA) and QC samples collected for this plan. All samples collected for laboratory analysis will be screened for gross alpha, beta, and gamma activity by the Sample Management Office to meet Department of Transportation sample shipping requirements. Samples will be collected in accordance with the methodology presented in Appendix G of the OU 1334 RFI Work Plan (SNL/NM October 1994).

### **6.1 Sampling Plan Objectives and Technical Approach**

The sampling program at ER Site 22 is designed to collect adequate samples to meet the data needs in Table 4-1. Specifically, sampling will be conducted at the site to determine whether regulated hazardous waste or constituents (including metals, SVOCs, PCBs, and radionuclides) are present above action levels or background concentrations. Figure 6-1 shows the decision logic for sampling activities at ER Site 22. Following UXO/HE and land surveys, intrusive sampling will be conducted to investigate the nature and extent of possible COCs below the scattered debris within the fenced storage area. Judgmental samples will be collected from areas where COCs are most likely to be present. Field-screening for radioactivity and VOC vapors will be conducted to monitor the site for health and safety, to identify areas of potential contamination, and to guide in identifying the sample locations. The sections below provide detail on the ER Site 22 sampling plan.

### **6.2 Nonintrusive Surveys**

UXO and surface radiation surveys of the site were performed in January and February 1994. No activities have occurred since then that would change conditions at the site.

### **6.3 Intrusive Sampling**

Surface and near-surface soil samples will be collected to characterize the site background and selected areas within the ER Site 22 fenced area. Appendix G of the OU 1334 RFI Work Plan (SNL/NM October 1994) presents collection procedures and methodology.

#### **Site Background Samples**

Surface and near-surface soil samples will be collected at three locations (Figure 6-2) to determine site-specific background concentrations for metals and radionuclides. The

