

**DECISION DOCUMENT
AMMUNITION CAN PILES, SWMU A-09A
Hawthorne Army Depot
Hawthorne, Nevada
April 2000**

1. PURPOSE of DECISION DOCUMENT

1.1. Introduction

This decision document describes the rationale for the proposed remedial action at, and closure of, Solid Waste Management Unit (SWMU) A-09A, Ammunition Can Piles, at the Hawthorne Army Depot (HWAD), Hawthorne, Nevada. This decision document was developed by the U.S. Army Corps of Engineers, Sacramento District (USACE), HWAD, and Day & Zimmermann Hawthorne Corporation, with support from the Nevada Department of Conservation and Natural Resources, Division of Environmental Protection (NDEP).

1.2 Site Description and Background

SWMU A-09A was a storage area for 13 piles of empty, crushed ammunition cans and 12 piles of soil/debris located 0.5 miles west of the 100 Group production area and approximately 2 miles south of Walker Lake. The waste piles were approximately 6 to 10 feet high and 12 to 25 feet in diameter and are estimated to range from 15 to 65 cubic yards in volume. The total bulk volume of the 25 piles is estimated to be approximately 800 cubic yards.

Approximately 530 cubic yards are composed of crushed ammunition cans and approximately 270 cubic yards are composed of soil/debris. Typically the ammunition cans were labeled with the following placard:

55 CARTRIDGES
20 MM HEI M97
W/FUZE PDM 75
LOT KOP 82-11

Other lot numbers were identified and recorded in the field logbooks.

The empty ammunition cans were dumped on open ground where they were then separated by magnetic means, crushed, and stacked into piles. The unflashed cans may contain reactive powder residues but this is believed to be unlikely (USAEHA 1987, 1988). SWMU A-09A has never been permitted and has not gone through a formal RCRA closure.

In 1974, the U.S. Geological Survey (USGS) installed 17 test wells and conducted a pump test at the Naval Ammunition Depot (NAD), now HWAD, supply well Number 8 to determine the source of nitrate contamination detected in NAD Well 8. NAD Well 8 and USGS Wells 1 and 3 are located 2,100 feet west, 1,900 feet west, and 600 feet north of SWMU A-09A, respectively. During this study, USGS reported that the upper aquifer occurs between 70 and 78 feet bgs with a northerly gradient (USGS 1975).

1.3 Chemicals of Concern

The chemicals of concern are nitrate, metals, explosives, and pH.

2. SUMMARY of SITE RISK

Soils at SWMU A-09A generally consisted of loose, dry, alluvial, coarse to medium sands with 0-10 percent gravel. Stained or discolored soils indicative of explosives or bulk contamination were not observed on the surface of this SWMU or in any of the hand auger holes. Therefore, TNT and RDX screening were not performed at this SWMU.

Four metals (arsenic, barium, chromium, and lead) were detected in nearly all of the samples collected. In addition, mercury was detected at a low concentration (0.081 mg/kg) in one sample. With the exception of lead, all of the detected metal concentrations are below the soil remediation criteria and are within the background ranges. Lead was detected at 230 mg/kg at surface soil sample location 2 and at 100 mg/kg at surface soil sample location 5. These concentrations equal or exceed the soil remediation criteria of 100 mg/kg.

Four nitroaromatics (HMX, RDX, 1,3,5-TNB, and 2,4,6-TNT) were detected in sample A9A-HA1-12-005 at 7.1 mg/kg, 33 mg/kg, 0.34 mg/kg, and 160 mg/kg, respectively. This sample was collected from a depth of five feet adjacent to the third ammunition can pile from the west (location 12). Analysis of the surface soil sample collected from the same location did not detect any nitroaromatics above the method detection limit. In addition, 2,4,6-TNT was detected in seven other surface and subsurface samples at estimated concentrations ranging from 0.1 mg/kg to 0.31 mg/kg. None of the detected concentrations for HMX, RDX, 1,3,5-TNB, and 2,4,6-TNT exceeded soil remediation criteria.

Because the detected metal concentrations are low and are similar with respect to other samples collected at the site, it does not appear that a release of metals has occurred to the adjacent soils. The detected concentrations (with the exception of lead) are below remediation criteria and are within the background ranges. The lead concentration at surface soil sample locations 2 and 5 suggest that lead from the ammunition cans may have been dispersed into the surface soils, or these anomalies may be the result of extraneous metallic debris inadvertently collected in the sample. Although the lead concentration of 230 mg/kg and 100 mg/kg are equal to or above the NDEP criteria of 100 mg/kg, they are well below other accepted standards including EPA Region IX Preliminary Remediation Goal (PRG) of 400 mg/kg in residential soils (EPA 1994).

3. SUMMARY of REMEDIAL INVESTIGATIONS and REMEDIAL ACTIONS

3.1.1 Remedial Investigation

The investigative approach at SWMU A-9A included the collection and analysis of surface and shallow subsurface soil samples. Due to the similarity of the piles, the investigative approach consisted of visually characterizing the former contents of the 25 piles by examining the container labels and markings and selecting six representative piles for characterization by sampling. From each representative pile, three surface soil and three hand auger samples were collected at equal distances around its margin, forming a triangle. It was intended that one of the three sample locations would be on the downslope side of the pile to maximize the probability of detecting possible contaminants migrating downgradient.

These samples were analyzed for nitrate, metals, ammonium picrate, explosives, and pH.

3.1.2 Results

Soils at SWMU A-9A generally consisted of loose, dry, alluvial, coarse to medium sands with 0-10 percent gravel. Stained or discolored soils indicative of explosives or bulk contamination were not observed on the surface of this SWMU or in any of the hand auger holes. Therefore, TNT and RDX screening were not performed at this SWMU. Analytical results for detected compounds and elements are summarized in Table A09a.

