FINAL REPORT

FOR THE

ASSESSMENT OF POTENTIAL CONTAMINATION AT THE DLA OUTDOOR STORAGE AREAS, RAVENNA ARMY AMMUNITION PLANT, RAVENNA, OHIO

PREPARED FOR

US ARMY JOINT MUNITIONS COMMAND
CONTRACT NO. DAAA09-01-G-0009
DELIVERY ORDER NO. 0009

AUGUST 2003

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ACRONYMS

DLA	Defense Logistics Agency
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
GPS	Global Positioning System
JMC	Joint Munitions Command
Ohio EPA	Ohio Environmental Protection Agency
OSC	Operations Support Command
RI	Remedial Investigation
RVAAP	Ravenna Army Ammunition Plant
SAP	Sampling and Analysis Plan
SRC	Site-Related Contaminant
USACE	US Army Corps of Engineers
TCLP	Toxicity Characteristic Leaching Procedure
WBG	Winklepeck Burning Grounds

1.0 INTRODUCTION

1.1 Purpose and Scope

The purpose of this assessment was to identify potential contamination to the shallow and deep soils, surface water and sediment media resulting from storage of strategic ores and materials at the Ravenna Army Ammunition Plant (RVAAP) by the Defense Logistics Agency (DLA), and to evaluate the data collected with respect to facility-wide background criteria for all significant media to support a decision regarding the need for further remedial action at these sites.

The primary objectives of this assessment were to:

- determine the operational history of the DLA ore pile, Load Line 3 tank storage, and Route 80 tank storage areas based on available information;
- determine the regulatory authority governing potential residual contamination resulting from ore storage at the three storage sites;
- define the physical characteristics of each area;
- determine and characterize potential contamination in each area;
- assess whether residual contamination, if present, poses a hazard to the environment using existing sitewide background and appropriate regulatory criteria.

This Final Report of the Assessment of Potential Contamination at the DLA Storage Sites at RVAAP has been prepared by SpecPro, Inc. under contract DAAA09-01-G-0009 with the U.S. Joint Munitions Command (JMC).

1.2 General Facility Description

The RVAAP is located in northeastern Ohio in Portage and Trumbull counties and lies about 16 kilometers (10 miles) east of Ravenna, Ohio (Figure 1-1). Operations at the facility began in September 1941 and included the storage, handling, and packing of military ammunition and explosives. The facility encompasses 8,668 hectares (21,419 acres) and is jointly operated by the Joint Munitions Command (JMC) of the U.S. Army and the National Guard Bureau.

1.3 Description of DLA Storage

In support of national defense operations, the DLA stockpiled strategic ores and minerals at three outdoor locations within the RVAAP since the late 1940's.

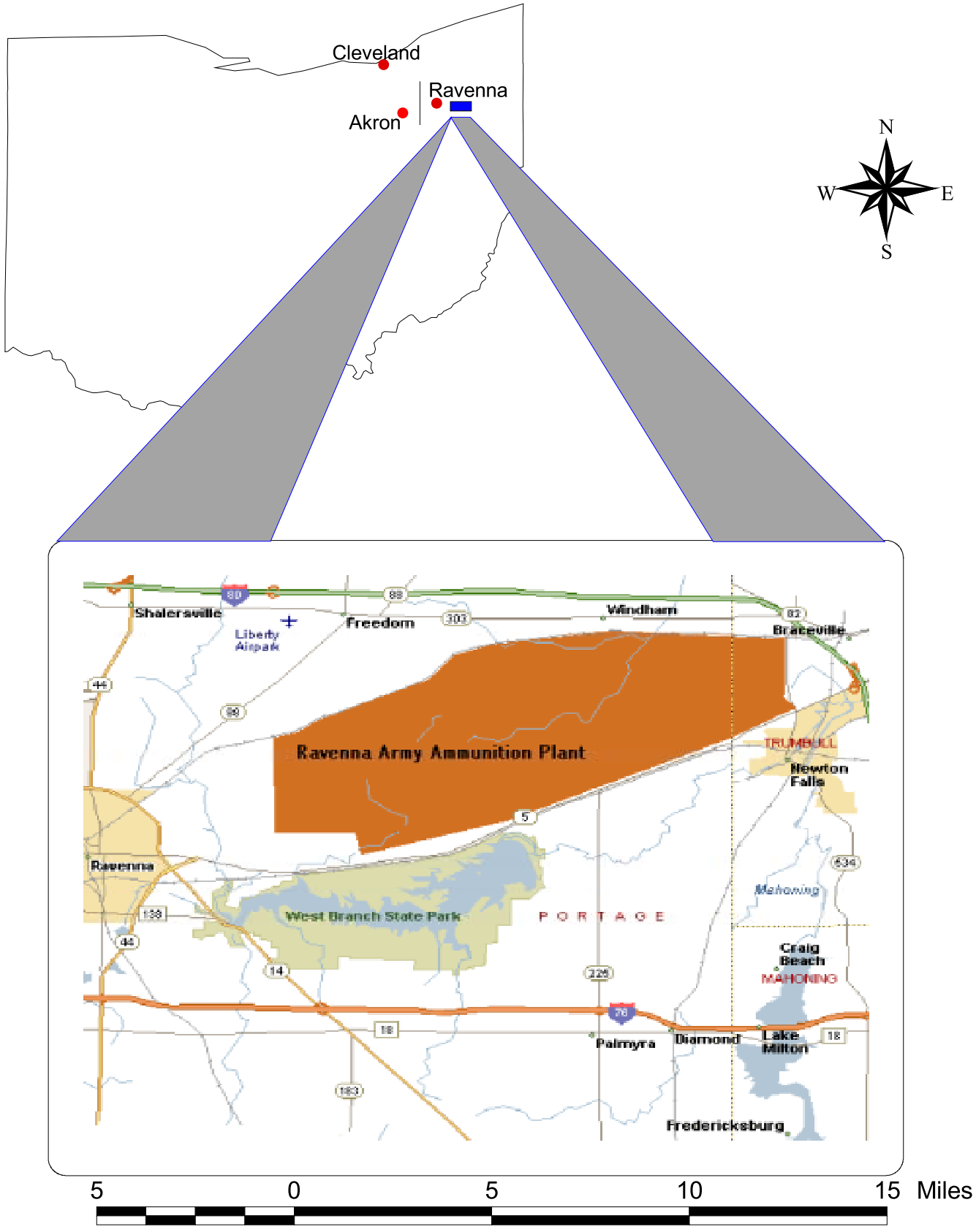


Figure 1.1. General location and orientation of RVAAP.

These materials were stockpiled in several locations; in unimproved piles (approximately 400,000 sq. ft. in total area) located in the transportation area near the facility's eastern boundary; outdoors in 100 steel tanks (500 bbl in size) located within Load Line 3; and within 18 steel tanks (1,000 to 10,000 bbl in size) located on Route 80. An area within Load Line 3 near the tank storage areas was also used to store magnesium alloy in the form of ingots. The ingots were stored outside, stacked on top of concrete blocks placed on the ground. In addition to the above outdoor storage locations, DLA also stored strategic materials in various warehouse locations within RVAAP. The warehouse storage locations were not addressed as part of this assessment. The relative locations of the three outdoor storage locations within RVAAP are shown in Figure 1-2. Materials known to have been stockpiled at RVAAP by DLA at each outdoor location are provided in Tables 1-1 through 1-3.

All stored materials and tanks in the Load Line 3 DLA tank storage area have been removed. One tank containing talc remains at the Route 80 location; all other materials and tanks at that location have been removed. Removal of stockpiled ore from the ore piles continues to the present, with material remaining in less than a quarter of the original ore pile storage area.

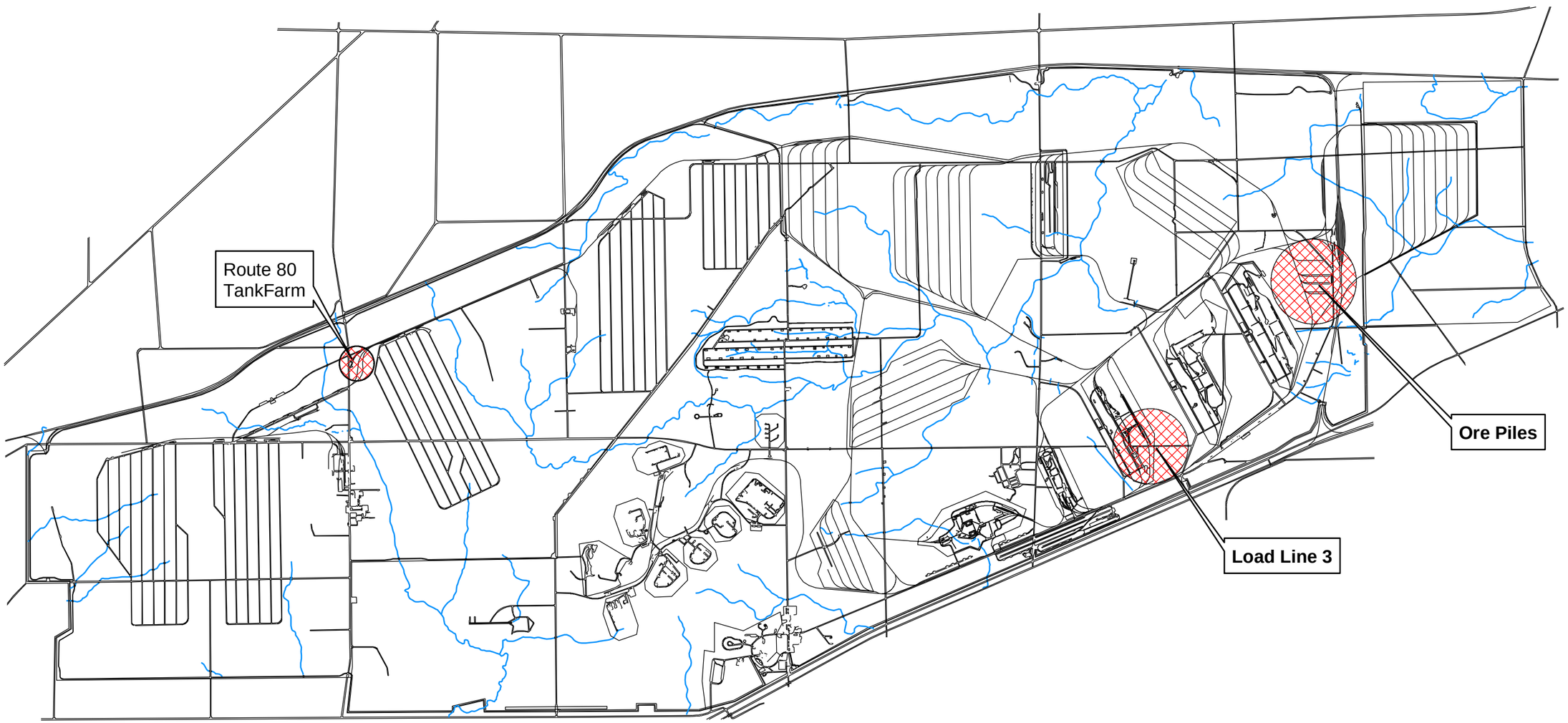
Based on the operational history for DLA storage at RVAAP, contaminants from the three outdoor storage areas may have entered the soil, surface water, and/or sediment from storage or material loading/unloading activities at the tank storage areas, or from runoff and seepage at the ore pile storage area. Potential contaminants of concern at the DLA storage sites are metals.

1.4 Summary of Existing Data

Previous investigations specifically targeting potential chemical releases resulting from DLA stockpile storage at RVAAP have included soil, sediment, and surface runoff sampling. A soil and sediment survey conducted in 1982 by The Mogul Corporation included seven soil and one pond sediment sample point in the DLA ore pile area (Mogul, 1982). The samples were analyzed for TNT, RDX, and selected metals content. Sampling for pollutants in stormwater discharges was conducted on a monthly basis upstream (NPDES Outfall #800) and downstream (NPDES Outfall #900) in a surface drainage pathway adjacent to the chromium ore piles from November 1992 through February 1997. And in 2001, several surface soil samples were collected within the Load Line 3 DLA Tank Storage Area as part of a Phase II Remedial Investigation of Load Lines 2, 3, & 4 conducted by SAIC (USACE 2001).

A visual survey and remediation for asbestos was conducted in 1998 at the Load Line 3 DLA storage area (Tanks 1444, 1445, and 1446) and in 2000 at the Route 80 DLA storage area (Tanks 1309, 1312, 1315, 1317, 1319, and 1321) by DLA following material removal. In addition, New World Technology performed a removal of soils contaminated with monazite sand (thorium-bearing) from the Route 80 tank storage area in 2000 (New World Technology, 2001).

Available results from previous investigations/sampling are provided in Appendix A.



