

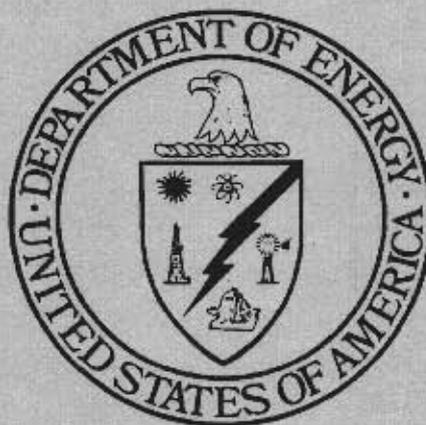


Sandia National Laboratories / New Mexico

**PROPOSAL FOR NO FURTHER ACTION
ENVIRONMENTAL RESTORATION PROJECT
SITE 72, OPERATION BEAVER SITE
OPERABLE UNIT 1333**

June 1995

**Environmental
Restoration
Project**



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

PROPOSAL FOR
NO FURTHER ACTION
Environmental Restoration Project

Site 72, Operation Beaver Site
Operable Unit 1333

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

Prepared for the
United States Department of Energy



1. Introduction

1.1 ER Site Identification Number and Name

Sandia National Laboratories/New Mexico (SNL/NM) is proposing an administrative 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) [Environmental Protection Agency (EPA August 1992)].

1.2 SNL/NM Administrative NFA Process

This proposal for a determination of an administrative NFA decision has been prepared using the criteria presented in Section 4.5.3 of the SNL/NM Program Implementation Plan (PIP) (SNL/NM February 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).

In requesting an administrative NFA decision for ER Site 72, Operation Beaver Site, this proposal is using existing administrative/archival information to satisfy the permit requirements. 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 72 is being proposed for an administrative NFA decision because the site has clearly not released hazardous waste or constituents into the environment (Criterion C).

1.3 Local Setting

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

ER Site 72 (Figure 1-1) is located on land listed as United States Air Force unassigned (SNL/NM July 1994). The site is situated on a northwest slope approximately 0.4 mile north of Manzano Lookout Tower (72-9). 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 mile west of the turnoff to Manzano Lookout Tower (72-7, 72-8, 72-9). The site lies on approximately 0.72 acres of land at a mean elevation of 7,855 feet 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 limestone). The site is situated on a topographic divide between the headwaters of Madera Canyon and the upper reach of Sol se Mete Canyon. Immediate topographic relief around the site is approximately 100 feet to the ridge of the Manzano Lookout Tower and 600 feet to the floor of Sol se Mete Canyon. Due to its location on a remote bedrock hillside, hydrologic conditions at ER Site 72 are not defined. Based on a similar geologic setting in Sol se Mete Canyon, the site may lie in a general recharge area with depth to ground water in excess of 200 feet. 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 mile northwest of ER Site 72 in the upper reach of Lurance Canyon. Depth to the first saturated ground water conditions at the Burn Site Well is nearly 240 feet and occurs in bedrock fractures under confined- to semiconfined-hydraulic conditions. Local ground water flow may be directed toward the topographically lower canyon area where some discharge may occur at small seeps and springs, such as Sol se Mete Spring located approximately 1 mile 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. History of the SWMU

2.1 Sources of Supporting Information

In preparing to request an administrative NFA decision for ER Site 72, a background study was conducted to collect available and relevant site information. Background information sources included existing records and reports of site activity. Classified technical reports were examined and pertinent material was extracted through a declassification process. In addition, interviews were conducted with SNL/NM staff and contractors familiar with site operational history. The study was completely documented and has provided traceable references that sustain the integrity of this proposal.