Four metals (arsenic, barium, chromium, and lead) were detected in nearly all of the samples collected by Tetra Tech. In addition, mercury was detected at a low concentration (0.081 mg/kg) in one sample. With the exception of lead, all of the detected metal concentrations are below the preliminary remediation goals (PRGs). Lead was detected at 230 mg/kg at surface soil sample location 2 and at 100 mg/kg at surface soil sample location 5.

Four nitroaromatics (HMX, RDX, 1,3,5-TNB, and 2,4,6-TNT) were detected in sample A9A-HA1-12-005 at 7.1 mg/kg, 33 mg/kg, 0.34 mg/kg, and 160 mg/kg, respectively, collected by Tetra Tech. This sample was collected from a depth of five feet adjacent to the third ammunition can pile from the west (location 12). Analysis of the surface soil sample collected from the same location did not detect any nitroaromatics above the method detection limit. In addition, 2,4,6-TNT was detected in seven other surface and subsurface samples at estimated concentrations ranging from 0.1 mg/kg to 0.31 mg/kg. None of the detected concentrations HMX, RDX, 1,3,5-TNB, and 2,4,6-TNT exceeded the PRGs, which are shown at Appendix A. The quantitation limits for these analyses are shown at Appendix B.

After the ammunition can piles and soil piles were removed, 31 locations were sampled by DZHC and analyzed for explosives and TCLP-8 metals. All 31 samples were non-detect for explosives. Twenty of the samples contained barium ranging in concentration from 1.1 to 1.9 mg/L. Three samples contained 0.10, 0.11, and 0.15 mg/L of arsenic. Two samples contained 0.07 and 0.12 mg/L of lead. Two samples contained .0025 and .0036 mg/L of mercury. Detection limits for these analyses are shown at Appendix C.

3.2 Remedial Actions

3.2.1 Summary of Remedial Alternatives

A random visual inspection inside the cans should be performed to insure there is no contamination in the cans. A sample of the cans should be analyzed for explosives contamination and TCLP metals. The empty cans should be removed and disposed of based on the results of the analysis. The soil piles should also be removed. After removal of the cans and soil piles, it is recommended that soil sampling for suspect contaminants be performed at the locations where the piles had been.

Table A09a							
PARAMETERS DETECTED IN SURFACE AND NEAR SURFACE SOIL SAMPLES AT SWMU A-9A CONCENTRATIONS IN mg/kg (ppm)							
Sample No./ Parameter	A-9A HA1-1-000	A-9A HA1-1-005	A-9A HA1-2-000	A-9A HA1-2-005	A-9A HA1-3-000	A-9A HA1-3-005	A-9A HA1-4-000
Job Number	9400.875	9400.875	9400.875	9400.875	9400.883	9400.883	9400.875
Sample Depth (feet)	0.5 - 1.0	3.5 - 4.0	0.5 - 1.0	2.0 - 2.5	0.5 - 1.0	3.0 - 3.5	0.5 - 1.0
Solids-Total (%)	99	94	97	96	99	97	88
pH	7.1 J	7.1 J	7.6 J	7.9 J	7.4 J	7.8 J	7.7 J
Nitrate-nitrogen	6.4 J	ND UJ	12 J	4.6 J	3.3 J	3.0 J	ND UJ
Metals							
Arsenic	16	4.7	9.9	13	12	65.4	10
Barium	90	35	180	61	69	40	100
Chromium (total)	3.1	2.4	8.4	1.5	2.1	ND	15
Lead	6.0 J	1.3 J	230 J	3.1 J	18	1.6	12 J
Mercury	ND						
Nitroaromatics							
HMX	ND						
RDX	ND						
1,3,5-TNB	ND						
2,4,6-TNT	ND						

Table A09a							
PARAMETERS DETECTED IN SURFACE AND NEAR SURFACE SOIL SAMPLES AT SWMU A-9A CONCENTRATIONS IN mg/kg (ppm)							
Sample No./ Parameter	A-9A HA1-4-005	A-9A HA1-5-000	A-9A HA2-5-000	A-9A HA1-5-005	A-9A HA1-6-000	A-9A HA1-6-005	A-9A HA1-7-000
Job Number	9400.875	9400.875	9400.883	9400.883	9400.883	9400.883	9400.883
Sample Depth (feet)	5.0 - 5.5	0.5 - 1.0	0.5 - 1.0 (duplicate)	2.5 - 3.0	0.5 - 1.0	5.0 - 5.5	0.5 - 1.0
Solids-Total (%)	98	100	100	98	98	96	98
pH	7.4 J	7.4 J	7.5 J	7.6 J	7.6 J	7.7 J	7.6 J
Nitrate-nitrogen	ND UJ	3.4 J	4.7 J	ND	3.0 J	ND	ND
Metals							
Arsenic	41	11	8.3	8.6	8.7	5.0	8.6
Barium	33	70	53	57	65	36	73
Chromium (total)	1.3	4.5	2.4	1.6	2.3	1.8	1.5
Lead	1.5 J	100 J	88	4.9	78	3.6	2.5
Mercury	ND	ND	ND	ND	ND	ND	ND
Nitroaromatics							
HMX	ND	ND	ND	ND	ND	ND	ND
RDX	ND	ND	ND	ND	ND	ND	ND
1,3,5-TNB	ND	ND	ND	ND	ND	ND	ND
2,4,6-TNT	0.12 J	ND	0.31 JN	0.15 JN	ND	ND	0.11JN