0 2,000 4,000 8,000 12,000 16,000
Meters

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Figure 1-2 RVAAP DLA Storage Areas Sites

Legend

Color

Water

Buildings / Roads

N

Sheet No. 1-2

Overview Map

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Date: June 2003

Table 1-1 DLA Material Storage – Ore Piles

DLA Material Storage – Ore Piles	
Pile Number	**Material Stored**
1	Manganese
2	Manganese
3	Manganese
4	Manganese
5	Chrome
6	Manganese
7	Manganese
8	Chrome
9	Chrome
10	Chrome
11	Manganese
12	Chrome
13	Manganese
14	Chrome
15	Manganese
16	Manganese
17	Manganese
18	Manganese
19	Manganese
20	Manganese
21	Ferro Chrome
22	Ferro Chrome
23	Ferro Chrome

Table 1-2 DLA Material Storage Load Line 3

DLA Material Storage – Load Line 3			
Tank Number	**Material Stored**	**Tank Number**	**Material Stored**
1401	Magnesium	1427	Magnesium
1402	Magnesium	1428	Magnesium
1403	Magnesium	1429	Magnesium
1404	Magnesium	1430	Magnesium
1405	Magnesium	1431	Magnesium
1406	Magnesium	1432	Magnesium
1407	Magnesium	1433	Kyanite (Al_2SiO_5)
1408	Magnesium	1434	Kyanite (Al_2SiO_5)
1409	Magnesium	1435	Kyanite (Al_2SiO_5)
1410	Magnesium	1436	Kyanite (Al_2SiO_5)
1411	Magnesium	1437	Kyanite (Al_2SiO_5)
1412	Magnesium	1438	Kyanite (Al_2SiO_5)
1413	Magnesium	1439	Kyanite (Al_2SiO_5)
1414	Magnesium	1440	Kyanite (Al_2SiO_5)
1415	Magnesium	1441	Kyanite (Al_2SiO_5)
1416	Magnesium	1442	Kyanite (Al_2SiO_5)
1417	Magnesium	1443	Talc
1418	Magnesium	1444	Kyanite (Al_2SiO_5)
1419	Magnesium	1445	Kyanite (Al_2SiO_5)
1420	Magnesium	1446	Kyanite (Al_2SiO_5)
1421	Magnesium	1447	Asbestos
1422	Magnesium	1448	Asbestos, Fluorospar
1423	Magnesium	1449	Kyanite (Al_2SiO_5), Fluorospar
1424	Magnesium	1450	Kyanite (Al_2SiO_5), Fluorospar
1425	Magnesium	1451	Kyanite (Al_2SiO_5), Fluorospar

DLA Material Storage – Load Line 3			
Tank Number	**Material Stored**	**Tank Number**	**Material Stored**
1426	Magnesium	1452	Kyanite (Al_2SiO_5)
1453	Kyanite (Al_2SiO_5)	1477	Kyanite (Al_2SiO_5)
1454	Kyanite (Al_2SiO_5)	1478	Kyanite (Al_2SiO_5)
1455	Kyanite (Al_2SiO_5)	1479	Kyanite (Al_2SiO_5)
1456	Kyanite (Al_2SiO_5)	1480	Kyanite (Al_2SiO_5)
1457	Kyanite (Al_2SiO_5)	1481	Kyanite (Al_2SiO_5)
1458	Kyanite (Al_2SiO_5)	1482	Kyanite (Al_2SiO_5)
1459	Kyanite (Al_2SiO_5)	1483	Kyanite (Al_2SiO_5)
1460	Kyanite (Al_2SiO_5)	1484	Kyanite (Al_2SiO_5), Antimony
1461	Kyanite (Al_2SiO_5)	1485	Kyanite (Al_2SiO_5), Antimony
1462	Kyanite (Al_2SiO_5)	1486	Kyanite (Al_2SiO_5), Antimony
1463	Kyanite (Al_2SiO_5)	1487	Kyanite (Al_2SiO_5), Antimony
1464	Kyanite (Al_2SiO_5)	1488	Kyanite (Al_2SiO_5), Antimony
1465	Kyanite (Al_2SiO_5)	1489	Antimony Sulfide Ore
1466	Kyanite (Al_2SiO_5)	1490	Antimony Sulfide Ore
1467	Kyanite (Al_2SiO_5)	1491	Antimony Sulfide Ore
1468	Kyanite (Al_2SiO_5)	1492	Antimony Sulfide Ore
1469	Kyanite (Al_2SiO_5)	1493	Antimony Sulfide Ore
1470	Kyanite (Al_2SiO_5)	1494	Antimony Sulfide Ore
1471	Kyanite (Al_2SiO_5)	1495	Antimony Sulfide Ore
1472	Kyanite (Al_2SiO_5)	1496	Antimony Sulfide Ore
1473	Kyanite (Al_2SiO_5)	1497	Antimony Sulfide Ore
1474	Kyanite (Al_2SiO_5)	1498	Antimony Sulfide Ore
1475	Kyanite (Al_2SiO_5)	1499	Antimony Sulfide Ore
1476	Kyanite (Al_2SiO_5)	1500	Antimony Sulfide Ore
Ingots	Magnesium		

Table 1-3 DLA Material Storage Route 80

DLA Material Storage – Route 80	
Tank Number	**Material Stored**
1301	Zircon Sand Ore ($ZrSiO_4$)
1302	Nickel Cathodes
1303	Monazite Sand
1304	Nickel Cathodes
1305	Monazite Sand
1306	Talc ($Mg_3Si_4O_{10}(OH)_2$)
1307	Zircon Sand Ore ($ZrSiO_4$)
1308	Talc ($Mg_3Si_4O_{10}(OH)_2$)
1309	Zircon Sand Ore ($ZrSiO_4$), Asbestos
1310	Rutile Sand (TiO_2)
1311	Cobalt, Rutile Sand (TiO_2)
1312	Cobalt, Rutile Sand (TiO_2), Asbestos
1313	Rutile Sand (TiO_2)
1314	Cobalt, Zircon Sand Ore ($ZrSiO_4$)
1315	Asbestos
1317	Asbestos
1319	Asbestos
1321	Asbestos

2.0 DLA STORAGE AREAS FIELD INVESTIGATION

A summary of the environmental matrices, number of sampling locations, and sampling rationale, are listed in Tables 2-1 and 2-2. The sampling locations are shown on Figures 2-1, 2-2, and 2-3, which are provided at the end of this section.

2.1 SURFACE AND SUBSURFACE SOIL AND SEDIMENT

2.1.1 Rationale

Surface soil samples from 0.0 to 0.3 meter (0 to 1 foot) were collected during this assessment to define whether soil contamination has resulted from DLA storage operations. For soil characterizations purposes most samples were to be analyzed using the RCRA 8 metals. A portion of those samples were further characterized using the complete TAL metals list to further define the remaining residues in the soils from the past DLA operations. If contamination in excess of the MCL was determined to be present at the 0 to 1 foot sample interval, a subsurface soil sample from 0.3 to 0.9 meter (1 to 3 feet) was also to be collected at that location. The soil sampling program employed biased (targeted to known or suspected hot spots) sampling to characterize potential contaminant source areas and contaminant accumulation points.

The sampling program also incorporated collection of sediments from drainage ditches in proximity to potential source areas and exit pathways (streams and ditches) in order to assess the potential for contaminant migration via leaching or erosion from surface soil to surface water and sediment.

2.1.2 Soil sampling locations

The sampling locations were selected on the basis of Data Quality Objectives (DQOs). Samples for characterization of surface soils (0 to 1 foot) were collected. Surface soil analytical results did not exhibit concentrations in excess of constituent MCL's; as such, subsurface sample collection was not performed. Each sample location was marked in the field and GPS coordinates taken and recorded.

Table 2-1 describes the rationale for the final placement of soil sampling stations. A total of 128 surface soil samples were collected as follows: 86 at the ore pile area, 32 at the Load Line 3 tank area; and 10 at the Route 80 tank farm. To fully characterize the remaining residues in the soils from past DLA operations; some samples were pre-selected to have the full TAL metal analysis's performed. The sampling locations are shown on Figures 2-1, 2-2, and 2-3 respectively. The number of soil sample stations identified for each DLA Storage Area is summarized on Table 2-1, detailed in Table 2-2, and results of each sample is shown in Appendix C.

2.1.3 Sediment sampling locations

Sampling locations outside and downstream of the DLA outdoor storage sites were chosen to provide data on potential contaminants exiting the sites and accumulating within surface water drainage system sediments. Sediments were sampled from drainage pathways in order to (1) assess the potential for contaminant migration via erosion to surface water and sediment; (2) evaluate potential contaminant accumulation areas, such as runoff collection points, to evaluate if residual contamination exists and if these areas could act as secondary sources for contamination; and (3) evaluate potential contaminant exit pathways from the storage site areas. The locations selected for all sediment sample stations were biased in nature.

Table 2-1 describes the rationale for the placement of sediment sampling stations. A total of 19 sediment samples were collected as follows: 14 at the ore pile area; and 5 at the Route 80 tank farm. To fully characterize the remaining residues in the sediments from past DLA operations; some samples were pre-selected to have the full TAL metal analysis's performed. No sediment samples were collected at the Load Line 3 tank area because there were no surface water drainage systems. The sampling locations are shown on Figures 2-1 through 2-3. The number of sediment sample stations identified for each DLA Storage Area is also summarized on Table 2-1, detailed in Table 2-2, and results shown in Appendix C.

All dry sediment stations were sampled from 0.0 to 0.3 meter (0.0 to 1 foot); subaqueous sediment samples were sampled from 0.0- to 0.15-meter (0.0- to 0.5-foot) depth intervals.

2.1.4 Soil and sediment sampling requirements

Surface Soil

All soil samples were collected as discrete samples. The soil from the appropriate sample interval was collected, placed in a stainless steel bowl, and homogenized with stainless steel implements. Sample volumes for analysis of total and TCLP metals were taken from the homogenized soil volume.

Dry and Subaqueous Sediment

All sediment samples were collected as discrete samples. Sediments were collected using a stainless steel trowel or scoop, hand auger, or remote sampler where necessary. Where sediment and surface water stations are co-located, surface water samples were collected first. The sediment sample was placed in a decontaminated, stainless steel bowl and homogenized. Sample aliquots for total and TCLP metals were then collected from the homogenized material.

2.1.5 Sampling Procedures

2.1.5.1 Sampling methods for soil/dry sediment

Bucket Hand-Auger Method

Surface soil samples were collected with a bucket hand auger. In this investigation, auger buckets 15.24 centimeters (6 inches) in length and 7.62 centimeters (3 inches) in diameter were used. At each location, an auger was advanced in 15.24-centimeters (6-inch) increments. The contents of each auger subsample was added to a stainless steel bowl and homogenized thoroughly. Aliquots for analyses were then extracted from the homogenized mixture and placed in the appropriate sample container.

2.1.5.2 Sampling methods for sediments

Trowel/Scoop Method

Sediment samples in locations where water depth did not exceed 15.2 centimeters (0.5 foot) were collected with a stainless steel trowel or scoop. The trowel was used to manually obtain sediment to a depth of 15.2 centimeters (0.5 foot) below the sediment surface. The collected sediment was then placed into a stainless steel bowl and homogenized.

Remote (Ekman) Sampler Method

A remote sediment sampler was used to collect sediment at locations where the sediment samples were co-located with surface water samples (sample locations OP-9 and OP-10). The remote sampler is a stainless steel clamshell device that is lowered to the sample point using a retrieval line or extension rods. The sampler is activated using a second line that closes the clamshell. Sediment was placed into a stainless steel bowl as it was collected.

2.1.5.2 Sample containers and preservation

Requirements for sample containers and preservation techniques for surface soil and sediment samples are presented in Section 4.4.2.6 of the facility-wide SAP. All sample containers used in this assessment were provided by the contracted laboratory.

Surface soil and sediment QA/QC samples were not collected as part of this assessment.

2.1.5.3 Decontamination procedures

The decontamination procedure for surface soil and sediment sampling activities

presented in Section 4.4.2.8 of the facility-wide SAP were followed.

2.2 SURFACE WATER

2.2.1 Rationale

Two samples for characterization of surface water were collected as part of this assessment. The surface water samples were collected in order to (1) assess the potential for contaminant migration in surface water; (2) evaluate potential contaminant accumulation areas, such as runoff collection points, to evaluate if residual contamination is partitioning to water and are acting as secondary sources for contamination to groundwater and surface water; and (3) evaluate potential contaminant exit pathways from the DLA Ore Pile Storage Area and determine if the target analytes were present in surface waters at levels in excess of their respective MCL's. Surface water sampling was conducted at the inflow and outflow locations within the ore pile retention pond, where potential contaminants could be expected to be transported from source areas into the surface water. The proposed sampling locations were selected on the basis of DQOs, and the conceptual site model as developed from operational information and analytical results from previous sampling events. Table 2-1 also describes the rationale for the placement of surface water sampling stations.

2.2.1.1 Locations

The surface water sampling stations were biased as to location and features as described above. All samples were grab samples. A total of 2 surface water samples were collected from the Ore Pile Retention Pond. No surface water samples were collected at either the Load Line 3 or Route 80 tank storage areas. Additional samples were included as contingency samples for additional characterization as needed based on subsequent analytical results. The sampling locations are shown on Figures 2-1. The surface water sample stations from the Ore Pile Retention Pond are identified in Table 2-1, detailed in Table 2-2, and results shown in Appendix C.

2.2.2 Sampling Procedures

All surface water sampling was conducted using the hand-held bottle method. The sample container was submerged, with the cap in place, into the surface water. The container was then slowly and continuously filled using the cap to regulate the rate of sample entry into the container. The sample container was removed from the flow with minimal disturbance to the sample. Immediately after collection of the sample and proper labeling, the container was placed into a sealable plastic bag and was preserved for total metals analysis. All surface water sample collection began at the sampling point furthest downstream and proceeded upstream to minimize the effects of sediment turbidity on surface water quality. Surface water samples were collected prior to sediment samples at co-located sites.

2.2.3 Sampling for chemical analysis

All surface water samples were submitted to the analytical laboratory for Total metals analysis.

2.2.3.1 Sample containers and preservation

Requirements for sample containers and preservation techniques for surface water samples are presented in Section 4.4.2.6 of the facility-wide SAP. All sample containers were provided by the contracted laboratory.

2.2.3.2 Field quality control sampling procedures

Surface water QA/QC samples were not collected as part of this assessment.

2.2.3.3 Decontamination procedures

The decontamination procedure for surface water sampling activities presented in Section 4.4.2.8 of the facility-wide SAP was followed.

