Sandia National Laboratories/New Mexico

PROPOSAL FOR NO FURTHER ACTION ENVIRONMENTAL RESTORATION PROJECT SITE 114, EXPLOSIVE BURN PIT OPERABLE UNIT 1303

June 1996

Environmental Restoration Project

United States Department of Energy
Albuquerque Operations Office

PROPOSAL FOR
NO FURTHER ACTION
ENVIRONMENTAL RESTORATION PROJECT

SITE 114, EXPLOSIVE BURNPIT
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Prepared by Sandia National Laboratories/New Mexico
Environmental Restoration Project
Albuquerque, New Mexico

Prepared for the
United States Department of Energy

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1. INTRODUCTION

1.1 ER Site Identification Number and Name

Sandia National Laboratories/New Mexico (SNL/NM) is proposing a No Further Action (NFA) decision based on a voluntary corrective measure (VCM) for Environmental Restoration (ER) Site 114, the Explosive Burn Pit (EBP) Operable Unit (OU) 1303. The Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) did not assign a RFA number to the EBP (EPA 1987). ER Site 114 was identified as the Explosive Burn Pit in the Hazardous and Solid Waste Amendment (HSWA) Module IV (EPA 1993) of the SNL/NM RCRA Hazardous Waste Management Facility Permit (NM5890110518) (EPA 1992).

1.2 SNL/NM Administrative NFA based on Confirmatory Sampling

This proposal for a decision of NFA based on confirmatory sampling was prepared using the criteria presented in Annex B, NFA Process and Criteria, of the Document of Understanding (DOU 1996). This proposal must provide sufficient documentation to reasonably assure that an NFA is appropriate.

This request for an NFA decision for ER Site 114, the EBP, is based primarily on analytical results of confirmatory soil samples collected from the bottom of three EBP excavations. Concentrations of site-specific constituents of concern (COCs) were first compared to background upper tolerance limit (UTL) concentrations of COCs found in SNL/NM soils (SNL 1996). If no background data were available for a particular COC, concentrations of that constituent were compared to Proposed 40 CFR Part 264 Subpart S (Subpart S) soil action levels for the COC of interest (EPA 1990). Concentrations of contaminants at this site were found to be less than either or both of background UTLs or Subpart S action levels. This unit is therefore eligible for a NFA proposal based on the following criterion taken from the DOU:

NFA Criterion 5: The potential release site (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.

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, 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 114 (Figure 1-1) is owned by the DOE. The site is located outside the western portion of Technical Area II (TA-II), immediately south of the entrance gate and northwest of the Building 901 septic system leachfield. TA-II, one of five Technical Areas within SNL/NM, is diamond-shaped, approximately 1450 feet on a side, and encompasses 45 acres.