Table A09a							
PARAMETERS DETECTED IN SURFACE AND NEAR SURFACE SOIL SAMPLES AT SWMU A-9A CONCENTRATIONS IN mg/kg (ppm)							
Sample No./ Parameter	A-9A HA1-7-005	A-9A HA1-8-000	A-9A HA1-8-005	A-9A HA1-9-000	A-9A HA1-9-005	A-9A HA1-10-000	A-9A HA2-10-000
Job Number	9400.883	9400.883	9400.883	9400.883	9400.883	9400.883	9400.883
Sample Depth (feet)	5.0 - 5.5	0.5 - 1.0	2.5 - 3.0	0.5 - 1.0	4.0 - 4.5	0.5 - 1.0	0.5 - 1.0 (duplicate)
Solids-Total (%)	95	99	99	99	97	100	100
pH	7.6 J	7.7 J	8.0 J	7.8 J	7.8 J	7.5 J	7.4 J
Nitrate-nitrogen	ND	14	ND	5.4	ND	ND	ND
Metals							
Arsenic	5.5	11	6.5	13	5.3	6.7	9.4
Barium	66	74	41	71	34	54	64
Chromium (total)	1.9	2.7	1.3	2.0	1.4	1.2	1.5
Lead	2.0	54	2.7	17	2.6	13	7.0
Mercury	ND	0.081	ND	ND	ND	ND	ND
Nitroaromatics							
HMX	ND	ND	ND	ND	ND	ND	ND
RDX	ND	ND	ND	ND	ND	ND	ND
1,3,5-TNB	ND	ND	ND	ND	ND	ND	ND
2,4,6-TNT	ND	ND	0.13 JN	ND	ND	ND	ND

Table A09a							
PARAMETERS DETECTED IN SURFACE AND NEAR SURFACE SOIL SAMPLES AT SWMU A-9A CONCENTRATIONS IN mg/kg (ppm)							
Sample No./ Parameter	A-9A HA1-10-005	A-9A HA1-11-000	A-9A HA1-11-005	A-9A HA1-12-000	A-9A HA1-12-005	A-9A HA1-13-000	A-9A HA1-13-005
Job Number	9400.883	9400.883	9400.883	9400.883	9400.883	9400.883	9400.884
Sample Depth (feet)	4.5 - 5.0	0.5 - 1.0	4.5 - 5.0	0.5 - 1.0	4.5 - 5.0	0.5 - 1.0	3.0 - 3.5
Solids-Total (%)	98	100	97	100	97	90	98
pH	7.7 J	7.7 J	7.7 J	7.6 J	7.6 J	7.6 J	7.2 J
Nitrate-nitrogen	ND	ND	ND	3.5 J	3.2 J	3.1 J	ND
Metals							
Arsenic	3.6	8.1	3.9	7.0	6.0	7.7	3.4
Barium	31	64	68	60	29	68	26
Chromium (total)	ND	1.5	1.3	2.0	1.4	2.0	ND
Lead	1.3	4.4	2.0	33	2.9	15	1.3
Mercury	ND						
Nitroaromatics							
HMX	ND	ND	ND	ND	7.1	ND	ND
RDX	ND	ND	ND	ND	33	ND	ND
1,3,5-TNB	ND	ND	ND	ND	0.34 J	ND	ND
2,4,6-TNT	ND	ND	ND	ND	160	ND	ND

Table A09a							
PARAMETERS DETECTED IN SURFACE AND NEAR SURFACE SOIL SAMPLES AT SWMU A-9A CONCENTRATIONS IN mg/kg (ppm)							
Sample No./ Parameter	A-9A HAI-14-000	A-9A HAI-14-005	A-9A HAI-15-000	A-9A HA2-15-000	A-9A HAI-15-005	A-9A HAI-16-000	A-9A HAI-16-005
Job Number	9400.884	9400.884	9400.884	9400.884	9400.884	9400.884	9400.884
Sample Depth (feet)	0.5 - 1.0	2.5 - 3.0	0.5 - 1.0	0.5 - 1.0 (duplicate)	5.0 - 5.5	0.5 - 1.0	4.5 - 5.0
Solids-Total (%)	100	96	99	99	83	100	100
pH	7.6 J	7.6 J	7.4 J	7.6 J	7.6 J	7.2 J	7.6 J
Nitrate-nitrogen	6.3	ND	5.6	ND	6.1	3.1 J	ND
Metals							
Arsenic	6.8	4.7	7.3	7.7	2.3	7.9	5.6
Barium	64	42	51	53	33	72	56
Chromium (total)	2.0	1.6	2.0	2.4	1.7	1.6	1.9
Lead	5.3	1.4	23	17	1.2	3.6	1.5
Mercury	ND	ND	ND	ND	ND	ND	ND
Nitroaromatics							
HMX	ND	ND	ND	ND	ND	ND	ND
RDX	ND	ND	ND	ND	ND	ND	ND
1,3,5-TNB	ND	ND	ND	ND	ND	ND	ND
2,4,6-TNT	ND	ND	0.10 JN	ND	0.19 JN	ND	ND

Table A09a				
PARAMETERS DETECTED IN SURFACE AND NEAR SURFACE SOIL SAMPLES AT SWMU A-9A CONCENTRATIONS IN mg/kg (ppm)				
Sample No./ Parameter	A-9A HAI-17-000	A-9A HAI-17-005	A-9A HAI-18-000	A-9A HAI-18-005
Job Number	9400.884	9400.884	9400.884	9400.884
Sample Depth (feet)	0.5 - 1.0	4.0 - 4.5	0.5 - 1.0	2.0 - 2.5
Solids-Total (%)	100	98	100	97
pH	7.6 J	7.6 J	7.3 J	7.6 J
Nitrate-nitrogen	ND	ND	ND	ND
Metals				
Arsenic	10	4.2	7.4	7.2
Barium	58	44	56	57
Chromium (total)	2.5	1.7	2.2	1.5
Lead	16	1.5	9.6	1.0
Mercury	ND	ND	ND	ND
Nitroaromatics				
HMX	ND	ND	ND	ND
RDX	ND	ND	ND	ND
1,3,5-TNB	ND	ND	ND	ND
2,4,6-TNT	ND	ND	ND	0.10 JN

NOTE: Picric acid was analyzed for; but not detected.