2.3 SITE SURVEY

Following sampling activities, the coordinates of all sampling stations and site boundaries were determined using a Trimble GeoExplorer3 GPS unit. All locations are conveyed in Ohio State Plane Coordinates (NAD83) and are shown in Figures 2-1 through 2-3.

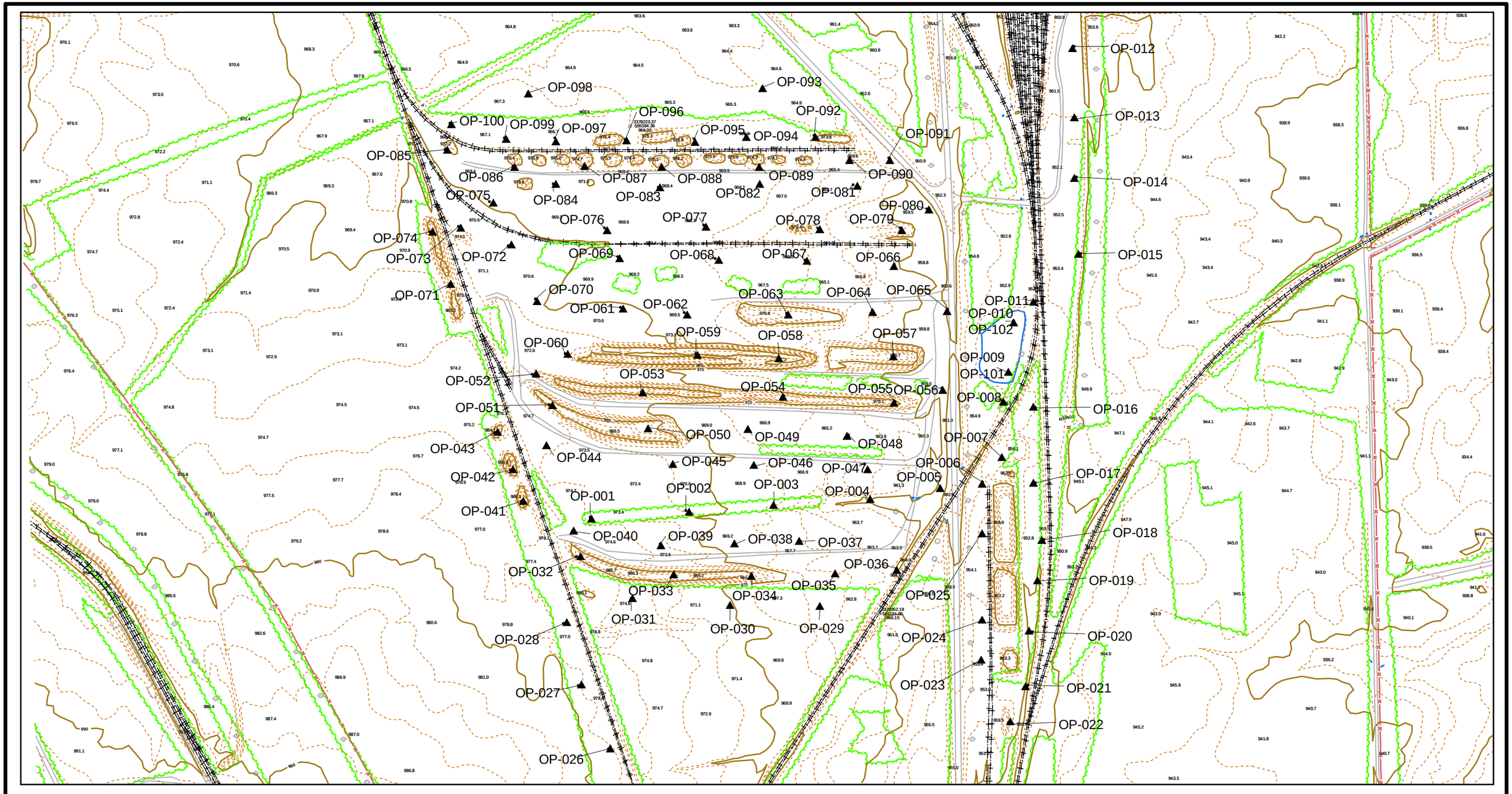

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Figure 2-1 RAAVP DLA Ore Pile Sample Locations

Legend

- Sample
- Roads
- Railroad
- Vegetation
- Water
- Fence
- 2' Contour
- 10' Contour

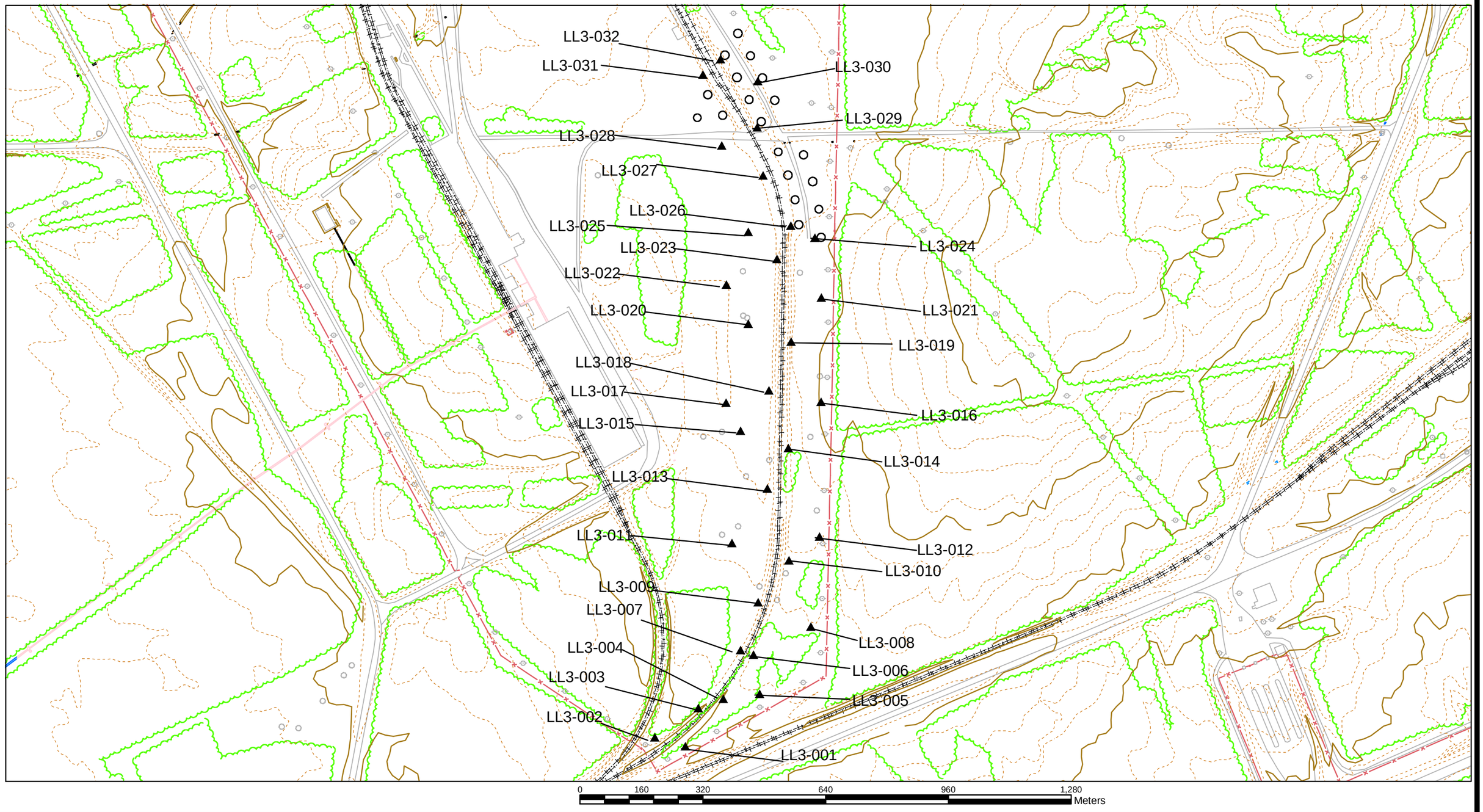
Ore Piles Map

Drawn By: VPG

Checked by: CC

Date: June 2003

Sheet No. 2.1



SpecPro

Figure 2-2 RVAAP DLA Load Line 3 Area

Legend

- Sample
- Railroad
- Water
- 2' Contour
- Roads
- Vegetation
- Fence
- 10' Contour

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Sheet No. 2-2

Load Line 3 Map

Drawn By: VPG

Checked by: CC

Date: June 2003

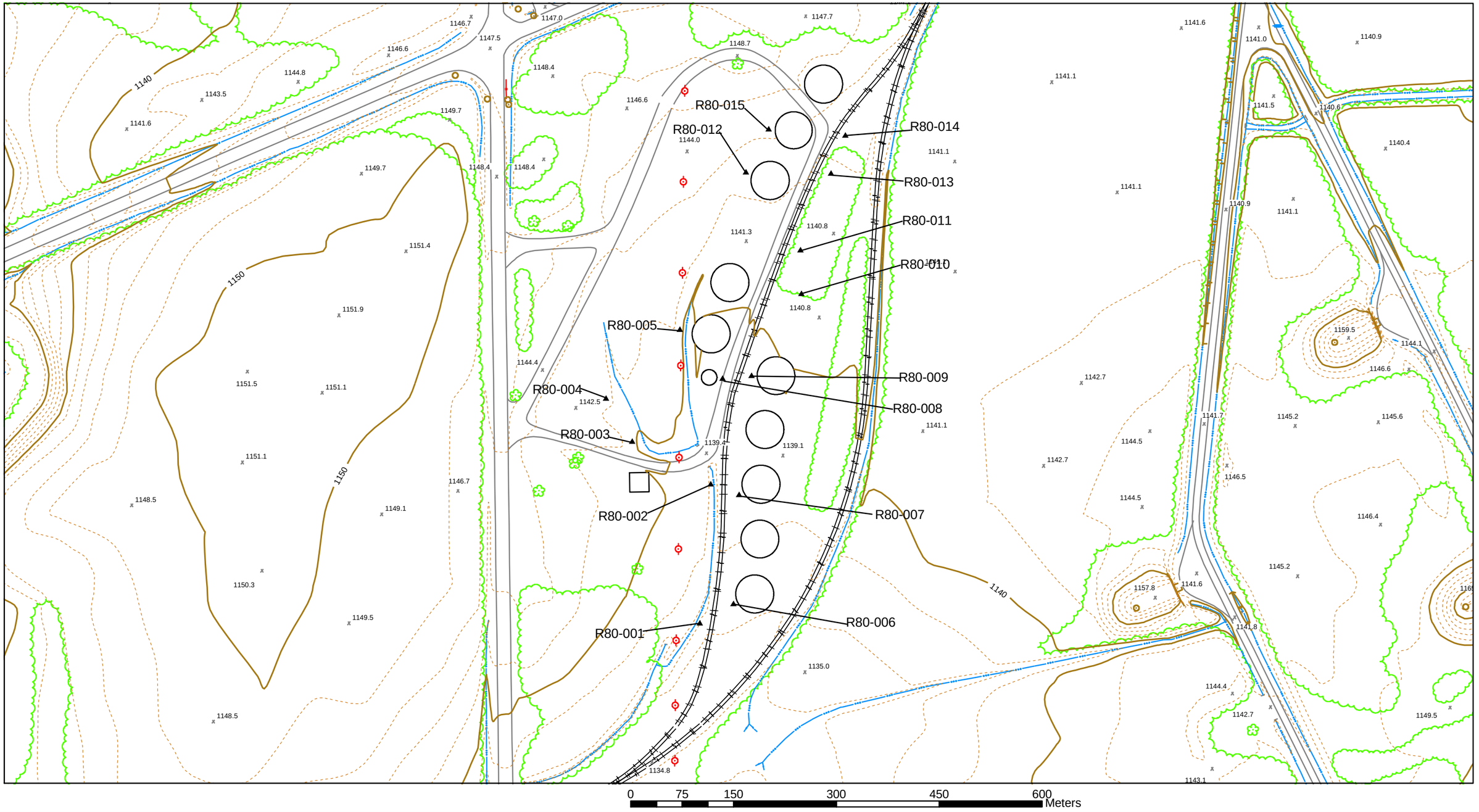

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Figure 2-3 RVAAP DLA Route 80 Tank Area

Legend

- Roads
- Vegetation
- Sample
- Other Features
- Railroad
- Water
- Poles
- 2' Contours
- 10' Contours

N

Sheet No. 2-3

Route 80 Map

Drawn By: VPG

Checked by: CC

Date: June 2003

Table 2-1. DLA Storage Areas Sampling Rationale and Matrix

Description	Principal Suspected Contaminants	Sampling Rationale	Sample Matrix		
			Soil Stations	Sediment Stations	Surface Water Station
Suspected potential source areas	Metals	Identify possible contamination in soil	120		
Site boundaries and areas outside of potential source areas	Metals	Define extent of contamination in soil	8		
Storage area ditches and drainage ways	Metals	Characterize potential contaminant exit pathways and accumulation points		19	
Ore Pile Retention Pond	Metals	Characterize potential for contaminant exit from AOC			2

Table 2-2. DLA Storage Areas Samples

Description	Sample Matrix	Depth	Sample Number	Total Metals	TCLP Metals
DLA Ore Pile Storage	Sediment	0-.5’	DLAOP-001 through DLAOP-011	X	X
	Soil	0-1’	DLAOP-012 through DLAOP-100	X	X
	Surface Water	N/A	DLAOP-101 and DLAOP-102	X	
Load Line 3 Tank Storage Area	Soil	0-1’	DLALL3-001 through DLALL3-32	X	X
Route 80 Tank Storage Area	Sediment	0-.5’	DLAR80-001 through DLAR80-005	X	X
	Soil	0-1’	DLAR80-006 through DLAR80-015	X	X

3.0 ASSESSMENT OF CONTAMINATION

This chapter presents results of the analytical data screening to identify contaminants resulting from DLA storage operations.

