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Justification for Class III Permit Modification April 2001 SWMU 151 Operable Unit 1295 Building 9940 Septic System

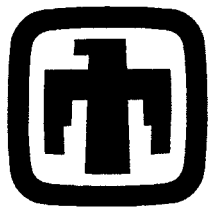
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Sandia National Laboratories

Justification for Class III Permit Modification

April 2001

SWMU 151

Operable Unit 1295

Building 9940 Septic System

NFA Originally Submitted June 1996
RSI Originally Submitted November 1998

**Environmental
Restoration
Project**



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

**Justification for
Class III Permit Modification**

April 2001

**Solid Waste Management Unit 151
Operable Unit 1295
Round 4**

(RCRA Permit No. NM5890110518)

NFA Originally Submitted June 1996

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NFA

**Justification for
Class III Permit Modification**

April 2001

**Solid Waste Management Unit 151
Operable Unit 1295
Round 4**

NFA Originally Submitted June 1996

**PROPOSAL FOR
NO FURTHER ACTION
ENVIRONMENTAL RESTORATION PROJECT**

**SITE 151, BUILDING 9940 SEPTIC SYSTEM
OPERABLE UNIT 1295
June 1996**

Prepared by
Sandia National Laboratories/New Mexico
Environmental Restoration Project
Albuquerque, New Mexico

Prepared for the
United States Department of Energy

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TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION.....	1-1
1.1 ER Site 151, Building 9940 Septic System	1-1
1.2 SNL/NM Administrative NFA Process.....	1-1
1.3 Local Setting.....	1-3
2. HISTORY OF THE SWMU.....	2-1
2.1 Sources of Supporting Information	2-1
2.2 Previous Audits, Inspections, and Findings.....	2-1
2.3 Historical Operations	2-2
3. EVALUATION OF RELEVANT EVIDENCE.....	3-1
3.1 Unit Characteristics	3-1
3.2 Operating Practices	3-1
3.3 Presence or Absence of Visual Evidence	3-1
3.4 Results of Previous Sampling/Surveys	3-1
3.5 Assessment of Gaps in Information.....	3-3
3.6 Confirmatory Sampling	3-3
3.7 Risk Analysis	3-7
3.8 Rationale for Pursuing a Risk-Based NFA Decision.....	3-14
4. CONCLUSION	4-1
5. REFERENCES.....	5-1
5.1 ER Site 151 References	5-1
5.2 Other References	5-2

LIST OF TABLES

	<u>Page</u>
Table 3-1	ER Site 151: Confirmatory Sampling Summary Table3-5
Table 3-2	ER Site 151: Summary of Organic and Other Constituents in Confirmatory Soil Samples Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall3-8
Table 3-3	ER Site 151: Summary of RCRA Metals and Hexavalent Chromium in Confirmatory Soil Samples Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall3-9
Table 3-4	ER Site 151: Summary of Isotopic Uranium and Tritium in Confirmatory Soil Samples Collected Around the Septic Tank, Seepage Pit and Solids Retention Tank Outfall3-11
Table 3-4	ER Site 151: Summary of Isotopic Uranium and Tritium in Confirmatory Soil Samples Collected Around the Septic Tank, Seepage Pit and Solids Retention Tank Outfall3-12

LIST OF FIGURES

Figure 1-1:	ER Site 151 Location Map1-4
Figure 1-2:	ER Site 151 Site Map1-5
Figure 3-1:	ER Site 151 Photographs3-4

LIST OF APPENDICES

	<u>Page</u>
Appendix A OU 1295, Site 151 Results of Previous Sampling and Surveys	A-1
Appendix A.1 ER Site 151 Summary of Constituents Detected in 1992 Septic Tank Samples	A-3
Appendix A.2 ER Site 151 Summary of Constituents Detected in 1994 Septic Tank Samples	A-9
Appendix A.3 ER Site 151 Summary of 1994 PETREX™ Passive Soil-Gas Survey Results	A-13
Appendix A.4 ER Site 151 Gamma Spectroscopy Screening Results for the Seepage Pit Shallow Interval Composite Soil Sample	A-17
Appendix A.5 ER Site 151 Gamma Spectroscopy Screening Results for the Seepage Pit Deep Interval Composite Soil Sample	A-21
Appendix A.6 ER Site 151 Gamma Spectroscopy Screening Results for the Solids Retention Outfall Shallow Interval Composite Soil Sample	A-25
Appendix A.7 ER Site 151 Gamma Spectroscopy Screening Results for the Solids Retention Outfall Deep Interval Composite Soil Sample	A-29

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1. INTRODUCTION

1.1 ER Site 151, Building 9940 Septic System

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a no further action (NFA) decision based on confirmatory sampling for Environmental Restoration (ER) Site 151, Building 9940 Septic System, Operable Unit (OU) 1295. ER Site 151 is listed in the Hazardous and Solid Waste Amendments (HSWA) Module IV (EPA August 1993) of the SNL/NM Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Facility Permit (NM5890110518-1) (EPA August 1992).

1.2 SNL/NM Administrative NFA Process

This proposal for a determination of a NFA decision based on confirmatory sampling was 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 "must contain information demonstrating that there are no releases of hazardous waste (including hazardous constituents) from solid waste management units (SWMUs) at the facility that may pose a threat to human health or the environment" (as proposed in 40 CFR 264.514[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 Environmental Protection Agency (EPA) acknowledged that the extent of sampling required may vary greatly, stating that:

the 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. . . . The actual extent of sampling will vary . . . depending on the amount and quality of existing information available (EPA December 1987).

This request for an NFA decision for ER Site 151 is based primarily on results of a passive soil-gas survey (NERI June 1995) and analytical results of confirmatory soil samples collected at the site. Concentrations of site-specific constituents of concern (COCs) detected in the soil samples were first compared to background 95th percentile or upper tolerance limit (UTL) concentrations of COCs found in SNL/NM soils (IT March 1996) or other relevant background limits. If no SNL/NM background limit was available for a particular COC, or if the COC concentration exceeded the SNL/NM or other relevant background limit, then the constituent concentration was compared to the proposed 40 CFR Part 264 Subpart S (Subpart S) or other relevant soil action level for the compound (EPA July 1990). If the COC concentration exceeded both the background limit and relevant action level for that compound, or if no background limit or action level has been determined or proposed for the constituent, then a risk assessment was performed. The highest concentration of the particular COC identified at the site was then compared to the derived risk assessment action level to determine if the COC concentration at the site poses a significant health risk.

A site is eligible for an NFA proposal if it meets one or more of the following criteria presented in the Environmental Restoration Document of Understanding (NMED, November 1995):

- NFA Criterion 1: The site cannot be located or has been found not to exist, is a duplicate potential release site (PRS) or is located within and therefore, investigated as part of another PRS.
- NFA Criterion 2: The site has never been used for the management (that is, generation, treatment, storage, or disposal) of RCRA solid or hazardous wastes and/or constituents or other CERCLA hazardous substances.
- NFA Criterion 3: No release to the environment has occurred, nor is likely to occur in the future.
- NFA Criterion 4: There was a release, but the site was characterized and/or remediated under another authority which adequately addresses corrective action, and documentation, such as a closure letter, is available.
- NFA Criterion 5: The PRS has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

Review and analysis of the ER Site 151 soil sample analytical data indicate that concentrations of COCs detected in soils at this site are less than (1) SNL/NM or other applicable background concentrations, or (2) proposed Subpart S or other action levels, or (3) derived risk assessment action levels. Thus ER Site 151 is being proposed for an NFA decision based on confirmatory sampling data demonstrating that hazardous waste or COCs that may have been released from this SWMU into the environment pose an acceptable level of risk under current and projected future land use (Criterion 5).

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 research and development activities since 1945 (DOE September 1987).

ER Site 151 is located in the Coyote Test Field on KAFB and is approximately 0.8 miles east of Technical Area III (TA III). Access to the site is provided by graded dirt roads that extend southwest from Lovelace Road (Figure 1-1). ER Site 151 consists of the immediate area around the seepage pit and septic tank northwest of Building 9940, and also includes the immediate area around the concrete settling tank that is south of Building 9940 (Figure 1-2). Building 9940 is built in the side of a hill. The area around the seepage pit is approximately 0.06 acres and it is at an average mean elevation of 5,524 feet above mean sea level (AMSL). The area around the concrete settling tank is also approximately 0.06 acres and it has an average mean elevation of 5,518 feet AMSL.

The surficial geology at ER Site 151 is characterized by alluvial fan deposits. Based on drilling records of similar deposits at KAFB, the alluvial materials are highly heterogeneous, composed primarily of medium to fine silty sands with frequent coarse sand, gravel, and cobble lenses. The alluvial deposits probably extend to the water-table. Vegetation consists predominantly of grasses including gramma, muhly, dropseed, and galleta. Shrubs commonly associated with the grasslands include sand sage, winter fat, saltbrush, and rabbitbush. Cacti are common, and include cholla, pincushion, strawberry, and prickly pear (SNL/NM March 1993).

Using the most recent map of the potentiometric surface for KAFB, the water-table elevation is approximated to be 5,300 feet AMSL at this location (SNL/NM March 1996). The corresponding depth to ground-water is 220 feet. However, the Tijeras fault zone complicates the potentiometric surface near this location. The potentiometric surface drops about 300 feet less than 1/2 mile west of ER Site 149. Groundwater flow at KAFB is believed to be in a generally west to northwest direction in the vicinity of this site (SNL/NM March 1996). The nearest production wells are northwest of the site and include KAFB-2, KAFB-4, and KAFB-7 which are approximately 4.2 to 5.3 miles away. The ground-water monitoring wells closest to ER Site 151 include the group of wells installed around the Chemical Waste Landfill in the southeast corner of TA III and the monitoring well at EOD Hill. ER Site 151 is about equidistant from these wells. The wells at the Chemical Waste Landfill are located approximately 1.3 miles southwest of ER Site 151 and the well at EOD Hill is located approximately 1.3 miles southeast of ER Site 151 (SNL/NM October 1995).

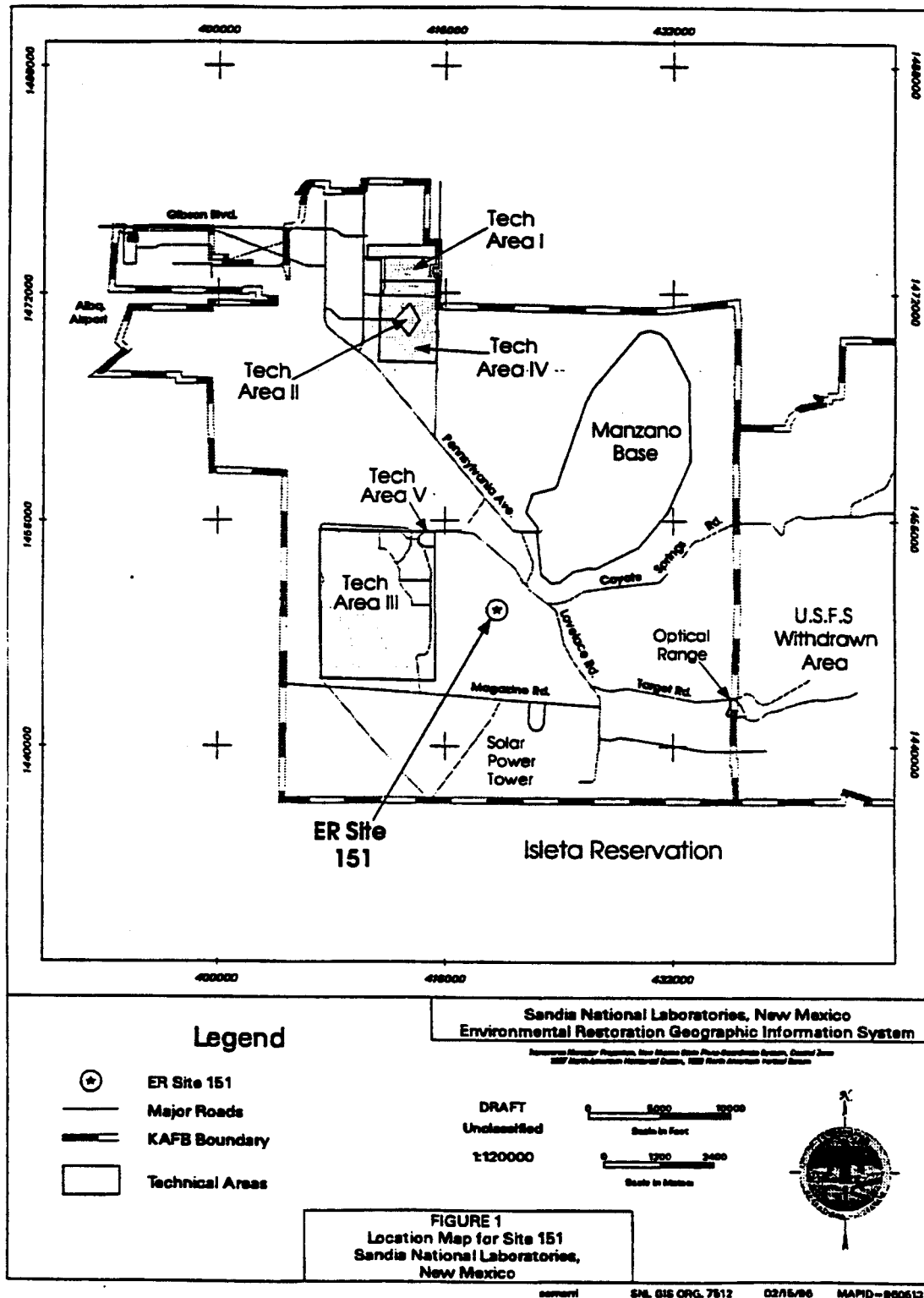


Figure 1-1: ER Site 151 Location Map

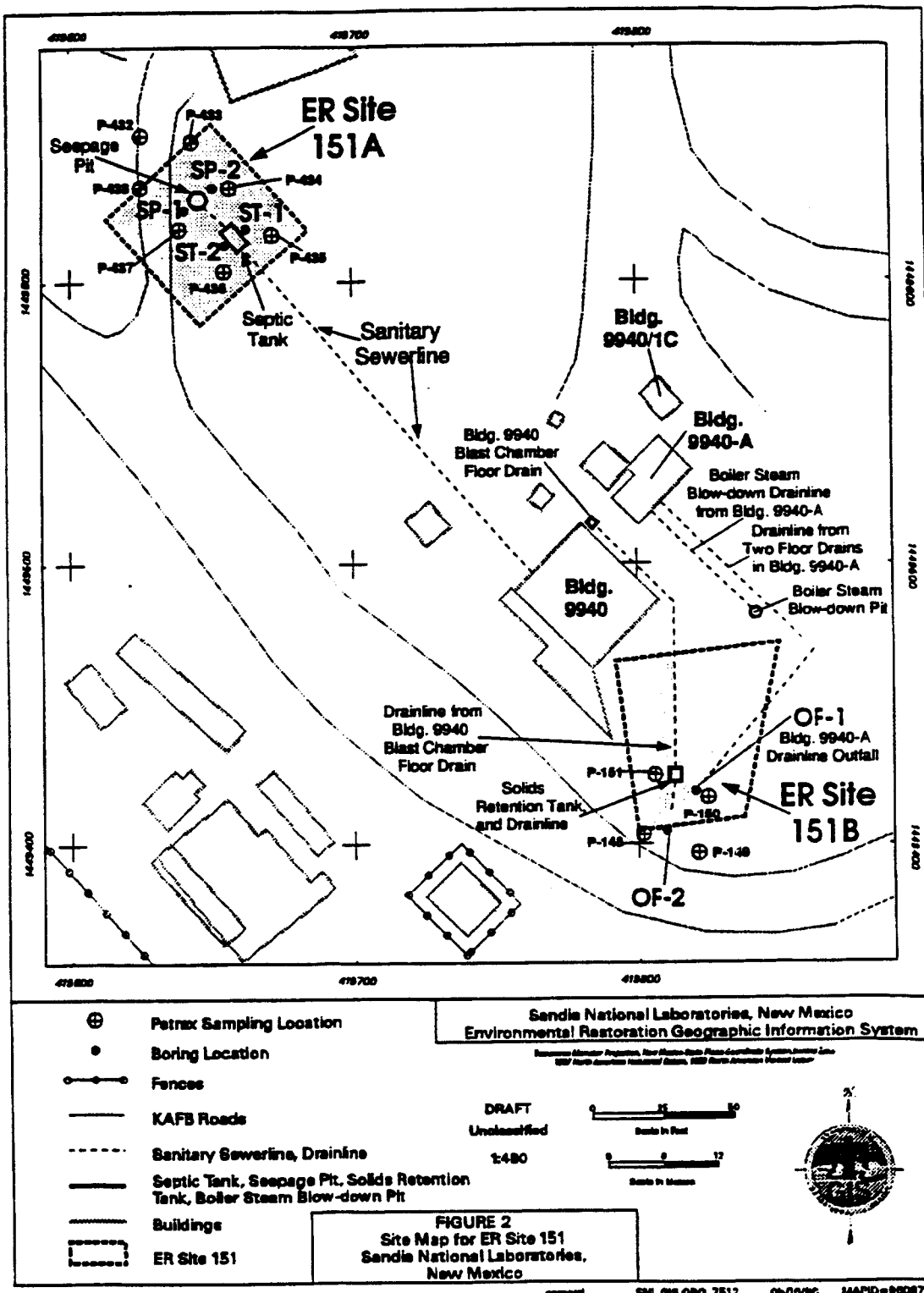


Figure 1-2: ER Site 151 Site Map

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2. HISTORY OF THE SWMU

2.1 Sources of Supporting Information

In preparing the confirmatory sampling NFA proposal for ER Site 151, available background information was reviewed to quantify potential releases and to select analytes for the soil sampling. Background information was collected from SNL/NM Facilities Engineering drawings and interviews with employees familiar with site operational history. The following sources of information, hierarchically listed with respect to assigned validity, were used to evaluate ER Site 151:

- Confirmatory subsurface soil sampling conducted in October 1994 (SNL/NM October 1994a, b) and January 1995 (SNL/NM January 1995a, b);
- Two survey reports, including a geophysical survey (Lamb 1994), and a passive soil gas survey (NERI June 1995);
- Results of samples collected from the septic tank in 1992 (SNL/NM June 1993) and 1994 (SNL/NM April 1994);
- RCRA Facility Investigation Work Plan for OU 1295, Septic Tanks and Drainfields (SNL/NM March 1993) and Comment Responses to US EPA Notice of Deficiency for the Septic Tanks and Drainfields RFI Work Plan (SNL/NM November 1994);
- Photographs and field notes collected at the site by SNL/NM ER staff;
- SNL/NM Facilities Engineering building drawings (SNL/NM April 1962, December 1980, June 1988);
- SNL/NM Geographic Information System (GIS) data; and
- The RCRA Facility Assessment (RFA) report (EPA April 1987).

2.2 Previous Audits, Inspections, and Findings

ER Site 151 was first listed as a potential release site in the RFA report to the EPA in 1987 (EPA April 1987). This report contained a generic statement about this and many other SNL/NM septic systems that sanitary and industrial wastes may have been discharged to septic tanks and drainfields during past operations. This SWMU was included in the RFA report as Site number 79, along with other septic and drain systems at SNL/NM. All the sites included in Site 79 are now designated by individual SWMU numbers.

2.3 Historical Operations

The following historical information has been excerpted from several sources, including SNL/NM March 1993, IT March 1994, and SNL/NM November 1994.

Building 9940 was constructed in 1962 as an explosive test facility. The building was originally used for explosive testing using 2-pound charges and possibly some depleted uranium. In 1978 it was converted to a U.S. Nuclear Regulatory Commission (NRC) testing facility. The NRC tests included dropping superheated metals containing iron and aluminum into vats of cooling water and documenting the reactions, and using depleted uranium in a nuclear reactor setting. Wastewater from the tests was discharged onto the ground or into the septic system. Inactive facilities at Building 9940 include an underground blast chamber and a darkroom. The septic system may have received the following contaminants from these facilities in the past: residual explosives, possibly containing depleted uranium, photoprocessing chemicals and solvents such as acetone, toluene, and MEK.

The text in the Septic Tanks and Drainfields RFI workplan originally indicated that this site included two drywells and a septic system. Further investigation and interviews at the site clarified the use of the features described as drywells in the workplan. One of the drywells was described as being located south of Building 9940 and connected to a floor drain in the underground blast chamber. The drywell is better described as a concrete settling tank, with concrete sides and bottom and a baffled drain pipe that released overflow from the tank to a surface outfall. No aggregate was placed in the tank. In the workplan, the figure for ER Site 151 did identify this feature as a concrete settling tank rather than a drywell.

The other drywell was described as being located on the southeast side of Building 9940. It is actually a steam blowdown and drain pit that served process steam equipment in Building 9940-A. The steam condensate that drained to the pit was treated before use to soften the water and remove carbon dioxide. There is no indication that any contaminants were released to the drain pit. Therefore confirmatory soil sampling was not conducted near this feature. The floor drains in Building 9940-A that were originally thought to be connected to this drain pit are piped separately to a surface outfall near the surface outfall for the concrete settling tank (see Figure 1-2).

3. EVALUATION OF RELEVANT EVIDENCE

3.1 Unit Characteristics

There are no safeguards inherent in the drain systems from Buildings 9940 or in facility operations that could have prevented past releases to the environment.

3.2 Operating Practices

As discussed in Section 2.3, effluent was released to the Building 9940 septic tank and seepage pit when the septic system was active. Also, effluent may have been released to the concrete settling tank and related surface outfall. Hazardous wastes were not managed or contained at ER Site 151.

3.3 Presence or Absence of Visual Evidence

No visible evidence of soil discoloration, staining, or odors indicating residual contamination was observed when soil samples were collected around the seepage pit and septic tank in October 1994 (SNL/NM October 1994a), or near the surface outfalls in January 1995 (SNL/NM January 1995a).

3.4 Results of Previous Sampling/Surveys

Sludge and aqueous samples were collected from the ER Site 151 septic tank in July 1992. The tank was resampled for a semivolatile organic compound (SVOC) analysis in August 1992 because the analytical laboratory surrogate recoveries for the July sample were outside the laboratory control limits and insufficient sample was available for reanalysis. The aqueous sample was analyzed for volatile organic compounds (VOCs), SVOCs, pesticides, polychlorinated biphenyls (PCBs), metals, selected radionuclide constituents and several miscellaneous analytes. Two VOCs were identified - trichloroethene and tetrachloroethene. No SVOCs, pesticides or PCBs were detected. Several metals were detected. The sludge sample was analyzed for metals and selected radionuclide constituents. Several metals and radionuclides were detected. The analytical results of these samples are presented in Appendix A.1.

A second round of septic tank sludge samples were collected for waste characterization purposes in April 1994 and were analyzed for VOCs, explosives, cyanide, isotopic uranium and thorium, gamma spectroscopy radionuclides, other radionuclides, and RCRA Toxicity Characteristic Leaching Procedure (TCLP) metals. Six VOCs were identified, including acetone, 2-butanone (MEK) and trace concentrations of carbon disulfide, chloromethane, and methylene chloride. Explosive compounds and cyanide were not detected. Two RCRA metals, barium and lead, were detected in the sludge; however, only a trace concentration of lead was detected. A number of radionuclides were detected in the analyses for radionuclides.

Liquid from the septic tank were also sampled in April. It was tested for VOCs, explosives, and cyanide. No analytes were detected in the liquid samples. The analytical results of the second round of septic tank samples are presented in Appendix A.2.

A third round of waste characterization sludge samples were collected in June 1994 and were analyzed for SVOCs, VOCs, RCRA total and TCLP metals, cyanide, explosives, hexavalent chromium and isotopic uranium. Two SVOCs, bis (2-ethylhexyl) phthalate and pyrene, were detected in trace concentrations. One VOC, methylene chloride, was detected in a trace concentration; it was also detected in a laboratory blank. Six RCRA metals were identified in the lab test for total RCRA metals, but only one of the six metals was detected in the TCLP-derived leachate. Cyanide, explosives, and hexavalent chromium were not detected in the samples. The analytical results of the third round of septic tank sludge characterization samples are also presented in Appendix A.2.

A geophysical survey was conducted in June 1994 using two different inductive electromagnetic (EM) ground conductivity meters, an EM-31 and an EM-38 (Lamb 1994). The purpose of this survey was to locate and delineate any possible plume of elevated moisture. However, "the EM-38 and EM-31 data at this site were dominated by interference from three buried utility lines. This interference obscured any septic effects."

A passive soil-gas survey conducted in June 1994 used PETREXTM sampling tubes to identify any releases of VOCs and SVOCs from the seepage pit that may have occurred. A PETREXTM tube soil-gas survey is a semi-quantitative screening procedure that can be used to identify many volatile and semivolatile organic compounds. This technique may be used to guide VOC and SVOC site investigations. The advantages of this sampling methodology are that large areas can be surveyed at relatively low cost, the technique is highly sensitive to organic vapors, and the result produces a measure of soil vapor chemistry over a two- to three-week period rather than at one point in time. Each PETREXTM soil-gas sampler consists of two activated charcoal coated wires housed in a reusable glass test tube container. At each sampling location, sample tubes are buried in an inverted position so that the mouth of the sampler is about 1 foot below grade. Samplers are left in place for a two- to three-week period, and are then removed from the ground and sent to the manufacturer, Northeast Research Institute (NERI), for analysis using thermal desorption-gas chromatography/mass spectrometry. The analytical laboratory reports all sample results in terms of "ion counts" instead of concentrations, and identifies those samples that contain compounds above the PETREXTM technique detection limits. In NERI's experience, levels below 100,000 ion counts for a single compound (such as perchloroethene [PCE] or trichloroethene [TCE]), and 200,000 ion counts for mixtures (such as BTEX or aliphatic compounds [C4-C11 cycloalkanes]), under normal site conditions, would not represent detectable levels by standard quantitative methods for soils and/or groundwater (NERI June 1995).

Four PETREXTM tube samplers (samplers 148 through 151) were placed in a grid pattern in the vicinity of the solids retention tank and the two outfalls and seven PETREXTM tube samplers (samplers 432 through 438) were placed in a grid pattern that surrounded the septic tank and seepage pit (Figure 1-2) (SNL/NM June 1994). The results from all the samplers at ER Site 151 caused NERI to classify ER Site 151 as having 'no significant soil gas detections.' The analytical results from the ER Site 151 passive soil gas survey are presented in Appendix A.3.

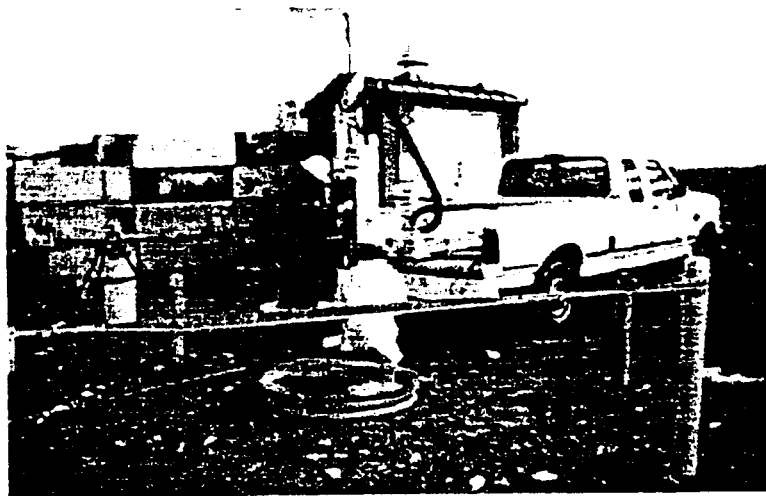
3.5 Assessment of Gaps in Information

The most recent material in the tank was not necessarily representative of all discharges to the unit that have occurred since it was put into service in 1962. The analytical results of the various rounds of septic tank sampling were used, along with process knowledge and other available information, to help identify the most likely COCs that might be found in soils surrounding the septic tank and seepage pit, and the surface outfalls, to help select the types of analyses to be performed on soil samples collected from the site. While the history of past releases at the site is incomplete, analytical data from confirmatory soil samples collected in October 1994 and January 1995 (discussed below) are sufficient to determine whether releases of COCs occurred at the site.

3.6 Confirmatory Sampling

Although the likelihood of significant releases of hazardous constituents at ER Site 151 was considered low, confirmatory soil sampling was conducted to determine whether COCs above background or detectable levels were released via the drains at this site. Samples were collected from the area immediately around the seepage pit and the septic tank in October 1994 (SNL/NM October 1994a) and from near the surface outfalls in January 1995 (SNL/NM January 1995a). The sampling operation near the seepage pit is shown in the upper photograph of Figure 3. An attempt was made to sample the surface outfalls in October 1994 using a large Geoprobe™. Because the large Geoprobe™ met repeated resistance at 11 feet, a backhoe was used to obtain the deep samples near the surface outfall in January 1995. The confirmatory soil sampling program was performed in accordance with the rationale and procedures described in the Septic Tank and Drainfields (ADS-1295) RCRA Facility Investigation Work Plan (SNL/NM March 1993), and addenda to the Work Plan developed during the OU 1295 project approval process (IT March 1994 and SNL/NM November 1994). A summary of the types of samples, number of sample locations, sample depths and analytical requirements for confirmatory soil samples collected at this site is presented in Table 3-1.

Soil samples were collected from two borings located on opposite sides of the seepage pit and on opposite sides of the septic tank in October 1994. The depth to the bottom of each of these features was measured in the field. In each seepage pit boring, two depth intervals were sampled, the first starting at the bottom of the seepage pit, which was approximately 12 feet below ground surface (BGS), and the second at 10 feet below the top of the first sampling interval (25 feet BGS).



Collecting soil samples next to the seepage pit with the Geoprobe™, 10/17/94. View looking southeast.



Septic tank septage removal and cleaning operation, 10/11/95.
View looking south.

Figure 3-1: ER Site 151 Photographs

Table 3-1
ER Site 151: Confirmatory Sampling Summary Table

Sampling Location	Analytical Parameters	Number of Sample Locations	Top of Sampling Intervals at Each Boring Location	Total Number of Investigative Samples	Total Number of Duplicate Samples	Date(s) Samples Collected
Seepage pit	VOCs	2	15', 25'	4		10/13/94
	SVOCs	2	15', 25'	4		
	RCRA metals + Cr ⁶⁺	2	15', 25'	4		
	Cyanide	2	15', 25'	4		
	TNT screen	2	15', 25'	4		
	Soil pH	2	15', 25'	4		
	Isotopic uranium	2	15', 25'	4		
	Gamma spec. & Tritium composite	2	15', 25'	2		
Septic tank	VOCs	2	12'	2		10/17-1894
	SVOCs	2	12'	2		
	RCRA metals + Cr ⁶⁺	2	12'	2		
	Cyanide	2	12'	2		
	TNT screen	2	12'	2		
	Isotopic uranium	2	12'	2		
Surface Outfalls	VOCs	2	1', 11'	4	one at 11'	1/19/95
	SVOCs	2	1', 11'	4	one at 11'	
	RCRA metals + Cr ⁶⁺	2	1', 11'	4	one at 11'	
	Cyanide	2	1', 11'	4	one at 11'	
	TNT screen	2	1', 11'	4	one at 11'	
	Soil pH	2	1', 11'	4	one at 11'	
	Isotopic uranium	2	1', 11'	4	one at 11'	
	Gamma spec. & Tritium composite	2	1', 11'	2		

Notes

Cr⁶⁺ = Hexavalent chromium

Iso. = Isotopic

RCRA = Resource Conservation and Recovery Act

Spec. = Spectroscopy

SVOCs = Semivolatile organic compounds

TNT = Trinitrotoluene

VOCs = Volatile organic compounds

In each of the two septic tank borings, there was one depth interval sampled. It started at the bottom of the septic tank (12 feet BGS) (SNL/NM October 1994a).

Finally, in January 1995 soil samples were collected from near the surface outfalls using the backhoe (SNL/NM January 1995a). One set of samples was collected from the surface outfall coming from Building 9940-A. Samples were collected at 1 and 11 feet BGS. Samples were also collected at 1 and 11 feet BGS at a second location that was approximately 20 feet from the surface outfall from Building 9940-A and 10 feet from the surface outfall of the pipe from the solids retention tank.

