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Statement of Basis Approval of No Further Action Volume 3 of 30 January 2000 ER Site 77 Operable Unit 1309 Round 2

Sandia National Laboratories/NM

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Approval of No Further Action
Volume 3 of 30

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ER Site 77
Operable Unit 1309
Round 2

(RCRA Permit No. NM5890110518)

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

Environmental Restoration Project

United States Department of Energy
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1. Introduction

1.1 ER Site Identification Number and Name

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a confirmatory sampling no further action (NFA) decision for Environmental Restoration (ER) Site 77, Oil Surface Impoundment Site, Operable Unit (OU) 1309. ER Site 77 is listed in the Hazardous and Solid Waste Amendment (HSWA) Module IV (EPA August 1993) of the SNL/NM Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Facility Permit (NM5890110518) (EPA August 1992).

1.2 SNL/NM Confirmatory Sampling NFA Process

This proposal for a determination of a confirmatory sampling NFA decision has been prepared using the criteria presented in Section 4.5.3 of the SNL/NM Program Implementation Plan (SNL/NM February 1994). Specifically, this proposal will "contain information demonstrating that there are no releases of hazardous waste (including hazardous constituents) from solid waste management units (SWMU) at the facility that may pose a threat to human health or the environment" (as proposed in the code of Federal Regulations [CFR], Section 40 Part 264.51[a][2]) (EPA July 1990). The HSWA Module IV contains the same requirements for an NFA demonstration:

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

This unit is eligible for an administrative NFA proposal based on one or more of the following criteria taken from the RCRA Facility Assessment Guidance (EPA October 1986):

Criterion A: The unit has never contained constituents of concern

Criterion B: The unit has design and/or operating characteristics that effectively prevent releases to the environment

Criterion C: The unit clearly has not released hazardous waste or constituents into the environment

Specifically, ER Site 77 is being proposed for an NFA decision because the unit clearly has not released hazardous waste or constituents into the environment. (Criterion C).

This proposal is using a technical approach which is the foundation for the SNL/NM corrective action process. The details of the SNL/NM technical approach are provided in Appendix C of the SNL/NM Program Implementation Plan (SNL/NM 1994). The first step in the technical approach is the data qualitative review step (the same step used to determine whether the SWMU is eligible for administrative-type NFA). Should significant uncertainities remain, the assessment of the SWMU continues with data collection. At this site, sufficient data were not available to compare to established action levels or to develop site-specific action levels. Site-specific data were collected and results indicated no contamination, which triggered this NFA proposal for Site 77.

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, the State of New Mexico, and the Isleta Indian Reservation. SNL/NM has been involved in nuclear weapons research, component development, assembly, testing, and other nuclear activities since 1945.

ER Site 77 is located on land owned by DOE. The site is situated outside the Technical Area (TA) IV fence, southeast of Building 981-1 (Figure 1).

Surficial deposits in the SNL/KAFB area lie within four geomorphic provinces which in turn contain nine geomorphic subprovinces. Site 77 lies within the Tijeras Arroyo subprovince. The Tijeras Arroyo subprovince is characterized by broad, west-sloping alluvial surfaces and the 50-meter-deep Tijeras Arroyo. The Tijeras Arroyo subprovince contains deposits derived from many sources, including granitic and sedimentary rocks of the Sandia Mountains, sedimentary and metamorphic rocks of the Manzanita Mountains, and sediments of the Upper Santa Fe Group.

2. History of the SWMU

2.1 Sources of Supporting Information

In support of this request for a confirmatory sampling NFA decision for ER Site 77, a background study was conducted to collect available and relevant site information. Interviews were conducted with Sandia National Laboratories/New Mexico (SNL/NM) staff and contractors familiar with site operational history.

The following information sources were available for the use in the evaluation of ER Site 77:

- Confirmatory-sampling program conducted in September 1994
- Interviews and personnel correspondence
- Historical aerial photographs spanning 40 years
- The Comprehensive Environmental Assessment and Response Program (CEARP) Phase I (DOE September 1987)
- The RCRA Facility Assessment (RFA) report (EPA April 1987)

2.2 Previous Audits, Inspections, and Findings

ER Site 77 was first listed as a potential release site based on the Comprehensive Environmental Assessment and Response Program (CEARP) interviews in 1985 (DOE September 1987). The Comprehensive Environmental Response, Compensation, and Liability Act finding was inconclusive for Federal Facility Site Discovery and Identification Findings, Preliminary Assessment, and Site Inspection; therefore, no Hazard Ranking System or Modified Hazard Ranking System migration mode scores were calculated for the SWMU (DOE September 1987). Subsequent to the CEARP inspection, the U.S. Environmental Protection Agency (EPA) conducted a RCRA Facility Assessment (RFA) in 1987 (EPA April 1987). Site 77 was included in the RFA report.

2.3 Historical Operations

The surface impoundment was constructed in the 1970s. It still is used to catch waste water from accelerators in TA-IV by gravity flow through underground piping after oil has been removed by an oil/water skimmer. At the time of the RFA (April 1987), the impoundment was unlined, approximately 15 feet deep with dimensions of 75 feet x 75 feet. Since then the impoundment was drained and soil samples were collected and analyzed for PCBs and solvents. Subsequently, the impoundment was lined with geotextile and is now regulated under Sandia's Surface Water Discharge Program.

3. Evaluation of Relevant Evidence

3.1 Unit Characteristics

The outer sidewalls are graded to prevent run-on. During a visual site Inspection in 1987, there were no signs that the impoundment was overtopping and three feet of freeboard was observed (EPA April 1987).

3.2 Operating Practice

According to the RFA, the oil/water skimmer has a concrete secondary containment system below it. Any leaks from the skimmer are routed back to the concrete sump therefore theoretically eliminating the possibility that oil could reach Site 77 (EPA April 1987).

3.3 Presence or Absence of Visual Evidence

During a visual site inspection in 1987 when the impoundment was unlined, an oil sheen was noticed on the water. During site visits in February, August, and September 1994, after the liner was installed, no oil sheen was observed on the water.

3.4 Results of Previous Sampling/Surveys

In 1987, while preparing to install a liner, soil samples were collected and analyzed for polychlorinated biphenyls (PCBs) and solvents after the impoundment was drained and soil

along the outside of the impoundment was removed. Results indicated that the impoundment was clean. Documentation of these samples and analyses has not been found.

