

# **FINAL SWMU J29 DECISION DOCUMENT**

## **SWMU J29 Building 103-5**

### **Suspected Former Landfill**

June 2012  
Version 01



**Hawthorne Army Depot**  
Hawthorne, Nevada

**U.S. Army Corps of Engineers – Sacramento District**  
Contract W91238-06-D-0019 Task Order 0004



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**FINAL**

**DECISION DOCUMENT  
SWMU J29 Building 103-5  
Suspected Former Landfill**

**Hawthorne Army Depot, Nevada**

**Contract No. W91238-06-D-0019**

**June 2012**

**Prepared for:**



**U.S. Army Environmental  
Command**



**Hawthorne Army Depot  
Hawthorne, Nevada**

**Prepared by:**



**U.S. Army Corps of Engineers  
Sacramento District**

**and**



**Bay West, Inc.  
5 Empire Drive  
St. Paul, Minnesota  
55103**

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## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1-1</b>
1.1	Site Name and Location .....	1-1
1.2	Statement of Basis and Purpose.....	1-1
1.3	Description of Selected Remedy.....	1-1
1.4	Regulatory Setting .....	1-1
1.5	Authorizing Signatures.....	1-2
<b>2.0</b>	<b>DECISION SUMMARY.....</b>	<b>2-1</b>
2.1	Site Name, Location, and Description.....	2-1
2.2	Physical Setting .....	2-1
2.3	Investigation History .....	2-1
2.4	Action Level Discussion.....	2-4
2.4.1	TP03 and TR03 .....	2-4
2.4.2	TP02.....	2-4
2.4.3	SS08, SS09, and SS15.....	2-4
2.4.4	Arsenic .....	2-4
2.5	Human Health Risk Evaluation .....	2-5
2.6	Decommissioning Activities .....	2-5
<b>3.0</b>	<b>CONCLUSIONS.....</b>	<b>3-1</b>
<b>4.0</b>	<b>REFERENCES.....</b>	<b>4-1</b>

### List of Tables

Table 2-1	Summary of Previous Actions at SWMU J29.....	2-2
Table 3-1	Site Evaluation for SWMU J29 .....	3-1

### List of Figures

Figure 1	Regional Site Map
Figure 2	Site Location
Figure 3	SWMU J29 Site Map

### List of Attachments

#### Attachment 1 (1998 Tetra Tech Final Remediation Investigation Report)

- Figure 3-1 Investigation Activity Map
- Table 4-1 Soil Sample Analytical Data
- Table 4-2 Groundwater Analytical Data
- Table 5-3 Calculated Cancer Risk and Hazard Quotients Associated with Industrial Exposure
- NDEP Letter dated 24 August 1998

#### Attachment 2 (Chung/Geofon 2006 SWMU J29 Final Remediation Report)

- Figure 3 SWMU J29 Site Map
- Figure 6 Excavation Confirmation Sample Locations
- Table 1 Site Action Levels
- Table 5 Summary of Windrow Compost Analysis
- Table 6 Summary of Excavation Cleanup Confirmation Analysis

**Attachment 3**

- NDEP Letter dated 1 August 2006.

**Attachment 4**

- NDEP Letter dated 7 November 2006
- SWMU J29 Site Map of Debris Field and Miscellaneous Metal Debris
- Photographic Log of backfilling and debris removal.

## Acronyms and Abbreviations

2,4-DNT .....	2,4-dinitrotoluene
µg/L.....	micrograms per Liter
AGPR .....	Airborne Ground Penetrating Radar
AOC.....	Area of Concern
Army .....	United States Army Environmental Command
BTEX .....	Benzene, Toluene, Ethylbenzene, and Xylene
bgs.....	below ground surface
COPC .....	Chemicals of Potential Concern
EMAG .....	Electromagnetic Terrain Conductivity
HWAAP.....	Hawthorne Army Ammunition Plant
HWAD.....	Hawthorne Army Depot
ICs .....	Institutional Controls
LTM .....	Long-Term Monitoring
LUC .....	Land Use Control
MAG .....	Vertical Magnetic Gradient
MCL.....	Maximum Contaminant Level
mg/kg.....	milligrams per kilogram
NAC .....	Nevada Administrative Code
NDEP.....	Nevada Division of Environmental Protection
NFA .....	No Further Action
PCBs .....	Polychlorinated Biphenyl
PCG.....	Proposed Closure Goal
PRG.....	Preliminary Remedial Goal
RAL.....	Remedial Action Level
RCRA .....	Resource Conservation and Recovery Act
RI.....	Remedial Investigation
RSL.....	Regional Screening Levels
SGPR .....	Surface Ground Penetrating Radar
SVOC .....	Semi-volatile Organic Compound
SWMU .....	Solid Waste Management Unit
Tetra Tech .....	Tetra Tech, Inc.
TNB .....	1,3,5-trinitrobenzene
TNT.....	2,4,6-trinitrotoluene
TPH .....	Total Petroleum Hydrocarbon
TPH-d .....	Total Petroleum Hydrocarbon-Diesel
USACE .....	United States Army Corps of Engineers
USEPA .....	United States Environmental Protection Agency
VOC.....	Volatile Organic Compound
yd <sup>3</sup> .....	Cubic Yards

## **1.0 INTRODUCTION**

### **1.1 Site Name and Location**

Facility Name: Hawthorne Army Depot  
Site Location: Hawthorne, Nevada  
Operable Unit/Site: Solid Waste Management Unit (SWMU) J29

### **1.2 Statement of Basis and Purpose**

This Decision Document describes the rationale for the selected remedy of No Further Action (NFA) with land use restrictions at SWMU J29 at Hawthorne Army Depot (HWAD), hereafter referred to as SWMU J29.

Remedial investigations of hazardous substances, pollutants, or contaminants at SWMU J29 have demonstrated that:

- Explosives, total petroleum hydrocarbons-diesel (TPH-d), and lead were detected at concentrations exceeding the site-specific proposed closure goals (PCGs) and Nevada State Corrective Action Levels in surface soil samples collected during the remedial investigation (RI) from 1994–1997. All COC concentrations currently are below Preliminary Remediation Goals (PRGS)/PCGs and/or site-specific Remedial Action Levels (RALs);
- Based on the current and future industrial land use scenario, it has been determined that no significant risks to human health or the environment now exist.

### **1.3 Description of Selected Remedy**

No further action with land use restrictions is necessary at SWMU J29. Based on investigative and remedial action results, the U.S. Army Environmental Command (Army), with concurrence from NDEP, has determined that no significant risks or threats to human health or the environment exist at this time. However, land use restrictions will be implemented at SWMU J29 to prevent future dumping of scrap metal and other debris.

Land use restrictions include land use controls (LUCs) that are incorporated into the base-wide master plan, in compliance with the HWAD's LUC policy. Access restrictions for this alternative would include installation of signs indicating that no dumping is permitted and notification for any installation personnel entering the SWMU J29 boundary that dumping of scrap metal and other debris is not permitted.

### **1.4 Regulatory Setting**

United States Environmental Protection Agency (USEPA) provides regulatory oversight of contamination assessment and corrective measures at Resource Conservation and Recovery Act (RCRA) SWMUs under Section 3004 (u) of the 1984 Hazardous and Solid Waste Amendments to RCRA. Corrective action for releases of hazardous wastes or constituents is required under 40 CFR Part 264.101 (a), (b), and (c).

The HWAD also maintains RCRA Permit No. NEV HW0017 (renewed in August 2005), which requires corrective actions for any hazardous waste or hazardous constituents released from any SWMUs at the facility. Authority and responsibility for the implementation of RCRA has been delegated by the USEPA to the State of Nevada, making the Nevada Division of Environmental Protection (NDEP) the lead regulatory agency for all RCRA investigations and corrective actions at HWAD.

### 1.5 Authorizing Signatures

This signature sheet documents the Army approval and NDEP concurrence of the remedy selected in this Decision Document for SWMU J29 at HWAD.

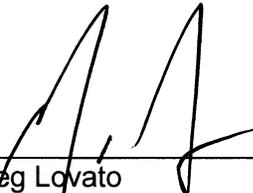
This remedy decision may be reviewed and modified in the future if information becomes available that indicates the presence of contamination that may cause unacceptable risk to human health or the environment.



Kirk L. Bausman  
Deputy to the Commander  
Hawthorne Army Depot

20120620

Date



Greg Lovato  
Chief, Bureau of Corrective Actions  
Nevada Division of Environmental Protection

6/20/12

Date

## 2.0 DECISION SUMMARY

The Decision Summary identifies the selected remedy, explains how the remedy fulfills statutory and regulatory requirements, and provides a substantive summary of the Administrative Record file that supports the remedy selection decision.

### 2.1 Site Name, Location, and Description

SWMU J29 is located in HWAD's north magazine area (**Figure 1** and **2**). SWMU J29 is an area 1,060 feet by 900 feet that is a suspected former landfill west of Building 103-5 (**Figure 3**).

SWMU J29 was identified as a suspected landfill by the NDEP, based on the 1954 historic aerial photographs (USACE, 1993). Building 103-5, located just east of SWMU J29, was a smokeless powder propellant loading facility and was active from the 1940s until the 1970s (Dellamonica, 1994). Explosives and metal casings were handled at this facility. Small volumes of wastewater were discharged from Building 103-5 when the floors and work areas in the building were washed down periodically. This wastewater appears to have been discharged to the leach field identified at SWMU J29. A drain line was traced from the southwest corner of Building 103-5 to the leach field (**Attachment 1**, Figure 3-1). Although no drain lines were identified that discharged into three drainage ditches at this SWMU, these ditches may have accepted wastewater from Building 103-5 through former drain lines or from tank trucks (Tetra Tech, 1998).

There is also evidence of surface disposal at SWMU J29, including debris found on the mineral ground surface. Charred wood found among the debris indicates that this debris was burned and may have been ignited using gasoline or other petroleum products. Also, because of the graded areas at this SWMU, it is suspected that debris may have been buried. No documentation of these activities or disposal practices at SWMU J29 was identified while researching the historical sources (Tetra Tech, 1998).

### 2.2 Physical Setting

HWAD is located on the southern shore of Walker Lake, 140 miles southeast of Reno, Nevada. It occupies approximately 150,000 acres of semi-arid land surrounding the Hawthorne community. The town has a resident population of about 5,000. The regional site location is shown in **Figure 1**.

### 2.3 Investigation History

A site walk visual survey, RI, groundwater monitoring, additional investigation, and remedial action (bioremediation) have been completed at SWMU J29. **Table 2-1** provides a brief summary of these activities.

**Table 2-1 Summary of Previous Actions at SWMU J29**

Date	Area and Purpose of Investigation	Company	Area Assessed	Major Findings	Recommendations
1993	Site walk visual survey	Tetra Tech, Inc. (Tetra Tech)	Solid Waste Management Unit (SWMU) J29	Identified three drainage ditches and a leach field. The graded surface area and surface debris (including charred wood, nails, packaging materials, and some munitions-related scrap items) suggest a potential former landfill. No other surface evidence of disposal pits or waste disposal observed.	Backfill drainage features to eliminate future wastewater disposal.  Further investigation for evidence of potential former landfill.
1994–1997	RI	Tetra Tech	Drain line locating survey to identify potential release points and sources at SWMU J29.	Identified one underground drain line present from the southwest corner of Building 103-5 to the leach field.  No evidence of drain lines that would have discharged wastewater into the drainage ditches within the SWMU boundary.	
			Airborne ground penetrating radar (AGPR) within the SWMU boundary (22 acres) at SWMU J29.	Identified 38 targets including surface debris, visually disturbed soils, disrupted soils that appeared to have been backfilled but that were not visually disturbed, single buried debris objects, and multiple buried debris objects. Several of these items appeared to be buried debris from landfill activities. Survey results are included on the Investigation Activity Map (Figure 3-1) included in <b>Attachment 1</b> .	
			Further definition of AGPR anomalies using surface geophysical surveys including vertical magnetic gradient (MAG), electromagnetic terrain conductivity (EMAG), and surface ground penetrating radar (SGPR) within the SWMU boundary (22 acres) at SWMU J29.	Nine MAG anomalies defined, three believed to be underground utilities. Twenty-one SGPR anomalies were defined. MAG and EMAG anomalies were located in areas with SGPR anomalies. Survey results are included on the Investigation Activity Map (Figure 3-1) included in <b>Attachment 1</b> .	
			14 soil gas samples were collected at five feet below ground surface (bgs) for volatile organic compounds (VOCs) analysis. Soil gas sample locations were based on anomalies identified during geophysical surveys. Sample locations are included on the Investigation Activity Map (Figure 3-1) included in <b>Attachment 1</b> .	VOCs were below laboratory detection limits in all 14 soil gas samples.	
			15 surface soil samples were collected from 6–12 inches bgs where surface debris was present. Geophysical anomalies indicated possible landfill disposal activities near drainage ditches and leach fields where wastewater may have been released. Samples were selectively analyzed for total petroleum hydrocarbons (TPH), metals and explosives using a mobile laboratory and for benzene, toluene, ethylbenzene, and for xylenes (BTEX) using a field test. Sample locations are included on the Investigation Activity Map (Figure 3-1) included in <b>Attachment 1</b> .	Two surface soil samples, SS09 and SS15, contained lead concentrations of 130 milligrams per kilogram (mg/kg). Analytical results are included in <b>Attachment 1</b> , Table 4-1.  One surface soil sample, SS08, contained explosive concentrations of 2,4,6-trinitrotoluene (TNT) at 17,000 mg/kg, 1,3,5-trinitrobenzene (TNB) at 40 mg/kg, 2,4-dinitrotoluene (2,4-DNT) at 37 mg/kg, and TPH-d at 1,800 mg/kg. Analytical results are included in <b>Attachment 1</b> , Table 4-1.	Remediate the surface soil in the vicinity of sample SS08 for explosives and TPH-d.  NDEP concurred in a letter dated 24 August 1998 ( <b>Attachment 1</b> ).
			One soil boring, SB06, was completed near SS08 to 60 ft bgs. Five subsurface samples were collected from 10, 20, 25, 39.5, and 57 feet bgs. Samples were selectively analyzed for TPH-d and explosives using laboratory analysis and field tests. Sample locations are included on the Investigation Activity Map (Figure 3-1) included in <b>Attachment 1</b> .	Explosives and TPH-d were not detected above laboratory reporting limits in any of the five soil samples collected from soil boring SB06. Analytical results are included in <b>Attachment 1</b> , Table 4-1.	