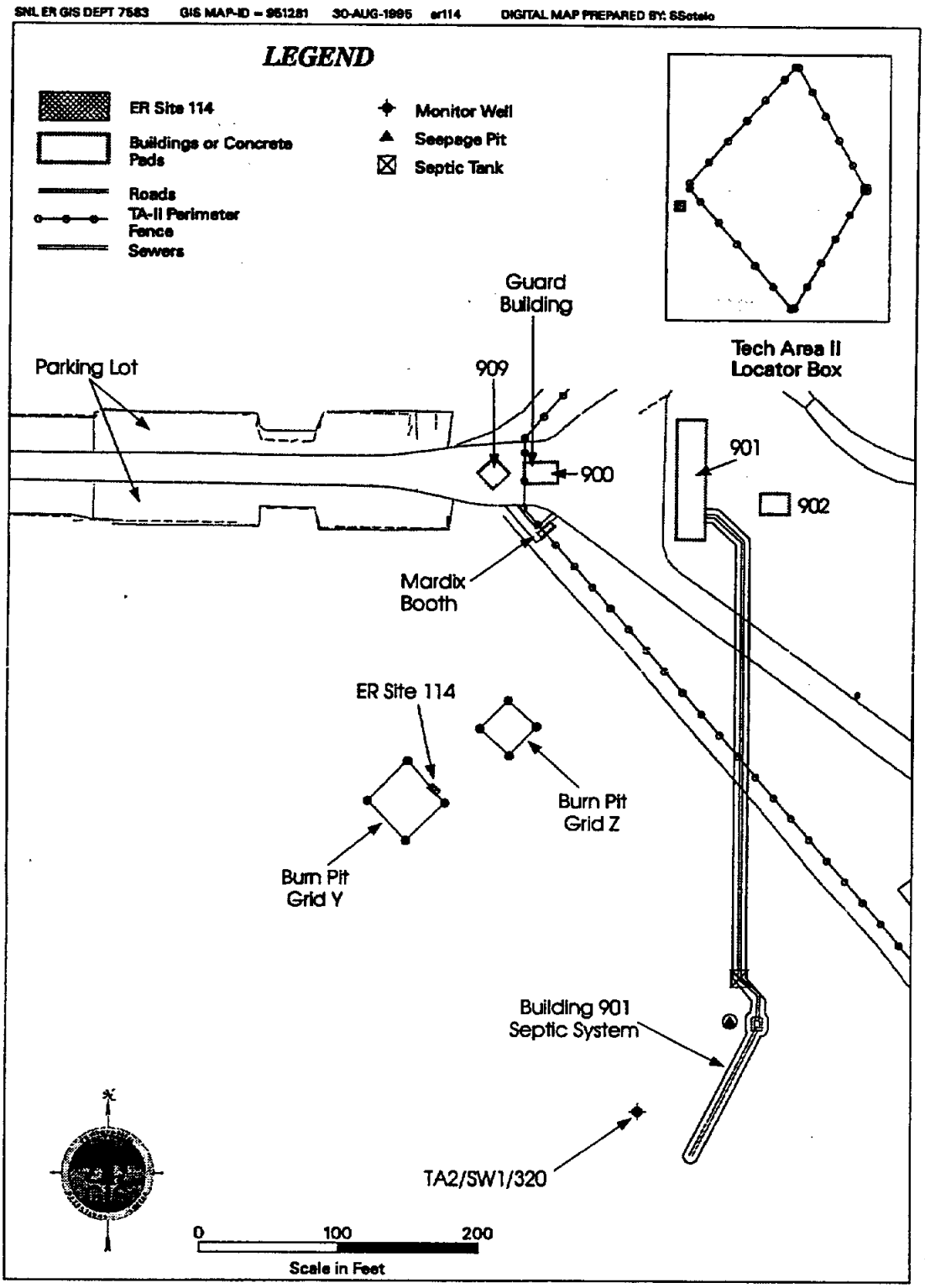

Figure 1-1. Map showing the location of the former Explosive Burn Pit area (ER Site 11), TA-11, SNL/NM.

The center of TA-II is approximately 3000 feet south of TA-I, the location for most administrative and research activities. TA-II abuts TA-IV to the south. TA-II is surrounded by a 10-feet high chain link fence, with a security gate at the west corner. TA-II currently contains 22 buildings and four mobile offices. The majority of the area has been vacated due to the occupancy of the new Explosive Component Facility. TA-II future land use has been designated as industrial.

TA-II lies west of the basin-bounding fault complex and northwest of the Tijeras Arroyo fault, which are the two main structural features of the Albuquerque Basin. The geologic materials consist of thick alluvial sediments which overlie deep bedrock. An alluvial fan and piedmont colluvium overlie Santa Fe Group strata. The Santa Fe deposits are estimated to be approximately 3,000 feet thick beneath TA-II (Hawley and Haase 1992). Detailed descriptions of the regional geology are in the annual Site-Wide Hydrogeologic Characterization Project (SWHCP) 1995 Annual Report (SNL 1995a).

SWHCP soil surveys and surficial mapping activities provide general soil characteristics for TA-II. Soil associated with the escarpments of Tijeras Arroyo is poorly developed, such as the Bluepoint-Kokan Association (Hacker 1977). Areas underlain by this soil series, however, locally contain well-developed calcic horizons, which are the remnants of the Tijeras, Wink, and Madurez soil originally developed on older surficial deposits. The Bluepoint-Kokan soil reflects erosion of older soil and is characterized by discontinuous soil horizons. The heterogeneity would be expected to strongly influence the location and rates of infiltration and geochemical interactions between soil and percolating water (SNL 1995a). TA-II is characterized as having an average surface soil permeability of approximately 0.1 inch per hour (SNL 1995a).

No perennial surface-water bodies are present within TA-II or in the immediate vicinity of the area. However, a large ephemeral surface drainage, Tijeras Arroyo, is located directly southeast of TA-II. TA-II is located outside the 100- and 500-year floodplains of Tijeras Arroyo.

Depth to regional groundwater in the vicinity of TA-II is approximately 540 feet below ground surface (BGS), with a shallower water-bearing unit present at approximately 300 feet BGS (SNL 1995). The gradient of regional groundwater is to the north-northwest. In the shallower saturated zone, the groundwater gradient is to the south-southeast. No water supply wells are present within TA-II.

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2. HISTORY OF THE SWMU

2.1 Sources of Supporting Information

In preparation for requesting an administrative NFA decision based on confirmatory sampling for ER Site 114, a background study was conducted to collect available and relevant site information. Background information sources included existing records and reports of site activity. 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 which sustain the integrity of this proposal.

The following information sources were available for use in the evaluation of ER Site 114:

- Interviews;
- The Site-Wide Hydrogeologic Characterization Project 1995 Annual Report;
- The Groundwater Protection Program Calendar Year 1995 Annual Groundwater Monitoring Report;
- Sequential historical aerial photographs from 1951 to 1992;
- One hundred and eighty-five boreholes drilled in the suspected area of the explosive burn pits in order to accurately pinpoint locations; and
- Voluntary corrective measures performed at three explosive burn pit locations.

Utilizing this information, a brief history of ER Site 114 and a discussion of all relevant evidence regarding past waste practices and releases at the site have been prepared and are presented in this proposal for an administrative NFA decision based on confirmatory sampling.

2.2 Previous Audits, Inspections, and Findings

The 1987 RCRA RFA did not assign a RFA number to the explosive burn pit (EPA 1987). The 1987 Comprehensive Environmental Assessment and Response Program (CEARP) Phase 1 (DOE 1987) is summarized below.

A small pit (Site 114), located to the right of the main TA-II entry gate, was reportedly used for burning high-explosives residues from bomb-assembly activities. Some of the explosives contained barium, which may remain in the area.

2.3 Historical Operations

The EBP area was reportedly used for burning residues of high explosive (HE) compounds resulting from bomb assembly during the late 1940s through the middle-to-late 1950s, when weapons assembly was discontinued at TA-II. The exact types and amounts of HE compounds burned in the pit area are not well known. During weapons assembly, some small blocks and shavings of HE did not meet the required specifications. These scrap pieces were thought to be less than one pound each and were subsequently burned in the EBP area. Some pieces of scrap reportedly contained barium, which may have been a component in Baratol (barium nitrate) and Compound B. Baratol commonly was mixed with 2,4,6-trinitrotoluene (TNT). Cyclotrimethylenetrinitramine (RDX) also was reportedly burned in the pit area. Other potential COCs that may have been associated with the HE compounds burned at the pit area include cadmium and lead.