3.5 Assessment of Gaps in Information

No recent environmental sampling data exist for Site 77. To confirm the previous data, a surface (0-6 inches) and shallow subsurface (6-36 inches) soil sampling program was developed and implemented in September 1994. The constituents of concern are PCBs and volatile organic compounds (VOCs). If PCB contamination is present, it is expected to be immobile and on the soil surface or in the shallow subsurface. If VOC contamination is present, it is expected to be detected in the shallow subsurface.

3.6 Confirmatory Sampling

Four surface and four shallow subsurface samples were collected in September 1994. The samples were collected along the sidewalls of the existing lined pond, two on each side (Figure 1) and analyzed for PCBs. The subsurface soil samples were also analyzed for VOCs. The Confirmatory Sampling and Analysis Plan (SAP) can be found in Appendix A. A photoionization detector, OVM, was used throughout the field program and no anomalous readings were detected. No PCBs were detected. No VOCs were detected at concentrations above the laboratory reporting limit. The results are summarized in Table 1; the quality assurance sample results for the 11-site sampling program are presented in Appendix B.

3.7 Rationale for Pursuing a Confirmatory Sampling NFA Decision

SNL/NM is proposing an NFA for Site 77 because analyses of confirmatory samples collected along the walls of the existing lined lagoon indicate no PCB and VOC contamination. Also, since the unit was lined in 1987, several site visits in 1993 and 1994 have confirmed that an oil sheen is absent on the surface water.

4. Conclusion

Based upon the evidence cited above, ER Site 77 clearly has not released hazardous waste or constituents into the environment. Therefore, ER Site 77 is recommended for an NFA determination.

5. References

5.1 ER Site References

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

5.2 Reference Documents

Sandia National Laboratories/New Mexico (SNL), February 1994. Draft "Program Implementation Plan for Albuquerque Potential Release Sites," Sandia National Laboratories, Albuquerque, New Mexico.

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

Sandia National Laboratories/New Mexico (SNL/NM), August 1994. Environmental Restoration Project Information Sheet for Site 77, Oil Surface Impoundment, Sandia National Laboratories, Albuquerque, New Mexico.

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

U.S. Environmental Protection Agency (EPA), August 1993. "Module IV of RCRA Permit No. NM 5890110518, EPA Region VI," issued to Sandia National Laboratories, Albuquerque, New Mexico.

U.S. Environmental Protection Agency (EPA), August 1992. "Hazardous Waste Management Facility Permit No. NM5890110518, EPA Region VI," issued to Sandia National Laboratories, Albuquerque, New Mexico.

5.3 Aerial Photographs

Ebert & Associates, Inc., November 1994, "Photo-Interpretation and Digital Mapping of ER Sites 7,16,45,228 from Sequential Historical Aerial Photographs".

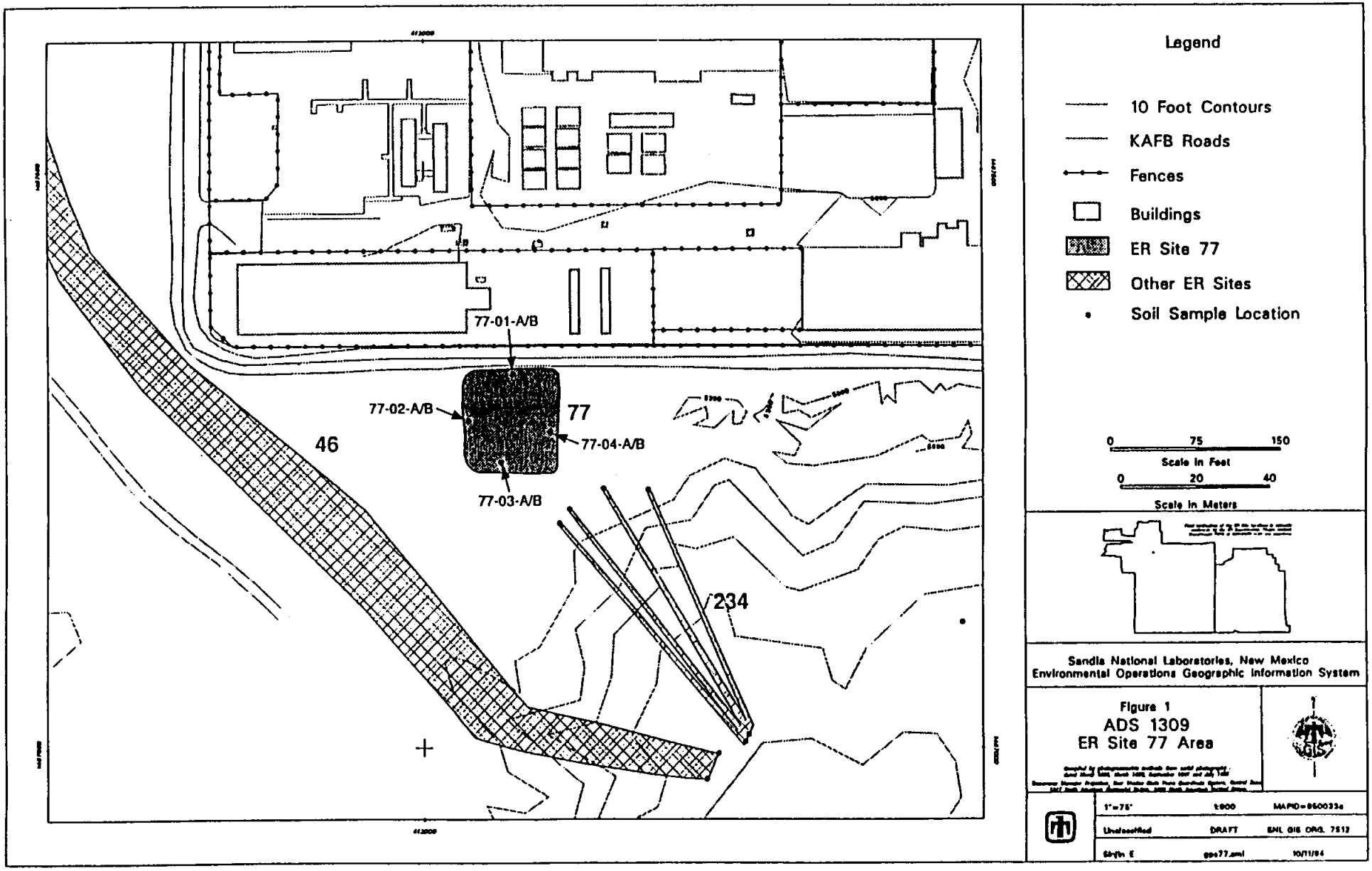

Figure 1. Oil Surface Impoundment Site 77

Table 1. Site - 77 Results of Shallow Soil Sampling and Analysis

Sample Identifier	Analytical Method	Constituent	Concentration (mg/kg)	Qualifiers[1,2]
77-01-B	VOCs (8240)	2-butanone	0.004	JB
77-02-B	VOCs (8240)	2-butanone	0.005	JB
77-03-B	VOCs (8240)	2-butanone	0.004	JB
77-04-B	VOCs (8240)	2-butanone	0.005	JB

Notes

[1]A "J" qualifier means detected at a concentration below the laboratory reporting limit.