**Table 2-1 Summary of Previous Actions at SWMU J29 (Continued)**

Date	Area and Purpose of Investigation	Company	Area Assessed	Major Findings	Recommendations
1994–1997	RI	Tetra Tech	Three test pits and six trenches were completed to assess geophysical anomalies, delineate potential landfill boundaries, characterize subsurface contents, and collect soil samples. 18 soil samples were collected from the sidewalls and bottoms of test pits and trenches and selectively analyzed for metals, explosives, and TPH. Two surface soil samples were collected at three of the trenches for geotechnical analysis to assess the cover over the suspected landfill. Sample locations are included on the Investigation Activity Map (Figure 3-1) included in <b>Attachment 1</b> .	Two locations, TP03-2 (2 feet bgs) and TR03-3 (5 feet bgs), contained lead concentrations of 584 mg/kg and 121 mg/kg, respectively. Both soil samples were collected within the same geophysical anomaly.  TP03-2 also contained chromium at a concentration of 22.9 mg/kg and TPH-heavy oil at a concentration of 190 mg/kg.  TP02-2 (2 feet bgs) contained beryllium at a concentration 1.1 mg/kg.  These lead, chromium, and beryllium concentrations do not exceed current regional screening levels (RSLs); see <b>Section 2.4</b> for additional action level discussion. Analytical results are included in <b>Attachment 1</b> , Table 4-1.  Test pit TP03 and trenches TR03, TR04, and TR05 contained debris indicating potential landfill disposal activities.	No remedial action. NDEP concurred in a letter dated 24 August 1998 ( <b>Attachment 1</b> ) and a letter dated August 1, 2006. ( <b>Attachment 3</b> ).
1997	Long-Term Monitoring (LTM)	Tetra Tech	Groundwater monitoring wells IRPMW29 (up-gradient), IRPMW28 (down-gradient), IRPMW24 and IRPMW25 (cross-gradient) were sampled for metals, explosives, VOCs, semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), herbicides, anions, cations, nitrogen compounds, total dissolved solids, and pH. Groundwater monitoring well locations are included on the Investigation Activity Map (Figure 3-1) included in <b>Attachment 1</b> .	No contaminants of potential concern (COPCs) were detected above the maximum contaminant levels (MCLs). Analytical results are included in <b>Attachment 1</b> , Table 4-2.	
2004	Additional Investigation (report cannot be located)	HWAD personnel	As documented in the Chung and Associates and Geofon Remedial Action Report (2006): Observed a flat area, 70 feet by 70 feet, with patches of discolored soils (suggestive of explosives) and scattered piles of miscellaneous debris.  Two soil samples were collected at different depths up to 4 feet bgs, within the discolored area. It is assumed that explosives were sampled; however, the data could not be located and it is not noted in the 2006 Remedial Action Report.	No exceedances were detected in the soil samples. Maximum extent of contamination believed to be within a 70 foot by 70 foot area, with a maximum depth of four feet.	Remove and treat approximately 100 cubic yards (yd <sup>3</sup> ) of soil.
2004–2005	Windrow Composting Bioremediation	Chung and Associates, Inc. and Geofon, Inc.	Excavated an area 30 feet by 40 feet by 4 feet deep. Field tests were used to determine if soils had been sufficiently excavated and treated. Three confirmation soil samples were collected from the windrow compost piles ( <b>Attachment 2</b> , Table 5). Samples were analyzed for explosives. Five confirmation samples were collected from walls and floor of the excavation ( <b>Attachment 2</b> , Table 6). Confirmation soil samples were analyzed for explosives. Excavation boundaries and sample locations are included in <b>Attachment 2</b> , Figure 6.	Confirmation samples were below established site specific RALs. RALs and analytical results are included in <b>Attachment 2</b> , Tables 1, 5 and 6.	No Further Action.

## 2.4 Action Level Discussion

Based on the RI completed at SWMU J29 between 1994 and 1997, the following three areas of concern (AOC) were identified at SWMU J29. Each AOC is identified by sample identification numbers. Sample locations are included on the Investigation Activity Map (**Attachment 1**, Figure 3-1). Because the site-specific RALs have changed over the course of the investigative work at SWMU J29, the 1997 PCGs, the 2004 PRGs, and current USEPA Regional Screening Levels (RSLs) are all considered in the discussion below.

### 2.4.1 TP03 and TR03

Lead concentrations in TP03 and TR03 exceeded the PCG in 1997, but are less than the current industrial RSL. Chromium and TPH-heavy oil in TP03 exceeded the PCG in 1997 at concentrations of 22.9 mg/kg and 190 mg/kg, respectively. Total chromium and TPH do not have established RSLs, although the concentrations of chromium are below the industrial RSL for chromium (III), insoluble salts. However, due to the TPH-heavy oil detection, this AOC was identified during the RI on the basis of the previous PCGs. In 2006 HWAD completed an *A-K Assessment for Test Pit 03 Area of SWMU J29* according to the Nevada Administrative Code (NAC) 445A.227 subsection 2, to determine if corrective action was necessary at the Test Pit 03 Area. Based on the assessment, and with concurrence from NDEP, additional corrective action is not necessary at this time for Test Pit 03 Area. The NDEP concurrence letter dated August 1, 2006 is included as **Attachment 3**.

### 2.4.2 TP02

The beryllium concentration in TP02 exceeded the PCG in 1997, but is less than the current industrial USEPA RSL. Therefore, although this AOC was identified during the RI on the basis of the previous PCGs, the concentrations of COPCs do not exceed current USEPA RSLs.

### 2.4.3 SS08, SS09, and SS15

Lead concentrations exceeded the PCG at SS09 and SS15 in 1997, but are less than the current industrial USEPA RSL.

TPH-d and explosives exceeded the site-specific remedial action levels at SS08. Explosives and TPH-d were not detected deeper than 10 feet bgs. The depth to groundwater is approximately 80 feet bgs in the vicinity of SWMU J29. Based upon this separation distance, explosives and TPH-d do not appear to have affected the groundwater at SWMU J29.

140 yd<sup>3</sup> of soil were excavated and treated from the SS08, SS09, and SS15 AOC in 2004 (**Attachment 1**, Figure 3-1). Confirmation soil samples were collected from the bottom and sidewalls of the excavation. Confirmation soil sample results were below site-specific RALs, which at that time were the EPA Region 9 PRGs for industrial soil. The confirmation soil sample concentrations are also below the current industrial USEPA RSLs. TPH-d was not analyzed in the confirmation samples collected during the excavation activities; however, as previously stated, TPH-d does not currently have an established RSL, the TPH-d contaminated soil was defined to the upper ten feet, and this soil is believed to have been removed with the explosives-contaminated soil.

### 2.4.4 Arsenic

The current RSL for arsenic is much lower than it was at the time of the RI, so although no arsenic concentrations in soil were observed to be above the PCG in 1997, all arsenic concentrations and reporting limits for soil shown in **Attachment 1**(Table 4-1), exceed the current USEPA RSL. However, arsenic is below the established HWAD background screening

levels cited in **Attachment 1** (Table 4-1). Therefore, the arsenic present in soil can be attributed to background levels and not to anthropogenic activity at SWMU J29.

Similarly, arsenic concentrations in groundwater summarized in **Attachment 1** (Table 4-2), were below the USEPA MCL of 50 micrograms per liter ( $\mu\text{g/L}$ ) in 1997 when the monitoring was conducted; however, the USEPA MCL for arsenic was lowered to 10  $\mu\text{g/L}$  in 2006. Arsenic concentrations in five of nine samples detected in 1997 exceed the current USEPA MCL, but as discussed for soil, arsenic is not attributed to anthropogenic activity. It is likely that arsenic in the groundwater can also be attributed to background screening levels.

## **2.5 Human Health Risk Evaluation**

As part of the RI report, a human health risk evaluation on the carcinogenic and noncarcinogenic hazards associated with COPCs identified in the surface soils at SWMU J29 was completed. A table summarizing the results of the human health risk evaluation, Summary of Chemicals of Potential Concern Detected in Surface Soil Samples (0 to 1.5 feet), is included in **Attachment 1** (Table 5-3). The human health risk evaluation determined the elevated carcinogenic and non-carcinogenic risk at SWMU J29 was primarily due to the TNT found in surface soil. The TNT-contaminated soil was removed and bio-remediated (by windrow composting) in 2004.

## **2.6 Decommissioning Activities**

Non-hazardous solid waste generated during the excavation and windrow composting was collected in an on-site roll-off container and disposed of by Walker Lake Disposal. Potentially hazardous wastes were stored in sealed 55-gallon drums within a labeled hazardous waste storage area. Drums were disposed of in accordance with local, state, and federal regulations. During use, the liquid waste was collected in a chemical-resistant can and transferred daily (Geofon, 2006).

The site was backfilled after it was determined that site action levels for explosives were achieved. The compost generated from SWMU J29 soils, which were remediated in SWMU B29, WR-10, and WR-13, were backfilled to Ponds C and D, respectively, at SWMU B29 (Geofon, 2006).

Based on a letter from NDEP dated November 6, 2006 (**Attachment 4**), NDEP requested the following actions be completed before approving a decision document for SWMU J29:

- Remove large metal debris items from SWMU J29;
- Backfill the former excavation and place two feet of surface soil in a manner so that adequate drainage will be maintained and the water will not pool.

The extent of the debris field and locations of large metal debris items observed during a 2011 Site visit are shown on the map included in **Attachment 4**.

Large metal debris items were removed from SWMU J29 and recycled on 18 April 2012. Small metal debris was allowed to remain at the site per NDEP. The small metal debris that remains at the SWMU is primarily nails and other building material. Land use restrictions, including signage, will be implemented to prevent further dumping at the SWMU.

Additional backfill material was added to the former excavation footprint on 19 April 2012 and was mounded to prevent water from pooling. Photographic documentation of metal debris removal and backfilling activities are included in **Attachment 4**.

### 3.0 CONCLUSIONS

Confirmation sampling analysis indicates that no present or future industrial receptors are likely to be adversely affected by site contamination at SWMU J29. NFA with institutional controls (ICs) is requested following NAC 445A.227 guidelines, under which the following issues were addressed (**Table 3-1**):

**Table 3-1 Site Evaluation for SWMU J29**

Assessment Criteria		Response
A	Depth of any groundwater	Approximately 80 feet bgs
B	Distance to irrigation or drinking water wells	Water supply well #7 is located approximately 4,700 feet north to northeast of SWMU J29
C	Type of soil that is contaminated	Well-graded gravels and sands
D	Annual precipitation	Annual precipitation for Hawthorne, Nevada is 4.6 inches
E	Type of waste or substance released	Explosives, metals, TPH, and BTEX
F	Extent of the contamination	Contaminated soil has been removed. Impacts to groundwater have not been observed in down-gradient wells.
G	Present and potential use for the land	SWMU J29 is presently used for industrial purposes. Future land use is also expected to be industrial.
H	Preferred routes of migration	Vertically through unsaturated materials
I	Location of structures and impediments	SWMU J29 is located west of Building 103-5
J	Potential for a hazard related to fire, vapor, or explosion	No such hazards identified at SWMU J29
K	Other site-specific factors	No other site-specific factors have been noted at SWMU J29

## 4.0 REFERENCES

Chung and Associates, Inc. and Geofon, Inc., 2006. *Final Remediation Report Solid Waste Management Unit J29, Hawthorne Army Depot, Hawthorne Nevada*, September.

Dellamonica, L. 1994. Hawthorne Army Depot. Personal communication via site walk Tom Whitehead of Tetra Tech. April 29, 1994.

Tetra Tech, 1998. *Final Remedial Investigation Report Solid Waste Management Unit J29 Building 103-5 Landfill, Hawthorne Army Depot, Hawthorne Nevada*, December.

United States Army Corps of Engineers (USACE). 1993. Installation Action Plan for Hawthorne Army Ammunition Plant (HWAAP), prepared by S. Hong.

## **Figures**

To  
Fallon

95



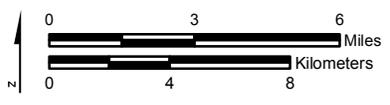
**HAWTHORNE  
ARMY  
DEPOT**

HAWTHORNE

839  
NEVADA

95

To Las Vegas



**Legend**  
 Installation Boundary

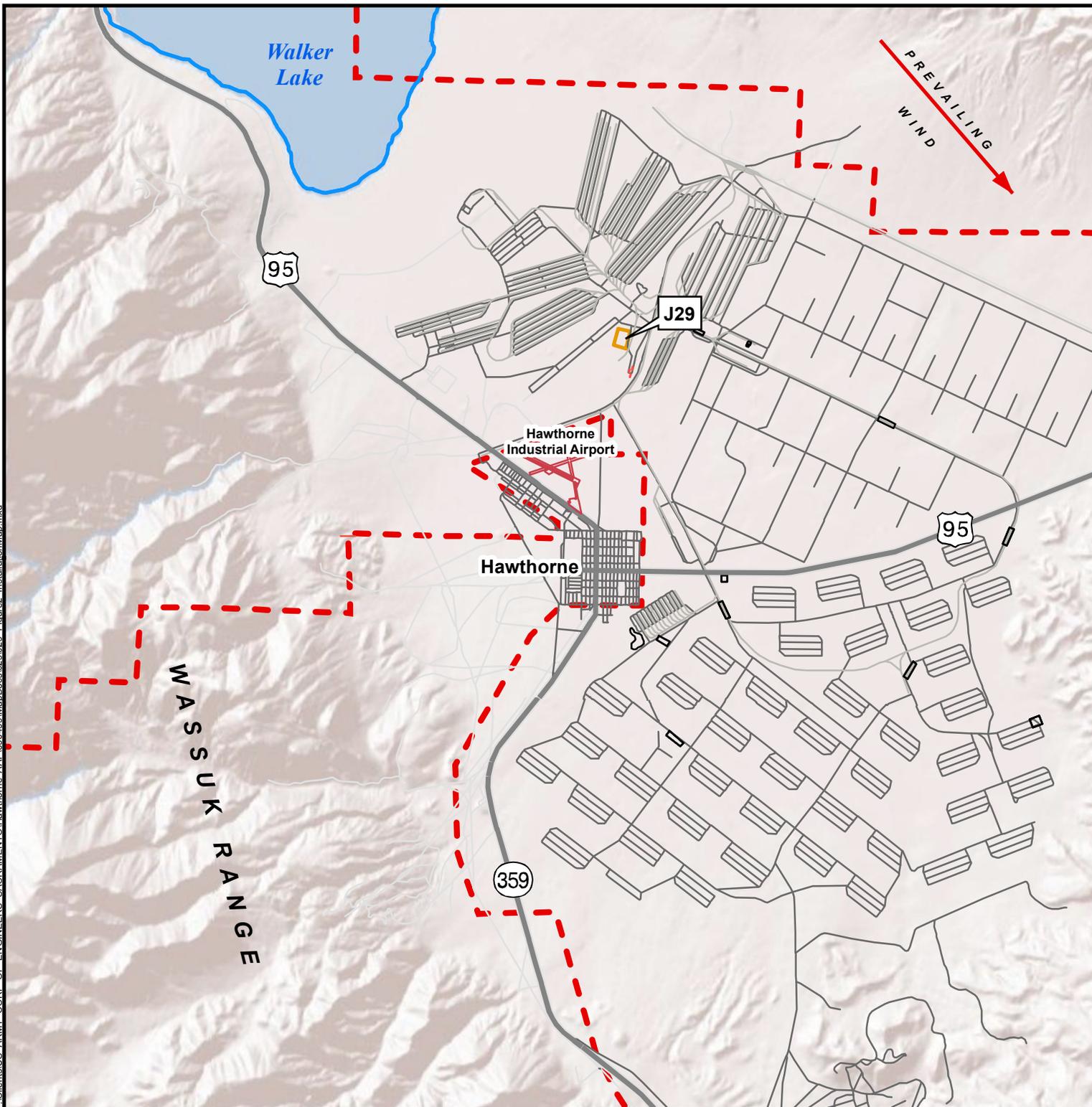
Data is Projected in the NAD83 UTM Zone 11N  
Aerial Photo: ArcGIS Online Map server  
Figure Create Using ArcMap 9.3.1