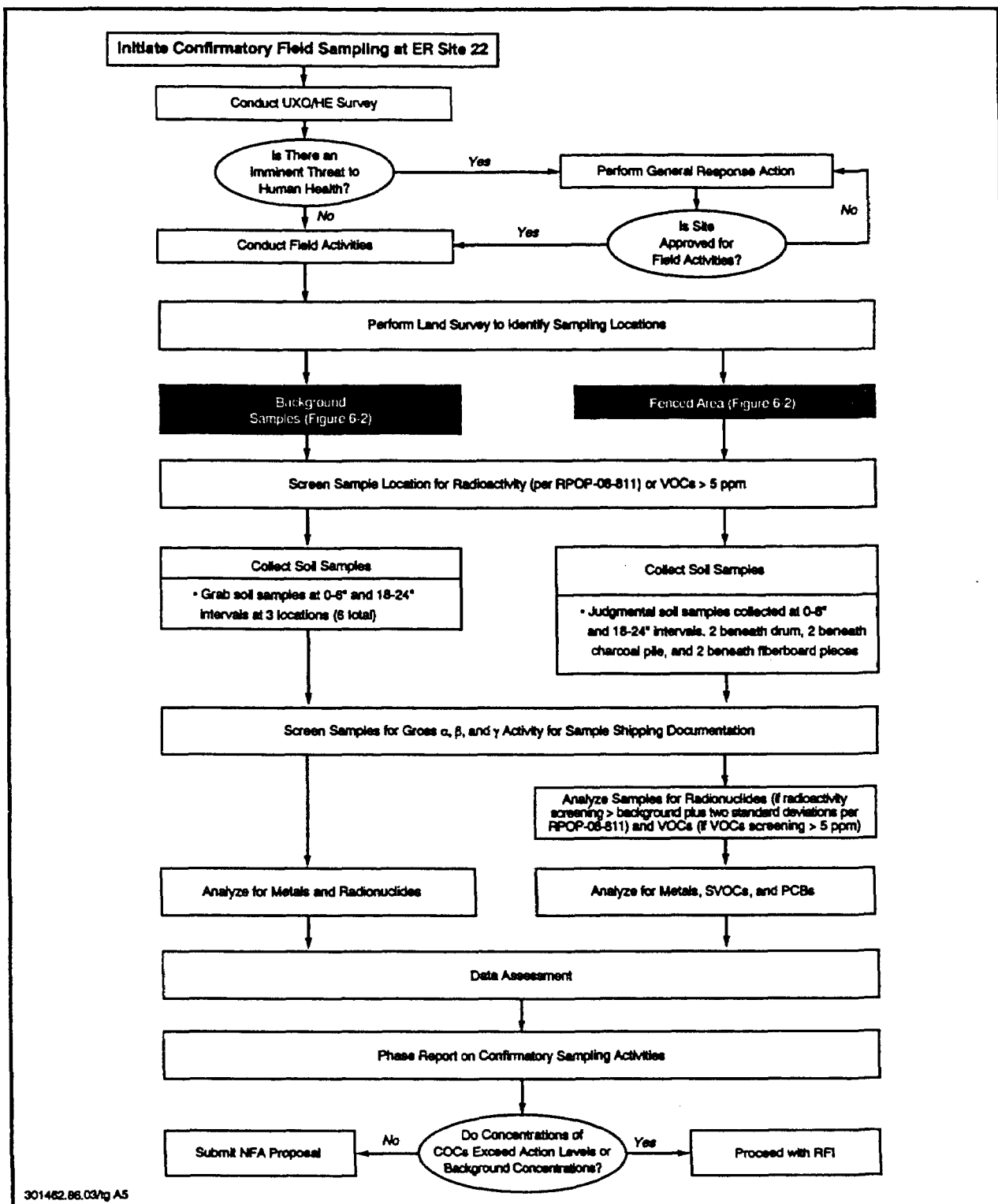
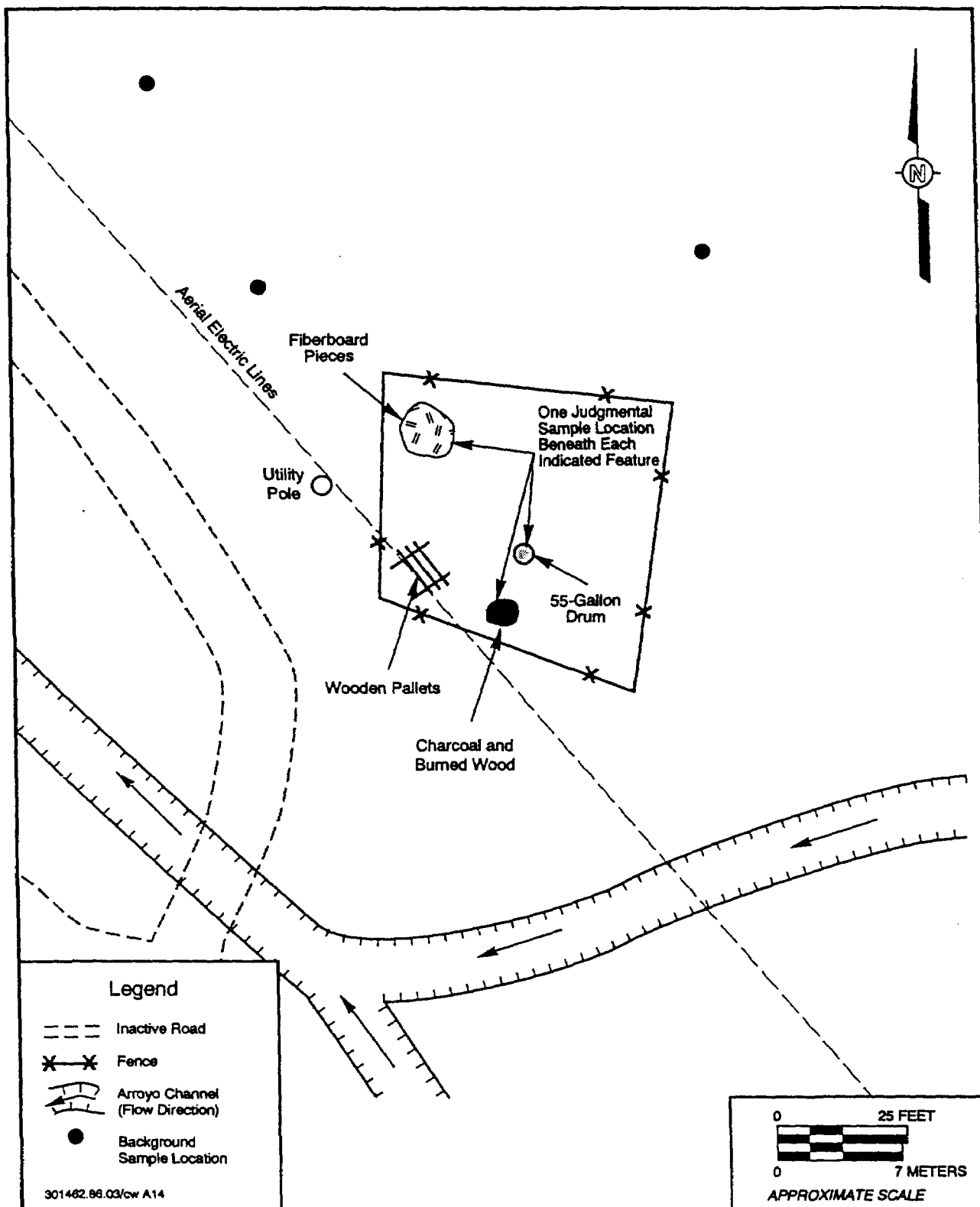


Figure 6-1  
Decision Logic for Sampling Activities at ER Site 22



**Figure 6-2**  
**Sample Locations at ER Site 22**

background concentrations will be compared to metal concentrations and radiological activity found in soils within the fenced area to determine whether COCs have been released to the environment.

#### Fenced Area

Surface and near-surface soil samples will be collected from selected locations within the fenced storage area to determine whether COCs have been released to the environment. Judgmental samples will be collected from beneath the fiberboard pieces, the 55-gal drum, and the charcoal and burned wood (Figure 6-2) at depths of 0 to 6 inches (in.) and 18 to 24 in. Soil samples from the fenced area will be analyzed for SVOCs, PCBs, and metals.