[2]A "B" qualifier means detected in the associated blank sample.

APPENDIX A

Confirmatory Sampling and Analysis Plan

APPENDIX B

Quality Assurance Results

SAMPLING AND ANALYSIS PLAN FOR ELEVEN SITES IN TIJERAS ARROYO OPERABLE UNIT SANDIA NATIONAL LABORATORIES/ NEW MEXICO

Sampling and Analysis Plan for Eleven Sites in Tijeras Arroyo Operable Unit

Introduction

The purpose of the sampling and analysis described in this plan is to determine the appropriate way to proceed toward closure of 11 (of the 17) sites in the Tijeras Arroyo Operable Unit. Based on the surface and shallow subsurface soil samples and analyses for the constituents of concern (COCs), one of three approaches will be pursued for each site:

1. A petition for "No Further Action" (NFA) will be produced for regulatory consideration;
2. A voluntary corrective measure (VCM) will be designed and implemented, hopefully followed by an NFA petition; or
3. The site assessment and eventual closure will follow the standard RFI/CMS path

Most of the sites covered by this Sampling and Analysis Plan (SAP) are outfalls from the storm water and sanitary sewer systems emanating from Sandia Technical Areas (TAs) I, II, and IV. The general sampling program for the outfalls will be to collect four samples at the head of the outfall, two samples of surface soil (0 to 6 inches deep) and two samples of shallow subsurface soil (18 to 36 inches deep) and four samples (two surface soil and two shallow subsurface soil) at the furthest extent of channel erosion and scour. The analytes for most of the samples are volatile organic compounds, semi-volatile organic compounds (BNAs), metals, chromium^{+6} for samples where chromium is found in a metals analysis, total petroleum hydrocarbon (TPH), explosives, Total Kjeldahl Nitrogen (TKN), nitrate/nitrite, and Gamma Spectroscopy for radionuclides, isotopic uranium, isotopic plutonium, tritium, and chlorodiphenyls (PCBs).

Sampling Procedures and Volumes

Surface soil samples will be collected with a stainless steel scoopula or trowel and placed in a stainless steel bowl. After at least 1000 ml[1] of soil has been collected, the soil will be thoroughly mixed in the bowl and transferred to two or three 500-ml sample bottles with a stainless steel scoopula. Sample bottles will be labeled accordingly and the appropriate sample information (sample depth, collection date and time, etc.) will be documented on the chain-of custody (COC) after each sample is collected. Samples will then be packaged and cooled to 4 degrees Celsius.

Shallow subsurface soil samples (18-36 inches) will be collected with a 2-inch (minimum) hand auger. A soil sample is collected by turning the auger clockwise and advancing it into the ground until the bucket at the end of the auger (last 6-8 inches) is full of soil or refusal occurs. Several runs with the auger is anticipated in order to obtain the appropriate volume. A hand shovel may also be used to bypass large rocks in order to continue with the auger. The auger is then extruded counter-clockwise from the ground and the soil is removed from the auger and placed in a stainless steel bowl. After 1,125[2] ml of soil has been collected, the soil will be mixed in the bowl and transferred to two or three 500-ml sample bottles and one 125-ml sample bottle with a stainless steel scoopula. Sample bottles will be labeled accordingly and the appropriate sample information will be documented on the COC after each sample is collected. Samples will then be packaged and cooled to 4 degrees Celsius.

Waste Generation and Equipment Decontamination

Decontamination of sampling equipment will be done between each sample. Decontamination will

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[1]The sample volume varies between 1,000 and 1,500 ml depending on the analyses for the sample.

[2]The sample volume varies between 1,125 and 1,625 ml depending on the analyses for the sample.

include thoroughly washing the inside and outside of the sampling equipment with a spray of ALCONOX™ or LIQUINOX™ and water; rinsing with distilled, deionized water; and drying before reusing. No soil waste will be generated. The soil removed from the hand-auger holes, while collecting samples at a depth of 18 to 36 inches, will be return to the hole. The sampling tools, which are scoopulas/trowels, hand-augers, and shovels, will be decontaminated with water and ALCONOX™ after each use. The decon leachate will be stored in capped 1-gallon containers. One or two containers will be used for each site and two to four containers will be used for the background samples. The containers will be labeled as "IDW" and the site number identified on each container. All the containers will be stored at Site 232, a central location. The leachate waste will be disposed according to the analytical results of the soil samples collected at the site.

Site Descriptions

The sites that will be sampled are

- Site 46, Old Acid Waste Line Outfall;
- Site 50, Old Centrifuge Site;
- Site 77, Oil Surface Impoundment;
- Site 227, Bldg. 904 outfall;
- Site 229, Storm Drain System Outfall;
- Site 230, Storm Drain System Outfall;
- Site 231, Storm Drain System Outfall;
- Site 232, Storm Drain System Outfall;
- Site 233, Storm Drain System Outfall;
- Site 234, Storm Drain System Outfall; and
- Site 235, Storm Drain System Outfall.

The site locations are shown in Figure 1. A description of the site history, conditions, previous investigations, and sampling plans are described in the following sections.

Site 46: Acid Waste Line Outfall

The Old Acid Waste Line carried wastes from several buildings in TA I. The waste line begins as a north-south trending, 750-feet long open trench in a grassy field northwest of Building 981-1 in TA IV. No pipe opening is visible at the "head" of the trench. As the trench crosses the field, it turns to the southeast and continues to a non-engineered spillway at the edge of Tijeras Arroyo. The spillway lies on a bank (40 to 50 feet of relief) composed of compacted alluvial sediment. Historical aerial photographs show vegetation, presumably supported by the discharge, growing southeast of the spillway to the active arroyo channel (about 200 feet distance from the spillway). The site is not restricted and is easily accessible.