**Figure 1**

**Hawthorne Army Depot**

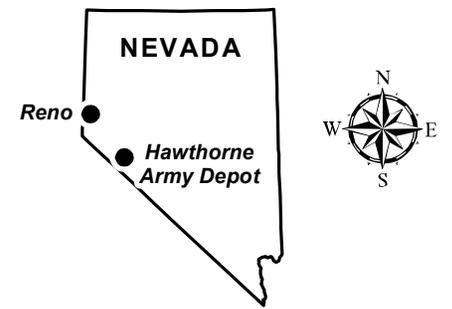


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## Figure 2 SWMU J29 Site Location

Hawthorne Army Depot  
Hawthorne, Nevada



Map Projection: NAD 1983 UTM Zone 11 North - Meters



-  J29 Site Boundary
-  Installation Boundary



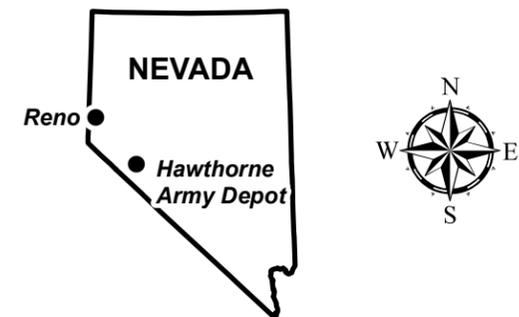
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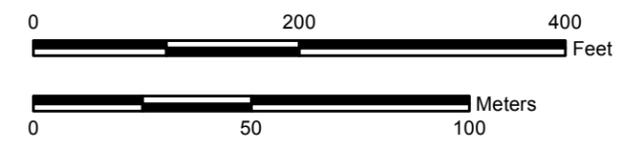
**Figure 3**

**SWMU J29 Site Map**

**Hawthorne Army Depot**  
Hawthorne, Nevada



Map Projection: NAD 1983 UTM Zone 11 North  
Bing World Imagery Basemap



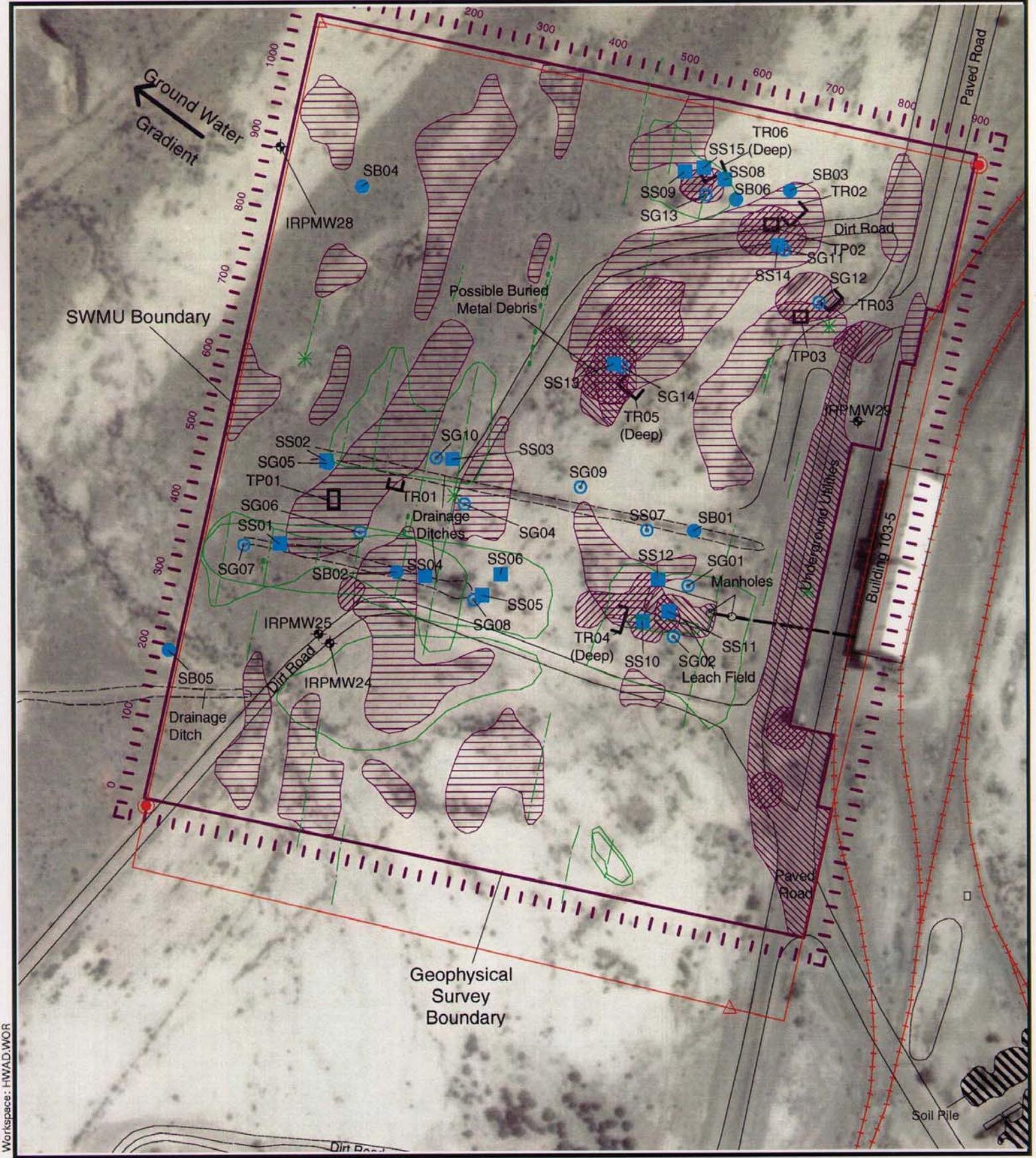
-  Remedial Area / Backfilled Area  
SS08, SS09, and SS15 AOC
-  Site Boundary



## **Attachment 1**

Data and Figures from  
Tetra Tech, December 1998. *Final Remedial Investigation Report Solid Waste Management  
Unit J29 Building 103-5 Landfill, Hawthorne Army Depot, Hawthorne Nevada.*

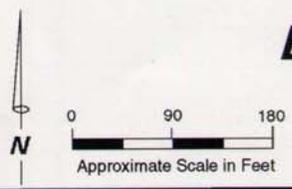
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Workspace: HWAD.WOR

**Legend:**

- |  |                     |  |                      |
|--|---------------------|--|----------------------|
|  | EMAG Anomaly        |  | Soil Boring Location |
|  | MAG Anomaly         |  | Monitoring Well      |
|  | Boundary Corner Pin |  | Railroad             |
|  | Drain Line          |  | Soil Gas Location    |
|  | SGPR Anomaly        |  | Surface Soil Sample  |
|  | Trench              |  | SWMU Monument        |
|  | Test Pit            |  | AGPR Anomalies       |
|  | Tetra Tech, Inc.    |  | Radar Targets        |
|  |                     |  | Disrupted Soil       |
|  |                     |  | Multiple Targets     |



**Investigation Activity Map**  
**SWMU J29**  
**Building 103-5 Landfill**  
 Hawthorne Army Depot  
 Hawthorne, Nevada  
**Figure 3-1**

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-SS01-1-S	J29-SS02-1-S	J29-SS03-1-S	J29-SS04-1-S	J29-SS05-1-S	J29-SS06-1-S	J29-SS07-1-S	J29-SS08-1-S	J29-SS08-1-S*
Location ID	SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS08
Sample Date	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94
Sample Depth (feet)	0	0	0	0	0	0	0	0	0
<b>Metals (mg/kg)</b>									
<b>Methods 6000s/7000s</b>									
Aluminum	NA	NA							
Arsenic	4.6 <sup>J</sup>	4.4 <sup>J</sup>	12 <sup>J</sup>	8.4 <sup>J</sup>	14 <sup>J</sup>	15 <sup>J</sup>	< 4	< 4	NA
Barium	43	55	87	63	180	180	130	46	NA
Beryllium	NA	NA							
Cadmium	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.67	1.6	NA
Chromium, Total	1.7 <sup>J</sup>	2.1 <sup>J</sup>	4.5 <sup>J</sup>	3.1 <sup>J</sup>	6.6	7	4.6 <sup>J</sup>	3 <sup>J</sup>	NA
Lead	< 5	15 <sup>J</sup>	17 <sup>J</sup>	7.7 <sup>J</sup>	24 <sup>J</sup>	29 <sup>J</sup>	23 <sup>J</sup>	46 <sup>J</sup>	NA
Mercury	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.047 <sup>J</sup>	< 0.04	< 0.04	NA
<b>Explosives (mg/kg)</b>									
<b>Method 8330/8090M</b>									
DNB	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 50	1.9 <sup>UJ</sup>
2,4-DNT	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 50	37
2,6-DNT	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 50	< 0.17
HMX	NA	21							
Nitrobenzene	< 0.25	< 0.25	< 0.25	< 50	< 0.25	< 0.25	< 0.25	< 50	7.4
4-Nitrotoluene	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 50	< 0.74
RDX	< 50 <sup>R</sup>	< 50 <sup>R</sup>	< 50 <sup>R</sup>	< 0.25 <sup>R</sup>	< 50 <sup>R</sup>	< 50 <sup>R</sup>	< 50 <sup>R</sup>	< 1000 <sup>R</sup>	3.3
TNB	< 0.50 <sup>R</sup>	< 0.50 <sup>R</sup>	< 0.50 <sup>R</sup>	< 0.25 <sup>R</sup>	< 0.50 <sup>R</sup>	< 0.50 <sup>R</sup>	< 0.50 <sup>R</sup>	< 100 <sup>R</sup>	40
TNT	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	12000	17000
<b>RDX Test Kit (mg/kg)</b>									
<b>Method 8510</b>									
RDX	NA	NA							
<b>TNT Test Kit (mg/kg)</b>									
<b>Method 8515</b>									
TNT	NA	NA							
<b>TPH (mg/kg)</b>									
<b>Method 8015M</b>									
TPH (as diesel)	< 0.2	< 0.2	< 0.2	< 0.1	< 0.2	< 0.2	5.5	1060 <sup>J</sup>	NA

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-SS01-1-S	J29-SS02-1-S	J29-SS03-1-S	J29-SS04-1-S	J29-SS05-1-S	J29-SS06-1-S	J29-SS07-1-S	J29-SS08-1-S	J29-SS08-1-S*
Location ID	SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS08
Sample Date	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94
Sample Depth (feet)	0	0	0	0	0	0	0	0	0
<b>TPH (mg/kg)</b>									
<b>Method M8015E</b>									
C08-C10 (Gasoline)	NA								
C11-C22 (Diesel)	NA								
C23-C30 (Motor oil)	NA								
C31-C40 (Heavy oil)	NA								
<b>TPH Test Kit (mg/kg)</b>									
<b>Method 4030</b>									
TPH-d	NA								
TPH-d (Rerun)	NA								
<b>BTEX Test Kit (mg/kg)</b>									
<b>Method 4031</b>									
BTEX	X> 50	NA							

## Notes:

NA = Not analyzed.

NE = Not established.

J29-SS08-1-S\* is a confirmation split duplicate sample of J29-SS08-1-S.

J29-DP097, J29-DP098, J29-DP099, J29-DP100, and J29-DP101 are split duplicate samples of J29-SS08-1-S.

J29-TP01-2-S is a collocation duplicate sample of J29-TP01-1-S.

J29-TR03-2-S is a collocation duplicate sample of J29-TR03-1-S.

J29-TR06-4-S is a collocation duplicate sample of J29-TR06-3-S.

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-DP097	J29-DP098	J29-DP099	J29-DP100	J29-DP101	J29-SS09-1-S	J29-SS10-1-S	J29-SS11-1-S	J29-SS12-1-S	J29-SS13-1-S
Location ID	SS08	SS08	SS08	SS08	SS08	SS09	SS10	SS11	SS12	SS13
Sample Date	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/21/94	7/21/94	7/21/94	7/21/94
Sample Depth (feet)	0	0	0	0	0	0	0	0	0	0
<b>Metals (mg/kg)</b>										
<b>Methods 6000s/7000s</b>										
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	< 4	NA	11 <sup>J</sup>	10 <sup>J</sup>	8.7 <sup>J</sup>	6.5 <sup>J</sup>	7.1 <sup>J</sup>
Barium	NA	NA	NA	47	NA	230	200	160	64	150
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	1.6	NA	2.4	< 0.2	< 0.2	< 0.2	< 0.2
Chromium, Total	NA	NA	NA	2.8 <sup>J</sup>	NA	7	2.9 <sup>J</sup>	< 0.6	< 0.6	< 0.6
Lead	NA	NA	NA	43 <sup>J</sup>	NA	130	15 <sup>J</sup>	20 <sup>J</sup>	5.5 <sup>J</sup>	21 <sup>J</sup>
Mercury	NA	NA	NA	< 0.04	NA	0.052 <sup>J</sup>	< 0.04	< 0.04	< 0.04	< 0.04
<b>Explosives (mg/kg)</b>										
<b>Method 8330/8090M</b>										
DNB	< 50	NA	NA	NA	2.1 <sup>UJ</sup>	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
2,4-DNT	< 50	NA	NA	NA	34	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
2,6-DNT	< 50	NA	NA	NA	15	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
HMX	NA	NA	NA	NA	9.9	NA	NA	NA	NA	NA
Nitrobenzene	< 50	NA	NA	NA	< 0.09	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
4-Nitrotoluene	< 50	NA	NA	NA	4.3 <sup>UJ</sup>	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
RDX	< 1000 <sup>R</sup>	NA	NA	NA	1.2 <sup>UJ</sup>	< 50 <sup>R</sup>				
TNB	< 100 <sup>R</sup>	NA	NA	NA	43	< 0.50 <sup>R</sup>				
TNT	12000	NA	NA	NA	< 0.19	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
<b>RDX Test Kit (mg/kg)</b>										
<b>Method 8510</b>										
RDX	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>TNT Test Kit (mg/kg)</b>										
<b>Method 8515</b>										
TNT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>TPH (mg/kg)</b>										
<b>Method 8015M</b>										
TPH (as diesel)	1800 <sup>J</sup>	NA	NA	NA	NA	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-DP097	J29-DP098	J29-DP099	J29-DP100	J29-DP101	J29-SS09-1-S	J29-SS10-1-S	J29-SS11-1-S	J29-SS12-1-S	J29-SS13-1-S
Location ID	SS08	SS08	SS08	SS08	SS08	SS09	SS10	SS11	SS12	SS13
Sample Date	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/17/94	7/21/94	7/21/94	7/21/94	7/21/94
Sample Depth (feet)	0	0	0	0	0	0	0	0	0	0
<b>TPH (mg/kg)</b>										
<b>Method M8015E</b>										
C08-C10 (Gasoline)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C11-C22 (Diesel)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C23-C30 (Motor oil)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C31-C40 (Heavy oil)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>TPH Test Kit (mg/kg)</b>										
<b>Method 4030</b>										
TPH-d	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH-d (Rerun)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>BTEX Test Kit (mg/kg)</b>										
<b>Method 4031</b>										
BTEX	NA	NA	X > 50	NA	NA	X > 50	X < 2	X < 2	X < 2	X < 2

## Notes:

NA = Not analyzed.