### **6.4 Contingency Sampling**

If any of the soil samples from ER Site 22 contain COCs above action levels or background concentrations, an OU 1334 RFI will be conducted in order to reevaluate the site for additional sampling needs.

## **7.0 ANALYTICAL METHODS AND REQUIREMENTS**

This chapter defines ER Site 22 specific analyte lists for HE compounds, metals, and radionuclides; methods of analysis; and QA/QC protocol for duplicate samples, matrix spikes, equipment rinsates, and field and trip blanks. Determined from knowledge of historical operations gained during archival activities, not all analytes provided by particular EPA methods will be required at ER Site 22. The generic QAPjP (Annex II of the PIP [SNL/NM February 1994]) and Appendix G of the OU 1334 RFI Work Plan (SNL/NM October 1994) contain sample size and container requirements.

### **7.1 Analyte Lists**

The following lists analytes referenced in Chapter 5.0 of the OU 1334 RFI Work Plan (SNL/NM October 1994):

- Metals, including arsenic, barium, beryllium, cadmium, chromium, lead, mercury, selenium, and silver
- Radionuclides, including lead-210, radium-226, radium-228, thorium-228, thorium-230, thorium-232, uranium-234, uranium-235/236, and uranium-238
- SVOCs, VOCs, and PCBs are consistent with standard EPA Methods listed in Section 4.3.2 of the OU 1334 RFI Work Plan (SNL/NM October 1994)

### **7.2 Analytical Methods**

Soil samples will be digested according to EPA Method 3050, followed by analysis (SW-846 protocol) for one or more of the following analyte lists:

- HE compounds, by EPA Method 8330
- Metals, by EPA Methods 6010/7000
- SVOCs, by EPA Method 8270
- VOCs, by EPA Method 8240
- PCBs, by EPA Method 8080

Radionuclide analysis may also be performed on digested soil samples as follows:

- Lead-210, radium-226, and radium-228 by gamma spectroscopy

- Thorium-228, thorium-230, thorium-232, uranium-234, uranium-235/236, and uranium-238 by alpha spectroscopy

The generic QAPjP (Annex II of the PIP [SNL/NM February 1994]) does not currently specify methods for radionuclide analysis. However, analytical laboratories will submit results and counting errors, blank results, duplicate results and relative percent difference, tracer or spike results and recoveries, instrument calibration documentation, control standard results, detection limit determinations, and all raw data.

### **7.3 Site-Specific Requirements**

ER Site 22 samples and specific QA/QC samples will be analyzed according to the methods listed in Table 7-1. Site background samples will be analyzed for the same suite of analytes as those collected for site characterization. Analytical requirements for ER Site 22 include

- Site background samples—metals and radionuclides
- Fenced area—metals, SVOCs, and PCBs

If field-screening indicates radioactivity greater than background plus two standard deviations as discussed in Radiation Protection Operating Procedure (RPOP) 08-811 and/or for VOCs greater than 5 parts per million, samples from the fenced storage area will be analyzed for radionuclides by alpha and gamma spectroscopy and/or for VOCs by gas chromatography/mass spectrometry.

### **7.4 QA/QC Requirements**

Laboratory QA/QC requirements for number of duplicates, matrix spikes and matrix spike duplicates, equipment rinsates, and field and trip blanks will follow the requirements presented in the generic QAPjP (Annex II of the PIP [SNL/NM February 1994]). The analytical laboratory will provide Level III data in a report format that meets all requirements of the generic QAPjP (SNL/NM February 1994) and of sufficient quality to support risk assessment calculations, if needed.

**Table 7-1**  
**ER Site 22 Summary of Nonintrusive and Intrusive Sampling**

Nonintrusive Sampling						Intrusive Sampling											
Survey Type	UXO/HE Survey	Radiological Survey	Land Survey			Level I/II Annlynn											
						Field-Screening											
Survey Date	TBD	TBD	TBD			Gross alpha/beta/gamma GM Pancake & NaI	VOCs (PID)	HE Compounds (SW 8330)	VOCs (SW 8240)	SVOCs (SW 8270)	SVOCs (TCLP)	PCBs (SW 8080)	Metals (TCLP)	Metals (SW 6010/7000)	Isotopic Uranium by Alpha Spectroscopy	Isotopic Thorium by Alpha Spectroscopy	Gamma spectroscopy
Name of Sample/Location			Sample Media	Sample Type	No. of Samples	Sample Depth											
Site Background			Soil	Grab	3	0-6"	X	X		O				X	X	X	X
					3	18-24"	X	X		O					X	X	X
Fenced Area			Soil	Grab	3	0-6"	X	X		O	X		X	O	O	O	
					3	18-24"	X	X		O	X		X		X	O	O

Refer to footnotes at end of table.