The Geoprobe™ sampling system was used to collect subsurface soil samples near the septic tank and seepage pit at this site. The Geoprobe™ sampling tool was fitted with a butyl acetate (BA) sampling sleeve and was then hydraulically driven to the top of the designated sampling depth. The sampling tool was opened, and driven an additional two feet in order to fill the two-foot long by approximately 1.25-inch diameter BA sleeve. The sampling tool and soil-filled sleeve were then retrieved from the borehole. In order to minimize the potential for loss of volatile compounds (if present), the soil to be analyzed for VOCs was not emptied from the BA sleeve into another sample container. The filled BA sleeve was removed from the sampling tool, and the top seven inches were cut off. Both ends of the seven-inch section of filled sleeve were immediately capped with a teflon membrane and rubber end cap, sealed with tape, and placed in an ice-filled cooler at the site. The soil in this section of sleeve was submitted for a VOC analysis.

Soil from the remainder of the sleeve was then emptied into a decontaminated mixing bowl. Following this, additional sampling runs were completed at each interval in order to recover enough soil to satisfy sample volume requirements for the interval. Soil recovered from these additional runs was also emptied into the mixing bowl, and blended with soil from the first sampling run. The soil was then transferred from the bowl into sample containers using a decontaminated plastic spatula.

VOC soil samples from the outfall sample locations were scooped from the backhoe bucket into a sample container. The sample containers were placed in an ice-filled cooler.

Seepage pit, septic tank and outfall samples were analyzed for VOCs, SVOCs, cyanide, RCRA metals, and hexavalent chromium by an offsite commercial laboratory. Samples were shipped to the offsite commercial laboratories by an overnight delivery service. Additional soil samples were also collected from the seepage pit, septic tank, and outfall sampling intervals and were submitted to the SNL/NM ER field laboratory for trinitrotoluene (TNT) analyses using a field screening immunoassay technique. To determine if radionuclides were released from past activities at this site, samples were collected from the seepage pit shallow and deep sampling intervals as well as the outfall shallow and deep intervals, to be analyzed by an offsite commercial laboratory for isotopic uranium. Composite samples were also collected to be: a) analyzed by an offsite commercial laboratory for tritium and b) screened for other radionuclides using SNL/NM in-house gamma spectroscopy.

Routine SNL/NM chain-of-custody and sample documentation procedures were employed for all samples collected at this site.

Quality assurance/quality control (QA/QC) samples collected during this effort consisted of a set of duplicate soil samples from one of the deep sampling intervals at OF-1 (Figure 1-2). The duplicate sample was analyzed for the same non-radiologic constituents as the other outfall soil samples. A set of aqueous equipment rinsate samples were also analyzed for most of the same non-radiological constituents as the other soil samples. No significant concentrations of COCs were detected in the equipment blank sample, and the concentrations of constituents detected in the duplicate soil samples were in good agreement with those detected in the equivalent field sample from the same interval. Also, a soil trip blank sample was included with each of the two shipments of ER Site 151 seepage pit, septic tank, and outfall soil samples to the offsite laboratory and were analyzed for VOCs only.

Four or more of the following compounds were detected in each of the trip blanks: acetone, 2-hexanone, methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK), methylene chloride, toluene, and total xylenes. These common laboratory contaminants were either not detected, or were found in lower concentrations in the site samples than in the trip blanks. Soil used for the trip blanks was prepared by heating the material, and then transferring it immediately to the sample container. This heating process drives off any residual organic compounds (if present), and soil moisture, that may be contained in the material. It is thought that when the soil trip blank container was opened at the laboratory, it immediately adsorbed both moisture and VOCs present in the laboratory atmosphere, and therefore became contaminated.

Summaries of all constituents detected in these confirmatory samples by either commercial laboratories or by the SNL/NM field laboratory are presented in Tables 3-2, 3-3, and 3-4. Results of the SNL/NM in-house gamma spectroscopy composite soil sample screening for other radionuclides are presented in Appendices A.4 through A.7. Complete soil sample analytical data packages are archived in the SNL/NM Environmental Operations Records Center and are readily available for review and verification (SNL/NM October 1994b and January 1995b).

3.7 Risk Analysis

As shown in Table 4, tritium was detected in soil moisture from the shallow interval seepage pit composite sample at an activity level of 2,365 picocuries per liter (pCi/L), and was not detected in the deep interval composite sample for the seepage pit. Tritium was also detected in soil moisture from the shallow interval outfall composite sample at an activity level of 230 pCi/L, and was not detected in the deep interval composite sample from the outfall. Background tritium activity levels for SNL/NM soils were not reported in the SNL/NM background study (IT March 1996). The soil moisture contained in shallow soil samples such as these represents either infiltrated precipitation, or water discharged from the Building 9940 to the seepage pit. It is therefore appropriate to compare the tritium activity level detected in the sample soil moisture to naturally occurring tritium levels found in precipitation or drinking water samples. The largest tritium activity level (2,365 pCi/L) detected in soil samples at this site was therefore compared to and found to be above the naturally occurring tritium activity range of 100 to 300 pCi/L found in precipitation samples collected from locations throughout the U.S., and 100 to 400 pCi/L in drinking water samples collected from locations around the country (EPA October 1993). A risk assessment was therefore performed to further evaluate this tritium activity level. The risk calculation was designed to produce a conservatively large estimate of radiation dose to counter uncertainties in the soil analytical data.

Table 3-2

ER Site 151

Summary of Organic and Other Constituents in Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Sample Number	Sample Matrix	Sample Type	Sample Date	Sample Location (Figure 2)	Top of Sample Interval (fbgs)	VOCs Method 8240							SVOCs Method 8270	Cyanide Method 9010/9012	TNT Screen Colorimetric method based on EPA 8515	Units
						2-Hexa-		Meth.			Total	BEHP				
						Acetone	none	MEK	MIBK	Chlorid	Toluene				Xylenes	
Septic Tank Soil and QA Samples:																
018132-1,2	Soil	Field	10/17/94	ST-1	12	ND	ND	ND	ND	2.6 B,J	ND	ND	ND	ND	ND	ug/kg
018133-1,2	Soil	Field	10/17/94	ST-2	12	ND	ND	ND	ND	2.7 B,J	ND	ND	ND	ND	ND	ug/kg
018134-1	Soil	TB	10/17/94	Site 151	NA	140	ND	54	ND	12 B	9.8	ND	NS	NS	NS	ug/kg
Seepage Pit Soil Samples:																
018128-1,2	Soil	Field	10/13/94	SP-1	15	ND	ND	ND	ND	1.9 B,J	ND	ND	ND	ND	ND	ug/kg
018129-1,2	Soil	Field	10/13/94	SP-1	25	ND	ND	ND	ND	2.6 B,J	ND	ND	ND	ND	ND	ug/kg
018130-1,2	Soil	Field	10/13/94	SP-2	15	ND	ND	ND	ND	2.7 B,J	ND	ND	ND	ND	ND	ug/kg
018131-1,2	Soil	Field	10/13/94	SP-2	25	ND	ND	ND	ND	1.9 B,J	ND	ND	ND	ND	ND	ug/kg
Solids Retention Tank Outfall Soil and QA Samples:																
018929-1,2	Soil	Field	1/19/95	OF-1	1	ND	ND	ND	ND	2.6 B,J	ND	ND	ND	ND	ND	ug/kg
018930-1,2	Soil	Field	1/19/95	OF-1	11	ND	ND	ND	ND	1.9, B,J	ND	ND	ND	ND	ND	ug/kg
018931-1,2	Soil	Dupl.	1/19/95	OFD-1	11	ND	ND	ND	ND	2.3 B,J	ND	ND	ND	ND	ND	ug/kg
018932-1,2	Soil	Field	1/19/95	OF-2	1	ND	ND	ND	ND	2.5 B,J	ND	ND	ND	ND	ND	ug/kg
018933-1,2	Soil	Field	1/19/95	OF-2	11	1.1 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ug/kg
018934-1	Soil	TB	1/19/95	Site 151	NA	160	7 J	71	5.2 J	4.7 B,J	1.8 J	2 J	NS	NS	NS	ug/kg
018935-1,2	Water	EB	1/23/95	Site 151	NA	ND	ND	ND	ND	1.5 J	ND	ND	3.4 J	ND	NS	ug/L
Laboratory Reporting Limit for Soil						10	10	10	10	5	5	5	330	1,000	1,000	ug/kg
Laboratory Reporting Limit for Water						10	10	10	10	5	5	5	10	10	NA	ug/L
Proposed Subpart S Action Level For Soil						8E+06	None	5E+07	4E+06	9E+04	2E+07	2E+08	5E+04	2E+06	4E+04	ug/kg

Notes:

B = Compound detected in associated blank sample

BEHP = Bis(2-Ethylhexyl)phthalate

Dupl. = Duplicate soil sample

EB = Equipment blank

fbgs = feet below ground surface

J = Result is detected below the reporting limit or is an estimated concentration.

MEK = Methyl ethyl ketone

Meth. chloride = Methylene chloride

MIBK = Methyl isobutyl ketone,

NA = Not applicable

ND = Not detected

NS = No sample

QA = Quality assurance

SVOCs = Semivolatile organic compounds

TB = Trip blank

ug/kg = Micrograms per kilogram

ug/L = Micrograms per liter

VOCs = Volatile organic compounds

Table 3-3

ER Site 151

**Summary of RCRA Metals and Hexavalent Chromium in Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall**

Sample Number	Sample Matrix	Sample Type	Sample Date	Sample Location (Figure 2)	Top of Sample Interval (fbgs)	RCRA Metals, Methods 6010 and 7471								Other Metals: Cr ⁶⁺ Method 7196	Units
						As	Ba	Cd	Cr, total	Pb	Hg	Se	Ag		
Septic Tank Soil Samples:															
018132-2	Soil	Field	10/17/94	ST-1	12	2.9	84.2	ND	8.1	ND	ND	ND	ND	ND	mg/kg
018133-2	Soil	Field	10/17/94	ST-2	12	3.1	194	ND	10.2	5.7	ND	ND	ND	ND	mg/kg
Seepage Pit Soil Samples:															
018128-2	Soil	Field	10/13/94	SP-1	15	2	115	ND	11.4	3.8 J	ND	ND	ND	ND	mg/kg
018129-2	Soil	Field	10/13/94	SP-1	25	2.2	280	ND	8.5	5.3	ND	ND	ND	ND	mg/kg
018130-2	Soil	Field	10/13/94	SP-2	15	2.1	200	ND	14.4	7.1	ND	ND	ND	ND	mg/kg
018131-2	Soil	Field	10/13/94	SP-2	25	1.9	74.6	ND	8.6	ND	ND	ND	ND	ND	mg/kg
Solids Retention Tank Outfall Soil and QA Samples:															
018929-2	Soil	Field	1/19/95	OF-1	1	3.2	75.2	ND	5.1	4.8 J	ND	ND	ND	ND	mg/kg
018930-2	Soil	Field	1/19/95	OF-1	11	2.5	90.5	ND	5.5	4.5 J	ND	ND	ND	ND	mg/kg
018931-2	Soil	Dupl.	1/19/95	OFD-1	11	2.1	43.4	ND	3.2	4.3 J	ND	ND	ND	ND	mg/kg
018932-2	Soil	Field	1/19/95	OF-2	1	3.3	74.1	ND	5.9	4.6 J	ND	ND	ND	ND	mg/kg
018933-2	Soil	Field	1/19/95	OF-2	11	2	84.3	ND	5.6	3.1 J	ND	ND	ND	ND	mg/kg
018935-3	Water	EB	1/23/95	Site 151	NA	ND	ND	ND	ND	ND	ND	ND	ND	NS	mg/L
Laboratory Reporting Limit for Soil						1	1	0.5	1	5	0.1	0.5	1	0.05 - 0.1	mg/kg
Laboratory Reporting Limit for Water						0.01	0.01	0.005	0.01	0.003	0.0002	0.005	0.01	NA	mg/L
Number of SNL/NM Background Soil Sample Analyses *						15	727	1,740	647	536	1,724	2,134	2,302	393	NA
SNL/NM Soil Background Range *						2.1-7.9	0.5-495	0.0027-6.2	0.5-31.4	0.75-103	0.0001-0.68	0.037-17.2	0.0016-8.7	0.02-<2.5	mg/kg
SNL/NM Soil Background UTL or 95th Percentile *						7	214	0.9	15.9	11.8	<0.1	<1.0	<1.0	<2.5	mg/kg
Proposed Subpart S Action Level For Soil						0.50	6,000	80	80,000 **	400 ***	20	400	400	400 **	mg/kg

Table 3-3, concluded:

ER Site 151

Summary of RCRA Metals and Hexavalent Chromium in Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Notes:

As = Arsenic. Arsenic background concentrations presented above are based on analyses of subsurface soil samples collected in the Coyote Test Field (CTF) area.

Ba = Barium. Barium background concentrations presented above are based on analyses of subsurface soil samples collected in the Southwest and CTF areas.

Cd = Cadmium. Cadmium background concentrations presented above are based on analyses of subsurface soil samples collected in the North, Tijeras, Southwest, CTF, and Offsite areas.

Cr = Chromium. Chromium background concentrations presented above are based on analyses of subsurface soil samples collected in the Southwest area.

Cr⁶⁺ = Hexavalent chromium. Hexavalent chromium background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

Pb = Lead. Lead background concentrations presented above are based on analyses of subsurface samples collected in the Southwest and Offsite areas.

Hg = Mercury. Mercury background concentrations presented above are based on analyses of subsurface soil samples collected in the North, Tijeras, Southwest, CTF and Offsite areas.

Se = Selenium. Selenium background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the North, Tijeras, Southwest, CTF and Offsite areas.

Ag = Silver. Silver background concentrations presented above are based on analyses of subsurface soil samples collected in the North, Tijeras, Southwest, CTF, and Offsite areas.