During use, discharged effluent averaged an estimated 130,000 gallons per day. Use of the line has been discontinued. The line received wastes from plating, etching, and photo processing operations, and cooling tower "blow down". Acids and metals are target contaminants. Chromic acid and ferric chloride are mentioned specifically in the site history, and ferric chloride was found in the soils during a limited sampling event. Various radionuclides, possibly including tritium, uranium, and plutonium were used in TA I.

Building 863 was a source of discharge to the Acid Line. The information sheet for ER Site 98 (Building 863, TCA Photochemical Release: Silver Catch Boxes) indicates the presence of trichloromethane, silver, and photo-processing chemicals with an ammonia-like odor. The waste solution from the silver recovery unit reportedly was discharged to the Old Acid Waste Line, which is the only specific information about chemical discharges.

The site has been visually surveyed for surface indications of unexploded ordnance and high explosives (UXO/HE). No UXO/HE were found. Also, a surface radiation survey was conducted on the entire

site. No surface radiation anomalies were detected.

The sampling program includes four samples collected at the "head" of the site outfall (by the fire extinguisher training area west of TA IV) and four samples collected by the spillway into the Tijeras Arroyo drainage (Figure 1). Every sample will be analyzed for tritium, metals, chromium[6] (if chromium is detected), TKN, and nitrate/nitrite. Half the samples will also be analyzed for semi-volatiles and cyanide. Additionally, all the subsurface samples will be analyzed for volatiles. The analytes are listed in Table 1. A "4" on the table indicates that ALL the samples will be analyzed for that specific analyte whereas a "2" on the table indicates half the samples will have additional analyses for the analyte listed.

Site 50: Old Centrifuge

Site 50, Old Centrifuge, was an outdoor, rocket propelled centrifuge that was used in the early 1950s to test units under G forces. The facility is located east of the TA II fence in a slight depression on top the escarpment northwest of Tijeras Arroyo. The concrete centrifuge pad has a diameter of 80 to 90 feet. The site has a 7-foot high wooden retaining wall on the north, east, and south sides. The west side is open. The centrifuge arm assembly, which has a 20-foot radius, is sitting outside the wall to the north and appears to be intact. Control wiring to the center axis of the centrifuge was suspended from a cable between two telephone poles on the north and south side of the pad. The control wiring went to a bunker located to the southwest over the escarpment. The bunker had a electrical transformer containing PCB. The electrical transformer has been removed. The pad was not stained and no spills or leaks were reported.

The centrifuge was rocket driven by two T40 6-KS-3000 or two Deacon 3.5DS-5700 solid rocket motors. The combustion byproducts produced by these rocket motors were carbon dioxide, carbon monoxide, water, hydrochloric acid, aluminum oxide, and possibly barium oxide. No other HE is known or suspected at the site. The rocket orientation would expel combustion byproducts towards the retaining wall and the opening to the west. The rocket propellant would be consumed in the rocket motor case. Under normal operating conditions, no unburned propellant would be released.

In 1987, a reconnaissance investigation at five potential contaminated sites, including the Old Centrifuge Site, was conducted by the ER Project. Samples were analyzed for uranium, TNT, HSL inorganics, TCLP constituents, and EP Toxicity constituents. Metals, including barium, were detected at concentrations well below regulatory action levels. Total uranium concentrations were typical of area background levels. TNT, pesticides, PCBs, herbicides, and semi-volatiles TCLP compounds were not detected.

Prior to sampling, the surface will be surveyed for radiation. If contamination exists, it is expected to be around the edge of the centrifuge pad at the surface, probably along the open west side. The constituents of concern are metals (specifically lead, beryllium, and barium), depleted uranium, and high explosives. Four surface samples and four subsurface samples will be collected. The sampling locations will be biased toward the west side of the site because that is the open side (Figure 1). All surface samples will be analyzed for all the COCs. One-half of the subsurface samples will be analyzed for uranium and high explosives. All four subsurface samples will be analyzed for metals.

Site 77: Oil Surface Impoundment

The Oil Surface Impoundment Site is outside the TA IV fence, southeast of Building 981-1. The surface impoundment, which was constructed in the 1970's, is used to catch waste water from accelerators. At the time of the RCRA facilities environmental survey, the impoundment was unlined. Since then the impoundment was drained. Soil samples were analyzed for PCBs and solvents. Based on the analytical results, the impoundment was determined to be clean. Subsequently, the impoundment was lined with geotextile and is now regulated under Sandia's Surface Water Discharge Program.

This site will not require UXO/HE or radiation surface surveys. Minimal confirmation sampling and analysis is proposed to verify that the site is clean. Three surface and three shallow subsurface samples are proposed. The samples will be collected along the perimeter of the existing lined pond (Figure 1). All the samples will be analyzed for PCBs. The subsurface soil samples also will be analyzed for volatile organic compounds (Table 1).

Site 227: Bunker 904 Outfall

Site 227 is an inactive outfall from the septic system for Building 904 (ER Site 48) in TA II. The site starts where the discharge exits the septic tank piping system, approximately 100 feet northeast of the southernmost point of TA II. The extent of the area influenced by the discharge may include the bank of Tijeras Arroyo below the outfall and some area between the outfall and the main channel of Tijeras Arroyo. The site is along the eastern edge of ER Site 45.

Building 904, built in 1948, was used for weapons assembly, HE testing, photo processing, and various other testing. Sanitary wastes were discharged to a septic tank, and other wastes were discharged to the outfall.

Mineral oil is also being considered a potential soil contaminant at all outfalls along the Tijeras Arroyo due to a recent release (June 1994) of mineral oil at Outfall 232 and vague historical records.

Possible soil contaminants are explosives, radioactive materials from weapons processing, including tritium, uranium, and plutonium, solvents (acetone, methylene chloride, methyl ethyl ketone, carbon tetrachloride, toluene, xylene, hexane, alcohols), and inorganics (ammonium hydroxide, barium, cadmium, silver, chromium, titanium, cyanide).

Access to this site is along the TA II perimeter road. This site is within the TA II testing exclusion zone. The best days to sample are generally Friday, Saturday, and Sunday, when testing ceases. Bruce Berry (telephone 845-8018) must be contacted to gain permission and access to this site. Prior to sampling

1. tumbleweeds will be cleared from locations to be sampled and placed adjacent to the drainage;
2. these locations will be visually scanned for UXO/HE; and
3. these locations will be screened for surface radiation anomalies.