3. EVALUATION OF RELEVANT EVIDENCE

3.1 Unit Characteristics

The EBP is not evident today. Furthermore, dimensions and configuration of the EBP in the years during its use are not accurately known. It was not clear from the interviews if one or two pits were used at the site. It has been reported that the EBP consisted of a section of four-ft diameter culvert standing on end. The culvert was above ground and was four to five-ft high. It is not known if the culvert was sealed on the bottom or if it sat directly on the ground surface (Haines, Kelly and Cochran 1991). However, some other former SNL/NM personnel have stated that the site may have consisted of two, four-ft diameter burn pits (Anonymous No Date). Another SNL employee recalled that there were two burn pits that were approximately four x two x two feet. The (single) burn pit was also reportedly moved a short distance once (Anonymous No date; Haines, Kelly and Cochran 1991). Another report states that a controlled burn of three-fourths of a pound of Compound B and Baratol was located in a ditch about 125 feet southwest of the entrance gate to Area II (Byrd 1991).

3.2 Operating Practices

No operating practices are known that would have limited environmental impact.

3.3 Presence or Absence of Visual Evidence

The EBP was not visually evident on the ground surface. However, a detailed interpretation and digital mapping of sequential historical aerial photographs identified three potential EBP areas. All obvious subsurface burned residue and debris was removed from these EBP areas and containerized during VCM activities. No visual evidence of contamination remained after VCM activities were complete.

3.4 Results of Previous Sampling/Surveys

The EBP was tentatively identified in 1992 from visual analysis of historical aerial photographs. The detailed interpretation and digital mapping of sequential historical aerial photographs had not yet been conducted. Based on this visual analysis, between September 3 and 22, 1992, 185 boreholes were drilled to six feet BGS on a four-foot grid pattern to more accurately locate the EBP (IT 1993). Two grids were informally named Burn Pit Grid Y (BPY) and Burn Pit Grid Z (BPZ) (Figure 3-2). The 370 soil samples collected (three and six-foot depths per borehole) were analyzed for total RCRA metals and HE compounds. All samples were field-screened for VOCs with a HNu photoionization detector (PID) and for alpha, beta, and gamma radiation using alpha scintillation and Geiger-Mueller (G-M) radiation instruments. On-site headspace field-screening did not detect VOCs in any soil sample collected at the EBP. Radiation-screening results of soil samples were all within 80 to 120 counts per minute (beta/gamma). The raw data, along with QA/QC documentation, are readily available and can be viewed in the Environmental Operations (EO) Records Center.

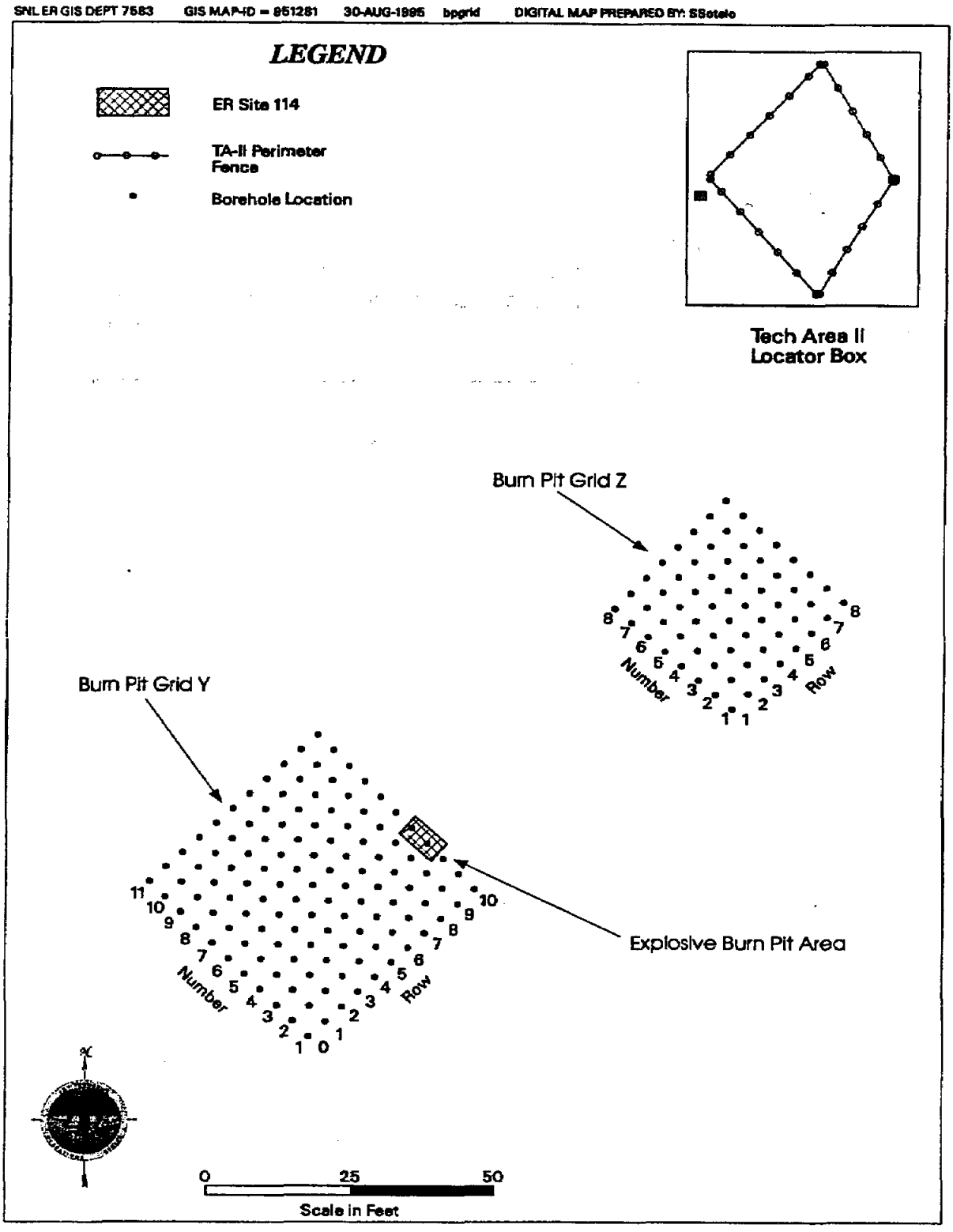

Figure 3-2. Map showing Explosive Burn Pit Grids BPY and BPZ and the locations of boreholes drilled at each grid location, TA-II, SNL/NM.

