KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
BUREAU OF ENVIRONMENTAL REMEDIATION
STATE COOPERATIVE PROGRAM

REMOVAL SITE EVALUATION REPORT

WADE'S ALUMINUM SITE
FORT SCOTT, KANSAS

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CONCURRENCE PAGE

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BUREAU OF ENVIRONMENTAL REMEDIATION

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1.0 INTRODUCTION

On December 20, 2010 an Environmental Remediation Agreement was signed between the Kansas Department of Health and Environment (KDHE) and Bourbon County. This Removal Site Evaluation (RSE) report was prepared by the KDHE for the Bourbon County Board of Commissioners as a component of the Environmental Agreement. The primary objectives of the Removal Site Evaluation (SI) at Wade's Aluminum were to:

- define the vertical and horizontal extent of contamination in order to estimate waste volumes and contaminated soil with lead levels greater than 1,000 milligrams per kilogram (mg/kg);
- collect sediment samples to delineate potential sediment impacts and evaluate whether sediment removal is necessary;
- collect surface water to determine possible impact on aquatic life;
- evaluate perched groundwater;
- characterize contents of drums and waste piles on Site; and,
- gather sufficient data to develop plans for remedial action.

This report contains relevant information gathered by KDHE/BER to meet the objectives of this RSE, as well as conclusions and recommendations.

2.0 SITE BACKGROUND

The Wade's Aluminum Site is an abandoned secondary aluminum smelter located in a rural area north of Fort Scott, Kansas in Section 17, Township 25 South, Range 25 East, Bourbon County (Figure 1). The geographic coordinates of the Site are 37.87136° latitude and -94.69159° longitude (NAD83). The facility reclaimed aluminum from dross, which was brought in from surrounding aluminum smelters and stored on Site.

Smelting operations began in December 1978 with two furnaces. In 1979, two more furnaces were added, one for the reclamation of dross (waste from aluminum smelting operations) and one for alloying aluminum. A fifth furnace was added in 1980 for alloying aluminum. In October 1984, Wade's Aluminum Products discontinued processing of aluminum dross and began using aluminum scrap materials. Wade's Aluminum Products filed for bankruptcy in November 1985. The Site was abandoned and acquired by Bourbon County in 2006 as part of a larger land purchase from Cullor Properties, L.L.C. Bourbon County signed an indemnification agreement with Cullor Properties, L.L.C. which indemnified Cullor Properties, L.L.C. from any environmental issues existing on the property at the time of sale.

2.1 Investigative History

KDHE completed a Preliminary Assessment of the property in 1995. The assessment included the collection of two dross samples and one soil sample. Analytical results of samples indicated that dross at the Site was potential RCRA characteristic hazardous waste because of concentrations of cadmium, chromium and lead.

An integrated Removal Site Evaluation/Site Inspection (RSE/SI) was conducted by KDHE in 2005. A total of 33 samples were collected, including five background soil samples and three surface water samples. Lead was the only analyte that exceeded the Tier 2 Levels for non-residential soils established in KDHE's Risk-Based Standards for Kansas (RSK) Manual (KDHE 2010) (i.e., Tier 2 Levels). Analytical results indicated lead concentrations in the dross and soil ranged between 270 mg/kg and 7,300 mg/kg. The non-residential Tier 2 Level for lead in soil is 1,000 mg/kg. Thirteen samples were submitted for Toxic Characteristic Leaching Procedure (TCLP) extraction via SW-846 Method 1311 and analysis for Resource Conservation and Recovery Act (RCRA) Metals (i.e., arsenic, barium, cadmium, chromium, lead, mercury, selenium and Silver) and zinc. The TCLP results indicated that the lead concentrations in three of the samples exceeded the maximum concentration of contaminants for the toxicity characteristic of 5 milligrams per liter (mg/L) as specified in 40 CFR 261.24. This indicates that that some of the dross could be characteristically hazardous. The RSE/SI report is included as Appendix D.

2.2 Site & Vicinity Characteristics

The Wades Aluminum Site is an abandoned industrial use property. The nearest residence is approximately 500 feet west of the Site; four more residences are located between 800 and 1,200 feet west of the Site. The Bourbon County construction and demolition landfill lies across Noble Road to the south. The Site occupies approximately twenty acres north of Noble Road and east of the BNSF railway. Agricultural land lies to the north and west. Wolverine Creek runs along the northern boundary of the Site; an unnamed intermittent drainage flows across the southeast corner of the Site. This drainage joins Wolverine Creek as it flows toward the Marmaton River, half a mile to the south.

Four buildings of wood construction (Figure 2, buildings 1-3), one of cinderblock (building 4), one large open-sided shed (building 5), and brick-and-concrete silos from former cement operations occupy the Site, as do several small outbuildings. All buildings are in various states of disrepair or collapse. A limestone quarry approximately 0.7 acres in size is present in the southwest and west-central portion of the Site.

Piles of dross primarily occupy the central portion of the Site near the former furnace building, but are scattered across the Site. Piles of material from the cement operation are located near the open-sided shed and silos. Household waste litters the surface of the Site, apparently the result of unauthorized dumping.

2.3 Topography & Hydrology

The Site is located in the Osage River Basin of the Missouri River Basin. Surface drainage from the Site is to Wolverine Creek, which flows south-southeast to the Marmaton River. Streams in Kansas are classified by their ability to support the use categories of aquatic life, agriculture or public health; each category has specific water quality standards. Wolverine Creek is classified as a Kansas General Purpose Water, Expected Aquatic Life Use Stream.

2.4 Geology & Geohydrology

The Site is situated upon the Fort Scott Limestone of the Pennsylvania age. The Fort Scott Limestone Formation consists of the Higginsville limestone member, the Little Osage shale member, and the Blackjack Creek limestone member. The Higginsville Limestone has been quarried on the western part of the Site.

The Kansas Geological Survey's Water Well Records database indicates one domestic water well located a mile west of the Site. This well was drilled to 180 feet, screened in bedrock from 20 to 160 feet below ground surface (bgs), and has an estimated yield of 45 gallons per minute. Bourbon County Rural Water District #2C provides water to the area surrounding the Site. RWD #2C buys water from the City of Fort Scott, which obtains it from an intake in the Marmaton River approximately three miles upstream of the Site.

Four monitoring wells were installed in 1995 at the Bourbon County landfill, ranging in distance from 600 feet to 1600 feet from the Site. These wells encountered limestone at depths varying from one to three feet, with alternating shale and limestone to total depths of 20 feet, 40 feet, 40 feet and 30 feet. Corresponding groundwater depths were 2.66 feet, 21 feet, no water and 17.35 feet upon completion, indicating confining layers within the sequence.

2.5 Soils

The soil type within the Site boundaries has been identified as gravel pits and quarries. This map unit occurs as excavated areas from which soil and limestone bedrock has been removed. Soil cover is typically thin and irregular in such areas.

3.0 Removal Site Evaluation Activities

The Removal Site Evaluation was completed in accordance with the scope of work provided in the Environmental Remediation Agreement (ERA) and approved work plan. Field activities were conducted during May 2 through May 5, 2011. All utilities were located and marked prior to mobilization. Field activities included collection of surface soil samples, dross samples, surface water samples and sediment samples. Attempts to collect groundwater samples were unsuccessful. Subsurface samples were collected using direct-push sampling equipment. In addition soil in a former transformer area was collected and the contents of a red drum sampled when encountered by field personnel. The sampling and analytical program is summarized in Table 1. All sample locations were determined using a global positioning satellite receiver (GPS). Field notes documenting key field activities are provided in Appendix A. Photographs depicting field activities and significant observations are provided in Appendix B.

Based on the data, field staff had to return to the Site on September 8, 2011 to collect additional samples for chromium. This activity was crucial to augment initial waste volume calculations.

3.1 XRF Sampling and Analytical Methodology

The investigation included the use of a hand-held XRF to collect field readings for arsenic, cadmium, lead and zinc concentrations in soils and dross. XRF screening was conducted in general accordance with EPA SW-846 Method 6200 using an Innov-X DC-4000 XRF instrument.

Samples for XRF analysis were collected into heavy-duty 1-quart ziplock bags and transported to the Bourbon County shop, where a temporary lab had been established. Each sample was homogenized within the ziplock bag. Wet samples were dried at between 37 and 52 degrees Celsius in a forced air oven and further homogenized with mortar and pestle before XRF analysis.

After XRF analysis, samples chosen as laboratory duplicates were transferred to 8-oz glass sample jars prior to laboratory submittal.

XRF accuracy was assessed by standardization checks, blank and standards analysis, precision measurements, and laboratory split samples. Standardization checks were conducted every morning and after every four hours of continuous use. Lead standards were checked at the beginning of each day and every 20 samples to ensure that concentrations were within 20% of known values. Instrument precision was measured once daily by analyzing a precision blank seven to ten times in replicate.

Representative samples from 14% of the 224 XRF sample locations were collected and retained for laboratory confirmation analysis by EPA SW-846 Method 6010/7470 for the 8 RCRA metals plus zinc. The samples were selected from soils, dross piles and drums across a range of XRF lead concentrations below, near and above its non-residential Tier 2 Level of 1,000 mg/kg.

Field quality assurance/quality control (QA/QC) measures were implemented to assess the validity of laboratory data. During the sampling event, 10% field QA/QC duplicate samples were collected and submitted for laboratory analysis. Primary and duplicate sample locations were recorded in the project field book and the field duplicates were labeled so as to be unknown to the laboratory.

3.2 Soil Sampling Protocol

Unbiased surface soil sample locations were placed in a grid pattern on approximate 100-foot centers across the Site. In addition to the grid sample locations, biased surface soil sample locations were selected based on XRF screening results and field observations indicating dross, stressed vegetation, or other factors indicative of former smelter impact, in order to better delineate the horizontal extent of soil contamination. Surface soil samples were collected from 0-0.5 feet below grade and composited from several locations within a one-foot area of the collection point. One hundred thirty-six surface soil locations, 94 grid and 42 biased, were sampled; 12 soil samples were collected and retained for laboratory confirmation analysis. Surface sample locations are shown in Figure 3.

Background soil data from the KDHE RSE/SI was used for this investigation. Background soil sample locations are shown in Figure 4.

3.3 Dross Sampling Protocol

Twenty-nine dross samples for XRF analysis were collected from drums located in and around buildings at the Site, as well as 59 samples from piles located throughout the Site. Drums were grouped according to proximity and visual similarity of contents. Composite samples were collected from each group, which ranged in size from two to twelve drums. One sample, composited from several locations, was collected from each dross pile sampled. Subsurface samples were collected from selected dross piles using direct-push methods.

Eight drum and 11 dross samples were submitted for laboratory analysis of total and TCLP RCRA Metals and zinc. Dross and drum sampling locations are shown in Figure 5.

3.4 Sediment Sampling Protocol

Two sediment samples were collected from Wolverine Creek upstream and downstream as it flows along the northern edge of the property, and two from an unnamed drainage at its entry and exit points at the southeast corner of the property. The samples were submitted for laboratory analysis for RCRA metals and zinc. Sediment sample locations are shown in Figure 6.

3.5 Surface Water Sampling Protocol

Two surface water samples were collected from Wolverine Creek upstream and downstream as it flows along the northern edge of the property, and two from an unnamed drainage at its entry and exit points at the southeast corner of the property. These samples were submitted for laboratory analysis for RCRA metals and zinc. Two duplicates were collected. In addition, a sample was collected from each stream for total hardness analysis. Surface water sample locations are shown in Figure 6.

3.6 Groundwater Sampling Protocol

Borings were advanced in three locations into shallow bedrock in an attempt to obtain groundwater samples. Groundwater probe locations (GWP-1, GWP-2, GWP-3) are shown on Figure 7. Probe refusal occurred at 14 feet, 1.5 feet and 18 feet, respectively. Groundwater was not encountered at these locations.

3.7 Additional Characterization Efforts

A possible former transformer area and a red drum with petroleum-type liquid contents were discovered during field work. No visible staining was evident in the former transformer area; a composite surface soil sample was collected for polychlorinated biphenyl (PCB) analysis by EPA SW-846 Method 8082. The drum was sampled by tipping and pouring through an open bunghole, and was analyzed for Total Petroleum Hydrocarbons (TPH) Diesel Range Organics by EPA SW-846 Method 8015B. Sample locations are shown in Figure 8.

Analytical results for chromium soils and dross in excess of Tier 2 levels were received from the laboratory after the 28-day holding time for hexavalent chromium (also known as chromium (VI)) had expired. In order to support derivation of a Tier 3 risk-based concentration for chromium at the Site, five additional samples were collected on September 8 from representative areas of the Site and three submitted for total chromium analysis by EPA SW-846 Method 6010 and hexavalent chromium analysis by EPA SW-846 Method 7196. Sample locations are shown in Figure 8.

3.8 Equipment Decontamination and Investigation-Derived Waste

Non-dedicated sampling equipment was decontaminated prior to arriving at the site and between samples. Decontamination water was disposed of on-site. Down-hole equipment was not re-used during probing and sample collection procedures, and was decontaminated upon return to station.

Clean disposable nitrile gloves were worn during sample collection and decontamination procedures and changed between sampling locations to minimize the potential for cross-contamination.

Project investigation-derived waste (IDW) generally included the following:

- soil cuttings from soil borings;
- decontamination water;
- used personal protective equipment (PPE); and,
- bagged samples for XRF analysis.

All IDW was managed in general accord with the KDHE-BER SOP entitled *Characterization and Disposal of Investigative-Derived Waste* (KDHE 2011a) and *Guide to Management of Investigation-Derived Wastes* (U.S. EPA, 1992). Disposable sampling equipment and personal protective equipment was disposed as municipal solid waste.

4.0 Data Analysis and Findings

The soil data collected during the RSE were compared to KDHE's Tier 2 Levels for the Soil Pathway provided in the RSK Manual. Tier 2 Levels vary based on current and future land use (i.e., residential or non-residential). The Soil Pathway addresses the impact to human health via ingestion of contaminated soil, inhalation of VOCs and/or fugitive emissions or dusts, and dermal contact with contaminated soil. The RSK Manual establishes Tier 2 Levels for two additional pathways: (1) the Soil-to-Groundwater Protection Pathway, which is based on the contaminant concentration in soil that is protective of groundwater; and (2) the Groundwater Pathway, which addresses the impact to human health in the event that groundwater is or may be a future source of drinking water. For those constituents for which U.S. EPA has promulgated primary maximum contaminant levels (MCLs), the Tier 2 Levels for the Groundwater Pathway are the MCLs. As groundwater was not encountered during the investigation, these potential pathways are not germane to this report.

While most soil data are compared to KDHE's non-residential Tier 2 Levels for the Soil Pathway, for chromium KDHE performed a Tier 3 analysis to determine the appropriate risk-based cleanup level. Chromium may occur in multiple oxidation states, some which have more health impacts than others. KDHE's Tier 2 Level for chromium is based on hexavalent chromium, because hexavalent chromium compounds are classified by the U.S. Department of Health and Human Services (DHHS) as known human carcinogens. Soil samples submitted for total chromium analysis during the initial phase of the investigation indicated concentrations in excess of KDHE's Tier 2 Level for chromium of 111 mg/kg. In order to better understand the nature of impacts at the Site and determine a better estimate of volume, KDHE collected additional soil samples for analysis of hexavalent chromium and total chromium. Findings from the September sampling indicate that hexavalent chromium was not detected in any sample above the laboratory reporting limit. On this basis, KDHE calculated the site-specific Tier 3 Level of 3,060,000 mg/kg for chromium in soil based on the toxicity of trivalent chromium.

Sediment samples from Wolverine Creek, a classified stream, were evaluated using Threshold Effect Concentrations (TECs) identified in MacDonald et al 2000, per KDHE/BER Sediment Policy (KDHE, 2004)). TECs are consensus-based, chemical-specific concentrations that are considered to

be protective of aquatic life in classified streams and are found in Tables 2 and 3 of the referenced policy document. Sediment samples collected from the non-classified intermittent stream were evaluated using Tier 2 Levels for the Soil Pathway.

Surface water samples from Wolverine Creek, a General Purpose, Expected Aquatic Life Use stream, were compared to chronic and acute Aquatic Life Standards (ALS) according to the KDHE Bureau of Water Kansas Surface Water Quality Standards (KDHE/BOW, December 2004). Surface water samples from the intermittent stream were compared to ALS standards for evaluation purposes only.

Eighteen soil, dross and drum samples were submitted for analysis of TCLP metals to determine if soil and/or waste material exhibited hazardous waste characteristics. The resultant data were compared to the maximum concentrations of contaminants for the toxicity characteristic as specified in 40 CFR 261.24.

4.1 Soil Sample Results

XRF results for soil samples are presented in Table 2; corresponding off-site laboratory results are presented in Table 3. Soil sample locations are shown in Figure 3. Copies of XRF reports are included in Appendix C.

XRF analyses indicated that average lead concentrations exceeding the Tier 2 Level for non-residential land use of 1,000 mg/kg were detected at nine surface soil (0-0.5 foot) sample locations. Average arsenic concentrations exceeding the Tier 2 Level of 38 mg/kg were detected at 24 surface soil sample locations. No samples exceeded the Tier 2 Levels for cadmium (965 mg/kg) or zinc (610,000 mg/kg). It was noted in the XRF operator's notes, but not recorded in XRF logs, that some soil samples exhibited chromium concentrations, but none in excess of site-specific Tier 3 Level of 3,060,000 mg/kg.

Laboratory analyses indicated that of the 12 soil samples analyzed, four exceeded the Tier 2 Level for lead with a range of 1,100 to 1,600 mg/kg (Table 3, Figure 9). No samples exceeded the Tier 2 Levels for arsenic, cadmium, chromium, or zinc (Figures 10-13). No soil samples submitted for TCLP extraction and analysis exceeded the applicable thresholds.

No metals in excess of Tier 2 Levels (Table 4) were detected in any of the background samples collected during previous KDHE investigations.

4.2 Dross and Drum Sample Results

XRF analyses of the 57 dross pile samples indicated lead concentrations up to 16,267 mg/kg and arsenic concentrations up to 807 mg/kg (Table 5). Cadmium was detected through XRF analyses at concentrations up to 30 mg/kg. It was noted in the XRF operator's notes, but not recorded in XRF logs, that relatively low concentrations of chromium were observed in some dross samples.

As shown in Table 7, laboratory analysis of the 11 dross pile samples submitted for offsite analysis indicated lead concentrations up to 32,000 mg/kg. Arsenic, cadmium, zinc and chromium were detected at concentrations up to 14 mg/kg, 9.2 mg/kg, 27,000 mg/kg, and 530 mg/kg, respectively. Waste Sample W-00, which appeared to be the contents of an emptied drum in building B, and

dross pile sample WP-7 exceeded the TCLP threshold for lead (5 mg/L) with concentrations of 110 mg/L and 160 mg/L, respectively. No dross pile samples exceeded TCLP thresholds for arsenic, cadmium, or chromium.

XRF analyses of the 29 drum samples (Table 6) indicated lead concentrations up to 16,333 mg/kg. Arsenic, cadmium, and zinc were detected at concentrations up to 697 mg/kg, 77 mg/kg, and 100,000 mg/kg, respectively. It was noted in the XRF operator's notes, but not recorded in XRF logs, that relatively low concentrations of chromium were observed in some drum samples.

As shown in Table 7, laboratory analysis of the eight drum samples submitted for offsite analysis indicated lead concentrations up to 38,000 mg/kg. Arsenic, cadmium, zinc and chromium were also detected at concentrations up to 15 mg/kg, 21 mg/kg, 180,000 mg/kg and 730 mg/kg, respectively. No drum samples exceeded arsenic, cadmium, zinc, or Site-specific chromium RSK. The three samples with the highest lead concentrations were collected from individual drum Y and drum groups X (2 drums) and Z (3 drums) containing solid material. These drums also exceeded the TCLP threshold for lead with respective concentrations of 19 mg/L, 63 mg/L and 28 mg/L (Table 8). No drum samples exceeded TCLP thresholds for arsenic, cadmium, and chromium.

4.3 Sediment

In accordance with KDHE policy, sediment sample results were compared to TECs and non-residential soil pathway RSK values (Table 9). The arsenic TEC (9.79 mg/kg) was exceeded in the upstream sample of Wolverine Creek (9.8 mg/kg) and in the downstream sample (10 mg/kg). Zinc exceeded its TEC (121 mg/kg) upstream (160 mg/kg) and downstream (1,000 mg/kg). Cadmium exceeded its TEC (0.99 mg/kg) in the downstream sample (4.6 mg/kg). Lead did not exceed its TEC (35.8 mg/kg) at either location.

Respective Tier 2 Levels were not exceeded in the intermittent stream samples for cadmium, lead and zinc. The upstream sample (42 mg/kg) exceeded the Tier 2 Level of 38 mg/kg for arsenic; the downstream sample did not.

4.4 Surface water

Surface water results were compared to acute and chronic Aquatic Life Use Standards (ALS), which are calculated using stream-specific water hardness values. These values are included with surface water results in Table 10. ALS standards were not exceeded in Wolverine Creek. The upstream sample collected from the intermittent stream exceeded the chronic ALS for copper; the downstream sample did not. Cadmium was not detected in either sample; however, the ALS standard of 3.05 µg/L for cadmium was below the laboratory's method detection limit (5 µg/L) for the contaminant.

4.5 Groundwater

Groundwater was not encountered in the three borings advanced to bedrock at the Site.

4.6 Additional Characterization

The contents of the red drum were identified by laboratory analysis as diesel fuel.

PCB-1260 was detected in the soil sample collected in the former transformer area at a concentration of 0.0615 mg/kg. This concentration is well below the cleanup standard for PCB in bulk remediation waste of 1 part per million. Soil staining was not observed during sample collection.

Hexavalent chromium was not detected at the Site. The laboratory reporting limit for hexavalent chromium was 2 mg/kg, well below the Tier 2 Level for hexavalent chromium of 111 mg/kg.

5.0 VOLUME CALCULATIONS

To evaluate future removal options for the contaminated soil and waste identified at the Site, KDHE calculated the volume of contaminated soils and waste and the volume of the adjacent limestone quarry. KDHE's methodology and findings for these activities are presented below.

5.1 Waste Volume Calculation

KDHE contracted Land and Mapping Services to conduct a stereographic flight over the Site in March 2011. From that flight, Land and Mapping Services developed a Triangular Irregular Network (TIN) elevation model which included breaklines and two-foot contours. Representative cross sections are shown on Figure 15. The TIN elevation model, sampling data and visual observations formed the basis for determining the extent of the various dross piles and calculating waste volumes.

To determine the lateral extent of the dross piles, the TIN and associated data files were imported into ESRI's ArcMap™ software. Supplementing this information with field observations and aerial photographs, polygons were drawn around the base of each pile. Volume calculations were made for waste piles identified as WP-7, WP-12, WP-17, WP-20, WP-21, WP-27, and WP-29. Waste Pile 7, a relatively small pile, did not show up as a pile of greater than two feet in height and consequently was digitized based solely from field observations and aerial photographs.

The initial 100-foot grid sampling identified soil contamination areas. KDHE staff further defined these areas by taking samples in 25 foot, 50 foot and/or 75 foot intervals around the initial 100-foot grid point. The sampling results from this sampling effort was used with the TIN elevation model to identify soil contamination areas (which may or may not be associated with waste piles) and estimate volumes. These areas include Area 1 (grid point 2-4), Area 2 (grid point 3-4), Area 3 (grid point 5-4), Area 4 (grid point 6.5-7), Area 5 (grid point 3-10) and Area 6 (grid points 1-10, 2-10 and 2-9.75). Sample location 6.5-7 occurred in a relatively level area surrounded by debris and the remains of an asphalt road. This area is represented as a circle of approximately 20 feet in diameter. These areas were otherwise treated in the same manner as the dross piles.

Once the extent for each waste pile was compiled, the elevation of the base was determined. The TIN model provides elevation of features on the surface and does not account for any natural topography hidden beneath the anthropogenic landscape. Because of this, any attempt to extract elevation information for a 3D polygon feature to represent the base of the waste piles would have resulted in a volume calculation of zero for each area of removal. An assumption was made that the topography underlying each pile is flat and the bases were assigned the lowest elevation value found along the edge of the base, rounded to the nearest foot. The exception to this would be waste piles 12 and 21, which are situated along a ridge and in part cover the ridge. In these instances, the use of

the lowest elevation has likely resulted in a significant over-estimation of the amount of waste present. To account for any sub-surface contamination, one foot, the rounded estimated depth to bedrock, was subtracted from each base elevation.

The "TIN Polygon Volume" ArcMap tool was then used to determine waste volumes. The dross pile base polygons were used for the reference plane (Figures 16-21). The following volume calculations were made:

Location ID	Volume (cubic yards)	Volume +50%	Analytical Lead (mg/kg)	XRF Lead (mg/kg)
WP-12	395	593	1,200	972
WP-17	25	38	2,600	2,065
WP-20	67	101	1,200	1,482
WP-21	404	606	-	1,539
WP-27	243	365	-	1,364
WP-29	51	77	-	1,943
Area 1	39	59	1,400	2,044
Area 2	75	113	-	10,610
Area 3	28	42	-	2,991
Area 4	29	44	-	2,312
Area 5	100	150	-	3,404
Area 6	282	423	1,400	1,912; 1,259; 1,085
Total	**1,738**	**2,611**		

Figure 22 illustrates locations and volumes. The total volume of material (waste piles and soil) that is equal to or greater than 1,000 mg/kg lead but not characterized as hazardous waste is estimated to be between 1,738 and 2,611 cubic yards.

Drum Y, drum groups X and Z, dross pile WP-7 (6 cubic yards) and W-00 combined for an estimated 8 cubic yards of material that failed TCLP for lead. Drum Y and drum groups X and Z contained enough metal to perhaps be candidates for beneficial reuse if interested parties could be found. WP-7 and W-00 must be disposed of as hazardous waste in a permitted hazardous waste facility.

An estimated volume was calculated to determine the amount of dross (waste material) that should be removed from the surface of the site. This calculation was based on outlining a total removal area using field observations and aerial photos (Figure 22) and sectioning it into areas of two-foot changes of elevation in order to account for the site's gradual rise in elevation north to south across the site. Using the average of each section's elevation as grade elevation, the volume of material above grade in each section was calculated and the results totaled. The volume of waste in drums on site was estimated to be approximately 60 cubic yards. Estimated

total volume of waste material at the site was determined to be between 7,000 and 10,500 cubic yards.

5.2 Quarry Volume Calculation

To derive quarry boundaries, a GPS receiver and antenna was used to delineate the edge. The north edge of the quarry was not evident in the field, so a northern boundary was determined on the basis of quarry features from air photos. Representative cross sections of the quarry are shown in Figure 23.

In order to take into account that the east edge of the quarry was often lower in elevation than the west, and provide an option for a sloped top, two separate polygons were created for the quarry, dividing the quarry roughly in half. The Digital Terrain Model (DTM) highlighted elevations at two foot intervals until the highlighted elevations no longer provided visual definition to the quarry. At that point, the average elevation for the previous interval was used to represent the top of the quarry, and each side of the quarry was evaluated separately, giving two separate elevations from which to determine volume.

Once the quarry edge was determined, the volume calculations used the same methods as the waste volume calculations. The capacity of the abandoned limestone quarry along the west edge of the Site is calculated to be 13,600 cubic yards.

6.0 DATA QUALITY ASSESSMENT

Removal Site Evaluation data were reviewed in accordance with BER SOP-11, *Evaluation and Validation of Data (KDHE, 2011b)* with consideration of *National Functional Guidelines for Superfund Inorganic Methods Review (U.S. EPA, 2010).* The evaluation included review of holding times, blank sample analyses, and duplicate sample results. In general, the laboratory and field quality assurance (QA)/quality control (QC) parameters were considered acceptable as reported and qualified.

6.1 XRF Quality Control

XRF energy calibration check samples consistently showed no instrument failures. Blank and standard samples were consistently within acceptance ranges. Precision replicates did not exceed 20% relative standard deviation.

6.2 Quality Control Sampling and Analysis

Samples submitted for laboratory analysis were extracted and analyzed for COCs within their respective EPA laboratory method holding times. Laboratory reporting limits for sample analyses were generally consistent with the method-specific detection limit. Laboratory reporting limits were below applicable Tier 2 Levels and all TEC concentrations except for cadmium in two samples. The lower reporting limits were achieved by re-submittal of Wolverine Creek samples, but not intermittent stream samples. The overall objectives of the SI were not affected by elevated reporting limits. Laboratory reporting and method detection limits are provided in the analytical laboratory report in Appendix C.

6.3 XRF Laboratory Split Results

Analytical results of the XRF/laboratory split samples are included in Appendix C and are summarized in Tables 2 through 7. The XRF data and the laboratory results were compared from drum samples, dross piles, and soil samples from a range of XRF lead values. A linear regression was calculated for the XRF vs. laboratory confirmation analysis data. According to EPA SW-846 Method 6200, a coefficient of determination (r^2) = 0.7 to r^2 = 0.9 can be considered qualitative screening level data; a value of r^2 = 0.9 or higher can be considered quantitative definitive level data. A value of r^2 = 0.94 was calculated for lead, r^2= 0.19 for arsenic and r^2= .81 for zinc. The majority of the XRF data for cadmium were below the instrument limits of detection (LOD) and no correlation coefficient was calculated. As chromium was detected in all laboratory samples, a value of r^2= .32 was calculated. The XRF data obtained for lead during this Removal Site Evaluation may be considered quantitative definitive level data. The XRF data for zinc may be considered qualitative screening level data.

6.4 Duplicates

Four duplicate sample results were compared to the original laboratory results by calculating the relative percent difference (RPD) for arsenic, cadmium, chromium, lead, and zinc. RPD ranges for duplicate laboratory analysis are as follows:

Arsenic: 0-15%

Cadmium: 1-15%

Chromium: 0-4%

Lead: 0-47%

Zinc: 0-13%

The typical RPD goal for field duplicates is less than 20 percent. This goal was achieved for all analytes in all duplicates except for lead in sample WP-12 (27%) and sample Drum R (47%). In general, RPD values for duplicate samples are within acceptable ranges and the data are valid for their intended use (Table 11).

6.5 General Data Assessment

Based on review of quality control sample data, the overall quality of the data generated is acceptable and none of the laboratory data was rejected. Reported contaminant levels generally appear to be accurate and precise.

Laboratory reporting limits were below applicable Tier 2 levels and all TEC concentrations except for cadmium in two samples. The overall objectives of the SI were not affected by elevated reporting limits.

Soil, waste, sediment, surface and groundwater data sets achieved 100 percent completeness as proposed by the SI Work Plan. KDHE concludes that the data set is representative of the soil, waste, sediment, surface water, and groundwater conditions encountered at the Site.

7.0 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are media-specific goals for protecting human health and the environment, based on current and reasonably likely site conditions. The primary constituent of concern at the Site is lead. Based on site conditions, Remedial Action Objectives include:

Human health: prevent human exposure through direct contact and/or ingestion of contaminated soil and smelter waste with concentrations of lead above acceptable levels.

Ecological: prevent additional adverse impact from waste and contaminated soil to aquatic life, individuals of a threatened or endangered species, and other ecological receptors

Contaminant Transport: prevent migration of soil and smelter waste that contains lead in excess of standards that could result in environmental degradation of surface water, sediment and soils.

8.0 REMEDIAL ALTERNATIVES

Remedial actions potentially applicable to the site RAOs could include:

- Excavation and offsite permitted landfill disposal with Environmental Use Controls (EUCs)
- Excavation and onsite disposal and capping with EUCs and offsite disposal of characteristic hazardous waste
- No Action

Each is discussed below.

8.1 Offsite Permitted Landfill Disposal (with EUC)

Soils and waste exceeding non-residential Tier 2 levels may be placed in offsite permitted landfills. Material found to be characteristic hazardous waste must be disposed in a hazardous waste disposal facility, while non-hazardous material can be placed as special waste in some Subtitle D landfills. Offsite disposal would be protective of human health and ecological receptors. In addition, it would prevent future degradation of surface water, sediment and soils at the Site. Costs for disposal in permitted landfills are relatively high. An Environmental Use Control could be used to place restrictions and conditions at the Site where contaminant levels remain at concentrations greater than residential cleanup levels. Restrictions commonly prohibit groundwater use, prohibit residential use of the property, have provisions and assurance for any necessary long-term operations and maintenance, and provide for KDHE access to the property to periodically confirm that the EUC conditions are being maintained. A EUC would be effective in preventing future residential child and adult expose to waste and soil in excess of residential standards at the Site. Costs for EUCs are relatively low.

8.2 Onsite Disposal and Encapsulation (with EUC)

After removal of household and other trash, soils and waste exceeding non-residential Tier 2 levels could be excavated and consolidated for placement in an onsite encapsulation cell that would consist of a low permeability covering, such as clay, over the contaminated material. The clay would be covered with topsoil to support vegetation. The capping material would prevent direct

contact by human and ecological receptors as well as prevent future degradation of surface water, sediment and soils at the Site; it would therefore be protective. Costs for encapsulation are expected to be below costs of offsite disposal. As with the first alternative, material found to be characteristic hazardous waste must be disposed in a hazardous waste disposal facility, and an EUC emplaced in order to be protective of future residential human exposure to waste and soil at the Site.

8.3 No Action

No Action would entail no remedial actions to mitigate existing contamination and would not be protective of human health or ecological receptors. No action could result in environmental degradation of surface water, sediment and soils.

9.0 CONCLUSIONS AND RECOMMENDATIONS

In general, elevated concentrations of metals in surface soil samples correlated with visual evidence of waste material observed at the Site. Laboratory data indicate that lead was the only analyte that exceeded its non-residential Tier 2 Level and respective TCLP threshold. Other contaminants were identified during the XRF screening but were not verified by laboratory analysis. Additional field sampling by KDHE in September documented the primary species of chromium as trivalent; therefore, chromium was eliminated as a contaminant of concern.

Surface water in Wolverine Creek did not exceed Aquatic Life Use Criteria for metals of interest. The Site does not appear to be a major contributor of metals to surface water.

Arsenic and zinc TECs were exceeded in both the upstream and downstream samples of Wolverine Creek. Cadmium exceeded its TEC in the downstream sample. Lead did not exceed its TEC at either location. The Site does not appear to be a major contributor of metals; however, given the observed increase in zinc concentrations from upgradient to downgradient, further evaluation of sediment impacts in Wolverine Creek may be warranted. The intermittent stream upstream sample exceeded the Tier 2 Level for arsenic but not for cadmium, lead or zinc.

Perched groundwater was not encountered at the Site. Completion data from nearby monitoring wells indicate the presence of competent shale and limestone acting as confining units for groundwater below.

The waste volume analysis indicates that an estimated 1,738 to 2,611 cubic yards of contaminated soil and waste above the KDHE Tier 2 level for non-residential land uses is present on-site. Approximately 8 cubic yards of that material failed the TCLP test and must be treated as a characteristic hazardous waste. The volume of the on-site quarry was calculated to be 13,600 cubic yards, which suggests that the quarry may be an appropriate location to consolidate and cap wastes on-site as discussed in Section 8.2.