The following information sources, hierarchically listed with respect to assigned validity, were available for use in the evaluation of ER Site 72:

- One SNL/NM technical report on the test conducted at the site
- One unexploded ordnance/high explosives (UXO/HE) survey report
- Three interviews with current and retired facility personnel
- Miscellaneous information sources, including the SNL/NM Geographic Information System
- Photographs and field notes from several site inspections conducted by SNL/NM staff
- The Comprehensive Environmental Assessment and Response Program (CEARP) Phase I report (DOE September 1987) and CEARP records contained in the Environmental Operations Record Center

Using this information, a brief history of ER Site 72, and a discussion of all relevant evidence regarding past practices and releases at the site have been prepared and are presented in this proposal for an administrative NFA decision.

2.2 Previous Audits, Inspections, and Findings

ER Site 72 was first listed as a potential release site based on CEARP interviews in 1985 (DOE September 1987), which noted that HE were used in a tree-clearing test performed at the site. This Vietnam Era test, conducted on September 18, 1968, used explosive-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 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) finding was negative for Federal Facility Site Discovery and Identification Findings (FSDIF), Preliminary Assessment (PA), and Site Inspection (SI); therefore, no Hazard Ranking System or Modified Hazard Ranking System migration mode scores were calculated for the SWMU (DOE September 1987). The SWMU received a no further action recommendation and was not investigated further (DOE September 1987).

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

2.3 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 explosive-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 if 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 of Composition-4 (C-4) explosives were placed in the innermost layer of the cylinder and detonated, producing an expanding steel perimeter that cut down trees and vegetation within a 50 foot 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 explosives, which are comprised of predominantly RDX¹ (Table 2-2). Because the detonations were high order, all of the HE were transferred to thermal energy and no explosive residues are expected to remain (DOE September 1987) (72-4, 72-7).

3. 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 x 2 inches, 6 to 8 feet long) that were welded together at alternate ends and stacked in a cylinder surrounding approximately 305 pounds of C-4 explosives (DOE September 1987) (72-2, 72-3, 72-4, 72-7, 72-8, 72-15). When the C-4 explosives were detonated, the rods expanded to clear the surrounding area of trees. The device was used only once at the 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 explosives, which caused the surrounding steel rods to expand and cut down trees. When expanded, the device formed a 100-foot diameter ring, which corresponds to the approximately 100-foot diameter cleared area at ER Site 72. The only hazardous waste or constituent used in the test was C-4 explosives. However, because the detonation of C-4 explosive is high order, all the C-4 explosives would have been expended, leaving no residue.

3.3 Presence or Absence of Visual Evidence

The approximate 100-foot diameter clearing produced from the continuous rod warhead is the only physical evidence of the experiment. This is supported by a 1987 aerial photograph which shows nothing more than an area cleared of trees (Figure 2-4a, b). 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).

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

3.4 Results of Previous Sampling/Surveys

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

3.5 Assessment of Gaps in Information

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

3.6 Rationale for Pursuing an Administrative NFA Decision

SNL/NM is proposing an administrative NFA decision for ER Site 72 because the SWMU clearly has not released hazardous waste or constituents into the environment (Criterion C). 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 explosives, as all C-4 explosives were expended in the high order detonation. Therefore, no constituents of concern exist at the site.

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 residue was 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). Therefore, based on recent surveys (72-10) and historical information (72-15), ER Site 72 is recommended for an administrative NFA decision because the SWMU clearly has not released hazardous waste or constituents into the environment (Criterion C).

4. Conclusion

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

5. References

5.1 ER Site References

Section 5.1 contains a comprehensive bibliographical list of the documents relating to ER Site 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 (SNL/NM), May 1993, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-001.
72-2.	Sandia National Laboratories/New Mexico (SNL/NM), October 1985, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-002.
72-3.	Sandia National Laboratories/New Mexico (SNL/NM), September 1985, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-003.
72-4.	Sandia National Laboratories/New Mexico (SNL/NM), May 1986, "CEARP Phase I, Draft," Sandia National Laboratories, Albuquerque, New Mexico.
72-5.	Site 72 Photographs, 1993, Sandia National Laboratories/New Mexico (SNL/NM), 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/New Mexico (SNL/NM), Albuquerque, New Mexico, June 17, 1993.
72-8.	Gaither, K., Site Visit with D. Bickel and P. Karas, Sandia National Laboratories/New Mexico (SNL/NM), Albuquerque, New Mexico, June 17, 1993.
72-9.	Sandia National Laboratories/New Mexico (SNL/NM), [n.d.], Site 72 Map, Albuquerque, New Mexico.
72-10.	Young, M., Memorandum to Distribution, Sandia National Laboratories/New Mexico (SNL/NM), Albuquerque, New Mexico, September 1, 1994.