3.1 DATA EVALUATION METHODS

The evaluation of analytical data generated during this assessment for each environmental medium involved three general steps: (1) defining background concentrations, (2) defining data aggregates, and (3) presenting data.

3.1.1 Site Chemical Background

Chemicals occur naturally in soil, sediment, surface water, and groundwater. The natural levels of chemicals - called background levels - must be known in order to determine whether the concentrations measured at the DLA storage areas are higher than would be expected if the strategic materials storage operations had not occurred. Facility-wide background values for inorganic constituents in soil, sediment, surface water, and groundwater were developed as part of a previous Phase II RI conducted at the Winklepeck Burning Grounds at RVAAP (USACE 2001c).

In the facility-wide background study, a background level was calculated for each inorganic constituent detected for each environmental medium of interest. The background level is the 95 percent upper tolerance limit of the 95th percentile of the distribution of background concentrations. This means that if a sample is taken from an area with concentrations of inorganics that are not elevated above background, the measured concentration will be below the background criteria 95 percent of the time. If a measured concentration is above the background criteria, it is likely that it comes from an area with concentrations above background levels.

Background criteria were set to zero for inorganics that were not detected in the facility-wide background samples. For metals that were not detected in the background samples, any detected result from the DLA Storage Areas was considered to be above background. RVAAP facility-wide background criteria for each medium are listed in Table 3-1.

3.1.2 Definition of Aggregates

The analytical data were grouped (aggregated) in two ways for evaluation of contaminants. The initial aggregation of data is by environmental media (soil, sediment, and surface water) to facilitate evaluation of contaminant nature and extent and site risks. For each of the media aggregates, the data were further aggregated by geographical location (Ore Piles, Load Line 3, and Route 80).

Table 3-1 RVAAP Facility-Wide Background Criteria

Analyte	units	Surface Soil	Sub-Surface Soil	Sediment	Surface water
Aluminum	mg/kg	17700	19500	13900	3370
Antimony	mg/kg	0.96	0.96	0	0
Arsenic	mg/kg	15.4	19.8	19.5	3.2
Barium	mg/kg	88.4	124	123	47.5
Beryllium	mg/kg	0.88	0.88	0.38	0
Cadmium	mg/kg	0	0	0	0
Calcium	mg/kg	15800	35500	5510	41400
Chromium	mg/kg	17.4	27.2	18.1	0
Cobalt	mg/kg	10.4	23.2	9.1	0
Copper	mg/kg	17.7	32.3	27.6	7.9
Cyanide	mg/kg	0	0	0	0
Iron	mg/kg	23100	35200	28200	2560
Lead	mg/kg	26.1	19.1	27.4	0
Magnesium	mg/kg	3030	8790	2760	10800
Manganese	mg/kg	1450	3030	1950	391
Mercury	mg/kg	0.036	0.044	0.059	0
Nickel	mg/kg	21.1	60.7	17.7	0
Potassium	mg/kg	927	3350	1950	3170
Selenium	mg/kg	1.4	1.5	1.7	0
Silver	mg/kg	0	0	0	0
Sodium	mg/kg	123	145	112	21300
Thallium	mg/kg	0	0.01	0.89	0
Vanadium	mg/kg	31.1	37.6	26.1	0
Zinc	mg/kg	61.8	93.3	532	42

3.1.3 Data Screening

3.1.3.1 Facility-wide background screen

For each inorganic constituent, concentrations were compared against facility-wide background values developed as part of the Phase II RI for the Winklepeck Burning Grounds (USACE 2001c). For inorganic constituents, if the maximum detected concentration of an analyte exceeded its respective background criterion, it was considered to be indicative of a soil-related contaminant (SRC). In the event a constituent was not detected in the background data set, the background value was set to zero, and any detected result for that constituent was considered to be above background.

3.1.2 Data Presentation

Summary tables of analytical data and results of the background comparison for inorganic compounds are all presented for each medium and aggregate in Appendix C. All numbers in bold are values that are over background.

3.2.4 Summary of Data Results – Ore Pile Storage Area

The summary of results is shown is Appendix C for surface soil, sediment, and surface water samples collected in the DLA Ore Pile Storage Area to background comparisons. A total of 15 inorganic analytes were determined to be present above background levels at least once in the samples collected during this assessment.

3.2.4.1 Surface Soil

Most metals were detected above background levels in the surface soil samples at least once. However, most samples only had three metals detected over background at any one time. Barium and Chromium were detected in most samples (58% and 60% of the time, respectively). However, in general, the occurrence of metals above background criteria was limited only to DLA Ore Pile Storage Area and not the area surrounding the main storage location. The discussion below is a brief summary of the nature and extent of metals contamination for this area (see Appendix C for complete details).

- Metals were detected above the background criterion in 83 out of 86 samples. Chromium occurred more often than any other analyte sampled (52 out of 86 times). Detected concentrations of chromium above the background criterion of 17.4 mg/kg ranged from 17.4 mg/kg to 840 mg/kg.

- Barium was detected above the background criterion in 50 out of 86 samples. Concentrations exceeding background (88.4 mg/kg) ranged from 88.8 mg/kg to 3,330 mg/kg.

3.2.4.2 Sediment

Five metals were detected above background levels in the sediment samples. However, most samples only had two analytes over background at one time. Arsenic and Chromium were detected in most samples (71% and 93% of the time, respectively). In general, the occurrence of metals above background criteria was limited to areas nearest to the Chromium Piles still in the Storage Area. The discussion below is a brief summary of the nature and extent of metals contamination for this area:

- Only five out of the eight analytes were detected above the background in any one sample. Chromium occurred more frequently than any other metal constituent sampled (13 out of 14 times). The highest detected concentrations were found in the ditch immediately behind the current chrome storage piles. The highest results were obtained from samples OP-018 and OP-019 (1200 mg/kg; 1970 mg/kg respectively).
- Arsenic occurred in 71% of the samples (10 of 14 samples), and was found in all the samples collected from near the detention pond at levels above background ranging from 19.7 mg/kg to 816 mg/kg. The highest sample result was found at location OP-005 (816 mg/kg).
- Lead and Barium were detected above background in several samples, at levels ranging from 73.5 mg/kg to 114 mg/kg for lead, and 126 mg/kg to 157 mg/kg for barium.
- Mercury was only detected in one sample over background at sample OP-019 (0.095 mg/kg). Cadmium, silver, and selenium were not detected in any of the samples over background limits.

3.2.4.3 Surface Water

Three metals (arsenic, chromium, and lead) were detected above background levels in the surface water samples. Two water samples were taken in the detention pond one at the inflow and one at the outflow point. Sample location OP-102 (outflow) had the highest result for arsenic (145 ug/L), chromium (5.9 ug/L), and lead (11.1 ug/L). Lead was not found over background levels at the inflow sample location.

3.2.5 Summary of Data Results – Load Line 3 Tank Storage

The summary of results of the background comparison for surface soil samples collected in the DLA Load Line 3 Tank Storage Area is shown in Appendix C. A total of eleven inorganic analytes were determined to be present above background levels at least once in the samples collected during this assessment.

3.2.5.1 Surface Soil

Eleven metals were detected above background levels in the surface soil samples. There were no sediment samples taken at LL3. Most samples only had three metals constituents over background at any one time. Barium and Chromium were detected in most samples (69% and 88% of the time, respectively). The discussion below is a brief summary of the nature and extent of metals contamination for this area:

- Chromium was detected in the most number of samples (28 out of 32 samples). Sample results over background ranged from 17.8 mg/kg to 42.4 mg/kg.
- Barium occurred over background at the second largest frequency (22 out of 32 samples), at levels ranging from 88.9 mg/kg to 1450 mg/kg. .

3.2.6 Summary of Data Results – Route 80 Tank Storage

The summary of results of the background comparison for surface soil and sediment samples collected in the DLA Route 80 Tank Storage Area is shown in Appendix C. Only one sample had more than one analyte present above background levels at any one time. The discussion below is a brief summary of the nature and extent of metals contamination for this area.

3.2.6.1 Surface Soil

Five metals were detected above background levels in the surface soil samples in 5 of the 10 samples taken. However, most sample detections were just over background detection limits. The 5 metals detected were arsenic, barium, cadmium, lead, and chromium.

3.2.6.2 Sediment

Five metals were detected above background levels in the sediment samples. Most samples only had one analyte at a time slightly over background, although one sample had no analytes detected over background. Arsenic, lead, and silver were found in most samples (60%, 20% and 20% of the time, respectively).

4.0 SUMMARY AND CONCLUSIONS

The Assessment of Contamination Report for the DLA Storage Areas presents a detailed analysis of the environmental data collected during the Assessment field effort. The following sections present an overview of the major findings of the nature and extent of contamination resulting from the outdoor storage of DLA strategic materials at the Ravenna Army Ammunition Plant. The conclusions of the Assessment are presented by storage location and media.

4.1 SUMMARY OF CONTAMINANT NATURE AND EXTENT

4.1.1 Contaminant Nature and Extent

The Assessment evaluated the nature and extent of contamination in three media as follows: surface soil [from 0 to 0.3 meter (0 to 1 foot) bgs], sediment, and surface water. The surface soil, sediment, and surface water were further divided into lateral aggregates based on location.

Surface Soil

A total of 128 soil samples from the 0- to 0.3-meter (0- to 1-foot) depth were collected for the purpose of determining nature and extent of surface soil contamination at the three DLA outdoor storage locations. All sampling locations were biased.

Surface soil does not appear to be significantly impacted by storage-related activities. Soil concentrations with metals are occurring in all three storage areas. However, it is limited to areas immediately near old or current storage locations. The area of highest detected concentration was located in the Ore Pile Storage area (see Appendix C). The metals occurring above site background concentrations most frequently included arsenic, barium, chromium, and lead. However, no metal concentration exceeded its maximum for toxicity contaminant limit (MCL) levels.

Subsurface Soil

No soil samples from the 0.3- to 0.9-meter (1- to 3-foot) depth were collected, due to the fact that target analyte MCL's were not exceeded in surface soil samples.

Sediment

A total of 19 sediment samples from the 0- to 0.2-meter (0- to 0.5-foot) depth were collected from drainage ditches and surface water features during the assessment to evaluate the potential for contaminant migration via leaching or erosion from surface soils to surface water and sediment.

Arsenic was found more often than any other contaminant above background at the Ore Pile Storage area and the Route 80 Tank farm. At the Ore Pile Storage location, chromium was present in greater than 50% of the samples, arsenic present in 29% of the samples. However, in sediment samples at the Route 80 Tank farm, arsenic and barium were found more often than other metals over background. Ditch sediment immediately east of the ferro-chrome piles, showed the highest over background chromium concentrations. Arsenic, barium, chromium, and lead were all detected at concentrations exceeding their respective site background concentrations in both soil and sediment in ditches near these areas. However, no metal concentration exceeded its MCL for toxicity.

Surface Water

A total of two surface water samples were collected from the ore pile retention pond at the DLA Ore Pile Storage Area to assess the potential for contaminant migration via leaching or erosion from surface soil to surface water. Arsenic, chromium, and lead were all detected above their respective site-wide background concentrations. As with sediment, surface water in the pond just downstream of ore pile storage piles showed higher results over background values.

4.2 UNCERTAINTIES

The uncertainties include the following:

- The exact source of arsenic is unknown. Potential sources of arsenic could be from past pesticide applications, leaching from the metal ores in slag related rail beds, or from railroad ties. Arsenic is known to be associated with stibnite, a high grade ore of antimony, both in stibnite and in accessory minerals such as orpiment.
- The amount of contaminant flux to the ore pile retention ponds attributable to the ore piles is unknown.

4.3 CONCLUSIONS

The conclusions presented below, by medium, combine the findings of the contaminant nature and extent evaluation.

4.3.1 Ore Pile Storage Area

- No analytes were detected in excess of their respective MCL's for toxicity in surface soil or sediment samples.
- The primary identified source areas in the Ore Pile Storage Area include the current ore piles.

- Although arsenic, barium, and chromium represented the most contaminants found over background levels in the Ore Pile Storage Area, concentrations of metals were highly variable.
- Sediment concentrations were very similar to their soil counterparts with respect to analytes detected. Arsenic and chromium were found in the greatest number of samples.
- Surface water samples had the highest concentrations of arsenic and lead. Although chromium was detected in both samples, the remaining metals were not detected over background.

4.3.2 Load Line 3 Tank Storage Area

- In the Load Line 3 Tank Storage Area, no existing contaminant source areas were identified. Barium and chromium were detected slightly over background in many of the samples. No analytes were detected in surface soil or sediment samples excess of their respective MCL's for toxicity.

4.3.3 Route 80 Tank Storage Area

- No analytes were detected in surface soil or sediment samples in excess of their respective MCL's for toxicity.
- Ditch sediments found only a few metals over background present. Arsenic was found more frequently, although one sample contained lead and another sample contained silver that were each over background.
- Similar to sediment, several surface soils were slightly over background in metals. Arsenic, barium, lead, cadmium, and chromium were detected in concentrations exceeding their respective site background concentrations.

5.0 RECOMMENDATIONS

This report was prepared to provide the Army and RVAAP stakeholders with the information necessary to reach a decision on remedial actions necessary to eliminate or reduce risks to receptors. Based on the analytical results obtained during the course of this assessment, SpecPro, Inc. recommends that no further action is required at the DLA Storage Area.

No analyte was detected in any soil or sediment sample above its MCL. Therefore sampled media are not required to be managed as hazardous waste with respect to metals contamination, and may be left in place.

