

**PROPOSAL FOR CONFIRMATORY SAMPLING
NO FURTHER ACTION
Environmental Restoration Project**

**Site 54, Pickax Site
OU 1335**

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Prepared for the
United States Department of Energy

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1.0 Introduction

1.1 ER Site 54, Pickax Site

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a no further action (NFA) decision based on confirmatory sampling for Environmental Restoration (ER) Site 54, Pickax Site, Operable Unit (OU) 1335. ER Site 54 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 an NFA decision based on confirmatory sampling was prepared using the process 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 54 is based primarily on analytical results of confirmatory soil samples collected at the site. Concentrations of site-specific constituents of concern (COCs) detected in the soil samples would have first been compared to background 95th percentile or upper tolerance limit (UTL) concentrations of COCs found in SNL/NM soils (IT March 1996). However, since there has been no background established for high explosives, the primary constituent of concern, this step would be irrelevant. If no SNL/NM or other relevant 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 taken from 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 54 soil sample analytical data indicate that concentrations of COCs at this site are less than (1) proposed Subpart S or other action levels, or (2) derived risk assessment action levels.

ER Site 54 is being proposed for an NFA decision based on confirmatory sampling data which demonstrates 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 (Figure 1). 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 54 is located near the southwest corner of Kirtland Air Force Base, south of Magazine Road and west of University Ranch Road (Figure 2). The site occupies 446 acres in an area called South Thunder Range. The site is essentially flat, with a slight slope to the west, at an average elevation of 5,420 feet above mean sea level (AMSL). Approximately 200 craters and trenches caused by past explosives testing are present in the area. Crater depths range from 0 feet (filled in) to one crater that is 30 feet deep. The depth of the trenches range from 0 to 10 feet. Desert grasses and cacti are the only significant vegetation in the area.

The surficial geology at ER Site 54 is characterized by a veneer of aeolian sediments that are underlain by alluvial fan or alluvial 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 grama, 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.

The water-table elevation is approximately 4,940 feet AMSL at this location, with a depth to groundwater of approximately 480 feet. Local groundwater flow is believed to be in a generally west to northwest direction. The nearest production wells are northwest of the site and include KAFB-2, KAFB-4, and KAFB-7 which are approximately 4.9 to 6.4 miles away. The nearest groundwater monitor wells to the site are the group of wells installed around the Chemical Waste Landfill in the southeast corner of TA III. These wells are located approximately 0.4 miles northeast of ER Site 54 (SNL/NM March 1995).

