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Statement of Basis Approval of No Further Action Volume 7 of 30 January 2000, ER Site 72, Operable Unit 1333 Round 5

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Sandia National Laboratories

**Statement of Basis
Approval of No Further Action
Volume 7 of 30**

January 2000

**ER Site 72
Operable Unit 1333
Round 5**

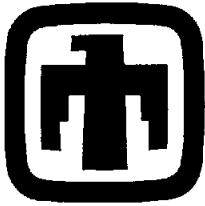
(RCRA Permit No. NM5890110518)

NFA Originally Submitted October 30, 1996
RSI Originally Submitted May 1998

**Environmental
Restoration
Project**



**United States Department of Energy
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1.0 INTRODUCTION

1.1 Environmental Restoration Site Identification Number and Name

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a no-further-action (NFA) decision for Environmental Restoration (ER) Site 72, Operation Beaver Site, Operable Unit 1333. ER Site 72 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 NFA Process

This proposal for the determination of an 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 "contain[s] 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).

The request for an NFA decision for ER Site 72 is based on existing administrative/archival information and supported by analytical results of confirmatory soil samples collected at the site. Detectable concentrations of site-specific constituents of concern (COC) were not present in the site soil samples.

A site is eligible for an NFA proposal if it meets one or more of the following criteria taken from the ER 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.

- o 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 Comprehensive Environmental Response Compensation and Liability Act (CERCLA) hazardous substances.
- o NFA Criterion 3: No release to the environment has occurred, nor is any likely to occur in the future.
- o NFA Criterion 4: There was a release, but the site was characterized and/or remediated under another authority that adequately addresses corrective action, and documentation such as a closure letter is available.
- o 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 72 soil sample analytical data indicate that detectable concentrations of COCs at this site were not present. Accordingly, ER Site 72 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).