With the exception of Boreholes BPY-10,4 (row, number) and BPY-10,5 (Figure 3-3), concentrations of metals of concern, based on site history, include barium to 462 milligrams per kilogram (mg/kg) cadmium to 1.5 mg/kg, and lead to 22.2 mg/kg.

Soil samples collected from Boreholes BPY-10,4 and BPY-10,5 contained elevated metal concentrations, probably attributable to EBP activities. The maximum concentrations of metals in soil collected from these locations were barium at 23,800 mg/kg (BPY-10,5 at 6')[site-wide UTL 200 mg/kg (surface 0 - 6") and 336 mg/kg (subsurface > 2')], cadmium at 16.8 mg/kg (BPY-10,5 at 6')[site-wide UTL - 1.6 mg/kg (surface) and 0.9 mg/kg (subsurface)], and lead at 110 mg/kg (BPY-10,4 at 6')[site-wide UTL - 68 mg/kg (surface) and 11.2 mg/kg (subsurface)].

All soil samples collected in the vicinity of the EBP area were analyzed for HE compounds. Only Borehole BPY-10,5 contained detectable concentrations of HE [at six feet, where RDX was detected at 3.1 micrograms per gram (ug/g) (IT 1993)]. No other HE compounds (i.e. nitroaromatics or nitroamines) were detected in any other soil sample collected in the vicinity of the EBP (IT 1993).

Except for barium, no other metals collected from the EBP area exceeded relevant Subpart S action levels (EPA, 1990). The barium concentration of 23,800 mg/kg detected in the soil sample collected at six feet in Borehole BPY-10,5 exceeded the Subpart S action level of 6,000 mg/kg (EPA 1990). At this location, the barium is associated with elevated concentrations of lead, cadmium, and HE compounds. However, these elevated concentrations are isolated and do not appear to indicate widespread contamination at the EBP area (IT 1993).

On March 1, 1994, nine additional shallow boreholes were drilled to extend grid BPY to the east and Boreholes BPY-10,5 and BPY-10,4 were re-drilled to a greater depth (Figure 3-3). The nine new boreholes were drilled to six feet and soil samples were collected at three- and six-foot depths. Boreholes BPY-10,5 and BPY-10,4 were drilled to 12 feet and soil samples were collected at nine and 12-foot depths. All soil samples were analyzed for HE compounds and metals.

In these 11 boreholes, barium, cadmium, and lead were detected at the following concentrations; barium from 45.9 mg/kg to 636 mg/kg, cadmium from 0.52 mg/kg to 9.6 mg/kg, and lead from 10.2 mg/kg to 45.8 mg/kg. The Subpart S action levels for these metals are 6000 mg/kg for barium and 80 mg/kg for cadmium (in food). EPA guidance provides an acceptable lead soil level of 400 mg/kg (EPA 1994). No HE compounds were detected in any of the March 1994 borehole soil samples.

3.5 Assessment of Gaps in Information

Analyses of data collected during the first phase of the investigation identified the need for performing a VCM to remove the contaminated soil and remediate the EBP. A VCM plan was devised and implemented during the first week of May in 1995. A detailed interpretation and digital mapping of sequential historical aerial photographs (Ebert 1994) identified two additional areas as potential burn pit locations. One area was identified from a 1951 photo and one was identified from a 1959 photo (Figure 3-4). Additional VCM activities were conducted in March 1996 at these two areas based on location of the culvert described in Section 3.1.