Key:

- J - Estimated value
- JN - Estimated value, analyte could not be confirmed by alternate procedure.
- ND - Not detected above quantitation limit.
- Shaded values exceed remediation criteria in Table 3-1.

3.2.2 Summary of Remedial Actions

A random sampling of the empty cans was visually inspected for contaminants. None were found. A sample of the cans was analyzed for explosives and TCLP-8 metals. The results were non-detect for all explosives and TCLP metals. After the cans and soil piles were removed, soil samples were collected from thirty-one locations where the piles had been. These samples were analyzed for explosives and TCLP-8 metals.

Photographs of the site before and after the remedial action was implemented are attached.

4. PUBLIC/COMMUNITY INVOLVEMENT

It is U.S. Department of Defense (DOD) and Army policy to involve the local community throughout the investigation process at an installation. To initiate this involvement, HWAD has established a repository in the local public library, which includes final copies of all past studies and documents regarding environmental issues at the facility. This repository will be maintained and updated with all future final documents as they are issued to HWAD.

HWAD has solicited community participation in establishment of the restoration advisory board (RAB). However, because of insufficient public response, HWAD has not formed a RAB. HWAD will continue to solicit community involvement.

5. CONCLUSIONS and RECOMMENDATIONS

Because the detected metal concentrations are low and are similar with respect to other samples collected at the site, it does not appear that a release of metals has occurred to the adjacent soils. The detected concentrations (with the exception of lead) are below remediation criteria and are likely within the background ranges. The lead concentration at surface soil sample locations 2 and 5 suggest that lead from the ammunition cans may have been dispersed into the surface soils, or these anomalies may be the result of extraneous metallic debris inadvertently collected in the samples. Although the lead concentration of 100 mg/kg and 230 mg/kg are at and above the NDEP criteria of 100 mg/kg, they are below other accepted standards including EPA Region IX Preliminary Remediation Goal (PRG) of 500 mg/kg in residential soils.

HMX, RDX, 1,3,5-TNB, and 2,4,6-TNT, detected at a five-foot depth at hand auger location 12 indicates that a release of nitroaromatics has occurred to the adjacent soils at concentrations below remediation criteria. However, no nitroaromatic compounds were detected in the surface soil sample collected from the same location, questioning the source of contamination detected at 5 feet. Very low concentrations of 2,4,6-TNT were also detected in seven other surface and subsurface samples.

The low concentrations of nitroaromatic compounds detected in the adjacent soils indicate that a release of low magnitude has occurred, potentially as a result of residue contained in the crushed ammunition cans. However, because the detected concentrations are significantly less than the soil remediation criteria, no additional sampling is recommended.

This SWMU will be closed with regard to the chemicals of concern and without land use restrictions.

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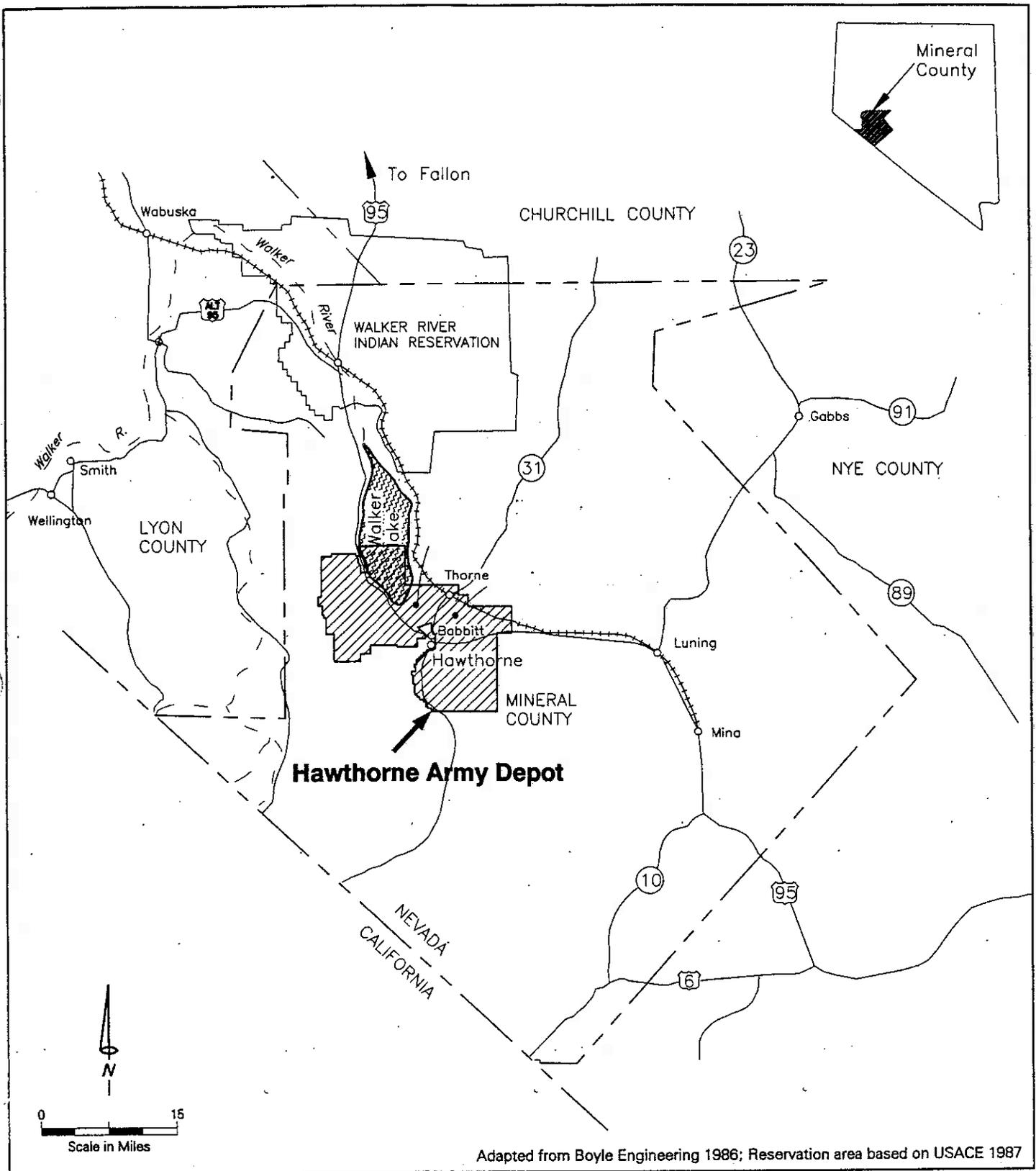
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Figures