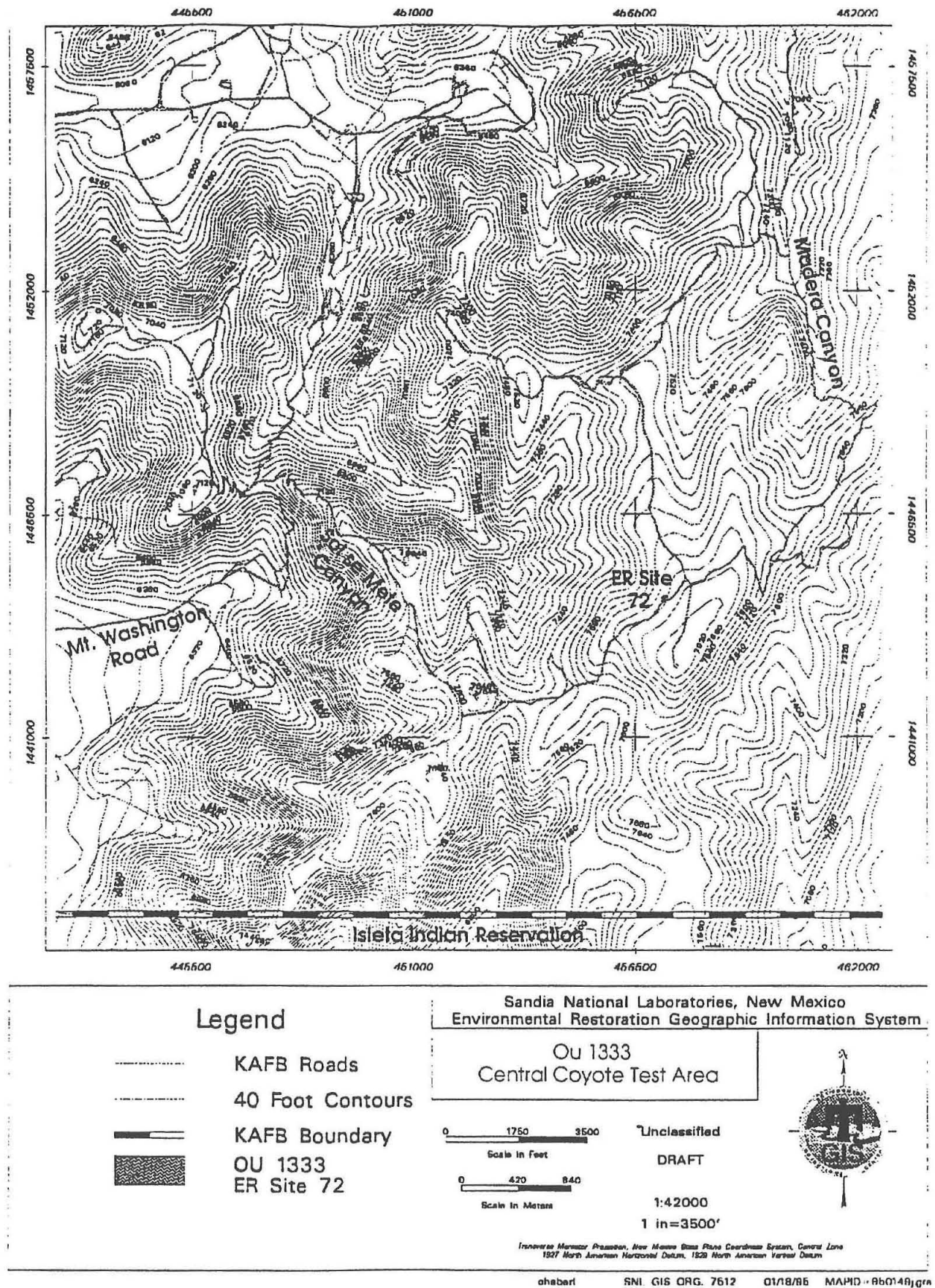
1.3 Local Setting

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

ER Site 72 (Figure 1-1) is located on land listed as U.S. Air Force unassigned (SNL/NM July 1994). The site is situated on a northwest slope approximately 0.4 mile (mi) north of the Manzano Lookout Tower (72-9)¹. Access to the general area is provided by the Mount Washington Road, and the site is located on the north side of an unnamed road 0.1 mi west of the turnoff to the Manzano Lookout Tower (72-7, 72-8, 72-9). The site lies on approximately 0.72 ac of land at a mean elevation of 7,855 feet (ft) above sea level (SNL/NM September 1994).

This inactive site is located on thin slope deposits correlated to the Seis very cobbly loam (USDA June 1977), which overlies Paleozoic carbonate rocks (Pennsylvanian Madera

¹All numbered citations within parentheses (72-) throughout this proposal refer to documents listed in the bibliography under Section 5.1 of this proposal.



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Figure 1-1
Location of ER Site 72, Operation Beaver Site

Location ER Site72, Operation Beaver Site

Limestone). The site is situated on a topographic divide between the headwaters of Madera Canyon and the upper reach of the Sol se Mete Canyon. Immediate topographic relief around the site is approximately 100 ft to the ridge of the Manzano Lookout Tower and 600 ft to the floor of the Sol se Mete Canyon. Because of its location on a remote bedrock hillside, hydrologic conditions at ER Site 72 are not defined. Based on a similar geologic setting in the Sol se Mete Canyon, the site may lie in a general recharge area with depth to groundwater in excess of 200 ft. No wells are located in the area of ER Site 72. The Burn Site Well (ER Site 94), the nearest well, is located approximately 2.5 mi northwest of ER Site 72 in the upper reach of the Lurance Canyon. Depth to the first saturated groundwater conditions at the Burn Site Well is nearly 240 ft and occurs in bedrock fractures under confined to semiconfined hydraulic conditions. Local groundwater flow may be directed toward the topographically lower canyon area where some discharge may occur at small seeps and springs, such as the Sol se Mete Spring located approximately 1 mi from ER Site 72. The geology and hydrogeology of the ER Site 72 area may be complicated by the local presence of fault and fracture systems in Paleozoic and Precambrian bedrock units.

2.0 HISTORY OF THE SWMU

2.1 Previous Audits, Inspections, and Findings

ER Site 72 was first listed as a potential release site based on the Comprehensive Environmental Assessment and Response Program (CEARP) interviews in 1985 (DOE September 1987), which noted that high explosives (HE) were used in a tree-clearing test performed at the site. This Vietnam Era test, conducted on September 18, 1968, used explosives-driven stainless steel rods to investigate whether the device could be used to clear an area for helicopter landings (72-15). Because the detonations were high order, all of the HE were expended. The CERCLA finding was negative 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). The SWMU received an NFA recommendation and was not investigated further (DOE September 1987).

Subsequent to the CEARP inspection, the U.S. Environmental Protection Agency conducted a RCRA Facility Assessment (RFA). This SWMU was not included in the RFA report (EPA April 1987).

2.2 Historical Operations

ER Site 72 (Figure 2-1) was created by a single test conducted under Project Beaver on September 18, 1968 (72-15). Project Beaver studied the feasibility of creating helicopter landing zones in wooded areas by using a device that employed explosives-driven steel rods to cut trees. The blast overpressure following the explosion cleared the debris. The objective of the test at ER Site 72 was to determine whether a continuous rod warhead design was effective in clearing a wooded area. The continuous rod warhead (Figure 2-2) was constructed using the components listed in Table 2-1 (72-15). Square, stainless steel rods were welded at alternate ends in a zig-zag fashion and folded into a cylinder (DOE September 1987, 72-3, 72-4, 72-7, 72-15). Approximately 305 pounds (lb) of Composition-4 (C-4) explosive was placed in the innermost layer of the cylinder and detonated. The blast produced an expanding steel perimeter that cut down trees and vegetation within a 50-ft radius of ground zero (Figure 2-3) (DOE September 1987, 72-3, 72-4, 72-7, 72-15). Figures 2-4a and 2-4b show the site in 1987, approximately 19 years after the test. Figure 2-4c shows a panoramic view of the cleared area at ER Site 72 taken in 1993, approximately 25 years after the test. The only hazardous material used in this test was C-4 explosive, which is comprised predominantly of RDX² (Table 2-2). Because the detonations were high order, all of the HE was transferred to thermal energy and no explosive residues are expected to remain (DOE September 1987, 72-4, 72-7).

²Cyclo-1,3,5-trimethylene-2,4,6-trinitramine.