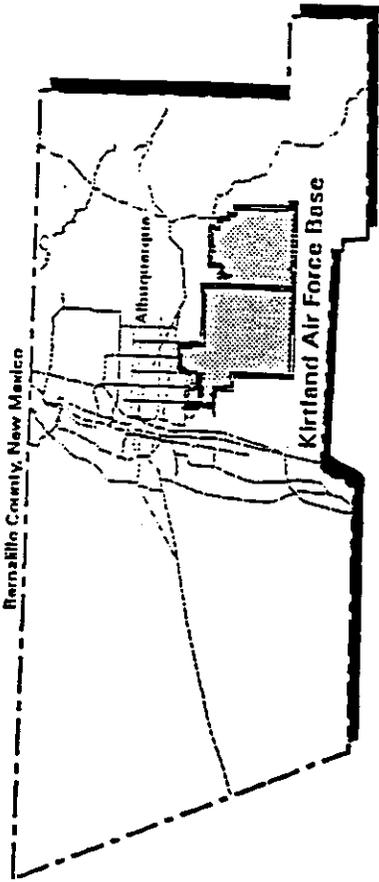
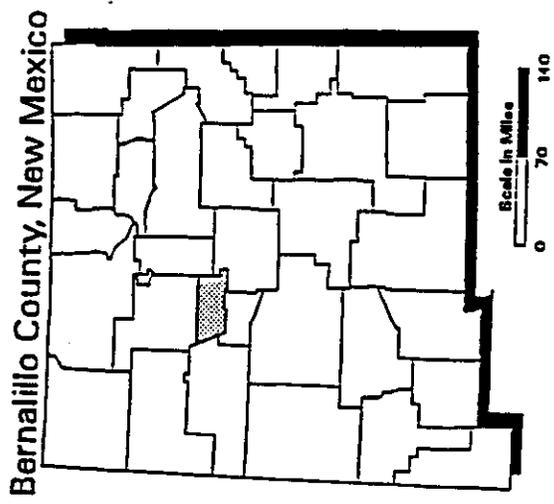
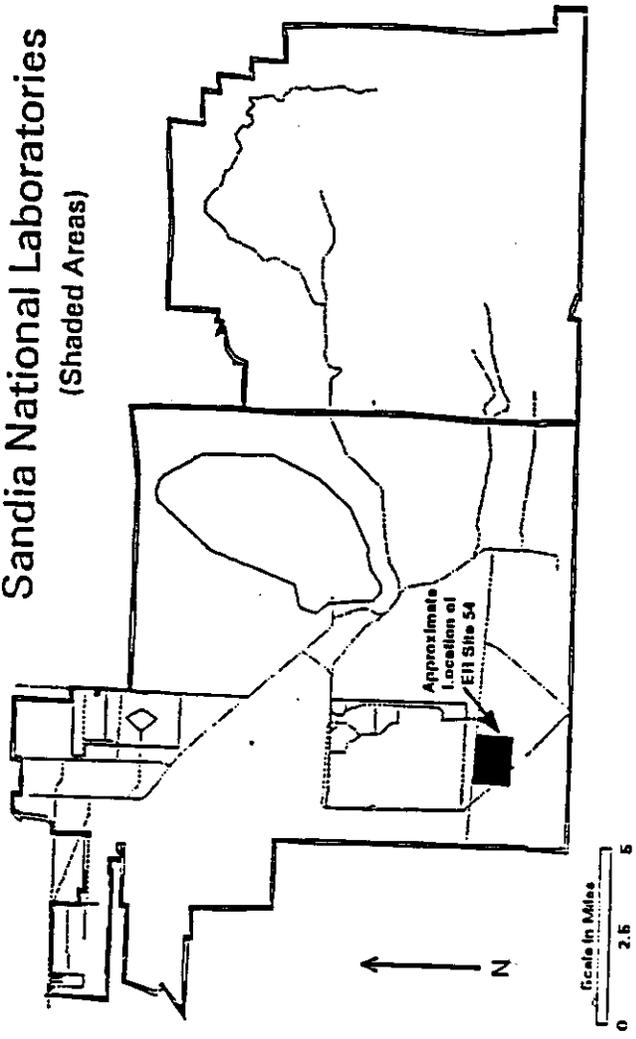