The proposed sampling program is to collect four surface soil samples and four shallow subsurface samples. Two surface and two subsurface samples will be collected at the outfall. The other two surface and two subsurface samples will be collected at the furthest visible channel erosion and scour (Figure 1). The analytes are listed in Table 1.

Sites 229 - 235: Storm Drain Systems Outfalls

These sites consist of the discharge areas at seven outfalls along the northern embankment of Tijeras Arroyo. The outfalls discharged industrial effluent and storm water from TAs I, II, and IV. Presently they only discharge storm water. The outfalls receive runoff from Site 96 (Storm Drain System) and other engineered drain systems within the three TAs. The sites are along approximately ¾ miles of the embankment.

The specific constituents in the industrial effluent at these sites are not known. The possible discharged contaminants include chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, and other petroleum products. To cover this array of possible contaminants, soil samples will be analyzed for volatiles (subsurface samples only), semi-volatiles, metals and chromium^{+6}, if chromium is found in the metals analysis.

Mineral oil is also being considered a potential soil contaminant at all outfalls along the Tijeras Arroyo

due to a recent release (June '94) of mineral oil at Outfall 232 and vague historical records. Therefore, soil samples will also be analyzed for TPH.

At Sites 229 through 234, prior to sampling

1. tumbleweeds will be cleared from locations to be sampled and placed adjacent to the drainage;
2. these locations will be visually scanned for UXO/HE; and
3. these locations will be screened for surface radiation anomalies.

Site 229 is due east of the footings of the old guard tower and the south "corner" of the TA II fence. It discharges near the top of the embankment through the center of ER Site 45. Access to this site is along the TA II perimeter road. This site is within the TA II testing exclusion zone. The best days to sample are generally Friday, Saturday, and Sunday, when testing ceases. Bruce Berry (telephone 845-8018) must be contacted to gain permission and access to this site. Because this site discharges from TA II, various radionuclides, possibly including tritium, uranium, and plutonium are of concern. Four surface soil and four subsurface soil samples will be collected at this site (Figure 1). The analytes are listed in Table 1.

Site 230 is west of Building 970 in TA IV. A drain pipe discharges into a bowl-shaped concrete structure adjacent to Building 970A. Flow from this structure is directed to a drain and flume located approximately 120 feet further west. The flume carries the flow to a discharge point slightly above the base of the arroyo embankment. Doug Bloomquist (845-7455) must be contacted to ensure that no laser testing is being performed in the area. Four surface soil and four subsurface soil samples will be collected at this site (Figure 1). The analytes are listed in Table 1.

Site 231 is west of Building 970 in TA IV. A drain pipe discharges to a concrete flume near the top of the embankment. The flume carries the flow to a discharge point near the base of the slope. Doug Bloomquist (845-7455) must be contacted to ensure that no laser testing is being performed in the area..Four surface soil and four subsurface soil samples will be collected at this site (Figure 1). The analytes are listed in Table 1.

Site 232 consists of two outfalls. One outfall is south of Building 970A, east of the lined lagoon. A drain pipe discharges to a concrete flume near the top of the embankment. The flume carries the flow to at discharge point near the bottom of hillside. On June 1, 1994, about 150 to 350 gallons of mineral oil was spilled into this outfall through the storm water drain by building 986. The day after the spill the site was screened for radiation and UXO/HE. No surface radiation anomalies or UXO/HE were found. Also, four surface soil and four subsurface soil samples were collected. The samples were sent to Quintera Laboratory in Denver for analysis for organics, metals, chromium^{+6}, and gamma spec. Other than TPH from the mineral, no contaminants were detected. A Voluntary Corrective Measure was conducted in July and August to remove soil contaminated with mineral oil above 100 mg/kg of TPH.

The second outfall in Site 232 also is south of Building 970A, west of lined lagoon, and approximately 120 feet east of the other Site 232 outfall. Discharge occurs from a concrete structure opening near base of embankment. Access to the site is along the road outside the south side of TA IV. Four surface soil and four subsurface soil samples will be collected at this drainage Figure 1). The analytes are listed in Table 1.

Site 233 is south-southwest of Building 986. Near the top of an escarpment, a small metal drain pipe discharges to an open drain which directs flow within another pipe before discharging near the base of the hillslope. Access to the site is along the road outside the south side of TA IV. Four surface soil and four subsurface soil samples will be collected at this site (Figure 1). The analytes are listed in Table 1.

Site 234 is southeast of Building 981I (Inflatable Building) and a lagoon impoundment (Site 77). The site discharges into a steep-sided, deeply incised channel cut into the hillside. The drainage channel splits

directly uphill of a tree. Access to the site is along the road outside the south side of TA IV. Both channels will be sampled. Six surface soil and six subsurface soil samples will be collected at this site (Figure 1). The analytes are listed in Table 1.

Site 235 is immediately downstream of a large concrete spillway on the northeast side of Pennsylvania and south of the Skeet Range, at the point where the road comes off the north bank of the arroyo and descends into the channel. The flow moves in a confined channel after dropping down the spillway. The site has been cleared for visible surface UXO/HE and screened for surface radiation with no anomalies detected. This channel is considerably larger than the other outfall sites. Six surface soil and six subsurface soil samples will be collected at this site (Figure 1). The analytes are listed in Table 1.

Background

Background soil concentrations for organic contaminants should be negligible. Background concentrations for total metals and radionuclides must be determined for comparison to concentrations found at the sites. Twelve locations have been identified to collect samples for background determination (Figure 1). At each of these sites, one sample will be collected at a depth of 0-6 inches and a second sample collected at 18-36 inches (Table 1).. In addition, the background study report prepared by International Technology Corporation (May 1994) will also be used to evaluate the data.

Quality Assurance

As shown in Table 1, quality assurance samples will include the following:

- Field "duplicates" on more than 10 percent of the samples. These samples will be collected adjacent to the original surface soil sample and in the same hole as the original subsurface soil sample;
- Field soil blanks for more than 10 percent of the VOC analyses. These sample will be obtained from Sample Management Office (SMO) and will contain no VOCs; and
- One rinsate blank. All rinsate will be composited in one container. A sample of the rinsate will be analyzed for all constituents. The disposal method for the rinsate will be determined by the analytical results on this sample.