Many of the metals found at the DLA Storage Areas may be attributed to sources that have already been removed, or are in the process of being removed. Remaining ore piles in the Ore Pile storage area are not considered hazardous waste but must be treated as solid waste upon removal from the site. These materials may be sent to an approved solid waste disposal facility or re-used for other purposes, such as road building materials, in accordance with the Integrated Alternative Waste Management Program (IAWMP) protocols. Chromium was noted at levels higher over background than other analytes in samples taken from the Ore Pile area throughout the ditch area just behind (east) of the current ferro-chrome piles. However, DLA Storage continues to remove this storage pile which removes a possible source of future contamination.

Surface water represents the primary contaminant exit pathway for the DLA storage areas, based on current topography and land use. Arsenic was found over background levels. The degree of contaminant loading from the current piles to the ore pile retention pond is somewhat unknown due to the presence of multiple possible sources. These sources may include the former pesticide applications, metal ores in slag related rail beds, and/or the railroad ties. However, contaminant loading from these sources has not resulted in the presence of hazardous concentrations of target analytes in pond media, as determined by samples collected during the course of this assessment. The pond does not have a proper outfall; water mainly leaves through evaporation and infiltration to ground water. Observed analyte concentrations, mobility of target analytes, the removal of historical source areas, and area topography and hydrology suggest that the risk of contamination of surrounding surface waters from the pond is low.

In conclusion, sampled media did not exhibit concentrations of analytes in excess of their respective MCL's, are not required to be handled as hazardous waste, and may be left in place. SpecPro recommends continued removal of observed source areas (i.e.: ferro-chrome ore piles), railroad ties and construction debris to mitigate the possibility of continued leaching resulting in increased future concentrations of sampled analytes. Such removal will also serve the purpose of reducing health and safety risks to site workers and visitors, improve aesthetics, and facilitate more productive land uses that may be considered in the future.

6.0 REFERENCES

New World Technology, 2001, *Remediation and Final Survey Work Plan, Ravenna Army Ammunition Plant Monazite Sand Removal Project, Phase III,* USA 00-005, Revision 3, July.

The Mogul Corporation, 1982, *Soil and Sediment Analyses Performed For: Ravenna Arsenal, Ravenna, Ohio.*

USACE 2001. *Facility-Wide Sampling and Analysis Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio*, DACA62-00-D-0001, D.O. CY02, Final.

USACE 2001. *Sampling and Analysis Plan Addendum No. 1 For the Phase II Remedial Investigation of Load Lines 2, 3, and 4 at the Ravenna Army Ammunition Plant, Ravenna, Ohio,* F44650-99-D-007, D.O. CY01, Final.

USACE 2001a*. Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3.

USACE 2001b. *Phase II Remedial Investigation Report for the Winklepeck Burning Grounds at the Ravenna Army Ammunition Plant, Ravenna, Ohio*, DACA62-94-D-0029, D.O. 0060, Final, April.

APPENDIX A

SELECTED RESULTS FROM PREVIOUS ENVIRONMENTAL INVESTIGATIONS AT THE DLA STORAGE AREAS

Selected Results From

The Mogul Corporation, *Soil and Sediment Analyses Performed for Ravenna Arsenal, Ravenna, Ohio,* 1982.

Ravenna Arsenal
Ravenna, Ohio

METAL DATA SUMMARY

Sample ID Number	Sample Location	Milligrams per Kilogram Dry Weight Chromium as Cr		Lead as Pb	Mercury as Hg
8	Block #C	290		150	1.24
9	Ore Area #6	15		22	1.04
10	Ore Area Background		25	51	1.24
11	Ore Pond	6			
21	Ore Are #4	15			
22	Ore Are #1	19			
23	Ore Are #2	16			
24	Ore Are #3	15			
25	Ore Are #5	16			
41	Block C Sample 3	13			
43	Block C Sample 1	16			
Blank		<1		<1	<0.01

THE MOGUL CORPORTATION

Selected Results From
RVAAP Monthly Monitoring, Chromium Ore Pile

	UPSTREAM		DOWNSTREAM	
SAMPLE DATE	TOTAL UG/L	DISSOLVED UG/L	TOTAL UG/L	DISSOLVED UG/L
11/12/92	<20	<20	<20	<20
12/17/92	<20	<20	<20	<20
1/14/93	<20	<20	<20	<20
2/25/93	<20	<20	<20	<20
3/4/93	<20	<20	<20	<20
4/1/93	<20	<20	<20	<20
May-93	NO FLOW	NO FLOW	NO FLOW	NO FLOW
6/22/93	<20	<20	160	160
7/29/93	<20	<20	1100	<20
Aug-93	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Sept-93	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Oct-93	NO FLOW	NO FLOW	NO FLOW	NO FLOW
11/3/93	<20	<20	1200	1200
Dec-93	NO FLOW	NO FLOW	NO FLOW	NO FLOW
1/28/94	<20	<20	<20	<20
2/18/94	<20	<20	<20	<20
3/21/94	320	<20	<20	<20
4/13/94	<20	<20	<20	<20
5/28/94	<20	<20	280	<20
Jun-94	NO FLOW	NO FLOW	NO FLOW	NO FLOW
7/7/94	<20	<20	<20	<20
Aug-94	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Sept-94	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Oct-94	NO FLOW	NO FLOW	NO FLOW	NO FLOW
11/1/94	31	<5	<5	<5
12/5/94	10	<10	20	10
1/20/95	<10	<10	<10	<10
2/28/95	<10	<10	<10	<10
Mar-95	NO FLOW	NO FLOW	NO FLOW	NO FLOW
4/21/95	<10	<10	<10	<10
5/19/95	<10	<10	<10	<10
June-95	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Jul-95	NO FLOW	NO FLOW	NO FLOW	NO FLOW
8/9/95	2.3	1.6	1.7	1.8
Sep-95	NO FLOW	NO FLOW	NO FLOW	NO FLOW
10/5/95	3	3	2	3
11/17/95	3	<1	2	1
Dec-95	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Jan-95	NO FLOW	NO FLOW	NO FLOW	NO FLOW
2/27/96	4	<1	1	1
Mar-96	NO FLOW	NO FLOW	NO FLOW	NO FLOW
4/29/96	1	<0.5	0.8	1
May-96	NO FLOW	NO FLOW	NO FLOW	NO FLOW
June-96	NO FLOW	NO FLOW	NO FLOW	NO FLOW
7/15/96	6	2	2	4
9/9/96	<5	<5	<5	<5
Oct-96	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Nov-97	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Dec 96	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Jan-97	NO FLOW	NO FLOW	NO FLOW	NO FLOW
Feb-97	NO FLOW	NO FLOW	NO FLOW	NO FLOW

APPENDIX B

PROJECT-SPECIFIC HEALTH AND SAFETY PLAN ADDENDUM

SITE SAFETY AND HEALTH PLAN ADDENDUM FOR THE ASSESSMENT OF POTENTIAL CONTAMINATION AT THE DLA OUTDOOR STORAGE AREAS

INTRODUCTION

It is the formal policy of SpecPro, Inc. to provide and maintain a work environment conducive to the safety and health of its employees. Each employee of SpecPro, Inc. is responsible for maintaining a safe environment. To ensure implementation of this policy, the Ravenna Army Ammunition Plant (RVAAP) Facility-wide Safety and Health Plan (FSHP),(USACE 2001) and this Site Safety and Health Plan (SSHP) Addendum collectively set forth the specific procedures required to protect SpecPro, Inc. and it's subcontractor personnel involved in the field activities under this project. These plans are driven by
requirements contained in U.S. Army Corps of Engineers (USACE) (1992) and USACE (1996). All field personnel are required to comply with the requirements of these programs and plans. In addition, subcontractors are responsible for providing their employees with a safe work place and nothing in these plans relieves such subcontractors of this responsibility. If the requirements of these plans are not sufficient to protect the employees of a subcontractor, that subcontractor is required to supplement this information with work practices and procedures that will ensure the safety of its personnel.

The FSHP addresses program issues and hazards and hazard controls common to the entire installation. This SSHP Addendum to the FSHP serves as the lower tier document addressing the hazards and controls specific to the assessment of potential contamination at the DLA Storage Areas. Copies of the FSHP and this SSHP Addendum will be present at the work site during all fieldwork.

SpecPro will perform a field investigation at the DLA storage areas. Contaminants of concern at this site are metals. Planned site activities for this project consist of environmental sampling and support tasks. These tasks include soil sampling, surface water and sediment sampling.

Potential hazards posed by the planned tasks include injury from lifting and strain hazards associated with operating soil sampling equipment; and from temperature extremes. The potential for chemical overexposure appears to be minimal, given the nature of planned tasks. All of the potential contaminants have low vapor pressures, making overexposure through vapor inhalation highly unlikely. All of the planned tasks pose minimal potential for creating airborne particulates. The crew will use protective gloves which are known to be resistant to the COCs on site to handle potentially contaminated materials, and, if necessary, the Site Safety and Health Officer (SSHO) will upgrade the required personal protective equipment (PPE) to prevent dermal contact with potentially contaminated materials. The SSHO will observe all site tasks during daily safety inspections and will use professional judgment and appropriate monitoring results to determine if upgrading PPE is required.

STAFF ORGANIZATION

This section presents the personnel (and their associated telephone numbers) responsible for site safety and health. Table 1 identifies the SpecPro staff that will fill key roles. See the FSHP for information on the roles and responsibilities of key positions.

Table 1. Staff Organization

Position	Name	Phone
Program Manager	Jim Wirth	(703) 339-6890
Health & Safety Manager	Gregg Rexroad, CEP	(321) 868-7800
Project Manager	Susan McCauslin	(330) 358-1753
Field Operations Manager	Susan McCauslin	(330) 358-1753
Site Safety and Health Officer	Chantelle Carroll	(330) 358-1753

CEP=Certified Environmental Professional

TRAINING

Training requirements are outlined in the FSHP.

PERSONAL PROTECTIVE EQUIPMENT

General guidelines for selection and use of PPE are presented in the FSHP.

MEDICAL SURVEILLANCE

Medical surveillance requirements are presented in the FSHP.

HEAT/COLD STRESS MONITORING

General requirements for heat/cold stress monitoring are contained in the FSHP.

STANDARD OPERATING SAFETY PROCEDURES

Standard operating safety procedures are described in the FSHP.

SITE CONTROL MEASURES

Site control measures are described in the FSHP. No formal site control is expected to be necessary for this work, as the work areas are somewhat remote and fenced, and

bystanders are not anticipated. The RVAAP installation is not open to the public, and only authorized personnel are allowed in the project areas. If the SSHO determines that a potential exists for unauthorized personnel to approach within 25 feet of a work zone or otherwise be at risk due to proximity, then exclusion zones will be established as described in the FSHP.

PERSONNEL HYGIENE AND DECONTAMINATION

Personal hygiene and decontamination requirements are described in the FSHP.

EMERGENCY PROCEDURES AND EQUIPMENT

Emergency contacts, telephone numbers, directions to the nearest medical facility, and general procedures can be found in the FSHP. The SpecPro field operations manager will remain in charge of all SpecPro and subcontractor personnel during emergency activities. The SpecPro field office will serve as the assembly point if it becomes necessary to evacuate one or more sampling locations. Each field team shall have a hand-held, two-way radio for communications purposes.

APPENDIX C

RESULTS FROM ALL CHEMICAL ANALYSIS AT THE DLA STORAGE AREAS

Appendix C Total and TCLP sediment and water results at the Ore Piles

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-001	OP-002	OP-003	OP-004	OP-005
Date Collected		4/28/2003	4/28/2003	4/28/2003	4/18/2003	4/18/2003
Depth (ft)		0-.5'	0-.5'	0-.5'	0-.5'	0-.5'
Sample Type		Grab	Grab	Grab	Grab	Grab
Analyte	Units					
TOTAL METALS						
Aluminum	mg/kg		12000		9570	10500
Antimony	mg/kg		0.58BN		3.7UN	4.3UN
Arsenic	mg/kg	19.4	**57.4**	**31.5**	**633**	**816**
Barium	mg/kg	91.3	**126**	**157**	116*	140*
Berryllium	mg/kg		**0.91**		0.74*	0.61*
Cadmium	mg/kg	.12U	.13U	.16U	.12U	.17U
Calcium	mg/kg		1140		1020*	929
Chromium	mg/kg	**23.6**	**22.6**	**27.1**	13.2	**22.3**
Cobalt	mg/kg		12.7*		**12.2**	**9.8**
Copper	mg/kg		17.6		23.6	25.7
Iron	mg/kg		22200		20000	21500
Lead	mg/kg	26.4	**114**	**73.5**	104E	368E
Magnesium	mg/kg		2210		1710*	2450*
Manganese	mg/kg		1550*		2520*	1730*
Mercury	mg/kg	0.047B	0.087B	0.069B	0.061U	0.039B
Nickel	mg/kg		**30.3**		15.8N*	17.8N*
Potassium	mg/kg		992		1510N	2110N
Selenium	mg/kg	1.1U	0.35B	0.55B	0.30B	1.6U
Silver	mg/kg	.21U	.21U	.26U	.2U	.29U
Sodium	mg/kg		71.3		70.0B	150B
Thallium	mg/kg		0.91BN		6.6U	7.6U
Vanadium	mg/kg		24.5		29.8N	25.5
Zinc	mg/kg		143		98.7	207
TCLP Metals						
Arsenic	ug/L	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U