- 72-11. Sandia National Laboratories/New Mexico (SNL/NM), 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 (SNL/NM), November 1994, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-004.
- 72-13. Sandia National Laboratories/New Mexico (SNL/NM), December 1994, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-005.
- 72-14. Sandia National Laboratories/New Mexico (SNL/NM), December 1994, Environmental Operations Records Center, Record Number ER/1333 072/INT/95-006.
- 72-15. Suber, L.A., January 1970, "Project Beaver," Sandia National Laboratories, Albuquerque, New Mexico.

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 I: Installation Assessment, Sandia National Laboratories, Albuquerque, New Mexico."

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.

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

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

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

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.

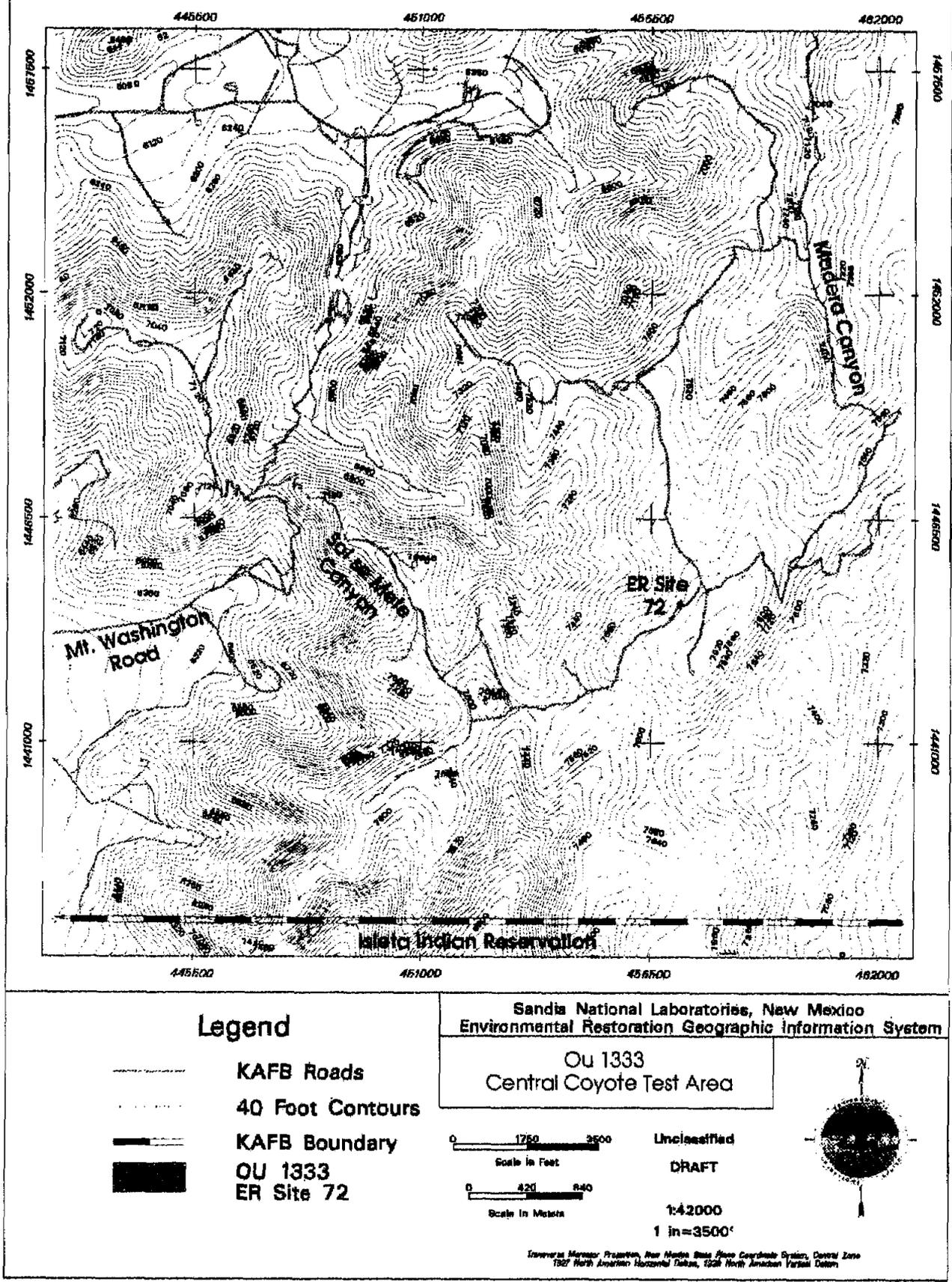
U.S. Environmental Protection Agency (EPA), July 1990, "Corrective Action for Solid Waste Management Units (SWMU) at Hazardous Waste Management Facilities, Proposed Rule," *Federal Register*, Vol. 55, Title 40, Parts 264, 265, 270, and 271.