The data collected during the RSE conclusively identify the former Wade's Aluminum operation as a source of heavy metals contamination (primarily lead). Further response actions are necessary to protect human health and the environment. KDHE offers the following recommendations for future actions:

- Bourbon County should proceed with development of a Removal Action Design (as agreed to in the ERA) to excavate, consolidate and cap contaminated soil and non-hazardous wastes

on-site and dispose of potentially hazardous waste off-site. Although shallow groundwater was not encountered during the SI, the RAD should minimize the potential for infiltration of precipitation and include controls to prevent leachate from degrading any subsurface water bearing units.

- Solid waste and dilapidated buildings should be addressed.
- Establish Environmental Use Controls (EUCs) to restrict future uses of the property as necessary to protect of the health of future employees and patrons of the facility.
- KDHE also recommends that waste material containing aluminum dross and other waste debris that did not test above 1000 mg/kg for lead be considered for on-site disposal. Sampling such material is highly variable, and test results can vary depending on a variety of factors. The total approximate volume of the estimated waste material at the site was determined to be between 7,000 and 10,500 cubic yards, which could be accommodated within the quarry boundaries. Removal of the majority of this dross from the site surface would further reduce potential exposure risk, as well as facilitate future development of the site.

10.0 REFERENCES

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United States Environmental Protection Agency, National Functional Guidelines for Superfund Inorganic Methods Data Review, January 2010.

United States Environmental Protection Agency, Guide to Management of Investigation-Derived Wastes, January 1992.

FIGURES

FIGURE 1. SITE LOCATION MAP

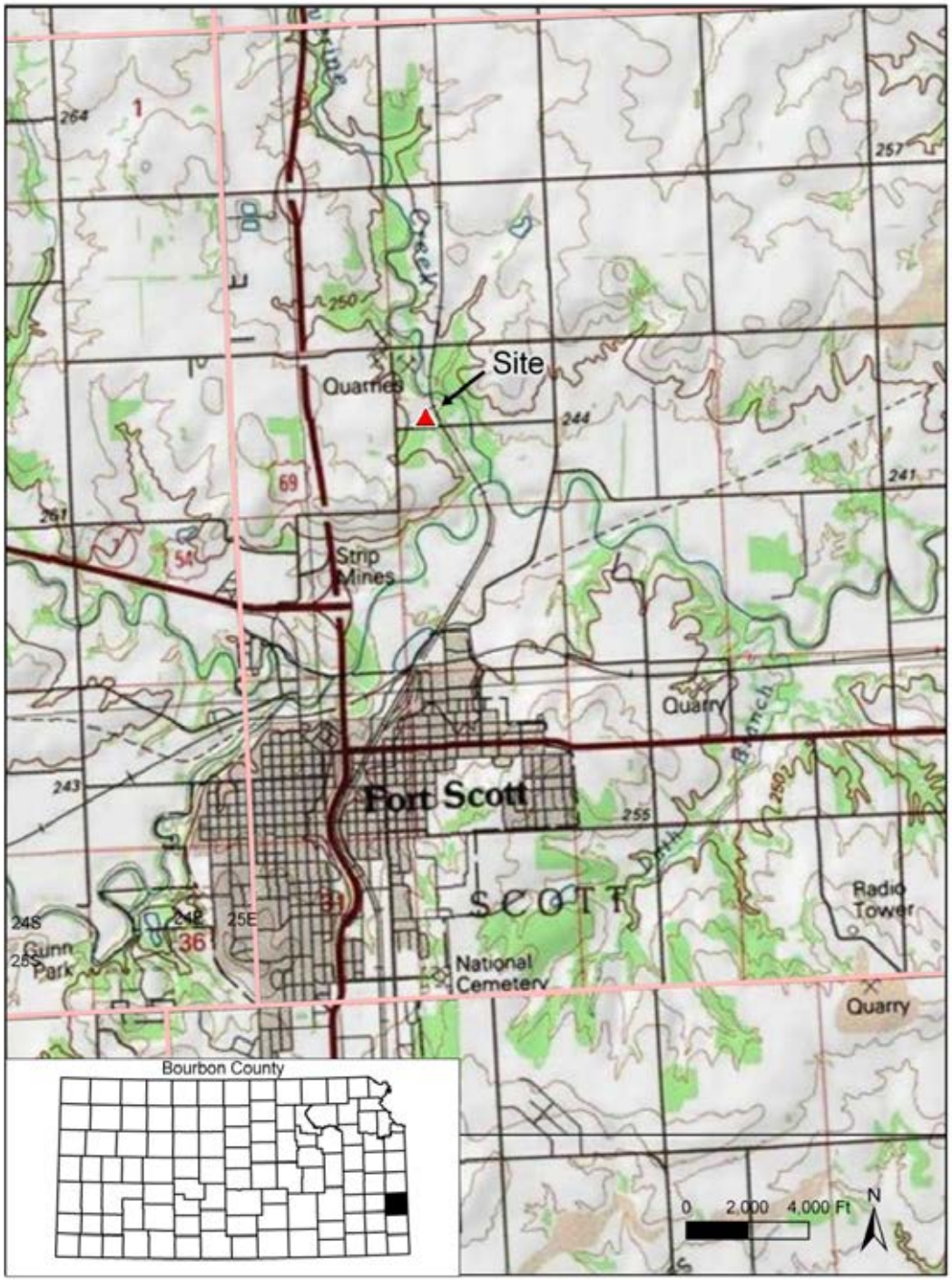


FIGURE 2. SITE FEATURES

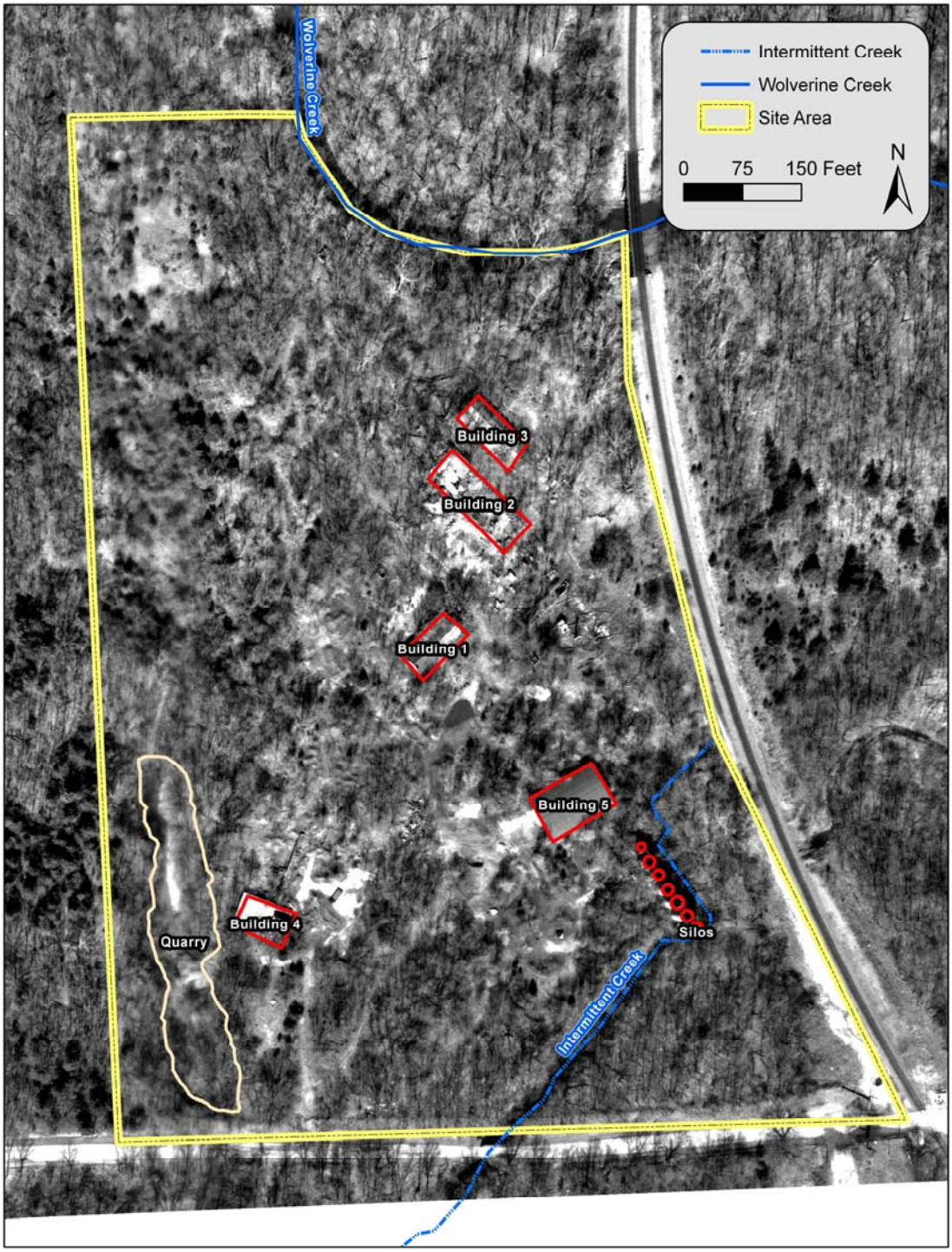


FIGURE 3. GRID AND BIASED SAMPLE LOCATIONS

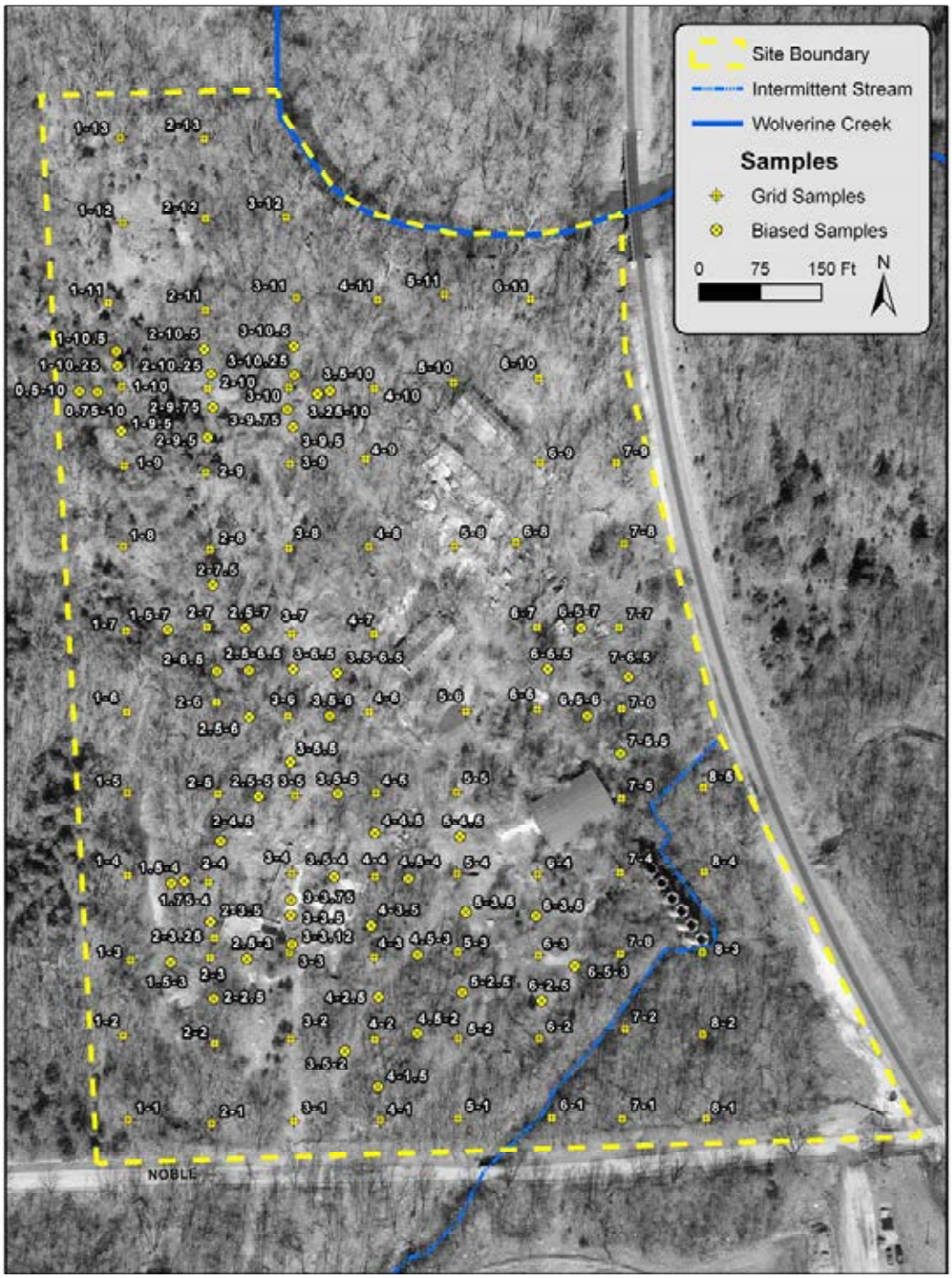


FIGURE 4. BACKGROUND SOIL SAMPLE LOCATIONS

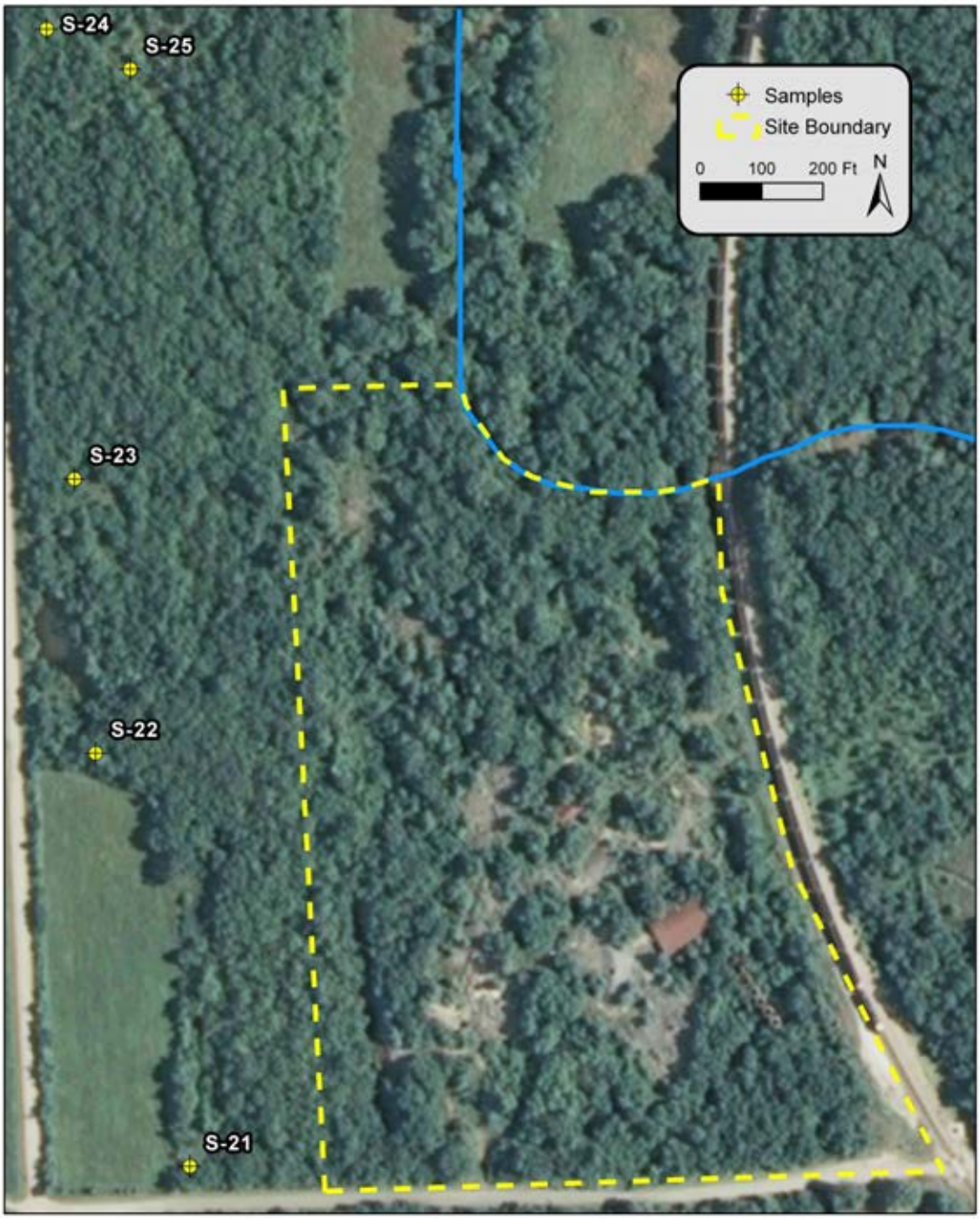


FIGURE 5. DROSS AND DRUM SAMPLE LOCATIONS

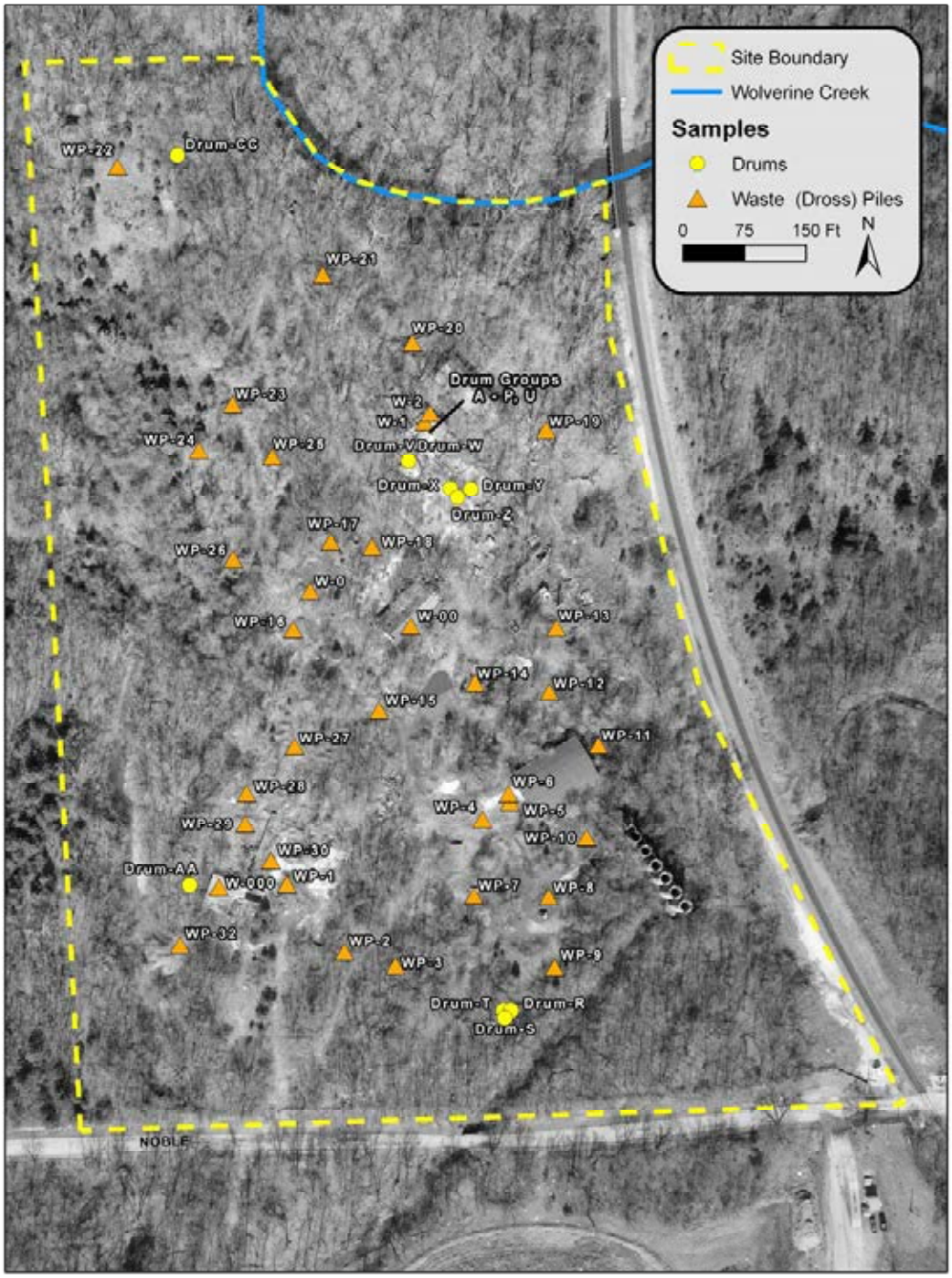


FIGURE 6. SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS

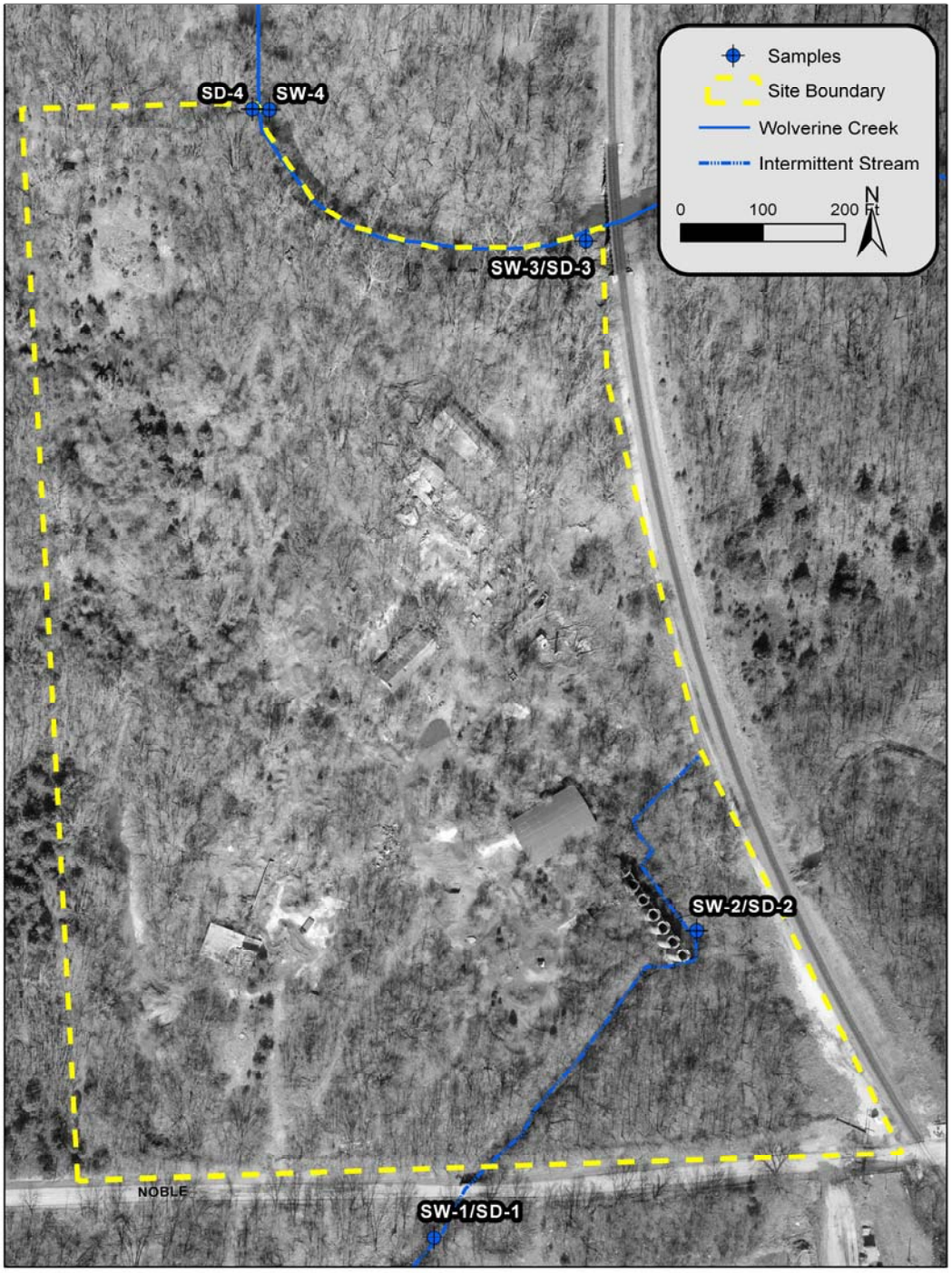


FIGURE 7. GROUNDWATER PROBE LOCATIONS

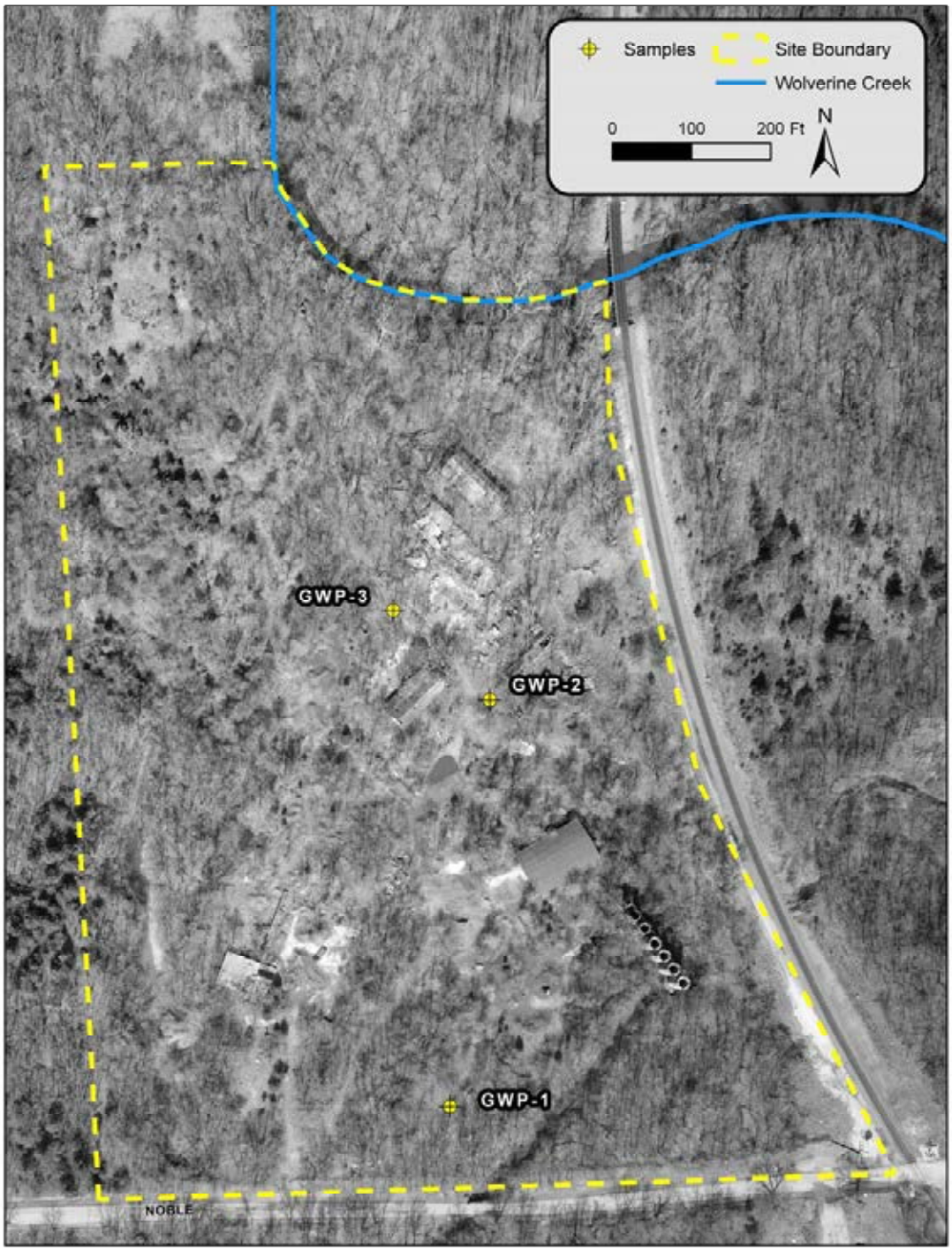


FIGURE 8. ADDITIONAL SAMPLING LOCATIONS

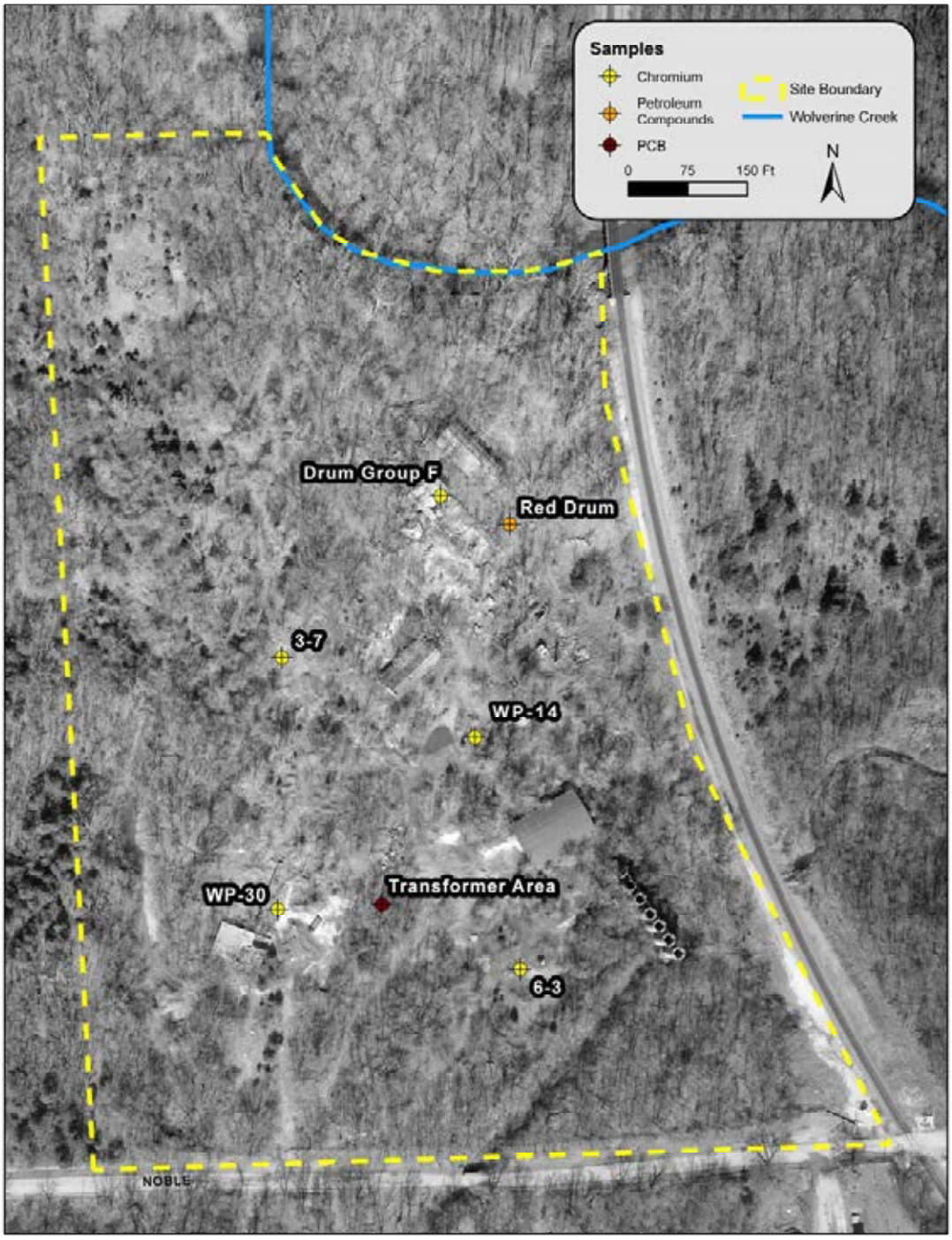


FIGURE 9. SOIL, DROSS AND DRUM SAMPLE LABORATORY RESULTS (LEAD)

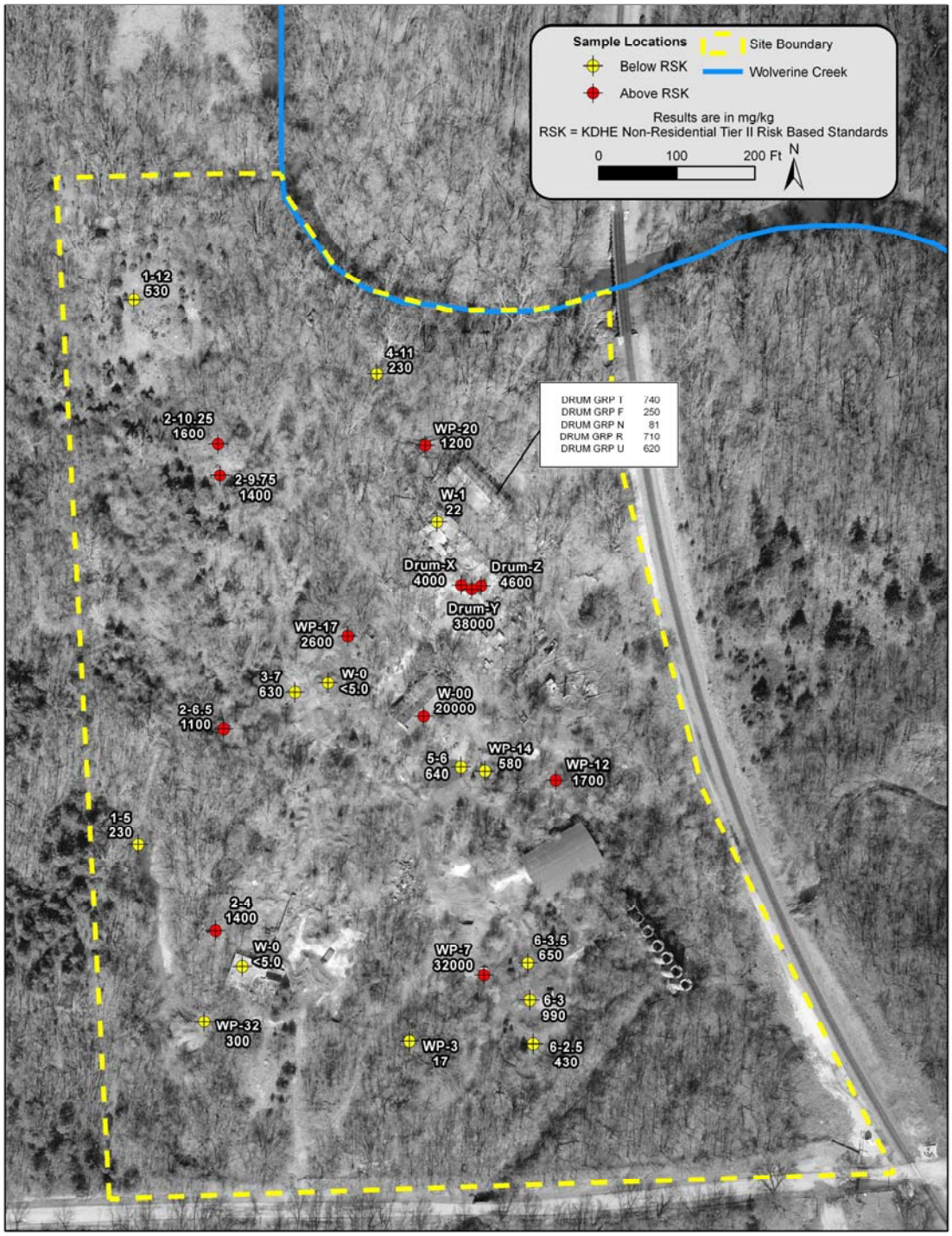


FIGURE 10. SOIL, DROSS, AND DRUM SAMPLE LABORATORY RESULTS (ARSENIC)