NE = Not established.

J29-SS08-1-S\* is a confirmation split duplicate sample of J29-SS08-1-S.

J29-DP097, J29-DP098, J29-DP099, J29-DP100, and J29-DP101 are split duplicate samples of J29-SS08-1-S.

J29-TP01-2-S is a collocation duplicate sample of J29-TP01-1-S.

J29-TR03-2-S is a collocation duplicate sample of J29-TR03-1-S.

J29-TR06-4-S is a collocation duplicate sample of J29-TR06-3-S.

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-SS14-1-S	J29-SS15-1-S	J29-SB06-1-S	J29-SB06-2-S	J29-SB06-3-S	J29-SB06-4-S	J29-SB06-5-S	J29-TP01-1-S	J29-TP01-2-S
Location ID	SS14	SS15	SB06	SB06	SB06	SB06	SB06	TP01	TP01
Sample Date	7/21/94	7/21/94	2/14/97	2/14/97	2/14/97	2/14/97	2/14/97	2/27/97	2/27/97
Sample Depth (feet)	0	0	10	20	25	39.5	57	5	5
<b>Metals (mg/kg)</b>									
<b>Methods 6000s/7000s</b>									
Aluminum	NA	NA	NA	NA	NA	NA	NA	4220	5280
Arsenic	9.3 <sup>J</sup>	< 4	NA	NA	NA	NA	NA	8.4	11.4
Barium	140	190	NA	NA	NA	NA	NA	51.2	59.2
Beryllium	NA	NA	NA	NA	NA	NA	NA	< 0.018	< 0.018
Cadmium	< 0.2	0.41 <sup>J</sup>	NA	NA	NA	NA	NA	< 0.021	< 0.021
Chromium, Total	< 0.6	1.1 <sup>J</sup>	NA	NA	NA	NA	NA	2.6	3
Lead	33 <sup>J</sup>	130	NA	NA	NA	NA	NA	4.5	5.1
Mercury	< 0.04	< 0.04	NA	NA	NA	NA	NA	< 0.07	< 0.07
<b>Explosives (mg/kg)</b>									
<b>Method 8330/8090M</b>									
DNB	< 0.25	< 0.25	< 0.034	< 0.039	< 0.035	< 0.035	< 0.033	< 0.026	< 0.026
2,4-DNT	< 0.25	< 0.25	< 0.042	< 0.048	< 0.044	< 0.044	< 0.041	< 0.027	< 0.027
2,6-DNT	< 0.25	< 0.25	< 0.045	< 0.052	< 0.047	< 0.047	< 0.045	< 0.058	< 0.058
HMX	NA	NA	< 0.058	< 0.067	< 0.061	< 0.061	< 0.058	< 0.047	< 0.048
Nitrobenzene	< 0.25	< 0.25	< 0.064	< 0.074	< 0.067	< 0.067	< 0.064	< 0.057	< 0.057
4-Nitrotoluene	< 0.25	< 0.25	< 0.073	< 0.085	< 0.077	< 0.077	< 0.073	< 0.074	< 0.074
RDX	< 50 <sup>R</sup>	< 50 <sup>R</sup>	< 0.044	< 0.051	< 0.046	< 0.046	< 0.044	< 0.052	< 0.052
TNB	< 0.50 <sup>R</sup>	< 0.50 <sup>R</sup>	< 0.062	< 0.072	< 0.065	< 0.065	< 0.062	< 0.013	< 0.013
TNT	< 0.25	< 0.25	< 0.056	< 0.065	< 0.059	< 0.059	< 0.056	< 0.041	< 0.041
<b>RDX Test Kit (mg/kg)</b>									
<b>Method 8510</b>									
RDX	NA	NA	< 0.8	NA	NA	NA	NA	0.98	10.84
<b>TNT Test Kit (mg/kg)</b>									
<b>Method 8515</b>									
TNT	NA	NA	< 0.8	NA	NA	NA	NA	< 0.8	< 0.8
<b>TPH (mg/kg)</b>									
<b>Method 8015M</b>									
TPH (as diesel)	< 0.2	1.5 <sup>J</sup>	NA						

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-SS14-1-S	J29-SS15-1-S	J29-SB06-1-S	J29-SB06-2-S	J29-SB06-3-S	J29-SB06-4-S	J29-SB06-5-S	J29-TP01-1-S	J29-TP01-2-S
Location ID	SS14	SS15	SB06	SB06	SB06	SB06	SB06	TP01	TP01
Sample Date	7/21/94	7/21/94	2/14/97	2/14/97	2/14/97	2/14/97	2/14/97	2/27/97	2/27/97
Sample Depth (feet)	0	0	10	20	25	39.5	57	5	5
<b>TPH (mg/kg)</b>									
<b>Method M8015E</b>									
C08-C10 (Gasoline)	NA	NA	NA	< 0.18	NA	NA	NA	NA	NA
C11-C22 (Diesel)	NA	NA	NA	< 0.96	NA	NA	NA	NA	NA
C23-C30 (Motor oil)	NA	NA	NA	< 0.44	NA	NA	NA	NA	NA
C31-C40 (Heavy oil)	NA	NA	NA	< 0.33	NA	NA	NA	NA	NA
<b>TPH Test Kit (mg/kg)</b>									
<b>Method 4030</b>									
TPH-d	NA	NA	X < 4	4 < X < 20	X < 4	4 < X < 20	X < 4	100 < X < 500	100 < X < 500
TPH-d (Rerun)	NA	X < 4	NA						
<b>BTEX Test Kit (mg/kg)</b>									
<b>Method 4031</b>									
BTEX	10 < X < 50	X < 2	NA	NA	NA	NA	NA	NA	NA

## Notes:

NA = Not analyzed.

NE = Not established.

J29-SS08-1-S\* is a confirmation split duplicate sample of J29-SS08-1-S.

J29-DP097, J29-DP098, J29-DP099, J29-DP100, and J29-DP101 are split duplicate samples of J29-SS08-1-S.

J29-TP01-2-S is a collocation duplicate sample of J29-TP01-1-S.

J29-TR03-2-S is a collocation duplicate sample of J29-TR03-1-S.

J29-TR06-4-S is a collocation duplicate sample of J29-TR06-3-S.

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TP01-3-S	J29-TP02-1-S	J29-TP02-2-S	J29-TP03-1-S	J29-TP03-2-S	J29-TR01-1-S	J29-TR01-2-S	J29-TR02-1-S	J29-TR02-2-S
Location ID	TP01	TP02	TP02	TP03	TP03	TR01	TR01	TR02	TR02
Sample Date	2/27/97	2/28/97	2/28/97	2/28/97	2/28/97	2/27/97	2/27/97	2/28/97	2/28/97
Sample Depth (feet)	1	5	2	5	2	5	5	5	5
<b>Metals (mg/kg)</b>									
<b>Methods 6000s/7000s</b>									
Aluminum	3830	4010	24700	5470	11400	4730	2800	4110	4680
Arsenic	6.5	3.5	17.8	3.9	11.4	5.1	9	2.8	3.8
Barium	46.8	23.3	329	35.4	165	39.2	36.8	26.8	30.2
Beryllium	< 0.017	< 0.017	1.1	< 0.017	0.32	< 0.017	< 0.017	< 0.017	< 0.017
Cadmium	< 0.021	< 0.02	0.29	< 0.02	1.1	< 0.02	< 0.02	< 0.02	< 0.02
Chromium, Total	1.8	2.4	10.3	2.7	22.9	2.9	1.9	2.1	2.3
Lead	3.3	3.3	26.4	5.8	548	5.3	2.7	3.4	3.7
Mercury	< 0.07	< 0.069	< 0.076	< 0.07	< 0.073	< 0.07	< 0.07	< 0.069	< 0.069
<b>Explosives (mg/kg)</b>									
<b>Method 8330/8090M</b>									
DNB	< 0.026	< 0.025	< 0.028	< 0.026	< 0.027	< 0.026	< 0.026	< 0.025	< 0.025
2,4-DNT	< 0.027	< 0.026	< 0.029	< 0.027	< 0.028	< 0.027	< 0.027	< 0.026	< 0.026
2,6-DNT	< 0.057	< 0.057	< 0.063	< 0.057	< 0.060	< 0.057	< 0.057	< 0.057	< 0.057
HMX	< 0.047	< 0.047	< 0.051	< 0.047	< 0.050	< 0.047	< 0.047	< 0.047	< 0.047
Nitrobenzene	< 0.056	< 0.056	< 0.061	< 0.056	< 0.059	< 0.056	< 0.056	< 0.056	< 0.056
4-Nitrotoluene	< 0.074	< 0.073	< 0.080	< 0.074	< 0.078	< 0.074	< 0.074	< 0.073	< 0.073
RDX	< 0.051	< 0.051	< 0.056	< 0.051	< 0.054	< 0.051	< 0.051	< 0.051	< 0.051
TNB	< 0.013	< 0.013	< 0.015	< 0.013	< 0.014	< 0.013	< 0.013	< 0.013	< 0.013
TNT	< 0.041	< 0.040	< 0.045	< 0.041	2.8	< 0.041	< 0.041	< 0.041	< 0.041
<b>RDX Test Kit (mg/kg)</b>									
<b>Method 8510</b>									
RDX	6.13	4.13	104.08	1.06	0.97	3.47	3.38	2.66	< 0.8
<b>TNT Test Kit (mg/kg)</b>									
<b>Method 8515</b>									
TNT	< 0.8	< 0.8	< 0.8	< 0.8	1.64	< 0.8	< 0.8	< 0.8	< 0.8
<b>TPH (mg/kg)</b>									
<b>Method 8015M</b>									
TPH (as diesel)	NA								

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TP01-3-S	J29-TP02-1-S	J29-TP02-2-S	J29-TP03-1-S	J29-TP03-2-S	J29-TR01-1-S	J29-TR01-2-S	J29-TR02-1-S	J29-TR02-2-S
Location ID	TP01	TP02	TP02	TP03	TP03	TR01	TR01	TR02	TR02
Sample Date	2/27/97	2/28/97	2/28/97	2/28/97	2/28/97	2/27/97	2/27/97	2/28/97	2/28/97
Sample Depth (feet)	1	5	2	5	2	5	5	5	5
<b>TPH (mg/kg)</b>									
<b>Method M8015E</b>									
C08-C10 (Gasoline)	NA	NA	NA	NA	< 0.81	NA	NA	NA	NA
C11-C22 (Diesel)	NA	NA	NA	NA	< 4.4	NA	NA	NA	NA
C23-C30 (Motor oil)	NA	NA	NA	NA	74	NA	NA	NA	NA
C31-C40 (Heavy oil)	NA	NA	NA	NA	190 <sup>J</sup>	NA	NA	NA	NA
<b>TPH Test Kit (mg/kg)</b>									
<b>Method 4030</b>									
TPH-d	20 < X < 100	100 < X < 500	100 < X < 500	100 < X < 500	100 < X < 500	100 < X < 500			
TPH-d (Rerun)	NA	4 < X < 20	NA	NA	NA	NA	NA	NA	NA
<b>BTEX Test Kit (mg/kg)</b>									
<b>Method 4031</b>									
BTEX	NA	NA	NA	NA	NA	NA	NA	NA	NA

## Notes:

NA = Not analyzed.

NE = Not established.

J29-SS08-1-S\* is a confirmation split duplicate sample of J29-SS08-1-S.

J29-DP097, J29-DP098, J29-DP099, J29-DP100, and J29-DP101 are split duplicate samples of J29-SS08-1-S.

J29-TP01-2-S is a collocation duplicate sample of J29-TP01-1-S.

J29-TR03-2-S is a collocation duplicate sample of J29-TR03-1-S.

J29-TR06-4-S is a collocation duplicate sample of J29-TR06-3-S.