Table 1. List of Analytes - Tijeras Arroyo Outfall Sampling and Analysis Plan

			Surface Soils															Subsurface Soils													
Site	Site Name	Potential Contaminants	Number of Samples	BNAs (8270)	TAL Metals (6010/7000)	Cr^{+6} (aqueous leaching)	Cyanide (acid digestion)	TPH (8015)	Explosives Res (8330)	TKN (acid digestion)	NO_3/NO_2 (353.2)	Gamma Spec (In-House) 600 901.1	Gamma Spec (Off-site) 600 901.1	PCBs (8080)	Tritium (600 906.0)	Isotopic Plutonium (600 7-79-081)	Isotopic Uranium (HASL-300 4.5)	Number of Samples	VOCs (8240)	BNAs (8270)	TAL Metals (6010/7000)	Cr^{+6} (aqueous leaching)	Cyanide (acid digestion)	TPH (8015)	Explosives Res (8330)	TKN (acid digestion)	NO_3/NO_2 (353.2)	Gamma Spec (In-House) 600 901.1	Gamma Spec (Off-site) 600 901.1	PCBs (8080)	Tritium (600 906.0)	Isotopic Plutonium (600 7-79-081)	Isotopic Uranium (HASL-300 4.5)
46	Old Acid Waste Line Outfall (Tijeras Arroyo)	Ferric chloride, chromic acid and other acids, ammonia, photo processing chemicals and other unknown chemicals	4	2	4	4	2			4	4	4	2		4	2	2	4	4	2	4	4	2			4	4	4			4	2	2
50	Old Centrifuge Site (TA-2)	Rocket propellant and residues	4		4				4			2			2	1	2	4			4				2						1		1
77	Oil Surface Impoundment	Solvents and PCBs	4											4				4	4											4			
227	Bldg. 904 outfall (TA-2)	High explosives, radioactive materials, nitrate, toluene, methanol, other solvents, carbon tetrachloride, ammonium hydroxide, barium, cadmium, silver, chromium, titanium, cyanide	4	2	4	4	2	2	2	4	4	4	2		4	2	2	4	4	2	4	4	2	4	2	4	4	4			4	2	2
29	Storm Drain System Outfall	Chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, other petroleum products	4	2	4	4		4				4	2		4	2	2	4	4	2	4	4		4				4			4	2	2
30	Storm Drain System Outfall	Chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, other petroleum products	4	2	4	4		4				2			2	1	1	4	4	2	4	4		4				2					
31	Storm Drain System Outfall	Chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, other petroleum products	4	2	4	4		4				2			2	1	1	4	4	2	4	4		4				2					
32	Storm Drain System Outfall	Chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, other petroleum products	4	2	4	4		4				2			2	1	1	4	4	2	4	4		4				2					
33	Storm Drain System Outfall	Chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, other petroleum products	4	2	4	4		4				2			2	1	1	4	4	2	4	4		4				2					
34	Storm Drain System Outfall	Chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, other petroleum products	6	3	6	6		6				2			2	1	1	6	6	3	6	6		6				2					
35	Storm Drain System Outfall	Chromates, antifoulants, chromium, sodium hydroxide, hydrochloric acid, chromosulfuric acid, diesel, other petroleum products	4	2	4	4		4				2			2	1	1	4	4	2	4	4		4				2					
a	Background		12		12							12			3	3	3	12			12							12			3	3	3
A	Duplicates	Na		2	5	4	1	4	1	1	1		1	1			2		5	2	5	4	1	4	1	1	1			1			1
A	Field Soil Blank	Na																	5														
A	Rinsate	Na		1	1	1	1	1	1	1	1	1	1	1	1	1	1		1		1												
	Totals		58	22	60	43	6	37	8	10	10	39	8	6	30	17	20	58	63	21	60	42	5	38	5	9	9	36		5	16	9	11
	Totals - Surface Plus Subsurface		116	43	120	86	11	75	13	19	19	78	8	11	46	26	31		63														

* Analyze for Cr^{+6} only if Cr is detected in metals analysis

APPENDIX B

Quality Assurance Results

Quality Assurance Results for Organic Constituents

Sample Identifier	Sample Type	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Chrysene	Di-n-octyl phthalate	Fluoranthene	Methylene Chloride	Phenanthrene	Pyrene	Styrene	total-Xylenes	TPH
227-01-A	original										0.066 J		0.055 J	0.040 J			
227-01-A	duplicate										0.038 J		0.051 J				
227-01-B	original	0.007 J		0.001 J													
227-01-B	duplicate	0.006 J			0.006 J												
227-04-B	original	0.004 J															
227-04-B	duplicate	0.005 J															
229-01-A	original					0.071 J	0.050 J	0.16 J	0.11 J		0.23 J		0.17 J	0.19 J			ND
229-01-A	duplicate					0.006 J	0.092 J	0.16 J	0.12 J		0.20 J		0.18 J	0.28 J			81
229-02-B	original	0.006 J															
229-02-B	duplicate	0.006 J															
229-03-B	original	0.006 J															
229-03-B	duplicate	0.006 J															
230-04-B	original	0.003 JB								0.16 J							
230-04-B	duplicate																
235-02-B	original	0.006 JB															
235-02-B	duplicate	0.004 JB															
Site 227	trip blank	0.010 B	0.003 J	0.002 J	0.019												
Site 229	trip blank	0.009 JB			0.015												
Site 230	trip blank	0.004 JB										0.003 J					
Site 232	trip blank	0.007 JB															
Site 234	trip blank	0.007 JB			0.015										0.001 J		
Site 235	rinsate	0.005 JB			0.010											0.001 J	ND

ACRONYMS FOR ANALYTICAL DATA

Organic/metals data for soil = mg/kg
Radionuclides data for soil = pCi/g

ND = Not detected

NS = Not significant

MDA = Maximum Detectable Activity

J = Detected at a concentration below the laboratory reporting limit

B = Detected in the associated blank sample

Statement of Basis
Approval of No Further Action

January 2000

ER Site 77
Operable Unit 1309
Round 2

NOD Originally Submitted October 1996

to affect human health under either an industrial or a residential land-use scenario (Attachment E).

SNL/NM reiterates the request that the ER Site 50 be approved for NFA status.

11. Site 77, OU 1309, Soil Surface Impoundment Site

a. A maximum sampling depth of 6-36 inches is not adequate for a surface impoundment that is 15 ft deep. Also, why were samples potentially composited over as much as 30 inches? Why are actual sample depths not reported?