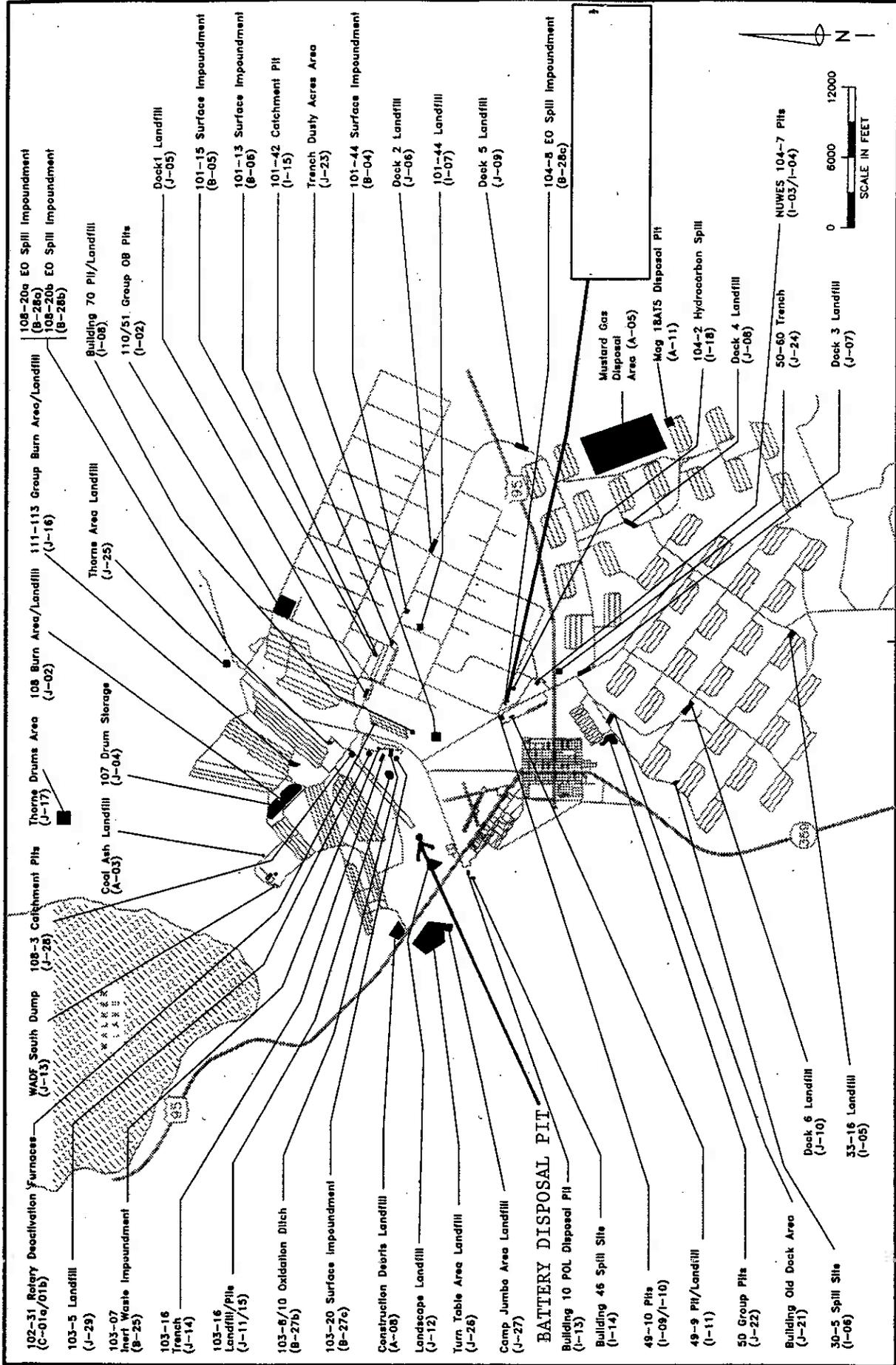


Location Map

Legend

 Hawthorne Army Depot

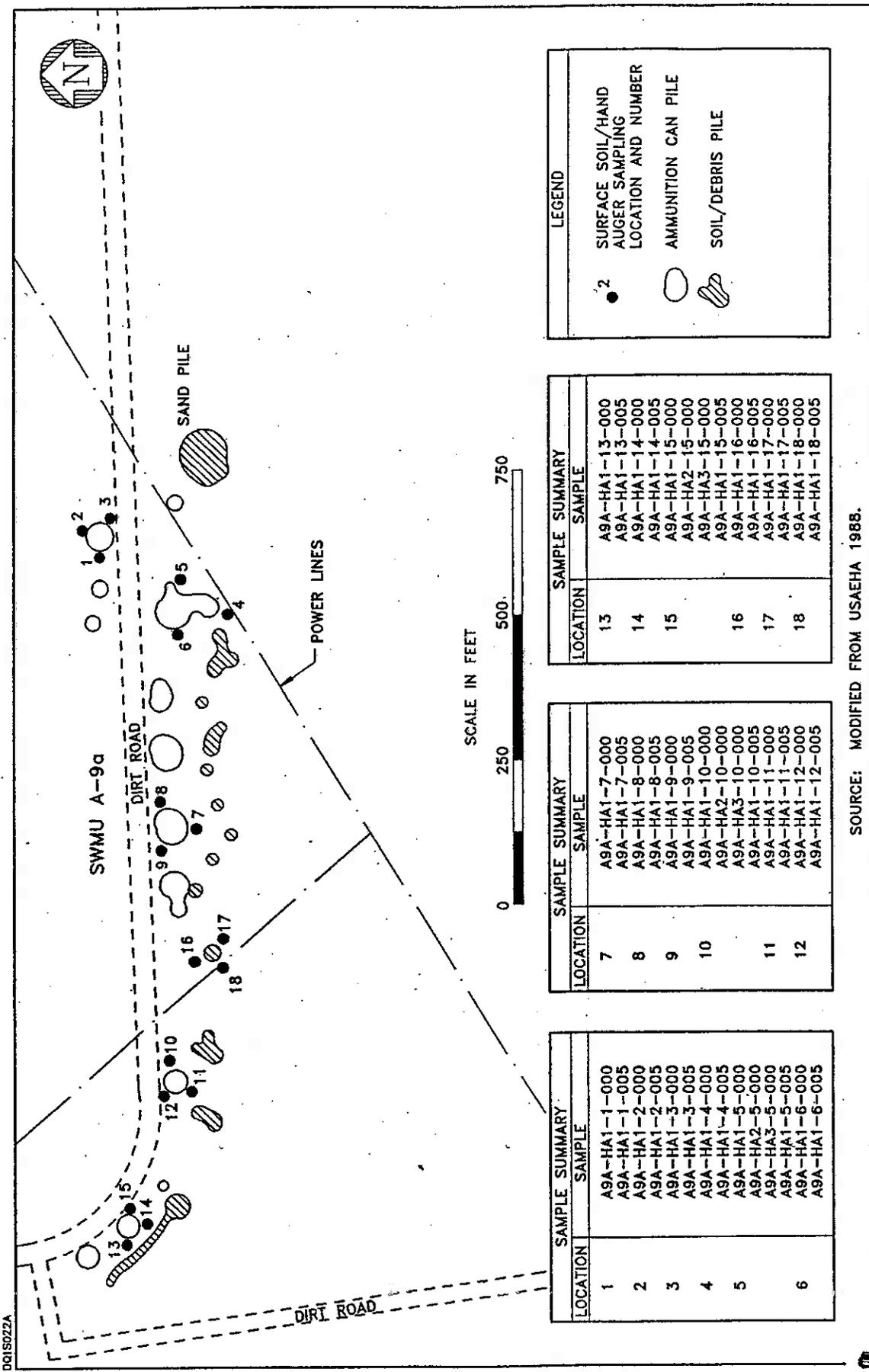
Hawthorne Army Depot
Hawthorne, Nevada



TEIRA TECH

Location Map Hawthorne Army Depot

Hawthorne, Nevada

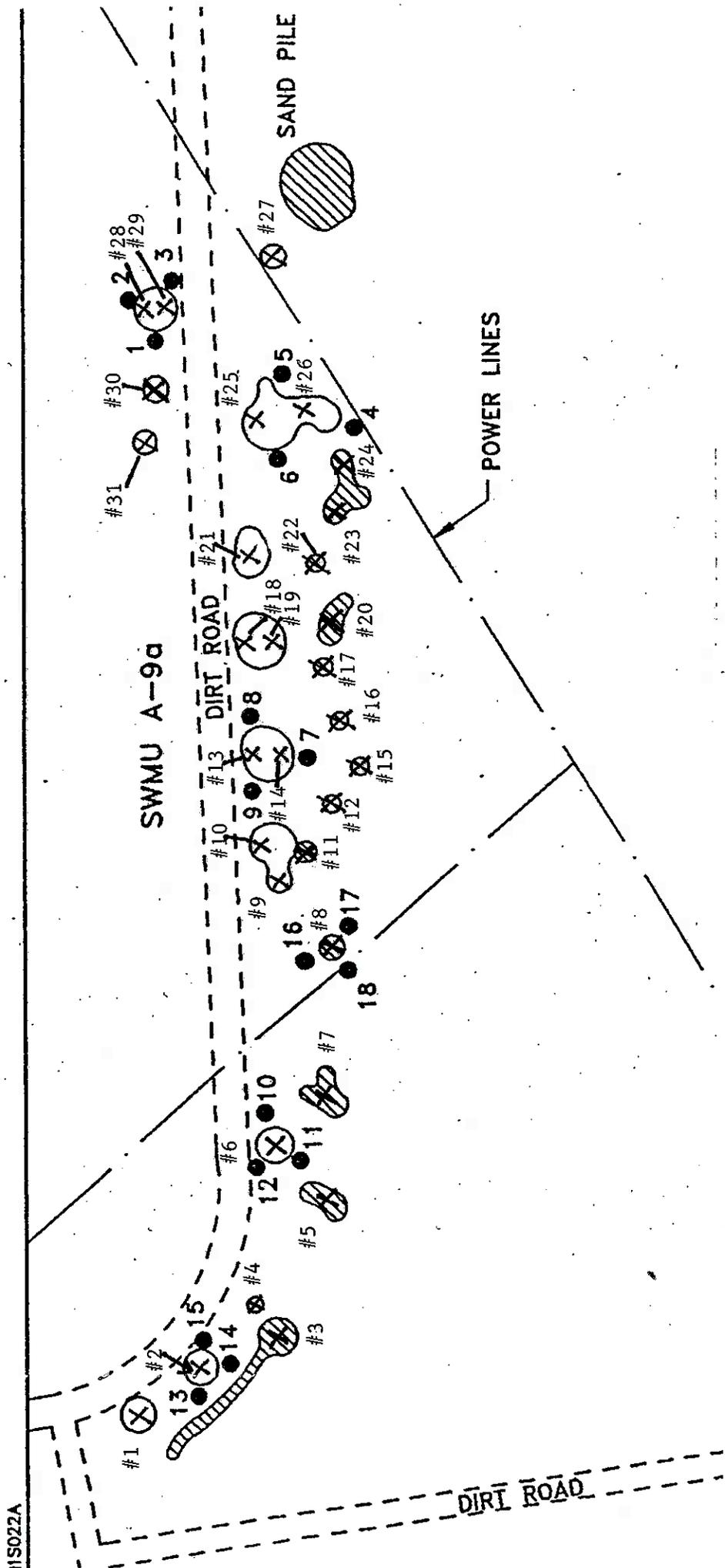


SOURCE: MODIFIED FROM USAEHA 1988.

Figure 3-2 SAMPLE LOCATIONS AT SWMU A-9a
AMMUNITION CAN PILES
HAWTHORNE ARMY DEPOT

ecology and environment

DZHC Sample Locations



31S022A

Appendix A

**Proposed Closure Goals
Hawthorne Army Depot
Hawthorne, Nevada**

Constituent of Concern	Chemical Classification	Carcinogenic (C) or Non-carcinogenic (NC)	HWAD Proposed Closure Goals for Soil (mg/kg)	HWAD Proposed Closure Goal Source
Nitrate	Anion	NC	128,000	Calculated Subpart S ^a
2-Amino-dinitrotoluene	Explosive	NC	-	NA ^b
4-Amino-dinitrotoluene	Explosive	NC	-	NA
1,3-Dinitrobenzene	Explosive	NC	8	Calculated Subpart S
2,4-Dinitrotoluene	Explosive	NC	160	Calculated Subpart S
2,6-Dinitrotoluene	Explosive	NC	80	Calculated Subpart S
HMX	Explosive	NC	4,000	Calculated Subpart S
Nitrobenzene	Explosive	NC	40	Calculated Subpart S