Dupl. = Duplicate soil sample

EB = Equipment blank

fbgs = Feet below ground surface

J = Result is detected below the reporting limit or is an estimated concentration.

mg/kg = Milligrams per kilogram

mg/L = Milligrams per liter

NA = Not applicable

ND = Not detected

NS = No sample

QA = Quality assurance

UTL = Upper Tolerance Limit

* IT March 1996

** 80,000 mg/kg is for Cr³⁺ only. For Cr⁶⁺, proposed Subpart S action level is 400 mg/kg.

*** No proposed Subpart S action level for lead in soil. 400 ppm is EPA proposed action level (EPA 1994)

Table 3-4

ER Site 151

Summary of Isotopic Uranium and Tritium in Composite Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

						Isotopic Uranium Method NAS-NS-3050 (pCi/g)									Tritium Method EERF H.01 (pCi/L)		
Sample Number	Sample Matrix	Sample Type	Sample Date	Sample Location (Figure 2)	Top of Sample Interval (fbgs)	U-234 Result	U-234 Error *	U-234 M.D.A.	U-235/ U-236 Result	U-235/ U-236 Error *	U-235/ U-236 M.D.A.	U-238 Result	U-238 Error *	U-238 M.D.A.	Result	Error	M.D.A.
Septic Tank Soil Samples:																	
018132-5	Soil	Field	10/13/94	ST-1	12	0.26	0.07	0.01	0.013	0.013	0.009	0.21	0.06	0.01			
018133-5	Soil	Field	10/13/94	ST-2	12	0.27	0.07	0.01	0.024	0.019	0.009	0.24	0.07	0.01			
Seepage Pit Soil Samples:																	
018128-5	Soil	Field	10/13/94	SP-1	15	0.56	0.13	0.01	0.031	0.022	0.015	0.46	0.11	0.01			
018129-5	Soil	Field	10/13/94	SP-1	25	0.31	0.08	0.01	0.018	0.015	0.008	0.27	0.07	0.01			
018130-5	Soil	Field	10/13/94	SP-2	15	0.32	0.08	0.01	0.012	0.012	0.008	0.28	0.07	0.01			
018131-5	Soil	Field	10/13/94	SP-2	25	0.27	0.07	0.02	0.024	0.019	0.019	0.35	0.09	0.01			
018128-4	Soil	Compos.	10/13/94	SP-1/2	15										2365	604	806
018129-4	Soil	Compos.	10/13/94	SP-1/2	25										ND	471	818
Solids Retention Tank Outfall and QA Soil Samples:																	
018929-5	Soil	Field	1/19/95	OF-1	1	0.49	0.19	0.16	0.04 J	0.067	0.12	0.71	0.23	0.17			
018930-5	Soil	Field	1/19/95	OF-1	11	0.86	0.18	0.084	0.017 J	0.03	0.054	1	0.2	0.06			
018931-5	Soil	Dupl.	1/19/95	OFD-1	11	0.86	0.25	0.11	0.028	0.065	0.12	0.93	0.27	0.13			
018932-5	Soil	Field	1/19/95	OF-2	1	0.76	0.17	0.066	0.018 J	0.027	0.043	0.7	0.16	0.051			
018933-5	Soil	Field	1/19/95	OF-2	11	0.7	0.16	0.084	0.038 J	0.049	0.08	0.82	0.18	0.09			
018935-6	Water	EB	1/23/95	Site 151	NA	0.067 J	0.058	0.083	0.015 J	0.033	0.062	0.05	0.052	0.079			
018929-3	Soil	Field	1/19/95	OF-1/2	1										230	140	220
018930-3	Soil	Field	1/19/95	OF-1/2	11										ND	140	230
Number of SNL/NM Background Soil Sample Analyses **						14			283			90			U		
SNL/NM Soil Background Range **						0.44-<5.02			0.004-3			0.153-2.3			U		
SNL/NM Soil Background 95th Percentile **						<5.02			0.16			1.4			U		
Nationwide Tritium Range in Precipitation and Drinking Water ***						NA			NA			NA			100-400		

Table 3-4, concluded

ER Site 151

Summary of Isotopic Uranium and Tritium in Composite Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Notes:

U-234 = Uranium 234. Uranium 233/234 background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

U-235 = Uranium 235. Uranium 235 background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

U 236 = Uranium 236

U-238 = Uranium 238. Uranium 238 background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

Compos. = Composite

D.L. = Detection limit

EB = Equipment blank

fbgs = Feet below ground surface

J = Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

pCi/g = Picocuries per gram

U = Undefined for SNL/NM soils

* Error = ± 2 sigma uncertainty

** IT March 1996

*** EPA October 1993

Appendix J, Section 1.3.6 of the PIP (SNL/NM February 1995) stipulates that, for the purpose of computing media action levels, the total radiation dose at a site should not be greater than 15 millirem/year (mrem/yr). 15 mrem/yr is also the maximum annual effective dose for all pathways that are being considered in the preliminary staff working draft of the EPA Radiation Site Cleanup regulation (EPA 1994). Therefore:

- if the dose estimate is unacceptable (greater than 15 mrem/yr), further investigation and remediation may be needed; or
- if the dose estimate is acceptable, the potential for health hazards at the site is extremely low, and further remedial actions are not needed.

The dose estimate for the tritium activity level cited above was computed using methods and equations promulgated in proposed Subpart S documentation (EPA July 1990). Accordingly, all calculations were based on the very conservative assumption that the receptor dose from radionuclides results from ingestion of 0.2 grams per day of contaminated soil for each of the 365 days in a year.

Calculation of radionuclide doses require values of dose conversion factors for internal radiation from ingestion [DCF(i)], which are used to convert radionuclide activities (in units pCi/g) into effective dose equivalents (in units of mrem/yr). A published DCF(i) value was found for tritium (0.000000063 [6.3E-08] mrem/pCi) (Gilbert et al. 1989); this DCF(i) value was used in the risk calculation.

To assure that the computed doses were conservatively large, the maximum observed activity of tritium detected at this site (2,365 pCi/L) was employed in the risk calculation. Analytical results for tritium in soil moisture are reported by the laboratory in units of pCi/L, and must be converted to units of pCi/g for the risk calculation presented below. The following conversion calculation was used:

Determined from laboratory results: 100.7 grams of sample, 3.5% by weight soil moisture in sample, tritium result of 2,365 pCi/L in soil moisture (SNL/NM October 1994b)

(1) $2,365 \text{ pCi/L} \times 1 \text{ L/1000 g} = 2.365 \text{ pCi/g}$ of soil moisture

(2) $100.7 \text{ grams of sample} \times 0.035 = 3.5 \text{ g}$ of soil moisture in sample

(3) $3.5 \text{ g of soil moisture} \times 2.365 \text{ pCi/g in soil moisture} = 8.28 \text{ pCi}$ of tritium activity in this 100.7 g soil sample

(4) $8.28 \text{ pCi in } 100.7 \text{ g of soil sample} = 0.082 \text{ pCi/g}$ for this sample

Following proposed Subpart S methodology, the equation and parameter values used to calculate the summed radiation dose was:

$$\text{DOSE} = \sum [\text{DSR}(i) \times \text{S}(i)],$$

where DOSE = total effective dose equivalent (mrem/yr);

DSR(i) = dose-to-soil concentration ratio for the i^{th} radionuclide = $I \times \text{DCF}(i)$;

I = soil ingestion rate = 0.2 grams/day = 73 grams/year;

DCF(i) = internal radiation dose conversion factor for the i^{th} radionuclide (mrem/pCi); and

S(i) = soil concentration of the i^{th} radionuclide (pCi/g).

The radionuclide risk calculation shows that the radiation dose from the highest tritium activity level (2,365 pCi/L, or 0.082 pCi/g) found at this site is 3.8 E-07 mrem/yr which is much less than 15 mrem/yr. Therefore, the site is considered to be risk-free in terms of tritium contamination.

3.8 Rationale for Pursuing a Risk-Based NFA Decision

As discussed in Section 3.4 above, the passive soil gas survey did not identify any significant concentrations of soil gas at any of the 11 PETREXTM soil-gas sampling locations at this site.

Confirmatory soil sampling around the seepage pits and septic tank did not identify any residual COCs indicating past discharges that could pose a threat to human health or the environment. As shown in Table 2, only two VOCs, acetone and methylene chloride, which are common laboratory contaminants, were detected at below-reporting-limit concentrations in soil samples collected from this site. No SVOCs, cyanide, or TNT were detected in any of the site soil samples.

As shown on Table 3, soil sample analytical results indicate that the nine metals that were targeted in the Site 151 investigation were either (1) not detected, or (2) were detected in concentrations below the background UTL or 95th percentile concentrations presented in the SNL/NM study of naturally-occurring constituents (IT March 1996), or (3) were less than the proposed Subpart S or other action levels for these metals.

Isotopic uranium activity levels that were detected in the soil samples were found to be below the corresponding 95th percentile background activity levels presented in the IT March 1996 report for those radionuclides (Table 4). The tritium activity level detected in the seepage pit shallow interval sample was determined to result in a radiation dose much lower than the maximum acceptable radiation dose of 15 mrem/yr at a site presented in the PIP (SNL/NM February 1995). Also, the gamma spectroscopy semi-qualitative screening of shallow and deep interval composite soil samples did not indicate that the soil at ER Site 151 had been contaminated by other radionuclides (Appendices A.4 through A.7).

Finally, the ER Site 151 septic tank contents were removed and the tank was cleaned in November 1995 (SNL/NM November 1995). The tank was then inspected by a representative of the New Mexico Environment Department (NMED) to verify that the tank contents had been removed and the tank had been closed in accordance with applicable State of New Mexico regulations (SNL/NM November 1995).

4. CONCLUSION

Sample analytical results generated from this confirmatory sampling investigation have shown that detectable or significant concentrations of COCs are not present in soils at ER Site 151, and that additional investigations are unwarranted and unnecessary. Based on archival information, chemical and radiological analytical results of soil samples collected next to the seepage pits, septic tank, and outfalls, and comparison of the results with action levels, SNL/NM has demonstrated that any contaminants present at this site pose an acceptable level of risk under current and projected future land use (Criterion 5 of Section 1.2). Therefore, ER Site 151 is recommended for an NFA determination.

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Appendix A

APPENDIX A

OU 1295, Site 151 Results of Previous Sampling and Surveys

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Appendix A.1

Appendix A.1

ER Site 151

Summary of Constituents Detected in 1992 Septic Tank Samples

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**Building 9940
Coyote Test Field
Sample ID No. SNLA008434
Tank ID No. AD89043R**

On July 21, 1992, aqueous and sludge samples were collected from the septic tank serving Building 9940. The tank was resampled for semivolatile organic compound analysis on August 20, 1992, because the analytical laboratory surrogate recoveries for sample SNLA008434 were outside the laboratory control limits and insufficient sample was available for reanalysis. Analytical results of concern are noted below

- Trichloroethene (TCE) was detected in the aqueous sample at a level of 4.7 mg/L, which exceeds the New Mexico Water Quality Control Commission (NMWQCCR) discharge limit (NMDL) of 0.1 mg/L and the Resource Conservation and Recovery Act (RCRA) toxicity characteristic (TC) limit of 0.5 mg/L.
- Tetrachloroethene (PERC, tetrachloroethylene) was detected in the aqueous sample at a level of 0.054 mg/L, which exceeds the NMDL of 0.02 mg/L.
- Copper, which is regulated under the City of Albuquerque (COA) wastewater ordinance and the NMWQCCR, was detected at a level in the sludge sample (2,530 mg/kg). Other metals were detected at levels that ranged from not detected at 1.9 mg/kg (thallium) to 536 mg/kg (zinc).

No other parameters were detected above NMDL, COA discharge limits, or RCRA TC limits that identify hazardous waste.

During sludge review of the radiochemistry data, the following items were noted:

- ^{226}Ra , measured at 1.12 pCi/mL does not exceed the investigation level established during this monitoring effort. However, it does exceed the U.S. Department of Energy derived concentration guideline limit. ^{226}Ra was measured at 0.0005 pCi/mL in the aqueous sample.

ER Site 151
Summary of Constituents Detected in 1992 Septic Tank Samples

Results of Septic Tank Analyses (LIQUID SAMPLES)				
Building No./Area:	9940 CTF			
Tank ID No.:	AD89043R			
Date Sampled:	7/22/92			
Sample ID No.:	SNLA-008434: semivolatiles: SNLA-008596			
Analytical Parameter	Measured Concentration	State Discharge Limit	COA Discharge Limit	Comments
Volatile Organics (EPA 624)	(mg/l)	(mg/l)	(mg/l)	
Trichloroethene	4.7	0.1	(TTO=5.0)	Exceeds State limit: Exceeds RCRA TC limit of 0.5 mg/L
Tetrachloroethene	0.054	0.02	(TTO=5.0)	Exceeds State Limit
Semivolatile Organics (EPA 625)	(mg/l)	(mg/l)	(mg/l)	
None detected above laboratory reporting limits.		Parameter Specific	(TTO=5.0)	
Pesticides (EPA 608)	(mg/l)	(mg/l)	(mg/l)	
None detected above laboratory reporting limits.		NR	(TTO=5.0)	
PCBs (EPA 608)	(mg/l)	(mg/l)	(mg/l)	
None detected above laboratory reporting limits.		0.001	(TTO=5.0)	
Metals	(mg/l)	(mg/l)	(mg/l)	
Arsenic	ND (0.005)	0.1	2.0	
Barium	0.15	1.0	20.0	
Cadmium	0.0039	0.01	2.8	
Chromium	0.038	0.05	20.0	
Copper	0.21	1.0	16.5	
Lead	0.048	0.05	3.2	
Manganese	0.097	0.20	20.0	
Mercury	0.00071	0.002	0.1	
Nickel	—	NR	12.0	Not analyzed
Selenium	ND (0.01)	0.05	2.0	
Silver	0.022	0.05	5.0	
Thallium	ND (0.01)	NR	NR	
Zinc	0.43	10.0	28.0	
Uranium	0.027	5.0	NR	
Miscellaneous Analyses	(mg/l)	(mg/l)	(mg/l)	
Phenolic Compounds	ND (0.01)	0.005	4.0	
Nitrates/Nitrites	4.7	10.0	NR	
Formaldehyde	0.43	NR	260.0	
Fluoride	0.53	1.6	180.0	
Cyanide	0.013	0.2	8.0	
Oil and Grease	ND (1.0)	NR	150.0	
Radiological Analyses	(pCi/l)	(pCi/l)	(pCi/l)	
Radium 226	0.5 +/- 0.1	30.0	NR	
Radium 228	0 +/- 30	30.0	NR	
Gross Alpha	-6 +/- 8	NR	NR	
Gross Beta	0 +/- 30	NR	NR	
Tritium	0 +/- 300	NR	NR	

NR = Not Regulated; ND (8.8) = Not detected (reporting limit); TC = Toxicity Characteristic of Hazardous Waste

Note: City and State Discharge Limits are for comparison purposes only. City limits apply to discharge of sanitary effluent and not toxic toxic waste, state limits apply to effluent discharged into or below the surface of the ground.

Reference: City of Albuquerque NM Sewer Use and Wastewater Control Ordinance (1980) Section 8-5-3 and New Mexico Water Quality Control Commission Regulations (1983) Section 3-100

Appendix A.1, concluded

ER Site 151
Summary of Constituents Detected in 1992 Septic Tank Samples

Results of Septic Tank Analyses (Sludge Sample)			
Building No./Area:	9940 CTF		
Tank ID No.:	AD89043R		
Date Sampled:	7/22/92		
Sample ID No.:	SNLA008434		
Analytical Parameter	Measured Concentration	+ 2 Sigma Uncertainty	Units
Water Content	74.0	NA	%
Arsenic	25.2	NA	mg/kg
Barium	201	NA	mg/kg
Cadmium	25.8	NA	mg/kg
Chromium	57.4	NA	mg/kg
Copper	2530	NA	mg/kg
Lead	519	NA	mg/kg
Manganese	177	NA	mg/kg
Mercury	1.3	NA	mg/kg
Nickel	---	NA	mg/kg
Selenium	ND (7.7)	NA	mg/kg
Silver	204	NA	mg/kg
Thallium	ND (1.9)	NA	mg/kg
Zinc	535	NA	mg/kg
Gross Alpha	3	17	pCi/g
Gross Beta	29	46	pCi/g
Gross Alpha	3	16	pCi/g
Gross Beta	41	42	pCi/g
Gross Alpha	7	17	pCi/g
Gross Beta	38	43	pCi/g
Gross Alpha	13	17	pCi/g
Gross Beta	26	34	pCi/g
Tritium	0E+03	3E+02	pCi/L
Bismuth-212	0.179	0.0322	pCi/mL
Bismuth-214	0.289	0.0167	pCi/mL
Cesium-137	0.0448	0.00761	pCi/mL
Potassium-40	5.67	0.211	pCi/mL
Lead-212	0.227	0.0153	pCi/mL
Lead-214	0.270	0.0158	pCi/mL
Radium-226	1.12	0.111	pCi/mL
Thorium-234	1.80	0.119	pCi/mL
Thallium-208	1.80	0.119	pCi/mL