U.S. Environmental Protection Agency (EPA), 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), October 1986, "RCRA Facility Assessment Guidance," EPA/530-86-053, PB87-107769, Washington, D.C.

5.3 Aerial Photograph

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



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



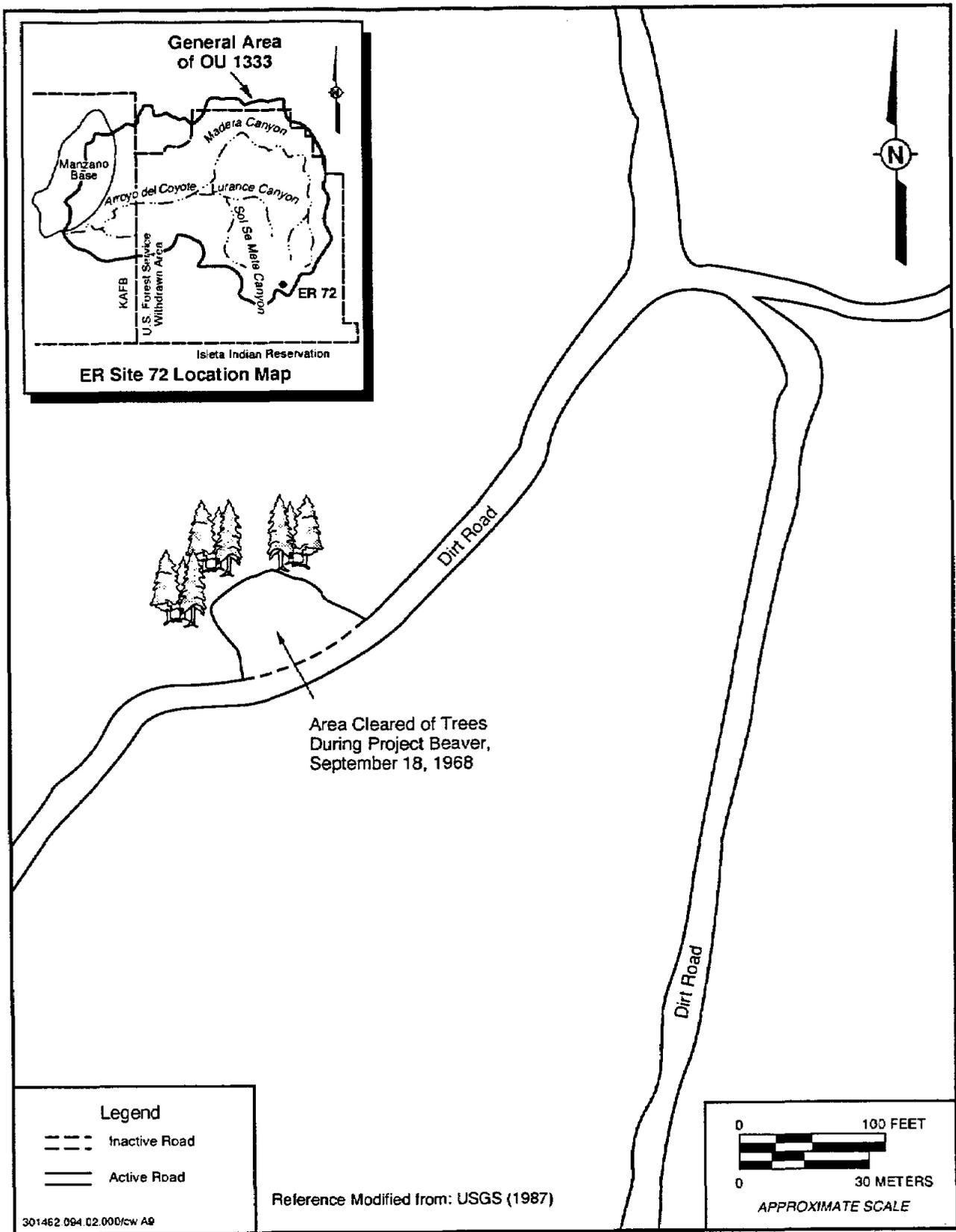


Figure 2-1. Site Map of Site 72, Operation Beaver Site

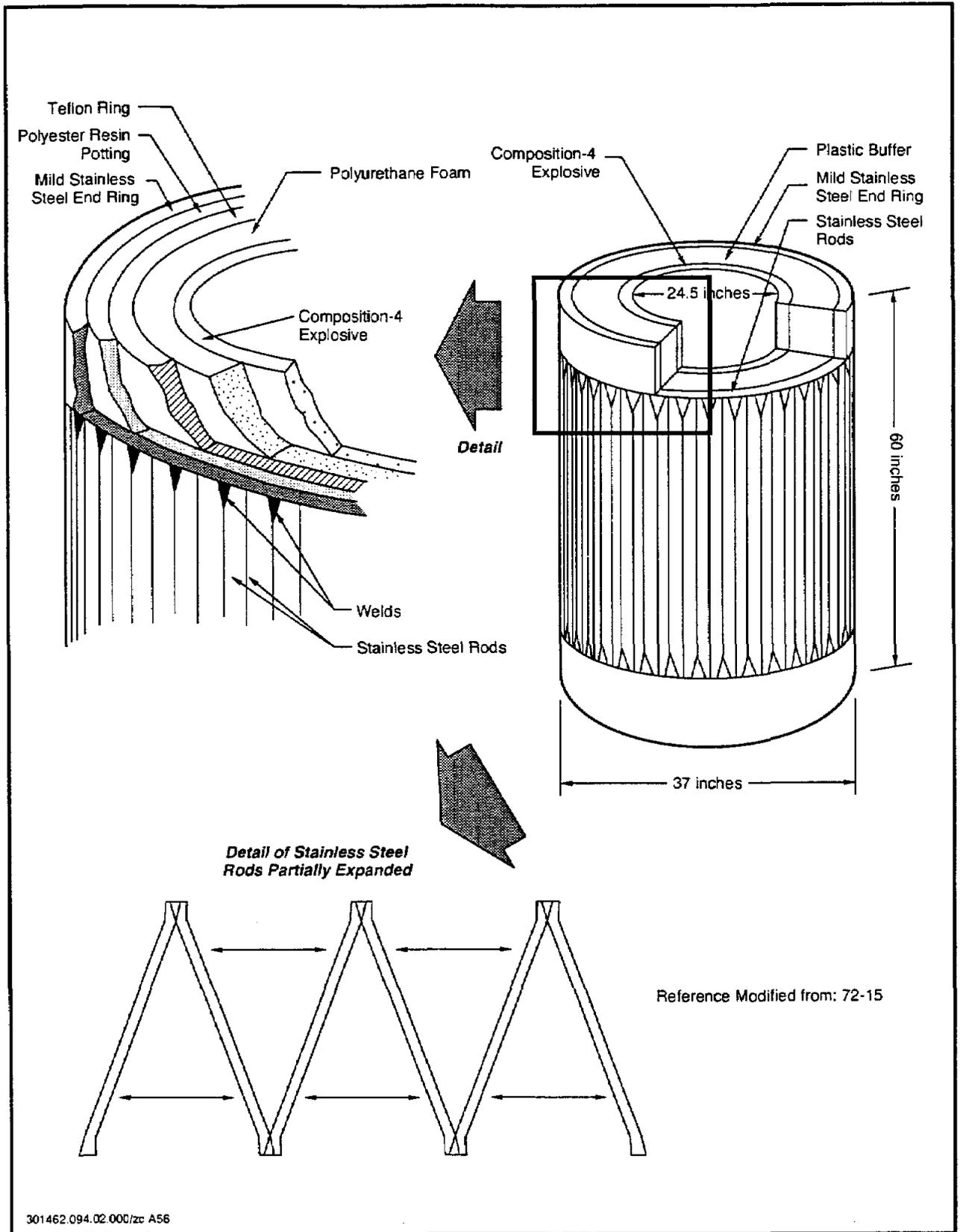


Figure 2-2. Design and Detail of Continuous Rod Warhead

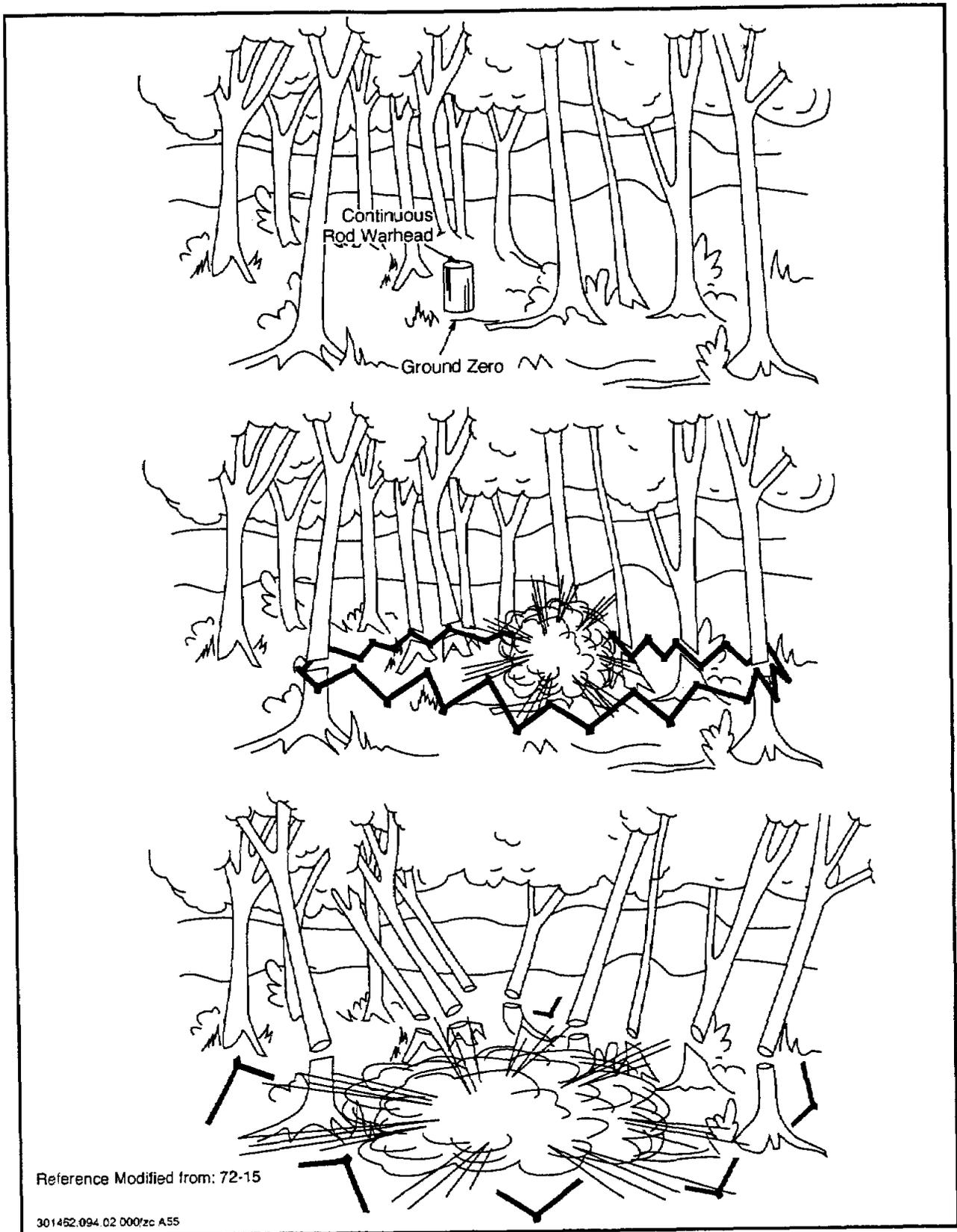


Figure 2-3. Continuous Rod Warhead Operation