**Table 7-1 (Concluded)**  
**ER Site 22 Summary of Nonintrusive and Intrusive Sampling**

Nonintrusive Sampling						Intrusive Sampling													
Survey Type	UXO/HE Survey	Radiological Survey	Land Survey			Level I/II Analyses		Level III Analyses											
						Field-Screening													
Survey Date	TBD	TBD	TBD			Gross alpha/beta/gamma GM Pancake & NaI	VOCs (PID)	HE Compounds (SW 8330)	VOCs (SW 8240)	SVOCs (SW 8270)	SVOCs (TCLP)	PCBs (SW 8080)	Metals (TCLP)	Metals (SW 6010/7000)	Isotopic Uranium by Alpha Spectroscopy	Isotopic Thorium by Alpha Spectroscopy	Gamma spectroscopy		
Quality Control Samples				Sample Media	Sample Type	No. of Samples	Sample Depth												
Fenced area duplicate				Soil	Grab	1	0-6"	X	X		O	X		X		X	O	O	O
Equipment rinsate (scoop)				Water	Grab	1	NA	NA	NA		O	X		X		X	O	O	O
Matrix spike/matrix spike duplicate				Soil	NA	1	NA	NA	NA		O	X		X		X	O	O	O
Trip blank (soil)				Soil	NA	1 per shipment <sup>a</sup>	NA	NA	NA		O								
Trip blank (water)				Water	NA	1 per shipment <sup>a</sup>	NA	NA	NA		O								
Fenced area field blank				Water	NA	1	NA	NA	NA		O	X		X		X	O	O	O
TOTAL NUMBER						17 <sup>b</sup>		13	13		0	10		10		16	6	6	6

<sup>a</sup> Assumes 1 shipment each for the site.

<sup>b</sup> Does not include matrix spike/matrix spike duplicate.

ER = Environmental Restoration

UXO = Unexploded ordnance

HE = High explosive(s)

TBD = To be done.

No. = Number

VOC = Volatile organic compound

PID = Photoionization detector

SVOC = Semivolatile organic compound

PCB = Polychlorinated biphenyl

TCLP = Toxic characteristic leaching procedure

NA = Not applicable.

O = Analysis will be performed if field screening indicates radioactivity background plus two standard deviations per RPOP-08-811 and/or VOCs >5 ppm.

Note: Refer to Chapter 4.0 in SNL/NM October 1994 for HE compounds, SVOCs, metals, and radionuclides analyte lists.



## 8.0 INVESTIGATION DERIVED WASTE

Section 4.3.4.2 of the PIP (SNL/NM February 1994) and Appendix G of the OU 1334 RFI Work Plan (SNL/NM October 1994) discuss the general procedures for the management of ER Project investigation-derived waste (IDW). The Waste Management Plan for VCMs and NFA Confirmatory Sampling in OU 1334, Central Coyote Test Field (SNL, November, 1994b) describes specific IDW management procedures for this task.

## 9.0 REFERENCES

### 9.1 ER Site References

ER Site Reference Number	Reference
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SNL/NM, see Sandia National Laboratories.

U.S. Environmental Protection Agency (EPA), April 1987. "Final RCRA Facility Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico," Contract No. 68-01-7038, EPA Region 6.

### **9.3            Operating Procedures**

RPOP-08-811    Sandia National Laboratories (SNL/NM), draft. "Radiological Surveys of Soil Samples," Sandia National Laboratories, Albuquerque, new Mexico

### **9.4            Aerial Photographs**

United States Department of Agriculture (USDA), 1983. Aerial Photograph, 613030-1382-173, Albuquerque, New Mexico.

**ATTACHMENT 1**

**Fiberboard Analysis for Asbestos**

## Sandia National Laboratories

P.O. Box 5800  
Albuquerque, New Mexico 87185-0651

Managed by Martin Marietta Corporation  
for the Department of Energy

Kevin Babb  
Industrial Hygiene

date: October 21, 1994

to: D. J. Sandhaus, 7585, Excel Technical & Environmental Services, Inc.

subject: Asbestos Bulk sample results

Department 7712 took bulk samples on October 5, 1994 from fiberboard located at ER site 22 Coyote Canyon Test site. The samples were submitted to the 7712 Analytical Laboratory for analysis. The analysis was conducted by PLM method with No Asbestos Detected from any of the three(3) samples.

If department 7712 could be of any further assistance, please call on us.

cc 7712 day file  
Donna Young, 7712

NOD

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**Statement of Basis  
Approval of No Further Action**

**January 2000**

**ER Site 22  
Operable Unit 1334  
Round 2**

NOD Originally Submitted October 1996

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**21. Site 22, OU 1334, Storage/Burn (West of DEER)**

- a. The tables are incorrect. Please provide the proper tables.**
- b. RECOMMENDATION: Site 22 is currently inappropriate for NFA because the proposal cannot be evaluated until the tables are corrected.**

Response: Corrected tables are provided for NMED review (Attachments A–C). Minor changes in the table format have been made to clarify possible points of confusion. This site should now be acceptable for NFA approval.