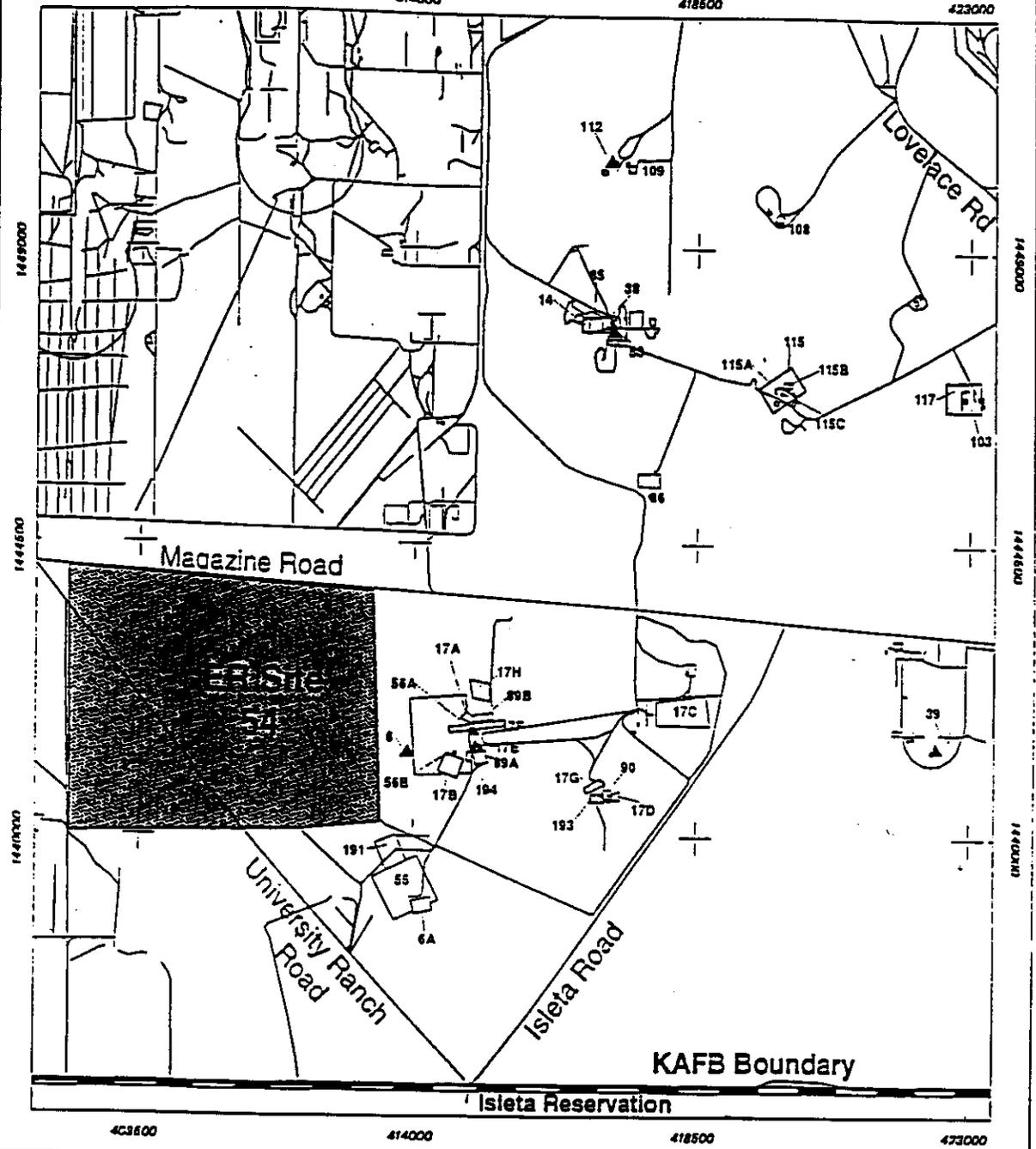
Figure 1
The Location of
Kirtland Air Force Base
and
Sandia National
Laboratories

Sandia National Laboratories
(Shaded Areas)



Source: SAN LEO GIS Database

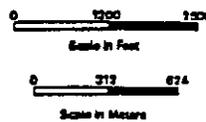
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Legend

- ▲ ER Sites < .1 acre
- Roadways
- KAFB Boundary
- ER Site 54
- Other ER Sites

Figure 2
Location of
ER Site 54 - Pickaxe Site



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2.0 History of the SWMU

2.1 Sources of Supporting Information

In preparing the NFA proposal for ER Site 54, 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 54:

- * Confirmatory subsurface soil sampling conducted in July 1995;
- * RCRA Facilities Investigation Work Plan for OU 1335, (SNL/NM March 1993);
- * Photographs and field notes collected at the site by SNL/NM ER staff;
- * Historical aerial photographs; and
- * The RCRA Facility Assessment (RFA) report (EPA September 1987).

2.2 Previous Audits, Inspections, and Findings

An Unexploded Ordnance (UXO)/High Explosives (HE) visual surface survey was conducted by KAFB Explosive Ordnance Disposal personnel in July of 1994. No UXO/HE or ordnance debris was found during the survey (SNL/NM, Sept. 1994).

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).

The site was used for more than 100 shallow subsurface explosive tests between 1958 and 1967. At the time, there was interest in using nuclear devices to dig canals or deep water ports. In order to understand the dynamics of crater and trench formation with relation to explosive yield and depth of detonation, scaled tests using conventional HE material were conducted. According to complete process knowledge, no nuclear materials were used at SNL/NM. The nuclear portion of these tests were conducted at Nevada Test Site.

SNL/NM Tests involved the detonation of HE in single charges, charges at multiple depths in the same hole, rows of charges at a single depth, and rows of charges at multiple depths. The tests involved the burial of explosive charges below ground level, detonation of the charges and studying the dimensions of crater or trench produced. Only HE materials were involved; no other hazardous materials were used in any of the tests.