Appendix C Total and TCLP sediment and water results at the Ore Piles

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-008	OP-009	OP-010	OP-011	OP-017
Date Collected		4/18/2003	4/24/2003	4/24/2003	4/18/2003	4/18/2003
Depth (ft)		0-.5'	0-.5'	0-.5'	0-.5'	0-.5'
Sample Type		Grab	Grab	Grab	Grab	Grab
Analyte	Units					
TOTAL METALS						
Aluminum	mg/kg	12400	**17400**	**15200**	**15700**	
Antimony	mg/kg	0.49BN	2.6UN	0.27BN	0.36BN	
Arsenic	mg/kg	**398**	**302**	**287**	**149**	13.8
Barium	mg/kg	93.5*	84.9	92.3	94.9*	87.6*
Berryllium	mg/kg	0.70	**0.91**	**0.67**	**0.76**	
Cadmium	mg/kg	.16U	.13U	.13U	.13U	.1U
Calcium	mg/kg	1430	2990	802	1660	
Chromium	mg/kg	**34.5**	**28.3**	**32.6**	**21.3**	**31.2**
Cobalt	mg/kg	10.4*	**11.5**	8.6	10.5*	
Copper	mg/kg	26.1	**41**	21.9*	15.9	
Iron	mg/kg	22300	26900	26900	**29500**	
Lead	mg/kg	112E	**55.5**	**59.2**	26.7E	23.4E
Magnesium	mg/kg	3240N	4180N	3200N	2500	
Manganese	mg/kg	966*	868*	422*	788*	
Mercury	mg/kg	0.060B	0.048B	0.063B	0.063B	0.058
Nickel	mg/kg	**34.5**	**37.3**	**24.7**	**18.1**	
Potassium	mg/kg	2270N	2760N	1810N	1560N	
Selenium	mg/kg	1.5U	1.2U	0.60B	0.32B	0.94B
Silver	mg/kg	.27U	.22U	.22U	.21U	.17U
Sodium	mg/kg	**140**	**225**	**128**	**114**	
Thallium	mg/kg	0.50BN	4.6U	1.7U	0.87BN	
Vanadium	mg/kg	32.2	42.8N	33.1N	**35.1**	
Zinc	mg/kg	140N	120*	77.6*	73.3N	
TCLP Metals						
Arsenic	ug/L	**557**	**469**	**299**	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U*	50U*	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U

Appendix C Total and TCLP sediment and water results at the Ore Piles

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-018	OP-019	OP-020	OP-021
Date Collected		4/18/2003	4/18/2003	4/18/2003	4/18/2003
Depth (ft)		0-.5'	0-.5'	0-.5'	0-.5'
Sample Type		Grab	Grab	Grab	Grab
Analyte	Units				
TOTAL METALS					
Aluminum	mg/kg	**19700**	11300		
Antimony	mg/kg	0.97BN	2.4N		
Arsenic	mg/kg	**19.7**	14.7	**20.1**	17
Barium	mg/kg	117*	88.2*	91.7*	111*
Berryllium	mg/kg	**1.3**	**0.92**		
Cadmium	mg/kg	.15U	.18U	.12U	.16U
Calcium	mg/kg	**9930**	4730		
Chromium	mg/kg	**1200**	**1970**	**358**	**401**
Cobalt	mg/kg	9.4*	6.2*		
Copper	mg/kg	25.8	18.1		
Iron	mg/kg	**32100**	28200		
Lead	mg/kg	24.9E	32.4E	20.8E	27.0E
Magnesium	mg/kg	4260N	2360N		
Manganese	mg/kg	430*	268*		
Mercury	mg/kg	0.058B	**0.095**	0.050B	0.063B
Nickel	mg/kg	**25.1**	14.8		
Potassium	mg/kg	1900	1450N		
Selenium	mg/kg	0.53B	1.3B	0.61B	0.49B
Silver	mg/kg	.25U	.29U	.21U	.27U
Sodium	mg/kg	**135**	**171**		
Thallium	mg/kg	1.2BN	1.1BN		
Vanadium	mg/kg	**29.5**	30.4		
Zinc	mg/kg	97.3N	92.2N		
TCLP Metals					
Arsenic	ug/L	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U
Chromium	ug/L	50U	**131**	50U	50U
Lead	ug/L	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U

Appendix C Total and TCLP sediment and water results at the Ore Piles

Location		DLA Ore Piles	DLA Ore Piles
Sample ID		OP-101	OP-103
Date Collected		4/24/2003	4/25/2003
Depth (ft)		0-.5'	0-.5'
Sample Type		Grab	Grab
Analyte	Units	WATER	WATER
TCLP Metals			
Arsenic	ug/L	**131**	**145**
Barium	ug/L	23.9	35.9
Cadmium	ug/L	1.2U	0.33B
Chromium	ug/L	**3.5**	**5.9**
Lead	ug/L	7.4B	**11.1**
Mercury	ug/L	0.35U	0.35U
Selenium	ug/L	2.1B	3.1B
Silver	ug/L	2.5U	2.5U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-006	OP-007	OP-012	OP-013	OP-014	OP-015	OP-016	OP-022
Date Collected		4/17/2003	4/18/2003	4/17/2003	4/17/2003	4/17/2003	4/17/2003	4/18/2003	4/17/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg				17000		14700		
Antimony	mg/kg				3.8UN		0.38BN		
Arsenic	mg/kg	22.0N	15.4	10.9	14.9	14.5	**15.7**	**16.5**	**30.9**
Barium	mg/kg	80.3	67.4*	**116**	**621**	**131**	**281**	71.3*	82.6
Berryllium	mg/kg				1.5*		0.71		
Cadmium	mg/kg	0.048B	.13U	.12U	**0.14**	0.043B	.1U	.12U	.13U
Calcium	mg/kg				30000*		2190		
Chromium	mg/kg	18	**20.3**	**17.4**	47.7B	**20.6**	**19.3**	**21.2**	12.9
Cobalt	mg/kg				9.2		8.7*		
Copper	mg/kg				21.6		**22.5**		
Iron	mg/kg				18800		**30100**		
Lead	mg/kg	17	24.6E	13.7E	20.9E	17.5E	14.1E	20.3E	**32.3**
Magnesium	mg/kg				5430*		3190N		
Manganese	mg/kg				28900*		1290*		
Mercury	mg/kg	0.038B	0.034B	0.030B	0.040B	0.036B	0.036B	0.028B	**0.084**
Nickel	mg/kg				57.1N*		**25.3**		
Potassium	mg/kg				1200N		1220N		
Selenium	mg/kg	0.74B	1.2U	5.3U	556U	4.5U	47.3U	1.1U	**3**
Silver	mg/kg	.21U	.21U	.19U	**2.2**	.17U	**0.42**	.21U	.22U
Sodium	mg/kg				**263**		94.1		
Thallium	mg/kg				6.8U		1.1BN		
Vanadium	mg/kg				31.0N		24.6		
Zinc	mg/kg				60.9		62.4N		
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	**1250**	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	**90.3**	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-023	OP-024	OP-025	OP-026	OP-027	OP-028	OP-029	OP-030
Date Collected		4/17/2003	4/17/2003	4/17/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg						12200		
Antimony	mg/kg						0.27BN		
Arsenic	mg/kg	15	13.7	**20.1**	6.4	9.8	6.9	12.2	10.8
Barium	mg/kg	**115**	**113**	85.4	87.3	72.5	41.3	**129**	60.4
Berryllium	mg/kg						0.51		
Cadmium	mg/kg	0.075B	**0.43**	**0.25**	.11U	.10U	**0.14**	.12U	.11U
Calcium	mg/kg						1240		
Chromium	mg/kg	**20.2**	**42.1**	17.1	**60.3**	**74.8**	**544**	16.6	13.8
Cobalt	mg/kg						8.2*		
Copper	mg/kg						7.9		
Iron	mg/kg						18500		
Lead	mg/kg	17.4	21.9	14.6	10.5	14.9	11.7	20	11.6
Magnesium	mg/kg						8600N		
Manganese	mg/kg						570*		
Mercury	mg/kg	0.046B	**0.069**	**0.11**	.019B	.027B	.019B	**0.065**	.03B
Nickel	mg/kg						**158**		
Potassium	mg/kg						588N		
Selenium	mg/kg	0.72B	1.8B	**2.1**	.37B	.33B	.96U	5.6U	.39B
Silver	mg/kg	.2U	0.081B	.2U	.19U	.17U	.17U	.2U	.18U
Sodium	mg/kg						68.3		
Thallium	mg/kg						1.2UN		
Vanadium	mg/kg						23.8		
Zinc	mg/kg						46.2		
Analyte	Units								
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	**258**	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-031	OP-032	OP-033	OP-034	OP-035	OP-036	OP-037	OP-038
Date Collected		4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg	8230	5990	13300			13900	13500	13600
Antimony	mg/kg	32.3UN	34.5UN	4.1UN			3.8UN	7.1UN	0.42BN
Arsenic	mg/kg	**59.7**	**93.3**	**41.5**	13.4	12.4	**409**	**386**	**130**
Barium	mg/kg	**1820**	**2790**	**1320**	**134**	**210**	**146**	**371**	**165**
Berryllium	mg/kg	1.4U	1.5U	0.52			0.59	0.69	0.83
Cadmium	mg/kg	**0.19**	**0.1**	**0.18**	**0.099**	.11U	.13B	**0.2**	.077B
Calcium	mg/kg	**23100**	**32200**	3300			1950	3450	659
Chromium	mg/kg	139U	138U	136U	**18.9**	15.7B	**17.6**	17.3B	15.7
Cobalt	mg/kg	**404**	432*	44.1*			13.2*	**14.5**	17.9*
Copper	mg/kg	**337**	**414**	**29.1**			13.9	**126**	15.1
Iron	mg/kg	13600	18400	20800			19800	23100	22700
Lead	mg/kg	**27.1**	**38.7**	23	11.9	12.1	**48.8**	**438**	**78.4**
Magnesium	mg/kg	8830N	11200N	2640N			2330N	3240N	1760N
Manganese	mg/kg	256000*	347000*	16800*			2070*	48600*	4190*
Mercury	mg/kg		.031B	.025B	.024B	**0.048**	.044B	.02B	.032B
Nickel	mg/kg	**97.8**	**102**	21.2			19.3	19.8	15.3
Potassium	mg/kg	2590N	3320N	852N			**1230**	3120N	2580N
Selenium	mg/kg	511U	504U	498U	17.7U	103U	12.5U	89.9U	19.7U
Silver	mg/kg	**13.5**	**18.7**	**9.1**	**0.18**	**0.35**	.23U	**2.9**	**0.47**
Sodium	mg/kg	**4100**	**5080**	**527**			60.9B	278B	**403**
Thallium	mg/kg	30.9BN	33.3BN	2.3BN			6.7UN	12.7UN	0.95BN
Vanadium	mg/kg	**37.2**	**42.4**	25.0			25.8	**40.6**	**33.6**
Zinc	mg/kg	60.1	62.1N	59.6N			66.5N	132N	60.0N
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	**354**	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	**1620**	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	250U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	**226**	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	1000U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-039	OP-040	OP-041	OP-042	OP-043	OP-044	OP-045	OP-046
Date Collected		4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg	13200					12000		11700
Antimony	mg/kg	8.5UN					6.9UN		6.4UN
Arsenic	mg/kg	**300**	15.0	17.6N	12.3	8.3	**231.0**	743N	263N
Barium	mg/kg	**148**	**180.0**	**155.0**	105*	87.6*	361*	**114.0**	**240.0**
Berryllium	mg/kg	0.48					0.60		0.50
Cadmium	mg/kg	.1U	.13U	0.10B	.13U	.13U	.1U	**0.1**	0.096B
Calcium	mg/kg	890					3700.0		3210.0
Chromium	mg/kg	11.1B	9.2B	17.0	**18.8**	16.1	**19.4**	14.7	14.3B
Cobalt	mg/kg	11.1*					**13.2**		**11.1**
Copper	mg/kg	15.5					131*		130*
Iron	mg/kg	22800					19300		16800.0
Lead	mg/kg	**259**	15.1	22.1	20.0E	16.3E	1390E	**30.4**	**732.0**
Magnesium	mg/kg	2380N					3390N		3360N
Manganese	mg/kg	2210*					52600*		53800*
Mercury	mg/kg	.02B	.033B	0.048B	0.049B	0.038B	0.032B	0.033B	0.022B
Nickel	mg/kg	15.2					20.4		16.2
Potassium	mg/kg	2860N					3020N		3120N
Selenium	mg/kg	95.1U	115U	12.2U	1.2U	1.2U	19U	5.2U	98.7U
Silver	mg/kg	**0.49**	**0.48**	**0.3**	.22U	.21U	.86U	0.059B	**1.8**
Sodium	mg/kg	304B					**743**		**706.0**
Thallium	mg/kg	15.1UN					12.3U		3.2B
Vanadium	mg/kg	**52.3**					28.0N		27.8N
Zinc	mg/kg	50.6N					134*		128*
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U	250U
Lead	ug/L	100U	100U	100U	100U	100U	100U	**109.0**	**150.0**
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	1000U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	**47.2**