**Attachment A**

**ATTACHMENT A**

**TABLE 3-1 (REVISED)  
SUMMARY OF SOIL SAMPLES COLLECTED AT  
ER SITE 22, SNL/NM**

Table 3-1  
Summary of Soil Samples Collected at ER Site 22, SNL/NM

Sample Location	EP Sample ID	Sample Type	Sample Depth	SMO Laboratory ID	Analyses Performed
22-001	22-S1-001-F	Background	0-6 in.	SNLA021087-1 SNLA021087-2 SNLA021087-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
	22-S2-001-F	Background	18-24 in.	SNLA021088-1 SNLA021088-2 SNLA021088-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
22-002	22-S1-002-F	Background	0-6 in.	SNLA021089-1 SNLA021089-2 SNLA021089-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
	22-S2-002-F	Background	18-24 in.	SNLA021090-1 SNLA021090-2 SNLA021090-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
22-003	22-S1-003-F	Background	0-6 in.	SNLA021091-1 SNLA021091-2 SNLA021091-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
	22-S1-003-F	Background	18-24 in.	SNLA021092-1 SNLA021092-2 SNLA021092-3	Metals—EPA Method 6010/7000 Series Isotopic Uranium and Thorium by Alpha Spectroscopy Gamma Spectroscopy
22-004	22-S1-004-F	On-site	0-6 in.	SNLA021093-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-004-F (MS/MSD)	On-site	18-24 in.	SNLA021094-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
22-005	22-S1-005-F	On-site	0-6 in.	SNLA021095-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-005-F	On-site	18-24 in.	SNLA021096-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-005-DU (Duplicate)	On-site (Duplicate)	18-24 in.	SNLA021097-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080

Table 3-1 (Concluded)  
Summary of Soil Samples Collected at ER Site 22, SNL/NM

Sample Location	ER Sample ID	Sample Type	Sample Depth	SMO Laboratory ID	Analyses Performed
22-006	22-S1-006-F	On-site	0-6 in.	SNLA021098-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
	22-S2-006-F	On-site	18-24 in.	SNLA021099-1	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080
22-007	22-RB-007	Rinsate Blank	NA	SNLA021100-1, -2, and -3	Metals—EPA Method 6010/7000 Series Semivolatile Organic Compounds—EPA Method 8270 Polychlorinated Biphenyls—EPA Method 8080

**Attachment B**

**ATTACHMENT B**

**TABLE 3-2 (REVISED)  
SUMMARY OF ORGANIC AND  
METALS ANALYTICAL RESULTS  
ER SITE 22 SOIL SAMPLES, SNL/NM**

Table 3-2  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Samples, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:	Soil Action Level <sup>a</sup>	Background Level <sup>b</sup>	22-001 22-S1-001-F SNLA021087-1 Background 0-6 inches 12/09/94	22-001 22-S2-001-F SNLA021088-1 Background 18-24 inches 12/09/94	22-002 22-S1-002-F SNLA021089-1 Background 0-6 inches 12/09/94	22-002 22-S2-002-F SNLA021090-1 Background 18-24 inches 12/09/94
<b>Volatile Organics</b>						
Field Screening Results, ppm in vapor (ppm <sub>v</sub> )	(5 ppm <sub>v</sub> ) <sup>c</sup>	0.3 ppm <sub>v</sub>	0.6-0.7 ppm <sub>v</sub>	0 ppm <sub>v</sub>	0 ppm <sub>v</sub>	0 ppm <sub>v</sub>
<b>Radionuclides</b>						
Field Screening Results <sup>d</sup>	(Background plus 2 standard deviations) <sup>c</sup>	NE	9,930 cpm	10,200 cpm	10,000 cpm	10,400 cpm
<b>Metals (Method 6010/7000 series), mg/kg</b>						
Arsenic (6010)	0.5	NE	5.1	3.2	2.9	3.5
Barium (6010)	6,000	0.13-730	102	91.3	93.2	511
Beryllium (6010)	0.2 <sup>e</sup>	0.1-1.1	0.69	0.43	0.32	0.43
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	10.0	6.4	4.3	6.1
Lead (6010)	400 <sup>g</sup>	1.0-110.0	9.0	3.6 J	3.5 J	3.3 J
Mercury (7471)	20	NE	ND<0.10	ND<0.10	ND<0.10	ND<0.10
Selenium (6010)	400	NE	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Silver (6010)	400	0.05-10.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
<b>Semivolatile Organics</b>						
(Method 8270/TCL) µg/kg or µg/L (water)	NA	NA	NA	NA	NA	NA
<b>Polychlorinated Biphenyls</b>						
(Method 8080/TCL) µg/kg or µg/L (water)	0.090	NA	NA	NA	NA	NA