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.

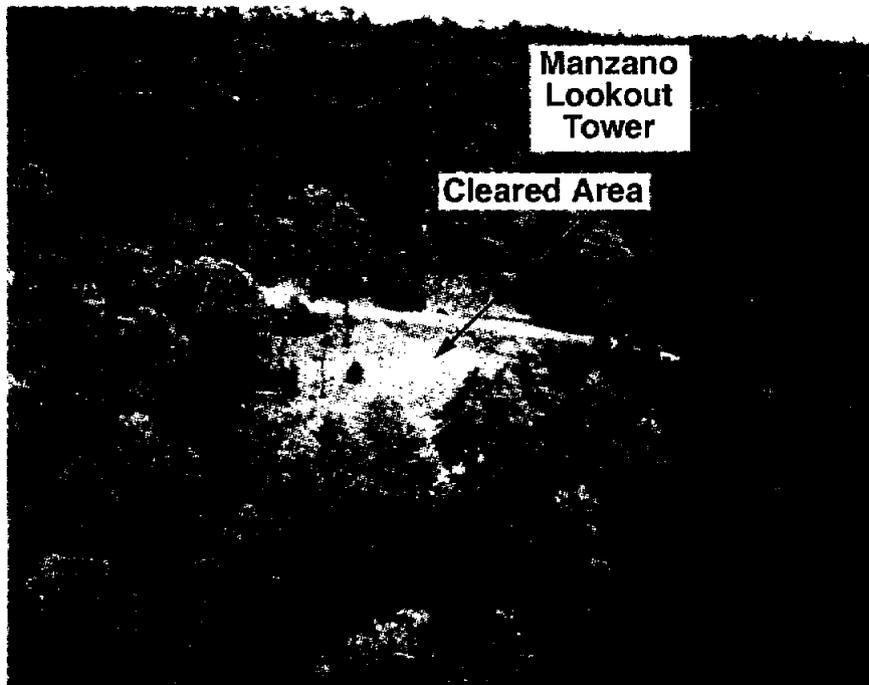


Figure 2-4b. Photograph of 100-foot diameter clearing produced by Project Beaver, also taken in 1987. View to the southeast.

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 2-4 (Concluded)
ER Site 72 Photograph**



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

Notes

Reference modified from: 72-15.

Table 2-2. Chemistry of Composition-4 (C-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)

Notes

Reference: Dobratz and Crawford January 1985.

C = Carbon.

H = Hydrogen.

N = Nitrogen.

O = Oxygen.

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