There were three distinct types of tests based on the type and amount of explosives used and the depths at which they were detonated. The explosive charges in the majority of tests were buried from 2 to 14 feet beneath the surface. These tests used 8 to 256 pounds of trinitrotoluene (TNT). A second type of test involved the detonation of 1,000 pounds of TNT or nitromethane in each test. These test charges were buried at a depth of 10 to 20 feet. A

small number of these tests (approximately 8) were conducted. In the third type of test, either 30, 478, or 30,000 pounds of Composition-B was detonated in a single test, depending on which reference was cited. The test detonation occurred 47.9 feet below ground level. Composition-B is a mixture of 60% cyclonite (RDX) and 40% TNT.

3.0 Evaluation of Relevant Evidence

3.1 Unit Characteristics

There were no safeguards inherent in the explosives testing procedures that would have prevented past releases to the environment.

3.2 Operating Practices

As discussed in Section 2.3, HE material was used in testing at the site. Hazardous wastes were not managed or stored at ER Site 54.

3.3 Presence or Absence of Visual Evidence

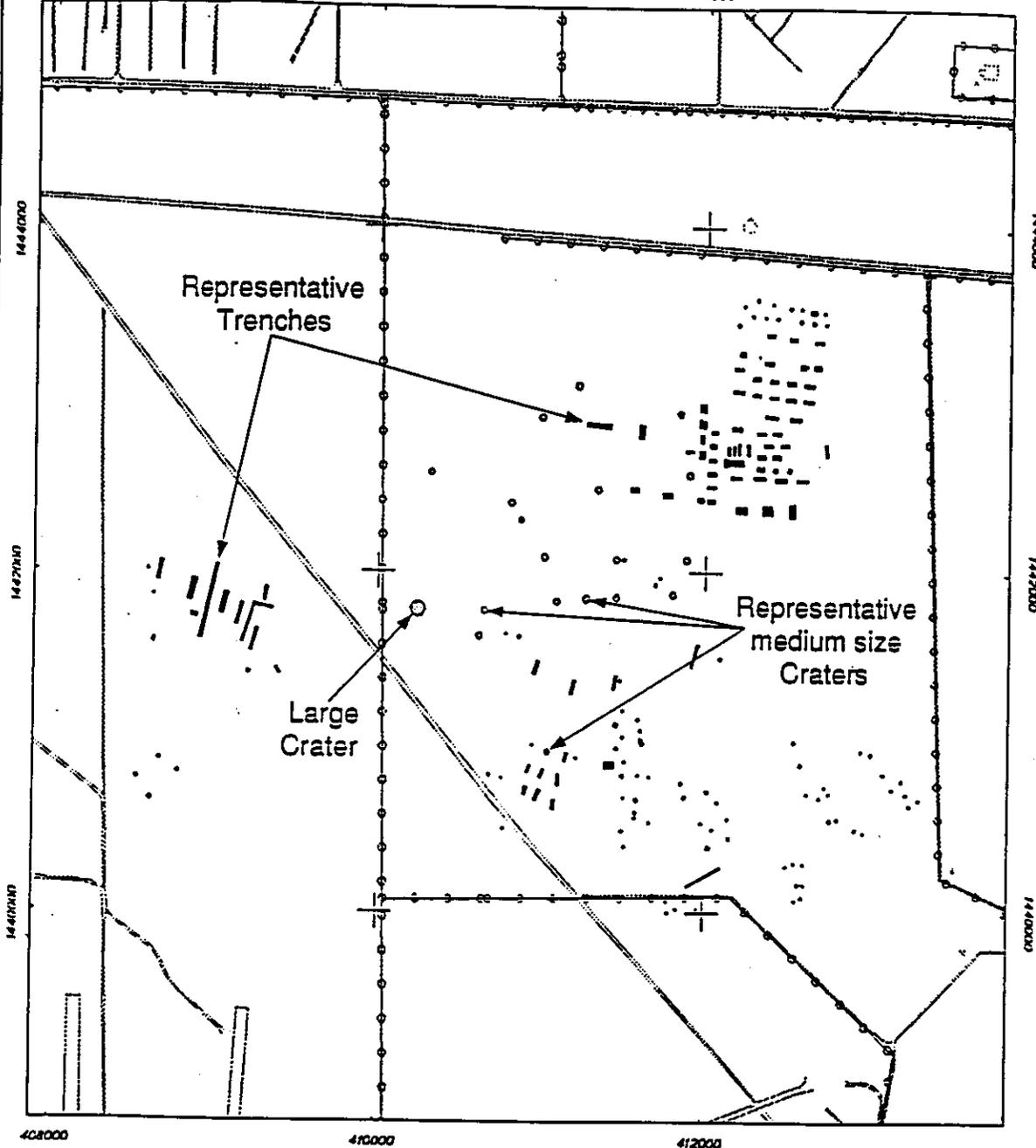
No visible evidence of soil discoloration, staining, or odors indicating residual contamination was observed when soil samples were collected in the craters and trenches in July 1995. However, physical craters on the ground surface exist and are as large as 30 feet deep.