Table 3-2 (Continued)  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Sample, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-003 22-S1-003-F SNLA021091-1 Background 0-6 inches 12/09/94	22-003 22-S2-003-F SNLA021092-1 Background 18-24 inches 12/09/94	22-004 22-S1-004-F SNLA021093-1 On Site 0-6 inches 12/09/94	22-004 22-S2-004-F SNLA021094-1 On Site (MS/MSD) 18-24 inches 12/09/94
	Soil Action Level <sup>f</sup>	Background Level <sup>g</sup>				
<u>Volatile Organics</u>						
Field Screening Results, ppm in vapor (ppm <sub>v</sub> )	(5 ppm <sub>v</sub> ) <sup>c</sup>	0.3 ppm <sub>v</sub>	0 ppm <sub>v</sub>	0 ppm <sub>v</sub>	0 ppm <sub>v</sub>	NF
<u>Radionuclides</u>	(Background plus 2 standard deviations) <sup>c</sup>	NE	10,200	9,830 cpm	10,600 cpm	10,400 cpm
Field Screening Results <sup>d</sup>						
Metals (Method 6010/7000 series), mg/kg						
Arsenic (6010)	0.5	NE	2.8	2.7	1.5	1.9
Barium (6010)	6,000	0.13-730	69.2	84.3	45.6	79.8
Beryllium (6010)	0.2 <sup>e</sup>	0.1-1.1	0.51	0.36	0.29	0.36
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<0.50	ND<0.50	ND<0.50
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	6.5	4.9	3.1	4.6
Lead (6010)	400 <sup>g</sup>	1.0-110.0	4.8 J	4.3 J	5.4	ND<5.0
Mercury (7471)	20	NE	ND<0.10	ND<0.10	ND<0.10	ND<0.10
Selenium (6010)	400	NE	ND<0.50	ND<0.54	ND<0.50	ND<0.50
Silver (6010)	400	0.05-10.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
<u>Semivolatile Organics</u>						
(Method 8270/TCL) µg/kg or µg/L (water)	NA	NA	NA	NA	<330 <sup>h</sup>	<330 <sup>h</sup>
<u>Polychlorinated Biphenyls</u>						
(Method 8080/TCL) µg/kg or µg/L (water)	0.090	NE	NA	NA	<33	<33



Table 3-2 (Continued)  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Sample, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:			22-005 22-S1-005-F SNLA021095 On Site 0-6 inches 12/09/94	22-005 22-S2-005-F SNLA021096-1 On Site 18-24 inches 12/09/94	22-005 22-S2-005-DU SNLA021097-1 On Site 18-24 inches 12/09/94
	Soil Action Level <sup>a</sup>	Background Level <sup>a</sup>			
<b>Volatile Organics</b> Field Screening Results, ppm in vapor (ppm <sub>v</sub> )	(5 ppm <sub>v</sub> ) <sup>c</sup>	0.3 ppm <sub>v</sub>	0 ppm <sub>v</sub>	NF	NF
<b>Radionuclides</b> Field Screening Results <sup>d</sup>	(Background plus 2 standard deviations) <sup>c</sup>	NE	10,200 cpm	10,400 cpm	10,400 cpm
<b>Metals (Method 6010/7000 series), mg/kg</b>					
Arsenic (6010)	0.5	NE	2.0	2.0	1.9
Barium (6010)	6,000	0.13-730	78.1	83.1	78.8
Beryllium (6010)	0.2 <sup>e</sup>	0.1-1.1	0.36	0.29	0.40
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<0.50	ND<0.50
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	4.4	3.6	4.2
Lead (6010)	400 <sup>g</sup>	1.0-110.0	7.6	4.0 J	4.2 J
Mercury (7471)	20	NE	ND<0.10	ND<0.10	ND<0.10
Selenium (6010)	400	NE	ND<0.50	ND<0.50	ND<0.50
Silver (6010)	400	0.05-10.0	ND<1.0	ND<1.0	ND<1.0
<b>Semivolatile Organics</b> (Method 8270/TCL) µg/kg or µg/L (water)	NA	NA	<330 <sup>h</sup>	<660 <sup>i</sup>	<330 <sup>h</sup>
<b>Polychlorinated Biphenyls</b> (Method 8080/TCL) µg/kg or µg/L (water)	0.090	NE	<33	<33	<33

Table 3-2 (Concluded)  
Summary of Organic and Metals Analytical Results  
ER Site 22 Soil Sample, SNL/NM

Sample Location: ER Sample ID: SMO Sample No: Sample Type: Sample Depth: Sample Date:	Soil Action Level <sup>a</sup>	Background Level <sup>a</sup>	22-006 22-S1-006-R SNLA021098-1 On Site 0-6 inches 12/09/94	22-006 22-S2-006-F SNLA021099-1 On Site 8-24 inches 12/09/94	22-007 22-FB-007 SNLA021100-1, -2, -3 Rinsate Blank RB 12/09/94
<b>Volatile Organics</b>					
Field Screening Results, ppm in vapor (ppm <sub>v</sub> )	(5 ppm <sub>v</sub> ) <sup>c</sup>	0.3 ppm <sub>v</sub>	0 ppm <sub>v</sub>	0.3 ppm <sub>v</sub>	0 ppm <sub>v</sub>
<b>Radionuclides</b>					
Field Screening Results <sup>d</sup>	Background plus 2 standard deviations) <sup>c</sup>	NE	10,300	NF	NF
<b>Metals (Method 6010/7000 series), mg/kg</b>					
Arsenic (6010)	0.5	NE	2.4	2.6 J	ND<0.010
Barium (6010)	6,000	0.13-730	82.1	236	ND<0.010
Beryllium (6010)	0.2 <sup>e</sup>	0.1-1.1	0.51	0.28 J	ND<0.0020
Cadmium (6010)	80	0.1-8.5	ND<0.50	ND<1.0	ND<0.0050
Chromium (total) (6010)	400 <sup>f</sup>	0.01-58.1	7.8	5.9	ND<0.010
Lead (6010)	400 <sup>g</sup>	1.0-110.0	5.9	ND<10.0	ND<0.0030
Mercury (7471)	20	NE	ND<0.10	ND<0.10	ND<0.0002
Selenium (6010)	400	NE	ND<0.50	ND<1.0	ND<0.0050
Silver (6010)	400	0.05-10.0	ND<1.0	ND<2.0	ND<0.010
<b>Semivolatile Organics</b>					
(Method 8270/TCL) µg/kg or µg/L (water)	--	--	--	--	<10 <sup>j</sup>
Phenol	50,000,000	NE	<330 <sup>h</sup>	<330 <sup>h</sup>	10
<b>Polychlorinated Biphenyls</b>					
(Method 8080/TCL) µg/kg or µg/L (water)	0.090	NE	<33	<33	<1