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TR03-1-S	J29-TR03-2-S	J29-TR03-3-S	J29-TR04-1-S	J29-TR04-2-S	J29-TR04-3-S	J29-TR04-4-S	J29-TR04-5-S	J29-TR04-6-S
Location ID	TR03	TR03	TR03	TR04	TR04	TR04	TR04	TR04	TR04
Sample Date	2/28/97	2/28/97	2/28/97	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97
Sample Depth (feet)	5	5	5	0	0	4.5	9	4.5	9
<b>Metals (mg/kg)</b>									
<b>Methods 6000s/7000s</b>									
Aluminum	6740	6950	8280	NA	NA	6530	11900	6960	13800
Arsenic	4	4.2	11.8	NA	NA	6.1	9	5.3	15.6
Barium	57.7	50.4	113	NA	NA	47.5	137	75.8	293
Beryllium	< 0.018	< 0.018	< 0.018	NA	NA	< 0.017	< 0.018	< 0.017	0.27
Cadmium	< 0.021	< 0.021	< 0.021	NA	NA	< 0.02	< 0.021	< 0.021	< 0.021
Chromium, Total	3.2	3.2	4.4	NA	NA	2.9	7.4	3.3	10.5
Lead	5.9	5.8	121	NA	NA	4.8	11.3	5.3	15.4
Mercury	< 0.07	< 0.07	< 0.07	NA	NA	< 0.07	< 0.073	< 0.07	< 0.073
<b>Explosives (mg/kg)</b>									
<b>Method 8330/8090M</b>									
DNB	< 0.026	< 0.026	< 0.026	NA	NA	< 0.026	< 0.027	< 0.026	< 0.027
2,4-DNT	< 0.027	< 0.027	< 0.027	NA	NA	< 0.027	< 0.028	< 0.027	< 0.028
2,6-DNT	< 0.058	< 0.058	< 0.058	NA	NA	< 0.057	< 0.060	< 0.057	< 0.060
HMX	< 0.047	< 0.047	< 0.047	NA	NA	< 0.047	< 0.049	< 0.047	< 0.049
Nitrobenzene	< 0.057	< 0.057	< 0.057	NA	NA	< 0.056	< 0.059	< 0.056	< 0.059
4-Nitrotoluene	< 0.074	< 0.074	< 0.074	NA	NA	< 0.074	< 0.077	< 0.074	< 0.077
RDX	< 0.052	< 0.052	< 0.051	NA	NA	< 0.051	< 0.054	< 0.051	< 0.054
TNB	< 0.013	< 0.013	< 0.013	NA	NA	< 0.013	< 0.014	< 0.013	< 0.014
TNT	0.75	0.84	< 0.041	NA	NA	< 0.041	< 0.043	< 0.041	< 0.043
<b>RDX Test Kit (mg/kg)</b>									
<b>Method 8510</b>									
RDX	14.08	12.84	24.8	3.47	3.38	7.16	4.13	10.89	6.13
<b>TNT Test Kit (mg/kg)</b>									
<b>Method 8515</b>									
TNT	1.02	0.96	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
<b>TPH (mg/kg)</b>									
<b>Method 8015M</b>									
TPH (as diesel)	NA								

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TR03-1-S	J29-TR03-2-S	J29-TR03-3-S	J29-TR04-1-S	J29-TR04-2-S	J29-TR04-3-S	J29-TR04-4-S	J29-TR04-5-S	J29-TR04-6-S
Location ID	TR03	TR03	TR03	TR04	TR04	TR04	TR04	TR04	TR04
Sample Date	2/28/97	2/28/97	2/28/97	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97
Sample Depth (feet)	5	5	5	0	0	4.5	9	4.5	9
<b>TPH (mg/kg)</b>									
<b>Method M8015E</b>									
C08-C10 (Gasoline)	NA	< 0.15	NA	NA	NA	NA	NA	NA	NA
C11-C22 (Diesel)	NA	< 0.84	NA	NA	NA	NA	NA	NA	NA
C23-C30 (Motor oil)	NA	< 0.38	NA	NA	NA	NA	NA	NA	NA
C31-C40 (Heavy oil)	NA	< 0.29	NA	NA	NA	NA	NA	NA	NA
<b>TPH Test Kit (mg/kg)</b>									
<b>Method 4030</b>									
TPH-d	100 < X < 500	100 < X < 500	100 < X < 500	NA	NA	100 < X < 500			
TPH-d (Rerun)	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>BTEX Test Kit (mg/kg)</b>									
<b>Method 4031</b>									
BTEX	NA	NA	NA	NA	NA	NA	NA	NA	NA

## Notes:

NA = Not analyzed.

NE = Not established.

J29-SS08-1-S\* is a confirmation split duplicate sample of J29-SS08-1-S.

J29-DP097, J29-DP098, J29-DP099, J29-DP100, and J29-DP101 are split duplicate samples of J29-SS08-1-S.

J29-TP01-2-S is a collocation duplicate sample of J29-TP01-1-S.

J29-TR03-2-S is a collocation duplicate sample of J29-TR03-1-S.

J29-TR06-4-S is a collocation duplicate sample of J29-TR06-3-S.

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TR05-1-S	J29-TR05-2-S	J29-TR05-3-S	J29-TR05-4-S	J29-TR05-5-S	J29-TR05-6-S	J29-TR06-1-S	J29-TR06-2-S	J29-TR06-3-S
Location ID	TR05	TR05	TR05	TR05	TR05	TR05	TR06	TR06	TR06
Sample Date	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97	2/28/97	2/28/97	2/28/97
Sample Depth (feet)	0	0	5	9.5	5	9.5	0	0	4.5
<b>Metals (mg/kg)</b>									
<b>Methods 6000s/7000s</b>									
Aluminum	NA	NA	6160	5290	3530	5490	NA	NA	21000
Arsenic	NA	NA	3.8	2.4	1.7	2.5	NA	NA	16.5
Barium	NA	NA	47.5	38.8	29.5	47.4	NA	NA	276
Beryllium	NA	NA	< 0.017	< 0.017	< 0.017	< 0.017	NA	NA	0.85
Cadmium	NA	NA	< 0.02	< 0.02	< 0.02	< 0.02	NA	NA	0.24
Chromium, Total	NA	NA	3.1	2.4	1.9	2.6	NA	NA	8.7
Lead	NA	NA	6.1	4.4	3.3	4.3	NA	NA	23.5
Mercury	NA	NA	< 0.07	< 0.069	< 0.069	< 0.07	NA	NA	< 0.075
<b>Explosives (mg/kg)</b>									
<b>Method 8330/8090M</b>									
DNB	NA	NA	< 0.026	< 0.026	< 0.026	< 0.026	NA	NA	< 0.027
2,4-DNT	NA	NA	< 0.027	< 0.027	< 0.027	< 0.027	NA	NA	< 0.029
2,6-DNT	NA	NA	< 0.057	< 0.057	< 0.057	< 0.057	NA	NA	< 0.062
HMX	NA	NA	< 0.047	< 0.047	< 0.047	< 0.047	NA	NA	< 0.051
Nitrobenzene	NA	NA	< 0.056	< 0.056	< 0.056	< 0.056	NA	NA	< 0.060
4-Nitrotoluene	NA	NA	< 0.074	< 0.073	< 0.074	< 0.074	NA	NA	< 0.079
RDX	NA	NA	< 0.051	< 0.051	< 0.051	< 0.051	NA	NA	< 0.055
TNB	NA	NA	< 0.013	< 0.013	< 0.013	< 0.013	NA	NA	< 0.014
TNT	NA	NA	< 0.041	< 0.041	< 0.041	< 0.041	NA	NA	< 0.044
<b>RDX Test Kit (mg/kg)</b>									
<b>Method 8510</b>									
RDX	NA	NA	13.96	< 0.8	< 0.8	< 0.8	NA	NA	43.3
<b>TNT Test Kit (mg/kg)</b>									
<b>Method 8515</b>									
TNT	NA	NA	< 0.8	< 0.8	< 0.8	< 0.8	NA	NA	< 0.8
<b>TPH (mg/kg)</b>									
<b>Method 8015M</b>									
TPH (as diesel)	NA								

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TR05-1-S	J29-TR05-2-S	J29-TR05-3-S	J29-TR05-4-S	J29-TR05-5-S	J29-TR05-6-S	J29-TR06-1-S	J29-TR06-2-S	J29-TR06-3-S
Location ID	TR05	TR05	TR05	TR05	TR05	TR05	TR06	TR06	TR06
Sample Date	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97	2/27/97	2/28/97	2/28/97	2/28/97
Sample Depth (feet)	0	0	5	9.5	5	9.5	0	0	4.5
<b>TPH (mg/kg)</b>									
<b>Method M8015E</b>									
C08-C10 (Gasoline)	NA	NA	NA	NA	< 0.15	NA	NA	NA	NA
C11-C22 (Diesel)	NA	NA	NA	NA	< 0.83	NA	NA	NA	NA
C23-C30 (Motor oil)	NA	NA	NA	NA	< 0.38	NA	NA	NA	NA
C31-C40 (Heavy oil)	NA	NA	NA	NA	< 0.29	NA	NA	NA	NA
<b>TPH Test Kit (mg/kg)</b>									
<b>Method 4030</b>									
TPH-d	NA	NA	100 < X < 500	NA	NA	100 < X < 500			
TPH-d (Rerun)	NA	NA	4 < X < 20	NA	4 < X < 20	NA	NA	NA	4 < X < 20
<b>BTEX Test Kit (mg/kg)</b>									
<b>Method 4031</b>									
BTEX	NA	NA	NA	NA	NA	NA	NA	NA	NA

## Notes:

NA = Not analyzed.

NE = Not established.

J29-SS08-1-S\* is a confirmation split duplicate sample of J29-SS08-1-S.

J29-DP097, J29-DP098, J29-DP099, J29-DP100, and J29-DP101 are split duplicate samples of J29-SS08-1-S.

J29-TP01-2-S is a collocation duplicate sample of J29-TP01-1-S.

J29-TR03-2-S is a collocation duplicate sample of J29-TR03-1-S.

J29-TR06-4-S is a collocation duplicate sample of J29-TR06-3-S.

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TR06-4-S	J29-TR06-5-S	J29-TR06-6-S	J29-TR06-7-S	Analyses	Detections	Minimum	Maximum	PCG	PCG Hits	Background	Background Hits
Location ID	TR06	TR06	TR06	TR06								
Sample Date	2/28/97	2/28/97	2/28/97	2/28/97								
Sample Depth (feet)	4.5	10	5.5	11								
<b>Metals (mg/kg)</b>												
<b>Methods 6000s/7000s</b>												
Aluminum	20400	3830	3820	8080	27	27	2800	24700	80000	0	12365	4
Arsenic	17.5	2.2	2.1	4.7	43	40	1.7	17.8	100	0	18.1	0
Barium	259	23.6	19.7	67	43	43	19.7	329	2000	0	447	0
Beryllium	0.83	< 0.017	< 0.017	< 0.018	27	5	0.27	1.1	1	1	0.58	3
Cadmium	0.24	< 0.02	< 0.02	< 0.021	43	9	0.24	2.4	20	0	1.08	4
Chromium, Total	8.7	2	2.2	3.8	43	39	1.1	22.9	20	1	13.76	1
Lead	23.4	3.3	3.7	6.3	43	42	1.8	548	100	4	16.7	16
Mercury	< 0.074	< 0.069	< 0.069	< 0.072	43	2	0.047	0.052	24	0	0.108	0
<b>Explosives (mg/kg)</b>												
<b>Method 8330/8090M</b>												
DNB	< 0.027	< 0.026	< 0.025	< 0.026	50	2	1.9	2.1	8	0	NE	NE
2,4-DNT	< 0.028	< 0.027	< 0.026	< 0.027	50	2	34	37	2.6	2	NE	NE
2,6-DNT	< 0.061	< 0.057	< 0.057	< 0.059	50	1	15	15	80	0	NE	NE
HMX	< 0.05	< 0.047	< 0.047	< 0.049	34	2	9.9	21	4000	0	NE	NE
Nitrobenzene	< 0.06	< 0.056	< 0.056	< 0.058	50	1	7.4	7.4	40	0	NE	NE
4-Nitrotoluene	< 0.078	< 0.073	< 0.073	< 0.076	50	1	4.3	4.3	800	0	NE	NE
RDX	< 0.054	< 0.051	< 0.051	< 0.053	50	2	1.2	3.3	64	0	NE	NE
TNB	< 0.014	< 0.013	< 0.013	< 0.014	50	2	40	43	4	2	NE	NE
TNT	< 0.043	< 0.041	< 0.041	< 0.042	50	6	0.75	17,000	233	3	NE	NE
<b>RDX Test Kit (mg/kg)</b>												
<b>Method 8510</b>												
RDX	41.15	4.31	< 0.8	3.56	30	24	0.97	104.08	64	1	NE	NE
<b>TNT Test Kit (mg/kg)</b>												
<b>Method 8515</b>												
TNT	< 0.8	< 0.8	< 0.8	< 0.8	30	3	0.96	1.64	233	0	NE	NE
<b>TPH (mg/kg)</b>												
<b>Method 8015M</b>												
TPH (as diesel)	NA	NA	NA	NA	16	4	1.5	1800	100	2	NE	NE

**Table 4-1**  
**Summary of Detected Analytical Results for Soil Samples**  
**SWMU J29 - Building 103-5 Landfill**

Sample ID	J29-TR06-4-S	J29-TR06-5-S	J29-TR06-6-S	J29-TR06-7-S	Analyses	Detections	Minimum	Maximum	PCG	PCG Hits	Background	Background Hits
Location ID	TR06	TR06	TR06	TR06								
Sample Date	2/28/97	2/28/97	2/28/97	2/28/97								
Sample Depth (feet)	4.5	10	5.5	11								
<b>TPH (mg/kg)</b>												
<b>Method M8015E</b>												
C08-C10 (Gasoline)	NA	NA	NA	NA	4	0	NE	NE	100	0	NE	NE
C11-C22 (Diesel)	NA	NA	NA	NA	4	0	NE	NE	100	0	NE	NE
C23-C30 (Motor oil)	NA	NA	NA	NA	4	1	74	74	100	0	NE	NE
C31-C40 (Heavy oil)	NA	NA	NA	NA	4	1	190	190	100	1	NE	NE
<b>TPH Test Kit (mg/kg)</b>												
<b>Method 4030</b>												
TPH-d	00< X< 500	100< X< 500	100< X< 500	100< X< 500	32	29	0< X< 20	100< X< 500	100	26	NE	NE
TPH-d (Rerun)	NA	NA	4< X< 20	NA	6	5	0< X< 20	0< X< 20	100	0	NE	NE
<b>BTEX Test Kit (mg/kg)</b>												
<b>Method 4031</b>												
BTEX	NA	NA	NA	NA	16	11	10< X< 50	X> 50	10	11	NE	NE

## Notes:

NA = Not analyzed.

NE = Not established.

J29-SS08-1-S\* is a confirmation split duplicate sample of J29-SS08-1-S.

J29-DP007, J29-DP098, J29-DP099, J29-DP100, and J29-DP101 are split duplicate samples of J29-SS08-1-S.

J29-TP01-2-S is a collocation duplicate sample of J29-TP01-1-S.

J29-TR03-2-S is a collocation duplicate sample of J29-TR03-1-S.

J29-TR06-4-S is a collocation duplicate sample of J29-TR06-3-S.