Figure 2-1

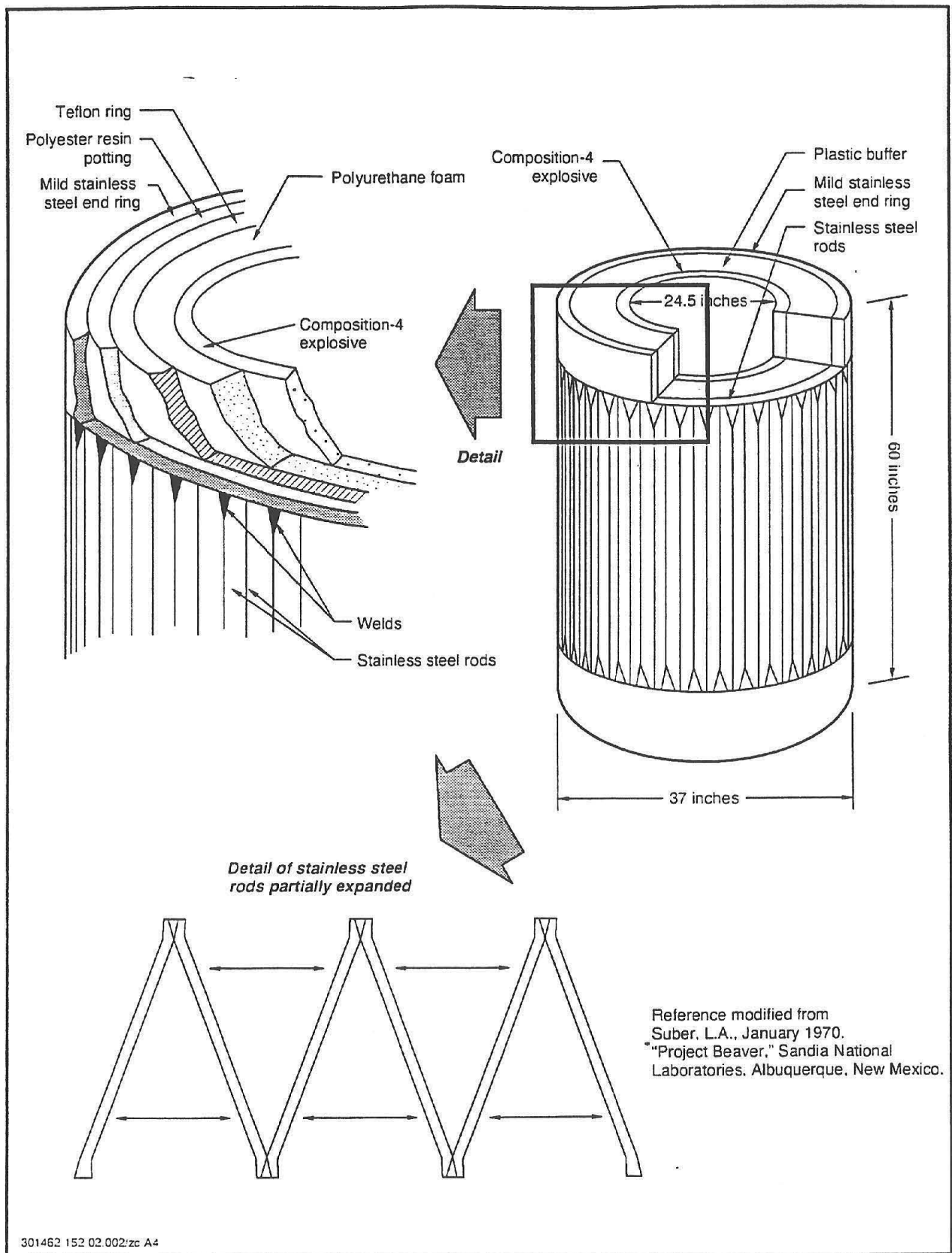


Figure 2-2
Design and Detail of Continuous Rod Warhead

Table 2-1
Summary of Continuous Rod Warhead Components

Component	Weight (pounds)
Stainless steel rods—110 rods, 1 inch (in.) ² by 48 in. long	1,494
End rings—2 rings, 37 in. outer diameter by 1 in. wall by 6 in. long	384
Polyester resin potting	284
Teflon sheet	482
Polyurethane foam	42
Composition-4 explosive	305
Total weight	2,991

Reference modified from Suber, L. A., January 1970. "Project Beaver," Sandia National Laboratories/New Mexico, Albuquerque, New Mexico.