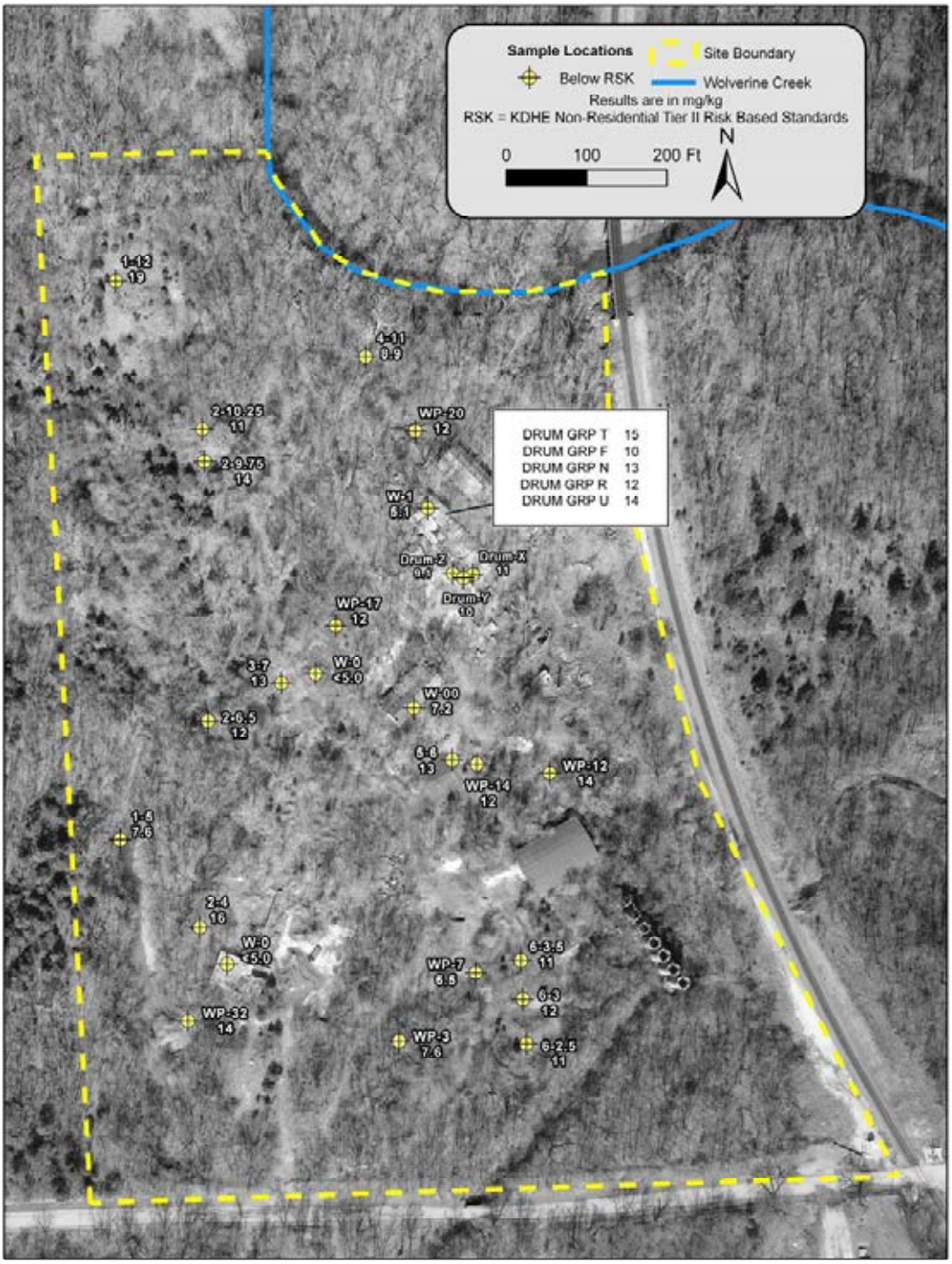


FIGURE 11. SOIL, DROSS AND DRUM LABORATORY RESULTS (CHROMIUM)

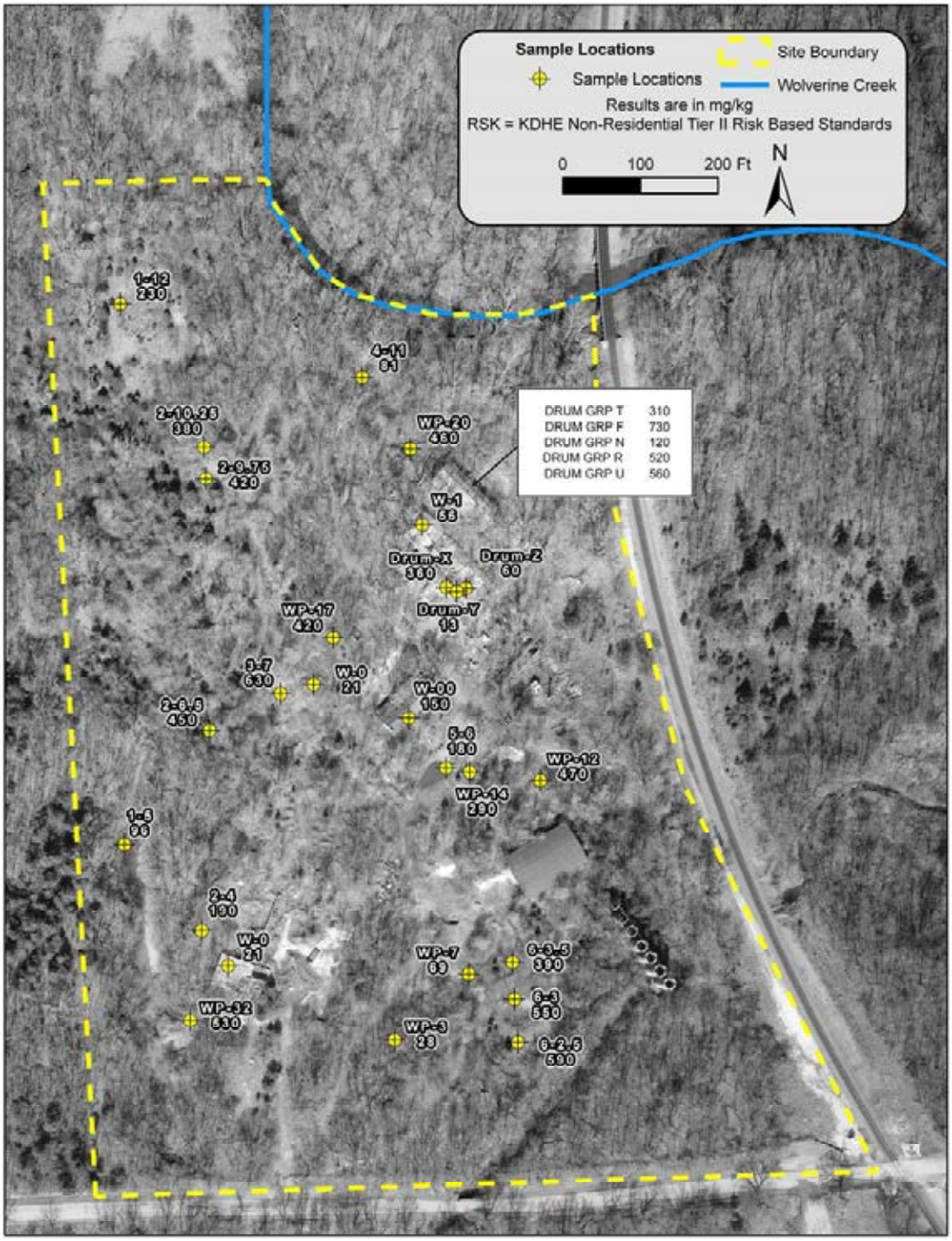


FIGURE 12. SOIL, DROSS AND DRUM LABORATORY RESULTS (CADMIUM)

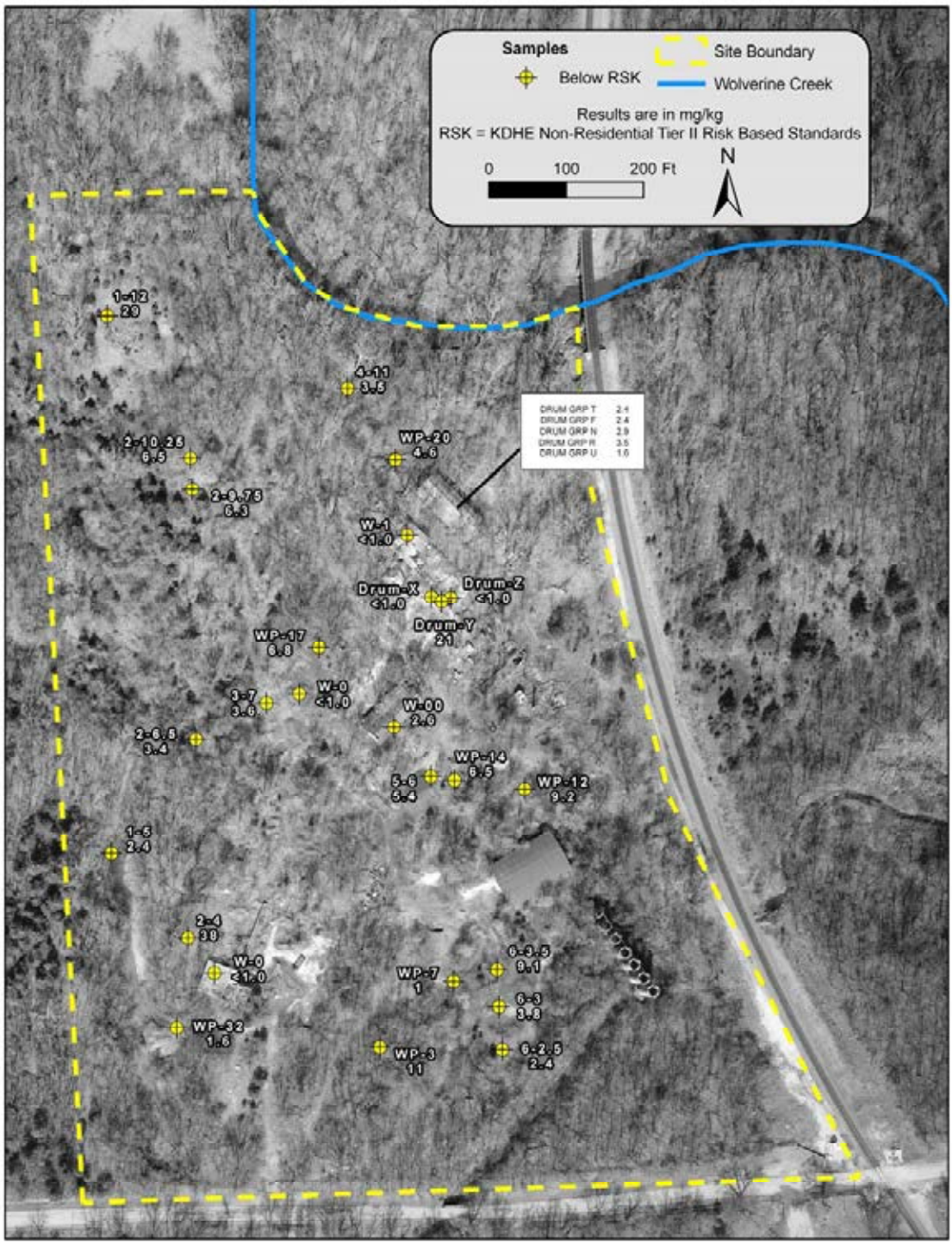


FIGURE 13. SOIL, DROSS AND DRUM LABORATORY RESULTS (ZINC)