**Table 4-2**  
**Summary of Detected Analytical Results for Ground Water Samples**  
**Tt 1997 Sampling Event – Building 103 Group**

Sample ID	IRPMW24-012997-W	IRPMW24C-042897-W	IRPMW25-012997-W	IRPMW25D-042897-W	IRPMW28-012997-W	IRPMW28A-042897-W
Location ID	IRPMW24	IRPMW24	IRPMW25	IRPMW25	IRPMW28	IRPMW28
Sample Date	1/29/97	4/28/97	1/29/97	4/28/97	1/29/97	4/28/97
Sample Depth (feet)	153	153	115	115	109	110
<b>Metals (µg/l) □</b>						
<b>Methods 6000 to 7000</b>						
Arsenic, Dissolved	6.9	10.9	38.2	27.4	2.2 <sup>J</sup>	8.6
Arsenic, Total	5.8	10.6	30.6	26	2.8 <sup>J</sup>	11.6
Cadmium, Total	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.34 <sup>J</sup>
Calcium, Total	125000	87000	107000	99600	106000	99400
Chromium, Dissolved	< 0.3	0.99 <sup>J</sup>	< 0.3	< 0.3	< 0.3	< 0.3
Chromium, Total	2.3 <sup>J</sup>	1.2 <sup>J</sup>	1.2 <sup>J</sup>	< 0.3	< 0.3	2.7 <sup>J</sup>
Iron, Total	53	22 <sup>J</sup>	< 1.2	16.3 <sup>J</sup>	< 1.2	25.1 <sup>J</sup>
Lead, Dissolved	< 0.6	1.3 <sup>J</sup>	< 0.6	1.5	< 0.6	1.8 <sup>J</sup>
Lead, Total	< 0.6	1.5 <sup>J</sup>	< 0.6	1.4 <sup>J</sup>	< 0.6	4.4 <sup>J</sup>
Magnesium, Total	23400	15900	18900	17000	17800	16000
Mercury, Dissolved	< 0.15	< 0.15	< 0.15	0.7	< 0.15	0.73
Mercury, Total	< 0.15	0.71	< 0.15	0.73	< 0.15	0.87
Potassium, Total	16600	13800	17200	15100	16900	15900
Selenium, Dissolved	< 2.3	< 2.3	< 2.3	< 2.3	5.2	< 2.3
Selenium, Total	6.4	< 2.3	4.5 <sup>J</sup>	< 2.3	3.1 <sup>J</sup>	< 2.3
Silver, Total	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	1.3 <sup>J</sup>
Sodium, Total	166000	113000	135000	123000	148000	134000
<b>Volatile Organics (µg/l) □</b>						
<b>Method 8260A (APCL)</b>						
Benzene	< 0.2	< 0.5	< 0.2	< 0.2	0.9 <sup>J</sup>	< 0.2
Methylene chloride	< 0.4	< 0.5	0.9 <sup>UJ</sup>	< 0.7	< 0.4	< 0.7

Note:

NE = Not established.

Duplicate Samples:

IRPMW28B-042897-W is a duplicate sample of IRPMW28A-042897-W.

**Table 4-2**  
**Summary of Detected Analytical Results for Ground Water Samples**  
**Tt 1997 Sampling Event – Building 103 Group (continued)**

Sample ID	IRPMW28B-042897-W	IRPMW29C-013097-W	IRPMW29-042897-W	Analyses	Detections	Minimum	Maximum	MCL	MCL Hits	PRG	PRG Hits
Location ID	IRPMW28	IRPMW29	IRPMW29								
Sample Date	4/28/97	1/30/97	4/28/97								
Sample Depth (feet)	150	96	100								
<b>Metals (µg/l) □</b>											
<b>Methods 6000 to 7000</b>											
Arsenic, Dissolved	10.4	4.3 <sup>J</sup>	6.3	9	9	2.2	38.2	50	0	0.045	9
Arsenic, Total	9.5	4.3 <sup>J</sup>	5.5	9	9	2.8	30.6	50	0	0.045	9
Cadmium, Total	< 0.1	< 0.1	< 0.1	9	1	0.34	0.34	5	0	18	0
Calcium, Total	95200	88600	85000	9	9	85000	125000	NE	NE	NE	NE
Chromium, Dissolved	< 0.3	4.1 <sup>J</sup>	2.4 <sup>J</sup>	9	3	0.99	4.1	100	0	NE	NE
Chromium, Total	< 0.3	4.5 <sup>J</sup>	3.4 <sup>J</sup>	9	6	1.2	4.5	100	0	NE	NE
Iron, Total	12.2 <sup>J</sup>	< 1.2	21.3 <sup>J</sup>	9	6	12.2	53	300	0	NE	NE
Lead, Dissolved	2.2 <sup>J</sup>	< 0.6	1.7 <sup>J</sup>	9	5	1.3	2.2	15	0	4	0
Lead, Total	1.4 <sup>J</sup>	1.1 <sup>J</sup>	1.8 <sup>J</sup>	9	6	1.1	4.4	15	0	4	1
Magnesium, Total	15500	14200	13400	9	9	13400	23400	NE	NE	NE	NE
Mercury, Dissolved	< 0.15	< 0.15	0.76	9	3	0.7	0.76	2	0	11	0
Mercury, Total	< 0.15	< 0.15	0.78	9	4	0.71	0.87	2	0	11	0
Potassium, Total	15400	7080	12600	9	9	7080	17200	NE	NE	NE	NE
Selenium, Dissolved	4.5 <sup>J</sup>	3.2 <sup>J</sup>	3.1 <sup>J</sup>	9	4	3.1	5.2	50	0	180	0
Selenium, Total	2.7 <sup>J</sup>	3.2 <sup>J</sup>	2.8 <sup>J</sup>	9	6	2.7	6.4	50	0	180	0
Silver, Total	< 1.1	< 1.1	< 1.1	9	1	1.3	1.3	100	0	180	0
Sodium, Total	130000	166000	157000	9	9	113000	166000	NE	NE	NE	NE
<b>Volatile Organics (µg/l) □</b>											
<b>Method 8260A(APCL)</b>											
Benzene	< 0.2	0.6 <sup>J</sup>	< 0.2	9	2	0.6	0.9	5	0	0.39	2
Methylene chloride	< 0.7	0.4 <sup>UJ</sup>	< 0.7	9	2	0.4	0.9	5	0	4.3	0

Note:

NE = Not established.

Duplicate Samples:

IRPMW28B-042897-W is a duplicate sample of IRPMW28A-042897-W.

**Table 4-2**  
**Summary of Detected Analytical Results for Ground Water Samples**  
**Tt 1997 Sampling Event – Building 103 Group**

Sample ID	IRPMW24-012997-W	IRPMW24C-042897-W	IRPMW25-012997-W	IRPMW25D-042897-W	IRPMW28-012997-W	IRPMW28A-042897-W
Location ID	IRPMW24	IRPMW24	IRPMW25	IRPMW25	IRPMW28	IRPMW28
Sample Date	1/29/97	4/28/97	1/29/97	4/28/97	1/29/97	4/28/97
Sample Depth (feet)	153	153	115	115	109	110
<b>Metals (µg/l) □</b>						
<b>Methods 6000 to 7000</b>						
Arsenic, Dissolved	6.9	10.9	38.2	27.4	2.2 <sup>J</sup>	8.6
Arsenic, Total	5.8	10.6	30.6	26	2.8 <sup>J</sup>	11.6
Cadmium, Total	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.34 <sup>J</sup>
Calcium, Total	125000	87000	107000	99600	106000	99400
Chromium, Dissolved	< 0.3	0.99 <sup>J</sup>	< 0.3	< 0.3	< 0.3	< 0.3
Chromium, Total	2.3 <sup>J</sup>	1.2 <sup>J</sup>	1.2 <sup>J</sup>	< 0.3	< 0.3	2.7 <sup>J</sup>
Iron, Total	53	22 <sup>J</sup>	< 1.2	16.3 <sup>J</sup>	< 1.2	25.1 <sup>J</sup>
Lead, Dissolved	< 0.6	1.3 <sup>J</sup>	< 0.6	1.5	< 0.6	1.8 <sup>J</sup>
Lead, Total	< 0.6	1.5 <sup>J</sup>	< 0.6	1.4 <sup>J</sup>	< 0.6	4.4 <sup>J</sup>
Magnesium, Total	23400	15900	18900	17000	17800	16000
Mercury, Dissolved	< 0.15	< 0.15	< 0.15	0.7	< 0.15	0.73
Mercury, Total	< 0.15	0.71	< 0.15	0.73	< 0.15	0.87
Potassium, Total	16600	13800	17200	15100	16900	15900
Selenium, Dissolved	< 2.3	< 2.3	< 2.3	< 2.3	5.2	< 2.3
Selenium, Total	6.4	< 2.3	4.5 <sup>J</sup>	< 2.3	3.1 <sup>J</sup>	< 2.3
Silver, Total	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	1.3 <sup>J</sup>
Sodium, Total	166000	113000	135000	123000	148000	134000
<b>Volatile Organics (µg/l) □</b>						
<b>Method 8260A (APCL)</b>						
Benzene	< 0.2	< 0.5	< 0.2	< 0.2	0.9 <sup>J</sup>	< 0.2
Methylene chloride	< 0.4	< 0.5	0.9 <sup>UJ</sup>	< 0.7	< 0.4	< 0.7

Note:

NE = Not established.

Duplicate Samples:

IRPMW28B-042897-W is a duplicate sample of IRPMW28A-042897-W.

**Table 4-2**  
**Summary of Detected Analytical Results for Ground Water Samples**  
**Tt 1997 Sampling Event – Building 103 Group (continued)**

Sample ID	IRPMW28B-042897-W	IRPMW29C-013097-W	IRPMW29-042897-W	Analyses	Detections	Minimum	Maximum	MCL	MCL Hits	PRG	PRG Hits
Location ID	IRPMW28	IRPMW29	IRPMW29								
Sample Date	4/28/97	1/30/97	4/28/97								
Sample Depth (feet)	150	96	100								
<b>Metals (µg/l) □</b>											
<b>Methods 6000 to 7000</b>											
Arsenic, Dissolved	10.4	4.3 <sup>J</sup>	6.3	9	9	2.2	38.2	50	0	0.045	9
Arsenic, Total	9.5	4.3 <sup>J</sup>	5.5	9	9	2.8	30.6	50	0	0.045	9
Cadmium, Total	< 0.1	< 0.1	< 0.1	9	1	0.34	0.34	5	0	18	0
Calcium, Total	95200	88600	85000	9	9	85000	125000	NE	NE	NE	NE
Chromium, Dissolved	< 0.3	4.1 <sup>J</sup>	2.4 <sup>J</sup>	9	3	0.99	4.1	100	0	NE	NE
Chromium, Total	< 0.3	4.5 <sup>J</sup>	3.4 <sup>J</sup>	9	6	1.2	4.5	100	0	NE	NE
Iron, Total	12.2 <sup>J</sup>	< 1.2	21.3 <sup>J</sup>	9	6	12.2	53	300	0	NE	NE
Lead, Dissolved	2.2 <sup>J</sup>	< 0.6	1.7 <sup>J</sup>	9	5	1.3	2.2	15	0	4	0
Lead, Total	1.4 <sup>J</sup>	1.1 <sup>J</sup>	1.8 <sup>J</sup>	9	6	1.1	4.4	15	0	4	1
Magnesium, Total	15500	14200	13400	9	9	13400	23400	NE	NE	NE	NE
Mercury, Dissolved	< 0.15	< 0.15	0.76	9	3	0.7	0.76	2	0	11	0
Mercury, Total	< 0.15	< 0.15	0.78	9	4	0.71	0.87	2	0	11	0
Potassium, Total	15400	7080	12600	9	9	7080	17200	NE	NE	NE	NE
Selenium, Dissolved	4.5 <sup>J</sup>	3.2 <sup>J</sup>	3.1 <sup>J</sup>	9	4	3.1	5.2	50	0	180	0
Selenium, Total	2.7 <sup>J</sup>	3.2 <sup>J</sup>	2.8 <sup>J</sup>	9	6	2.7	6.4	50	0	180	0
Silver, Total	< 1.1	< 1.1	< 1.1	9	1	1.3	1.3	100	0	180	0
Sodium, Total	130000	166000	157000	9	9	113000	166000	NE	NE	NE	NE
<b>Volatile Organics (µg/l) □</b>											
<b>Method 8260A (APCL)</b>											
Benzene	< 0.2	0.6 <sup>J</sup>	< 0.2	9	2	0.6	0.9	5	0	0.39	2
Methylene chloride	< 0.7	0.4 <sup>UJ</sup>	< 0.7	9	2	0.4	0.9	5	0	4.3	0

Note:

NE = Not established.

Duplicate Samples:

IRPMW28B-042897-W is a duplicate sample of IRPMW28A-042897-W.

**Table 5-3**  
**Calculated Cancer Risks and Hazard Quotients Associated with Industrial Exposure**  
**SWMU J29 – Building 103-5 Landfill**

Analyte	Maximum Detected Concentration	USEPA Region IX Industrial Cancer PRG (August 1996)	USEPA Region IX Industrial Non-cancer PRG (August 1996)	Chemical-specific Cancer Risk	Chemical-specific Hazard Quotient
<b>Metals (mg/kg)</b>					
<b>Methods 6000s/7000s</b>					
Cadmium	2.4	3,000	850	$8.0 \times 10^{-10}$	0.0028
Lead	130	*	1,000	*	*
<b>Explosives (mg/kg)</b>					
<b>Method 8090M/8330</b>					
DNB	2.1	NE	68	NE	0.031
2,4-DNT	37	2.8	1,400	$1.3 \times 10^{-5}$	0.026
2,6-DNT	15	2.8	680	$5.4 \times 10^{-6}$	0.022
HMX	21	NE	34,000	NE	0.00062
Nitrobenzene	7.4	NE	94	NE	0.079
4-Nitrotoluene	4.3	NE	6,800	NE	0.00063
RDX	3.3	17	2,000	$1.9 \times 10^{-7}$	0.0016
TNB	43	NE	34	NE	1.3
TNT	17,000	64	340	$2.7 \times 10^{-4}$	50
Total Cancer Risk				$2.9 \times 10^{-4}$	
Total Hazard Index					51.5

## Notes:

\*Lead risk evaluated in Sections 5.3.8 and 5.3.9.

NE = Not established.



PL 110001 - APPROVED 10/20/98  
L. H. DODGSON, Administrator  
333 W. Nye Lane  
Carson City, NV 89706-0851  
Fax: 687-6396

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES  
DIVISION OF ENVIRONMENTAL PROTECTION

333 W. Nye Lane, Room 138  
Carson City, Nevada 89706-0851

August 24, 1998

Mr. Herman Millsap  
Operations Review Division  
Hawthorne Army Depot  
Hawthorne, Nevada 89415-5000

**SUBJECT: Draft Remedial Investigation Report, Solid Waste Management Unit J29, Building 103-5 Landfill**

Dear Mr. Millsap:

The Nevada Division of Environmental Protection (NDEP) has received and evaluated your Remedial Investigation Report, Solid Waste Management Unit J29, Building 103-5 Landfill dated May 1998 regarding the environmental investigation of an old landfill located at Hawthorne Army Depot. This report is approved.