Notes

NE = Not Established

NF = Not Field Screened

NA = Not Analyzed

<sup>a</sup>Reference: SNL/NM June 1994

<sup>b</sup>Reference: IT May 1994b.

<sup>c</sup>Action level triggers collection of soil samples for that fraction.

<sup>d</sup>Radiological screening performed with sodium-iodide scintillation detector.

<sup>e</sup>Action level obtained from FR, July 27, 1990. Proposed Rule for 40 CFR Part 264.

<sup>f</sup>Action level is for chromium (VI).

<sup>g</sup>Reference: EPA December 1994.

Detection Limit Footnotes

Analyte	h(mg/kg)	i(mg/kg)	j(µg/kg)
Benzoic Acid	1600	3200	50
2,4,5-trichlorophenol	1600	3200	50
2-nitroaniline	1600	3200	50
3-nitroaniline	1600	3200	50
2,4-dinitrophenol	1600	3200	50
4-nitrophenol	1600	3200	50
4-nitroaniline	1600	3200	50
4,6-dinitro-2-methylphenol	1600	3200	50
Pentachlorophenol	1600	3200	50
3-3'-dichlorobenzidine	660	1300	20

**Attachment C**

**ATTACHMENT C**

**TABLE 3-4 (REVISED)**  
**SUMMARY OF ALPHA SPECTROSCOPY RESULTS**  
**ER SITE 22 BACKGROUND SOIL SAMPLES, SNL/NM**

**Table 3-4**  
**Summary of Alpha Spectroscopy Results,**  
**ER Site 22 Background Soil Samples, SNL/NM**

Sample Location ER Sample ID SMO Sample No. Sample Type Sample Depth Sample Date			22-001 22-S1-001-F SNLA021087-2 Background 0-5 inches 12/09/94		22-001 22-S2-001-F SNLA021088-2 Background 0-5 inches 12/09/94		22-002 22-S1-002-F SNLA021089-2 Background 0-5 inches 12/09/94	
	SNL/NM Alpha Level in Soil	SNL/NM Beta Level in Soil						
Parameter Detected (Unit)	(pCi/g)	(pCi/g)	(pCi/g) ± 2σ	MDA	(pCi/g) ± 2σ	MDA	(pCi/g) ± 2σ	MDA
<b>Radionuclides, Alpha Spectroscopy<sup>c</sup></b>								
Uranium 233/234	NE	0.05-1.0	0.70 ± 0.20	0.080	0.85 ± 0.22	0.057	0.75 ± 0.32	0.33
Uranium 235	NE	0.05-0.18	0.091 ± 0.062	0.075	0.024 ± 0.028 U	0.042	0.033 ± 0.072 U	0.17
Uranium 238	NE	NE	0.52 ± 0.16 B	0.049	0.66 ± 0.18 B	0.057	0.62 ± 0.27 B	0.19
Thorium 230	NE	NE	0.75 ± 0.30	0.16	0.53 ± 0.18	0.088	0.61 ± 0.19	0.14
Thorium 232	NE	0.23 - 1.20	0.92 ± 0.34	0.16	0.49 ± 0.17	0.076	1.1 ± 0.28	0.11

Table 3-4 (Concluded)  
Summary of Alpha Spectroscopy Results,  
ER Site 22 Background Soil Samples, SNL/NM

Sample Location ER Sample ID SMO Sample No. Sample Type Sample Depth Sample Date			22-002 22-S2-002-F SNLA021090 Background 18-24 inches 12/09/94		22-003 22-S1-003-F SNLA021091-2 Background 0-6 inches 12/09/94		22-003 22-S2-003-F SNLA021092-2 Background 18-24 inches 12/09/94	
	SNL/NM Action Level in Soil <sup>a</sup>	SNL/NM Check Point Level in Soil <sup>b</sup>						
Parameter Detected (units)	(pCi/g)	(pCi/g)	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA	(pCi/g) $\pm 2\sigma$	MDA
<b>Radionuclides, Alpha Spectroscopy<sup>c</sup></b>								
Uranium 233/234	NE	0.05-1.0	0.64 $\pm$ 0.29	0.16	0.65 $\pm$ 0.20	0.094	0.57 $\pm$ 0.23	0.15
Uranium 235	NE	0.05-0.18	0.069 $\pm$ 0.10 U	0.16	0.020 $\pm$ 0.034 U	0.068	0.048 $\pm$ 0.056	0.044
Uranium 238	NE	NE	0.67 $\pm$ 0.30 B	0.16	0.79 $\pm$ 0.23 B	0.094	0.77 $\pm$ 0.27 B	0.044
Thorium 230	NE	NE	0.66 $\pm$ 0.21	0.075	0.74 $\pm$ 0.17	0.086	0.57 $\pm$ 0.18	0.065
Thorium 232	NE	0.23 - 1.20	0.72 $\pm$ 0.23	0.089	1.1 $\pm$ 0.22	0.083	0.62 $\pm$ 0.19	0.030

Notes

<sup>a</sup>SNL/NM action level not established.