Response: Rather than collecting additional soil samples beneath the impoundment at this time, the SNL/NM ER Project requests that NFA status be applied to ER Site 77 since NMED regulates the impoundment under 'Surface Water Discharge Plan 530' (DP-530). Additional details are discussed below in SNL/NM Response to NMED Comment b.

b. Boreholes should be drilled beneath the surface impoundment, and an adequate number of samples should be collected for analysis of potential contaminants of concern, including VOCs, SVOCs, metals, and PCBs. The full list of constituents of concern should be developed from historical records of waste from the TA-4 accelerator facility that had potential to enter the unlined impoundment.

Response: Since submittal of the NFA Proposal in June 1995, SNL/NM ER Project has gathered additional process and historical knowledge. The impoundment was listed an as ER site during the 1987 CEARP process. In 1988, SNL/NM submitted 'Surface Water Discharge Plan 530 (DP-530) pursuant to NM Water Quality Control Commission (NMWQCC) section 3. The plan was subsequently approved by NMED. Operation of the impoundment is the responsibility of SNL/NM Organization 9300 with oversight by the Water Quality Program in SNL/NM Organization 7500.

The primary purpose of the impoundment (evaporative lagoon) is to store surface runoff from precipitation that collects in the sump of the transformer oil tank farm spill-containment area (SNL/NM, 1995b). The impoundment is lined with a synthetic membrane. The collected runoff is pumped to the impoundment by a manually operated sump pump. If visible oil is present in the sump, a manually operated skimmer is used to transfer the skimmed oil to an oil storage tank. The sump also receives non-routine water and transformer oil spills from floor

trenches in Buildings 981 and 983. The capacity of the impoundment is 137,000 gallons.

The Water Quality Program in SNL/NM Organization 7500 conducts semiannual inspections that include the measurement of the water level and the collection of water samples. To date, water has not overflowed onto the ground surface. The water is analyzed for major ions, total dissolved solids (TDS), volatile organics, and extractable organics. Water quality results have not necessitated the pumping of the water for off-site disposal. NMED inspected the surface impoundment twice during 1995; no deficiencies were noted. The SNL/NM Water Quality Program submits a monitoring report to NMED on a semiannual basis. The report includes water level measurements and analytical data.

Additional soil sampling will be performed after the impoundment is removed from service. The closure and soil sampling activities will be the responsibility of SNL/NM Organization 9300.

Since NMED inspects and regulates the impoundment under DP-530, the SNL/NM ER Project requests that the site not be regulated under the HSWA permit. A HSWA permit modification will be requested to resolve this duplication in regulation.

c. Method detection limits are not provided in Table 1 and Appendix B.

Response: Method detection limits are listed in Attachment A of this response.

d. Although NMED understands the request for NFA is specific only to the portion of the unit below the liner, because the impoundment is still active, why is Site 77 listed as an ER site?

Response: As discussed above, the SNL/ER Project requests that NFA status be applied to ER Site 77 since NMED regulates the impoundment under 'Surface Water Discharge Plan 530' (DP-530). Maintenance of the impoundment is the responsibility of TA-IV Organization 9300.

e. RECOMMENDATION: Based upon SNL/NM's proposal and the fact that Site 77 was originally an unlined impoundment, NMED is concerned that contaminants may have been "flushed" to depth beneath this site. Boreholes beneath the site should be drilled and sampled appropriately to determine whether soils and possibly groundwater have been impacted beneath the site. Site 77 is currently not appropriate for NFA.

Response: As discussed in the June 1995 NFA Proposal, soil samples were collected before the impoundment was lined with a synthetic membrane. No PCBs or solvents were detected in the soil samples. Maintenance of the impoundment is the responsibility of TA-IV Organization 9300 under plan DP-530. No waste water is released from the impoundment due to significant evaporation. Eventual impoundment closure and soil sampling is the responsibility of SNL/NM Organization 9300.

SNL/NM believes that ER Site 77 should not be an ER site. As discussed above, the SNL/ER Project requests that NFA status be applied to ER Site 77 since NMED regulates the impoundment under 'Surface Water Discharge Plan 530' (DP-530).

12. **Site 227, OU 1309, Bunker 904 Outfall Site**

a. NMED is concerned that Site 227 may not be accurately located because the pipe that discharged into the outfall (open trench) at the concrete headwall is not currently visible. Trenching and/or historical photographs may help to locate the pipe for the Bunker 904 Outfall Site.

Response: Historical aerial photographs from 1951, 1959, 1964, 1965, 1966, 1968, 1972 through 1980, and 1982 through 1993 were reviewed. No outfall pipe for ER Site 227 was apparent in these photographs. However, discharge to the 10-ft deep, drainage ditch was apparent in these photographs in the form of vegetation along the ditch floor. The soil sampling locations along the ER Site 227 drainage ditch are shown on Figures 1 and 2.

b. NMED understands that Site 227, Bunker 904 Outfall Site, Operable Unit 1309, discharged industrial effluent from Building 904, located at Technical Area 2 (TA-2). Building 904 was used for nuclear weapons assembly, high explosives testings, and photo processing. The outfall, connected to the piping of ER Site 48, was active for about 43 years (1948 to 1991). The average rate and volume of discharge were not reported by SNL/NM. Potential contaminants at Site 227 include metals, radionuclides, VOCs, SVOCs, explosives, and nitrate. NMED is concerned that effluent discharged at Site 227 may have contained contaminants at concentrations that are a threat to groundwater, even if such contaminants are not readily detectable in Site 227 soils.

Response: Specific discharge rates were not recorded and are not available. However, the potential contaminants of concern (COCs) are known from personnel interviews.

Attachment A

ATTACHMENT A

ANALYTICAL METHODS FOR SOIL SAMPLES

Attachment A -
Analytical Methods for Soil Samples

Table A-1. Analytical Methods and Detection Limits for Cyanide, Nitrate/Nitrite, SVOCs, TKN, TPH, and VOCs in soil.

Analyte	Method	Detection Limit, mg/kg (ppm)	Analytical Lab
Cyanide	U.S. EPA Method 9010	0.10	ENCOTEC
Nitrate/Nitrite	U.S. EPA Method 353.2	100.0	ENCOTEC
SVOCs	U.S. EPA Method 8270	0.30 - 2.6	ENCOTEC
TPH	U.S. EPA Method 418.1	40.0	ENCOTEC
VOCs	U.S. EPA Method 8240	0.005 - 0.010	ENCOTEC

ENCOTEC = Environmental Control Technology Corporation, Ann Arbor, Michigan
SVOCs = Semi-volatile organic compounds
TKN = Total Kjedahl Nitrogen
TPH = Total Petroleum Hydrocarbons
VOCs = Volatile Organic Compounds

Table A-2. Analytical Methods and Detection Limits for Metals in soil.