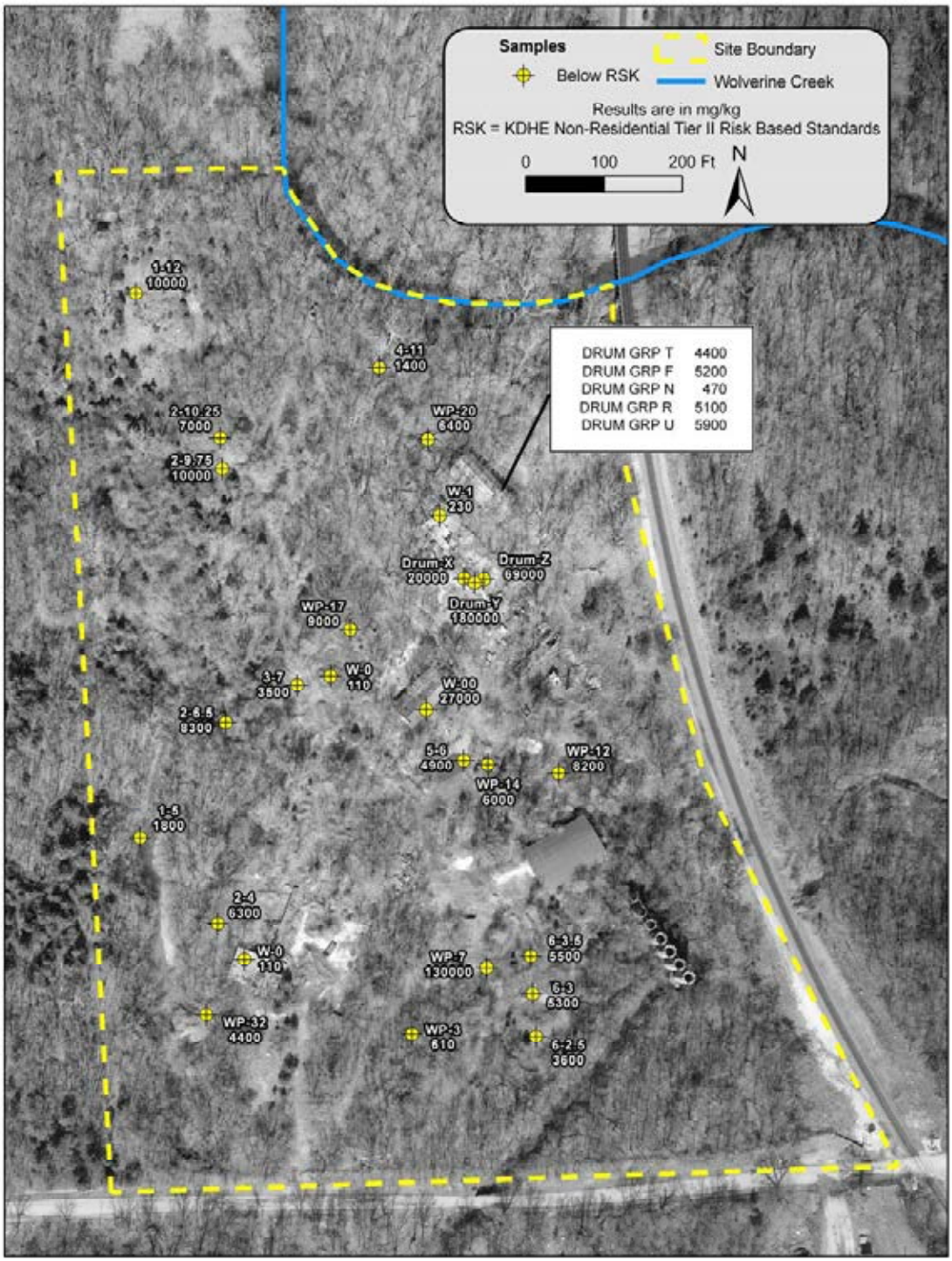


FIGURE 14. SEDIMENT AND SURFACE WATER SAMPLE RESULTS

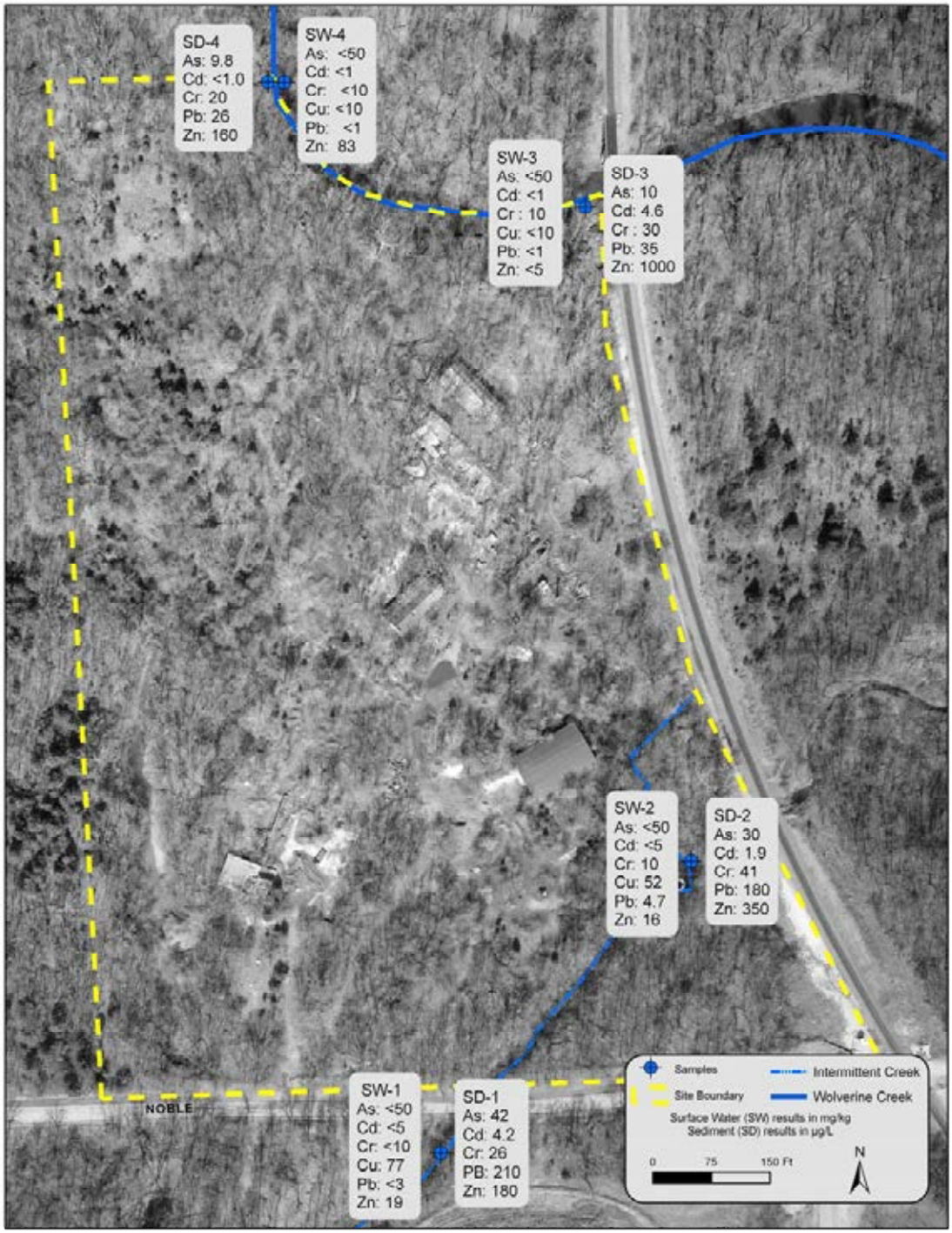


FIGURE 15. REPRESENTATIVE WASTE PILE CROSS SECTIONS

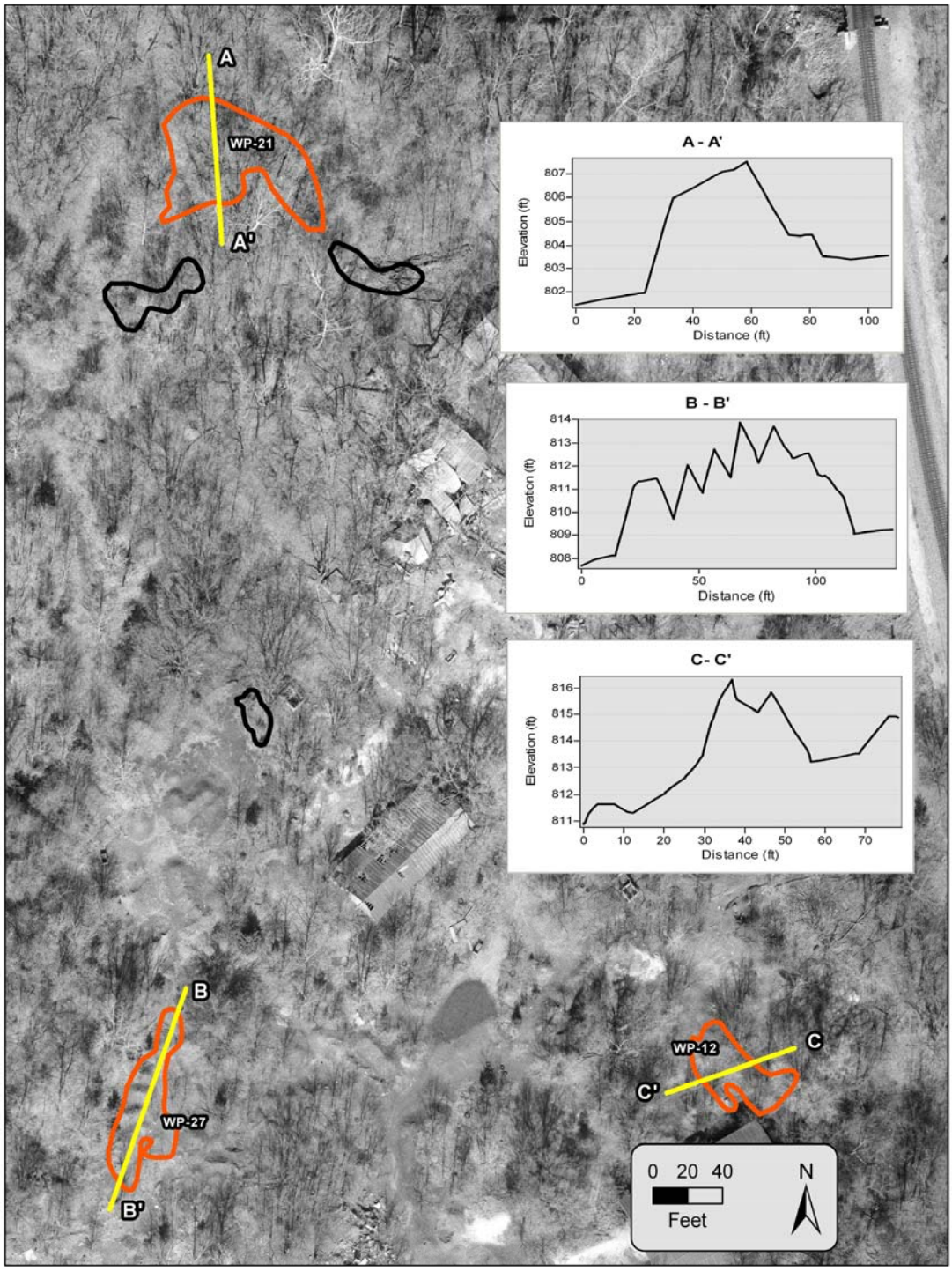


FIGURE 16. WASTE VOLUMES AREA 1 AND AREA 2

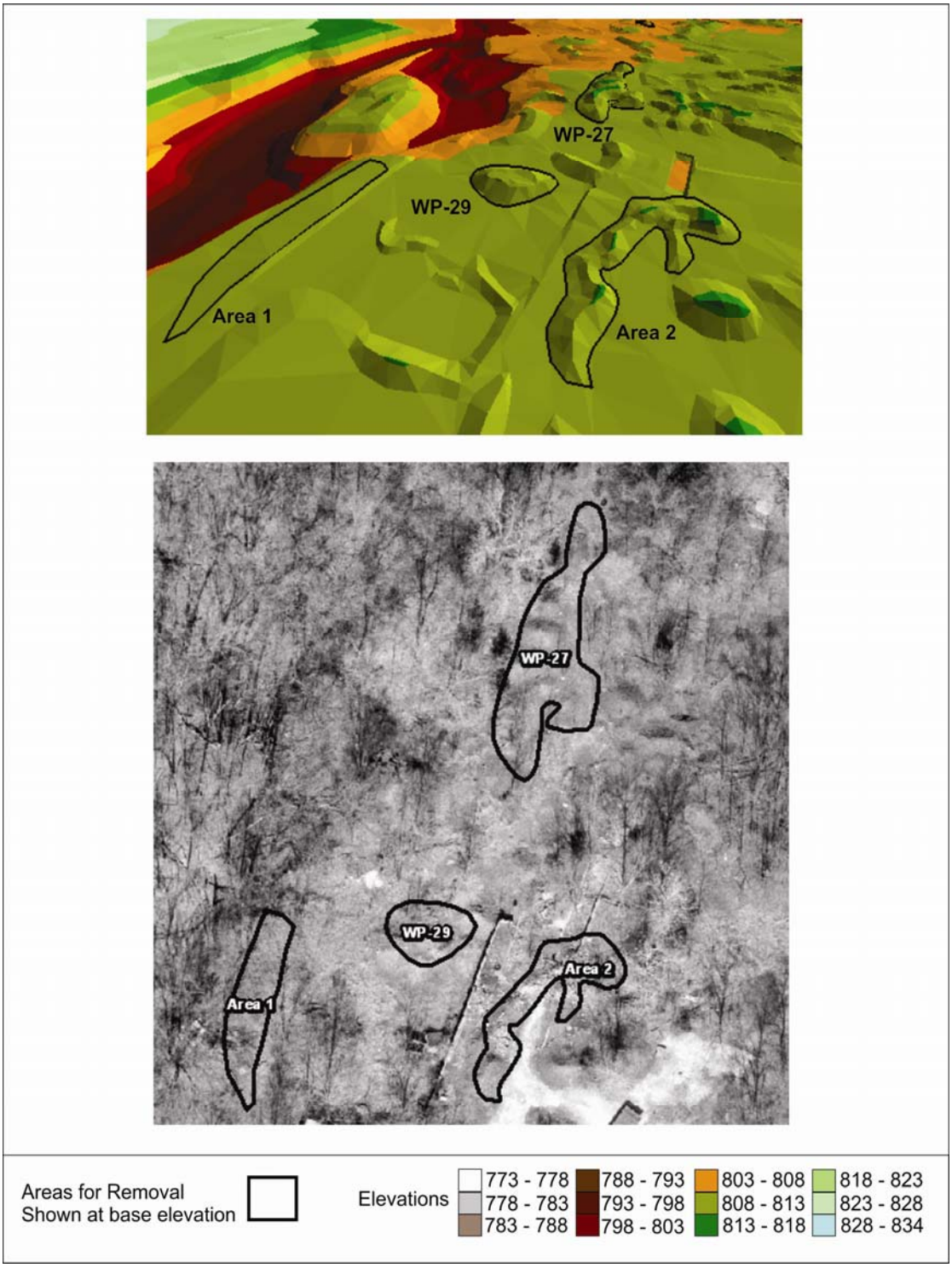


FIGURE 17. WASTE VOLUMES AREA 3

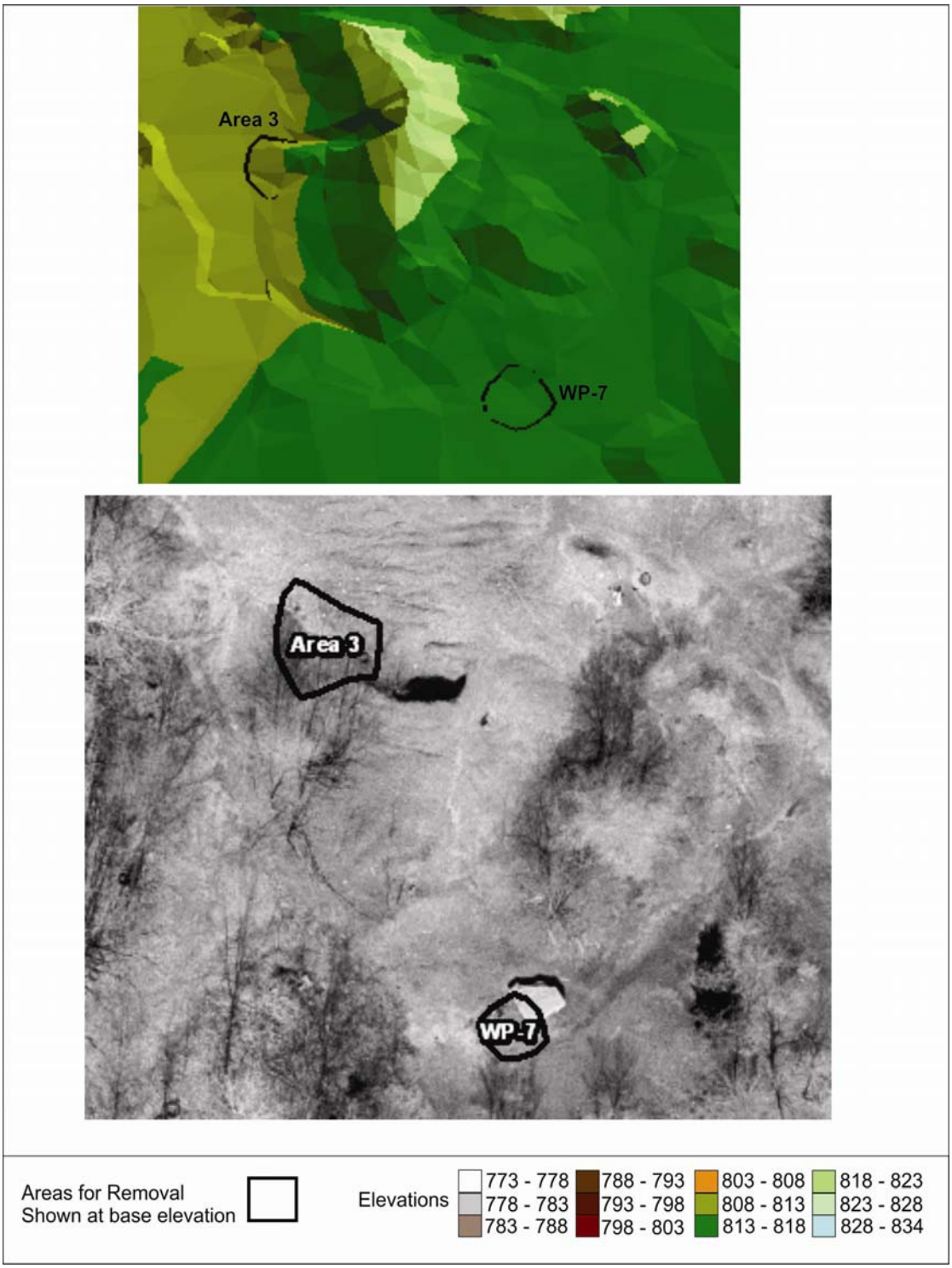


FIGURE 18. WASTE VOLUMES AREA 4

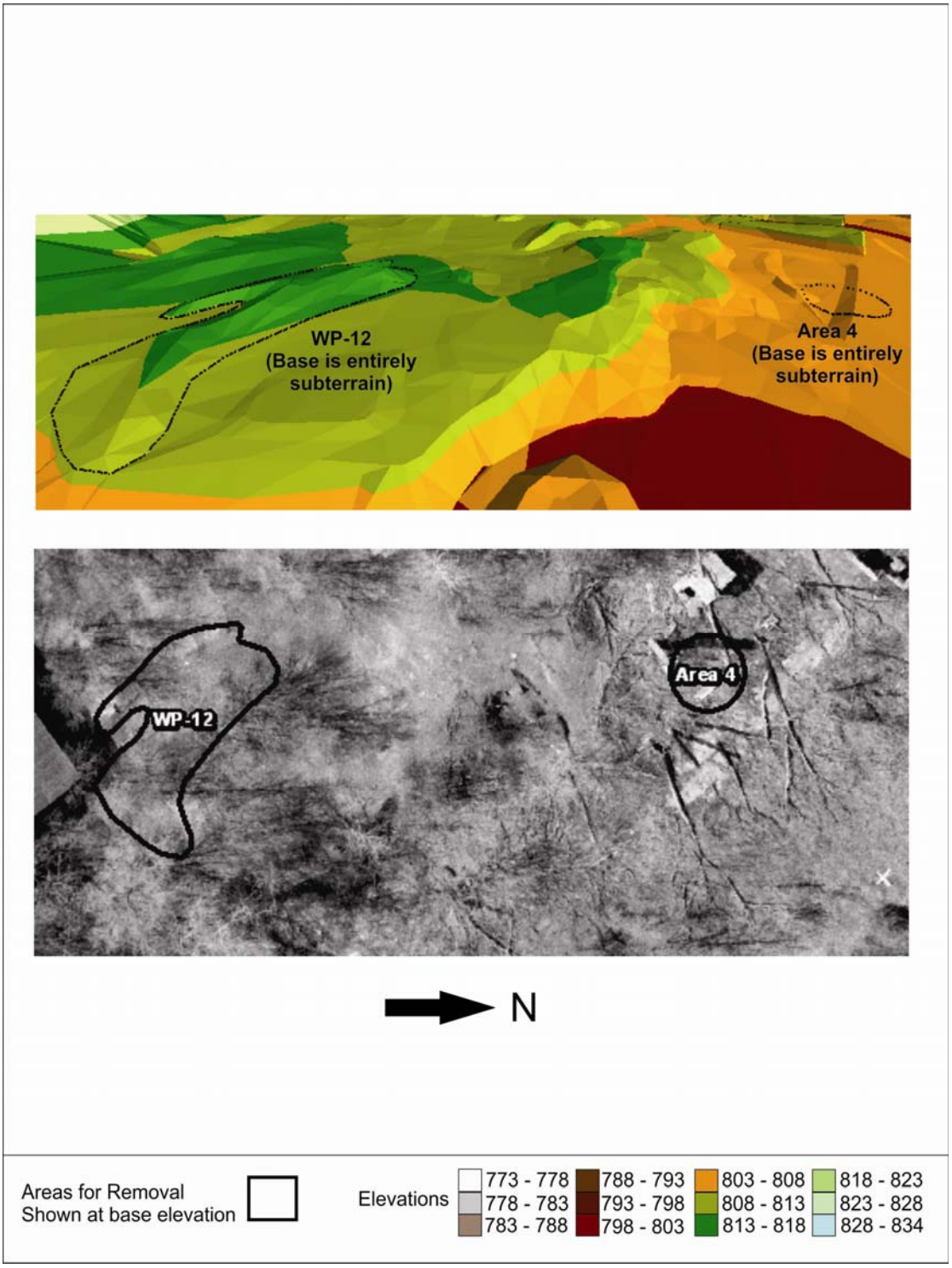


FIGURE 19. WASTE VOLUMES AREA 5

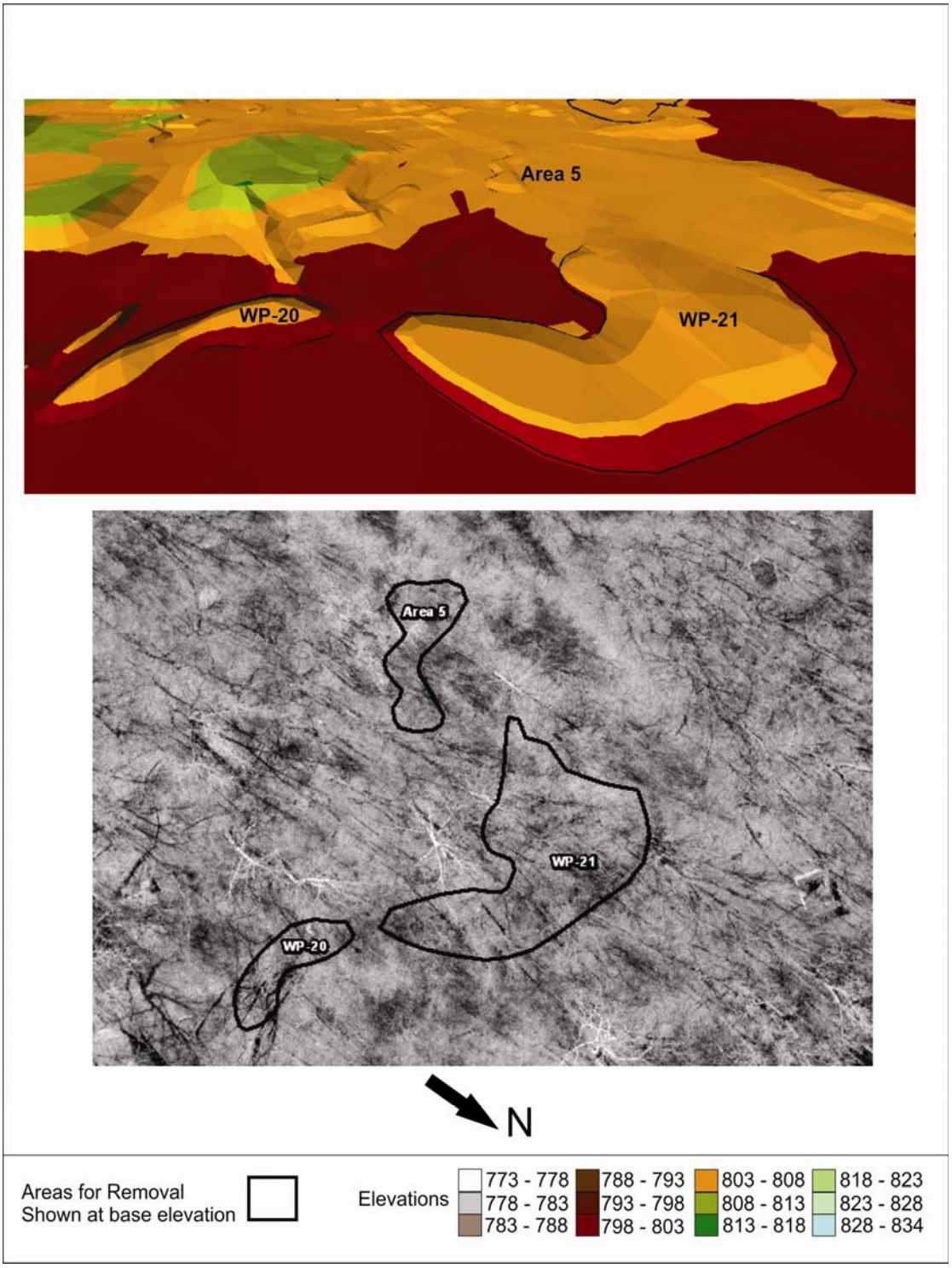


FIGURE 20. WASTE VOLUMES AREA 6

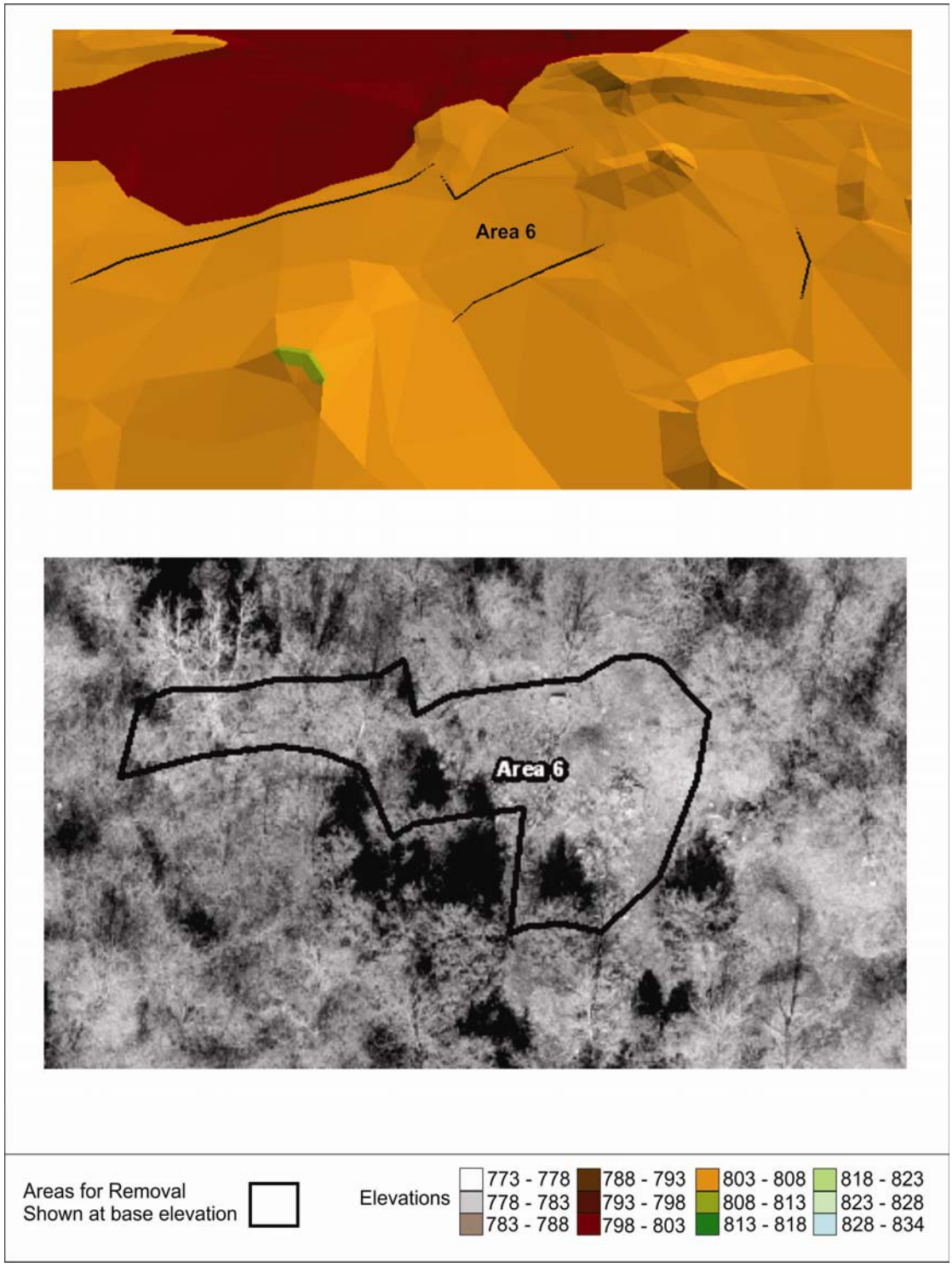


FIGURE 21. WASTE VOLUME – WASTE PILE 17

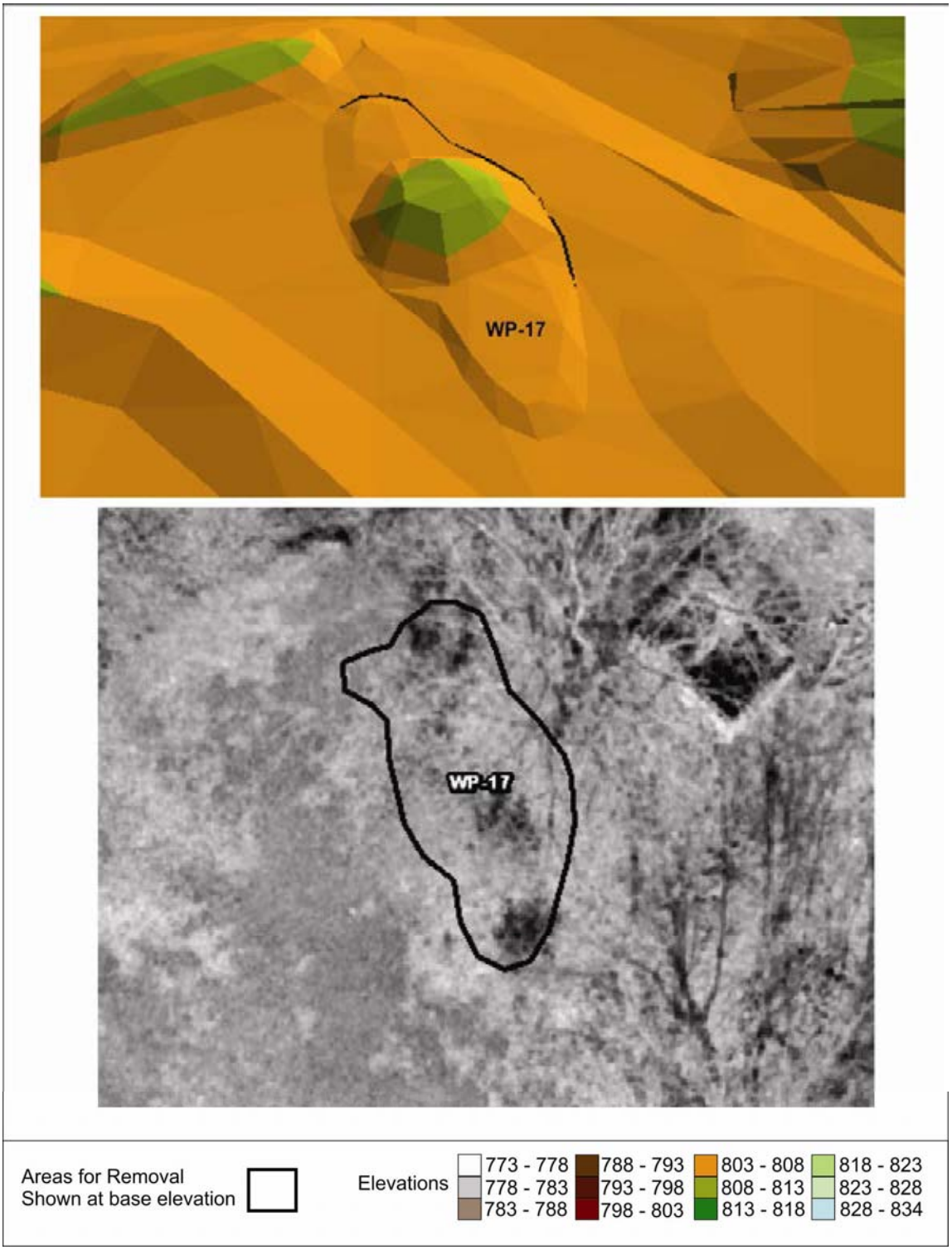


FIGURE 22. TARGETED REMOVAL AREAS FOR LEAD

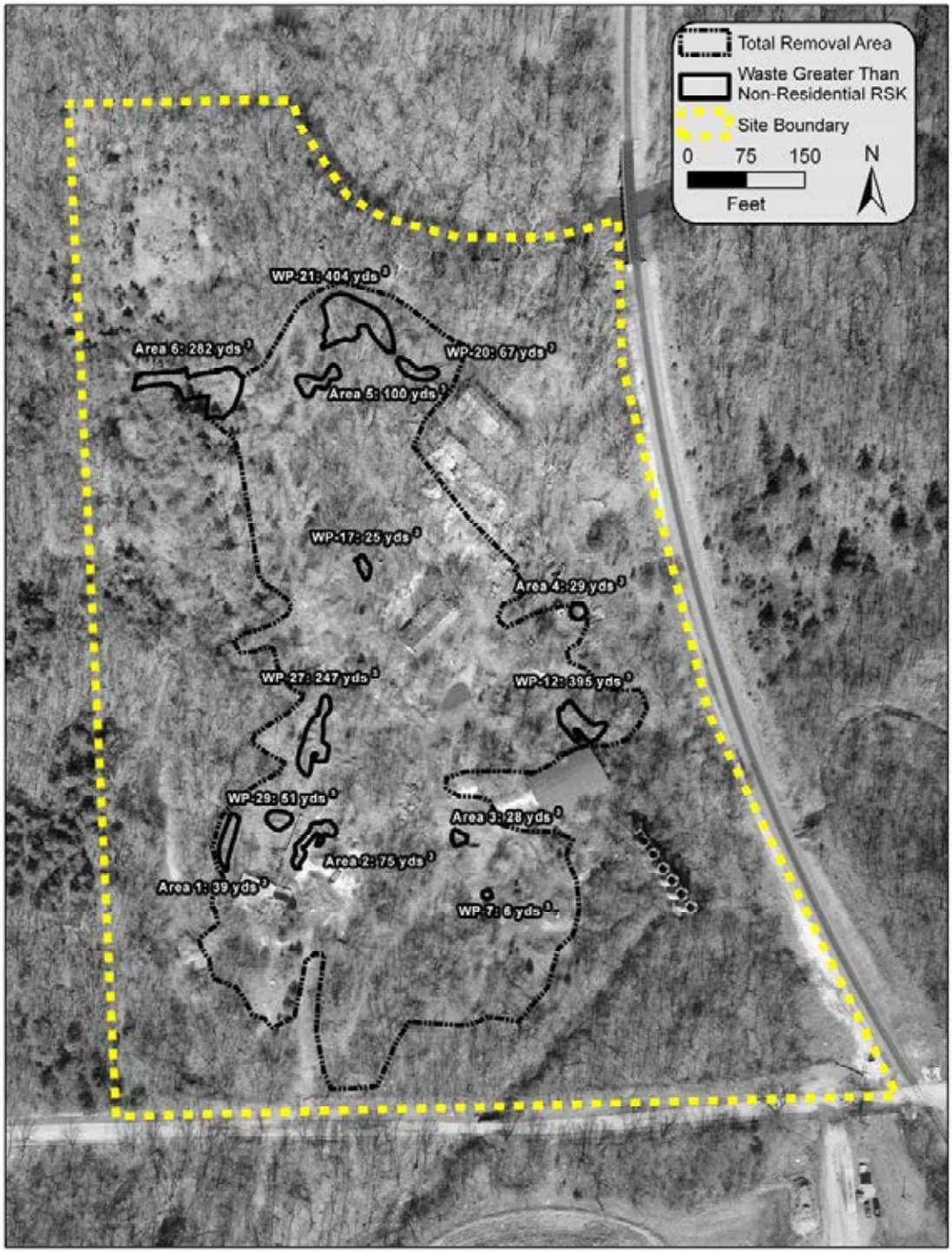
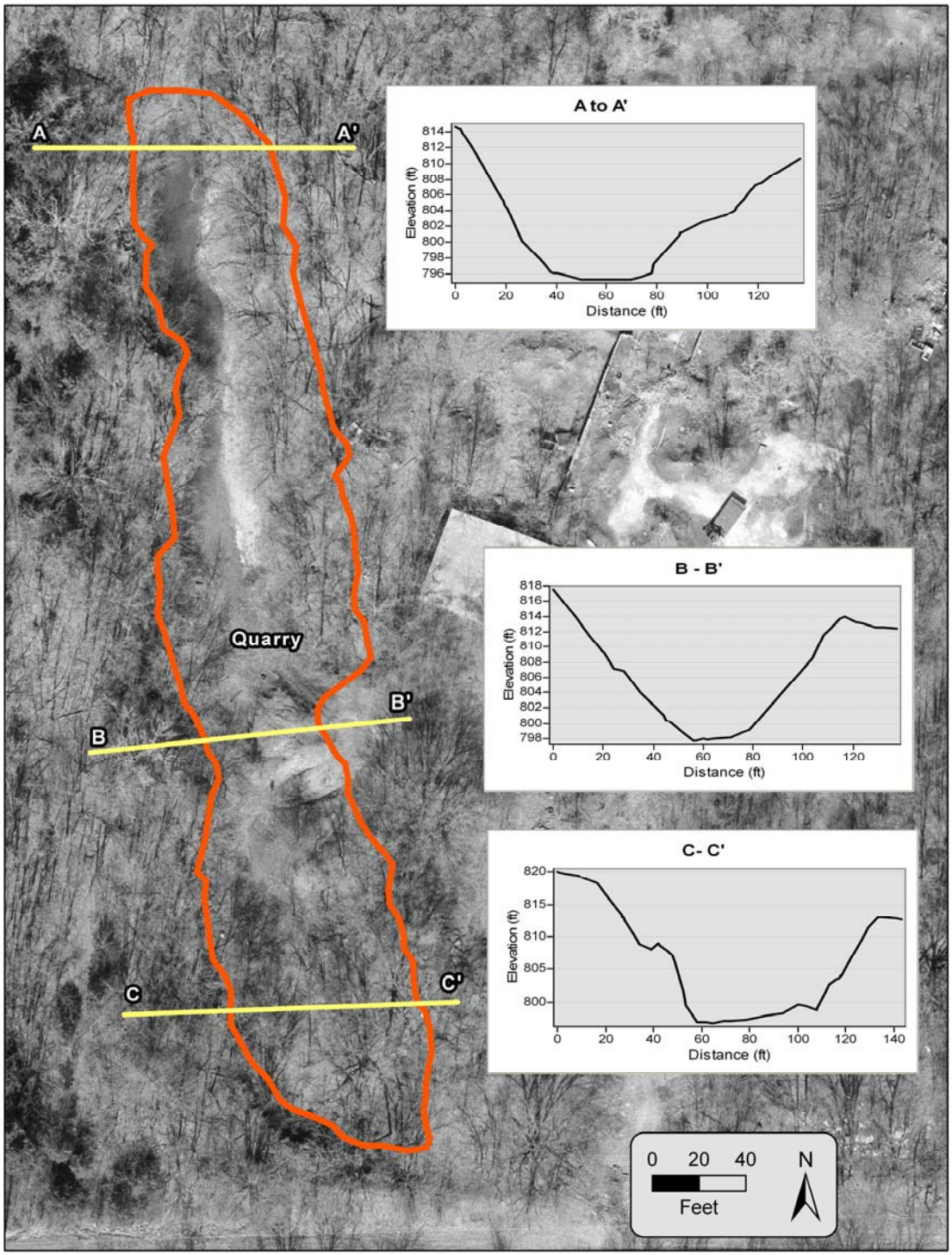


FIGURE 23. REPRESENTATIVE QUARRY ELEVATION CROSS-SECTIONS



TABLES

TABLE 1. SAMPLING AND ANALYSIS PROGRAM SUMMARY

Analysis	Sample Type					Total
	Soil	Dross	Drums	Sediment	Surface Water	
XRF Field Analysis	138	57	29	-	-	224
Total RCRA Metals	12 + 2 dup	11 + 1 dup	8 + 1 dup	4	4 + 2 dup	39
TCLP RCRA Metals	12 + 2 dup	11 + 1 dup	8 + 1 dup	-	-	31
PCBs	1	-	-	-	-	1
TPH-DRO	-	-	1	-	-	1

TABLE 2. XRF AVERAGE RESULTS: GRID & BIASED SOIL SAMPLES

Sample ID	Lead	Cadmium	Arsenic	Zinc
Tier 2 Level (Soil Pathway)	***1,000***	***965***	***38***	***613,000***
0.5-10	34	-	14	142
0.75-10	23	-	13	116
1-1	47	-	-	150
1-2	68	-	-	411
1-3	45	-	-	284
1-4	78	-	-	416
1-5	228	-	26	1,827
1-6	54	-	-	206
1-7	53	-	-	118
1-8	48	-	-	200
1-9	244	-	-	3,566
1-9.5	61	-	-	319
1-10	**1,912**	-	**48**	16,433
1-10.2	79	-	-	906
1-10.5	52	-	14	274
1-11	327	-	-	3,213
1-12	578	-	-	9,675
1-13	32	-	-	112
1.5-3	723	-	-	9,027
1.5-4	79	-	-	638
1.5-7	162	-	--	226
1.75-4	668	27	29	5,689
2-1	57	-	22	291
2-2	44	-	-	407
2-2.5	173	-	-	1,927
2-3	489		**40**	4,364
2-3.5	414	23	32	4,489
2-4	**2,044**	46	**105**	11,100
2-4.5	690	31	-	7,413
2-5	83	-	-	518
2-6	128	-	21	1,200
2-6.5	902	-	-	6,135
2-7	509	-	**48**	7,395
2-7.5	151	28	-	1,280
2-8	286	-	26	3,802
2-9	695	-	**38**	5,394
2-9.5	717	-	37	6,083

TABLE 2. XRF AVERAGE RESULTS: GRID & BIASED SOIL SAMPLES (CONTINUED)

Sample ID	Lead	Cadmium	Arsenic	Zinc
Tier 2 Level (Soil Pathway)	***1,000***	***965***	***38***	***613,000***
2-9.75	**1,085**	-	**55**	9,609
2-10	**1,259**	-	**100**	12167
2-10.2	842	-	36	32681
2-10.5	789	-	-	5111
2-11	185	-	31	1,462
2-12	279	-	-	686
2-13	33	-	-	840
2.5-3	259	-	23	3,045
2.5-5	48	-	-	860
2.5-6	120	-	-	1,416
2.5-6.5	439	-	-	4,674
2.5-7	456	-	-	5,200
3-1	133	-	-	1,184
3-2	261	-	30	3,847
3-3	304	-	23	4,268
3-3.12	420	-	-	5,974
3-3.5	493	33	-	10,433
3-3.75	401	-	37	4,115
3-4	**10,610**	47	**785**	15,333
3-5	**2,060**	38	**163**	9,367
3-6	854	33	**67**	14,533
3-6.5	691	-	**43**	7,890
3-7	753	-	-	5,419
3-8	385	-	-	5,292
3-9	397	-	31	6,552
3-9.5	279	-	26	2,466
3-9.75	272	-	-	2,310
3-10	**3,404**	-	-	10,567
3-10.2	464	-	**41**	8,463
3-10.5	794	25	-	3,646
3-11	80	-	-	458
3-12	30	-	-	265
3.25-10	491	-	31	2,851
3.5-2	164	-	22	964
3.5-4	317	-	23	4,653
3.5-5	619	-	-	5,840
3.5-6	279	-	-	6,845
3.5-10	259	-	-	1,653

TABLE 2. XRF AVERAGE RESULTS: GRID & BIASED SOIL SAMPLES (CONTINUED)

Sample ID	Lead	Cadmium	Arsenic	Zinc
Tier 2 Level (Soil Pathway)	***1,000***	***965***	***38***	***613,000***
4-1	103	-	18	656
4-1.5	250	-	-	3,277
4-2	861	-	**56**	7,248
4-2.5	265	-	32	3,653
4-3	627	-	**38**	9,785
4-3.5	264	-	-	4,192
4-4	463	-	**44**	5,419
4-4.5	365	-	33	3,479
4-5	446	-	-	6,654
4-6	372	29	**38**	4,509
4-7	104	-	-	1,312
4-8	229	-	34	1,774
4-9	76	-	-	504
4-10	130	-	-	643
4-11	238	-	27	2,281
4.5-2	103	-	-	918
4.5-3	310	-	-	177,778
4.5-4	277	23	22	4,244
5-1	45	-	13	217
5-2	257	-	-	3,007
5-2.5	382	-	29	3,812
5-3	699	37	**39**	7,371
5-3.5	565	-	-	5,258
5-4	**2,991**	-	**137**	17,833
5-4.5	380	-	26	4,651
5-5	154	80	21	6,196
5-6	786	-	**62**	6,350
5-8	18	-	-	99
5-10	167	-	-	1,270
5-11	34	-	13	280
6-1	36	-	-	181
6-2	366	-	24	4,127
6-2.5	437	-	**38**	4,200
6-3	934	-	**71**	5,729
6-3.5	445	-	-	4,067
6-4	429	-	-	5,534
6-6	424	-	33	5,453
6-6.5	153	-	-	1,660

TABLE 2. XRF AVERAGE RESULTS: GRID & BIASED SOIL SAMPLES (CONTINUED)

Sample ID	Lead	Cadmium	Arsenic	Zinc
Tier 2 Level (Soil Pathway)	***1,000***	***965***	***38***	***613,000***
6-7	261	-	**38**	2,690
6-8	21	-	-	162
6-9	366	-	-	1,276
6-10	408	-	-	2,365
6-11	45	32	-	642
6.5-3	443	-	25	4,846
6.5-6	361	-	-	4,511
6.5-7	**2,312**	-	**109**	2,615
7-1	54	-	-	337
7-2	32	-	-	284
7-3	384	-	-	3,583
7-4	344	-	29	4,772
7-5	432	-	-	6,491
7-5.5	301	-	-	2,614
7-6	710	-	**53**	11,136
7-6.5	483	23	-	5,644
7-7	282	-	-	2,899
7-8	139	-	-	4,268
7-9	54	-	-	742
7.5-6	157	-	-	2,126
8-1	64	-	18	277
8-2	76	-	21	821
8-3	52	-	-	325
8-4	42	-	13	239
8-5	61	-	14	588

All concentrations reported in milligrams per kilogram (mg/kg)

Red Text indicates the result exceeds the applicable Tier 2 Level

- indicates that no average calculated due to concentrations below XRF detection level

TABLE 3. LABORATORY ANALYSIS SUMMARY: SOIL

Sample ID	Arsenic	Cadmium	Lead	Zinc	Chromium
Tier 2 Level (Soil Pathway)	***38***	***965***	***1,000***	***213,000***	***3,060,000[1]***
1-12-1	19	29	530	10,000	230
1-5-1	7.6	2.4	230	1,800	96
6-2.5-1	11	2.4	430	3,600	590
6-3.5-1	11	9.1	650	5,500	390
4-11-1	8.9	3.5	230	1,400	81
2-6.5-1	12	3.4	**1,100**	8,300	450
5-6-1	13	5.4	640	4,900	180
3-7-1	13	3.6	630	3,500	370
2-4-1	16	38	**1,400**	6,300	190
2-10.25-1	11	6.5	**1,600**	7,000	380
2-9.75-1	14	6.3	**1,400**	10,000	420
2-9.75-1 DUP	14	7.3	**1,300**	9,400	430
6-3-1	12	3.8	990	5,300	550
6-3-1 DUP	13	4.1	990	5,300	530

All concentrations reported in milligrams per kilogram (mg/kg)

[1] The specified concentration for chromium is the site-specific Tier 3 Level

Red Text indicates the result exceeds the applicable Tier 2 or Tier 3 Level

TABLE 4. LABORATORY ANALYSIS: BACKGROUND SAMPLES

Sample ID	Arsenic	Cadmium	Lead	Zinc	Chromium
Tier 2 Level (Soil Pathway)	***38***	***965***	***1000***	***213,000***	***3,060,000[1]***
S-21	11	1.6	44	170	50
S-22	11	1	35	100	52
S-23	15	4.4	65	920	61
S-24	5	1.1	15	160	34
S-25	ND	2.2	13	340	15

All concentrations reported in milligrams per kilogram (mg/kg)

ND The analyte was not detected at a level greater than or equal to the laboratory reporting limit

[1] The specified concentration for chromium is the site-specific Tier 3 Level

TABLE 5. XRF AVERAGE RESULTS: DROSS

Sample ID	Sample Depth	Lead	Cadmium	Arsenic	Zinc
white-waste	0'-0.5'	73	-	-	345
W-0	0'-.5'	1,141	-	-	5329
W-00	0'-0.5'	13,633	-	807	52,500
W-000	0'-0.5'	-	-	-	-
W-1	0'-0.5'	1,824	-	-	397
W-2	0'-0.5'	200	-	-	329
WP-1	0'-0.5'	421	25	-	12,200
WP-2	0'-0.5'	298	-	-	7,346
WP-3	0'-0.5'	390	-	-	6,715
WP-4	0'-.5'	511	25	-	5,525
WP-4	.3'-.5'	109	-	-	1,182
WP-4	.5'-1'	21	-	-	152
WP-4	1'-2'	16	-	13	503
WP-4	2'-3.5'	232	-	-	4,488
WP-4	3.5'-4'	19	-	-	355
WP-5	0'-0.5'	367	-	-	5,863
WP-6	2.5'-3'	428	-	31	9,495
WP-6	3'-3.5'	21	30	-	578
WP-6	3.5'-4'	11	-	-	142
WP-6	0'-0.5'	113	-	-	1,747
WP-7	0'-.5'	16,267	-	-	100,000
WP-7	2'-2.5'	45	-	16	71
WP-7	2.5'-3.5'	104	-	26	1,285
WP-7	3.5'-4'	79	25	20	681
WP-8	0'-0.5'	422	-	-	3,042
WP-9	0'-0.5'	450	-	-	5,140
WP-10	0'-0.5'	459	-	30	4,734
WP-11	0'-0.5'	354	-	-	2,967
WP-12	0'-0.5'	972	-	-	7,693
WP-12	2	123	-	28	879
WP-12	3	78	-	34	217
WP-12	4	47	-	14	145
WP-13	0'-0.5'	291	-	-	4,355
WP-14	0'-0.5'	463	-	27	4,546
WP-15	0'-0.5'	541	-	-	4,870
WP-16	0'-0.5'	452	-	-	3,330
WP-17	0'-0.5'	2,065	-	60	7,235
WP-17	2	76	-	-	801
WP-17	3	32	-	-	302
WP-17	4	16	-	14	107

TABLE 5. XRF AVERAGE RESULTS: DROSS (CONTINUED)

Sample ID	Sample Depth	Lead	Cadmium	Arsenic	Zinc
WP-18	0'-0.5'	29	-	-	453
WP-19	0'-0.5'	-	-	-	102
WP-20	0'-0.5'	1,482	-	56	8,241
WP-21	0'-0.5'	1,539	-	78	7,434
WP-22	0'-0.5'	470	-	31	7,243
WP-23	0'-0.5'	713	-	-	8,836
WP-24	0'-0.5'	56	-	-	572
WP-25	0'-0.5'	767	-	-	7,088
WP-26	0'-0.5'	555	-	38	7,910
WP-27	0'-0.5'	1,364	47	-	12,733
WP-28	0'-0.5'	723	-	-	10,007
WP-29	0'-0.5'	1,943	-	73	12,867
WP-30[1]	0'-0.5'	983	-	-	12,667
WP-31	0'-0.5'	318	-	28	9,050
WP-32	0'-4'	222	-	28	7,695
WP-32	4'-8'	208	-	23	4,266
WP-32	10'-12'	29	-	-	197

All concentrations reported in milligrams per kilogram (mg/kg)

- indicates that no average calculated due to concentrations below XRF detection level

[1] WP-30 is located within Waste Area 2

TABLE 6. XRF AVERAGE RESULTS: DRUMS

Sample ID	Lead	Cadmium	Arsenic	Zinc
Drum GRP A	114	-	-	1,773
Drum GRP B	76	-	-	542
Drum GRP C	82	-	-	576
Drum GRP D	74	-	-	361
Drum GRP E	169	-	-	8,111
Drum GRP F	200	-	-	8,979
Drum GRP G	128	-	-	4,758
Drum GRP H	104	38	-	2,055
Drum GRP I	147	-	-	6,424
Drum GRP J	53	25		415
Drum GRP K	59	24	14	476
Drum GRP L	62	-	-	426
Drum GRP M	49	-	-	403
Drum GRP N	80	-	-	463
Drum GRP O	24	-	-	323
Drum GRP P	27	-	-	192
Drum GRP Q	13	-	-	111
Drum GRP R	430	-	-	4,572
Drum GRP S	463	-	-	4,456
Drum GRP T	540	-	-	4,522
Drum GRP U	480	-	-	4,884
Drum GRP V	35	-	-	269
Drum GRP W	30	-	-	246
Drum GRP X	4,539	-	697	23,367
Drum GRP X©	28	-	-	27,033
Drum Y	16,333	77	536	100,000
Drum GRP Z	5,649	-	449	100,000
Drum AA	430	-	-	16,933
Drum GRP CC	626	-	-	3,767

All concentrations reported in milligrams per kilogram (mg/kg)

- indicates that no average calculated due to concentrations below XRF detection level

TABLE 7. LABORATORY ANALYSIS SUMMARY: DROSS AND DRUM SAMPLES

Sample ID	Arsenic	Cadmium	Lead	Zinc	Chromium
W-0	ND	ND	ND	110	21
W-00	7.2	2.6	20,000	27,000	150
W-1 BLDG 2	5.1	ND	22	230	56
WP-1 (0'-0.5')	12	16	520	12,000	280
WP-6 (3'-3.5')	7.6	11	17	610	28
WP-7 (0'-2')	6.5	1	32,000	130,000	69
WP-12 (0'-0.5')	14	9.2	1,700	8,200	470
WP-12 DUP	14	9.1	1,300	7,900	460
WP-14 (0'-0.5)	12	6.5	580	6,000	290
WP-17	12	6.8	2,600	9,000	420
WP-20 (0'-0.5)	12	4.6	1,200	6,400	460
WP-32 (4'-8')	14	1.6	300	4,400	530
DRUM GRP F	10	2.4	250	5,200	730
DRUM GRP N	13	2.9	81	470	120
DRUM GRP R	12	3.5	710	5,100	520
DRUM GRP R DUP	14	3.2	440	5,800	520
DRUM GRP T	15	2.4	740	4,400	310
DRUM GRP U	14	1.6	620	5,900	560
DRUM GRP X	11	ND	4,000	20,000	360
DRUM Y	10	21	38,000	180,000	13
DRUM GRP Z	9.1	ND	4,600	69,000	60