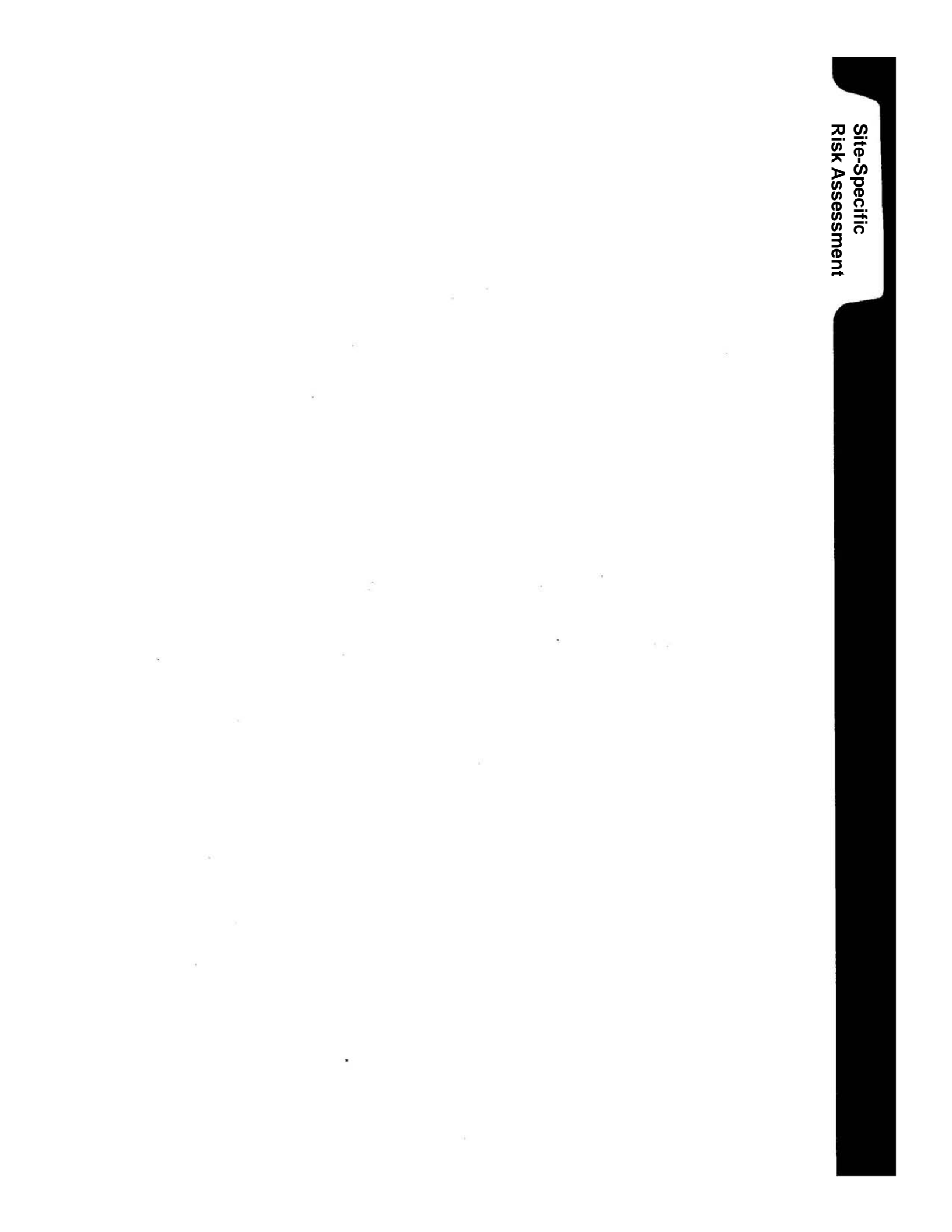
<sup>b</sup>Reference: IT May 1994b.

<sup>c</sup>Alpha Spectroscopy analyses performed.

B = A reagent blank associated with this sample had a result without a U flag and, after correcting for possible different aliquots, that result is greater than or equal to the MDA for this sample.

U = The result is less than the MDA.

**Site-Specific  
Risk Assessment**



**21. Site 22, OU 1334, Storage/Burn (West of DEER)**

- a. The tables are incorrect. Please provide the proper tables.**
- b. RECOMMENDATION: Site 22 is currently inappropriate for NFA because the proposal cannot be evaluated until the tables are corrected.**

Response: Corrected tables are provided for NMED review (Attachments A–C). Minor changes in the table format have been made to clarify possible points of confusion. This site should now be acceptable for NFA approval.