ND = Not Detected
NA = Not Applicable

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Appendix A.2

Appendix A.2

ER Site 151

Summary of Constituents Detected in 1994 Septic Tank Samples

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Appendix A.2

ER Site 151 Summary of Constituents in 1994 Septic Tank Samples

Sample Number	Sample Matrix	Sample Type	Sample Date	Method	Compound Name	Result	Detection Limit	+ 2 Sigma Uncertainty	Units
April 1994 Samples:									
015449-1A	Sludge	Field	4/14/94		Uranium Series:				
				EPA-600 901.1	Uranium 238	9.8	6.6	4.5	pCi/g
				EPA-600 901.1	Uranium 235	0.1	0.28	0.18	pCi/g
				EPA-600 901.1	Thorium 234	7.5	3.8	2.6	pCi/g
				EPA-600 901.1	Radium 226	0.74	0.67	0.49	pCi/g
				EPA-600 901.1	Lead 214	0.62	0.52	0.36	pCi/g
					Thorium Series:				
				EPA-600 901.1	Radium 228	0.61	1.4	0.95	pCi/g
				EPA-600 901.1	Lead 212	0.86	0.54	0.38	pCi/g
					Other Radionuclides:				
				EPA-600 901.1	Cesium 137	0.35	0.29	0.22	pCi/g
				EPA-600 901.1	Potassium 40	11	3.3	4.1	pCi/g
015451-1A	Sludge	Field	4/14/94		Uranium Series:				
				EPA-600 901.1	Uranium 238	4.9	2.5	1.7	pCi/g
				EPA-600 901.1	Uranium 235	0.14	0.099	0.068	pCi/g
				EPA-600 901.1	Thorium 234	4.1	1.7	1.1	pCi/g
				EPA-600 901.1	Radium 226	0.42	0.24	0.18	pCi/g
				EPA-600 901.1	Lead 214	0.73	0.22	0.18	pCi/g
					Thorium Series:				
				EPA-600 901.1	Thorium 232	0.53	0.47	0.34	pCi/g
				EPA-600 901.1	Radium 228	0.53	0.47	0.34	pCi/g
				EPA-600 901.1	Thorium 228	1.2	0.61	0.49	pCi/g
				EPA-600 901.1	Actinium 228	0.53	0.47	0.34	pCi/g
				EPA-600 901.1	Lead 212	0.85	0.26	0.19	pCi/g
				EPA-600 901.1	Thallium 208	1.1	0.57	0.45	pCi/g
					Other Radionuclides:				
				EPA-600 901.1	Cesium 137	0.18	0.15	0.11	pCi/g
				EPA-600 901.1	Potassium 40	13	1.1	1.7	pCi/g
015450-1	Sludge	Field	4/14/94	LANL Vol III ER 200	Thorium 232	0.57	0.051	0.12	pCi/g
				LANL Vol III ER 200	Thorium 230	0.49	0.051	0.11	pCi/g
				HASL-300	Uranium 238	1.9	0.027	0.21	pCi/g
				HASL-300	Uranium 235	0.055	0.016	0.024	pCi/g
				HASL-300	Uranium 233/234	2.4	0.022	0.25	pCi/g
015449-1	Sludge	Field	4/14/94	8240 (VOCs)	Acetone	560	100	NA	ug/kg
					2-Butanone (MEK)	140	100	NA	ug/kg
					Carbon disulfide	46 J	50	NA	ug/kg
					Chloromethane	23 J	100	NA	ug/kg
					Methylene chloride	12 J	50	NA	ug/kg
015449-2	Liquid	Field	4/14/94	8240 (VOCs)	34 Compounds	ND	5 -10	NA	ug/L
015449-5	Sludge	Field	4/14/94	TCLP/6010	Arsenic	ND	0.2	NA	mg/L
				TCLP/6010	Barium	0.72	0.02	NA	mg/L
				TCLP/6010	Cadmium	ND	0.01	NA	mg/L
				TCLP/6010	Chromium	ND	0.02	NA	mg/L
				TCLP/6010	Lead	0.071 J	0.1	NA	mg/L
				TCLP/6010	Selenium	ND	0.4	NA	mg/L
				TCLP/6010	Silver	ND	0.02	NA	mg/L
				TCLP/7470	Mercury	ND	0.0004	NA	mg/L

Appendix A.2, concluded

ER Site 151 Summary of Constituents in 1994 Septic Tank Samples

Sample Number	Sample Matrix	Sample Type	Sample Date	Method	Compound Name	Result	Detection Limit	+ 2 Sigma Uncertainty	Units
April 1994 Samples, continued:									
015449-5	Sludge	Field	4/14/94	HPLC	14 explosive compounds	ND	0.25 - 2.2	NA	ug/kg
015449-6	Sludge	Field	4/14/94	9010/9012	Cyanide	ND		NA	mg/kg
015449-7	Liquid	Field	4/14/94	HPLC	14 explosive compounds	ND	0.02 - 0.84	NA	ug/l
015449-8	Liquid	Field	4/14/94	9012	Cyanide	ND	0.01	NA	mg/L
June 1994 Samples									
015945-1	Sludge	Field	6/1/94	TCLP/6010	Arsenic	ND	0.2	NA	mg/L
				TCLP/6010	Barium	1.1 B	0.02	NA	mg/L
				TCLP/6010	Cadmium	ND	0.01	NA	mg/L
				TCLP/6010	Chromium	ND	0.02	NA	mg/L
				TCLP/6010	Lead	ND	0.1	NA	mg/L
				TCLP/6010	Selenium	ND	0.4	NA	mg/L
				TCLP/6010	Silver	ND	0.02	NA	mg/L
				TCLP/7470	Mercury	ND	0.0002	NA	mg/L
015945-2	Sludge	Field	6/1/94	8270 (SVOCs)	bis(2-Ethylhexyl)*phthalate	0.12 J	0.33	NA	mg/kg
					Pyrene	0.081 J	0.33	NA	mg/kg
015945-3	Sludge	Field	6/1/94	8240 (VOCs)	Methylene chloride	0.22 BJ	0.5	NA	mg/L
015945-4	Sludge	Field	6/1/94	HPLC	14 explosive compounds	ND	0.25 - 2.2	NA	ug/kg
015945-5	Sludge	Field	6/1/94	9010/9012	Cyanide	ND	0.50	NA	mg/kg
015945-6	Sludge	Field	6/1/94	7471	Mercury	ND	0.1	NA	mg/kg
				6010	Arsenic	ND	10	NA	mg/kg
				6010	Barium	102	1	NA	mg/kg
				6010	Cadmium	0.73	0.5	NA	mg/kg
				6010	Chromium	5.9	1	NA	mg/kg
				6010	Lead	18.8	5	NA	mg/kg
				6010	Selenium	17.6 J	20	NA	mg/kg
				6010	Silver	9.9	1	NA	mg/kg
015945-7	Sludge	Field	6/1/94	7196	Chromium (VI)	ND	0.05	NA	mg/kg
015945-8	Sludge	Field	6/1/94	Isotopic Uranium	Uranium 238	0.66	0.015	0.1	pCi/g
					Uranium 235	0.032	0.015	0.018	pCi/g
					Uranium 233/234	0.48	0.021	0.082	pCi/g

Notes:

B = Compound detected in the laboratory blank.
 Dupl. = Duplicate
 J = Result is detected below the reporting limit
 or is an estimated concentration.
 mg/L = Milligrams per liter
 mg/kg = Milligrams per kilogram
 NA = Not applicable
 ND = Not detected

NP = Not provided by laboratory
 pCi/g = Picocuries per gram
 pCi/L = Picocuries per liter
 pCi/mL = Picocuries per milliliter
 Spec. = Spectroscopy
 SVOCs = Semivolatile organic compounds
 TCLP = Toxicity Characteristic Leaching Procedure
 VOCs = Volatile organic compounds
 +/- 2 Sigma Uncertainty = Total error

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Appendix A.3

Appendix A.3

ER Site 151

Summary of 1994 PETREXTM Passive Soil-Gas Survey Results

Note: Samples 152 through 154 were installed around the drywell located on the southeast side of Building 9940. It was later determined that this drywell served only as a steam blowdown and drain pit for process steam equipment in Building 9940-A. Therefore, investigation of this drywell was discontinued and these results are not discussed in the text.

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ER Site 151
Summary of 1994 PETREX™ Passive Soil-Gas Survey Results

Table 11
PETREX Relative Soil Gas Response Values
(in ion counts)
STD SITE 151

Sample	PCE	TCE	BTEX	Aliphatics
148	1233	ND	14948	11636
149	3625	ND	20429	29329
150	1357	ND	61830	132483
151	11298	ND	39750	80498
152	ND	ND	16092	5228
153	ND	ND	20470	5576
154	ND	ND	ND	1095
155	ND	ND	4210	ND
D-1155	ND	ND	902	2067
* 900	ND	ND	4553	6219
* 901	ND	ND	4732	ND

PCE - Tetrachloroethene
Indicator Mass Peak(s) 164

TCE - Trichloroethene
Indicator Mass Peak(s) 130

BTEX - Benzene, Toluene, Ethylbenzene/Xylene(s)
Indicator Mass Peak(s) 78, 92, 106

Aliphatics - C4-C11 Cycloalkanes/Alkenes
Indicator Mass Peak(s) 56, 70, 84, 98, 112,
126, 140, 154

D - Duplicate Sample
Sample numbers in thousands duplicate of sample numbers in hundreds

* QA/QC Blank Sample - No Compounds Detected
above the PETREX Normal reporting Limits

Note: Samples 152 through 154 were installed around the drywell located on the southeast side of Building 9940. It was later determined that this drywell served only as a steam blowdown and drain pit for process steam equipment in Building 9940-A. Therefore, investigation of this drywell was discontinued and these results are not discussed in the text.

Appendix A.3 concluded:

ER Site 151
Summary of 1994 PETREX™ Passive Soil-Gas Survey Results

Table 28
PETREX Relative Soil Gas Response Values
(in ion counts)
STD SITE 151 Seepage Pit

Sample	PCE	TCE	BTEX	Aliphatics
432	2955	ND	51199	23606
433	3526	ND	67242	24196
434	ND	ND	15151	6495
435	ND	ND	8581	2291
436	2674	ND	49664	74372
437	ND	ND	25726	25280
438	ND	4622	14845	13216
D-1436	4697	1130	84845	104725
* 139	ND	ND	5334	10013
* 140	ND	ND	ND	2593

PCE- Tetrachloroethene

Indicator Mass Peak(s) 164

TCE - Trichloroethene

Indicator Mass Peak(s) 130

BTEX - Benzene, toluene, Ethylbenzene/xylene(s)

Indicator Mass Peak(s) 78, 92, 106

Aliphatics - C4-C11 Cycloalkanes/Alkenes

Indicator Mass Peak(s) 56, 70, 84, 98, 112,
126, 140, 154

D - Duplicate Sample

Sample numbers in thousands duplicate of sample numbers in hundreds

* QA/QC Blank Sample - No Compounds Detected
above the PETREX Normal reporting Limits

Appendix A.4

Appendix A.4

ER Site 151

**Gamma Spectroscopy Screening Results for the Seepage Pit
Shallow Interval Composite Soil Sample**

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ER Site 151
Gamma Spectroscopy Screening Results for the Seepage Pit
Shallow Interval Composite Soil Sample

* SNL Radiation Sample Diagnostic Program (7715)/881 19-OCT-94 09:48:57 *

B.GALLOWAY/J.ROSE (7582/SMO) 018128-4

Operator: Theresa Cole 10/19/94 Reviewed by Agua 12/22/94

Data File : 94055501.DAT *
Acquire Date: 19-OCT-94 08:42:28 * Sample Quantity: 807.000 GRAM
Sample Date: 13-OCT-94 14:30:00 * Efficiency File: SMAR2.EFF
Sample Type: SOLID * Library File: RSDP.LIB

Preset Live Time: 3600.0 sec *
Elapsed Live Time: 3600.0 sec * FWHM at 1332 KeV : 2.2 KeV
Elapsed Real Time: 3601.0 sec * Peak Search Sensitivity: 4.0
***** Gaussian Assymetry : 10.0 %

Detector : DET2 *
Calib Date : 17-OCT-94 12:36:09 * Fit Iterations : 20.
KeV/Channel: .36638 * Energy Tolerance: 1.5 KeV
Offset : -.31767 * Half Life Ratio : 8.0
***** Abundance Limit : 50.00 %

[Summary Report -- SNL (7715) -- version 1.2]

Nuclide	Activity (PCI /GRAM)	2-sigma Error	MDA (PCI /GRAM)
U-238	1.32E+00	4.03E-01	-----
TH-234	1.32E+00	4.04E-01	-----
U-234	Not Detected	-----	5.19E+00
PA-226	1.22E+00	5.12E-01	-----
PB-214	5.93E-01	6.30E-02	-----
BI-214	5.19E-01	5.94E-02	-----
PB-210	1.90E+00	2.32E+00	-----
TH-232	6.08E-01	9.96E-02	-----
PA-228	6.08E-01	9.96E-02	-----
AC-228	5.49E-01	8.99E-02	-----
TH-228	6.37E-01	4.95E-02	-----
PA-224	Not Significant	-----	-----
PB-212	6.40E-01	4.97E-02	-----
BI-212	4.39E-01	2.03E-01	-----
TL-208	5.22E-01	7.85E-02	-----
U-235	Not Detected	-----	3.25E-02
TH-231	3.02E-01	1.78E-01	-----
PA-231	Not Detected	-----	7.28E-01
AC-227	Not Detected	-----	8.65E-01
TH-227	Not Detected	-----	1.35E-01
AM-241	Not Detected	-----	8.02E-02
NP-237	Not Detected	-----	1.33E-01
PA-233	Not Detected	-----	4.03E-02
TH-229	Not Detected	-----	6.11E-02

ER Site 151
Gamma Spectroscopy Screening Results for the Seepage Pit
Shallow Interval Composite Soil Sample

ID: B.GALLOWAY/J.ROSE (7582/SMO) 018128-4

Nuclide	Activity (PCI /GRAM)	2-sigma Error	MDA (PCI /GRAM)
PU-239	Not Detected	-----	1.84E+02
AG-110	Not Detected	-----	1.25E-02
BE-7	Not Detected	-----	1.31E-01
AR-41	Short Half-Life	-----	-----
BA-133	Not Detected	-----	2.16E-02
BA-140	Not Detected	-----	7.03E-02
BI-207	Not Detected	-----	1.30E-02
CD-109	Not Detected	-----	5.31E-01
CE-139	Not Detected	-----	1.55E-02
CE-144	Not Detected	-----	1.00E-01
CO-56	Not Detected	-----	2.49E-02
CO-57	Not Detected	-----	1.23E-02
CO-58	Not Detected	-----	1.82E-02
CO-60	Not Detected	-----	2.43E-02
CR-51	Not Detected	-----	1.50E-01
CS-134	Not Detected	-----	1.53E-02
CS-137	Not Detected	-----	1.78E-02
CU-64	Short Half-Life	-----	-----
EU-152	Not Detected	-----	3.77E-02
EU-154	Not Detected	-----	7.40E-02
EU-155	Not Detected	-----	6.09E-02
FE-59	Not Detected	-----	3.50E-02
GD-153	Not Detected	-----	4.19E-02
HG-203	Not Detected	-----	2.01E-02
--125	Not Detected	-----	1.50E+00
--129	Not Detected	-----	8.71E-01
--131	Not Detected	-----	2.74E-02
IN-115M	Short Half-Life	-----	-----
IR-192	Not Detected	-----	1.78E-02
--40	1.34E+01	6.13E-01	-----
LA-140	Not Detected	-----	1.19E-01
LN-54	Not Detected	-----	1.94E-02
MN-56	Short Half-Life	-----	-----
NA-22	Not Detected	-----	1.86E-02
NA-24	Short Half-Life	-----	-----
NB-95	Not Detected	-----	1.87E-01
RU-103	Not Detected	-----	1.29E-02
RU-106	Not Detected	-----	1.16E-01
SB-124	Not Detected	-----	1.41E-02
SB-125	Not Detected	-----	4.49E-02
SB-126	Not Detected	-----	1.87E-02
SC-46	Not Detected	-----	1.76E-02
SN-113	Not Detected	-----	1.98E-02
SR-85	Not Detected	-----	1.67E-02
TA-182	Not Detected	-----	1.37E-01
TE-123M	Not Detected	-----	1.48E-02
TL-201	Not Detected	-----	4.41E-01
XE-133	Not Detected	-----	1.03E-01
Y-88	Not Detected	-----	1.82E-02
ZN-65	Not Detected	-----	4.00E-02
ZR-95	Not Detected	-----	3.13E-02

Appendix A.5

Appendix A.5

ER Site 151

Gamma Spectroscopy Screening Results for the Seepage Pit
Deep Interval Composite Soil Sample

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ER Site 151

Gamma Spectroscopy Screening Results for the Seepage Pit
Deep Interval Composite Soil Sample

 * SNL Radiation Sample Diagnostic Program (7715)/881 19-OCT-94 11:59:54 *

 3. GALLOWAY/J.ROSE (7582/SMO) 018129-4

Operator: John J. Galloway 10/19/94 Reviewed by John 10/22/94

 *
 Data File : 94055502.DAT * Sample Quantity: 696.000 GRAM
 Acquire Date: 19-OCT-94 09:49:13 * Efficiency File: SMAR2.EFF
 Sample Date: 13-OCT-94 14:30:00 * Library File: RSDP.LIB
 Sample Type: SOLID *