Metal	U.S. EPA Method	Detection Limit (mg/kg, ppm)	Analytical Lab
Aluminum(Al)	6010	10	ENCOTEC
Antinomy (Sb)	6010	3.0	ENCOTEC
Arsenic (As)	6010	0.50	ENCOTEC
Barium (Ba)	6010	10	ENCOTEC
Beryllium (Be)	6010	0.25	ENCOTEC
Cadmium (Cd)	6010	0.27	ENCOTEC
Calcium (Ca)	6010	250	ENCOTEC
Chromium (Cr)-total	6010	1.0	ENCOTEC
Chromium-VI (Cr+6)	7196	0.1	ENCOTEC
Cobalt (Co)	6010	2.5	ENCOTEC
Copper (Cu)	6010	1.2	ENCOTEC
Iron (Fe)	6010	5.0	ENCOTEC
Lead (Pb)	6010	2.0	ENCOTEC
Magnesium (Mg)	6010	256	ENCOTEC
Manganese (Mn)	6010	0.75	ENCOTEC
Mercury (Hg)	7471	0.04	ENCOTEC
Nickel (Ni)	6010	2.0	ENCOTEC
Potassium (K)	6010	250	ENCOTEC
Selenium (Se)	7741	0.25	ENCOTEC
Silver (Ag)	6010	0.5	ENCOTEC
Sodium (Na)	6010	250	ENCOTEC
Thallium (Tl)	6020	0.5	ENCOTEC
Vanadium (V)	6010	2.5	ENCOTEC
Zinc (Zn)	6010	1.0	ENCOTEC

Table A-3. Analytical Methods and Detection Limits for High Explosive Compounds in soil.

High Explosive Compound	U.S. EPA Method	Detection Limit (mg/kg, ppm)	Analytical Lab
1,3-Dinitrobenzene	8330	1.25	ENCOTEC
2,4-Dinitrotoluene	8330	1.25	ENCOTEC
2,6-Dinitrotoluene	8330	1.25	ENCOTEC
HMX	8330	1.25	ENCOTEC
Nitrobenzene	8330	1.25	ENCOTEC
o-nitrotoluene	8330	1.25	ENCOTEC
m-nitrotoluene	8330	1.25	ENCOTEC
p-nitrotoluene	8330	1.25	ENCOTEC
RDX	8330	1.25	ENCOTEC
Tetryl	8330	1.25	ENCOTEC
1,3,5-Trinitrobenzene	8330	1.25	ENCOTEC
2,4,6-Trinitrotoluene	8330	1.25	ENCOTEC

Table A-4. Analytical Methods for Radionuclides in soil.

Radionuclide	Method	Analytical Lab
Americium-241	HASL 300 - Gamma Spectroscopy	Quanterra
Cadmium-109	HASL 300 - Gamma Spectroscopy	Quanterra
Cerium-139	HASL 300 - Gamma Spectroscopy	Quanterra
Cesium-137	HASL 300 - Gamma Spectroscopy	Quanterra
Cobalt-57	HASL 300 - Gamma Spectroscopy	Quanterra
Cobalt-60	HASL 300 - Gamma Spectroscopy	Quanterra
Iodine-129	HASL 300 - Gamma Spectroscopy	Quanterra
Lead-212/214	HASL 300 - Gamma Spectroscopy	Quanterra
Mercury-203	HASL 300 - Gamma Spectroscopy	Quanterra
Plutonium-238	NAS-NS-3058 /SL13028/SL13033	Quanterra
Plutonium-239/240	NAS-NS-3058 /SL13028/SL13033	Quanterra
Potassium-40	HASL 300 - Gamma Spectroscopy	Quanterra
Strontium-85	HASL 300 - Gamma Spectroscopy	Quanterra
Thorium-232	HASL 300 - Gamma Spectroscopy	Quanterra
Thorium-234	HASL 300 - Gamma Spectroscopy	Quanterra
Tin-113	HASL 300 - Gamma Spectroscopy	Quanterra
Tritium	EERF-H.01	Quanterra
Uranium-234	NAS-NS-3050	Quanterra
Uranium-235/236	NAS-NS-3050	Quanterra
Uranium-238	NAS-NS-3050	Quanterra
Yttrium-88	HASL 300 - Gamma Spectroscopy	Quanterra

Quanterra = Quanterra Environmental Services - St. Louis Laboratory

Specific Risk Assessment Comments

10. Site 50, OU 1309, Old Centrifuge Site

The radioactive portion of the risk assessment was compared to a radioactive dose. It is EPA Region 6 policy to require the calculation of not only the radioactive dose present at a site, but also to require an evaluation of radioactive risk. SNL/NM should revise the risk evaluation accordingly.

Response: SNL/NM has recently completed a quantitative risk assessment for all contaminants, including cancer-causing radionuclides, in soil. The section Site 50, OU 1309, Old Centrifuge Site in NMED Site-Specific Technical Comments discusses the risk assessment.

11. Site 77, OU 1309, Oil Surface Impoundment Site

The data provided appear to support an NFA proposal from a human health standpoint. However, the proposal should provide information on the potential for ecological impact.

Response: The issue of ecological impact is not applicable to ER Site 77 at this time. ER Site 77 is an active, evaporative lagoon (impoundment) that is used by TA-IV for storing tank-farm surface water. The lagoon is regulated under NMED 'Surface Water Discharge Plan 530' (DP-530). Since the lagoon is already regulated, monitored, and inspected according to NMED regulations, ER Site 77 should be granted NFA status. SNL/NM Organization 9300 manages the lagoon with oversight by the Water Quality Program in SNL/NM Organization 7500. The section Site 77, OU 1309, Oil Surface Impoundment Site in NMED Site-Specific Technical Comments presents more details.

12. Site 227, OU 1309, Bunker 904 Outfall Site

The radioactive risk analysis was based on comparative doses. The evaluation of the risk due to the radioactive dose should be part of the risk analysis. Please revise accordingly. The NFA proposal should address the potential for ecological risk.

Response: SNL/NM has recently completed a quantitative risk assessment for all contaminants, including cancer-causing radionuclides, in soil. The section Site 227, OU 1309, Bunker 904 Outfall Site in NMED Site-Specific Technical Comments discusses the risk assessment. The issue of ecological risk is discussed in Item 3 of the NMED General Risk Assessment Comments section.