All concentrations reported in milligrams per kilogram (mg/kg)

ND The analyte was not detected at a level greater than or equal to the laboratory reporting limit

TABLE 8. TCLP ANALYSES

Sample ID	Arsenic	Cadmium	Chromium	Lead
TCLP Threshold	***5.0***	***1.0***	***5.0***	***5.0***
1-12-1	ND	0.016	ND	ND
W-1 BLDG 2	ND	0.0072	ND	ND
DRUM GRP U	ND	ND	ND	ND
1-5-1	ND	ND	ND	ND
WP 17	ND	0.033	ND	3.5
6-2.5-1	ND	0.016	ND	0.071
6-3.5-1	ND	0.0073	ND	ND
4-11-1	ND	0.0093	ND	ND
DRUM GRP Z	ND	ND	0.016	**28**
DRUM GRP X	ND	ND	0.046	**19**
DRUM Y	ND	0.78	ND	**63**
2-6.5-1	ND	ND	ND	0.13
5-6-1	ND	0.036	ND	0.53
DRUM GRP T	ND	ND	ND	ND
WP-6 (3'-3.5')	ND	ND	0.077	ND
3-7-1	ND	ND	ND	ND
2-4-1	ND	0.033	ND	ND
WP 20	ND	0.025	ND	1.6
WP 32 4-8	ND	0.014	0.014	ND
W-0	ND	0.013	ND	ND
2-10.25-1	ND	0.01	ND	0.23
W-00	ND	0.0061	0.13	**110**
WP-1	ND	0.023	ND	ND
WP-7	ND	ND	ND	**160**
WP-14	ND	0.019	ND	0.27
DRUM GRP N	ND	0.0084	ND	ND
DRUM GRP F	ND	0.021	0.025	0.58
2-9.75-1	ND	0.027	0.012	1.7
2-9.75-1 DUP	ND	0.026	0.011	1.6
6-3-1	ND	0.019	ND	0.43
6-3-1 DUP	ND	0.015	ND	0.39
DRUM GRP R	ND	ND	ND	ND
DRUM GRP R DUP	ND	ND	ND	ND
WP-12	ND	0.052	ND	2.5
WP-12 DUP	ND	0.058	ND	4.8

All concentrations reported in milligrams per liter (mg/L)

Red Text indicates the result exceeds the TCLP thresholds specified in 40 CFR 261.24

ND The analyte was not detected at a level greater than or equal to the laboratory reporting limit

TABLE 9. SEDIMENT LABORATORY ANALYSIS

Sample ID	Relative Location	Arsenic	Cadmium	Lead	Zinc	Chromium
Threshold Effects Concentration		**9.79**	**0.99**	**35.8**	**121**	**43.4**
SD-1	upstream	**42**	**4.2**	**210**	**180**	26
SD-2	downstream	**30**	**1.9**	**180**	**350**	41
SD-3	downstream	**10**	**4.6**	35	**1,000**	30
SD-4	upstream	**9.8**	ND	26	**160**	20

All concentrations reported in milligrams per kilogram (mg/kg)

Red Text indicates the result exceeds the applicable Threshold Effects Concentration

ND The analyte was not detected at a level greater than or equal to the laboratory reporting limit

TABLE 10. SURFACE WATER LABORATORY ANALYSIS (MAY 2011)

Sample	Relative Location	Arsenic	Cadmium	Chromium	Copper	Lead	Zinc
ALS (acute/chronic)		***340/150***	***20/3***	***a/40***	***111/61***	***1339/52***	***771/771***
SW-1	upstream	ND	ND	ND	**77**	ND	19
SW-2	downstream	ND	ND	ND	52	ND	16
ALS (acute/chronic)		***340/150***	***15/2.4***	***a/40***	***83/47***	***902/35***	***593/593***
SW-3	downstream	ND	ND	ND	ND	ND	ND
SW-4	upstream	ND	ND	ND	ND	ND	83

All concentrations reported in micrograms per liter (µg/L)

Red Text indicates the result exceeds the applicable Aquatic Life Standard

a criterion not available

ND The analyte was not detected at a level greater than or equal to the laboratory reporting limit

TABLE 11. DUPLICATE ANALYSIS RELATIVE PERCENT DIFFERENCES

Sample ID (sample/duplicate)	Analyte	Primary	Duplicate	RPD (%)
WP-12/WP-50	Arsenic	14	14	0.0
	Cadmium	9.2	9.1	1.1
	Chromium	470	460	2.2
	Lead	1,700	1,300	26.7
	Zinc	8,200	7,900	3.7
6-3-1/16-3-1	Arsenic	12	13	8.0
	Cadmium	3.8	4.1	7.6
	Chromium	550	530	3.7
	Lead	990	990	0.0
	Zinc	5,300	5,300	0.0
Drum R/Drum Z	Arsenic	12	14	15.4
	Cadmium	3.5	3.2	9.0
	Chromium	520	520	0.0
	Lead	710	440	47.0
	Zinc	5,100	5,800	12.8
2-9.75-1/22-9.75-1	Arsenic	14	14	0.0
	Cadmium	6.3	7.3	14.7
	Chromium	420	430	2.4
	Lead	1,400	1,300	7.4
	Zinc	10,000	9,400	6.2

All concentrations reported in milligrams per kilogram (mg/kg)

KANSAS HEALTH AND ENVIRONMENTAL LABORATORIES

Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561581
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 1-5-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/02/11 14:03 Date/Time Received: 05/16/11 11:53

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	79000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	5.2	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	7.6	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	0.95	mg/L	06/20/11	EPA 1311
Barium (Total)	140	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	2.2	mg/Kg	06/02/11	EPA 6010
Boron (Total)	18	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	2.4	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	8600	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	96	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	7.8	mg/Kg	06/02/11	EPA 6010
Copper (Total)	2200	mg/Kg	06/02/11	EPA 6010
Iron (Total)	19000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Lead (Total)	230	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	4900	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	340	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	2.4	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	83	mg/Kg	06/02/11	EPA 6010
Percent Solids	66	Percent	05/18/11	EPA 1311
Potassium (Total)	4400	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	4000	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	< 1.0	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	410	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	32	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	1800	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
Copies To: File

< - Not Detected at Indicated Level
* - Holding Time Exceeded

RECEIVED
JUN 28 2011
ENVIRONMENTAL REMEDIATION

KANSAS HEALTH AND ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561598
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 1-12-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/02/11 14:45 Date/Time Received: 05/16/11 12:15

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	110000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	9.4	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	19	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.97	mg/L	06/23/11	EPA 1311
Barium (Total)	120	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	1.1	mg/Kg	06/03/11	EPA 6010
Boron (Total)	15	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.016	mg/L	06/23/11	EPA 1311
Cadmium (Total)	29	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	43000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	230	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	13	mg/Kg	06/03/11	EPA 6010
Copper (Total)	4300	mg/Kg	06/16/11	EPA 6010
Iron (Total)	44000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Lead (Total)	530	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	5900	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1600	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	0.052	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	8.5	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	350	mg/Kg	06/03/11	EPA 6010
Percent Solids	73	Percent	05/18/11	EPA 1311
Potassium (Total)	1200	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3700	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Silver (Total)	4.6	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	120	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	28	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	10000	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561596
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 2-4-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/02/11 17:15 Date/Time Received: 05/16/11 12:11

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	110000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	17	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	16	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.46	mg/L	06/20/11	EPA 1311
Barium (Total)	140	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	2.0	mg/Kg	06/03/11	EPA 6010
Boron (Total)	54	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.033	mg/L	06/20/11	EPA 1311
Cadmium (Total)	38	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	28000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	190	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	11	mg/Kg	06/03/11	EPA 6010
Copper (Total)	2800	mg/Kg	06/16/11	EPA 6010
Iron (Total)	98000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Lead (Total)	1400	mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	7000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1200	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	0.16	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	9.7	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	130	mg/Kg	06/03/11	EPA 6010
Percent Solids	64	Percent	05/18/11	EPA 1311
Potassium (Total)	2900	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	4000	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	1.1	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	520	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	31	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	6300	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561590
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 2-6.5-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/04/11 09:00 Date/Time Received: 05/16/11 12:08

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	180000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	13	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	12	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	3.0	mg/L	06/20/11	EPA 1311
Barium (Total)	670	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	9.8	mg/Kg	06/02/11	EPA 6010
Boron (Total)	40	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	3.4	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	14000	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	450	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	8.3	mg/Kg	06/02/11	EPA 6010
Copper (Total)	7400	mg/Kg	06/02/11	EPA 6010
Iron (Total)	14000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	0.13	mg/L	06/20/11	EPA 1311
Lead (Total)	1100	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	14000	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	900	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	7.9	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	230	mg/Kg	06/02/11	EPA 6010
Percent Solids	75	Percent	05/18/11	EPA 1311
Potassium (Total)	1100	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3800	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	5.6	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	780	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	45	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	8300	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561601

4EM80

Site ID: 2-9.75-1
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM ~~2-9375-1~~
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/04/11 14:19 Date/Time Received: 05/16/11 12:18

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	170000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	16	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	14	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	4.2	mg/L	06/17/11	EPA 1311
Barium (Total)	290	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	3.2	mg/Kg	06/03/11	EPA 6010
Boron (Total)	27	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.027	mg/L	06/17/11	EPA 1311
Cadmium (Total)	6.3	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	35000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	0.012	mg/L	06/17/11	EPA 1311
Chromium (Total)	420	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	7.9	mg/Kg	06/03/11	EPA 6010
Copper (Total)	8700	mg/Kg	06/16/11	EPA 6010
Iron (Total)	29000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	1.7	mg/L	06/17/11	EPA 1311
Lead (Total)	1400	mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	13000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1200	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	11	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	270	mg/Kg	06/03/11	EPA 6010
Percent Solids	71	Percent	05/23/11	EPA 1311
Potassium (Total)	870	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	0.067	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	4200	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	7.7	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	210	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	45	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	10000	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 562118

4EM80

Site ID: 22-9.75-1
Account Code: EB

Collection Location: C3-0869-03010 WADE'S ALUMINUM
Collector: OHALLORAN Matrix: Soil Collect Depth: 6
Date/Time Collected: 05/05/11 12:15 Date/Time Received: 05/31/11 13:29

Sample Comments: 2-9.75-1 dup

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	160000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	6.6	mg/Kg	06/16/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	14	mg/Kg	06/16/11	EPA 6010
Barium (TCLP)	4.2	mg/L	06/17/11	EPA 1311
Barium (Total)	280	mg/Kg	06/16/11	EPA 6010
Beryllium (Total)	3.7	mg/Kg	06/16/11	EPA 6010
Boron (Total)	38	mg/Kg	06/16/11	EPA 6010
Cadmium (TCLP)	0.026	mg/L	06/17/11	EPA 1311
Cadmium (Total)	7.3	mg/Kg	06/16/11	EPA 6010
Calcium (Total)	40000	mg/Kg	06/16/11	EPA 6010
Chromium (TCLP)	0.011	mg/L	06/17/11	EPA 1311
Chromium (Total)	430	mg/Kg	06/16/11	EPA 6010
Cobalt (Total)	8.6	mg/Kg	06/16/11	EPA 6010
Copper (Total)	7500	mg/Kg	06/16/11	EPA 6010
Iron (Total)	35000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	1.6	mg/L	06/17/11	EPA 1311
Lead (Total)	1300	mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	15000	mg/Kg	06/16/11	EPA 6010
Manganese (Total)	1000	mg/Kg	06/16/11	EPA 6010
Mercury (Total)	< 0.050 *	mg/Kg	06/14/11	EPA 245.1
Molybdenum (Total)	8.5	mg/Kg	06/16/11	EPA 6010
Nickel (Total)	250	mg/Kg	06/16/11	EPA 6010
Percent Solids	76	Percent	06/03/11	EPA 1311
Potassium (Total)	1500	mg/Kg	06/16/11	EPA 6010
Selenium (TCLP)	0.080	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/16/11	EPA 6010
Silica (Total)	920	mg/Kg	06/16/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	7.2	mg/Kg	06/16/11	EPA 6010
Sodium (Total)	250	mg/Kg	06/16/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/16/11	EPA 6010
Vanadium (Total)	44	mg/Kg	06/16/11	EPA 6010
Zinc (Total)	9400	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561602
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 2-10.25-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/04/11 14:22 Date/Time Received: 05/16/11 12:18

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	180000	mg/Kg	06/15/11	EPA 6010
Antimony (Total)	16	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	11	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	3.6	mg/L	06/23/11	EPA 1311
Barium (Total)	730	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	3.8	mg/Kg	06/03/11	EPA 6010
Boron (Total)	43	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.010	mg/L	06/23/11	EPA 1311
Cadmium (Total)	6.5	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	47000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	380	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	5.8	mg/Kg	06/03/11	EPA 6010
Copper (Total)	26000	mg/Kg	06/15/11	EPA 6010
Iron (Total)	12000	mg/Kg	06/15/11	EPA 6010
Lead (TCLP)	0.23	mg/L	06/23/11	EPA 1311
Lead (Total)	1600	mg/Kg	06/15/11	EPA 6010
Magnesium (Total)	12000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	950	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	12	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	220	mg/Kg	06/03/11	EPA 6010
Percent Solids	70	Percent	05/23/11	EPA 1311
Potassium (Total)	500	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3800	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Silver (Total)	9.0	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	240	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	38	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	7000	mg/Kg	06/15/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561594
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP6 3-3.5
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 16:18 Date/Time Received: 05/16/11 12:11

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	16000	mg/Kg	06/03/11	EPA 6010
Antimony (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	7.6	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.69	mg/L	06/17/11	EPA 1311
Barium (Total)	110	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	0.55	mg/Kg	06/03/11	EPA 6010
Boron (Total)	33	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/17/11	EPA 1311
Cadmium (Total)	11	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	220000	mg/Kg	06/15/11	EPA 6010
Chromium (TCLP)	0.077	mg/L	06/17/11	EPA 1311
Chromium (Total)	28	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	4.3	mg/Kg	06/03/11	EPA 6010
Copper (Total)	140	mg/Kg	06/03/11	EPA 6010
Iron (Total)	18000	mg/Kg	06/15/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Lead (Total)	17	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	37000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1100	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	6.8	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	23	mg/Kg	06/03/11	EPA 6010
Percent Solids	82	Percent	05/18/11	EPA 1311
Potassium (Total)	1100	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3300	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	< 1.0	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	360	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	26	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	610	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561595
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 3-7-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/02/11 14:30 Date/Time Received: 05/16/11 12:11

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	240000	mg/Kg	06/15/11	EPA 6010
Antimony (Total)	14	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	13	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	2.3	mg/L	06/20/11	EPA 1311
Barium (Total)	210	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	3.2	mg/Kg	06/03/11	EPA 6010
Boron (Total)	36	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	3.6	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	19000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	370	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	7.8	mg/Kg	06/03/11	EPA 6010
Copper (Total)	5300	mg/Kg	06/15/11	EPA 6010
Iron (Total)	9400	mg/Kg	06/03/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Lead (Total)	630	mg/Kg	06/15/11	EPA 6010
Magnesium (Total)	9900	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1100	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	5.5	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	190	mg/Kg	06/03/11	EPA 6010
Percent Solids	72	Percent	05/18/11	EPA 1311
Potassium (Total)	590	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3800	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	3.3	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	200	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	44	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	3500	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
Copies To: File

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561585
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 4-11-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/02/11 15:26 Date/Time Received: 05/16/11 11:57

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	96000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	8.9	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	0.96	mg/L	06/17/11	EPA 1311
Barium (Total)	78	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	0.78	mg/Kg	06/02/11	EPA 6010
Boron (Total)	23	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	0.0093	mg/L	06/17/11	EPA 1311
Cadmium (Total)	3.5	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	120000	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	81	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	5.3	mg/Kg	06/02/11	EPA 6010
Copper (Total)	1500	mg/Kg	06/02/11	EPA 6010
Iron (Total)	10000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Lead (Total)	230	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	6300	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	620	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	5.0	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	55	mg/Kg	06/02/11	EPA 6010
Percent Solids	75	Percent	05/18/11	EPA 1311
Potassium (Total)	1300	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	0.13	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3500	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	< 1.0	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	170	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	27	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	1400	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561591
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 5-6-1
Collector: BER Matrix: Sediment/Sludge Collect Depth:
Date/Time Collected: 05/04/11 09:25 Date/Time Received: 05/16/11 12:08

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	160000	mg/Kg	06/15/11	EPA 6010
Antimony (Total)	14	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	13	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	2.1	mg/L	06/17/11	EPA 1311
Barium (Total)	150	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	2.7	mg/Kg	06/03/11	EPA 6010
Boron (Total)	33	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.036	mg/L	06/17/11	EPA 1311
Cadmium (Total)	5.4	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	56000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	180	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	6.3	mg/Kg	06/03/11	EPA 6010
Copper (Total)	5600	mg/Kg	06/15/11	EPA 6010
Iron (Total)	12000	mg/Kg	06/15/11	EPA 6010
Lead (TCLP)	0.53	mg/L	06/17/11	EPA 1311
Lead (Total)	640	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	9700	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	740	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	6.5	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	180	mg/Kg	06/03/11	EPA 6010
Percent Solids	73	Percent	05/18/11	EPA 1311
Potassium (Total)	1200	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	0.10	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	4200	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	0.015	mg/L	06/17/11	EPA 1311
Silver (Total)	2.2	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	250	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	33	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	4900	mg/Kg	06/15/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561583
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 6-2.5-1
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 13:10 Date/Time Received: 05/16/11 11:53

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	140000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	8.2	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	11	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	1.1	mg/L	06/17/11	EPA 1311
Barium (Total)	130	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	4.5	mg/Kg	06/02/11	EPA 6010
Boron (Total)	50	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	0.016	mg/L	06/17/11	EPA 1311
Cadmium (Total)	2.4	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	71000	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	590	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	14	mg/Kg	06/02/11	EPA 6010
Copper (Total)	4900	mg/Kg	06/02/11	EPA 6010
Iron (Total)	22000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	0.071	mg/L	06/17/11	EPA 1311
Lead (Total)	430	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	9900	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	1000	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	16	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	340	mg/Kg	06/02/11	EPA 6010
Percent Solids	79	Percent	05/18/11	EPA 1311
Potassium (Total)	990	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	0.070	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3600	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	2.0	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	1200	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	51	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	3600	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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Kansas Department of Health and Environment
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561589
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 6-3-1
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/02/11 17:58 Date/Time Received: 05/16/11 12:08

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	180000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	10	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	12	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	1.3	mg/L	06/17/11	EPA 1311
Barium (Total)	210	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	2.8	mg/Kg	06/02/11	EPA 6010
Boron (Total)	60	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	0.019	mg/L	06/17/11	EPA 1311
Cadmium (Total)	3.8	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	42000	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	550	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	12	mg/Kg	06/02/11	EPA 6010
Copper (Total)	5200	mg/Kg	06/02/11	EPA 6010
Iron (Total)	24000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	0.43	mg/L	06/17/11	EPA 1311
Lead (Total)	990	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	11000	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	1000	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	16	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	300	mg/Kg	06/02/11	EPA 6010
Percent Solids	79	Percent	05/18/11	EPA 1311
Potassium (Total)	1200	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	0.11	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3200	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	4.2	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	1600	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	51	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	5300	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
Copies To: File

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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 562117
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 16-3-1.0
Collector: OHALLORAN Matrix: Solid Collect Depth: 6
Date/Time Collected: 05/05/11 12:15 Date/Time Received: 05/31/11 13:29

Sample Comments: 6-3-1 dup

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	190000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	6.8	mg/Kg	06/16/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	13	mg/Kg	06/16/11	EPA 6010
Barium (TCLP)	1.3	mg/L	06/17/11	EPA 1311
Barium (Total)	210	mg/Kg	06/16/11	EPA 6010
Beryllium (Total)	5.3	mg/Kg	06/16/11	EPA 6010
Boron (Total)	46	mg/Kg	06/16/11	EPA 6010
Cadmium (TCLP)	0.015	mg/L	06/17/11	EPA 1311
Cadmium (Total)	4.1	mg/Kg	06/16/11	EPA 6010
Calcium (Total)	50000	mg/Kg	06/16/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	530	mg/Kg	06/16/11	EPA 6010
Cobalt (Total)	11	mg/Kg	06/16/11	EPA 6010
Copper (Total)	4700	mg/Kg	06/16/11	EPA 6010
Iron (Total)	26000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	0.39	mg/L	06/17/11	EPA 1311
Lead (Total)	990	mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	13000	mg/Kg	06/16/11	EPA 6010
Manganese (Total)	1000	mg/Kg	06/16/11	EPA 6010
Mercury (Total)	< 0.050 *	mg/Kg	06/14/11	EPA 245.1
Molybdenum (Total)	13	mg/Kg	06/16/11	EPA 6010
Nickel (Total)	250	mg/Kg	06/16/11	EPA 6010
Percent Solids	78	Percent	06/03/11	EPA 1311
Potassium (Total)	1400	mg/Kg	06/16/11	EPA 6010
Selenium (TCLP)	0.10	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/16/11	EPA 6010
Silica (Total)	530	mg/Kg	06/16/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	4.1	mg/Kg	06/16/11	EPA 6010
Sodium (Total)	1700	mg/Kg	06/16/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/16/11	EPA 6010
Vanadium (Total)	50	mg/Kg	06/16/11	EPA 6010
Zinc (Total)	5300	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561584
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM 6-3.5-1
Collector: BER Matrix: Soil Collect Depth:
Date/Time Collected: 05/04/11 13:13 Date/Time Received: 05/16/11 11:53

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	210000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	16	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	11	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	1.2	mg/L	06/20/11	EPA 1311
Barium (Total)	140	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	0.49	mg/Kg	06/02/11	EPA 6010
Boron (Total)	56	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	0.0073	mg/L	06/20/11	EPA 1311
Cadmium (Total)	9.1	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	15000	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	390	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	9.0	mg/Kg	06/02/11	EPA 6010
Copper (Total)	4800	mg/Kg	06/02/11	EPA 6010
Iron (Total)	47000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Lead (Total)	650	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	4400	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	620	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	5.1	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	210	mg/Kg	06/02/11	EPA 6010
Percent Solids	72	Percent	05/18/11	EPA 1311
Potassium (Total)	240	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3300	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	0.053	mg/L	06/20/11	EPA 1311
Silver (Total)	3.1	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	610	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	36	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	5500	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561604
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP-1
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/03/11 11:20 Date/Time Received: 05/16/11 12:22

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	180000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	12	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	12	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.98	mg/L	06/23/11	EPA 1311
Barium (Total)	160	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	12	mg/Kg	06/03/11	EPA 6010
Boron (Total)	59	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.023	mg/L	06/23/11	EPA 1311
Cadmium (Total)	16	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	22000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	280	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	7.7	mg/Kg	06/03/11	EPA 6010
Copper (Total)	7400	mg/Kg	06/16/11	EPA 6010
Iron (Total)	49000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Lead (Total)	520	mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	7700	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1000	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	10	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	220	mg/Kg	06/03/11	EPA 6010
Percent Solids	67	Percent	05/23/11	EPA 1311
Potassium (Total)	310	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	4100	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Silver (Total)	4.3	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	1200	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	36	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	12000	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561615
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP-7
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/03/11 13:25 Date/Time Received: 05/16/11 12:24

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	200000	mg/Kg	06/15/11	EPA 6010
Antimony (Total)	91	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	6.5	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	1.2	mg/L	06/23/11	EPA 1311
Barium (Total)	39	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	0.86	mg/Kg	06/03/11	EPA 6010
Boron (Total)	9.3	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/23/11	EPA 1311
Cadmium (Total)	1.0	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	3000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	69	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	1.8	mg/Kg	06/03/11	EPA 6010
Copper (Total)	42000	mg/Kg	06/15/11	EPA 6010
Iron (Total)	4000	mg/Kg	06/03/11	EPA 6010
Lead (TCLP)	160	mg/L	06/23/11	EPA 1311
Lead (Total)	32000	mg/Kg	06/15/11	EPA 6010
Magnesium (Total)	2700	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	210	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	< 2.0	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	1000	mg/Kg	06/03/11	EPA 6010
Percent Solids	75	Percent	05/23/11	EPA 1311
Potassium (Total)	67	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3500	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	0.026	mg/L	06/23/11	EPA 1311
Silver (Total)	57	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	51	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	3.0	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	130000	mg/Kg	06/15/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561619
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP-12
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/03/11 13:55 Date/Time Received: 05/16/11 12:27

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	260000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	23	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	14	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	4.0	mg/L	06/23/11	EPA 1311
Barium (Total)	270	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	3.5	mg/Kg	06/03/11	EPA 6010
Boron (Total)	50	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.052	mg/L	06/23/11	EPA 1311
Cadmium (Total)	9.2	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	9000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	470	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	12	mg/Kg	06/03/11	EPA 6010
Copper (Total)	12000	mg/Kg	06/16/11	EPA 6010
Iron (Total)	13000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	2.5	mg/L	06/23/11	EPA 1311
Lead (Total)	1700	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	7600	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	990	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	18	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	440	mg/Kg	06/03/11	EPA 6010
Percent Solids	67	Percent	05/23/11	EPA 1311
Potassium (Total)	680	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3900	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	0.026	mg/L	06/23/11	EPA 1311
Silver (Total)	5.9	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	400	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	49	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	8200	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 562116
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP-50
Collector: MAURA OHALLORAN Matrix: Solid Collect Depth: 6
Date/Time Collected: 05/05/11 12:05 Date/Time Received: 05/31/11 13:28

Sample Comments: WP-12 dup

Parameter	Analytical Result		Units	Analysis Date	Analytical Method
Aluminum (Total)	260000		mg/Kg	06/16/11	EPA 6010
Antimony (Total)	13		mg/Kg	06/16/11	EPA 6010
Arsenic (TCLP)	< 0.050		mg/L	06/23/11	EPA 1311
Arsenic (Total)	14		mg/Kg	06/16/11	EPA 6010
Barium (TCLP)	3.4		mg/L	06/23/11	EPA 1311
Barium (Total)	230		mg/Kg	06/16/11	EPA 6010
Beryllium (Total)	4.3		mg/Kg	06/16/11	EPA 6010
Boron (Total)	54		mg/Kg	06/16/11	EPA 6010
Cadmium (TCLP)	0.058		mg/L	06/23/11	EPA 1311
Cadmium (Total)	9.1		mg/Kg	06/16/11	EPA 6010
Calcium (Total)	8800		mg/Kg	06/16/11	EPA 6010
Chromium (TCLP)	< 0.010		mg/L	06/23/11	EPA 1311
Chromium (Total)	460		mg/Kg	06/16/11	EPA 6010
Cobalt (Total)	9.7		mg/Kg	06/16/11	EPA 6010
Copper (Total)	11000		mg/Kg	06/16/11	EPA 6010
Iron (Total)	9500		mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	4.8		mg/L	06/23/11	EPA 1311
Lead (Total)	1300		mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	10000		mg/Kg	06/16/11	EPA 6010
Manganese (Total)	900		mg/Kg	06/16/11	EPA 6010
Mercury (Total)	< 0.050	*	mg/Kg	06/14/11	EPA 245.1
Molybdenum (Total)	16		mg/Kg	06/16/11	EPA 6010
Nickel (Total)	340		mg/Kg	06/16/11	EPA 6010
Percent Solids	73		Percent	06/03/11	EPA 1311
Potassium (Total)	700		mg/Kg	06/16/11	EPA 6010
Selenium (TCLP)	< 0.050		mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0		mg/Kg	06/16/11	EPA 6010
Silica (Total)	980		mg/Kg	06/16/11	EPA 6010
Silver (TCLP)	0.017		mg/L	06/23/11	EPA 1311
Silver (Total)	6.5		mg/Kg	06/16/11	EPA 6010
Sodium (Total)	410		mg/Kg	06/16/11	EPA 6010
Thallium (Total)	< 5.0		mg/Kg	06/16/11	EPA 6010
Vanadium (Total)	47		mg/Kg	06/16/11	EPA 6010
Zinc (Total)	7900		mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561616
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP14
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/03/11 14:05 Date/Time Received: 05/16/11 12:24

Sample Comments:

Parameter	Analytical Result		Units	Analysis Date	Analytical Method
Aluminum (Total)	260000		mg/Kg	06/16/11	EPA 6010
Antimony (Total)	14		mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050		mg/L	06/23/11	EPA 1311
Arsenic (Total)	12		mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	1.1		mg/L	06/23/11	EPA 1311
Barium (Total)	87		mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	6.5		mg/Kg	06/03/11	EPA 6010
Boron (Total)	59		mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.019		mg/L	06/23/11	EPA 1311
Cadmium (Total)	6.5		mg/Kg	06/03/11	EPA 6010
Calcium (Total)	16000		mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010		mg/L	06/23/11	EPA 1311
Chromium (Total)	290		mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	8.8		mg/Kg	06/03/11	EPA 6010
Copper (Total)	6200		mg/Kg	06/16/11	EPA 6010
Iron (Total)	12000		mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	0.27		mg/L	06/23/11	EPA 1311
Lead (Total)	580		mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	7300		mg/Kg	06/03/11	EPA 6010
Manganese (Total)	890		mg/Kg	06/03/11	EPA 6010
Mercury (Total)	0.048		mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	7.4		mg/Kg	06/03/11	EPA 6010
Nickel (Total)	210		mg/Kg	06/03/11	EPA 6010
Percent Solids	72		Percent	05/23/11	EPA 1311
Potassium (Total)	400		mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050		mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Silica (Total)	3600		mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010		mg/L	06/23/11	EPA 1311
Silver (Total)	3.7		mg/Kg	06/03/11	EPA 6010
Sodium (Total)	260		mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	51		mg/Kg	06/03/11	EPA 6010
Zinc (Total)	6000		mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561582
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP 17
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/03/11 14:40 Date/Time Received: 05/16/11 11:53

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	240000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	28	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	12	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	5.6	mg/L	06/20/11	EPA 1311
Barium (Total)	270	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	3.3	mg/Kg	06/02/11	EPA 6010
Boron (Total)	35	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	0.033	mg/L	06/20/11	EPA 1311
Cadmium (Total)	6.8	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	8800	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	420	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	4.4	mg/Kg	06/02/11	EPA 6010
Copper (Total)	12000	mg/Kg	06/02/11	EPA 6010
Iron (Total)	8800	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	3.5	mg/L	06/20/11	EPA 1311
Lead (Total)	2600	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	15000	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	1100	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	8.9	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	470	mg/Kg	06/02/11	EPA 6010
Percent Solids	67	Percent	05/18/11	EPA 1311
Potassium (Total)	280	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3700	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	5.9	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	120	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	41	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	9000	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561597
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP20
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/03/11 15:15 Date/Time Received: 05/16/11 12:12

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	210000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	22	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	12	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	8.5	mg/L	06/17/11	EPA 1311
Barium (Total)	500	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	2.4	mg/Kg	06/03/11	EPA 6010
Boron (Total)	28	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.025	mg/L	06/17/11	EPA 1311
Cadmium (Total)	4.6	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	43000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	460	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	4.6	mg/Kg	06/03/11	EPA 6010
Copper (Total)	9800	mg/Kg	06/16/11	EPA 6010
Iron (Total)	11000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	1.6	mg/L	06/17/11	EPA 1311
Lead (Total)	1200	mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	11000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1200	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	16	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	260	mg/Kg	06/03/11	EPA 6010
Percent Solids	67	Percent	05/18/11	EPA 1311
Potassium (Total)	410	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	0.094	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3800	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	5.0	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	110	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	51	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	6400	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
Copies To: File

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KANSAS HEALTH AND ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561599

Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WP 32 4-8
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 18:01 Date/Time Received: 05/16/11 12:15

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	190000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	7.8	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	14	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.73	mg/L	06/17/11	EPA 1311
Barium (Total)	160	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	1.9	mg/Kg	06/03/11	EPA 6010
Boron (Total)	48	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.014	mg/L	06/17/11	EPA 1311
Cadmium (Total)	1.6	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	40000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	0.014	mg/L	06/17/11	EPA 1311
Chromium (Total)	530	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	12	mg/Kg	06/03/11	EPA 6010
Copper (Total)	5400	mg/Kg	06/16/11	EPA 6010
Iron (Total)	13000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Lead (Total)	300	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	10000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1200	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	18	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	400	mg/Kg	06/03/11	EPA 6010
Percent Solids	63	Percent	05/23/11	EPA 1311
Potassium (Total)	1700	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	0.076	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3200	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	1.5	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	2300	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	47	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	4400	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561600

Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM W-0
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 14:25 Date/Time Received: 05/16/11 12:17

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	7200	mg/Kg	06/03/11	EPA 6010
Antimony (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	1.5	mg/L	06/17/11	EPA 1311
Barium (Total)	150	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	0.51	mg/Kg	06/03/11	EPA 6010
Boron (Total)	8.3	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.013	mg/L	06/17/11	EPA 1311
Cadmium (Total)	< 1.0	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	120000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	21	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	7.2	mg/Kg	06/03/11	EPA 6010
Copper (Total)	130	mg/Kg	06/03/11	EPA 6010
Iron (Total)	17000	mg/Kg	06/03/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Lead (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	14000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	810	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	2.1	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	56	mg/Kg	06/03/11	EPA 6010
Percent Solids	91	Percent	05/23/11	EPA 1311
Potassium (Total)	2800	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	0.13	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3400	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Silver (Total)	< 1.0	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	220	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	9.2	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	110	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561603
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM WASTE SAMP 00
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 11:45 Date/Time Received: 05/16/11 12:19

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	170000	mg/Kg	06/03/11	EPA 6010
Antimony (Total)	23	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	7.2	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.65	mg/L	06/23/11	EPA 1311
Barium (Total)	9.8	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	< 0.10	mg/Kg	06/03/11	EPA 6010
Boron (Total)	9.8	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.0061	mg/L	06/23/11	EPA 1311
Cadmium (Total)	2.6	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	2900	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	0.13	mg/L	06/23/11	EPA 1311
Chromium (Total)	1507	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	19	mg/Kg	06/03/11	EPA 6010
Copper (Total)	290000	mg/Kg	06/15/11	EPA 6010
Iron (Total)	4800	mg/Kg	06/03/11	EPA 6010
Lead (TCLP)	110	mg/L	06/23/11	EPA 1311
Lead (Total)	20000	mg/Kg	06/15/11	EPA 6010
Magnesium (Total)	1100	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	280	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	< 2.0	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	1500	mg/Kg	06/03/11	EPA 6010
Percent Solids	94	Percent	05/23/11	EPA 1311
Potassium (Total)	1900	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	2700	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	0.010	mg/L	06/23/11	EPA 1311
Silver (Total)	25	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	6900	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	8.2	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	27000	mg/Kg	06/15/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561614
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM W-1 BLDG 2
Collector: BER Matrix: Sediment/Sludge Collect Depth:
Date/Time Collected: 05/02/11 13:30 Date/Time Received: 05/16/11 12:24