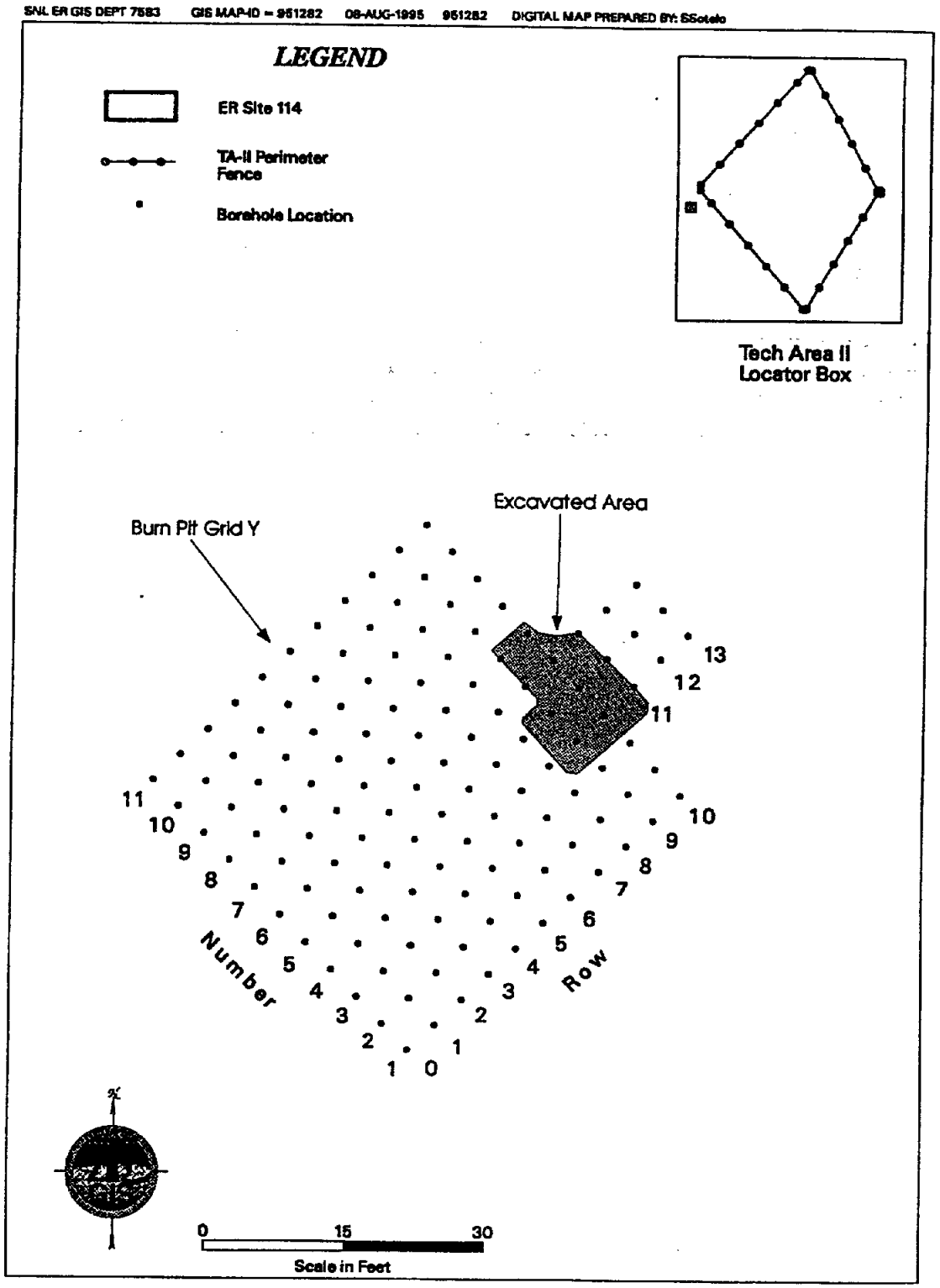

Figure 3-3. Map showing Explosive Burn Pit Excavation location, TA-II, SNL/NM.