3.4 Assessment of Gaps in Information

Process knowledge and other available information help identify the most likely COCs which may be found in soils at ER Site 54, and help select the types of analyses to be performed on soil samples. While the history of past releases at the site is incomplete, analytical data from confirmatory soil samples collected in July 1995 (discussed below) are sufficient to determine whether releases of COCs occurred at the site.

3.5 Confirmatory Sampling

Although the likelihood of hazardous waste releases at ER Site 54 was considered low, confirmatory soil sampling was conducted to determine whether COCs above background or detectable levels were released at this site. The confirmatory soil sampling program was performed in accordance with the rationale and procedures described in the Site 54 - Pickax Site Sampling and Analysis Plan developed in June 1995. A series of soil samples were collected to determine possible contamination at the site at randomly selected medium-sized crater and trench locations (Figure 3). The medium size craters were selected because they were generated with 1,000 lbs of HE each rather than the 256 lbs, at most, that was used in the small craters and were considered "worst case" with relation to the small craters. The largest crater was also selected to be sampled because of the amount of HE used in the test that created the depression. Since the tests were detonated in the subsurface, the majority of the explosive material would be contained at the center of the blast area. Therefore, the boreholes were advanced near the center of the craters to target the "worst case" scenario for contamination at each of the craters.



408000

410000

412000

1442000

1442000

1440000

Legend

-  Building
-  Roadways
-  Fences
-  Trenches
-  Craters

Figure 3
Site Map for
ER Site 54



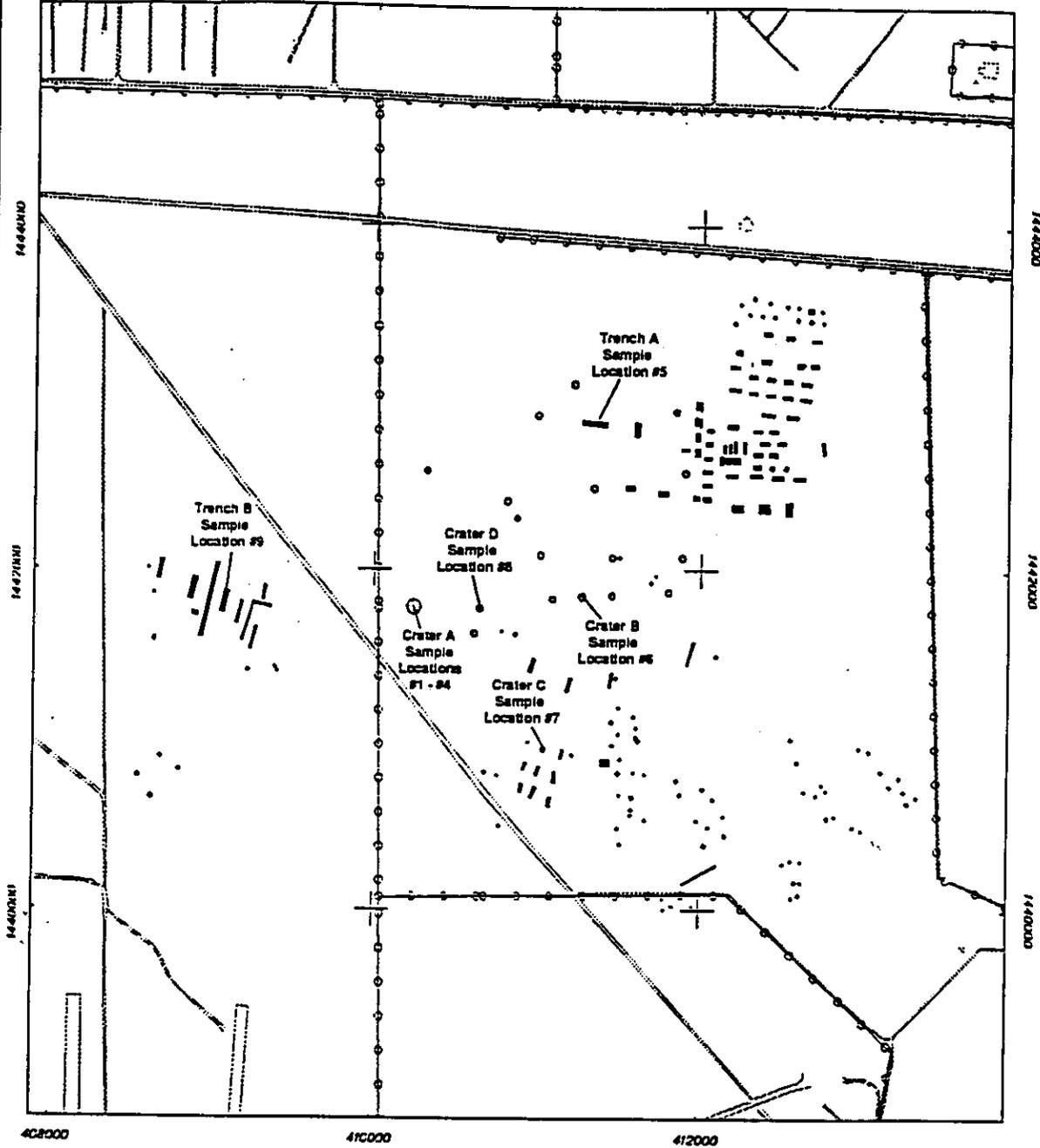
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ER Site 54 samples were analyzed for HE by both an offsite commercial laboratory and onsite laboratories. The onsite laboratories used were the SNL Department 2552 High Explosives laboratory and the SNL Department 7713 Radiation Protection Sample Diagnostics Laboratory. All samples were routed to the laboratories by the SNL/NM Sample Management Office. Routine SNL/NM chain-of-custody and sample documentation procedures were employed for all samples collected at this site.