 *
 Preset Live Time: 3600.0 sec * FWHM at 1332 KeV : 2.2 KeV
 Elapsed Live Time: 3600.0 sec * Peak Search Sensitivity: 4.0
 Elapsed Real Time: 3601.0 sec * Gaussian Assymetry : 10.0 %

 *
 Detector : DET2 * Fit Iterations : 20.
 Calib Date : 17-OCT-94 12:36:09 * Energy Tolerance: 1.5 KeV
 KeV/Channel: .36638 * Half Life Ratio : 8.0
 Offset : -.31767 * Abundance Limit : 50.00 %

[Summary Report -- SNL (7715) -- version 1.2]

Nuclide	Activity (PCI /GRAM)	2-sigma Error	MDA (PCI /GRAM)
U-238	Not Detected	-----	3.51E-01
TH-234	Not Detected	-----	3.52E-01
U-234	Not Detected	-----	5.25E+00
PA-226	1.43E+00	5.70E-01	-----
PB-214	6.33E-01	7.37E-02	-----
BI-214	Not Detected	-----	9.84E-02
PB-210	Not Detected	-----	1.18E+00
TH-232	6.56E-01	1.43E-01	-----
PA-228	6.56E-01	1.43E-01	-----
AC-228	5.92E-01	1.29E-01	-----
TH-228	6.89E-01	5.02E-02	-----
PA-224	2.34E+00	4.72E-01	-----
PB-212	6.92E-01	5.04E-02	-----
BI-212	5.58E-01	1.63E-01	-----
TL-208	4.70E-01	8.34E-02	-----
U-235	Not Detected	-----	3.50E-02
TH-231	Not Detected	-----	2.61E-01
PA-231	Not Detected	-----	8.02E-01
AC-227	Not Detected	-----	9.22E-01
TH-227	Not Detected	-----	1.35E-01
AM-241	Not Detected	-----	8.46E-02
NP-237	Not Detected	-----	1.48E-01
PA-233	Not Detected	-----	4.40E-02
TH-229	Not Detected	-----	6.85E-02

Appendix A.5, concluded:

ER Site 151

Gamma Spectroscopy Screening Results for the Seepage Pit
Deep Interval Composite Soil Sample

ID: B. GALLOWAY/J.ROSE (7582/SMO) 018129-4

Nuclide	Activity (PCI /GRAM)	2-sigma Error	MDA (PCI /GRAM)
PU-239	Not Detected	-----	2.22E+02
AG-110	Not Detected	-----	1.45E-02
BE-7	Not Detected	-----	1.34E-01
AR-41	Short Half-Life	-----	-----
BA-133	Not Detected	-----	2.22E-02
BA-140	Not Detected	-----	6.70E-02
BI-207	Not Detected	-----	1.28E-02
CD-109	1.38E+00	5.21E-01	-----
CE-139	Not Detected	-----	1.56E-02
CE-144	Not Detected	-----	1.05E-01
CO-56	Not Significant	-----	-----
CO-57	Not Detected	-----	1.37E-02
CO-58	Not Detected	-----	1.90E-02
CO-60	Not Detected	-----	2.38E-02
CR-51	Not Detected	-----	1.74E-01
CS-134	Not Detected	-----	1.51E-02
CS-137	Not Detected	-----	1.92E-02
CU-64	Short Half-Life	-----	-----
EU-152	Not Detected	-----	4.05E-02
EU-154	Not Detected	-----	9.23E-02
EU-155	Not Detected	-----	6.81E-02
FE-59	Not Detected	-----	3.90E-02
GD-153	Not Detected	-----	4.41E-02
HG-203	Not Detected	-----	2.25E-02
I-125	Not Detected	-----	1.66E+00
I-129	Not Detected	-----	8.88E-01
I-131	Not Detected	-----	2.74E-02
IN-115M	Short Half-Life	-----	-----
IR-192	Not Detected	-----	1.91E-02
K-40	1.49E+01	7.08E-01	-----
LA-140	Not Detected	-----	1.80E-01
MN-54	1.46E-02	1.50E-02	-----
MN-56	Short Half-Life	-----	-----
NA-22	Not Detected	-----	2.28E-02
NA-24	Short Half-Life	-----	-----
NB-95	Not Detected	-----	1.83E-01
RU-103	Not Detected	-----	1.70E-02
RU-106	Not Detected	-----	1.34E-01
SB-124	Not Detected	-----	1.70E-02
SB-125	Not Detected	-----	4.65E-02
SB-126	Not Detected	-----	2.17E-02
SC-46	Not Detected	-----	1.59E-02
SN-113	Not Detected	-----	2.43E-02
SR-85	Not Detected	-----	1.66E-02
TA-182	Not Detected	-----	1.58E-01
TE-123M	Not Detected	-----	1.62E-02
TL-201	Not Detected	-----	4.61E-01
XE-133	Not Detected	-----	1.11E-01
Y-88	Not Detected	-----	2.25E-02
ZN-65	Not Detected	-----	4.34E-02
ZR-95	Not Detected	-----	3.51E-02

N.D. from 10/2/94

N.D. from 10/2/94

Appendix A.6

ER Site 151

**Gamma Spectroscopy Screening Results for the Solids Retention Outfall
Shallow Interval Composite Soil Sample**

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Coc 02080

Par 02081

3 02511

ER Site 151

**Gamma Spectroscopy Screening Results for the Solids Retention Outfall
Shallow Interval Composite Soil Sample**

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program [881 Laboratory] *
 * 1-20-95 1:01:36 PM *
 * *****
 * Analyzed by: *[Signature]* 1/20/95 Reviewed by: *[Signature]* 1/20/95 *
 * *****

Customer : GALLOWAY/McLAUGHLIN (7582/SMO)
 Customer Sample ID : 018929-3A
 Lab Sample ID : 50006401

Sample Description : MARINELLI SOLID SAMPLE
 Sample Type : Solid
 Sample Geometry : 1SMAR
 Sample Quantity : 783.000 Gram
 Sample Date/Time : 1-19-95 2:55:00 PM
 Acquire Start Date : 1-20-95 12:28:27 PM
 Detector Name : LAB01
 Elapsed Live Time : 1800 seconds
 Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/Gram)	2S Error	MDA
U-238	Not Detected	-----	-----
TH-234	4.33E-01	2.39E-01	2.03
U-234	Not Detected	-----	4.77E-01
RA-226	6.11E-01	2.87E-01	5.49E+01
PB-214	4.54E-01	1.32E-01	4.64E-01
BI-214	4.26E-01	8.76E-02	4.63E-02
PB-210	Not Detected	-----	5.24E-02
			4.91E+02
TH-232	3.97E-01	1.49E-01	1.42E-01
RA-228	5.28E-01	1.74E-01	1.90E-01
AC-228	Not Detected	-----	2.93E-01
TH-228	6.00E-01	2.91E-01	4.37E-01
RA-224	8.79E-01	3.48E-01	3.74E-01
PB-212	4.19E-01	1.32E-01	3.58E-02
BI-212	Not Detected	-----	8.12E-01
TL-208	4.23E-01	9.97E-02	7.93E-02
U-235	Not Detected	-----	2.66E-01
TH-231	Not Detected	-----	6.72E-01
PA-231	Not Detected	-----	1.17
AC-227	Not Detected	-----	2.01
TH-227	Not Detected	-----	3.71E-01
RA-223	Not Detected	-----	2.22E-01
RN-219	Not Detected	-----	2.95E-01
PB-211	Not Detected	-----	7.40E-01
TL-207	Not Detected	-----	2.08E+01
AM-241	Not Detected	-----	2.79E-01
PU-239	1.54E+02	8.89E+01	1.93E-02
NP-237	Not Detected	-----	4.58E-01
PA-233	Not Detected	-----	6.49E-02

NOT Detected max 1/20/95

Appendix A.6, concluded:

ER Site 151
Gamma Spectroscopy Screening Results for the Solids Retention Outfall
Shallow Interval Composite Soil Sample

[Summary Report] - Sample ID: 50006401

Nuclide	Activity (pCi/Gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.99E-02
AR-41	Not Detected	-----	2.72E+02
BA-133	Not Detected	-----	6.62E-02
BA-140	Not Detected	-----	1.40E-01
CD-109	1.49	6.22E-01	7.61E-01
CD-115	Not Detected	-----	9.67E-02
CE-139	Not Detected	-----	3.23E-02
CE-141	Not Detected	-----	6.11E-02
CE-144	Not Detected	-----	2.86E-01
CO-56	5.36E-01	1.64E-02	3.42E-02
CO-57	Not Detected	-----	3.94E-02
CO-58	Not Detected	-----	5.09E-02
CO-60	Not Detected	-----	6.67E-02
CR-51	Not Detected	-----	2.76E-01
CS-134	Not Detected	-----	5.48E-02
CS-137	3.40E-02	1.73E-02	2.66E-02
CU-64	Not Detected	-----	4.21E+01
EU-152	Not Detected	-----	3.76E-01
EU-154	Not Detected	-----	2.66E-01
EU-155	Not Detected	-----	1.73E-01
FE-59	Not Detected	-----	1.04E-01
GD-153	Not Detected	-----	1.25E-01
EG-203	Not Detected	-----	3.08E-02
I-131	Not Detected	-----	3.46E-02
IN-115m	Not Detected	-----	2.12
IR-192	Not Detected	-----	3.20E-02
K-40	1.46E+01	2.21	3.44E-01
LA-140	Not Detected	-----	9.58E-02
MN-54	Not Detected	-----	5.29E-02
MN-56	Not Detected	-----	1.20E+01
MO-99	Not Detected	-----	4.71E-01
NA-22	Not Detected	-----	6.59E-02
NA-24	Not Detected	-----	1.71E-01
NE-95	Not Detected	-----	2.01E-01
ND-147	Not Detected	-----	2.62E-01
NI-57	Not Detected	-----	1.21E-01
BE-7	Not Detected	-----	3.11E-01
RU-103	Not Detected	-----	3.64E-02
RU-106	Not Detected	-----	4.16E-01
SB-122	Not Detected	-----	6.98E-02
SB-124	Not Detected	-----	4.06E-02
SB-125	Not Detected	-----	9.92E-02
SC-46	Not Detected	-----	8.10E-02
SR-85	Not Detected	-----	4.83E-02
TA-182	Not Detected	-----	2.37E-01
TA-183	Not Detected	-----	2.71E-01
TE-132	Not Detected	-----	3.57E-02
TL-201	Not Detected	-----	1.59E-01
XE-133	Not Detected	-----	1.80E-01
Y-88	Not Detected	-----	6.57E-02
ZN-65	Not Detected	-----	1.63E-01
ZR-95	Not Detected	-----	8.99E-02

Not Detected mca 1/20/95

not detected 11/20/95

Appendix A.7

ER Site 151

**Gamma Spectroscopy Screening Results for the Solids Retention Outfall
Deep Interval Composite Soil Sample**

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ER Site 151
Gamma Spectroscopy Screening Results for the Solids Retention Outfall
Deep Interval Composite Soil Sample

* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program [881 Laboratory] *
* 1-20-95 12:23:18 PM *

* Analyzed by: *[Signature]* 1/20/95 Reviewed by: *[Signature]* 1/20/95 *

Customer : GALLOWAY/McLAUGHLIN (7582/SMO)
Customer Sample ID : 018930-3A
Lab Sample ID : 50006402

Sample Description : MARINELLI SOLID SAMPLE
Sample Type : Solid
Sample Geometry : 1SMAR
Sample Quantity : 916.000 Gram
Sample Date/Time : 1-19-95 3:55:00 PM
Acquire Start Date : 1-20-95 11:50:01 AM
Detector Name : LAB01
Elapsed Live Time : 1800 seconds
Elapsed Real Time : 1801 seconds

Comments:

Nuclide	Activity (pCi/Gram)	2S Error	MDA
U-238	Not Detected	-----	1.95
TH-234	Not Detected	-----	4.56E-01
U-234	Not Detected	-----	5.11E+01
PA-226	7.17E-01	2.97E-01	4.54E-01
PB-214	4.11E-01	1.16E-01	4.10E-02
BI-214	4.24E-01	8.44E-02	5.08E-02
PB-210	Not Detected	-----	4.80E+02
TH-232	5.81E-01	1.94E-01	1.26E-01
RA-228	7.09E-01	1.93E-01	1.70E-01
AC-228	8.08E-01	1.68E-01	1.02E-01
TH-228	7.15E-01	3.19E-01	4.42E-01
RA-224	5.36E-01	2.60E-01	3.85E-01
PB-212	5.68E-01	1.77E-01	3.59E-02
BI-212	9.59E-01	2.96E-01	3.18E-01
TL-208	6.03E-01	1.25E-01	7.28E-02
U-235	Not Detected	-----	2.70E-01
TH-231	Not Detected	-----	6.84E-01
PA-231	Not Detected	-----	1.19
AC-227	Not Detected	-----	1.90
TH-227	Not Detected	-----	3.88E-01
RA-223	Not Detected	-----	2.19E-01
RN-219	Not Detected	-----	2.95E-01
PB-211	Not Detected	-----	7.35E-01
TL-207	Not Detected	-----	2.03E+01
AM-241	Not Detected	-----	2.72E-01
PU-239	Not Detected	-----	3.28E+02
NP-237	Not Detected	-----	2.15E-01
PA-233	Not Detected	-----	6.18E-02

Appendix A.7, concluded:

ER Site 151
Gamma Spectroscopy Screening Results for the Solids Retention Outfall
Deep Interval Composite Soil Sample

[Summary Report] - Sample ID: 50006402

Nuclide	Activity (pCi/Gram)	2S Error	MDA
AG-110m	Not Detected	-----	4.30E-02
AR-41	Not Detected	-----	1.39E+02
BA-133	Not Detected	-----	5.93E-02
BA-140	Not Detected	-----	1.38E-01
CD-109	Not Detected	-----	7.40E-01
CD-115	Not Detected	-----	9.36E-02
CE-139	Not Detected	-----	3.32E-02
CE-141	Not Detected	-----	6.09E-02
CE-144	Not Detected	-----	2.79E-01
CO-56	2.22E-02	1.44E-02	2.85E-02
CO-57	Not Detected	-----	3.86E-02
CO-58	Not Detected	-----	4.67E-02
CO-60	Not Detected	-----	5.65E-02
CR-51	Not Detected	-----	2.36E-01
CS-134	Not Detected	-----	4.79E-02
CS-137	Not Detected	-----	5.03E-02
CU-64	Not Detected	-----	3.75E+01
EU-152	Not Detected	-----	3.25E-01
EU-154	Not Detected	-----	2.46E-01
EU-155	Not Detected	-----	1.75E-01
FE-59	Not Detected	-----	1.12E-01
GD-153	Not Detected	-----	1.23E-01
EG-203	Not Detected	-----	3.07E-02
I-131	Not Detected	-----	3.33E-02
IN-115m	Not Detected	-----	1.63
IR-192	Not Detected	-----	2.86E-02
K-40	1.85E+01	2.70	2.94E-01
LA-140	Not Detected	-----	8.08E-02
MN-54	Not Detected	-----	4.86E-02
MN-56	Not Detected	-----	6.47
MO-99	Not Detected	-----	4.39E-01
NA-22	Not Detected	-----	6.70E-02
NA-24	Not Detected	-----	1.32E-01
NB-95	Not Detected	-----	2.08E-01
ND-147	Not Detected	-----	2.51E-01
NI-57	Not Detected	-----	1.14E-01
BE-7	Not Detected	-----	2.88E-01
RU-103	Not Detected	-----	3.41E-02
RU-106	Not Detected	-----	3.76E-01
SB-122	Not Detected	-----	6.18E-02
SB-124	Not Detected	-----	3.74E-02
SB-125	Not Detected	-----	9.77E-02
SC-46	Not Detected	-----	7.91E-02
SR-85	Not Detected	-----	4.60E-02
TA-182	Not Detected	-----	2.33E-01
TA-183	Not Detected	-----	2.63E-01
TE-132	Not Detected	-----	3.23E-02
TL-201	Not Detected	-----	1.57E-01
XE-133	Not Detected	-----	1.74E-01
Y-88	Not Detected	-----	5.90E-02
ZN-65	Not Detected	-----	1.48E-01
ZR-95	Not Detected	-----	8.34E-02

not Detected max 1/20/95

RSI

**Justification for
Class III Permit Modification**

April 2001

**Solid Waste Management Unit 151
Operable Unit 1295
Round 4**

RSI Originally Submitted November 1998

PLEASE NOTE

**Only pages relevant to this SWMU
are included in the binder.**

Site-Specific Comments

Response: SNL believes that cemented gravel and Precambrian bedrock is present at a shallow depth (less than 15 ft bgs) at this site. This is based upon the fact that Precambrian gneiss is exposed in a bank behind (northwest) of Building 9930, about 150 ft north of the septic tank. Cemented gravels deposited directly on Precambrian rocks are exposed on the south side of the drainage in which the Building 9930 facility has been constructed. Also, a large water storage tank is located about 300 ft south of ER Site 149; large blocks of cemented gravel were excavated by drilling and blasting in order to construct a level surface for this tank. It is, therefore, apparent that additional sampling at greater than about 15 ft bgs can only be accomplished with equipment capable of drilling into hard rock. Soil/sediment samples were collected from immediately above the bedrock surface in boreholes drilled at this site, and no significant concentrations of COCs were detected in those samples.