Nitrotoluene (2-, 3-, 4-)	Explosive	NC	800	Calculated Subpart S
RDX	Explosive	NC	64	Calculated Subpart S
Tetryl	Explosive	NC	800	Calculated Subpart S
1,3,5-Trinitrobenzene	Explosive	NC	4	Calculated Subpart S
2,4,6-Trinitrotoluene	Explosive	C	233	Calculated Subpart S
Aluminum	Metal	NC	80,000	Calculated Subpart S
Arsenic (cancer endpoint)	Metal	C & NC	30	Background ^c
Barium and compounds	Metal	NC	5,600	Calculated Subpart S
Beryllium and compounds	Metal	C	1	Background
Cadmium and compounds	Metal	NC	40	Calculated Subpart S
Chromium III and compounds	Metal	NC	80,000	Calculated Subpart S
Lead	Metal	NC	1000	PRG ^d
Mercury and compounds (inorganic)	Metal	NC	24	Calculated Subpart S
Selenium	Metal	NC	400	Calculated Subpart S
Silver and compounds	Metal	NC	400	Calculated Subpart S
Acenaphthene	PAH	NC	4,800	Calculated Subpart S
Benzo[a]anthracene	PAH	C	0.96	Calculated Subpart S
Benzo[a]pyrene	PAH	C	0.10	Detection Limit ^e
Benzo[b]fluoranthene	PAH	C	0.96	Calculated Subpart S
Benzo[k]fluoranthene	PAH	C	10	Calculated Subpart S
Chrysene	PAH	C	96	Calculated Subpart S
Dibenz[ah]anthracene	PAH	C	0.96	Calculated Subpart S