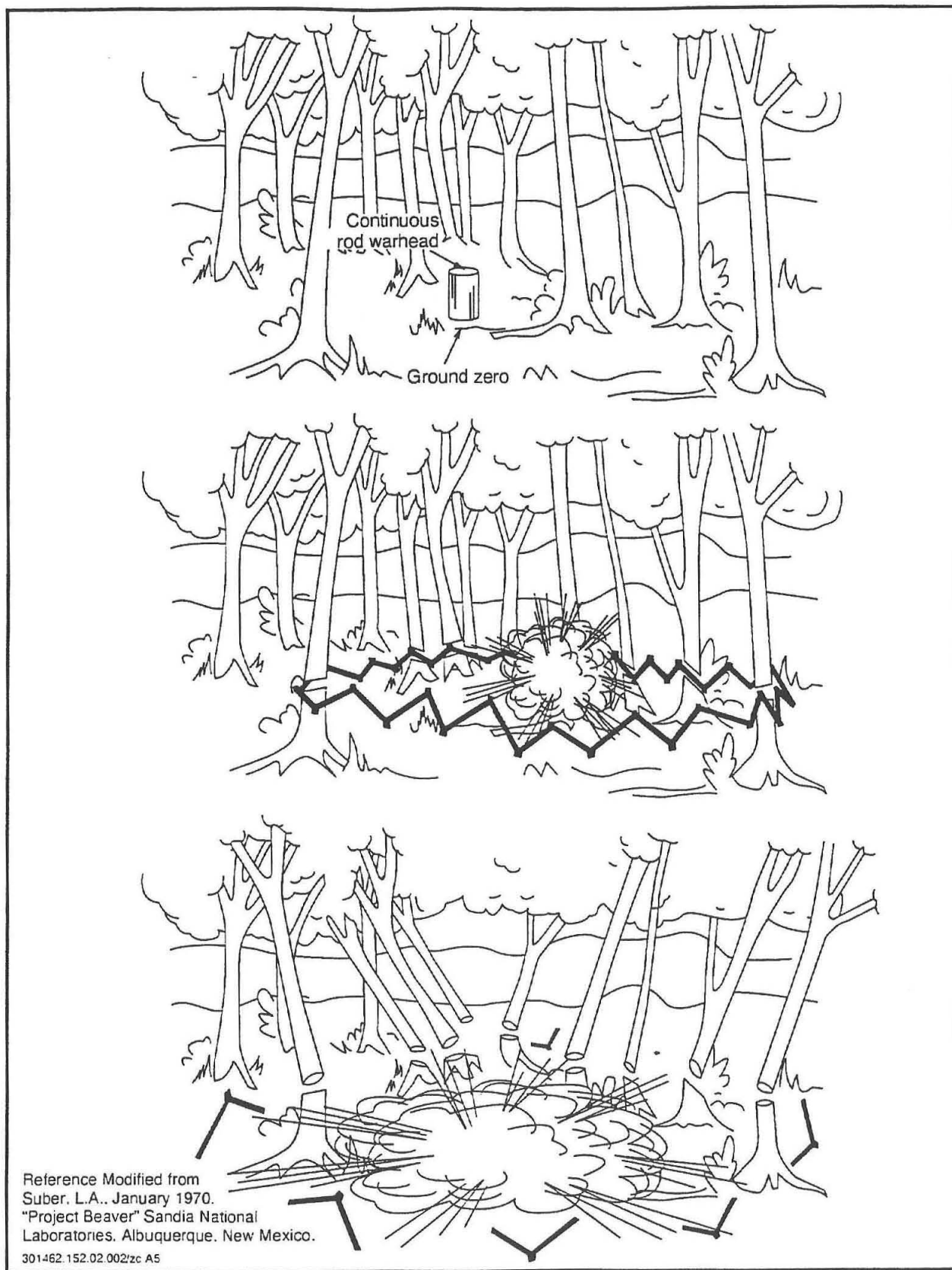


Figure 2-3
Continuous Rod Warhead Operation

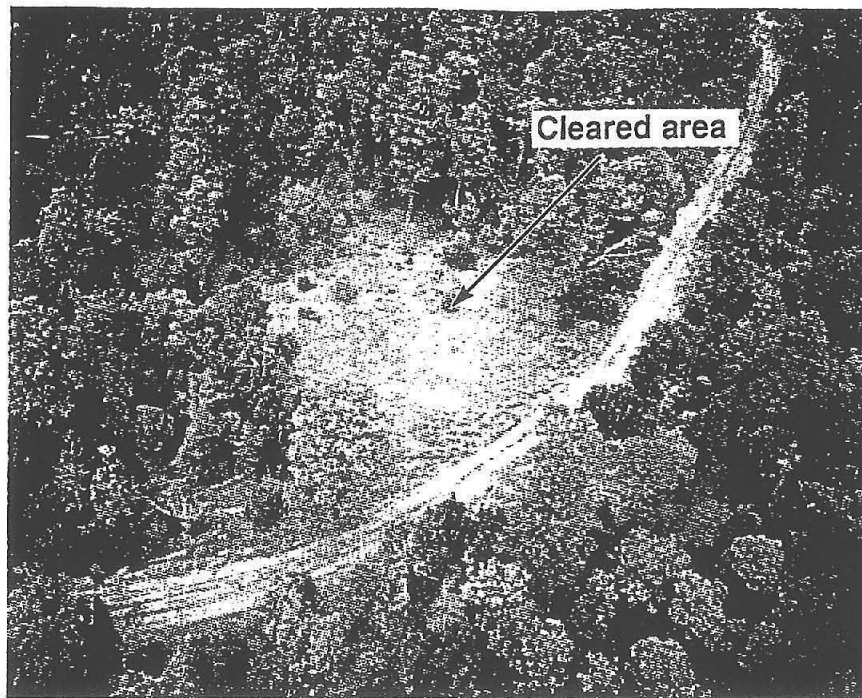


Figure 2-4a. Photograph of 100-foot-diameter clearing produced by Project Beaver (taken in 1987, approximately 19 years after the detonation of the continuous rod warhead). View to the north.