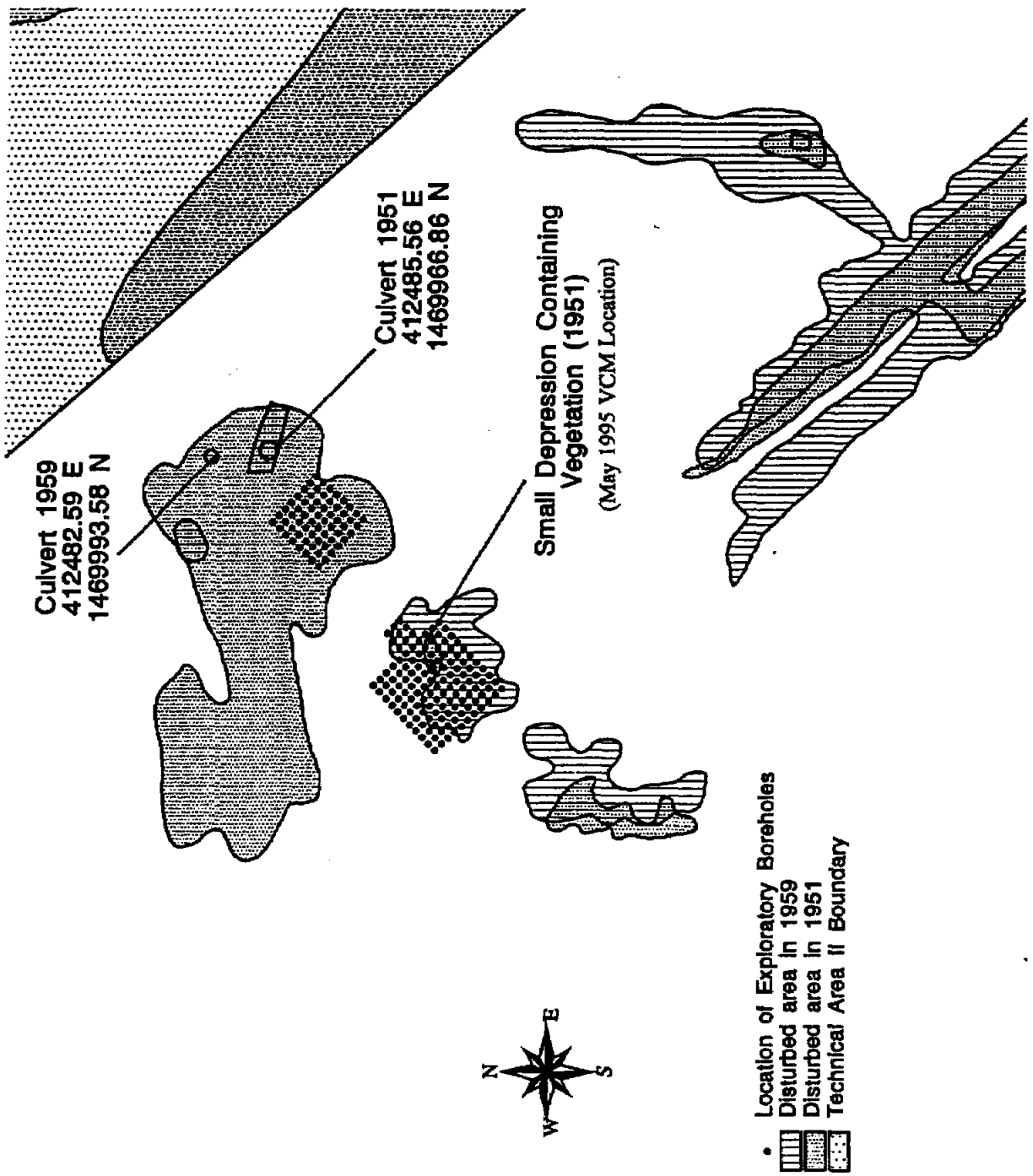

Figure 3-4. Location of EBP culvert in 1951 and 1959 with GPS coordinates.

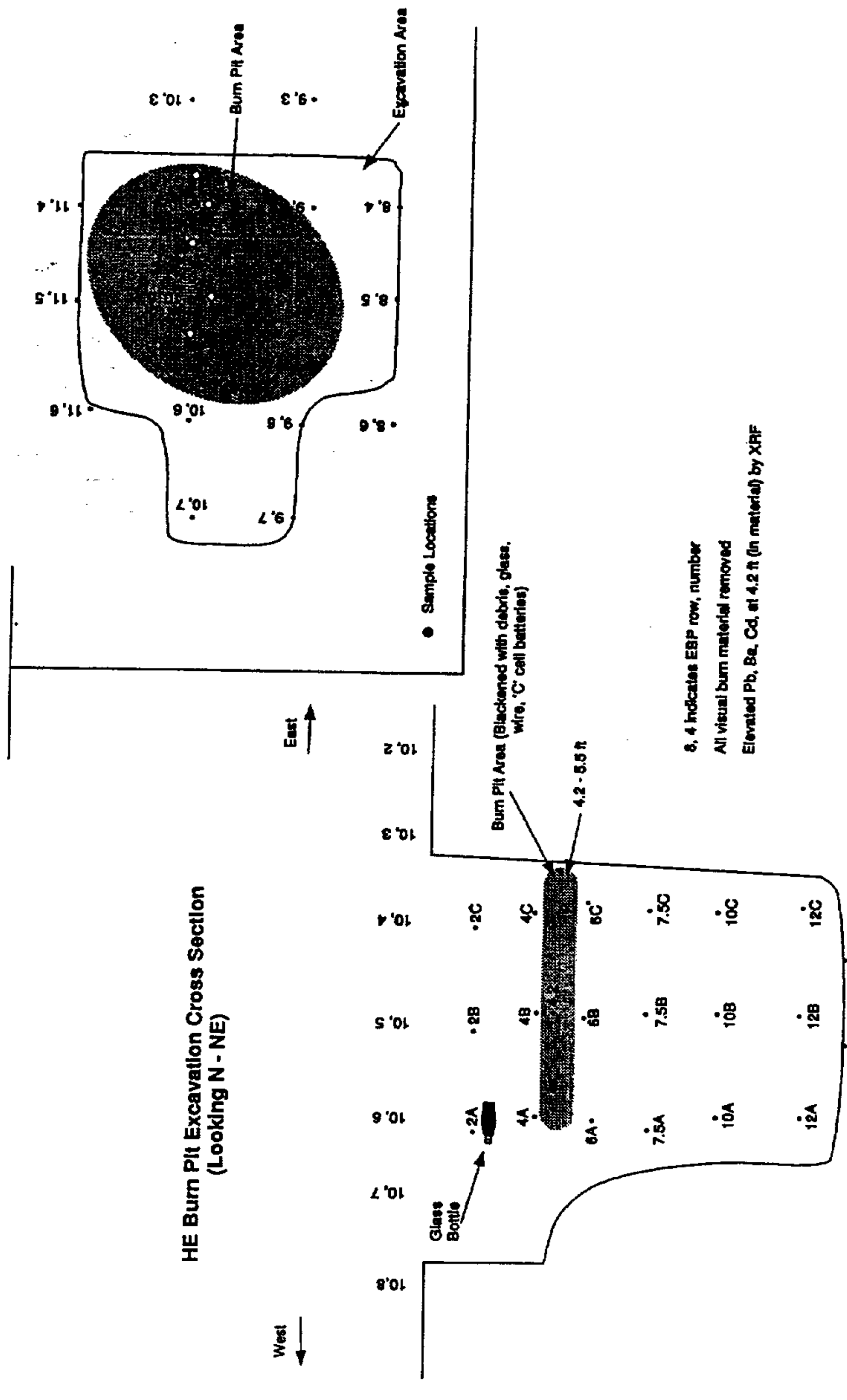

Figure 3-5. Horizontal and Vertical Extent of the EBP VCM Excavation (May 1995 VCM Location)