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	5800	mg/Kg	06/03/11	EPA 6010
Antimony (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	5.1	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.74	mg/L	06/23/11	EPA 1311
Barium (Total)	46	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	1.1	mg/Kg	06/03/11	EPA 6010
Boron (Total)	53	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.0072	mg/L	06/23/11	EPA 1311
Cadmium (Total)	< 1.0	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	14000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	56	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	6.6	mg/Kg	06/03/11	EPA 6010
Copper (Total)	230	mg/Kg	06/03/11	EPA 6010
Iron (Total)	120000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Lead (Total)	22	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	4200	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1000	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	< 2.0	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	6.5	mg/Kg	06/03/11	EPA 6010
Percent Solids	81	Percent	05/23/11	EPA 1311
Potassium (Total)	500	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	2100	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	0.043	mg/L	06/23/11	EPA 1311
Silver (Total)	< 1.0	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	130	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	18	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	230	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
Copies To: File

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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561618

4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM GRP F
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/02/11 13:58 Date/Time Received: 05/16/11 12:27

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	220000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	13	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	10	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	1.4	mg/L	06/23/11	EPA 1311
Barium (Total)	26	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	1.8	mg/Kg	06/03/11	EPA 6010
Boron (Total)	15	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.021	mg/L	06/23/11	EPA 1311
Cadmium (Total)	2.4	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	3500	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	0.025	mg/L	06/23/11	EPA 1311
Chromium (Total)	730	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	3.8	mg/Kg	06/03/11	EPA 6010
Copper (Total)	9700	mg/Kg	06/16/11	EPA 6010
Iron (Total)	8200	mg/Kg	06/03/11	EPA 6010
Lead (TCLP)	0.58	mg/L	06/23/11	EPA 1311
Lead (Total)	250	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	3000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1900	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	20	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	170	mg/Kg	06/03/11	EPA 6010
Percent Solids	78	Percent	05/23/11	EPA 1311
Potassium (Total)	7700	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	3100	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	0.065	mg/L	06/23/11	EPA 1311
Silver (Total)	4.7	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	11000	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	60	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	5200	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561617

4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM GRP N
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/02/11 14:26 Date/Time Received: 05/16/11 12:24

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	280000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	9.6	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	13	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	0.73	mg/L	06/23/11	EPA 1311
Barium (Total)	78	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	0.75	mg/Kg	06/03/11	EPA 6010
Boron (Total)	100	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	0.0084	mg/L	06/23/11	EPA 1311
Cadmium (Total)	2.9	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	15000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	120	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	8.6	mg/Kg	06/03/11	EPA 6010
Copper (Total)	1300	mg/Kg	06/03/11	EPA 6010
Iron (Total)	5600	mg/Kg	06/03/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Lead (Total)	81	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	7800	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	920	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	2.3	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	58	mg/Kg	06/03/11	EPA 6010
Percent Solids	89	Percent	05/23/11	EPA 1311
Potassium (Total)	6900	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	2200	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Silver (Total)	< 1.0	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	13000	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	45	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	470	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
Copies To: File

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KANSAS HEALTH AND ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561592
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM GRP R
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 10:50 Date/Time Received: 05/16/11 12:11

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	180000	mg/Kg	06/15/11	EPA 6010
Antimony (Total)	12	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	12	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	1.7	mg/L	06/20/11	EPA 1311
Barium (Total)	320	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	4.4	mg/Kg	06/03/11	EPA 6010
Boron (Total)	48	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	3.5	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	31000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	520	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	23	mg/Kg	06/03/11	EPA 6010
Copper (Total)	6700	mg/Kg	06/15/11	EPA 6010
Iron (Total)	19000	mg/Kg	06/15/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Lead (Total)	710	mg/Kg	06/15/11	EPA 6010
Magnesium (Total)	13000	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	870	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	16	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	280	mg/Kg	06/03/11	EPA 6010
Percent Solids	71	Percent	05/18/11	EPA 1311
Potassium (Total)	990	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	4200	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	0.016	mg/L	06/20/11	EPA 1311
Silver (Total)	3.4	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	860	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	43	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	5100	mg/Kg	06/15/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 562115
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM Drum ZZ
Collector: OHALLORAN Matrix: Solid Collect Depth:
Date/Time Collected: 05/05/11 12:00 Date/Time Received: 05/31/11 13:28

Sample Comments: Drum R dup

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	200000	mg/Kg	06/16/11	EPA 6010
Antimony (Total)	8.4	mg/Kg	06/16/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Arsenic (Total)	14	mg/Kg	06/16/11	EPA 6010
Barium (TCLP)	1.7	mg/L	06/23/11	EPA 1311
Barium (Total)	300	mg/Kg	06/16/11	EPA 6010
Beryllium (Total)	6.0	mg/Kg	06/16/11	EPA 6010
Boron (Total)	44	mg/Kg	06/16/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/23/11	EPA 1311
Cadmium (Total)	3.2	mg/Kg	06/16/11	EPA 6010
Calcium (Total)	30000	mg/Kg	06/16/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/23/11	EPA 1311
Chromium (Total)	520	mg/Kg	06/16/11	EPA 6010
Cobalt (Total)	12	mg/Kg	06/16/11	EPA 6010
Copper (Total)	6400	mg/Kg	06/16/11	EPA 6010
Iron (Total)	29000	mg/Kg	06/16/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Lead (Total)	440	mg/Kg	06/16/11	EPA 6010
Magnesium (Total)	17000	mg/Kg	06/16/11	EPA 6010
Manganese (Total)	900	mg/Kg	06/16/11	EPA 6010
Mercury (Total)	< 0.050 *	mg/Kg	06/14/11	EPA 245.1
Molybdenum (Total)	20	mg/Kg	06/16/11	EPA 6010
Nickel (Total)	260	mg/Kg	06/16/11	EPA 6010
Percent Solids	69	Percent	06/03/11	EPA 1311
Potassium (Total)	1100	mg/Kg	06/16/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/23/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/16/11	EPA 6010
Silica (Total)	590	mg/Kg	06/16/11	EPA 6010
Silver (TCLP)	0.039	mg/L	06/23/11	EPA 1311
Silver (Total)	3.7	mg/Kg	06/16/11	EPA 6010
Sodium (Total)	1100	mg/Kg	06/16/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/16/11	EPA 6010
Vanadium (Total)	42	mg/Kg	06/16/11	EPA 6010
Zinc (Total)	5800	mg/Kg	06/16/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561593
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM BRP T
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 10:45 Date/Time Received: 05/16/11 12:11

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	140000	mg/Kg	06/15/11	EPA 6010
Antimony (Total)	11	mg/Kg	06/03/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	15	mg/Kg	06/03/11	EPA 6010
Barium (TCLP)	1.4	mg/L	06/20/11	EPA 1311
Barium (Total)	200	mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	2.3	mg/Kg	06/03/11	EPA 6010
Boron (Total)	56	mg/Kg	06/03/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	2.4	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	22000	mg/Kg	06/03/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	310	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	15	mg/Kg	06/03/11	EPA 6010
Copper (Total)	6800	mg/Kg	06/15/11	EPA 6010
Iron (Total)	120000	mg/Kg	06/15/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Lead (Total)	740	mg/Kg	06/15/11	EPA 6010
Magnesium (Total)	8500	mg/Kg	06/03/11	EPA 6010
Manganese (Total)	980	mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	19	mg/Kg	06/03/11	EPA 6010
Nickel (Total)	180	mg/Kg	06/03/11	EPA 6010
Percent Solids	73	Percent	05/18/11	EPA 1311
Potassium (Total)	780	mg/Kg	06/03/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Silica (Total)	4200	mg/Kg	06/03/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	2.5	mg/Kg	06/03/11	EPA 6010
Sodium (Total)	540	mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	29	mg/Kg	06/03/11	EPA 6010
Zinc (Total)	4400	mg/Kg	06/15/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561580
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM GRP U
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 10:50 Date/Time Received: 05/16/11 11:53

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	170000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	8.5	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	14	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	1.0	mg/L	06/20/11	EPA 1311
Barium (Total)	160	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	2.4	mg/Kg	06/02/11	EPA 6010
Boron (Total)	40	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	1.6	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	22000	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Chromium (Total)	560	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	11	mg/Kg	06/02/11	EPA 6010
Copper (Total)	7300	mg/Kg	06/02/11	EPA 6010
Iron (Total)	52000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Lead (Total)	620	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	10000	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	880	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	16	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	290	mg/Kg	06/02/11	EPA 6010
Percent Solids	74	Percent	05/18/11	EPA 1311
Potassium (Total)	750	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3900	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	2.9	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	1500	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	39	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	5900	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561587
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM X
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 11:50 Date/Time Received: 05/16/11 12:01

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	290000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	17	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	11	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	0.60	mg/L	06/20/11	EPA 1311
Barium (Total)	7.3	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	< 0.10	mg/Kg	06/02/11	EPA 6010
Boron (Total)	28	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	< 1.0	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	3600	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	0.046	mg/L	06/20/11	EPA 1311
Chromium (Total)	360	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	9.2	mg/Kg	06/02/11	EPA 6010
Copper (Total)	140000	mg/Kg	06/15/11	EPA 6010
Iron (Total)	12000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	19	mg/L	06/20/11	EPA 1311
Lead (Total)	4000	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	9400	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	590	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	< 2.0	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	820	mg/Kg	06/02/11	EPA 6010
Percent Solids	93	Percent	05/18/11	EPA 1311
Potassium (Total)	150	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	1800	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	< 0.010	mg/L	06/20/11	EPA 1311
Silver (Total)	39	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	98	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	26	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	20000	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561588
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM Y
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 14:00 Date/Time Received: 05/16/11 12:08

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	9200	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	150	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Arsenic (Total)	10	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	0.47	mg/L	06/17/11	EPA 1311
Barium (Total)	6.2	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	< 0.10	mg/Kg	06/02/11	EPA 6010
Boron (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	0.78	mg/L	06/17/11	EPA 1311
Cadmium (Total)	21	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	4200	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	< 0.010	mg/L	06/17/11	EPA 1311
Chromium (Total)	13	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	59	mg/Kg	06/02/11	EPA 6010
Copper (Total)	440000	mg/Kg	06/15/11	EPA 6010
Iron (Total)	22000	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	63	mg/L	06/17/11	EPA 1311
Lead (Total)	38000	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	8800	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	520	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	< 2.0	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	2300	mg/Kg	06/02/11	EPA 6010
Percent Solids	96	Percent	05/18/11	EPA 1311
Potassium (Total)	1400	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/17/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	3500	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	0.018	mg/L	06/17/11	EPA 1311
Silver (Total)	91	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	780	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	9.3	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	180000	mg/Kg	06/15/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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CLIA No. 17D0648254

KANSAS HEALTH AND ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561586
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM DRUM Z
Collector: BER Matrix: Solid Collect Depth:
Date/Time Collected: 05/04/11 14:05 Date/Time Received: 05/16/11 11:57

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum (Total)	220000	mg/Kg	06/02/11	EPA 6010
Antimony (Total)	14	mg/Kg	06/02/11	EPA 6010
Arsenic (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Arsenic (Total)	9.1	mg/Kg	06/02/11	EPA 6010
Barium (TCLP)	0.75	mg/L	06/20/11	EPA 1311
Barium (Total)	12	mg/Kg	06/02/11	EPA 6010
Beryllium (Total)	< 0.10	mg/Kg	06/02/11	EPA 6010
Boron (Total)	20	mg/Kg	06/02/11	EPA 6010
Cadmium (TCLP)	< 0.0050	mg/L	06/20/11	EPA 1311
Cadmium (Total)	< 1.0	mg/Kg	06/02/11	EPA 6010
Calcium (Total)	820	mg/Kg	06/02/11	EPA 6010
Chromium (TCLP)	0.016	mg/L	06/20/11	EPA 1311
Chromium (Total)	60	mg/Kg	06/02/11	EPA 6010
Cobalt (Total)	5.5	mg/Kg	06/02/11	EPA 6010
Copper (Total)	190000	mg/Kg	06/15/11	EPA 6010
Iron (Total)	6500	mg/Kg	06/02/11	EPA 6010
Lead (TCLP)	28	mg/L	06/20/11	EPA 1311
Lead (Total)	4600	mg/Kg	06/02/11	EPA 6010
Magnesium (Total)	1800	mg/Kg	06/02/11	EPA 6010
Manganese (Total)	1000	mg/Kg	06/02/11	EPA 6010
Mercury (Total)	< 0.050	mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	< 2.0	mg/Kg	06/02/11	EPA 6010
Nickel (Total)	500	mg/Kg	06/02/11	EPA 6010
Percent Solids	97	Percent	05/18/11	EPA 1311
Potassium (Total)	49	mg/Kg	06/02/11	EPA 6010
Selenium (TCLP)	< 0.050	mg/L	06/20/11	EPA 1311
Selenium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Silica (Total)	1400	mg/Kg	06/02/11	EPA 6010
Silver (TCLP)	0.045	mg/L	06/20/11	EPA 1311
Silver (Total)	41	mg/Kg	06/02/11	EPA 6010
Sodium (Total)	21	mg/Kg	06/02/11	EPA 6010
Thallium (Total)	< 5.0	mg/Kg	06/02/11	EPA 6010
Vanadium (Total)	17	mg/Kg	06/02/11	EPA 6010
Zinc (Total)	69000	mg/Kg	06/02/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561610
4EM80
Site ID:
Account Code: EB

Collection Location: C3-006-03010 WADE'S ALUMINUM SW-1
Collector: BER Matrix: Water Collect Depth:
Date/Time Collected: 05/04/11 15:10 Date/Time Received: 05/16/11 12:23

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum	< 0.050	mg/L	05/20/11	EPA 200.7
Antimony	< 0.050	mg/L	05/20/11	EPA 200.7
Arsenic	< 0.050	mg/L	05/20/11	EPA 200.7
Barium	0.40	mg/L	05/20/11	EPA 200.7
Beryllium	< 0.0010	mg/L	05/20/11	EPA 200.7
Boron	0.50	mg/L	05/20/11	EPA 200.7
Cadmium	< 0.0050	mg/L	05/20/11	EPA 200.7
Calcium	230	mg/L	05/20/11	EPA 200.7
Chromium	< 0.010	mg/L	05/20/11	EPA 200.7
Cobalt	< 0.010	mg/L	05/20/11	EPA 200.7
Copper	0.077	mg/L	05/20/11	EPA 200.7
Iron	0.36	mg/L	05/20/11	EPA 200.7
Lead	< 0.050	mg/L	05/20/11	EPA 200.7
Magnesium	81	mg/L	05/20/11	EPA 200.7
Manganese	0.54	mg/L	05/20/11	EPA 200.7
Molybdenum	0.023	mg/L	05/20/11	EPA 200.7
Nickel	< 0.050	mg/L	05/20/11	EPA 200.7
Potassium	2900	mg/L	05/20/11	EPA 200.7
Selenium	< 0.050	mg/L	05/20/11	EPA 200.7
Silica	8.5	mg/L	05/20/11	EPA 200.7
Silver	< 0.010	mg/L	05/20/11	EPA 200.7
Sodium	4100	mg/L	05/20/11	EPA 200.7
Thallium	< 0.050	mg/L	05/20/11	EPA 200.7
Total Hardness	900	mg/L	05/25/11	SM 2340B
Vanadium	< 0.0050	mg/L	05/20/11	EPA 200.7
Zinc	0.019	mg/L	05/20/11	EPA 200.7

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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561611
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S ALUMINUM SW-1
Collector: BER Matrix: Water Collect Depth:
Date/Time Collected: 05/04/11 15:10 Date/Time Received: 05/16/11 12:23

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum	< 0.050	mg/L	05/20/11	EPA 200.7
Antimony	< 0.050	mg/L	05/20/11	EPA 200.7
Arsenic	< 0.050	mg/L	05/20/11	EPA 200.7
Barium	0.40	mg/L	05/20/11	EPA 200.7
Beryllium	< 0.0010	mg/L	05/20/11	EPA 200.7
Boron	0.49	mg/L	05/20/11	EPA 200.7
Cadmium	< 0.0050	mg/L	05/20/11	EPA 200.7
Calcium	230	mg/L	05/20/11	EPA 200.7
Chromium	< 0.010	mg/L	05/20/11	EPA 200.7
Cobalt	< 0.010	mg/L	05/20/11	EPA 200.7
Copper	0.061	mg/L	05/20/11	EPA 200.7
Iron	0.37	mg/L	05/20/11	EPA 200.7
Lead	< 0.050	mg/L	05/20/11	EPA 200.7
Magnesium	82	mg/L	05/20/11	EPA 200.7
Manganese	0.55	mg/L	05/20/11	EPA 200.7
Molybdenum	0.022	mg/L	05/20/11	EPA 200.7
Nickel	< 0.050	mg/L	05/20/11	EPA 200.7
Potassium	2900	mg/L	05/20/11	EPA 200.7
Selenium	< 0.050	mg/L	05/20/11	EPA 200.7
Silica	8.5	mg/L	05/20/11	EPA 200.7
Silver	< 0.010	mg/L	05/20/11	EPA 200.7
Sodium	4100	mg/L	05/20/11	EPA 200.7
Thallium	< 0.050	mg/L	05/20/11	EPA 200.7
Vanadium	< 0.0050	mg/L	05/20/11	EPA 200.7
Zinc	0.016	mg/L	05/20/11	EPA 200.7

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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561613
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S ALUMINUM SW-2
Collector: BER Matrix: Water Collect Depth:
Date/Time Collected: 05/04/11 15:45 Date/Time Received: 05/16/11 12:24

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum	0.053	mg/L	05/20/11	EPA 200.7
Antimony	< 0.050	mg/L	05/20/11	EPA 200.7
Arsenic	< 0.050	mg/L	05/20/11	EPA 200.7
Barium	0.42	mg/L	05/20/11	EPA 200.7
Beryllium	< 0.0010	mg/L	05/20/11	EPA 200.7
Boron	0.44	mg/L	05/20/11	EPA 200.7
Cadmium	< 0.0050	mg/L	05/20/11	EPA 200.7
Calcium	230	mg/L	05/20/11	EPA 200.7
Chromium	< 0.010	mg/L	05/20/11	EPA 200.7
Cobalt	< 0.010	mg/L	05/20/11	EPA 200.7
Copper	0.052	mg/L	05/20/11	EPA 200.7
Iron	0.20	mg/L	05/20/11	EPA 200.7
Lead	< 0.050	mg/L	05/20/11	EPA 200.7
Magnesium	79	mg/L	05/20/11	EPA 200.7
Manganese	0.45	mg/L	05/20/11	EPA 200.7
Mercury	< 0.50	ug/L	05/26/11	EPA 245.1
Molybdenum	0.021	mg/L	05/20/11	EPA 200.7
Nickel	< 0.050	mg/L	05/20/11	EPA 200.7
Potassium	2600	mg/L	05/20/11	EPA 200.7
Selenium	< 0.050	mg/L	05/20/11	EPA 200.7
Silica	7.8	mg/L	05/20/11	EPA 200.7
Silver	< 0.010	mg/L	05/20/11	EPA 200.7
Sodium	3800	mg/L	05/20/11	EPA 200.7
Thallium	< 0.050	mg/L	05/20/11	EPA 200.7
Vanadium	< 0.0050	mg/L	05/20/11	EPA 200.7
Zinc	0.016	mg/L	05/20/11	EPA 200.7

Reporting Analyst: JAB
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Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561620
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S ALUMINUM SW-3
Collector: BER Matrix: Water Collect Depth:
Date/Time Collected: 05/04/11 16:00 Date/Time Received: 05/16/11 12:27

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum	0.17	mg/L	05/20/11	EPA 200.7
Antimony	< 0.050	mg/L	05/20/11	EPA 200.7
Arsenic	< 0.050	mg/L	05/20/11	EPA 200.7
Barium	0.087	mg/L	05/20/11	EPA 200.7
Beryllium	< 0.0010	mg/L	05/20/11	EPA 200.7
Boron	< 0.050	mg/L	05/20/11	EPA 200.7
Cadmium	< 0.0050	mg/L	05/20/11	EPA 200.7
Calcium	85	mg/L	05/20/11	EPA 200.7
Chromium	< 0.010	mg/L	05/20/11	EPA 200.7
Cobalt	< 0.010	mg/L	05/20/11	EPA 200.7
Copper	< 0.010	mg/L	05/20/11	EPA 200.7
Iron	0.29	mg/L	05/20/11	EPA 200.7
Lead	< 0.050	mg/L	05/20/11	EPA 200.7
Magnesium	10	mg/L	05/20/11	EPA 200.7
Manganese	0.20	mg/L	05/20/11	EPA 200.7
Mercury	< 0.50	ug/L	05/26/11	EPA 245.1
Molybdenum	< 0.020	mg/L	05/20/11	EPA 200.7
Nickel	< 0.050	mg/L	05/20/11	EPA 200.7
Potassium	4.1	mg/L	05/20/11	EPA 200.7
Selenium	< 0.050	mg/L	05/20/11	EPA 200.7
Silica	4.0	mg/L	05/20/11	EPA 200.7
Silver	< 0.010	mg/L	05/20/11	EPA 200.7
Sodium	16	mg/L	05/20/11	EPA 200.7
Thallium	< 0.050	mg/L	05/20/11	EPA 200.7
Vanadium	< 0.0050	mg/L	05/20/11	EPA 200.7
Zinc	< 0.0050	mg/L	05/20/11	EPA 200.7

Reporting Analyst: JAB
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561609
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S ALUMINUM SW-4 SPRING
Collector: BER Matrix: Water Collect Depth:
Date/Time Collected: 05/04/11 16:15 Date/Time Received: 05/16/11 12:23

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum	0.20	mg/L	05/20/11	EPA 200.7
Antimony	< 0.050	mg/L	05/20/11	EPA 200.7
Arsenic	< 0.050	mg/L	05/20/11	EPA 200.7
Barium	0.073	mg/L	05/20/11	EPA 200.7
Beryllium	< 0.0010	mg/L	05/20/11	EPA 200.7
Boron	0.14	mg/L	05/20/11	EPA 200.7
Cadmium	< 0.0050	mg/L	05/20/11	EPA 200.7
Calcium	180	mg/L	05/20/11	EPA 200.7
Chromium	< 0.010	mg/L	05/20/11	EPA 200.7
Cobalt	< 0.010	mg/L	05/20/11	EPA 200.7
Copper	< 0.010	mg/L	05/20/11	EPA 200.7
Iron	0.21	mg/L	05/20/11	EPA 200.7
Lead	< 0.050	mg/L	05/20/11	EPA 200.7
Magnesium	51	mg/L	05/20/11	EPA 200.7
Manganese	0.018	mg/L	05/20/11	EPA 200.7
Molybdenum	< 0.020	mg/L	05/20/11	EPA 200.7
Nickel	< 0.050	mg/L	05/20/11	EPA 200.7
Potassium	80	mg/L	05/20/11	EPA 200.7
Selenium	< 0.050	mg/L	05/20/11	EPA 200.7
Silica	11	mg/L	05/20/11	EPA 200.7
Silver	< 0.010	mg/L	05/20/11	EPA 200.7
Sodium	80	mg/L	05/20/11	EPA 200.7
Thallium	< 0.050	mg/L	05/20/11	EPA 200.7
Total Hardness	620	mg/L	05/25/11	SM 2340B
Vanadium	< 0.0050	mg/L	05/20/11	EPA 200.7
Zinc	0.083	mg/L	05/20/11	EPA 200.7

Reporting Analyst: JAB
Date Reported: 06/01/11
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Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561612
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S OHALLORAN SW-4
Collector: BER Matrix: Water Collect Depth:
Date/Time Collected: 05/04/11 16:15 Date/Time Received: 05/16/11 12:24

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Aluminum	0.29	mg/L	05/20/11	EPA 200.7
Antimony	< 0.050	mg/L	05/20/11	EPA 200.7
Arsenic	< 0.050	mg/L	05/20/11	EPA 200.7
Barium	0.070	mg/L	05/20/11	EPA 200.7
Beryllium	< 0.0010	mg/L	05/20/11	EPA 200.7
Boron	0.13	mg/L	05/20/11	EPA 200.7
Cadmium	< 0.0050	mg/L	05/20/11	EPA 200.7
Calcium	180	mg/L	05/20/11	EPA 200.7
Chromium	< 0.010	mg/L	05/20/11	EPA 200.7
Cobalt	< 0.010	mg/L	05/20/11	EPA 200.7
Copper	< 0.010	mg/L	05/20/11	EPA 200.7
Iron	0.31	mg/L	05/20/11	EPA 200.7
Lead	< 0.050	mg/L	05/20/11	EPA 200.7
Magnesium	52	mg/L	05/20/11	EPA 200.7
Manganese	0.026	mg/L	05/20/11	EPA 200.7
Mercury	< 0.50	ug/L	05/26/11	EPA 245.1
Molybdenum	< 0.020	mg/L	05/20/11	EPA 200.7
Nickel	< 0.050	mg/L	05/20/11	EPA 200.7
Potassium	84	mg/L	05/20/11	EPA 200.7
Selenium	0.053	mg/L	05/20/11	EPA 200.7
Silica	12	mg/L	05/20/11	EPA 200.7
Silver	< 0.010	mg/L	05/20/11	EPA 200.7
Sodium	82	mg/L	05/20/11	EPA 200.7
Thallium	< 0.050	mg/L	05/20/11	EPA 200.7
Vanadium	< 0.0050	mg/L	05/20/11	EPA 200.7
Zinc	0.087	mg/L	05/20/11	EPA 200.7

Reporting Analyst: JAB
Date Reported: 06/01/11
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Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 563098
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADES ALUMINUM SW-1A
Collector: OHALLORAN Matrix: Water Collect Depth:
Date/Time Collected: 06/25/11 16:26 Date/Time Received: 06/27/11 13:16

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Cadmium	< 5.0	ug/L	07/09/11	EPA 200.8
Lead	< 3.0	ug/L	07/09/11	EPA 200.8

Reporting Analyst: JAB
Date Reported: 07/13/11
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Kansas Department of Health and Environment

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 563099
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADES ALUMINUM SW-2A
Collector: OHALLORAN Matrix: Water Collect Depth:
Date/Time Collected: 06/25/11 15:41 Date/Time Received: 06/27/11 13:16

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Cadmium	< 5.0	ug/L	07/09/11	EPA 200.8
Lead	4.7	ug/L	07/09/11	EPA 200.8

Reporting Analyst: JAB
Date Reported: 07/13/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 563100
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADES ALUMINUM SW-3A
Collector: OHALLORAN Matrix: Water Collect Depth:
Date/Time Collected: 06/25/11 15:54 Date/Time Received: 06/27/11 13:17

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Cadmium	< 1.0	ug/L	07/09/11	EPA 200.8
Lead	< 1.0	ug/L	07/09/11	EPA 200.8

Reporting Analyst: JAB
Date Reported: 07/13/11
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Kansas Department of Health and Environment

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 563101
Site ID: 4EM80
Account Code: EB

Collection Location: C3-006-03010 WADES ALUMINUM SW-4A
Collector: OHALLORAN Matrix: Water Collect Depth:
Date/Time Collected: 06/25/11 16:10 Date/Time Received: 06/27/11 13:18

Sample Comments:

Parameter	Analytical Result	Units	Analysis Date	Analytical Method
Cadmium	< 1.0	ug/L	07/09/11	EPA 200.8
Lead	< 1.0	ug/L	07/09/11	EPA 200.8

Reporting Analyst: JAB
Date Reported: 07/13/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561607
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S ALUMINUM SD-1
Collector: BER Matrix: Sediment/Sludge Collect Depth:
Date/Time Collected: 05/04/11 15:10 Date/Time Received: 05/16/11 12:23

Sample Comments:

Parameter	Analytical Result		Units	Analysis Date	Analytical Method
Aluminum (Total)	13000		mg/Kg	06/03/11	EPA 6010
Antimony (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Arsenic (Total)	42	38	mg/Kg	06/03/11	EPA 6010
Barium (Total)	2300		mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	2.3		mg/Kg	06/03/11	EPA 6010
Boron (Total)	6.1		mg/Kg	06/03/11	EPA 6010
Cadmium (Total)	4.2	965	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	63000		mg/Kg	06/03/11	EPA 6010
Chromium (Total)	26	43.4	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	190		mg/Kg	06/03/11	EPA 6010
Copper (Total)	360		mg/Kg	06/03/11	EPA 6010
Iron (Total)	91000		mg/Kg	06/16/11	EPA 6010
Lead (Total)	210	1000	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	3500		mg/Kg	06/03/11	EPA 6010
Manganese (Total)	27000		mg/Kg	06/16/11	EPA 6010
Mercury (Total)	< 0.050		mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	15		mg/Kg	06/03/11	EPA 6010
Nickel (Total)	240		mg/Kg	06/03/11	EPA 6010
Percent Solids	82		Percent	05/23/11	EPA 1311
Potassium (Total)	5100		mg/Kg	06/03/11	EPA 6010
Selenium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Silica (Total)	2700		mg/Kg	06/03/11	EPA 6010
Silver (Total)	< 1.0		mg/Kg	06/03/11	EPA 6010
Sodium (Total)	1600		mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	91		mg/Kg	06/03/11	EPA 6010
Zinc (Total)	180	612,000	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
Forbes Field, Bldg. 740, Topeka, Kansas 66620-0001

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561605
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S ALUMINUM SD-2
Collector: BER
Date/Time Collected: 05/04/11 15:45
Matrix: Sediment/Sludge Collect Depth:
Date/Time Received: 05/16/11 12:22

Sample Comments:

Parameter	Analytical Result		Units	Analysis Date	Analytical Method
Aluminum (Total)	20000		mg/Kg	06/03/11	EPA 6010
Antimony (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Arsenic (Total)	30	38	mg/Kg	06/03/11	EPA 6010
Barium (Total)	960		mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	1.9		mg/Kg	06/03/11	EPA 6010
Boron (Total)	13		mg/Kg	06/03/11	EPA 6010
Cadmium (Total)	1.9	965	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	41000		mg/Kg	06/03/11	EPA 6010
Chromium (Total)	41	43.4	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	110		mg/Kg	06/03/11	EPA 6010
Copper (Total)	620		mg/Kg	06/03/11	EPA 6010
Iron (Total)	60000		mg/Kg	06/16/11	EPA 6010
Lead (Total)	180	1000	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	4400		mg/Kg	06/03/11	EPA 6010
Manganese (Total)	11000		mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050		mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	9.8		mg/Kg	06/03/11	EPA 6010
Nickel (Total)	160		mg/Kg	06/03/11	EPA 6010
Percent Solids	62		Percent	05/23/11	EPA 1311
Potassium (Total)	7000		mg/Kg	06/03/11	EPA 6010
Selenium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Silica (Total)	3600		mg/Kg	06/03/11	EPA 6010
Silver (Total)	< 1.0		mg/Kg	06/03/11	EPA 6010
Sodium (Total)	3400		mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	74		mg/Kg	06/03/11	EPA 6010
Zinc (Total)	150	613,000	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561608
Site ID: 4EM80
Account Code: EB

Collection Location: WADE'S ALUMINUM SD-3
Collector: BER
Date/Time Collected: 05/04/11 16:00
Matrix: Sediment/Sludge Collect Depth:
Date/Time Received: 05/16/11 12:23

Sample Comments:

Parameter	Analytical Result		Units	Analysis Date	Analytical Method
Aluminum (Total)	12000		mg/Kg	06/03/11	EPA 6010
Antimony (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Arsenic (Total)	10	3.78	mg/Kg	06/03/11	EPA 6010
Barium (Total)	150		mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	0.95		mg/Kg	06/03/11	EPA 6010
Boron (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Cadmium (Total)	4.8	.99	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	42000		mg/Kg	06/03/11	EPA 6010
Chromium (Total)	30	43.4	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	14		mg/Kg	06/03/11	EPA 6010
Copper (Total)	250		mg/Kg	06/03/11	EPA 6010
Iron (Total)	27000		mg/Kg	06/03/11	EPA 6010
Lead (Total)	35	35.8	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	2300		mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1200		mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050		mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	3.4		mg/Kg	06/03/11	EPA 6010
Nickel (Total)	38		mg/Kg	06/03/11	EPA 6010
Percent Solids	63		Percent	05/23/11	EPA 1311
Potassium (Total)	2100		mg/Kg	06/03/11	EPA 6010
Selenium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Silica (Total)	3200		mg/Kg	06/03/11	EPA 6010
Silver (Total)	< 1.0		mg/Kg	06/03/11	EPA 6010
Sodium (Total)	120		mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	46		mg/Kg	06/03/11	EPA 6010
Zinc (Total)	1000	121	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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Kansas Department of Health and Environment
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REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: BUREAU OF ENV. REMEDIATION
ATTN MAURA OHALLORAN
CURTIS SOB, SUITE 410
TOPEKA KS 66612

Analysis Code: PT Lab Number: 561606

4EM80
Site ID:
Account Code: EB

Collection Location: WADE'S ALUMINUM SD-4
Collector: BER
Date/Time Collected: 05/04/11 16:15

Matrix: Sediment/Sludge Collect Depth:
Date/Time Received: 05/16/11 12:22

Sample Comments:

Parameter	Analytical Result		Units	Analysis Date	Analytical Method
Aluminum (Total)	13000		mg/Kg	06/03/11	EPA 6010
Antimony (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Arsenic (Total)	9.8	9.79	mg/Kg	06/03/11	EPA 6010
Barium (Total)	120		mg/Kg	06/03/11	EPA 6010
Beryllium (Total)	0.87		mg/Kg	06/03/11	EPA 6010
Boron (Total)	6.4		mg/Kg	06/03/11	EPA 6010
Cadmium (Total)	< 1.0	.99	mg/Kg	06/03/11	EPA 6010
Calcium (Total)	59000		mg/Kg	06/03/11	EPA 6010
Chromium (Total)	20	93.4	mg/Kg	06/03/11	EPA 6010
Cobalt (Total)	17		mg/Kg	06/03/11	EPA 6010
Copper (Total)	260		mg/Kg	06/03/11	EPA 6010
Iron (Total)	29000		mg/Kg	06/03/11	EPA 6010
Lead (Total)	26	35.8	mg/Kg	06/03/11	EPA 6010
Magnesium (Total)	6000		mg/Kg	06/03/11	EPA 6010
Manganese (Total)	1200		mg/Kg	06/03/11	EPA 6010
Mercury (Total)	< 0.050		mg/Kg	05/26/11	EPA 245.1
Molybdenum (Total)	2.2		mg/Kg	06/03/11	EPA 6010
Nickel (Total)	63		mg/Kg	06/03/11	EPA 6010
Percent Solids	65		Percent	05/23/11	EPA 1311
Potassium (Total)	3100		mg/Kg	06/03/11	EPA 6010
Selenium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Silica (Total)	3700		mg/Kg	06/03/11	EPA 6010
Silver (Total)	< 1.0		mg/Kg	06/03/11	EPA 6010
Sodium (Total)	220		mg/Kg	06/03/11	EPA 6010
Thallium (Total)	< 5.0		mg/Kg	06/03/11	EPA 6010
Vanadium (Total)	20		mg/Kg	06/03/11	EPA 6010
Zinc (Total)	160	121	mg/Kg	06/03/11	EPA 6010

Analytical Comments:
Results for total metals are expressed on a dry weight basis.