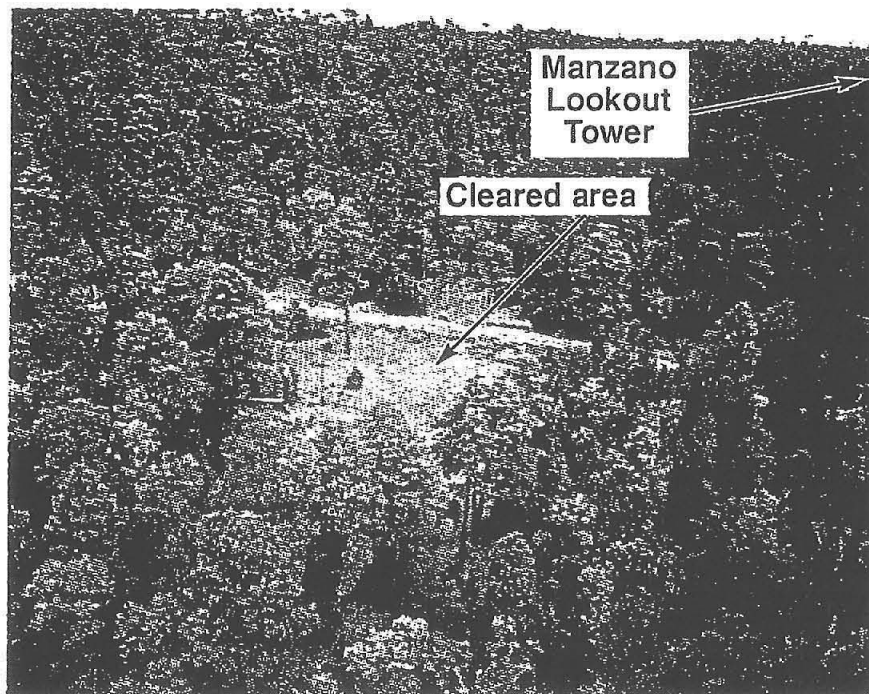


Figure 2-4b. Photograph of 100-foot-diameter clearing produced by Project Beaver (taken in 1987). View to the southeast.

Figure 2-4 ER Site 72 Photographs



Figure 2-4c. Panoramic photograph of 100-foot-diameter clearing produced by Project Beaver (taken in 1993). View to the northwest.

Figure 2-4c
ER Site 72 Photograph

Table 2-2
Chemistry of Composition-4 Explosive

Chemical Formula (Percent)	Elemental Composition
91% RDX 5.3% di-(2-ethylhexyl) Sebacate 2.1% polyisobutylene 1.6% motor oil	$C_{1.82}H_{3.54}N_{2.46}O_{2.51}$ (Approximate)

Reference: Dobratz, P.M., and P.C. Crawford, January 1985. "Lawrence Livermore National Laboratory Explosives Handbook: Properties of Chemical Explosives and Explosive Stimulants. Change 2." UCRL-52997-CHG2.

C = Carbon.

H = Hydrogen.

N = Nitrogen.

O = Oxygen.

RDX = Cyclo-1,3,5-trimethylene-2,4,6-trinitramine.

Submission 5

file 72

3.0 EVALUATION OF RELEVANT EVIDENCE

3.1 Unit Characteristics

The test device used in the Project Beaver experiment conducted at ER Site 72 consisted of square, stainless steel rods (2 inches [in.] x 2 in., 6 to 8 ft long) that were welded together at alternate ends and stacked in a cylinder surrounding approximately 305 lb of C-4 explosive (DOE September 1987, 72-2, 72-3, 72-4, 72-7, 72-8, 72-15). When the C-4 explosive was detonated, the rods expanded to clear the surrounding area of trees. The device was used only once at this site (72-7, 72-8, 72-15).

3.2 Operating Practices

The Project Beaver test conducted at ER Site 72 involved the detonation of a continuous rod warhead containing C-4 explosive, which caused the surrounding steel rods to expand and cut down trees. When expanded, the device formed a 100-ft-diameter ring, which corresponds to the approximately 100-ft-diameter cleared area at ER Site 72. The only hazardous waste or constituent used in the test was C-4 explosive. However, because the detonation of C-4 explosive is "high order," all of the C-4 explosive would have been expended, leaving no residue.

3.3 Presence or Absence of Visual Evidence

The approximate 100-ft-diameter clearing produced from the continuous rod warhead is the only physical evidence of the experiment. This is supported by a 1987 aerial photograph that shows nothing more than an area cleared of trees (Figure 2-4a-c) (USGS 1987). Stainless steel rods and shrapnel, which would be the only potential physical test debris, were not observed during walkover surveys conducted in 1993 (72-7, 72-8).

3.4 Results of Previous Sampling/Surveys

In June 1994, KAFB Explosive Ordnance Division (EOD) conducted a surface visual survey for unexploded ordnance (UXO) and HE at ER Site 72. No UXO/HE or ordnance debris was found at the site (72-10).

3.5 Assessment of Gaps in Information

Although no previous environmental sampling data exist to verify the absence of potential constituents of concern, it is believed from the process description and test report (72-15) that a release of hazardous constituents did not occur. The C-4 explosive used in the test was

completely expended by the detonation, leaving no residue. Based on UXO/HE results, there is no physical evidence for a release of C-4 explosive (72-10), and interviewees familiar with the test have indicated that no explosive residues would have remained (DOE September 1987; 72-4, 72-7). Available data are sufficient to determine the potential for release of hazardous constituents from the site, but based on regulatory input, confirmatory sampling was completed. The analytical data from confirmatory soil samples collected in May 6, 1996 (discussed below), are sufficient to determine whether releases of COCs occurred at the site.