The Geoprobe™ sampling system was used to collect subsurface soil samples 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. 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 to be sent to the onsite laboratory was delivered to the lab in the sealed BA sleeve. The soil to be sent to the offsite laboratory was removed from the BA sleeve, emptied into and mixed in a decontaminated mixing bowl, then placed in 4 ounce glass sample containers using a decontaminated plastic spatula, sealed with tape and placed in an ice-filled cooler at the site.

A Geoprobe™ borehole was advanced at the bottom center of each selected trench and medium sized crater (Figure 4). Samples were taken at depths of 0-1, 5-6, 10-11, and 14-15 feet below the bottom of the crater or trench. This sample interval is a standard interval used due to the 5-foot sleeve lengths of the Geoprobe™ sampling tool. Although most samples were analyzed for HE residues only, sample numbers 1335-54-005-S and 1335-54-009-S were split and analyzed for radiation using the gamma spectroscopy method at the SNL/NM department 7717 laboratory. Four Geoprobe™ boreholes were sampled in the large crater at the locations shown in Figure 5. The crater floor is at approximately 30 feet below ground surface. The depth of the charge was at 49 feet below ground when detonated. Thus the detonation occurred 19 feet below the current crater floor. Samples were taken at 15, 19, 23, and 27 feet below the crater bottom.

Fifty sample splits from 36 individual locations were collected and delivered to the appropriate laboratory. Of the 50 splits, 10 were analyzed by a commercial offsite laboratory, maintaining the 20 percent offsite analysis for verification purposes. This number and locations of samples was determined to provide an adequate representation of the site conditions based on site history and best professional judgment. 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 1.