Reporting Analyst: JAB
Date Reported: 06/27/11
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THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Nashville
2960 Foster Creighton Road
Nashville, TN 37204
Tel: 800-765-0980

TestAmerica Job ID: NUI1290
Client Project/Site: 006-03010
Client Project Description: Wade's Aluminum

For:
KDHE-Kansas Dept of Health & Environment(1376531)
Curtis State Office Building 100 SW Jackson Street; Suite 410
Topeka, KS 66612

Attn: Maura OHalloran

Heather L Baker

Authorized for release by:
09/15/2011 05:16:30 PM

Heather L Baker
Project Manager
Heather.Baker@testamericainc.com

Links
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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
NUI1290-01	Drum Group F - Cr	Soil	09/08/11 15:25	09/10/11 11:00
NUI1290-02	WP-14 - Cr	Soil	09/08/11 15:33	09/10/11 11:00
NUI1290-03	WP-30 - Cr	Soil	09/08/11 15:46	09/10/11 11:00

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional initial metals/anion analysis of the sample
EDL	Estimated Detection Limit (Dioxin)
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or method detection limit if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: Drum Group F - Cr — **Lab Sample ID: NUI1290-01**
Date Collected: 09/08/11 15:25 — **Matrix: Soil**
Date Received: 09/10/11 11:00

Method: SW846 6010B - Total Metals by EPA Method 6010B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	528		9.71		mg/kg		09/13/11 13:00	09/14/11 09:35	10.0

Method: SW846 7196A - General Chemistry Parameters

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium (VI)	ND		2.00		mg/kg		09/15/11 09:12	09/15/11 09:12	1.00

Client Sample Results

Client: KDHE-Kansas Dept of Health & Environment(1376531)
Project/Site: 006-03010

TestAmerica Job ID: NUI1290

Client Sample ID: WP-14 - Cr
Date Collected: 09/08/11 15:33
Date Received: 09/10/11 11:00

Lab Sample ID: NUI1290-02
Matrix: Soil

5

Method: SW846 6010B - Total Metals by EPA Method 6010B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	223		0.975		mg/kg		09/13/11 13:00	09/13/11 20:34	1.00

Method: SW846 7196A - General Chemistry Parameters

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium (VI)	ND		2.00		mg/kg		09/15/11 09:12	09/15/11 09:12	1.00

Client Sample Results

Client: KDHE-Kansas Dept of Health & Environment(1376531)
Project/Site: 006-03010

TestAmerica Job ID: NUI1290

Client Sample ID: WP-30 - Cr
Date Collected: 09/08/11 15:46
Date Received: 09/10/11 11:00

Lab Sample ID: NUI1290-03
Matrix: Soil

5

Method: SW846 6010B - Total Metals by EPA Method 6010B

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	128		0.998		mg/kg		09/13/11 13:00	09/13/11 20:49	1.00

Method: SW846 7196A - General Chemistry Parameters

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium (VI)	ND		2.00		mg/kg		09/15/11 09:12	09/15/11 09:12	1.00

Method: SW846 6010B - Total Metals by EPA Method 6010B

Lab Sample ID: 11I2238-BLK1 — Client Sample ID: Method Blank
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2238 — Prep Batch: 11I2238_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium	ND		0.986		mg/kg		09/13/11 13:00	09/13/11 20:08	1.00

Lab Sample ID: 11I2238-BS1 — Client Sample ID: Lab Control Sample
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2238 — Prep Batch: 11I2238_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chromium	78.7	78.7		mg/kg		100	80 - 120

Lab Sample ID: 11I2238-MS1 — Client Sample ID: Matrix Spike
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2238 — Prep Batch: 11I2238_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Chromium	50.2		79.7	126		mg/kg		95	75 - 125

Lab Sample ID: 11I2238-MSD1 — Client Sample ID: Matrix Spike Duplicate
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2238 — Prep Batch: 11I2238_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Chromium	50.2		76.2	121		mg/kg		93	75 - 125	4	20

Method: SW846 7196A - General Chemistry Parameters

Lab Sample ID: 11I2755-BLK1 — Client Sample ID: Method Blank
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2755 — Prep Batch: 11I2755_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium (VI)	ND		2.00		mg/kg		09/15/11 09:12	09/15/11 09:12	1.00

Lab Sample ID: 11I2755-BS1 — Client Sample ID: Lab Control Sample
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2755 — Prep Batch: 11I2755_P

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Chromium (VI)	40.0	43.3		mg/kg		108	80 - 120

Lab Sample ID: 11I2755-MS1 — Client Sample ID: Matrix Spike
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2755 — Prep Batch: 11I2755_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits
Chromium (VI)	ND		40.0	39.3		mg/kg		98	75 - 125

Method: SW846 7196A - General Chemistry Parameters (Continued)

Lab Sample ID: 11I2755-MSD1 — Client Sample ID: Matrix Spike Duplicate
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2755 — Prep Batch: 11I2755_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Chromium (VI)	ND		40.0	39.4		mg/kg		98	75 - 125	0.2	20

Lab Sample ID: 11I2755-DUP1 — Client Sample ID: Duplicate
Matrix: Soil — Prep Type: Total
Analysis Batch: 11I2755 — Prep Batch: 11I2755_P

Analyte	Sample Result	Sample Qualifier	Duplicate Result	Duplicate Qualifier	Unit	D	RPD	RPD Limit
Chromium (VI)	ND		ND		mg/kg			20

QC Association Summary

Client: KDHE-Kansas Dept of Health & Environment(1376531)
Project/Site: 006-03010

TestAmerica Job ID: NUI1290

Metals

Analysis Batch: 11I2238

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
11I2238-BLK1	Method Blank	Total	Soil	SW846 6010B	11I2238_P
11I2238-BS1	Lab Control Sample	Total	Soil	SW846 6010B	11I2238_P
11I2238-MS1	Matrix Spike	Total	Soil	SW846 6010B	11I2238_P
11I2238-MSD1	Matrix Spike Duplicate	Total	Soil	SW846 6010B	11I2238_P
NUI1290-01	Drum Group F - Cr	Total	Soil	SW846 6010B	11I2238_P
NUI1290-02	WP-14 - Cr	Total	Soil	SW846 6010B	11I2238_P
NUI1290-03	WP-30 - Cr	Total	Soil	SW846 6010B	11I2238_P

Prep Batch: 11I2238_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
11I2238-BLK1	Method Blank	Total	Soil	EPA 3051A/6010	
11I2238-BS1	Lab Control Sample	Total	Soil	EPA 3051A/6010	
11I2238-MS1	Matrix Spike	Total	Soil	EPA 3051A/6010	
11I2238-MSD1	Matrix Spike Duplicate	Total	Soil	EPA 3051A/6010	
NUI1290-01	Drum Group F - Cr	Total	Soil	EPA 3051A/6010	
NUI1290-02	WP-14 - Cr	Total	Soil	EPA 3051A/6010	
NUI1290-03	WP-30 - Cr	Total	Soil	EPA 3051A/6010	

WetChem

Analysis Batch: 11I2755

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
11I2755-BLK1	Method Blank	Total	Soil	SW846 7196A	11I2755_P
11I2755-BS1	Lab Control Sample	Total	Soil	SW846 7196A	11I2755_P
11I2755-DUP1	Duplicate	Total	Soil	SW846 7196A	11I2755_P
11I2755-MS1	Matrix Spike	Total	Soil	SW846 7196A	11I2755_P
11I2755-MSD1	Matrix Spike Duplicate	Total	Soil	SW846 7196A	11I2755_P
11I2755-PS1	NUI1043-01	Total	Soil	SW846 7196A	11I2755_P
NUI1290-01	Drum Group F - Cr	Total	Soil	SW846 7196A	11I2755_P
NUI1290-02	WP-14 - Cr	Total	Soil	SW846 7196A	11I2755_P
NUI1290-03	WP-30 - Cr	Total	Soil	SW846 7196A	11I2755_P

Prep Batch: 11I2755_P

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
11I2755-BLK1	Method Blank	Total	Soil	NO PREP	
11I2755-BS1	Lab Control Sample	Total	Soil	NO PREP	
11I2755-DUP1	Duplicate	Total	Soil	NO PREP	
11I2755-MS1	Matrix Spike	Total	Soil	NO PREP	
11I2755-MSD1	Matrix Spike Duplicate	Total	Soil	NO PREP	
11I2755-PS1	NUI1043-01	Total	Soil	NO PREP	
NUI1290-01	Drum Group F - Cr	Total	Soil	NO PREP	
NUI1290-02	WP-14 - Cr	Total	Soil	NO PREP	
NUI1290-03	WP-30 - Cr	Total	Soil	NO PREP	

Lab Chronicle

Client: KDHE-Kansas Dept of Health & Environment(1376531)
Project/Site: 006-03010

TestAmerica Job ID: NUI1290

Client Sample ID: Drum Group F - Cr — Lab Sample ID: NUI1290-01

Date Collected: 09/08/11 15:25
Date Received: 09/10/11 11:00
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	EPA 3051A/6010		0.971	11I2238_P	09/13/11 13:00	CAT	TAL NSH
Total	Analysis	SW846 6010B		10.0	11I2238	09/14/11 09:35	AVR	TAL NSH
Total	Analysis	SW846 7196A		1.00	11I2755	09/15/11 09:12	TCB	TAL NSH
Total	Prep	NO PREP		1.00	11I2755_P	09/15/11 09:12	TCB	TAL NSH

Client Sample ID: WP-14 - Cr — Lab Sample ID: NUI1290-02

Date Collected: 09/08/11 15:33
Date Received: 09/10/11 11:00
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	EPA 3051A/6010		0.975	11I2238_P	09/13/11 13:00	CAT	TAL NSH
Total	Analysis	SW846 6010B		1.00	11I2238	09/13/11 20:34	AVR	TAL NSH
Total	Analysis	SW846 7196A		1.00	11I2755	09/15/11 09:12	TCB	TAL NSH
Total	Prep	NO PREP		1.00	11I2755_P	09/15/11 09:12	TCB	TAL NSH

Client Sample ID: WP-30 - Cr — Lab Sample ID: NUI1290-03

Date Collected: 09/08/11 15:46
Date Received: 09/10/11 11:00
Matrix: Soil

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total	Prep	EPA 3051A/6010		0.996	11I2238_P	09/13/11 13:00	CAT	TAL NSH
Total	Analysis	SW846 6010B		1.00	11I2238	09/13/11 20:49	AVR	TAL NSH
Total	Analysis	SW846 7196A		1.00	11I2755	09/15/11 09:12	TCB	TAL NSH
Total	Prep	NO PREP		1.00	11I2755_P	09/15/11 09:12	TCB	TAL NSH

Laboratory References:
TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Road, Nashville, TN 37204, TEL 800-765-0980

Method Summary

Client: KDHE-Kansas Dept of Health & Environment(1376531)
Project/Site: 006-03010

TestAmerica Job ID: NUI1290

Method	Method Description	Protocol	Laboratory
SW846 6010B	Total Metals by EPA Method 6010B		TAL NSH
SW846 7196A	General Chemistry Parameters		TAL NSH

Protocol References:

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Road, Nashville, TN 37204, TEL 800-765-0980

Certification Summary

Client: KDHE-Kansas Dept of Health & Environment(1376531)
Project/Site: 006-03010

TestAmerica Job ID: NUI1290

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Nashville	A2LA	ISO/IEC 17025		0453.07
TestAmerica Nashville	A2LA	WY UST		453.07
TestAmerica Nashville	AIHA	IHLAP		100790
TestAmerica Nashville	Alabama	State Program	4	41150
TestAmerica Nashville	Alaska	Alaska UST	10	UST-087
TestAmerica Nashville	Arizona	State Program	9	AZ0473
TestAmerica Nashville	Arkansas	State Program	6	88-0737
TestAmerica Nashville	CALA	CALA		3744
TestAmerica Nashville	California	NELAC	9	1168CA
TestAmerica Nashville	Colorado	State Program	8	N/A
TestAmerica Nashville	Connecticut	State Program	1	PH-0220
TestAmerica Nashville	Florida	NELAC	4	E87358
TestAmerica Nashville	Illinois	NELAC	5	200010
TestAmerica Nashville	Iowa	State Program	7	131
TestAmerica Nashville	Kansas	NELAC	7	E-10229
TestAmerica Nashville	Kentucky	Kentucky UST	4	19
TestAmerica Nashville	Kentucky	State Program	4	90038
TestAmerica Nashville	Louisiana	NELAC	6	30613
TestAmerica Nashville	Louisiana	NELAC	6	LA100011
TestAmerica Nashville	Maryland	State Program	3	316
TestAmerica Nashville	Massachusetts	State Program	1	M-TN032
TestAmerica Nashville	Minnesota	NELAC	5	047-999-345
TestAmerica Nashville	Mississippi	State Program	4	N/A
TestAmerica Nashville	Montana	MT DEQ UST	8	NA
TestAmerica Nashville	Nevada	State Program	9	TN00032
TestAmerica Nashville	New Hampshire	NELAC	1	2963
TestAmerica Nashville	New Jersey	NELAC	2	TN965
TestAmerica Nashville	New York	NELAC	2	11342
TestAmerica Nashville	North Carolina	North Carolina DENR	4	387
TestAmerica Nashville	North Dakota	State Program	8	R-146
TestAmerica Nashville	Ohio	OVAP	5	CL0033
TestAmerica Nashville	Oklahoma	State Program	6	9412
TestAmerica Nashville	Oregon	NELAC	10	TN200001
TestAmerica Nashville	Pennsylvania	NELAC	3	68-00585
TestAmerica Nashville	Rhode Island	State Program	1	LAO00268
TestAmerica Nashville	South Carolina	State Program	4	84009
TestAmerica Nashville	South Carolina	State Program	4	84009
TestAmerica Nashville	Tennessee	State Program	4	2008
TestAmerica Nashville	Texas	NELAC	6	T104704077-09-TX
TestAmerica Nashville	USDA	USDA		S-48469
TestAmerica Nashville	Utah	NELAC	8	TAN
TestAmerica Nashville	Virginia	NELAC Secondary AB	3	460152
TestAmerica Nashville	Virginia	State Program	3	00323
TestAmerica Nashville	Washington	State Program	10	C789
TestAmerica Nashville	West Virginia	West Virginia DEP	3	219

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Nashville, TN

COOLER REC

NUI1290

Cooler Received/Opened On 9/10/2011 @ 1100

1. Tracking # 1137 (last 4 digits, FedEx)

Courier: FedEx IR Gun ID 97310166

2. Temperature of rep. sample or temp blank when opened: 1.4 Degrees Celsius
3. If item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO (NA)
4. Were custody seals on outside of cooler? (YES)...NO...NA
   If yes, how many and where: One front
5. Were the seals intact, signed, and dated correctly? (YES)...NO...NA
6. Were custody papers inside cooler? (YES)...NO...NA

I certify that I opened the cooler and answered questions 1-6 (intial) DA

7. Were custody seals on containers: YES (NO) and Intact YES...NO...(NA)
   Were these signed and dated correctly? YES...NO...(NA)
8. Packing mat'l used? (Bubblewrap) Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
9. Cooling process: (Ice) Ice-pack Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)? (YES)...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)? (YES)...NO...NA
12. Did all container labels and tags agree with custody papers? (YES)...NO...NA

13a. Were VOA vials received? YES...(NO)...NA

b. Was there any observable headspace present in any VOA vial? YES...NO...(NA)

14. Was there a Trip Blank in this cooler? YES...NO...(NA) If multiple coolers, sequence # ______

I certify that I unloaded the cooler and answered questions 7-14 (intial) P.H.

15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...(NA)

b. Did the bottle labels indicate that the correct preservatives were used YES...NO...(NA)

16. Was residual chlorine present? YES...NO...(NA)

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (intial) P.H.

17. Were custody papers properly filled out (ink, signed, etc)? (YES)...NO...NA
18. Did you sign the custody papers in the appropriate place? (YES)...NO...NA
19. Were correct containers used for the analysis requested? (YES)...NO...NA
20. Was sufficient amount of sample sent in each container? (YES)...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (intial) P.H.

I certify that I attached a label with the unique LIMS number to each container (intial) P.H.

21. Were there Non-Conformance issues at login? (YES)...NO Was a PIPE generated? (YES)...NO...# 60783

BIS = Broken in shipment
Cooler Receipt Form.doc

LF-1
End of Form

Revised 6/24/09

09/15/2011

>>> Select a Laboratory Here <<<

#N/A
#N/A
#N/A
#N/A

NUI1290
09/15/11 23:59

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Chain of Custody Record

TestAmerica Laboratories, Inc.

Client Contact								
Your Company Name here: KDHE/BER	Project Manager: Maura Ohalloran	Site Contact: Ohalloran	Date: 8/9/11	COC No: ___ of ___ COCs				
Address: 1000 SW Jackson ST 410	Tel/Fax: 785 296-0268	Lab Contact:	Carrier:	Job No.				
City/State/Zip: Topeka KS 66612-1367	Analysis Turnaround Time							
785-296-0268 phone	Calendar (C) or Work Days (W) W			SDG No.				
785-296-7030 fax	TAT if different from Below 72 hrs							
Project Name: Wades Aluminum	2 weeks (40% surcharge per contract)							
Site: 006-03010	1 week							
P O #	2 days							
	1 day							

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample	EPA 6010 Total Chromium	EPA 7196 Cr +6	Sample Specific Notes
Drum Group F - Cr	8/8/11	15:25	Comp	S	1		✓	✓	
WP-14 - Cr	8/8/11	15:33	Comp	S	1		✓	✓	
WP-30 - Cr	8/8/11	15:46	Comp	S	1		✓	✓	
S3-7 - Cr	8/8/11	15:40	Comp	S	1		✓	✓	Pls hold pending results from 1st 3 samples
S6-3 - Cr	8/8/11	15:50	Comp	S	1		✓	✓	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other 1

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month): ☐ Return To Client ☒ Disposal By Lab ☐ Archive For ___ Months

Special Instructions/QC Requirements & Comments: Please hold S3-7-Cr and S6-3-Cr until results from 1st three samples are reported

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]	KDHE/BER	8/9/11 11:50	Mike Pa Beale	KDHE	8/9/11 1150
Michael Pa Beale	KDHE	9/9/11 1311	M. Okwodox	TA	9/9/11 1313
			Paul R. Mill	TestAmerica	9/10/11 11:00 1.4°C

Form No. CA-C-WI-002, dated 04/07/2011

09/15/11

X_ID	Y_ID	Depth_ID	XRF_Read	Pb	Cd	As	Zn
0.5	10	1	250	42	-99	-99	134
0.5	10	1	251	30	-99	14	146
0.5	10	1	252	30	-99	-99	145
0.75	10	1	268	21	-99	-99	108
0.75	10	1	269	27	-99	-99	111
0.75	10	1	270	21	-99	13	129
1	10	1	80	2199	-99	84	19400
1	10	1	81	1403	-99	65	13300
1	10	1	82	2134	-99	-99	16600
1	11	1	83	386	-99	-99	3765
1	11	1	84	309	-99	-99	3351
1	11	1	85	287	-99	-99	2522
1	12	1	86	579	-99	-99	10200
1	12	1	87	576	-99	-99	8724
1	12	1	88	578	-99	-99	10100
1	9	1	89	233	-99	-99	3524
1	9	1	90	239	-99	-99	3741
1	9	1	91	261	-99	-99	3433
1	8	1	92	44	-99	-99	197
1	8	1	93	52	-99	-99	181
1	8	1	94	49	-99	-99	222
1	9	9	101	170	-99	-99	2701
1	9	9	102	202	-99	-99	2630
1	9	9	103	175	-99	-99	2615
1	10	9	104	2810	-99	-99	27000
1	10	9	105	1600	-99	-99	12300
1	10	9	106	1882	-99	-99	13200
1	11	9	107	291	-99	-99	2398
1	11	9	108	267	-99	-99	2695
1	11	9	109	250	-99	-99	2474
1	12	9	110	473	-99	-99	7384
1	12	9	111	366	-99	-99	6256
1	12	9	112	388	-99	26	6505
1	7	1	113	44	-99	-99	127
1	7	1	114	61	-99	-99	115
1	7	1	115	53	-99	-99	113
1	10.25	1	274	74	-99	-99	841
1	10.25	1	275	95	-99	-99	1063
1	10.25	1	276	69	-99	-99	815
1	13	1	96	33	-99	-99	99
1	13	1	97	34	-99	-99	88
1	13	1	98	28	-99	-99	148
1	2	1	132	78	-99	-99	439
1	2	1	133	52	-99	-99	343
1	2	1	134	73	-99	-99	450
1	3	1	138	54	-99	-99	323
1	1	1	174	49	-99	-99	139
1	1	1	175	42	-99	-99	150
1	3	1	139	43	-99	-99	257
1	3	1	140	37	-99	-99	272
1	4	1	141	76	-99	-99	444

1	4	1	142	91	-99	-99	405	
1	4	1	143	67	-99	-99	400	
1	5	1	144	223	-99	26	1788	227
1	5	1	145	238	-99	-99	1865	
1	5	1	146	222	-99	-99	1829	
1	6	1	147	42	-99	-99	198	
1	6	1	148	56	-99	-99	214	
1	6	1	149	63	-99	-99	207	
1	1	1	176	51	-99	-99	162	
1	9.5	1	253	76	-99	-99	360	
1	9.5	1	254	55	-99	-99	338	
1	9.5	1	255	51	-99	-99	260	
1	10.5	1	256	45	-99	14	343	
1	10.5	1	257	50	-99	-99	235	
1	10.5	1	258	61	-99	-99	243	
1	12	1	86	579	-99	-99	10200	
1	12	1	87	576	-99	-99	8724	578
1	12	1	88	578	-99	-99	10100	
1.5	3	1	208	730	-99	-99	9677	
1.5	3	1	209	689	-99	-99	8601	
1.5	3	1	210	751	-99	-99	8804	
1.5	7	1	245	49	-99	-99	203	
1.5	7	1	246	388	-99	-99	227	
1.5	7	1	247	50	-99	-99	247	
1.5	4	1	4	83	-99	-99	675	
1.5	4	1	5	68	-99	-99	531	
1.5	4	1	6	86	-99	-99	709	
1.75	4	1	280	648	-99	-99	5499	
1.75	4	1	281	766	32	-99	6440	
1.75	4	1	282	590	22	29	5129	
2	2.5	1	65	143	-99	-99	1649	
2	2.5	1	66	147	-99	-99	1647	
2	2.5	1	67	230	-99	-99	2486	
2	6.5	1	68	832	-99	-99	6116	
2	6.5	1	69	1013	-99	-99	6451	
2	6.5	1	70	862	-99	-99	5839	
2	10.5	1	71	767	-99	-99	5325	
2	10.5	1	72	775	-99	-99	4874	
2	10.5	1	73	825	-99	-99	5133	
2	3.5	1	202	412	-99	32	4290	
2	3.5	1	203	401	23	-99	4587	
2	3.5	1	204	428	-99	-99	4590	
2	1	1	78	59	-99	-99	325	
2	1	1	79	74	-99	22	333	
2	1	1	80	39	-99	-99	214	
2	2	1	81	36	-99	-99	390	
2	2	1	82	43	-99	-99	373	
2	2	1	83	53	-99	-99	458	
2	3	1	84	432	-99	-99	3998	
2	3	1	85	475	-99	40	4178	
2	3	1	86	559	-99	-99	4917	
2	4	1	87	2022	44	108	12300	2044

2	4	1	88	2238	54	116	13200	
2	4	1	89	1872	41	90	7800	
2	5	1	90	75	-99	-99	503	
2	5	1	91	95	-99	-99	532	
2	7	1	5	522	-99	-99	7369	
2	7	1	6	519	-99	-99	7307	
2	7	1	7	485	-99	48	7510	
2	8	1	8	323	-99	-99	4043	
2	8	1	9	322	-99	26	4682	
2	8	1	10	212	-99	-99	2681	
2	9	1	11	721	-99	-99	5475	
2	9	1	12	696	-99	-99	5065	
2	9	1	13	668	-99	38	5643	
2	10	1	14	1004	-99	-99	12000	
2	10	1	15	1266	-99	-99	12900	
2	10	1	16	1507	-99	100	11600	
2	9.75	1	248	950	-99	55	9159	
2	9.75	1	249	1128	-99	-99	10100	
2	9.75	1	250	1178	-99	-99	9569	
2	10.25	1	262	766	-99	36	77666	
2	10.25	1	263	862	-99	-99	11700	
2	10.25	1	264	897	-99	-99	8678	842
2	5	1	92	80	-99	-99	519	
2	6	1	93	131	-99	-99	1137	
2	6	1	94	144	-99	-99	1549	
2	6	1	95	109	-99	21	915	
2	13	1	99	34	-99	-99	915	
2	13	1	100	24	-99	-99	671	
2	13	1	101	40	-99	-99	935	
2	11	1	102	149	-99	27	1099	
2	11	1	103	205	-99	32	1570	
2	11	1	104	201	-99	33	1718	
2	12	1	156	318	-99	-99	731	
2	12	1	157	268	-99	-99	600	
2	12	1	158	251	-99	-99	726	
2	7.5	1	265	149	28	-99	1260	
2	7.5	1	266	155	-99	-99	1215	
2	7.5	1	267	149	-99	-99	1365	
2	9.5	1	268	762	-99	37	6108	
2	9.5	1	269	670	-99	-99	6307	
2	9.5	1	271	718	-99	-99	5833	
2	4.5	1	330	724	-99	-99	7420	
2	4.5	1	331	683	36	-99	7462	
2	4.5	1	332	662	25	-99	7357	
2.5	6	1	74	106	-99	-99	1225	
2.5	6	1	75	97	-99	-99	1234	
2.5	6	1	76	156	-99	-99	1789	
2.5	6.5	1	77	418	-99	-99	4470	439
2.5	6.5	1	78	471	-99	-99	5036	
2.5	6.5	1	79	429	-99	-99	4517	
2.5	7	1	80	440	-99	-99	5730	
2.5	7	1	81	457	-99	-99	4739	

2.5	7	1	82	471	-99	-99	5132	
2.5	3	1	265	273	-99	23	3129	
2.5	3	1	266	245	-99	-99	2775	
2.5	3	1	267	258	-99	-99	3232	
2.5	3	2		0	0	0	0	
2.5	5	1	318	35	-99	-99	769	
2.5	5	1	319	39	-99	-99	767	
2.5	5	1	320	69	-99	-99	1045	
3	1	1	95	141	-99	-99	1260	
3	1	1	96	130	-99	-99	1136	
3	1	1	97	129	-99	-99	1157	
3	2	1	98	251	-99	31	3826	
3	2	1	99	230	-99	28	3420	
3	2	1	100	302	-99	-99	4296	
3	3	1	116	316	-99	-99	4048	
3	3	1	117	315	-99	24	4593	
3	3	1	118	282	-99	22	4164	
3	4	1	119	2236	-99	-99	11400	
3	4	1	120	27500	59	1473	19500	
3	4	1	121	2095	34	96	15100	
3	5	1	126	2041	-99	-99	8949	
3	5	1	127	1919	38	-99	8951	
3	5	1	128	2219	-99	163	10200	
3	6	1	129	837	33	78	17000	
3	6.5	1	96	707	-99	34	6927	
3	6.5	1	97	625	-99	-99	7356	
3	6.5	1	98	742	-99	51	9386	
3	9.75	1	205	310	-99	-99	2243	
3	9.75	1	206	273	-99	-99	2625	
3	9.75	1	207	232	-99	-99	2062	
3	6	1	130	914	-99	55	13700	
3	6	1	131	810	-99	-99	12900	
3	3.75	1	271	453	-99	-99	1619	
3	3.75	1	272	333	-99	37	5476	
3	3.75	1	273	416	-999	-99	5250	
3	10.25	1	277	413	-99	41	21100	
3	10.25	1	278	529	-99	-99	2498	
3	10.25	1	279	450	-99	-99	1791	
3	11	1	105	83	-99	-99	435	
3	11	1	106	65	-99	-99	445	
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Drum	T	0	0	504	-99	-99	4254	
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Drum	U	0	0	495	-99	-99	4024	
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w	0	3	240	-99	-99	-99	112	
w	0	3	241	15	-99	-99	123	
w	0	4	242	-99	-99	-99	71	
w	0	4	243	-99	-99	-99	-99	
w	0	4	244	-99	-99	-99	73	
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w	000	1	257	-99	-99	-99	-99	
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W	2	9	126	152	-99	-99	277	
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WP	7	4	234	82	-99	25	661	
WP	7	4	235	84	-99	15	695	
wp	6	2	293	427	-99	28	7131	
wp	6	2	294	460	-99	33	9255	
wp	6	2	295	398	-99	-99	12100	
WP	6	3	296	17	-99	-99	827	
WP	6	3	297	23	30	-99	386	
WP	6	3	298	23	-99	-99	520	
wp	6	4	4	11	-99	-99	78	
wp	6	4	5	-99	-99	-99	186	
wp	6	4	6	-99	-99	-99	163	
wp	12	4	7	54	-99	14	161	
wp	12	4	8	40	-99	14	134	
wp	12	4	9	46	-99	-99	139	
wp	4	2	10	128	-99	-99	1289	
wp	4	2	11	62	-99	-99	656	
wp	4	2	12	137	-99	-99	1602	
wp	4	3	13	19	-99	-99	137	
wp	4	3	14	22	-99	-99	162	
wp	4	3	15	-99	-99	-99	157	
wp	4	4	16	-99	-99	-99	358	
wp	4	4	17	14	-99	13	616	
wp	4	4	18	18	-99	-99	534	
wp	32	1	19	22	-99	18	99	
wp	32	1	20	31	-99	-99	252	
wp	32	1	21	28	-99	-99	94	
wp	4	5	22	208	-99	-99	4818	
wp	4	5	23	203	-99	-99	4091	
wp	4	5	24	284	-99	-99	4555	
wp	32	2	28	192	-99	-99	3440	
wp	32	2	29	167	-99	-99	3551	
wp	32	2	30	215	-99	-99	3424	
wp	32	3	31	267	-99	-99	7016	
wp	32	3	32	175	-99	-99	3123	
WP	1	9	229	418	25	-99	12800	421
WP	1	9	230	432	-99	-99	12100	
WP	1	9	231	414	-99	-99	11700	
WP	2	9	232	271	-99	-99	7211	
WP	2	9	233	314	-99	-99	7143	
WP	2	9	234	310	-99	-99	7685	
WP	3	9	235	423	-99	-99	7067	
WP	3	9	236	362	-99	-99	6329	
WP	3	9	237	385	-99	-99	6748	
WP	4	1	238	542	25	-99	5527	
WP	4	1	239	519	-99	-99	5980	

WP	4	1	240	472	-99	-99	5069	
WP	5	9	241	365	-99	-99	6442	
WP	5	9	242	353	-99	-99	5550	
WP	5	9	243	384	-99	-99	5598	
WP	6	9	244	127	-99	-99	1884	
WP	6	9	245	126	-99	-99	1795	
WP	6	9	246	86	-99	-99	1562	
WP	7	9	281	16200	-99	-99	100000	16267
WP	7	9	282	15200	-99	-99	100000	
WP	7	9	283	17400	-99	-99	100000	
WP	8	9	284	445	-99	-99	3342	
WP	8	9	285	432	-99	-99	2662	
WP	8	9	286	389	-99	-99	3122	
WP	9	9	287	449	-99	-99	4740	
WP	9	9	288	452	-99	-99	5951	
WP	9	9	289	449	-99	-99	4729	
WP	10	9	290	426	-99	-99	4995	
WP	10	9	291	464	-99	-99	4576	
WP	10	9	292	488	-99	30	4632	
WP	11	9	293	338	-99	-99	2849	
WP	11	9	294	379	-99	-99	2685	
WP	11	9	295	346	-99	-99	3368	
WP	12	9	296	836	-99	-99	7081	972
WP	12	9	297	1018	-99	-99	8075	
WP	12	9	298	1062	-99	-99	7922	
WP	13	9	299	299	-99	-99	4556	
WP	13	9	300	290	-99	-99	4528	
WP	13	9	301	283	-99	-99	3980	
WP	14	9	302	431	-99	27	4940	463
WP	14	9	303	544	-99	-99	4532	
WP	14	9	304	413	-99	27	4166	
WP	15	9	305	394	-99	-99	3857	
WP	15	9	306	609	-99	-99	5604	
WP	15	9	307	620	-99	-99	5149	
WP	16	9	308	430	-99	-99	3330	
WP	16	9	309	504	-99	-99	3591	
WP	16	9	310	423	-99	-99	3068	
WP	17	9	312	2137	-99	61	6920	
WP	17	9	313	1990	-99	-99	7579	
WP	17	9	314	2067	-99	58	7206	
WP	18	9	315	29	-99	-99	435	
WP	18	9	316	37	-99	-99	497	
WP	18	9	317	21	-99	-99	426	
WP	19	9	7	-99	-99	-99	119	
WP	19	9	8	-99	-99	-99	91	
WP	19	9	10	-99	-99	-99	97	
WP	20	1	11	1468	-99	56	8369	1492
WP	20	1	12	1480	-99	-99	8088	
WP	20	1	13	1498	-99	-99	8266	
WP	21	1	14	1395	-99	-99	6735	
WP	21	1	15	1563	-99	-99	7613	
WP	21	1	16	1659	-99	78	7953	

WP	22	9	17	446	-99	31	6603	
WP	22	9	18	483	-99	-99	8043	
WP	22	9	19	482	-99	-99	7084	
WP	23	9	20	723	-99	-99	9291	
WP	23	9	21	683	-99	-99	8445	
WP	23	9	22	732	-99	-99	8773	
WP	24	1	23	47	-99	-99	520	
WP	24	1	24	44	-99	-99	581	
WP	24	1	25	78	-99	-99	615	
WP	25	9	26	930	-99	-99	8090	
WP	25	9	27	721	-99	-99	6741	
WP	25	9	28	649	-99	-99	6432	
WP	26	9	29	605	-99	38	8197	
WP	26	9	30	576	-99	-99	7213	
WP	26	9	31	483	-99	-99	8320	
WP	27	9	33	1297	-99	-99	13300	
WP	27	9	34	1409	47	-99	13400	
WP	27	9	35	1385	-99	-99	11500	
WP	28	9	38	752	-99	-99	9622	
wp	32	3	33	225	-99	-99	5391	
wp	4	6	34	-99	-99	-99	391	
wp	4	6	35	-99	-99	-99	385	
wp	4	6	36	19	-99	-99	290	
WS	00	0	0	13000	-99	924	50400	13633
WS	00	0	0	13300	-99	598	46800	
WS	00	0	0	14600	-99	900	60300	
WS	W0	0	0	1110	-99	59	5468	
WS	W0	0	0	1362	-99	-99	5253	
WS	W0	0	0	953	-99	-99	5286	

APPENDIX A FIELD NOTES

BER SCANNED
NOV 16 2011

PROJECT INFORMATION

Project Name: Wade's Aluminum

Project Number: _____

Address: _____

City: Fort Scott

County: _____

Project Manager: _____
Telephone #: ___-___-_____

Team Members: _____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____

Key Contacts:
Property Owner: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
City Contact: _____ Telephone #: ___-___-_____

Project Start Date: May 2, 2011 Project End Date: _____

Book _____ of _____

Recorder : Stuart Aller, KDHE/BER May 2, 2011
Weather : overcast, 58°F, wind @ 5 mph out of NW
* Deconned metal trowels prior to sampling and after each drum group *

Sampler	Building	Sample ID	Date	Time	Location in Building	Composition
Rick B.	Bldg. 2	W-1	5/2/2011	1330 hrs	SW corner (floor)	clayey, iron red no odor
Rick B.	Bldg. 2	W-2	5/2/2011	1335 hrs	NW Corner (floor)	dark, black fine-grained no odor
Rick B.	Bldg. 2	Drum Grp. A	5/2/2011	1339 hrs	North-center	Dross, white precipitate
Rick B.	Bldg. 2	Drum Grp. B	5/2/2011	1342 hrs	North-center	Dross, white precipitate
Rick B.	Bldg. 2	Drum Grp. C	5/2/2011	1343 hrs	North-Center	Dross, white precipitate
Rick B.	Bldg 2	Drum Grp. D	5/2/2011	1347 hrs	North-Center	Dross, white precipit.
Rick B.	Bldg. 2	Drm Grp. E	5/2/2011	1355 hrs.	North-Center	Dross, white prec aqua blue color in one drum.
Rick B.	Bldg. 2.	Drum Grp. F	5/2/2011	1358 hrs	North-Center	Dross, white prec
Rick B.	Bldg 2	Drm Grp. G	5/2/2011	1405 hrs	Northeast	Dross, white prec.
Rick B.	Bldg. 2	Drum Grp. H	5/2/2011	1407 hrs	Northeast	Dross, white prec.
Rick B.	Bldg 2	Drum Grp. I	5/2/2011	1410 hrs	Northeast	Dross, Blue, yella white prec.