3.6 Confirmatory Sampling

Although the likelihood of hazardous waste releases at ER Site 72 was considered low, confirmatory soil sampling was conducted to determine whether COCs at detectable levels were released. One sample location was in the center (ground zero) of the site, and four sample locations were in each of the four cardinal directions at the margin of the cleared area (Figure 3-1). Each location was sampled at the 0- to 6-in. and 6- to 12-in. intervals using a scoop sampler in accordance with ER FOP 94-52 (SNL/NM January 1995). A single duplicate sample was collected from the 0- to 6-in.-depth interval at the ground-zero location. All samples were analyzed off site for HE using EPA Method 8330. HE was not detected in any of the samples.

3.7 Rationale for Pursuing an NFA Decision

The site was used once on September 18, 1968, (72-15) to determine the feasibility of clearing a wooded area for a helicopter landing site using a continuous rod warhead (72-7, 72-8, 72-15). No visual evidence remains of any C-4 explosive because all C-4 explosive was likely expended in the high-order detonation.

Approximately 18 years after the site was abandoned, an inspection conducted under the CEARP reported HE to be the only hazardous material used in this study and that no residues were expected to remain (DOE September 1987; 72-4, 72-7). No further action was planned under the CEARP (DOE September 1987).

In June 1994, a UXO/HE survey conducted by KAFB EOD found no live UXO/HE or ordnance debris at the site (72-10). Confirmatory sampling showed no detectable levels of HE at the site. Accordingly, based on historical information (72-15) and confirmatory sampling, ER Site 72 is being proposed for an NFA decision because 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).

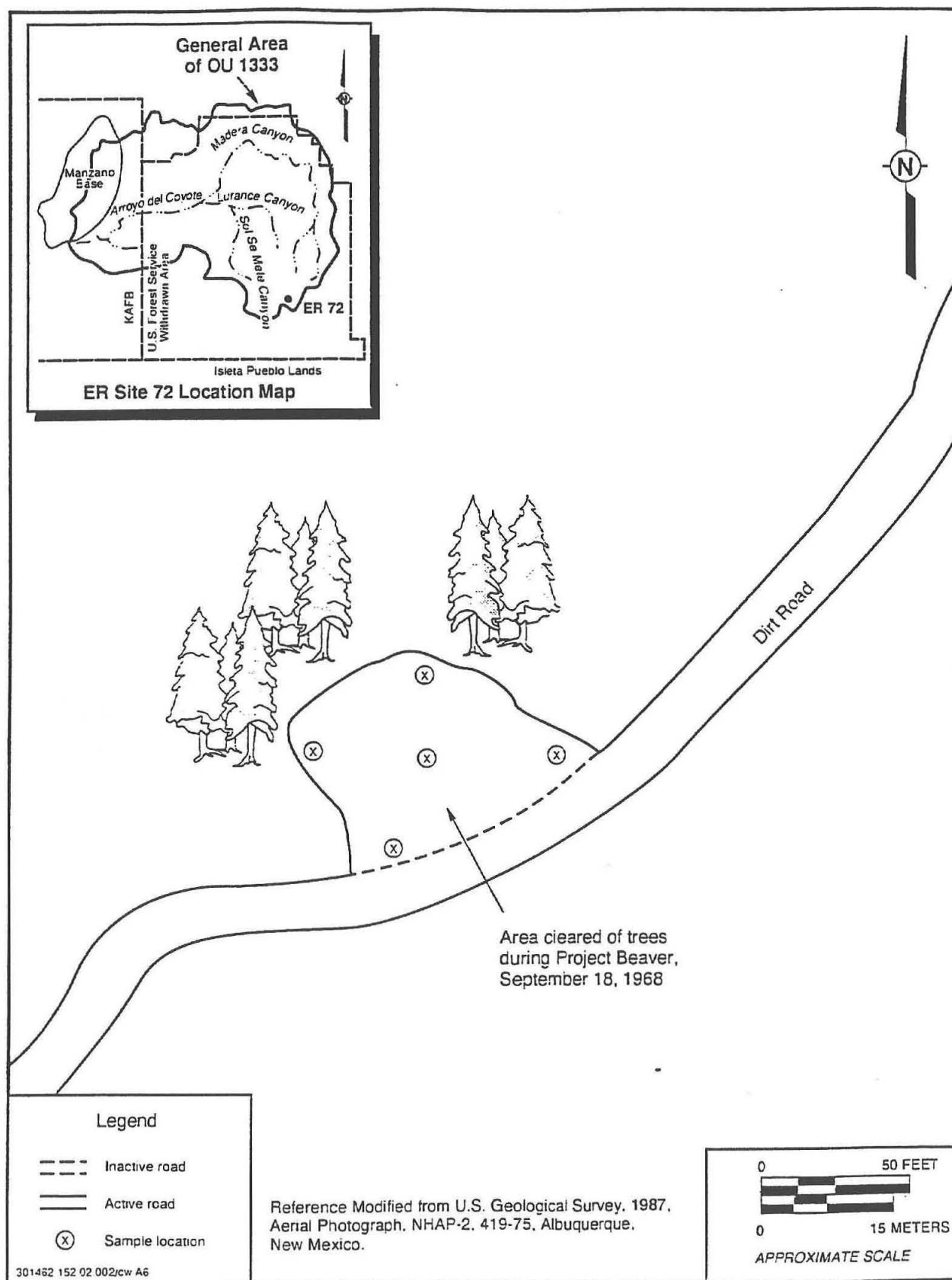


Figure 3-1
Sampling Locations at ER Site 72, Operation Beaver Site

4.0 CONCLUSION

Based upon the evidence cited above, no potential remains for a significant release of hazardous waste (including hazardous constituents) that may pose a threat to human health or the environment. Therefore, ER Site 72 is recommended for an NFA determination.