Should you have any questions or if I can be of any assistance, please do not hesitate to contact me at 702-687-4670 Extension 3032 (FAX 702-687-6396). All future correspondence regarding this subject should be addressed to the undersigned.

Sincerely,

A handwritten signature in black ink, appearing to read "A. G. Gravenstein".

Arthur G. Gravenstein  
Environmental Scientist  
Department of Defense Branch  
Bureau of Federal Facilities

AGG/js

cc: Ms. Karen Beckley, NDEP  
Chairman Mineral County Board of Commissioners, P.O. Box 1450, Hawthorne, NV 89415  
Chief, Mineral County Fire Department, P.O. Box 1095, Hawthorne, NV 89415

Director, Office of Emergency Management, Mineral County, P.O. Box 1600, Hawthorne, NV 89415-1600

Environmental Health Specialist, P.O. Box 667, Tonopah, NV 89049

Mr. Stan Wiemeyer, USDI, Fish and Wildlife Service, Reno Fish and Wildlife Office, 1340 Financial Boulevard, Suite 234, Reno, NV 89502

Ms. Elveda Martinez, Administrator, Water Resource Coordinator, Walker River Paiute Tribe, P.O. Box 220, Schurz, NV 89427

Mr. Alan Tinney, Nevada Health Protection Services, 505 E. King Street, Carson City, NV 89710

Mr. Bob McQuivey, Nevada Division of Wildlife, Habitat Bureau Chief, 1100 Valley Road, P.O. Box 10678, Reno, NV 89520

Mr. John Matthiessen, Bureau of Land Management, 5665 Morgan Mill Road, Carson City, NV 89701

Mr. Eugene Dillard, Executive Director, Mineral County Chamber Of Commerce, P.O. Box 1635, Hawthorne, NV 89415

Ms. Judy Soutiere, U.S. Army Corps of Engineers, Sacramento District, 1325 J Street, Sacramento CA 95814-2922

Mr. Wayne Sisk, Environmental Scientist, Army Environmental Center, CETHA-TS-D, Aberdeen Proving Ground, MD 21010-5401

## **Attachment 2**

Data and Figures from  
Chung and Associates, Inc. and Geofon, Inc., 2006. *Final Remediation Report Solid Waste  
Management Unit J29, Hawthorne Army Depot, Hawthorne Nevada.*

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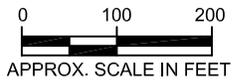
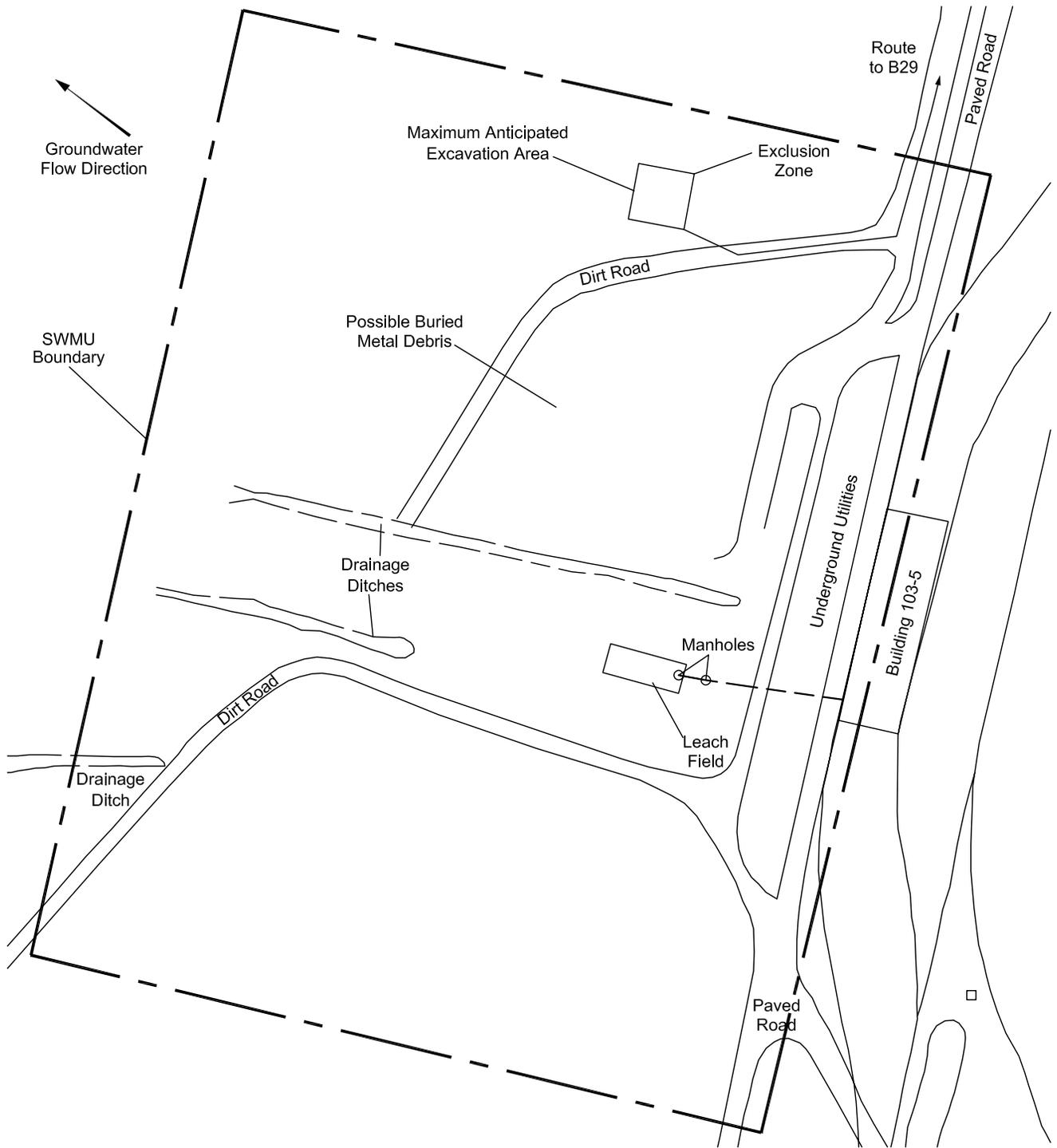
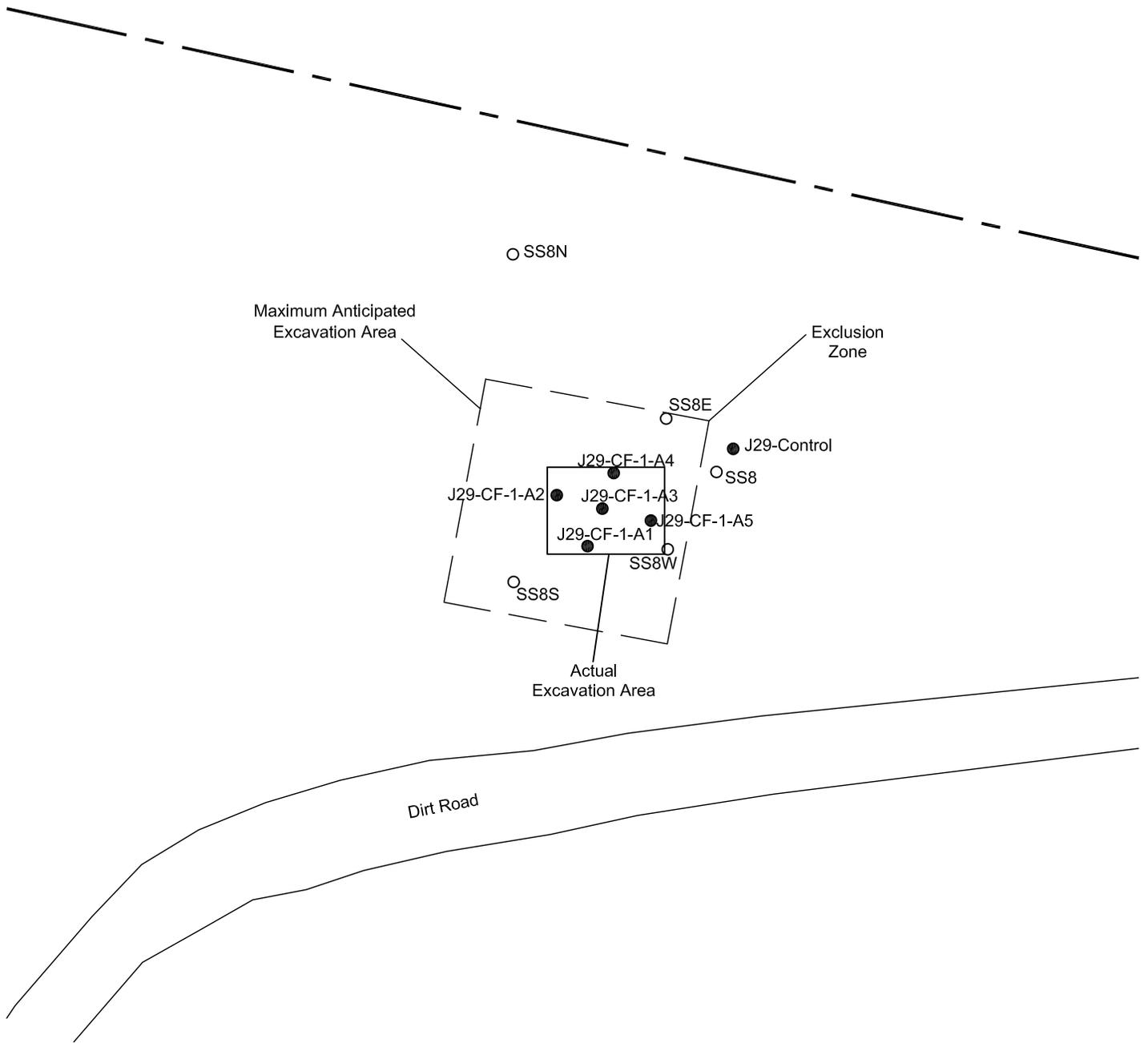


Figure 3  
 SWMU J29 SITE MAP  
 Hawthorne Army Depot – SWMU J29  
 Hawthorne, Nevada

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5-10002	



**LEGEND**

- SS8S Sample location from previous investigation (USACE, 5/5/04)
- J29-CF-1-A2 Sample location with sample name (Current investigation)

NOTE: Sample locations are based on Lumos and Associates survey data.

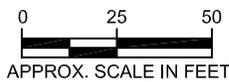


Figure 6  
 EXCAVATION CONFIRMATION  
 SAMPLING LOCATIONS  
 Hawthorne Army Depot – SWMU J29  
 Hawthorne, Nevada

DRAWN: J. Gierek	DATE: 10/21/05
FILE: 5-10002\J29 Report\Figure 6.dwg	
5-10002	

**Table 1 Site Action Levels**

<b>Compound</b>	<b>Site Action Level (mg/kg)</b>
HMX	31,000
RDX	16
1,3,5-TNB	18,000
2,4,6-TNT	57
2,4-DNT	1,200
AP	120
PCP	9.0

mg/kg = milligrams per kilogram

HMX = high melting explosive

RDX = Royal Dutch Explosive

TNB = Trinitrobenzene

TNT = Trinitrotoluene

DNT = Dinitrotoluene

AP = Ammonium Picrate

PCP = Pentachlorophenol

NOTE: Site action levels are based upon the EPA Region 9 Preliminary Remediation Goals for industrial soil.

**Table 5. Summary of Windrow Compost Analysis**

Date Collected	Sample Name	Windrow	Cell	AP (mg/kg)	HMX (mg/kg)	RDX (mg/kg)	2,4,6-TNT (mg/kg)	2,4-DNT (mg/kg)	2,6-DNT (mg/kg)	2-Amino-4,6-DNT (mg/kg)	4-Amino-2,6-DNT (mg/kg)	m-NT (mg/kg)	o-NT (mg/kg)	1,3,5-TNB (mg/kg)	m-DNB (mg/kg)	PCP (mg/kg)
<i>Action Level</i>				120	31,000	16	57	1,200	620	120	120	1,000	2.2	18,000	62	9.0
9/29/2004	B29-WR10-050	10	1	4.0 U	0.25 U	0.25 U	44.2	1.8	0.409	17.6	19	0.375 U	0.6 U	3.2	0.25 U	7.47
9/29/2004	B29-WR10-100	10	1	4.0 U	0.25 U	0.25 U	55.6	0.488 J	0.25 U	4.98	13.6 J+	0.375 U	0.6 U	1.51	0.25 U	NA
11/17/2004	B29-WR13-350	13	4	4.0 UJ	0.25 UJ	0.25 U	0.25 U	0.75 U	0.25 U	0.0901 J	0.375 U	0.375 UJ	0.6 U	0.14 J	0.25 U	NA

AP = Ammonium Picrate

HMX = High Melting Explosives

RDX = Royal Dutch Explosives

TNT = Trinitrotoluene

DNT = Dinitrotoluene

NT = Nitrotoluene

m-NT = m-Nitrotoluene

o-NT = o-Nitrotoluene

TNB = Trinitrobenzene

DNB = Dinitrobenzene

PCP = Pentachlorophenol

mg/kg = milligrams per kilogram

U = The material was analyzed for, but was not detected above the level of the associated value.

J = The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ = The compound was positively identified. The associated numerical value has a low bias and is the approximate concentration of the compound in the sample.

UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

NA = Not analyzed

NOTES:

1) Compounds analyzed by EPA Method 8321A modified for explosives and not shown on table were not detected above the method detection limit.

**Table 6. Summary of Excavation Cleanup Confirmation Analysis**

Sample Name	AP (mg/kg)	HMX (mg/kg)	RDX (mg/kg)	2,4,6-TNT (mg/kg)	2,4-DNT (mg/kg)	2,6-DNT (mg/kg)	2-Amino- 4,6-DNT (mg/kg)	4-Amino- 2,6-DNT (mg/kg)	1,3,5-TNB (mg/kg)	m-DNB (mg/kg)
<i>Action Level</i>	<i>120</i>	<i>31,000</i>	<i>16</i>	<i>57</i>	<i>1,200</i>	<i>620</i>	<i>120</i>	<i>120</i>	<i>18,000</i>	<i>62</i>
J29-CF-1-A1	4 U	0.25 U	0.25 U	0.583	0.267 J	0.25 U	0.25 U	0.375 U	0.111 J	0.287
J29-CF-1-A2	4 U	0.25 U	0.25 U	0.0618 J	0.75 U	0.25 U	0.25 U	0.375 U	0.25 U	0.25 U
J29-CF-1-A3	4 U	0.25 U	0.25 U	0.073 J	0.75 U	0.25 U	0.25 U	0.375 U	0.25 U	0.25 U
J29-CF-1-A4	4 UJ	0.25 UJ	0.25 U	0.25 U	0.75 U	0.25 U	0.25 U	0.375 U	0.25 U	0.25 U
J29-CF-1-A5	4 U	0.25 U	0.25 U	0.25 U	0.75 U	0.25 U	0.25 U	0.375 U	0.25 U	0.25 U
J29-CF-DUP1 (J29-CF-1-A5)	4 U	0.25 U	0.25 U	0.25 U	0.75 U	0.25 U	0.25 U	0.375 U	0.25 U	0.25 U

AP = Ammonium Picrate

HMX = High Melting Explosives

RDX = Royal Dutch Explosive

TNT = Trinitrotoluene

DNT = Dinitrotoluene

U = The material was analyzed for, but was not detected above the level of the associated value.