It is apparent that deeper sampling at this site can only be accomplished with equipment capable of drilling into hard rock. The DOE/SNL are willing to discuss additional sampling with the NMED, but see no technical justification in attempting to sample in relatively impermeable bedrock.

ER Site 151, Building 9940 Septic System

ER Site 151 comprises the septic tank and seepage pit that service sinks and floor drains in Building 9940, the settling tank and surface outfall that serviced the underground blast chamber in Building 9940, and the surface outfalls that service Building 9940A. Building 9940 was constructed in 1962 as an explosive facility in which DU was used in underground tests. The building was converted to a Nuclear Regulatory Commission (NRC) test facility in 1978. The NRC dropped superheated metals into vats of water and used DU in simulated reactor experiments. The building is still in use, although present activities are not described. Building 9940A contained "process steam equipment"; no information on other activities is given.

Hazardous materials used at ER Site 151 are photochemicals (Cd, Cr⁺⁶, CN, Ag), VOCs (acetone, toluene, and MEK), DU, and unidentified explosive compounds. After disposal into sinks and/or floor drains, these hazardous materials may have entered the soil column following discharge onto the surface at the outfalls and through the bottom of the seepage pit. Once in the soil column, contaminants may have migrated to the water table through the process of vapor-phase transport or in solution with discharged wastewater. Sandia's estimate of depth to ground water at this site is 500 ft.

Response: Groundwater is now estimated to be approximately 474 ft bgs beneath the site, based upon the most recent potentiometric surface map of the SNL/KAFB area, which is presented in the "Site Wide Hydrogeologic Characterization Project, Calendar Year 1995 Annual Report," published in March 1996. Also, although not confirmed by exposed outcrops, shallow bedrock is suspected at ER Site 151. Subsurface refusal was encountered at approximately 11 ft bgs at multiple locations near the surface outfall, south of Building 9940. Subsurface refusal at multiple locations was also encountered at about 17 ft bgs beneath the seepage pit. However, with repeated attempts at additional locations, samples from deeper depths (i.e., 25 to 27 ft bgs) were ultimately collected from around this unit.

2.3 Historical Operations

42. Figures 1-1 and 1-2 - see General Comment 1.

Site-Specific Comments

Response: See response to General Comment 1.

43. **Has the septic system been removed or sealed to prevent any accidental discharge into the system? Is Building 9940 still being used by the NRC? Also, see General Comment 4.**

Response: The top of the septic tank was been removed, and the tank was cleaned out and decontaminated in November 1995. The septic system has not been operational since that time. Effluent from Building 9940 has been directed to the sanitary sewer line that was constructed to the facility in the early 1990s.

According to Mr. Weldon Teague, Assistant Facility Manager at Building 9940, NRC testing has occurred at the facility from 1994 to the present. In 1994 and 1995, reactor core meltdown experiments were performed. Also, since 1996, pressure vessel failure testing has taken place outside of the building. Mr. Teague indicated that no Nuclear Regulatory Commission work is scheduled for fiscal year 1999.

Also, see response to General Comment 4.

3.4 The Results of Previous Sampling/Surveys

44. **The results of the PETREX SVS indicate PCE, BTEX, and aliphatic plumes, or a combined plume may be migrating from the seepage pit and the drainline outfall. Sandia must complete boreholes at or near PETREX SVS locations 151 and 433, and install active or passive soil-vapor monitoring systems at the surface and at the bottoms of the boreholes. Also, see General Comments 5 and 11.**

Response: The negligible ion count values detected in the PETREX samplers at locations P-433 north of the septic system (PCE-3,526, TCE-ND, BTEX-67,242, and aliphatics-24,196) and P-151 near the outfall south of Building 9940 (PCE-11,298, TCE-ND, BTEX-39,750, and aliphatics-80,498) are substantially below the 100K and 200K "threshold" values that in NERI's opinion would represent detectable levels by standard quantitative methods for soils and/or groundwater. The ion count values detected in these samplers are in no way suggestive of significant organic contamination at this site. As stated earlier, VOC concentrations in soil vapor are not regulated. VOC concentrations in conventionally analyzed soil samples are regulated to the extent that these data are used in risk assessment evaluations. Significant VOC and other COC concentrations that could pose a threat to human health or the environment were not detected in any of the soil samples collected from four intervals near the two outfalls south of Building 9940 or in any of the original soil samples collected from six sampling intervals around the septic tank and seepage pit. Also, one additional set of samples was collected from a follow-up boring drilled directly beneath the center of the seepage pit at this site. These samples were analyzed for VOCs, HE compounds (using EPA Method 8330), RCRA metals, and isotopic uranium. Significant VOC or other COC concentrations were not detected in these samples. Analytical results for these additional seepage pit samples have been added to the analytical data summary tables submitted with the ER Site 151 NFA proposal and are provided in Attachment C of the site-specific portion of this submittal. The ER Site 151 site map has also been revised to reflect these additional sample locations and is provided in Attachment A. The DOE/SNL, therefore, do not believe that additional soil vapor sampling is required or justified at this site.

Site-Specific Comments

3.6 Confirmatory Sampling

45. **Data collection - see General Comments 2, 6, 8, 9, and 10.**

Response: See responses to General Comments 2, 6, 8, and 9. Regarding General Comment 10, an additional HE sample was collected from a single sampling interval in the borehole drilled through the center of the seepage pit at this site (deep-interval samples were not collected from beneath the seepage pit because subsurface refusal was encountered at 20 ft bgs). This HE sample was analyzed by a commercial laboratory using EPA Method 8330, and no HE compounds were detected in the samples. As the NMED indicates in General Comment 2, the highest COC concentrations are most likely located along a vertical axis beneath the center of the disposal structure. Therefore, because TNT was not detected in samples collected from four separate intervals on either side of the seepage pit and no HE compounds were detected in the sample from beneath the center of the unit, the DOE/SNL believe that additional HE sampling at this site is unnecessary.

46. **Table 3-3 indicates that Ba concentrations exceeding the proposed background level are increasing with depth in soil boring SP-1. Additional samples must be collected at SP-1, at depths greater than 25 ft, to characterize the vertical extent of potential Ba contamination under the leachfield.**

Response: Only one of the seven soil samples collected in the septic system area contained a barium concentration (280 mg/kg) that was above the approved maximum background barium concentration of 214 mg/kg for subsurface samples from the Southwest Area Supergroup. In addition, the soil sample collected from directly beneath the seepage pit only contained 89.9 mg/kg of barium. This sample was collected from the area beneath the disposal structure which usually contains the highest COC concentrations, according to General Comment 2. The DOE/SNL, therefore, believe that samples collected at the site show that significant concentrations of barium that could realistically pose a threat to human health or the environment are not present and that additional sampling is unnecessary.

47. **Because the sanitary sewer line is approximately 160 ft long, subsurface soil sampling must be conducted along the line, especially at joints. Historical sludge analyses indicate that potential contaminants were transported through this line.**

Response: See response to General Comment 4.

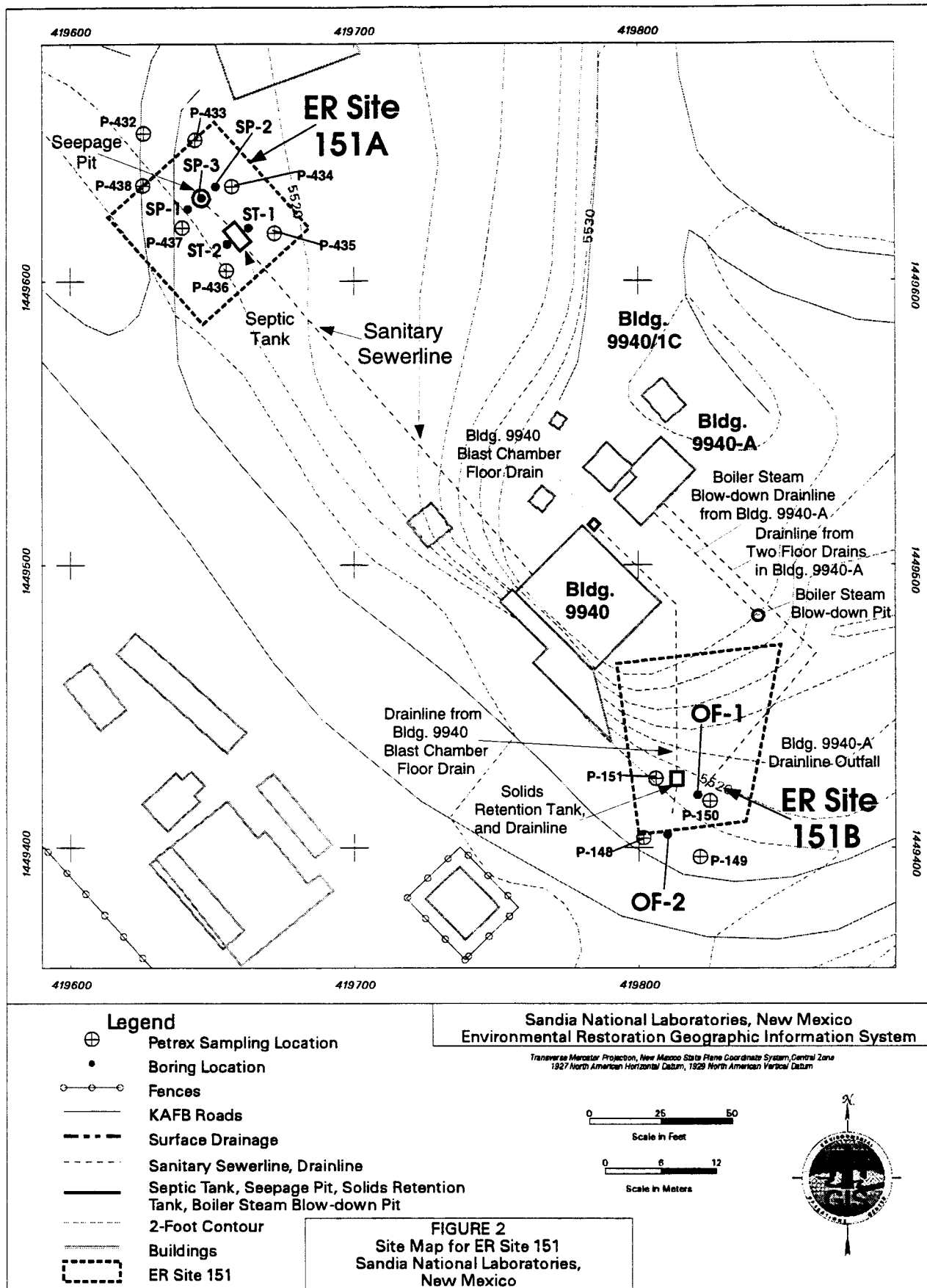
ER Site 160, Building 9832 Septic System

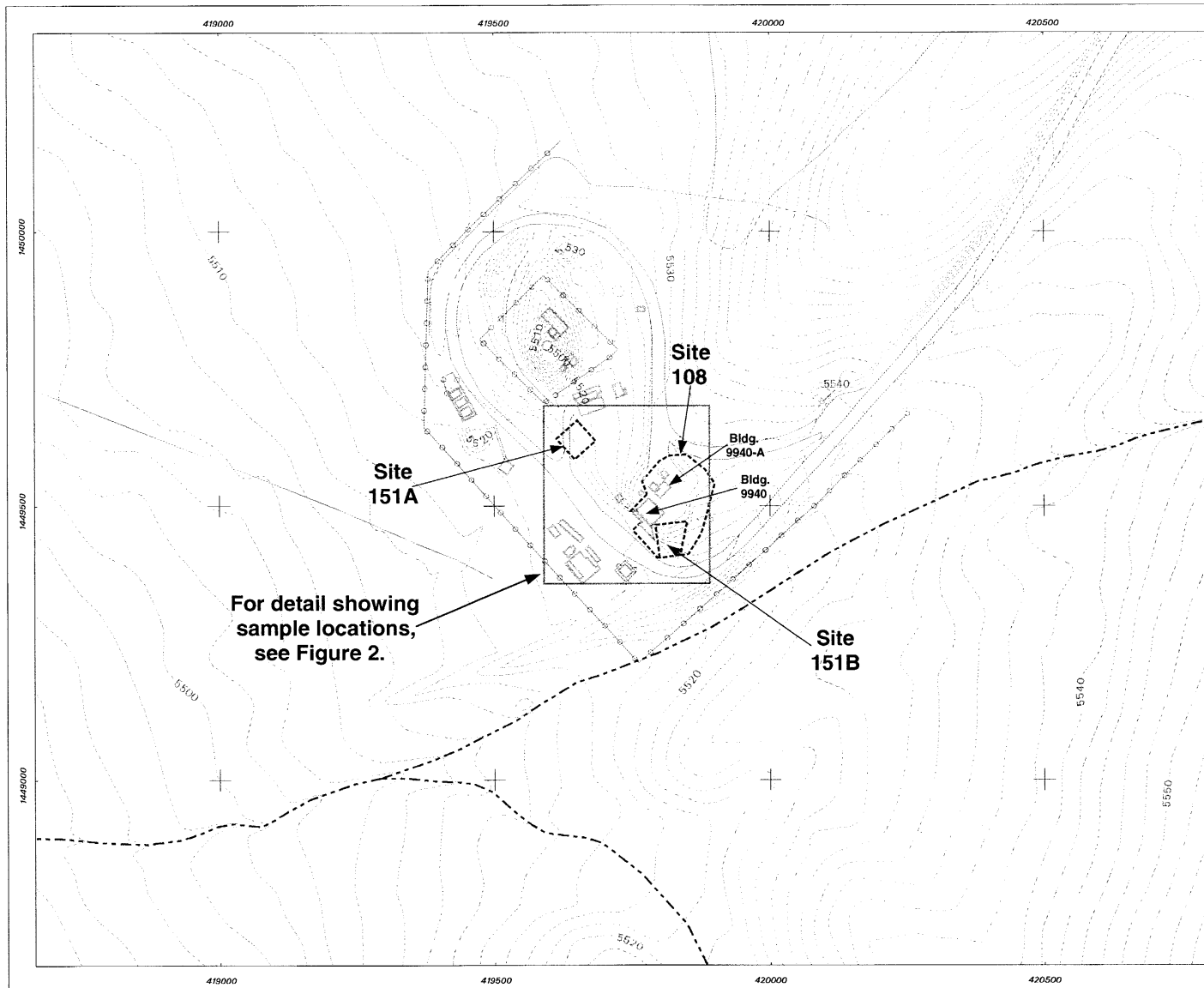
ER Site 160 consists of the catch-box and seepage pit components of the septic system that served Building 9832, the Vehicle Assembly Building for the New Aerial Cable Site. Although the facility was constructed in 1968 and is still in operation, the seepage pit has reportedly not been used since 1981.