5.0 REFERENCES

5.1 ER Site Bibliography

Section 5.1 contains a comprehensive bibliographical list of the documents relating to ER Site 72. This list is arranged numerically by the numbers assigned to each document.

ER Site Reference Number	Reference
72-1.	Sandia National Laboratories/New Mexico, May 1993, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-001, Sandia National Laboratories, Albuquerque, New Mexico.
72-2.	Sandia National Laboratories/New Mexico, October 1985, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-002, Sandia National Laboratories, Albuquerque, New Mexico.
72-3.	Sandia National Laboratories/New Mexico, September 1985, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-003, Sandia National Laboratories, Albuquerque, New Mexico.
72-4.	Sandia National Laboratories, May 1986. "CEARP Phase I, Draft," Sandia National Laboratories, Albuquerque, New Mexico.
72-5.	Site 72 Photographs, 1993. Sandia National Laboratories, Albuquerque, New Mexico.
72-6.	Reference removed/not applicable to site.
72-7.	Karas, P. Site Visit with D. Bickel and K. Gaither, Sandia National Laboratories, Albuquerque, New Mexico, June 17, 1993.
72-8.	Gaither, K. Site Visit with D. Bickel and P. Karas, Sandia National Laboratories, Albuquerque, New Mexico, June 17, 1993.
72-9.	Sandia National Laboratories, [n.d.]. Site 72 Map, Albuquerque, New Mexico.
72-10.	Young, M. Memorandum to Distribution, Sandia National Laboratories, Albuquerque, New Mexico, September 1, 1994.
72-11.	Sandia National Laboratories, November 1994. Environmental Restoration Project Information Sheet for ER Site 72, Beaver Site, Sandia National Laboratories, Albuquerque, New Mexico.

- 72-12. Sandia National Laboratories/New Mexico, November 1994, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-004, Sandia National Laboratories, Albuquerque, New Mexico.
- 72-13. Sandia National Laboratories/New Mexico, December 1994, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-005, Sandia National Laboratories, Albuquerque, New Mexico.
- 72-14. Sandia National Laboratories/New Mexico, December 1994, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-006, Sandia National Laboratories, Albuquerque, New Mexico.
- 72-15. Suber, L.A., January 1970. "Project Beaver," Sandia National Laboratories, Albuquerque, New Mexico.

5.2 Reference Documents

DOE, see U.S. Department of Energy.

EPA, see U.S. Environmental Protection Agency.

New Mexico Environment Department (NMED), November 1995. "Environmental Restoration Document of Understanding," New Mexico Environmental Department, Santa Fe, New Mexico.

NMED, see New Mexico Environment Department.

Sandia National Laboratories/New Mexico, January 1995. "Spade Scoop Method for Collection of Soil Samples," FOP 94-52, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), September 1994. "Mean Elevation and Acreage Computation Report," GIS Group, Environmental Restoration Department, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), July 1994. "Ownership (Land Use), Canyons Test Area—ADS 1333," GIS Group, Environmental Restoration Department, Sandia National Laboratories, Albuquerque, New Mexico.

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

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

U.S. Department of Agriculture (USDA), June 1977. "Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico," Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C.

U.S. 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," U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, New Mexico.

USDA, see U.S. Department of Agriculture.

U.S. Environmental Protection Agency (EPA), August 1993. Module IV of RCRA Permit No. NM 5890110518, EPA Region 6, 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 6, issued to Sandia National Laboratories, Albuquerque, New Mexico.

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, Washington, D.C.

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

5.3 Aerial Photograph

United States Geological Survey (USGS), 1987. Aerial Photograph, NHAP-2, 419-75, Albuquerque, New Mexico.

USGS, see United States Geological Survey.



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

January 2000

**ER Site 72
Operable Unit 1333
Round 5**

RSI Originally Submitted May 1998

OU 1333***ER Site 72, Operation Beaver Site***

ER Site 72 is appropriate for NFA petition, pending submittal of a final site map (Figure 1-1) (see general comment 1).

Response: A final site map, Figure 1-1, is included in Attachment A of the General Comments section of this submittal. Please also refer to the response to General Comment 1.

ER Site 93A, B, and C; Madera Canyon Rocket Launcher Pads A, B, and C

ER Site 93 is appropriate for NFA petition, pending submittal of a final site map (Figure 1-1) (see general comment 1).

Response: A final site map, Figure 1-1, is included in Attachment A of the General Comments section of this submittal. Please also refer to the response to General Comment 1.

However, for the record, HRMB has three comments. The first comment explains HRMB's decision to support the NFA proposal. The second comment is editorial; whereas, the third comment expresses a concern that must be addressed for a related site.