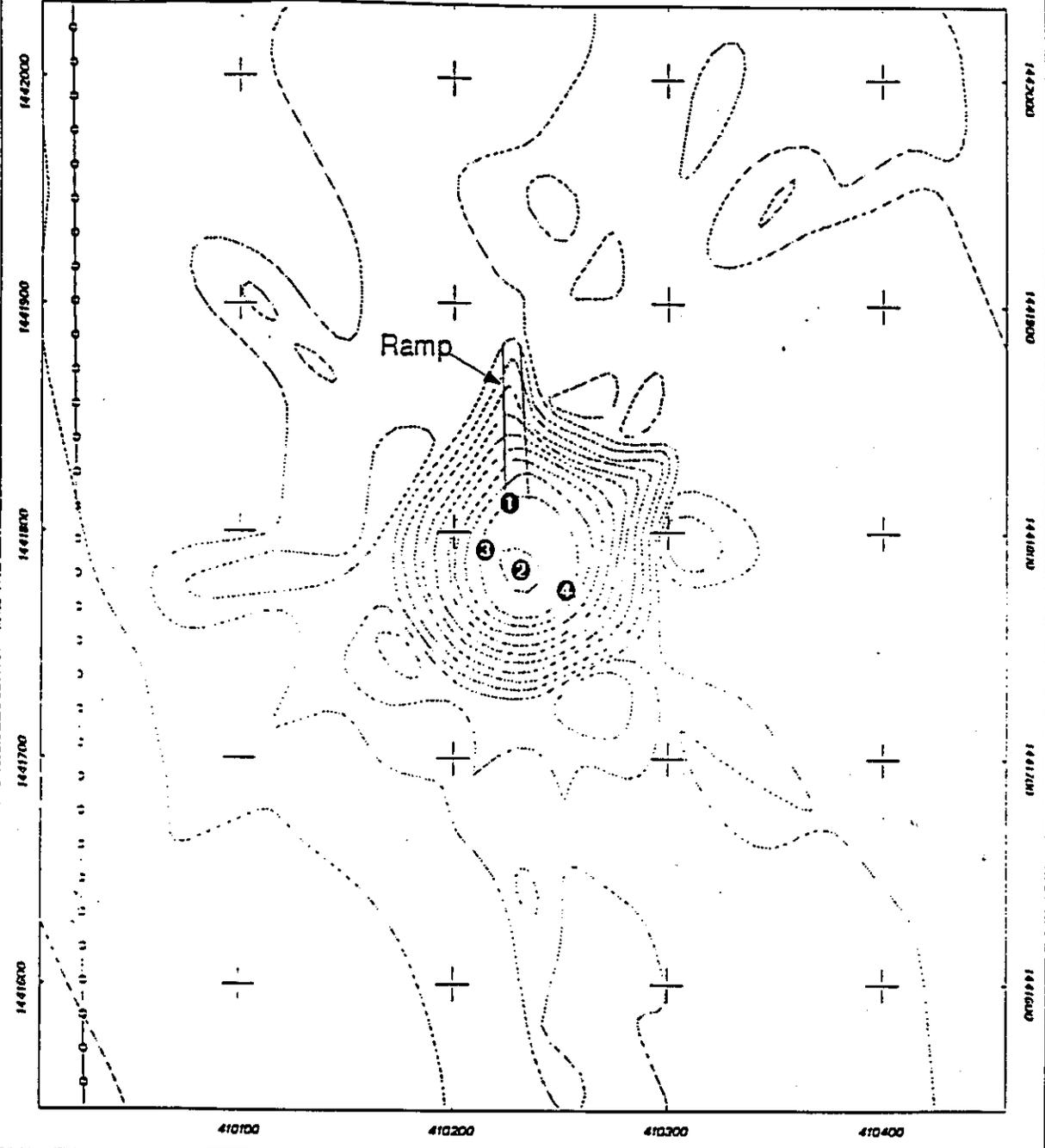
Legend

-  Building
-  Roadways
-  Fences
-  Trenches
-  Craters

Figure 4
Sampling Locations at
ER Site 54 - Pickaxe Site



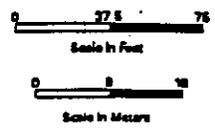
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Legend

-  Fences
-  2 Foot Contours
-  Boreholes

Figure 5
Large Crater Sampling Locations
at ER Site 54



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Table 1
ER Site 54: Confirmatory Sampling Summary Table