Hazardous materials used at ER Site 160 include nitroguanidine, ammonium nitrate, C4, PBX-9404, and PETN. Additionally, although not on the list for this site, chlorinated solvents were probably used, as at other Sandia explosives testing facilities on KAFB. These hazardous materials may have entered the soil column through the bottom of the culvert-lined seepage pit as wash-down from

ATTACHMENT A

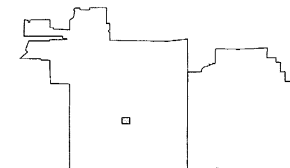
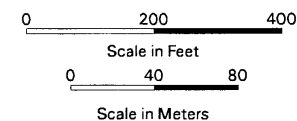
**FINAL SITE MAPS FOR
SWMUs 49, 101, 116, 138, 141, 149, 151, 160, AND 161**





Legend

- Fences
- KAFB Roads
- Buildings
- Detailed Area - Figure 2
- 2-Foot Contour
- Surface Drainage
- ER Site 151



Sandia National Laboratories, New Mexico
Environmental Geographic Information System

Figure 2-A
Site Map for ER Site 151
Showing Drainages and Watercourses
Sandia National Laboratories
New Mexico

Transverse Mercator Projection, New Mexico State Plane Coordinate System,
Central Zone, 1983 North American Horizontal Datum,
1983 North American Vertical Datum



1:2400 MAPID=990007a

Unclassified SNL GIS ORG. 6804

scmorri sm990007a.aml 10/15/98

ATTACHMENT C

**SUMMARY DATA TABLES
SWMUs 101, 141, 151, AND 160**

Table 2

ER Site 151
Summary of Organic and Other Constituents in Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Sample Number	Sample Matrix	Sample Type	Sample Date	Location (Figure 2)	Top of Sample Interval (fbgs)	VOCs Method 8240								SVOCs Method 8270 BEHP	Cyanide Method 9010/9012	TNT Screen (1994 spls.) or EPA 8330 (1998 spls.)	Units
						2-Hexa- Acetone	none	MEK	MIBK	Meth. Chloride	Toluene	Xylenes	Total				
Septic Tank Soil and QA Samples:																	
018132-1,2	Soil	Field	10/17/94	ST-1	12	ND	ND	ND	ND	2.6 B,J	ND	ND	ND	ND	ND	ug/kg	
018133-1,2	Soil	Field	10/17/94	ST-2	12	ND	ND	ND	ND	2.7 B,J	ND	ND	ND	ND	ND	ug/kg	
018134-1	Soil	TB	10/17/94	Site 151	NA	140	ND	54	ND	12 B	9.8	ND	---	---	---	ug/kg	
Seepage Pit Soil Samples, Borings on Each Side of Unit:																	
018128-1,2	Soil	Field	10/13/94	SP-1	15	ND	ND	ND	ND	1.9 B,J	ND	ND	ND	ND	ND	ug/kg	
018129-1,2	Soil	Field	10/13/94	SP-1	25	ND	ND	ND	ND	2.6 B,J	ND	ND	ND	ND	ND	ug/kg	
018130-1,2	Soil	Field	10/13/94	SP-2	15	ND	ND	ND	ND	2.7 B,J	ND	ND	ND	ND	ND	ug/kg	
018131-1,2	Soil	Field	10/13/94	SP-2	25	ND	ND	ND	ND	1.9 B,J	ND	ND	ND	ND	ND	ug/kg	
Seepage Pit Soil Samples, Boring Through Center of Unit:																	
037103-1,2	Soil	Field	1/21/98	SP-3	15	7.6 J,B	ND	ND	ND	2.3 J,B	ND	ND	---	---	ND	ug/kg	
Note: no deep samples in this borehole; refusal occurred at 19-20 fbgs.																	
Solids Retention Tank Outfall Soil and QA Samples:																	
018929-1,2	Soil	Field	1/19/95	OF-1	1	ND	ND	ND	ND	2.6 B,J	ND	ND	ND	ND	ND	ug/kg	
018930-1,2	Soil	Field	1/19/95	OF-1	11	ND	ND	ND	ND	1.9 B,J	ND	ND	ND	ND	ND	ug/kg	
018931-1,2	Soil	Dupl.	1/19/95	OFD-1	11	ND	ND	ND	ND	2.3 B,J	ND	ND	ND	ND	ND	ug/kg	
018932-1,2	Soil	Field	1/19/95	OF-2	1	ND	ND	ND	ND	2.5 B,J	ND	ND	ND	ND	ND	ug/kg	
018933-1,2	Soil	Field	1/19/95	OF-2	11	1.1 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ug/kg	
018934-1	Soil	TB	1/19/95	Site 151	NA	160	7 J	71	5.2 J	4.7 B,J	1.8 J	2 J	---	---	---	ug/kg	
018935-1,2	Water	EB	1/23/95	Site 151	NA	ND	ND	ND	ND	1.5 J	ND	ND	3.4 J	ND	---	ug/L	
Laboratory Reporting Limit for Soil (1994 samples):						10	10	10	10	5	5	5	330	1,000	1,000	ug/kg	
Laboratory Reporting Limit for Soil (1998 samples):						10	5	5	5	5	2	6	---	---	80	ug/kg	
Laboratory Reporting Limit for Water (1994 samples):						10	10	10	10	5	5	5	10	10	NA	ug/L	
Proposed Subpart S Action Level For Soil						8E+06	None	5E+07	4E+06	9E+04	2E+07	2E+08	5E+04	2E+06	4E+04	ug/kg	

Table 2, concluded:

ER Site 151
Summary of Organic and Other Constituents in Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Notes:

B = Compound detected in associated blank sample

BEHP = Bis(2-Ethylhexyl)phthalate

Dupl. = Duplicate soil sample

EB = Equipment blank

fbgs = feet below ground surface

J = Result is detected below the reporting limit or is an estimated concentration.

MEK = Methyl ethyl ketone

Meth. chloride = Methylene chloride

MIBK = Methyl isobutyl ketone,

NA = Not applicable

ND = Not detected

NS = No sample

QA = Quality assurance

SVOCs = Semivolatile organic compounds

TB = Trip blank

ug/kg = Micrograms per kilogram

ug/L = Micrograms per liter

VOCs = Volatile organic compounds

--- Indicates that no sample was collected, or a sample was collected but was not analyzed for the particular analyte.

Table 3

ER Site 151

Summary of RCRA Metals and Hexavalent Chromium in Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Sample Number	Sample Matrix	Sample Type	Sample Date	Sample Location (Figure 2)	Top of Sample Interval (fbgs)	RCRA Metals, Methods 6010 and 7471								Other Metals: Cr ⁶⁺	Units
						As	Ba	Cd	Cr, total	Pb	Hg	Se	Ag	Method 7196	
Septic Tank Soil Samples:															
018132-2	Soil	Field	10/17/94	ST-1	12	2.9	84.2	ND	8.1	ND	ND	ND	ND	ND	mg/kg
018133-2	Soil	Field	10/17/94	ST-2	12	3.1	194	ND	10.2	5.7	ND	ND	ND	ND	mg/kg
Seepage Pit Soil Samples, Borings on Each Side of Unit:															
018128-2	Soil	Field	10/13/94	SP-1	15	2	115	ND	11.4	3.8 J	ND	ND	ND	ND	mg/kg
018129-2	Soil	Field	10/13/94	SP-1	25	2.2	280	ND	8.5	5.3	ND	ND	ND	ND	mg/kg
018130-2	Soil	Field	10/13/94	SP-2	15	2.1	200	ND	14.4	7.1	ND	ND	ND	ND	mg/kg
018131-2	Soil	Field	10/13/94	SP-2	25	1.9	74.6	ND	8.6	ND	ND	ND	ND	ND	mg/kg
Seepage Pit Soil Samples, Boring Through Center of Unit:															
037103-2	Soil	Field	1/21/98	SP-3	15	1.84	89.9	0.424 J	7.39	3.36	ND	ND	0.444 J	ND	mg/kg
Note: no deep samples in this borehole; refusal occurred at 19-20 fbgs.															
Solids Retention Tank Outfall Soil and QA Samples:															
018929-2	Soil	Field	1/19/95	OF-1	1	3.2	75.2	ND	5.1	4.8 J	ND	ND	ND	ND	mg/kg
018930-2	Soil	Field	1/19/95	OF-1	11	2.5	90.5	ND	5.5	4.5 J	ND	ND	ND	ND	mg/kg
018931-2	Soil	Dupl.	1/19/95	OFD-1	11	2.1	43.4	ND	3.2	4.3 J	ND	ND	ND	ND	mg/kg
018932-2	Soil	Field	1/19/95	OF-2	1	3.3	74.1	ND	5.9	4.6 J	ND	ND	ND	ND	mg/kg
018933-2	Soil	Field	1/19/95	OF-2	11	2	84.3	ND	5.6	3.1 J	ND	ND	ND	ND	mg/kg
018935-3	Water	EB	1/23/95	Site 151	NA	ND	ND	ND	ND	ND	ND	ND	ND	NS	mg/L
Laboratory Reporting Limit for Soil (1994 samples)						1	1	0.5	1	5	0.1	0.5	1	0.05 - 0.1	mg/kg
Laboratory Reporting Limit for Soil (1998 samples)						0.485	0.485	0.485	0.485	0.485	0.0329	0.485	0.485	0.195	mg/kg
Laboratory Reporting Limit for Water (1994 samples)						0.01	0.01	0.005	0.01	0.003	0.0002	0.005	0.01	NA	mg/L
Number of SNL/NM Background Soil Sample Analyses *						15	727	1,740	647	536	1,724	2,134	2,302	393	NA
SNL/NM Soil Background Range *						2.1-7.9	0.5-495	0.0027-6.2	0.5-31.4	0.75-103	0.0001-0.68	0.037-17.2	0.0016-8.7	0.02-<2.5	mg/kg
SNL/NM Soil Background UTL or 95th Percentile *						7	214	0.9	15.9	11.8	<0.1	<1.0	<1.0	<2.5	mg/kg
Proposed Subpart S Action Level For Soil						0.50	6,000	80	80,000 **	400 ***	20	400	400	400 **	mg/kg

Table 3, Concluded:

ER Site 151

Summary of RCRA Metals and Hexavalent Chromium in Confirmatory Soil Samples Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Notes:

As = Arsenic. Arsenic background concentrations presented above are based on analyses of subsurface soil samples collected in the Coyote Test Field (CTF) area.

Ba = Barium. Barium background concentrations presented above are based on analyses of subsurface soil samples collected in the Southwest and CTF areas.

Cd = Cadmium. Cadmium background concentrations presented above are based on analyses of subsurface soil samples collected in the North, Tijeras, Southwest, CTF, and Offsite areas.

Cr = Chromium. Chromium background concentrations presented above are based on analyses of subsurface soil samples collected in the Southwest area.

Cr⁶⁺ = Hexavalent chromium. Hexavalent chromium background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

Pb = Lead. Lead background concentrations presented above are based on analyses of subsurface samples collected in the Southwest and Offsite areas.

Hg = Mercury. Mercury background concentrations presented above are based on analyses of subsurface soil samples collected in the North, Tijeras, Southwest, CTF and Offsite areas.

Se = Selenium. Selenium background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the North, Tijeras, Southwest, CTF and Offsite areas.

Ag = Silver. Silver background concentrations presented above are based on analyses of subsurface soil samples collected in the North, Tijeras, Southwest, CTF, and Offsite areas.

Dupl. = Duplicate soil sample

EB = Equipment blank

fbgs = Feet below ground surface

J = Result is detected below the reporting limit or is an estimated concentration.

mg/kg = Milligrams per kilogram

mg/L = Milligrams per liter

NA = Not applicable

ND = Not detected

NS = No sample

QA = Quality assurance

UTL = Upper Tolerance Limit

* IT March 1996

** 80,000 mg/kg is for Cr³⁺ only. For Cr⁶⁺, proposed Subpart S action level is 400 mg/kg.

*** No proposed Subpart S action level for lead in soil. 400 ppm is EPA proposed action level (EPA 1994)

Table 4

ER Site 151
Summary of Isotopic Uranium and Tritium in Composite Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Sample Number	Sample Matrix	Sample Type	Sample Date	Sample Location (Figure 2)	Top of Sample Interval (fbgs)	Isotopic Uranium Method NAS-NS-3050 (pCi/g)									Tritium Method EERF H.01 (pCi/L)		
						U-234 Result	U-234 Error *	U-234 M.D.A.	U-235/ U-236 Result	U-235/ U-236 Error *	U-235/ U-236 M.D.A.	U-238 Result	U-238 Error *	U-238 M.D.A.	Result	Error	M.D.A.
Septic Tank Soil Samples:																	
018132-5	Soil	Field	10/13/94	ST-1	12	0.26	0.07	0.01	0.013	0.013	0.009	0.21	0.06	0.01			
018133-5	Soil	Field	10/13/94	ST-2	12	0.27	0.07	0.01	0.024	0.019	0.009	0.24	0.07	0.01			
Seepage Pit Soil Samples, Borings on Each Side of Unit:																	
018128-5	Soil	Field	10/13/94	SP-1	15	0.56	0.13	0.01	0.031	0.022	0.015	0.46	0.11	0.01			
018129-5	Soil	Field	10/13/94	SP-1	25	0.31	0.08	0.01	0.018	0.015	0.008	0.27	0.07	0.01			
018130-5	Soil	Field	10/13/94	SP-2	15	0.32	0.08	0.01	0.012	0.012	0.008	0.28	0.07	0.01			
018131-5	Soil	Field	10/13/94	SP-2	25	0.27	0.07	0.02	0.024	0.019	0.019	0.35	0.09	0.01			
018128-4	Soil	Compos.	10/13/94	SP-1/2	15										2365	604	806
018129-4	Soil	Compos.	10/13/94	SP-1/2	25										ND	471	818
Seepage Pit Soil Samples, Boring Through Center of Unit:																	
037103-3	Soil	Field	1/21/98	SP-3	15	0.975	0.408	0.415	ND	0.197	0.32	0.502	0.284	0.319			
Note: no deep samples in this borehole; refusal occurred at 19-20 fbgs.																	
Solids Retention Tank Outfall and QA Soil Samples:																	
018929-5	Soil	Field	1/19/95	OF-1	1	0.49	0.19	0.16	0.04 J	0.067	0.12	0.71	0.23	0.17			
018930-5	Soil	Field	1/19/95	OF-1	11	0.86	0.18	0.084	0.017 J	0.03	0.054	1	0.2	0.06			
018931-5	Soil	Dupl.	1/19/95	OFD-1	11	0.86	0.25	0.11	0.028	0.065	0.12	0.93	0.27	0.13			
018932-5	Soil	Field	1/19/95	OF-2	1	0.76	0.17	0.066	0.018 J	0.027	0.043	0.7	0.16	0.051			
018933-5	Soil	Field	1/19/95	OF-2	11	0.7	0.16	0.084	0.038 J	0.049	0.08	0.82	0.18	0.09			
018935-6	Water	EB	1/23/95	Site 151	NA	0.067 J	0.058	0.083	0.015 J	0.033	0.062	0.05	0.052	0.079			
018929-3	Soil	Field	1/19/95	OF-1/2	1										230	140	220
018930-3	Soil	Field	1/19/95	OF-1/2	11										ND	140	230
Number of SNL/NM Background Soil Sample Analyses **						14			283			90			U		
SNL/NM Soil Background Range **						0.44-5.02			0.004-3			0.153-2.3			U		
SNL/NM Soil Background 95th Percentile **						1.6			0.16			1.4			U		
Nationwide Tritium Range in Precipitation and Drinking Water ***						NA			NA			NA			100-400		

Table 4, concluded:

ER Site 151
Summary of Isotopic Uranium and Tritium in Composite Confirmatory Soil Samples
Collected Around the Septic Tank, Seepage Pit, and Solids Retention Tank Outfall

Notes:

U-234 = Uranium 234. Uranium 233/234 background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

U-235 = Uranium 235. Uranium 235 background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

U 236 = Uranium 236

U-238 = Uranium 238. Uranium 238 background concentrations presented above are based on analyses of surface and subsurface soil samples collected in the Southwest area.

Compos. = Composite

D.L. = Detection limit

EB = Equipment blank

fbgs = Feet below ground surface

J = Result is detected below the reporting limit or is an estimated concentration.

ND = Not detected

pCi/g = Picocuries per gram

U = Undefined for SNL/NM soils

* Error = ± 2 sigma uncertainty

** IT March 1996

*** EPA October 1993