J = The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

NOTES:

1) All samples were collected 11/17/2004.

2) Compounds analyzed by EPA Method 8321A modified for explosives and not shown on table were not detected above the method detection limit.

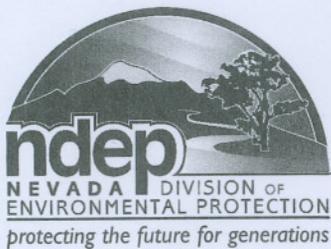
TNB = Trinitrobenzene

DNB = Dinitrobenzene

mg/kg = milligrams per kilogram

## **Attachment 3**

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# STATE OF NEVADA

Department of Conservation & Natural Resources

DIVISION OF ENVIRONMENTAL PROTECTION

BUREAU OF CORRECTIVE ACTIONS

P: 775.687.9368 F: 775.687.8335

Kenny C. Guinn, Governor

Allen Biaggi, Director

Leo M. Drozdoff, P.E., Administrator

August 1, 2006

Mrs. Rebecca-Jewell Benscoter  
Hawthorne Army Depot  
1 South Maine Street  
Hawthorne, NV 89415-9404

RE: A-K Assessment for Test Pit 03 Area of SWMU J29

Dear Mrs. Benscoter:

The Nevada Division of Environmental Protection, Bureau of Corrective Actions (NDEP) has reviewed Hawthorne Army Depot's (HWAD's) *A-K Assessment for Test Pit 03 Area of SWMU J29* received on July 25, 2006. The A-K assessment was completed according to Nevada Administrative Code 445A.227, subsection 2, to determine if corrective action was necessary at the Test Pit 03 Area of SWMU J29. The area contained total petroleum hydrocarbons (TPH) as heavy oil at 190 mg/kg, which is above the State of Nevada action level of 100 mg/kg.

NDEP has considered and concurs with the evaluation of the site. **NDEP has determined that additional corrective action is not necessary at this time.** However, this determination applies only to the TPH issue at TP03 at SWMU J29. Environmental issues that may arise at SWMU J29 are still subject to possible regulatory enforcement by NDEP. Moreover, NDEP reserves the right to withdraw its concurrence at any time if conditions at the site change, or new information or previously unidentified information (which would alter the results of the evaluation of the site) becomes available and demonstrates that residual contamination may have a detrimental impact on public health or the environment [Nevada Administrative Code 445A.22705, subsection 2].

If you should have any questions, please feel free to contact me at (775) 687-9443.

Sincerely,

Raquel M. Kutsch

Department of Defense Branch  
Bureau of Corrective Actions

SS/RMK

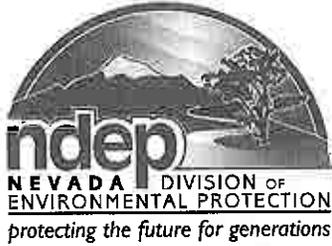
cc: Scott Smale, Supervisor, Department of Defense Branch, Bureau of Corrective Actions, NDEP  
Lt. Col. Hardee Green, Hawthorne Army Depot, Hawthorne, NV 89415  
Herman Millsap, Hawthorne Army Depot, Hawthorne, NV 89415  
Sophie Ngu, USACE Sacramento District, 1325 J Street, Sacramento, CA 95814

901 S. Stewart Street, Suite 4001 • Carson City, Nevada 89701 • p: 775.687.4670 • f: 775.687.5856 • www.ndep.nv.gov



## **Attachment 4**

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# STATE OF NEVADA

Department of Conservation & Natural Resources

DIVISION OF ENVIRONMENTAL PROTECTION

BUREAU OF CORRECTIVE ACTIONS

P: 775.687.9368 F: 775.687.8335

Kenny C. Guinn, Governor

Allen Biaggi, Director

Leo M. Drozdoff, P.E., Administrator

November 7, 2006

Mr. Kevin Shannon  
Hawthorne Army Depot  
1 South Maine Street  
Hawthorne, NV 89415-9404

RE: Final Remediation Report, Solid Waste Management Unit J29, Hawthorne Army Depot, Hawthorne, Nevada

Dear Mr. Shannon:

The Nevada Division of Environmental Protection, Bureau of Corrective Actions (NDEP) has reviewed Hawthorne Army Depot's (HWAD's) *Final Remediation Report, Solid Waste Management Unit J29*, received on October 11, 2006. The purpose of the remediation report was to document soil excavation and treatment activities at Solid Waste Management Unit (SWMU) J29. Soil was treated using windrow composting bioremediation. Remediation activities took place at SWMU J29 from September 2004 through January 2005, and 140 cubic yards of explosives contaminated soil were excavated and treated. SWMU J29 remediation activities took place concurrently with remediation activities at SWMU B29, and all remediation took place at the SWMU B29 site.

Samples taken for SWMU J29 soil remediation included an initial sample, three windrow treatment confirmation samples, and five excavation confirmation samples. The initial sample was above action levels for 2,4,6-TNT and 4-Amino-2,6-DNT. None of the confirmation samples, either from the windrow or the excavation, had analytical values above action limits.

NDEP's previously transmitted comments to the draft final version of the subject document were addressed. It has been brought to NDEP attention, however, that the *Final Work Plan, Explosives-Contaminated Soil Remediation, Solid Waste Management Units B29 and J29, July 2004* indicates that after completion of backfilling of the excavation with satisfactory treated compost, "a two-foot layer of topsoil will be placed in the backfill to grade in two 12-inch lifts. Clean soil will be obtained from the Dock 1 borrow pit. Each lift will be compacted with three passes of heavy rubber-tired equipment. The finished surface of all excavated areas will be reasonably smooth and free from irregular surface changes. Care will be taken to ensure that the backfilled area drains properly and that no water pools." NDEP requires information indicating that backfilling and completion with two feet of soil with adequate drainage was done as indicated in the Final Work Plan. The report indicates only that soil was put over the compost. On page 7, the report says "the site was backfilled with compost after it was determined that site action levels for explosives were met for both the compost and the excavation confirmation samples. Soil was spread over the backfilled compost."

NDEP also requests information regarding the removal of metal and other surface debris at SWMU J29. A site visit to SWMU J29 was conducted on April 26, 2005 by NDEP and HWAD (Stamates and Millsap). NDEP indicated during the site visit that metal debris should be removed from the site. Indicate the progress toward debris removal at SWMU J29.



Mr. Kevin Shannon  
Page 2  
November 7, 2006

NDEP requests additional information regarding the backfilling and placing of two feet of surface soil with adequate drainage to prevent pooling at the excavation at SWMU J29. When information is provided that this has been done at the site according to the Final Work Plan dated July 2004, NDEP will provide approval of the *Final Remediation Report, Solid Waste Management Unit J29*.

If you should have any questions or wish to discuss any of these items, please feel free to contact me at (775) 687-9443.

Sincerely,

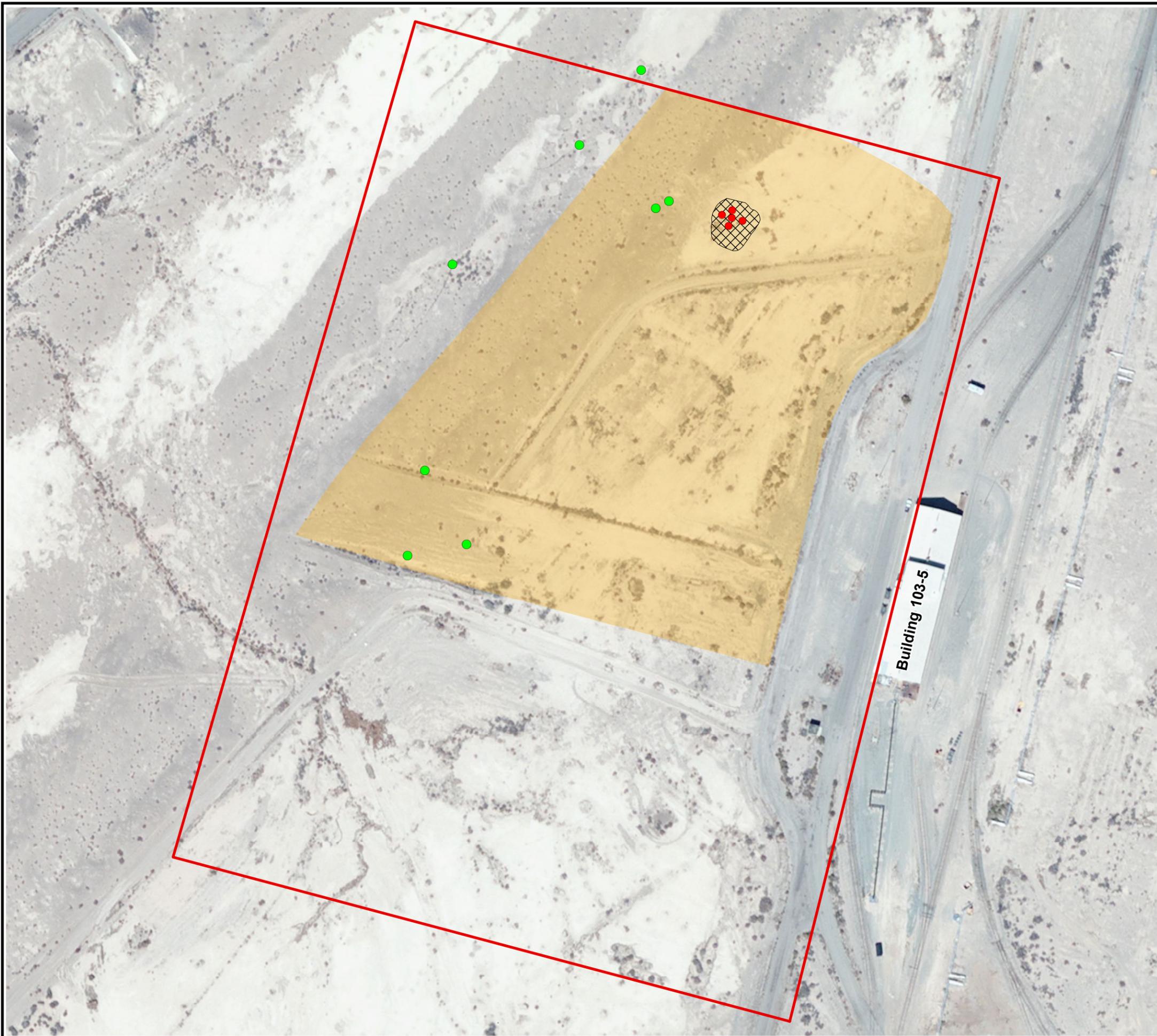


Raquel M. Kutsch  
Department of Defense Branch  
Bureau of Corrective Actions

SS/RMK

cc: Scott Smale, Supervisor, Department of Defense Branch, Bureau of Corrective Actions, NDEP  
Lt. Col. Hardee Green, Hawthorne Army Depot, Hawthorne, NV 89415  
Herman Millsap, Hawthorne Army Depot, Hawthorne, NV 89415  
Rebecca Bencoter, Hawthorne Army Depot, Hawthorne, NV 89415  
Sophie Ngu, USACE Sacramento District, 1325 J Street, Sacramento, CA 95814

Y:\Clients\US\_ARMY\_CORP\_OF\_ENGINEERS\_SACRAMENTO\Hawthorne\_AAP\090499\MapDocs\J29\J29\_SiteMap.mxd



# SWMU J29 Site Map

Hawthorne Army Depot  
Hawthorne, Nevada



Map Projection: NAD 1983 UTM Zone 11 North

Bing World Imagery Basemap



- Previous Sample Locations
- Miscellaneous Large Metal Debris (Removed)
- Backfill Area
- Debris Field  
(Large Metal Surface Debris Removed)
- Site Boundary



<p><b>Image of:</b> SWMU J29, former excavation area with 80 cubic yards of backfill material staged at the site.</p> <p><b>Notes:</b> The wood stakes indicate locations where samples were collected during the 2004 soil removal activities.</p> <p><b>Photograph View:</b> South/Southeast.</p> <p><b>Date:</b> 19 April 2012</p>	<p style="text-align: center;"><b>SWMU J29</b></p>  A wide-angle photograph of a large, flat, sandy area under a blue sky with scattered white clouds. In the foreground, there are several mounds of light-colored sand or backfill material. A few wooden stakes are visible in the ground. In the background, there are some buildings and utility poles, and distant mountains on the horizon.
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<p><b>Image of:</b> Backfill material leveled out over the excavation footprint such that water will not pool within the area.</p> <p><b>Notes:</b> The wood stakes indicate locations where samples were collected during the 2004 soil removal activities.</p> <p><b>Photograph View:</b> Northwest</p> <p><b>Date:</b> 19 April 2012</p>	<p style="text-align: center;"><b>SWMU J29</b></p>  A wide-angle photograph of a large, flat, sandy area under a clear blue sky with a few white clouds. The ground is mostly level and light-colored. Several wooden stakes are visible in the ground. In the background, there are some buildings and utility poles, and distant mountains on the horizon.
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SWMU J29 Metal Debris Removal	
<p><b>Images of:</b> Metal debris removed from SWMU J29</p> <p><b>Notes:</b> The metal debris was recycled.</p> <p><b>Photograph View:</b> Chain-link fence, fiber drum (In bucket), metal drum (in truck), and more fencing with B-34 metal debris (photo in bottom right) were all removed from the site.</p> <p><b>Date:</b> 19 April 2012</p>	

SWMU J-29 Metal Debris Removal	
<p><b>Image of:</b> Large metal debris removed from SWMU J29.</p> <p><b>Notes:</b> Approximately 1.5 tons of metal debris was recycled.</p> <p><b>Photograph View:</b> Metal cable, straps, signs, containers, and other large metal items were removed from the site.</p> <p><b>Date:</b> 19 April 2012</p>	