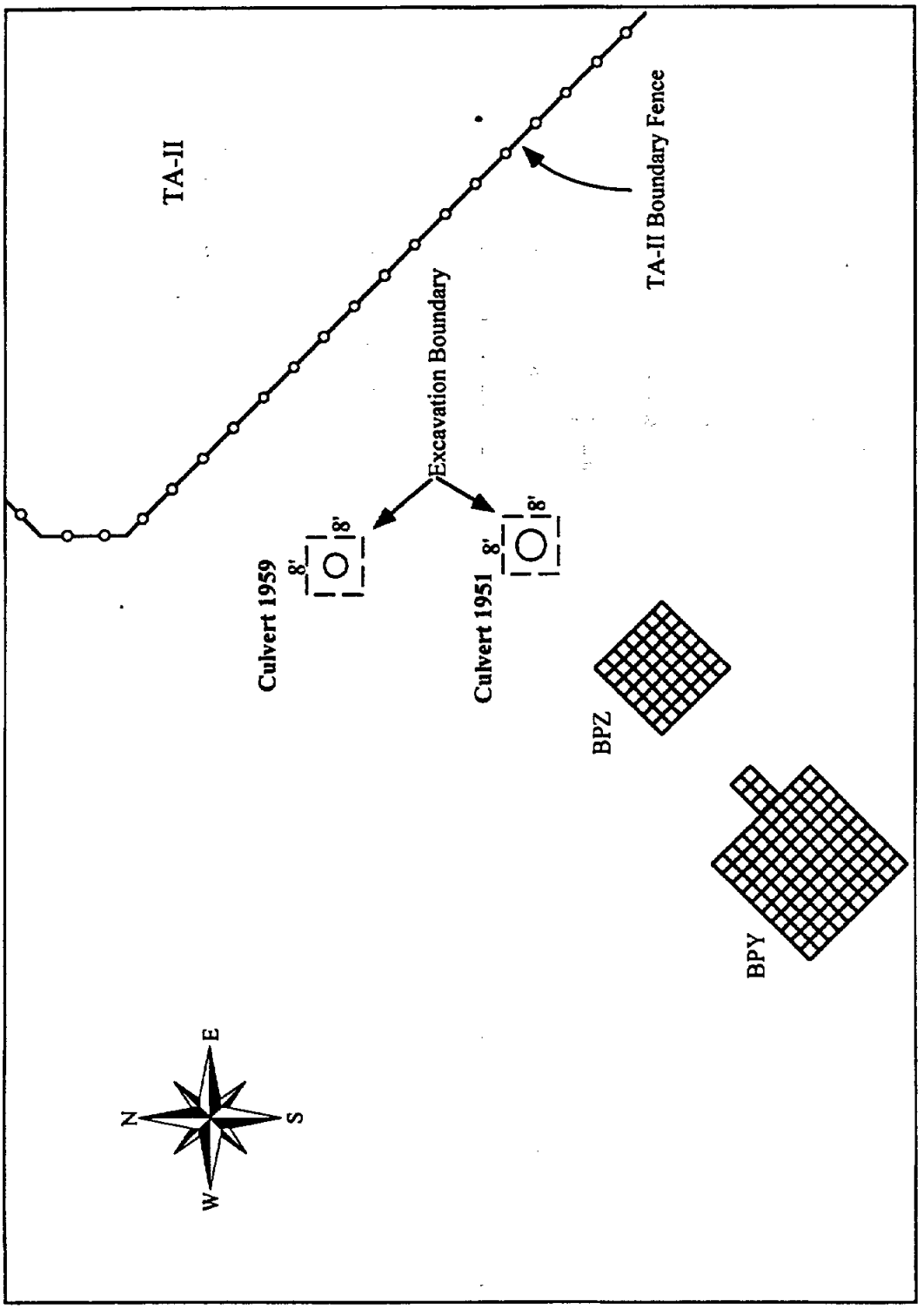

Figure 3-6. Horizontal extent of March, 1996 VCM excavation.