Fluoranthene	PAH	NC	3,200	Calculated Subpart S
Fluorene	PAH	NC	3,200	Calculated Subpart S
Indeno[1,2,3-cd]pyrene	PAH	C	-	NA
Naphthalene	PAH	NC	3,200	Calculated Subpart S
Pyrene	PAH	NC	2,400	Calculated Subpart S
Total Petroleum Hydrocarbons as Diesel (TPH-d)	PAH	C	100	NDEP Level Clean-up ^f
Polychlorinated biphenyls (PCBs)	PCBs	C	25	TSCA ^g
Bis(2-ethylhexyl)phthalate (DEHP)	SVOC	C	1,600	Calculated Subpart S
Bromoform (tribromomethane)	SVOC	C	89	Calculated Subpart S

Appendix B

Table G-1

LIST OF ANALYTES FOR INORGANICS (METALS) ANALYSES

Method Reference	Method Number	Brief Description of Method	Matrix (soil/water)	Quantitation Limit ^a
Metals Sample Preparation				
SW-846	3010	ICP Digestion	Water	NA
SW-846	3050	ICP Digestion	Soil	NA
Arsenic				
SW-846	7060	Furnace AA	Water	5 µg/L
SW-846	7060	Furnace AA	Soil	0.5 mg/kg
Barium				
SW-846	6010	ICP	Water	20 µg/L
SW-846	6010	ICP	Soil	2.0 mg/kg
Beryllium				
SW-846	6010	ICP	Water	5 µg/L
SW-846	6010	ICP	Soil	0.5 mg/kg
Cadmium				
SW-846	6010	ICP	Water	5 µg/L
SW-846	6010	ICP	Soil	0.5 mg/kg
Chromium				
SW-846	6010	ICP	Water	10 µg/L
SW-846	6010	ICP	Soil	1 mg/kg

Table G-1.