Sampling Location	Analytical Parameters	Number of Borehole Locations	Top of Sampling Intervals at Each Borehole Location (ft)	Total Number of Investigative Samples	Total Number of QA/QC Samples	Samples Collection Date
Large Crater - A						
Sample Locations 1 - 4	High Explosives	4	15, 19, 23, 27	18	1	7/18/95
	Gamma Spec.			2		7/18/95
Representative Trench - A						
Sample Location 5	High Explosives	1	0, 5, 10, 15	5		7/19/95
Representative Medium Sized Craters - B, C, D						
Sample Location 6	High Explosives	1	0, 5, 10, 15	4		7/20/95
Sample Location 7	High Explosives	1	0, 5, 10, 15	5		7/19/95
Sample Location 8	High Explosives	1	0, 5, 10, 15	5		7/20/95
Representative Trench - B						
Sample Location 9	High Explosives	1	0, 5, 10, 15	5	4	7/19/95

Notes

Spec. = Spectroscopy

Quality assurance/quality control (QA/QC) samples collected during this effort consisted of two sets of aqueous equipment rinsate samples, one for the onsite lab and one for the offsite lab, that were analyzed for the same constituents as the other crater and trench soil samples. Two sets of soil samples, one for each laboratory, were collected as field blanks as well. No significant concentrations of COCs were detected in the QA/QC samples.

All samples, with the exception of sample number 1334-54-018-S, were non-detect for all analytes in the analysis suite. The single detection was TNT, at 3 ppm. The RCRA Action Level for TNT is 40 ppm. A summary of all analytes for the offsite commercial laboratory analyses is presented in Appendix B and the corresponding summary for all constituents detected by the SNL/NM laboratories in these confirmatory samples is presented in Table 2. Complete soil sample analytical data packages are archived in the SNL/NM Environmental Operations Records Center and are readily available for review.

Table 2
ER Site 54: Summary of Constituent Detected in Confirmatory Soil Samples

Sample Location	Analyte	Amount Detected	RCRA Action Level
1335-54-018-S	TNT	3 ppm	40 ppm

Notes

ppm = parts per million

3.6 Rationale for Pursuing a Confirmatory Sampling NFA Decision

The confirmatory sampling identified TNT in one soil sample at Borehole 5 - Trench A at a depth of 5 feet. This single detection was not confirmed by the presence of any other HE compounds. This sampling did not identify any residual COCs indicating past releases that could pose a threat to human health or the environment. As shown in Appendix B, TNT was detected at only one sample location collected but was well below the proposed RCRA Subpart S action level of 40 ppm. Also, the gamma spectroscopy semi-qualitative screening of shallow and deep interval composite soil samples did not indicate the presence of radioactive contamination.

4.0 Conclusion

Sample analytical results generated from this confirmatory sampling investigation have shown that significant concentrations of COCs are not present in soils at ER Site 54, and that additional investigations are unwarranted and unnecessary. Based on archival information and chemical and radiological analytical results of soil samples collected in the craters and trenches, SNL/NM has demonstrated that the potential release site 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 (Criterion 5 of Section 1.2). The site does not pose a threat to human health or the environment. Therefore, ER Site 54 is recommended for an NFA determination.

5.0 References

5.1 ER Site 54 References

Sandia National Laboratories/New Mexico (SNL/NM), June 1995, Field Log #2RN, Pages 10-12, 07/18/95, Field notes of confirmatory sampling activities at ER Site 54 - Pickax Site.

5.2 Other References

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 1: Installation Assessment, Sandia National Laboratories, Albuquerque", Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

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Sandia National Laboratories/New Mexico (SNL/NM), February 1995, "Program Implementation Plan for Albuquerque Potential Release Sites", Sandia National Laboratories Environmental Restoration Program, Albuquerque, New Mexico.

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Sandia National Laboratories/New Mexico (SNL/NM), March 1996, "RCRA Facility Investigation Work Plan for Operable Unit 1335 Southwest Test Area", Sandia National Laboratories Environmental Restoration Project, Albuquerque, New Mexico.

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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.

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.

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.

October 13, 2003

ADDITIONAL /SUPPORTING DATA

**CAN BE VIEWED AT THE
ENVIRONMENTAL, SAFETY, HEALTH
AND SECURITY (ES&H and Security)
RECORD CENTER**

**FOR ASSISTANCE CALL
844-4688**