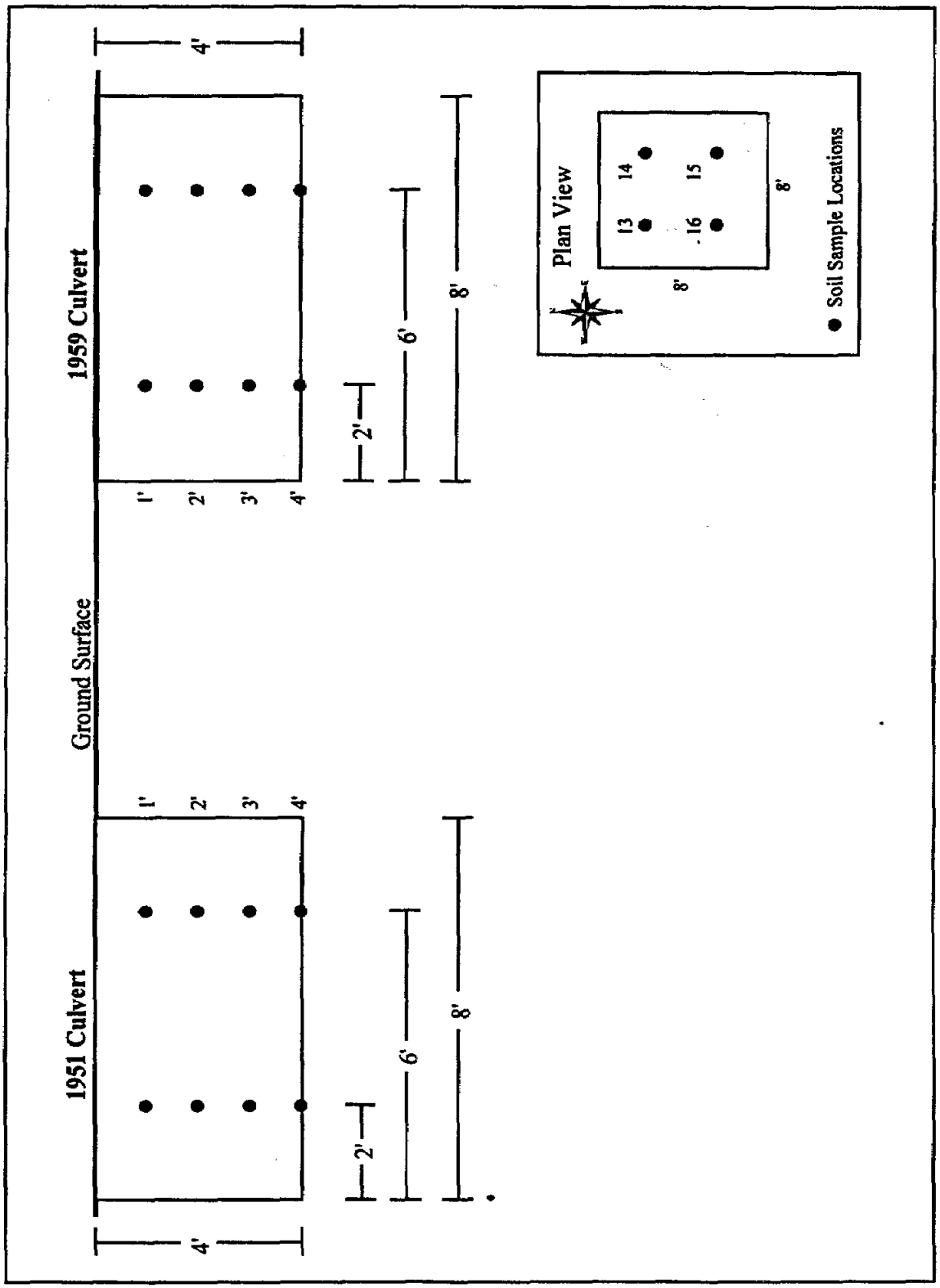

Figure 3-7. Vertical extent of March 1, 1996 VCM excavation.

The ditch located southwest of the EBP area (mentioned in Section 3.1) was visually inspected for indications of surface disturbances in an effort to substantiate or discount the reported controlled burn of three-fourths of a pound of Compound B. The inspection did not reveal any indications of a burn location. Results of the detailed interpretation and digital mapping of sequential historical aerial photographs identified a large area of disturbance along the ditchbank southwest of the EBP area from 1972 through 1974 (Ebert 1994). This ditch is an active diversion channel for run-off during periods of precipitation. Based on results of EBP field investigations and VCM activities, the one-time burn along the ditch bank, if it actually occurred, would not pose a risk to human health and the environment. The majority of the HE would have burned and any remains would have washed down the drainage ditch over the years.

3.6 VCM Action and Results of Verification Sampling

HE were known to have been burned in the EBP. To eliminate the potential for the EBP to release contaminants to the environment, VCM activities were conducted, followed by verification soil sampling and analysis. A summary of the confirmatory soil data is presented as Table 3-1 and includes the confirmatory concentrations of the COCs, sample depths, site-wide background UTLs, and the Subpart S action levels, as appropriate and available. The raw data, along with QA/QC documentation, are readily available and can be viewed in the EO Records Center.

VCM activities were conducted in May 1995 and March 1996. Figures 3 and 5 show the horizontal and vertical extent of the May 1995 excavation. Figures 6 and 7 show the horizontal and vertical extent of the March 1996 excavation. Buried debris, some charred, was identified during the May 1995 excavation. Excavation activities at this location ceized after all visual evidence was removed and on-site sample results showed no elevated contaminant concentrations. Excavation of the 1951 culvert area also revealed some charred and other debris at approximately 3 ft depth. Excavation of the 1959 culvert area did not reveal any buried debris. Horizontal excavation of these two areas was limited to eight feet by eight feet to account for the estimated size of the burn pit and any error associated with the digitized location and global positioning system. The vertical extent was limited to four feet based on on-site analysis which showed no elevated concentrations of contaminants. In all cases, the horizontal extent of identified debris or charred material were defined and removed.

Confirmatory soil samples were collected at the bottom of the excavations. No HE compounds were detected in any of the confirmatory soil samples. No metals exceeded either their respective SNL/NM site-wide calculated UTL background concentrations or Subpart S action levels (Table 3-1).

Table 3-1

Table Showing Results of Confirmatory Soil Samples Analysis for COCs Collected at ER Site 114

Pit Locations	Soil Sample Location	Depth	Barium (mg/kg)	Cadmium (mg/kg)	Lead (mg/kg)
BPY	12.0A	12'	448	0.67	1.4
	12.0B	12'	717	0.66	1.6
	12.0C	12'	224	0.64	6.3
	13.0AA	13'	898	0.67	1.6
	13.0BB	13'	703	0.67	1.6
Culvert 1951	13	4'	96	1.0	9.3
	14	4'	170	1.0	9.9
	15	4'	71	0.98	5.3
	16	4'	89	1.0	4.3
Culvert 1959	13	4'	210	1.0	5.2
	14	4'	110	0.98	4.3
	15	4'	15	1.0	2.7
	16	4'	19	1.0	2.4
	Background UTL	0 - 6" > 0.5'	200 336	1.6 0.9	68 11.2
	Subpart S Action Level	---	6000	80 (food)	---
	EPA Guidance	---	---	---	400

3.7 Rationale for Pursuing a VCM-Based NFA Decision

The need for a VCM was identified because explosives were known to have been burned and the remains were likely to have been left at the EBP locations. VCM activities consisted of excavating three EBP areas. Confirmatory samples were collected at the bottom of the excavations. A comparison of confirmatory sample analytical results to SNL/NM background levels and Subpart S action levels shows that all COCs are within background concentration levels and/or below the prescribed action level. The results of soil sampling and analysis indicate that there has been no release of hazardous constituents from this site that may pose a threat to human health and/or the environment.

4. CONCLUSION

ER Site 114 is being proposed for an administrative NFA decision based on results of confirmatory sampling. The evidence cited above demonstrates that the SWMU has been remediated and verification data indicate that contaminants have either been removed or were not present and no threat to human health or the environment exists from this site.

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