LIST OF ANALYTES FOR INORGANICS (METALS) ANALYSES

Method Reference	Method Number	Brief Description of Method	Matrix (soil/water)	Quantitation Limit ^a
Lead^b				
SW-846	7421	Furnace AA	Water	5 µg/L
SW-846	7421	Furnace AA	Soil	0.5 mg/kg
SW-846	6010	ICP	Water	75 µg/L
SW-846	6010	ICP	Soil	7.5 mg/kg
Mercury				
SW-846	7470	Cold Vapor	Water	0.2 µg/L
SW-846	7471	Cold Vapor	Soil	0.1 mg/kg
Selenium				
SW-846	7740	Furnace AA	Water	5 µg/L
SW-846	7740	Furnace AA	Soil	0.5 mg/kg
Silver				
SW-846	6010	ICP	Water	10 µg/L
SW-846	6010	ICP	Soil	1.0 mg/kg

Note: Detection Limits are target values and may be affected by matrix. Completeness objectives for all parameters are 95% unless stated otherwise.

- ^a ASC reporting levels. Instrument detection limits are determined quarterly and are at or below the levels in the table.
- ^b Samples that are non-detect for lead by Method 6010 will be reanalyzed by Method 7421.

Key:

NA =Not applicable.

SW-846: EPA "Test Methods for Evaluating Solid Wastes," SW-846, 3rd edition, Update I, July 1992.

Table G-2

LIST OF ANALYTES FOR INORGANICS (NON-METALS) ANALYSES

Method Reference	Method Number	Brief Description of Method	Matrix (soil/water)	Quantitation Limit ^a
Nitrate				
EP1	353.2	Cd Reduction/Colorimetric	Water	0.01 mg/L
EP1	m353.2 ^b	Cd Reduction/Colorimetric	Soil/Solid	1 mg/kg ^c
Ammonia				
EP1	350.3	Ion Selective Electrode	Water	0.03 mg/L
pH				
SW-846	9045	Combination Electrode	Soil/Solid	± 0.1 pH unit

- ^a ASC reporting levels.
- ^b Modified for the analysis of soils.
- ^c Infrequent test - approximate quantitation limit.

Key:

NA = Not applicable.
 EP1 = EPA "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79-020, revised March 1983.
 SW-846: EPA "Test Methods for Evaluating Solid Wastes," SW-846, 3rd edition, Update I, July 1992.

Table G-6	
LIST OF NITROAROMATICS AND NITRAMINES (HIGH EXPLOSIVES)	
EPA METHOD 8330	
Compound	Quantitation Limits
	Soil/Sediment ($\mu\text{g}/\text{kg}$)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	1.0
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	1.0
1,3,5-Trinitrobenzene (1,3,5-TNB)	1.0
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	1.0
1,3-Dinitrobenzene (1,3-DNB)	1.0
2,4,6-Trinitrotoluene (2,4,6-TNT)	1.0
2,4-Dinitrotoluene (2,4-DNT)	1.0
2,6-Dinitrotoluene (2,6-DNT)	1.0
Nitrobenzene (NB)	1.0
2-Nitrotoluene (2-NT)	1.0
3-Nitrotoluene (3-NT)	1.0
4-Nitrotoluene (4-NT)	1.0
2-Amino-Dinitrotoluene (2-AmDNT)	1.0
4-Amino-Dinitrotoluene (4-AmDNT)	1.0
Picrate	3.0

Appendix C

Reporting Limits for Soil Samples Collected by DZHC

Parameter	Reporting Limit	Method
Arsenic	0.1 mg/L	EPA 6010A
Barium	1.0 mg/L	EPA 6010A
Cadmium	0.01 mg/L	EPA 6010A
Chromium	0.01 mg/L	EPA 6010A
Lead	0.05 mg/L	EPA 6010A
Mercury	0.002 mg/L	EPA 7470A
Selenium	0.1 mg/L	EPA 6010A
Silver	0.02 mg/L	EPA 6010A

Appendix D

Table E-1			
COORDINATES AND ELEVATIONS FOR NINE SWMU SAMPLE LOCATIONS HAWTHORNE ARMY AMMUNITION PLANT HAWTHORNE, NEVADA			
Sample Location	Easting	Northing	Elevation (MSL)
A9A-H1	481839.998	1387113.152	4108.629
A9A-H2	481859.301	1387130.071	4108.888
A9A-H3	481867.049	1387108.660	4108.853
A9A-H4	481743.293	1386986.931	4108.618
A9A-H5	481757.435	1387023.192	4109.503
A9A-H6	481722.196	1387008.977	4109.667
A9A-H7	481450.699	1386879.638	4108.446
A9A-H8	481455.377	1386903.719	4108.886
A9A-H9	481417.575	1386886.568	4109.053
A9A-H10	481117.750	1386768.593	4108.446
A9A-H11	481085.464	1386740.945	4108.816
A9A-H12	482597.192	1386696.333	4077.071
A9A-H13	480788.782	1386715.334	4109.239
A9A-H14	480827.586	1386705.658	4109.165
A9A-H15	480823.348	1386727.874	4109.487
A9A-H16	481263.016	1386808.317	4108.853
A9A-H17	481284.943	1386792.313	4109.133
A9A-H18	481260.275	1386786.851	4109.177

Appendix E