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-047	OP-048	OP-049	OP-050	OP-051	OP-052	OP-053	OP-054
Date Collected		4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/15/2003	4/16/2003	4/16/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg	12300			10400				
Antimony	mg/kg	3.4UN			0.39BN				
Arsenic	mg/kg	**245.0**	5.9	12.3	10	11.3	8.7	8.2	11.9
Barium	mg/kg	303*	101*	57.3*	80.8*	26.9*	87.4*	73.5	72.5
Berryllium	mg/kg	0.6			0.55				
Cadmium	mg/kg	.11U	.12U	.12U	.13U	.12U	.13U	.12U	.11U
Calcium	mg/kg	1620.0			964				
Chromium	mg/kg	13.4	**65.7**	**18.6**	**44**	**121**	**69**	**39.6**	**25.7**
Cobalt	mg/kg	**12.3**			6.1				
Copper	mg/kg	78.5*			10.0*				
Iron	mg/kg	19700.0			12900				
Lead	mg/kg	1690E	13.0E	11.5E	15.5E	14.3E	17.1E	15.2	13.8
Magnesium	mg/kg	2680N			1700N				
Manganese	mg/kg	23600*			628*				
Mercury	mg/kg	0.027B	0.040B	0.045B	0.026B	0.014B	0.041B	0.036B	0.041B
Nickel	mg/kg	17.3			16.3				
Potassium	mg/kg	2480N			670N				
Selenium	mg/kg	20.4U	1.1U	0.31B	1.1U	0.31B	1.2U	1.1U	0.30B
Silver	mg/kg	.93U	.19U	.2U	.21U	.2U	.21U	.2U	.18U
Sodium	mg/kg	**481**			99.8				
Thallium	mg/kg	6U			1.4U				
Vanadium	mg/kg	27.1N			17.7N				
Zinc	mg/kg	89.8*			41.8*				
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	**1790.0**	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	500U	50U	250U	**120**	50U	50U	50U	50U
Lead	ug/L	**111.0**	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	2000U	200U	1000U	200U	200U	200U	200U	200U
Silver	ug/L	**65.6**	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-055	OP-056	OP-057	OP-058	OP-059	OP-060	OP-061	OP-062
Date Collected		4/16/2003	4/16/2003	4/17/2003	4/16/2003	4/16/2003	4/16/2003	4/16/2003	4/16/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg					6720			14700
Antimony	mg/kg					0.54BN			0.37BN
Arsenic	mg/kg	8.9N	15.2	**16**	9	4	10.2	13.2	13.6N
Barium	mg/kg	41.6	70.2	25.1	**188**	54.2	**115**	79.4	**126**
Berryllium	mg/kg					0.25			0.52
Cadmium	mg/kg	**0.18**	.12U	.1U	.13U	0.099U	.12U	.13U	**0.28**
Calcium	mg/kg					1220			1150
Chromium	mg/kg	**97.6**	**24.1**	6.3	**63.9**	**840**	**64.1**	**49.5**	**328**
Cobalt	mg/kg					10.0			5.3
Copper	mg/kg					10.7*			19.0*
Iron	mg/kg					13700			**27300**
Lead	mg/kg	10.4	13.8	4.6E	**17.7**	11.7	17.6	19.7	20.9
Magnesium	mg/kg					12400N			3030N
Manganese	mg/kg					711*			156*
Mercury	mg/kg	0.020B	0.030B	.048U	0.045B	0.030B	0.025B	0.036B	0.044B
Nickel	mg/kg					297			**27.8**
Potassium	mg/kg					345N			1020N
Selenium	mg/kg	.97U	1.1U	9.6U	0.49B	.91U	0.32B	1.2U	10.6U
Silver	mg/kg	.18U	.2U	0.11B	.21U	.16U	.2U	.21U	0.15B
Sodium	mg/kg					72.9			**255**
Thallium	mg/kg					2.4U			0.83B
Vanadium	mg/kg					16.3N			26.5N
Zinc	mg/kg					28.7*			47.3*
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	**86.8**	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-063	OP-064	OP-065	OP-066	OP-067	OP-068	OP-069	OP-070
Date Collected		4/16/2003	4/16/2003	4/17/2003	4/17/2003	4/16/2003	4/16/2003	4/16/2003	4/16/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg				14800		8150		4560
Antimony	mg/kg				0.53BN		67.7UN		1.2UN
Arsenic	mg/kg	14.6N	14.1N	12.9	**20.1**	13.0N	**28.8**	16.1N	11.4
Barium	mg/kg	87.5	73.1	**115**	**835**	**329**	**3330**	**146**	66.8
Berryllium	mg/kg				0.84		1.9B		0.14
Cadmium	mg/kg	0.060B	0.077B	**0.18**	**0.15**	**0.2**	.58U	0.044B	0.087B
Calcium	mg/kg				1340		5850		937
Chromium	mg/kg	**51**	**90.5**	**19.2**	44.3B	**19.6**	14.8	**17.5**	**652**
Cobalt	mg/kg				16.1*		**103**		8.3
Copper	mg/kg				11.6		48.5*		9.0*
Iron	mg/kg				**23200**		**38900**		11100
Lead	mg/kg	**17.4**	14.2	18.9E	24.7E	20.5	19.7	14.8	9.1E
Magnesium	mg/kg				2360N		1240N		16400N
Manganese	mg/kg				9030*		287000*		920*
Mercury	mg/kg	0.044B	0.041B	**0.047**	**0.055**	0.038B	**0.056**	0.037B	**0.14**
Nickel	mg/kg				19.1		**110**		**341**
Potassium	mg/kg				853		6700N		292
Selenium	mg/kg	2.2U	0.40B	5.1U	534U	24.1U	21.2U	10.8U	.95U
Silver	mg/kg	.2U	.18U	.18U	**1.4**	**0.61**	.96U	0.11B	.17U
Sodium	mg/kg				**75.7**		2710U		59.9
Thallium	mg/kg				24.3U		120U		2.2U
Vanadium	mg/kg				31.4N		40.7N		11.5N
Zinc	mg/kg				62.2*		172*		22.3*
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U	**77**
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-071	OP-072	OP-073	OP-074	OP-075	OP-076	OP-077	OP-078
Date Collected		4/16/2003	4/16/2003	4/16/2003	4/16/2003	12/19/2002	4/16/2003	4/16/2003	4/17/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg			8880					
Antimony	mg/kg			1.3BN					
Arsenic	mg/kg	9.4N	12.1N	22.7N	11.3N	12.8	14.3	10.7N	**18.1**
Barium	mg/kg	88.2	**105**	**1020**	**88.8**	**648**	**224**	**320**	**854**
Berryllium	mg/kg			**0.97**					
Cadmium	mg/kg	0.064B	**0.12**	**1.2**	0.067B	.11U	.13U	**0.15**	**0.2**
Calcium	mg/kg			**21300**					
Chromium	mg/kg	**45.6**	**100**	**434**	**21.3**	44.9UN	**20.2**	16	42.5B
Cobalt	mg/kg			**16.7**					
Copper	mg/kg			18.8*					
Iron	mg/kg			**40500**					
Lead	mg/kg	**13.2**	**15.7**	**35.1**	19.8	**16.4**	15.0E	16.9	23.5E
Magnesium	mg/kg			11300N					
Manganese	mg/kg			30900*					
Mercury	mg/kg	**0.056**	0.045B	**0.06**	0.049B	.042B	0.026B	0.037B	0.047B
Nickel	mg/kg			**186**					
Potassium	mg/kg			1080N					
Selenium	mg/kg	0.63B	2.1U	119U	0.42B	117UN	23.3U	22U	554U
Silver	mg/kg	0.079B	0.064B	**1.9**	.21U	**2.2**	**0.33**	**0.32**	**2.8**
Sodium	mg/kg			132B					
Thallium	mg/kg			7.2U					
Vanadium	mg/kg			73.6N					
Zinc	mg/kg			147*					
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	**1610.0**	1000U	1000U	**1170**
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-079	OP-080	OP-081	OP-082	OP-083	OP-084	OP-085	OP-086
Date Collected		4/17/2003	12/17/2002	12/17/2002	12/19/2002	12/19/2002	12/19/2002	12/18/2002	12/18/2002
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg		12800			13000			13700
Antimony	mg/kg		0.53BN			30.9UN			3.8UN
Arsenic	mg/kg	16.1	11.2	11.1	12.7	**17.8**	**20.1**	14.1	**15.4**
Barium	mg/kg	**190**	**1060**	**258**	**764**	**2260**	**384**	**102**	84.7
Berryllium	mg/kg		0.67			**1.8**			0.52
Cadmium	mg/kg	.12U	.11U	.11U	.1U	.11U	**0.12**	.11U	.12U
Calcium	mg/kg		1770			**18000**			1200
Chromium	mg/kg	**22.3**	16	**17.4**	19.1	**17.9**	**19.9**	17	15.8
Cobalt	mg/kg		9.6*			**55.9**			10.4*
Copper	mg/kg		11.2			88.0*			10.1
Iron	mg/kg		19900			**46600**			23100
Lead	mg/kg	14.9E	19.6	20.8	**47.2**	**68.7**	**57.5**	**94.3**	**27.3**
Magnesium	mg/kg		2040N			2880N			2020N
Manganese	mg/kg		1270*			179000*			14000*
Mercury	mg/kg	0.034B	.043B	.047B	.03B	**0.061**	**0.061**	**0.078**	.048B
Nickel	mg/kg		15.1			**86.7**			12.1
Potassium	mg/kg		809N			3910N			881N
Selenium	mg/kg	10.7U	22.8U	12.4U	44.4UN	119UN	45.2UN	5.7UN	6.4UN
Silver	mg/kg	0.097B	**0.43**	.17B	**0.61**	**2.7**	**1.9**	**0.56**	**0.45**
Sodium	mg/kg		69.3			965B			77.8B
Thallium	mg/kg		0.41BN			55U			6.8UN
Vanadium	mg/kg		24.2			73.2N			30.2
Zinc	mg/kg		69.3N			100*			152N
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	**1060.0**	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-087	OP-088	OP-089	OP-090	OP-091	OP-092	OP-093	OP-094
Date Collected		12/18/2002	12/19/2002	12/17/2002	12/17/2002	12/17/2002	12/17/2002	12/17/2002	12/17/2002
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units								
TOTAL METALS									
Aluminum	mg/kg		10500	10800	12700		12800		
Antimony	mg/kg		17UN	1.7BN	1.4BN		1.6BN		
Arsenic	mg/kg	11.5	**37**	**40**	**111**	12.2	**34.3**	12	14
Barium	mg/kg	**116**	**324**	**101**	**842**	79.6	**243**	76.1	75.4
Berryllium	mg/kg		0.67B	0.56	0.81		0.71		
Cadmium	mg/kg	.13U	**1.5**	0.52	**4.7**	.13U	**1.9**	.11U	.11U
Calcium	mg/kg		6120	1960	**2700**		1520		
Chromium	mg/kg	16.8	8.8	14.7	**42.3**	**19.2**	17.2	**17.9**	**24.2**
Cobalt	mg/kg		9.8	9.7	8.4		10.4		
Copper	mg/kg		63.9*	9.4*	57.5*		20.9*		
Iron	mg/kg		18100	18900	19600		21000		
Lead	mg/kg	**38.2**	**154**	**117**	**429**	16.6	**449**	19.2	15.7
Magnesium	mg/kg		2350N	1580N	2560N		2220N		
Manganese	mg/kg		123000*	36100*	63800*		31300*		
Mercury	mg/kg	.059B	**0.2**	**0.081**	**0.41**	.034B	**0.11**	.038B	.045B
Nickel	mg/kg		10.9B	10.9	13.3		15.7		
Potassium	mg/kg		3180N	814	1940N		1160N		
Selenium	mg/kg	7.1U	107UN	45.2U	231U	1.1B	53.7U	1.3	**1.5**
Silver	mg/kg	.33B	**4.8**	**2.2**	**13.1**	.31U	**4.5**	.27U	.29U
Sodium	mg/kg		363B	46.9B	132B		54.7B		
Thallium	mg/kg		30.3U	5.9B	182B		5.4B		
Vanadium	mg/kg		29.7N	29.7N	40.2BN		29.4N		
Zinc	mg/kg		2130*	1340*	1050*		1310*		
TCLP Metals									
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Ore Piles.

Location		DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles	DLA Ore Piles
Sample ID		OP-095	OP-096	OP-097	OP-098	OP-099	OP-100
Date Collected		12/19/2002	12/18/2002	12/18/2002	12/18/2002	12/18/2002	12/18/2002
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units						
TOTAL METALS							
Aluminum	mg/kg	11600			13200		
Antimony	mg/kg	1.6BN			0.49BN		
Arsenic	mg/kg	**148**	15.1	13.1	12.1	**14.7**	14.0
Barium	mg/kg	**597**	83.5	85	**93.5**	87.2	**137.0**
Berryllium	mg/kg	0.72			0.83		
Cadmium	mg/kg	**11.8**	.11U	.1U	.11U	.13U	.12U
Calcium	mg/kg	1410			371		
Chromium	mg/kg	51.3UN	**29**	**43.3**	**17.6**	**37.3**	**23.5**
Cobalt	mg/kg	**19.1**			24.5*		
Copper	mg/kg	14.6*			8.9		
Iron	mg/kg	**23900**			**31000**		
Lead	mg/kg	**1140**	20.5	16	20.3	18.1	14.7
Magnesium	mg/kg	1790N			1580N		
Manganese	mg/kg	29600*			3410*		
Mercury	mg/kg	**0.24**	.036B	.027B	.047B	0.037B	0.056B
Nickel	mg/kg	12.9			12.4		
Potassium	mg/kg	1240N			753N		
Selenium	mg/kg	133UN	.73BN	.83B	5.8U	1.3BN	6.3U
Silver	mg/kg	**15.5**	.27U	.25U	**14.6**	.33U	.29U
Sodium	mg/kg	172U			76.9		
Thallium	mg/kg	**7.7**			1.0BN		
Vanadium	mg/kg	28.4N			**33.5**		
Zinc	mg/kg	1260*			55.8		
TCLP Metals							
Arsenic	ug/L	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U

Appendix C Total and TCLP sediment results at the Route 80 Tank Farm

Location		DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80
Sample ID		R80-001	R80-002	R80-003	R80-004	R80-005
Date Collected		37739	37739	37739	37739	37739
Depth (ft)		0-.5'	0-.5'	0-.5'	0-.5'	0-.5'
Sample Type		Grab	Grab	Grab	Grab	Grab
Analyte	Units					
TOTAL METALS						
Aluminum	mg/kg	9830				
Antimony	mg/kg	0.28BN				
Arsenic	mg/kg	**51.8**	**24.8**	4.6	17	**49.8**
Barium	mg/kg	50.7	65	67.5	78.3	42
Berryllium	mg/kg	**0.56**				
Cadmium	mg/kg	.1U	**.11U**	.095U	.1U	**.11U**
Calcium	mg/kg	1490				
Chromium	mg/kg	11.5	**10.7**	5.3	12.6	9.1
Cobalt	mg/kg	**15.0**				
Copper	mg/kg	18.0*				
Iron	mg/kg	**28500**				
Lead	mg/kg	13.1	**17.5**	**33**	19.9	22.7
Magnesium	mg/kg	2010N				
Manganese	mg/kg	1150*				
Mercury	mg/kg	0.024B	0.043B	0.020B	0.051B	0.021B
Nickel	mg/kg	**20.0**				
Potassium	mg/kg	871N				
Selenium	mg/kg	.94U	1U	.87U	0.43B	1U
Silver	mg/kg	.17U	**.19U**	.16U	.17U	**0.24**
Sodium	mg/kg	65.3				
Thallium	mg/kg	0.51B				
Vanadium	mg/kg	17.6N				
Zinc	mg/kg	67.8*				
TCLP Metals						
Arsenic	ug/L	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U
Chromium	ug/L	50U*	50U*	50U*	50U*	50U
Lead	ug/L	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U

Appendix Total and TCLP Soil results at Load Line 3.