1. **Table 3-2, Page 3-8 -- The upper tolerance limit for Pb (52.1 mg/kg), taken from Anonymous (1996), is not an approved background concentration. However, analytical results of the characterization samples are low enough that they are unlikely to exceed the background concentration for Pb that will eventually be approved for this part of the Kirtland Air Force Base area. This conclusion is based on 1.) the maximum Pb concentration of DOE OB background samples is 39 mg/kg, and 2.) the proposed background concentration in SNL's "2nd Canyons Background Study" is 18.9 mg/kg. Because the maximum concentration of the characterization samples is 11.3 mg/kg, HRMB concludes that no significant release of Pb has occurred as a result of testing activities at ER Site 93.**

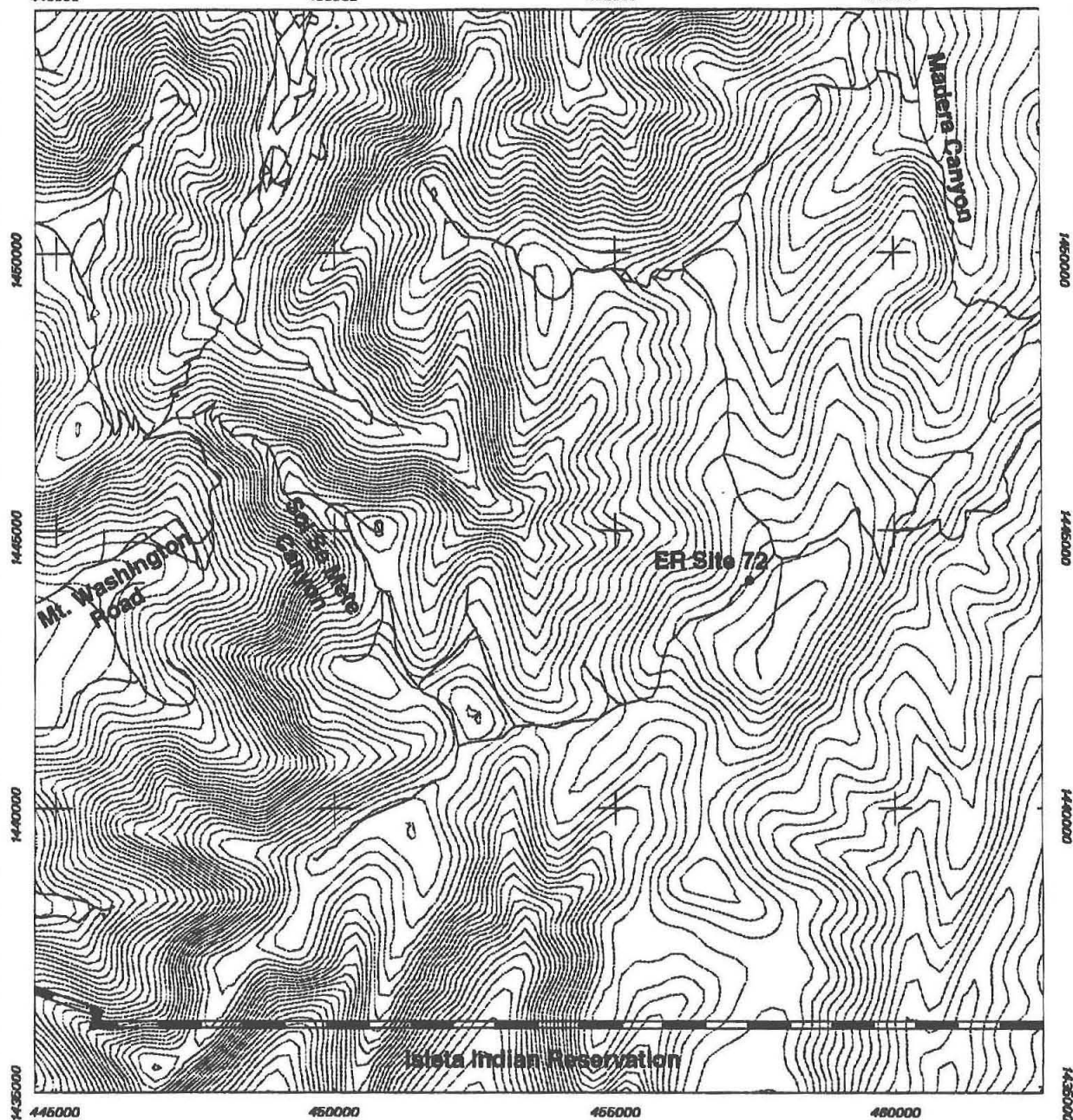
Response: Comment noted.

2. **The title of Table 3-2 is confusing, suggesting that the samples were *collected offsite* (instead, the samples were analyzed by an offsite laboratory).**

Response: Comment noted.

3. **Page 2-7, last paragraph, last sentence -- Although the impact area is not considered a part of ER Site 93, HRMB does not understand and requests clarification for the statement that the "USAF maintains responsibility for the impact area".**

ATTACHMENT A
FINAL SITE MAPS FOR
OU 1333



Legend

-  Road
-  40 Foot Contour
-  KAFB Boundary
-  ER Site 72

Figure 1-1-
OU 1333
Canyons Test Area