Location		DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3
Sample ID		LL3-001	LL3-002	LL3-003	LL3-004	LL3-005	LL3-006	LL3-007
Date Collected		4/10/2003	4/10/2003	4/10/2003	4/10/2003	4/10/2003	4/10/2003	4/10/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units							
TOTAL METALS								
Aluminium	mg/kg					**26200**		
Antimony	mg/kg					3.9UN		
Arsenic	mg/kg	**16.8**	8.2	11.5	10.1	5.8	13.9	9.4
Barium	mg/kg	55.4	64.5	**110**	**119**	**1450**	71.2	**158**
Beryllium	mg/kg					**2.6**		
Cadmium	mg/kg	.049B	.079B	**0.17**	**0.21**	**0.71**	.069B	**0.27**
Calcium	mg/kg					**161000**		
Chromium	mg/kg	**28.3**	**30**	**18.8**	**22.2**	**42.4**	**19.4**	**19.1**
Cobalt	mg/kg					3.2*		
Copper	mg/kg					**20.7**		
Iron	mg/kg					10600		
Lead	mg/kg	15.1	15.3	23.2	**29.5**	**389**	20.5	**37.1**
Magnesium	mg/kg					9590N		
Manganese	mg/kg					1830*		
Mercury	mg/kg	.019B	.029B	.039B	.039B	**0.1**	.03B	.042B
Nickel	mg/kg					8.1		
Potassium	mg/kg					4540N		
Selenium	mg/kg	.62B	.42B	.88B	.55B	1.9B	.89B	5.6U
Silver	mg/kg	.19U	.19U	.21U	.2U	.11B	.18U	.097B
Sodium	mg/kg					**1610**		
Thallium	mg/kg					7UN		
Vanadium	mg/kg					20.5		
Zinc	mg/kg					134N		
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U

Appendix Total and TCLP Soil results at Load Line 3.

Location		DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3
Sample ID		LL3-008	LL3-009	LL3-010	LL3-011	LL3-012	LL3-013	LL3-014
Date Collected		4/10/2003	4/10/2003	4/10/2003	4/10/2003	4/10/2003	4/11/2003	4/11/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units							
TOTAL METALS								
Aluminium	mg/kg							
Antimony	mg/kg							
Arsenic	mg/kg	10.8	11.8	13	11.7	10.4	10.5	8.4
Barium	mg/kg	**220**	**88.9**	**137**	**128**	**95.2**	**96.3**	**138**
Beryllium	mg/kg							
Cadmium	mg/kg	**0.29**	**0.16**	**0.2**	**0.23**	**0.19**	0.14U	.12U
Calcium	mg/kg							
Chromium	mg/kg	**19.8**	**19.5**	**25.8**	**18.8**	**19.2**	**20.9**	**19.4**
Cobalt	mg/kg							
Copper	mg/kg							
Iron	mg/kg							
Lead	mg/kg	**27.2**	25.9	**53.7**	**29.8**	21.9	24.7	24.1
Magnesium	mg/kg							
Manganese	mg/kg							
Mercury	mg/kg	.037B	.037B	.024B	.048B	.037B	0.037B	0.032B
Nickel	mg/kg							
Potassium	mg/kg							
Selenium	mg/kg	4.7U	.77B	4.6U	2.3U	.45B	1.2U	0.43B
Silver	mg/kg	.17U	.2U	.17U	.21U	.2U	.23U	.21U
Sodium	mg/kg							
Thallium	mg/kg							
Vanadium	mg/kg							
Zinc	mg/kg							
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U

Appendix Total and TCLP Soil results at Load Line 3.

Location		Location		DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3
Sample ID		Sample ID		LL3-015	LL3-016	LL3-017	LL3-018	LL3-019	LL3-020	LL3-021
Date Collected		Date Collected		4/11/2003	4/11/2003	4/11/2003	4/11/2003	4/11/2003	4/11/2003	4/11/2003
Depth (ft)		Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units	Analyte	Units							
TOTAL METALS		TOTAL METALS								
Aluminium	mg/kg	Aluminium	mg/kg	13400						
Antimony	mg/kg	Antimony	mg/kg	0.32						
Arsenic	mg/kg	Arsenic	mg/kg	9.8	12.9	11.6	13.9	10.7	13.9	11.8
Barium	mg/kg	Barium	mg/kg	**200**	**94.7**	**99.9**	84.4	**131**	**95.8**	**93.3**
Beryllium	mg/kg	Beryllium	mg/kg	0.88						
Cadmium	mg/kg	Cadmium	mg/kg	**0.29**	**0.043**	.076B	.12U	.13U	.12U	.14U
Calcium	mg/kg	Calcium	mg/kg	13200						
Chromium	mg/kg	Chromium	mg/kg	**24.6**	**21.2**	16.7	**21.9**	17.1	**18.2**	**21.2**
Cobalt	mg/kg	Cobalt	mg/kg	9.4*						
Copper	mg/kg	Copper	mg/kg	11.8						
Iron	mg/kg	Iron	mg/kg	21500						
Lead	mg/kg	Lead	mg/kg	**67.1**	21.6	21	14.4	20.5	21.8	**41.3**
Magnesium	mg/kg	Magnesium	mg/kg	3400N						
Manganese	mg/kg	Manganese	mg/kg	1120*						
Mercury	mg/kg	Mercury	mg/kg	.047B	.040B	.042B	.042B	0.043B	0.030B	0.034B
Nickel	mg/kg	Nickel	mg/kg	17.2						
Potassium	mg/kg	Potassium	mg/kg	1090N						
Selenium	mg/kg	Selenium	mg/kg	5.3U	.42B	.41B	.52B	0.39B	1.1U	0.61B
Silver	mg/kg	Silver	mg/kg	.19U	.19U	.18U	.2U	.21U	.2U	.23U
Sodium	mg/kg	Sodium	mg/kg	108						
Thallium	mg/kg	Thallium	mg/kg	1.3UN						
Vanadium	mg/kg	Vanadium	mg/kg	23.8						
Zinc	mg/kg	Zinc	mg/kg	58.9						
Arsenic	ug/L	Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	Barium	ug/L	1000U	1000U	**1130**	1000U	1000U	1000U	1000U
Cadmium	ug/L	Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	Lead	ug/L	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	Silver	ug/L	30U	30U	30U	30U	30U	30U	30U

Appendix Total and TCLP Soil results at Load Line 3.

Location		DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3
Sample ID		LL3-022	LL3-023	LL3-024	LL3-025	LL3-026	LL3-027	LL3-028
Date Collected		4/11/2003	4/11/2003	4/11/2003	4/11/2003	4/11/2003	4/11/2003	4/11/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units							
TOTAL METALS								
Aluminium	mg/kg							
Antimony	mg/kg							
Arsenic	mg/kg	12.5	14.7	14	**27.1**	13.2	**17.4**	10.9
Barium	mg/kg	79.9	86.6	85.5	**145**	**112**	**170**	62.6
Beryllium	mg/kg							
Cadmium	mg/kg	.11U	.14U	.13U	.12U	.12U	.12U	.13U
Calcium	mg/kg							
Chromium	mg/kg	16.1	**23.8**	**21.7**	14.5	**18.4**	**20.1**	**20.3**
Cobalt	mg/kg							
Copper	mg/kg							
Iron	mg/kg							
Lead	mg/kg	18	**32.2**	18.7	23	**39.7**	20.9	17.2
Magnesium	mg/kg							
Manganese	mg/kg							
Mercury	mg/kg	0.034B	0.019B	0.034B	0.029B	**0.059**	.041B	0.043B
Nickel	mg/kg							
Potassium	mg/kg							
Selenium	mg/kg	0.32B	1.3U	1.2U	0.38B	.85B	5.7U	1.2U
Silver	mg/kg	.18U	.24U	.22U	.2U	.19U	.21U	.22U
Sodium	mg/kg							
Thallium	mg/kg							
Vanadium	mg/kg							
Zinc	mg/kg							
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U

Appendix Total and TCLP Soil results at Load Line 3.

Location		DLA Load Line 3	DLA Load Line 3	DLA Load Line 3	DLA Load Line 3
Sample ID		LL3-029	LL3-030	LL3-031	LL3-032
Date Collected		4/11/2003	4/11/2003	4/11/2003	4/11/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab
Analyte	Units				
TOTAL METALS					
Aluminium	mg/kg	10900			
Antimony	mg/kg	24.1N			
Arsenic	mg/kg	**23.2**	12.6	**16.2**	14.3
Barium	mg/kg	**382**	**105**	54	50
Beryllium	mg/kg	0.82			
Cadmium	mg/kg	.11U	.12U	.12U	.12U
Calcium	mg/kg	2910			
Chromium	mg/kg	**17.8**	**18.1**	**21.1**	**19.7**
Cobalt	mg/kg	13.5*			
Copper	mg/kg	6.7			
Iron	mg/kg	**34800**			
Lead	mg/kg	**26.3**	**34.7**	23.7	13.7
Magnesium	mg/kg	2430			
Manganese	mg/kg	2240*			
Mercury	mg/kg	.033B	.049B	0.037B	0.025B
Nickel	mg/kg	19.8			
Potassium	mg/kg	786N			
Selenium	mg/kg	20.8U	.59B	1.1U	1.1U
Silver	mg/kg	.058B	.2U	.2U	.21U
Sodium	mg/kg	63.9			
Thallium	mg/kg	0.91BN			
Vanadium	mg/kg	29.5			
Zinc	mg/kg	56.6N			
Arsenic	ug/L	200U	200U	200U	200U
Barium	ug/L	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U
Chromium	ug/L	50U	50U	50U	50U
Lead	ug/L	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U

Appendix C Total and TCLP soil results at the Route 80 Tank Farm

Location		DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80	DLA Route 80
Sample ID		R80-006	R80-007	R80-008	R80-009	R80-010	R80-011	R80-012	R80-013	R80-014	R80-015
Date Collected		4/28/2003	4/28/2003	4/28/2003	4/28/2003	4/28/2003	4/28/2003	4/28/2003	4/28/2003	4/28/2003	4/28/2003
Depth (ft)		0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'	0-1'
Sample Type		Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
Analyte	Units										
TOTAL METALS											
Aluminium	mg/kg						967				
Antimony	mg/kg						0.40BN				
Arsenic	mg/kg	10	14.9	**47.7**	**23.1**	**64.9**	4.2	9.4	12.4	5.1	6.4
Barium	mg/kg	51.6	**131**	57.8	21.7	22.9	14.3	42.7	69.8	11.2	**213**
Beryllium	mg/kg						0.11				
Cadmium	mg/kg	.1U	.1U	.11U	.13U	.11U	.1U	.12U	.12U	.11U	**0.18**
Calcium	mg/kg						263				
Chromium	mg/kg	8.1	9.7	13.4	15.7	10.3	3.5	10.1	15.1	4.6	**23.6**
Cobalt	mg/kg						4.1				
Copper	mg/kg						3.4*				
Iron	mg/kg						7850				
Lead	mg/kg	10.3	7.7	15.4	**48.9**	**45.1**	3.7	21	20.2	3.8	33.3
Magnesium	mg/kg						137				
Manganese	mg/kg						458*				
Mercury	mg/kg	0.041B	.043U	0.018B	0.017B	.043U	.05U	0.027B	0.036B	.043U	0.046B
Nickel	mg/kg						6.7				
Potassium	mg/kg						244				
Selenium	mg/kg	.94U	.96U	.96U	0.49B	1U	.95U	0.32B	0.32B	.97U	0.79B
Silver	mg/kg	.17U	.17U	0.12B	.21U	0.093B	.17U	.2U	.2U	.18U	.2U
Sodium	mg/kg						58.3				
Thallium	mg/kg						1.3U				
Vanadium	mg/kg						4.3N				
Zinc	mg/kg						12.5*				
TCLP Metals											
Arsenic	ug/L	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U
Barium	ug/L	1000U	**1290**	1000U	1000U	1000U	1000U	1000U	1000U	1000U	1000U
Cadmium	ug/L	60U	60U	60U	60U	60U	60U	60U	60U	60U	60U
Chromium	ug/L	**105***	50U*	50U*	50U	50U*	50U*	50U*	50U	**112***	50U*
Lead	ug/L	100U	100U	100U	100U	100U	100U	100U	100U	100U	100U
Mercury	ug/L	2U	2U	2U	2U	2U	2U	2U	2U	2U	2U
Selenium	ug/L	200U	200U	200U	200U	200U	200U	200U	200U	200U	200U
Silver	ug/L	30U	30U	30U	30U	30U	30U	30U	30U	30U	30U