* Deconned metal trowels prior to sampling and after each drum group *

* Decomed metal trowels prior to sampling and after each drum group. *

ampler	Building #/ Location in Building	Sample ID	Date	Time	Composition
ick B.	2 / Northeast	Drum Grp J	5/2/2011	1412 hrs	Dross, white prec and iron staining.
ick B.	2/N-center	Drum Grp. K	5/2/2011	1413 hrs	Dross white precipitate
Rick B.	2/N-center	Drum Grp. L	5/2/2011	1415 hrs.	Dross, white precipitate iron staining.
ick B.	2/N-Center	Drm Grp. M	5/2/2011	1418 hrs	Dross, white precipitate iron staining.
ick B.	2/N-Center	Drum Grp N (3 drums)	5/2/2011	1426 hrs	Dross, very white precip. Very fine material
ck B.	2/S-East	Drum Grp. O (6 drums)	5/2/2011	1430 hrs	Dross, greenish tint 2 of drums in corrugated liner.
ick B.	2/Outside East of North wing of Bldg 2.	Drum Grp. P (9 drums)	5/2/2011	1435 hrs	Dross, white-greenish tint somewhat solidified pure white prec. throughout located just outside of North wing
ick B	2/South of North wing of Bldg. 2	Drum Grp Q (4 drums)	5/2/2011	1438 hrs.	Dross, white-grey tint. alot of white speckles

* Decomed metal trowels prior to sampling and after each drum group.

May 4, 2011

①

Weather: partly cloudy, 70°F, very slight breeze

* Decanted metal trowels prior to sampling.

Sampler	Location	Sample ID	Time	Composition	Notes
S. Aller	Near #2 Creek (W)	Drum Grp. R ~8-10 drums	1040	Fine green mixed w dirt chunks of coal, aluminum, and aqua Blue metal	Drum pile, partially buried material est
Aller	North of R	Drum Group S 8-10	10:43	SAME More Blue material	Same as above
Aller	North of S	Drum Group T 5-8	10:45	SAME More coal	Same as above
Aller	North of T	Drum Group U 12 drums	10:48	Coal Coarser material	Drums at surface poor shape, rusted
Aller	South Bldg #2 actually was in S. part of building Co. Hopped	Drum Group V	1115	Very fine material Glued white specks	10 drums Same material
Aller	North of V	Drum Group W	1120	SAME as V more white some green	4 drums
Aller	Pile East of Bldg NE of WC	Waste near 17	11:30	Pile with more green than others	Sent composite 27x21x5' bags aqua green dark-c chrome green
Aller	Building E of S-6	Waste 00	11:45	Blue contents on floor of BUILDING near 6	looks like material was dumped from a drum
Aller	South of above bldg	Drums X	11:50	Blue gray material HARDER	2 drums
Aller	East of Bldg 2	Drum Y	2:00	HARD SLAG (Jal)	~ drums Acc 13ft N 37°52.356 W 094°41.514
Aller	East of Bldg 2	Drum Z	2:05	Material Rocks-little/hard Blue material	3 drums Acc. 12 ft 10 ft N 34

GPS Coordinates for Waste-00 (W-0 [redacted]) N 37°52.340' W 094°41.557'

5/4/11

(2)

After	Inside Furnace area	Wood	2:25	White material on floor Powdery	Inside concrete Structure on floor	A 20 N 37° 52.282 W 94° 41.583
After	Drum AA W. of Furnace	Drum AA	2:30	Aqua green & Grey material bottom of drum	Located west of Concrete Structure Furnace Edge	Nails & Aluminum Shoving pole near drums 6 drums
✓		Est	Edge of Quarry		GPS for AA	A 16' N 37° 52.282 W 94 41.587
	By 4-7 10' N	Drums BB	No Samples	Inaccessible empty solids		10' North of 4-7 9 Drums
After		SW-1 SD-1	2-water Hardness & Sed 3:10pm		Stream clear 1-2' deep 6' wide	up gradient Sample S. Side Nobel St Bridge
		GPS	A 13 N 37 52.219 W 94 41.528	2 pics taken		
After		SW-2 SD-2	3:45pm	2 pics taken	no water flow pooled area 2 ft wide	pooled area heat to concrete silos
			A 15 N 37° 52.278 W 94.41.458			Below (w side) Railroad bridge - Rocky bottom
After		SW-3 SD-3	4:00	2 pics	45 ft wide 3 ft deep clear	from Railroad
			A 16 N 37, 52.417 W 94-41.478			
After		SW-4 SD-4	4:15	2 pics	Spring 1 inch deep 1 ft wide	Took sample at spring just downstream
			A 15 N 37 52.447 W 94.41.478			
After		Drum CC	4:30	GPS on pit most empty		40+ drums S. BANK Creek

S14/A

GPS

East Opening Bldg 2 where drums are located
A 14'
N 37° 52.366
W 094° 41.516

GPS

South Side Bldg 2 DRUMS V W
A 17'
N 37° 52.361
W 094° 41.513

Southeast Side Bldg 3 green metal on floor
A 14'
N 37° 52.332 W 00
W 94° 41.528

Near drum pile R, S, + T
Accuracy 19'
N 37° 52.254'
W 094° 41.509'

Drum cc
Large Drum Pile South bank of Creek (2 pics)
Approximately 40 plus drums
most empty
A 17
N 37.52.425
W 094.41.577

BER SCANNED
NOV 16 2011

PROJECT INFORMATION

Project Name: Wade's Aluminum

Project Number: _____

Address: _____

City: _____

County: _____

Project Manager: _____
Telephone #: ___-___-_____

Team Members: _____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____

Key Contacts:
Property Owner: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
City Contact: _____ Telephone #: ___-___-_____

Project Start Date: _____ Project End Date: _____

Book _____ of _____.

5/2/11

Peterson & Ottallora on site ~ 11:00. Bean & Allen already there. Schneider, Carey & Costlow on site. Safety meeting. Off site to eat. Ottallora Peterson & Schneider to Bean to offload equipment. Meet up w/ Brown. Back to site to collect samples.

Ottallora & Peterson, surface grid samples

3-1 @ 13:45
3-2 @ 13:55
3-3 @ 14:00

Marty Pearson on site - as long as we leave someone @ business, he'll leave it open for us to lock up. Marty off site to bring back LaBuda calls, told him to send both kind of augers.

3-4 @ 14:10 - waste pile
3-5 @ 14:15 - waste pile
3-6 @ 14:25 - (waste pile ~ 50 ft west)
3-7 @ 14:30
3-8 @ 14:35 - between waste piles
3-9 @ 14:37 next to waste pile

Offsite to deliver samples & prepare. Back to site.

2-1 @ 17:00
2-2 @ 17:05
2-3 @ 17:10 edge of quarry waste pile
2-4 @ 17:15
2-5 @ 17:20

skip 2-6, needs to be relocated

2-7 @ 17:30 scattered light blue bits on surface
2-8 @ 17:35 one blue/gray powder area, rest thermos
2-9 @ 17:40
2-10 @ 17:45 on top of waste pile
4-10 @ 17:50
4-9 @ 17:55

no 4-8

4-7 @ 18:00 mostly ls pile, grades to slag to the south

4-6 @ 18:05 on slag pile
4-5 @ 18:10 on slag pile
4-4 @ 18:15 beside gutted drive
4-3 @ 18:20 10' from barrel w/ solidified waste
4-2 @ 18:23
take samples to barn @17:00. ~~Process samples.~~
All offsite (lock up bus barn) @ 20:15

7:30-5:30 & 5:30 to 20:15 4.15

On site @ 7:45 May 3
WP-1 – brownish gray w/ turquoise bits & iron oxide chunks scattered
@ 11:20 aluminum filings and whitish powder here & there in pile. East of furnace bldg. all piles in this area visually similar

WP-2 pile by 4-3. Very ashy, similar to WP-1
@ 11:25

WP-3 grayish brown. less iron oxide than
@ 11:30 WP-1 - almost none, and fewer

WP-4 gray w/ brown overtones. sparse turquoise
@ 11:35 pieces. Sample is composite from N-M-S of very large waste pile West of open-bain shed

WP-5 gray w/ considerable iron oxide, very
@ 11:40 little turquoise. Speculate that this was dumped on top of ls pile (WP-6)

WP-6 ls pile directly west of shed. cream to
@ 11:45 light yellow brown

Off site @ 12:20, back @ 13:15

WP-7 small pile grayish brown, blue surface
13:25 due to small pieces & powdered turquoise color

WP-8 pile by shaker. Gray w/ considerable number of
13:30 pieces of coal (small), small amount of turquoise, moss growing on pile

WP-9 linear pile following creek, gray but brown
13:35 with limestone on top

WP-10 pile next to northernmost concrete silo
13:45 very weathered. gray w/ ls pieces on top.

WP-11 inside open hangar-type shed. Gray,
13:50 sandy, no clasts in particular

WP-12 northernmost extent of pile that runs out
13:55 of east edge of hangar (WP-11) but with some green pieces slightly greener than turquoise

WP-13 northern of pile ending @ lone chimney
14:00 grayish w/ ls on top (weathered pea gravel shape & size)

concrete pile north of 6-6 poured pile of concrete (bad batch?)

WP-14 very gray on surface, gray/brown below
14:05 small amount of turquoise
some crushed ls

WP-15 composite from three northern piles
14:15 from very large area of piles south of 4-4

WP-16 @ 14:35 average of six piles in this area gray w/ surface pea gravel, very little else

WP-17 @ 14:40 very weathered pile, gray w/ small amount of green particles. Collected to see if weathered status changes readings

WP-18 @ 14:45 crushed ls pile, similar to another between it and building which runs length of building - same make up as sample 5-8

limestone waste pile similar to WP-18 & 5-8

WP-19 @ 15:00 limestone(?) chert(?) pile by tall concrete foundation - sandy, silty clay underneath

WP-20 @ 15:15 ~~overburden~~ > very weathered, fluffy, at west end of northernmost building, very small amounts green & metallic

WP-21 15:25 large pile w/ trees growing in it. Ashy but very little pea gravel & green & turquoise. Directly NW of ~~test~~ 4-11

WP-22 @ 15:50 low spread waste pile north of shingle dump. Some pea gravel, some small amount of turquoise & green

2-10 probably representative of large pile to north

WP-23
@ 16:00 waste pile with Al (?) shavings, some iron nodules & very little turquoise

same @ WP-23 – GPS'd – east across road from WP-23

WP-24 extension low pile directly SE of 2-9
@ 16:04

WP-25 weathered fluffy ash, very small amounts
@ 16:10 of very fine gravel and very little, small green & turquoise. Composite of 3 largish piles east of road

WP-26 weathered fluffy ash from extension
@ 16:20 low piles west of WP-17

WP-27 composite of similar piles to 3.5-5,
@ 16:25 will see if XRF's same

WP-28 very weathered, not much surface gravel
@ 16:30 some small amount of green/turquoise

WP-29 gray, lots of surface gravel, iron nodules
@ 16:35 and larger green pieces (1/2-3/4")

WP-30 brownish gray, large amounts of
@ 16:40 surface iron (next to 3-4)

– Julie collects two bag samples by flag 2-4

WP-31 pile w/ large amount of shavings
@ 16:45

Talk to west prop owner, have permission to use his drive to north end of quarry; samples to bus barn off site @ 18:07)

4:45 8 1.75

May 4 '11
Cistlow & O'Halloran onsite w/ geoprobe.
Recon to find gwp locations. Start GWP-1
@ 9:00 refusal @ 14' @ 9:14
photo — top left surface to refusal bottom right

0'-4" soil
4"-8" crushed ls
8"-12" dark gray moist clay
12"-30" mottled yellow clay plastic
30"-48" same, drier mixed w/ crushed ls &
limestone dust for color change to
buff
48"-60" same as above
6'-8' alternating clay as from 12"-30" w/
friable black coal
8'-9' yellow mottled clay discoloring to black
thin plates of ?shale ?coal, ~~from~~ 2"
at 8' ~~to~~ 9'
9'-12' less discoloring of clay, but very
platey & friable
~~12'-14'~~
12'-13' more of same
13'-14' ~~weathered very~~ weathered very friable
platy medium gray, expanded in
macrocore

put in temporary casing 5' screen loose
in hole, bentonite seal at surface

Start GWP-2 @ 10:00 refusal @ 1.5'

~~0000~~ 0'-12" friable brown clay w/ gravel
12"-18" gradating to yellow/gray
18" limestone

GWP-3

0-4' 3' recovery

0'-6" clayey topsoil mixed w/ crushed ls
6"-~~18"~~ 24" soft friable silty clay, gray-brown
~~18"-24"~~ gray-brown stiff plastic clay
24-30
30-36 thin natic ls ~ 2" overlying fissile, dry ? black shale & coal

4-8' 3' recovery

12" fissile shale/coal
2" ls
12" hard yellow clay w/ mottling, mottled area friable
12" fissile coal/shale

8'-12' 3' recovery alternating mottled clay fissile coal/shale w/ grading

12'-16' 3.5' recovery - all very friable dark gray/black coal/shale

refusal @ 18'

16-16.5 fissile, platy coal/shale

16.5-16.75 band of tight clayey material - gray

16.75-18' dry, crumbly gray mudstone (?) slightly gritty

Off site @ 19:00

May 5, 2011

Schneider Costlow Ross & O'Halloran on site @ 8:30, loaded unused equipment @ bus barn
collected Transformer Area Sample @ 9:20
Costlow pulls tarp cassity; all holes dry
take photographs
Ross & O'Halloran off site ~11:20

June 25, 2011 Sunny, 85°

O'Halloran arrived @ site @ ~~15:30~~ 15:30.
Collect SW-2a at ~~flag~~ location SW-2 from May.
Collect SW-3a at west side of RR bridge @ 15:54
Collect SW-4a directly downstream of spring on south side of Wolverine Creek. Water in spring inadequate for sample.
Collect SW-1a off ~~south~~ north side of ~~drainage~~ bridge over drainage @ Noble Road
SW-1a @ 16:26
Off site @ 16:40

Sept 8 2010
Sunny/ partly cloudy 80°

J. Carey & O'Halloran on site @ 11:30.
Compared air photo to pile on site
Determined depth of topsoil - in almost all cases sharpshooter encountered rock (or resistance of some sort) @ 6" to 12"
Took photos of WP-7, W-00 and W-0.
Collected surface samples for hexavalent chromium analysis into 4-qt ziplock bags

Drum Group F - Cr @ 15:25
WP-14 - Cr @ 15:33
S3-7 - Cr @ 15:40
WP-30 - Cr @ 15:46
S6-3 - Cr @ 15:50

All hexavalent samples were collected in same location as original samples WP-14, S3-7, etc.

Located coordinates of ~~[illegible]~~ fenceline west of Wolverine creek that will be used as northern property boundary

Off site @ 16:00

BER SCANNED

NOV 16 2011

5-2-11: Nicholas Schneider running Inner-X XRF

Sample ID	Pb	Cd	As	Zn	other
NIST 2702	137	<32	25	404	
Building 2	111	<22	<14	977	
Drum A	155	<22	<16	3238	Cu-3447
5-2-11 13:39	77	<21	<11	1105	Cu-1259
Building 2	86	<23	<12	473	
Drum B	79	<24	<12	731	
5-2-11 13:42	64	<22	<11	422	
Building 2	98	<23	<13	789	
Drum C	78	<22	<12	607	
5-2-11 13:43	70	<22	<11	332	
Building 2	68	<21	<11	346	
Drum D	82	<22	<12	336	
5-2-11 13:47	71	<22	<12	402	
Building 2	178	<24	<18	7641	Cu-7278 Cr-479 Ni-231
Drum E	142	<24	<16	7600	Cu-6059 Cr-319 Ni-175
5-2-11 13:53	187	<25	<20	9092	Cu-8210 Cr-374 Ni-199
Building 2	192	<23	<18	9141	Cu-9345 Cr-383 Ni-199
Drum F	181	<23	<18	8648	Cu-8876 Cr-449 Ni-206
5-2-11 13:58	226	<23	<20	9149	Cu-8488 Cr-452 Ni-175
Building 2	140	<21	<15	5387	Cu-5709 Cr-204
Drum G	182	<22	<17	7498	Cu-7624 Cr-448
5-2-11 14:05	62	<21	40	1388	Cu-1609
Building 2	103	44	<13	574	Cu-1029
Drum H	77	31	<11	559	
5-2-11 14:07	131	<22	<15	5032	Cr-336

Sample ID	Pb	Cd	As	Zn	Other
NIST 2702	117	<29	34	431	
Building 2	160	<26	<19	7236	Cr-382
Drum I	143	<26	<18	5876	Cr-296
5-2-11 14:10	137	<25	<18	6161	Cr-289
Building 2	44	25	<9	308	
Drum J	61	<22	<11	589	
5-2-11 14:14	53	<24	<11	348	
Building 2	39	<24	14	402	
Drum K	67	24	<11	612	
5-2-11 14:13	70	<23	<11	413	
Building 2	74	<24	<12	477	
Drum L	67	<23	<11	395	
5-2-11 14:15	46	<22	<10	405	
Building 2	69	<21	<11	365	
Drum M	43	<21	<10	528	
5-2-11 14:18	35	<20	<8	317	
Building 2	74	<22	<12	446	
Drum N	82	<22	<12	447	
5-2-11 14:26	83	<22	<12	497	
Building 2	32	<20	<8	484	
Drum O	23	<20	<8	345	
5-2-11 14:30	17	<21	<7	140	
Building 2	29	<20	<7	134	
Drum P	22	<20	<8	232	
5-2-11 14:35	29	<20	<8	211	
Building 2	11	<19	<5.6	106	
Drum Q	9	<19	<6	97	
5-2-11 14:38	18	<19	<6	131	

Sample ID	Pb	Cd	As	Zn	Other
NIST 2702	140	<32	<23	367	
Building 2	1039	<51	<62	662	Cr-2475 Hg-219
SW Corner W-1	372	<39	<33	963	Cr-1337 Hg-90
5-2-11 13:30	556	<42	<42	941	Cr-1787 Hg-144
Building 2	23	<23	<9	587	
NW Corner W-2	22	<23	<9	322	Cr-247
5-2-11 13:35	12	<22	<8	115	

Notes on XRF results for grid soil samples:
1-10-1 : Cr - 248, 419
1-11-1 : Cr - 332, 260, 245
1-12-1 : Cr - 356, 268
1-9-1 : Cr - 267, 252
3-4-1 : Cr - 383
3-5-1 : Cr - 401, 582
3-6-1 : Cr - 291

NIST 2702 Standard at the end of 5-2-11 : Pb - 136 Zn - 359
5-3-11 8:00 Nicholas Schneider running XRF. Calibrated on table mount
NIST 2702 Pb - 148 Zn - 433
NIST 2781 Pb - 174 Zn - 996
Notes:
7-6-1 : Hg - 46 Cr - 245
4-9-1 : Hg - 38
5-2-1 : Cr - 459
5-1-1 : Cr - 289, 296
Test #48 : NIST 2781 Standard: Pb - 140 Zn - 805 Pb and Zn too low
2702 Standard: Pb - 111 Zn - 296 Pb and Zn too low
Recalibrated XRF - passed
NIST 2781 Standard: Pb - 157 Zn - 952 still low
NIST 2702 Standard: Pb - 126 Zn - 361 Pb ok, Zn low
4-2-1 : Cr - 295, 424, 577
4-3-1 : Cr - 222
4-4-1 : Cr - 323
4-5-1 : Cr - 308
4-6-1 : Cr - 280
Ran XRF on paper cups. Red cup read 81 ppm for lead, white read 120 ppm. Propped white cup up onto a cardboard box and it read 43 ppm. XRF must have been going through to underlying table. Going to try propping soil samples on top of cardboard box for future tests.
2-3-1 : Cr - 352, 265, 283
2-4-1 : Cr - 557, 336
2-6-1 : Cr - 245
1-13-1 : Cr - 302

2-12-1: Hg-31, 41
2-11-1: Cr-290
3-7-1: Cr-283
3-8-1: Cr-252, 310
3-9-1: Cr-372, 489
W-1: Cr-4542, Hg-237, 237, 269 renamed W-X in computer
4026, 4266
W-2: Hg-69, 116, 64 Cr-785, 1526, 1716
Test # 129 NIST 2702 Standard: Pb-127 Zn-350
Test # 130 NIST 2781 Standard: Pb-177 Zn-1016
Database saying we already entered 1-1-1, so we're entering it in the computer as 1-1B-1.
1-4-1: Cr-249
3-10-1: Cr-413, 405, 540
6-10-1: Cr-337
6-2-1: Cr-188, 211
6-3-1: ~~25~~ Cr-251, 422, 360
6-4-1: Cr-198
6-6-1: Cr-227 320
Test # 192 NIST 2702 Standard: Pb-127 Zn-446
6-8-1: Hg-35
7-1-1: Cr-271 Hg-30
7-3-1: Cr-207, 261
7-5-1: Cr-203
8-1-1: Cr-326, 301
8-2-1: Cr-235, 214
8-3-1: Cr-254
8-5-1: Hg-33
WP-3: Cr-212, 215
WP-4: 209 Cr
WP-5: Cr-197 204
Test # 247 - NIST 2702 Standard: Pb-124 Zn-436
Test # 248 - NIST 2781 Standard: Pb-181 Zn-1093
.5-10: Hg-37
1-9.5: Cr-351 Hg-30
3-3.5: Cr-462, 380, 471

2-9.5 : Cr - 282
3.5-5 : Cr - 361 , 242 , 182
3.5-6 : Cr - 369 , 327
4-4.5 : Cr - 323 , 265
WP-7 : Cu - 73,000 , 72,600 , 76,300
Cr - 595 , 714
Ag - 72 , 83 , 81
WP-8 : Cr - 344 , 218 , 311
WP-9 : Cr - 371 , 362 , 421
WP-10 : Cr - 260 , 174
WP-12 : Cr - 392
WP-14 : Cr - 174
Test #311 : NIST 2702 Standard : Pb - 140 Zn - 386
WP-17 : Cr - 183
3-9.5-1 : Cr - 257
3-10.5-1 : Cr - 214
2-4.5-1 : Cr - 236 , 168 , 228
Test #334 : NIST 2781 Standard : Pb - 180 Zn - 1066
18:00 - end of day

8-4-11 7:45 - Nicholas Schneider running Innov-X XRF
Passed calibration check
NIST 2702 Standard : Pb - 127 Zn - 427
NIST 2781 Standard : Pb - 169 Zn - 1094

1.5-4-1 Test #4 : Pb - 83 Cd - ND As - ND Zn - 675 0805 hrs
" #5 Pb - 68 Cd - ND As - ND Zn - 531
" #6 Pb - 86 Cd - ND As - ND Zn - 709

WP-19 Test #7 : Pb - ND Cd - ND As - ND Zn - 119 Hg - 52 0807 hrs
" #8 Pb - ND Cd - ND As - ND Zn - 91 Hg - 53
" #10 Pb - ND Cd - ND As - ND Zn - 97 Hg - ND

WP-20 Test #11 Pb - 1468 Cd - ND As - 56 Zn - 8369 Cr - 369 0810 hrs
" #12 Pb - 1480 Cd - ND As - ND Zn - 8088 Cr - 685
" #13 Pb - 1498 Cd - ND As - ND Zn - 82600 Cr - 426

NIST 2702 - As - 45.7 ± 1.8 Cr - 352 ± 22 Ni - 75.4 ± 1.5
2881 - As - 7.82 ± 0.28 Cr - none Ni -

WP-21: Cr - 297, 286, 383
WP-23: Cr - 372, 251, 359
WP-25: Cr - 334, 330
WP-26: Cr - 282
WP-27: Cr - 316, 365, 350
WP-28: Cr - 450, 1326, 576
WP-29: Cr - 344
WP-30: Cr - 287
WP-31: Cr - 408, 279

W-3 Test # 48: Pb - 119 Cd - Nd As - 33 Zn - 2799
" # 49: Pb - 376 Cd - Nd As - Nd Zn - 3416
50: Pb - 140 Cd - Nd As - Nd Zn - 1927

W-4 Test # 51: Pb - 2017 Cd - Nd As - Nd Zn - >10% Ag - 69 Cu - >10%
52: Pb - 2886 Cd - Nd As - Nd Zn - 37,800 Cu - >10%
53: Pb - 3402 Cd - Nd As - Nd Zn - >10% Cu - >10%

W-5 Test # 54: Pb - 531 Cd - 24 As - Nd Zn - 3314
55: Pb - 350 Cd - 25 As - 46 Zn - 3735
56: Pb - 446 Cd - Nd As - Nd Zn - 2435

W-6 Test # 57: Pb - 350 Cd - Nd As - 63 Zn - 1217
58: Pb - 133 Cd - Nd As - Nd Zn - 484
59: Pb - 248 Cd - Nd As - 58 Zn - 905

Test # 60 - NIST 2702 Standard: Pb - 143 Zn - 429
Test # 62 - NIST 2702 Standard: Pb - 128 As - 43 Cr - 379 - Zn - 411
Test # 63 - NIST 2781 Standard: Pb - 193 As - <19 Cr - Zn - 1101

2-6.5-1: Cr - 383, 321, 193
2-10.5-1: Cr - 348, 189, 311
2.5-6.5-1: Cr - 267, 190, 288
5-3: Cr - 218
5-4: Cr - 337, 523
3-6.5-1: Cr - 286, 196

Sample ID	Pb	Cd	As	Zn	other
Drum R	461	Nd	Nd	4683	Cr - 405
5-4-1	437	Nd	ND	4861	Cr - 263
10:40	393	ND	ND	4172	

Sample ID	Pb	Cd	As	Zn	Other
Drum S	462	ND	ND	4520	
5-4-11	497	ND	ND	4565	
10:43	431	ND	ND	4283	
Drum T	480	ND	42	4306	Cr-309
5-4-11	637	ND	42	5007	Cr-431
10:45	504	ND	ND	4254	Cr-215
Waste sample 00	13,000	ND	924	50,400	Ag-84 Cu->10%
5-4-11	13,700	ND	598	46,800	Ag-51 Cu->10%
11:45	14,600	ND	900	60,300	Ag-66 Cu->10%
Waste sample W-0	1110	ND	59	5468	
5-4-11	1362	ND	ND	5253	
11:30	953	ND	ND	5286	
Drum U	356	ND	ND	6012	Cr-516
5-4-11	589	~~34~~ ND	34	4615	Cr-179
10:50	495	ND	ND	4024	Cr-376
Drum V	30	ND	ND	201	
5-4-11	45	ND	ND	434	
11:15	31	ND	ND	171	
Drum W	30	ND	ND	263	
5-4-11	29	ND	ND	251	
11:20	32	ND	ND	224	
Drum X	2755	ND	ND	13,900	
5-4-11	9063	ND	697	37,800	Ag-46 Cu->10%
11:50	1799	ND	ND	18,400	Cu-20,600
Drum X-crushed	26	ND	ND	30,300	Cr-923
5-4-11	27	ND	ND	26,000	Cr-670
11:50	31	ND	ND	24,800	Cr-623

XRF'd green pieces

mostly grey pieces

Test # 132: NIST 2202 Standard: Pb-137 As-44 Cr-454 Zn-367

7.5-6-1 : Cr - 417
6-3.5-1 : Cr - 206, 340, 275
6-2.5-1 : Cr - 1059, 675, 528
4.5-3-1 : Cr - 269
5-4.5-1 : Cr - 317, 440, 344 Hg - 34
6.5-3-1 : Cr - 191, 249, 174
4-3.5-1 : Cr - 208
4-2.5-1 : Cr - 260, 217, 430
Test # 192 NIST 2702 Standard : Pb - 112 As - 30 Cr - 378 Zn - 271
Test # 192 NIST 2781 Standard : Pb - 163 Zn - 963
5-6-1 : Cr - 248, 223
WP-12-0.5-1.5 : Cr - 611, 770
WP-7-.5-1.5 : Hg - 44, 42, 48
W-0-.5-1.5 : Cr - 282
2-9.75-1 : Cr - 459, 270
Test #251 NIST 2702 Standard : Pb - 124 As - 41 Cr: 423 Zn - 369
2-10.25-1 : Cr - 306
3-7.75-1 : Cr - 327, 373, 338
DA-CC : Cr - 291, 195
3.5-4-1 : Cr - 211
WP 6-2.5-3 : Cr - 277, 218
Test #299 NIST 2702 Standard : Pb - 148 As - 40 Cr - 627 Zn - 399
Test #300 NIST 2781 Standard : Pb - 174 Zn - 1079
18:45 : End of day

8-5-11 8:30 - Nicholas Schneider running Innov-X XRF
XRF cal check passed
Test #2 : NIST 2702 Standard : Pb - 138 As - 43 Cr - 501 Zn - 421
Test #3 : NIST 2781 Standard : Pb - 196 Zn - 1081
WP-12-1.5-2 : Cr - 361, 287, 318
WP-32-10-12 : Hg - 30
WP-4-4-6" interface : Cr - 316
WP-32-4-8" : Cr - 211, 304, 283
WP-32-0-4" : Cr - 213, 243

Sample ID	Pb	Cd	As	Zn	Other	
Drum Y	11,100	ND	475	>10%	Cu - >10%	Cr - 2646
5-4-11	16,000	ND	502	>10%	Cu - >10%	Cr - 2825
14:00	21,900	77	570	>10%	Cu - >10%	Cr - 3013
Drum 2	6317	ND	609	>10%	Cu - >10%	
5-4-11	5246	ND	437	>10%	Cu - >10%	
14:05	5383	ND	301	>10%	Cu - >10%	Ag - 51
NIST 2702	130	ND	53	403	Cr - 547	
NIST 2781	168	ND	23	1066		

9:35 - left shop

BER SCANNED

NOV 16 2011

PROJECT INFORMATION

Project Name: Wade's Aluminum Smelter

Project Number: _____

Address: _____

City: Ft Scott, KS

County: Bourbon

Project Manager: Maura O'Halloran

Telephone #: ___-___-_____

Team Members: Probe Logging - Deanna Ross Function: _____

_____ Function: _____

_____ Function: _____

_____ Function: _____

_____ Function: _____

_____ Function: _____

Key Contacts:

Property Owner: _____ Telephone #: ___-___-_____

Utility Contact: _____ Telephone #: ___-___-_____

Utility Contact: _____ Telephone #: ___-___-_____

Utility Contact: _____ Telephone #: ___-___-_____

Other Contact: _____ Telephone #: ___-___-_____

Other Contact: _____ Telephone #: ___-___-_____

City Contact: _____ Telephone #: ___-___-_____

Project Start Date: _____ Project End Date: _____

Book _____ of _____

5/4/11 Waste Piles - Probe Installation

1405 → WP17
0-2.5' - Waste material
2.5'-3' - Brwn silty clay, friable, scattered LS rubble.
3'-4' - Brwn clayey silt, very friable
4' - Gray LS intermixed w/ clayey silt, moist ½p

1419 → WP0
0-2' - Waste material
2-2.5' - Brwn/Gry silty clay, scattered LS fragments
2.5-3.5' - AA
3.5-4' - AA, Tan LS @ ≈ 3'8"
Sampled 6"-1.5 1425

1435 → WP7
0-2' - Waste material
2-2.5' - Brwn clay, sparse, intermixed w/ LS rubble
2.5-3.5' - Black coal, friable, LS intermixed
3.5-4' - Brwn clay w/ rust intermixed, red brick fragments, shff, LS fragments.

1502 → WP12
0-2' - Waste material
2-2.5' - Brwn clayey silt w/ LS fragments
2.5-3.5 - Black coal, shale seams
3.5-4' - Coal w/ brwn clay intermixed
4'-8' - Silty clay, brwn, intermixed rust, dry, shff, coal fragments intermixed
8'-9' - AA
9'-9.5' - Tan LS, fragmented
9.5-12' - AA - intermixed w/ tan clay
12'-13' - Coal, 1" LS stringer at 13'1"
13'-16' - Brwn clay, black/red nodules, dry, shff, LS stringer @ 15'
16' - Tan LS ≈ 2"
1530 16'2"-18' - Brwn clay, rust nodules, black nodules, shff,
18'-19' - Gray siltstone, very friable w/ LS fragments
19'-20' - Coal, friable, intermixed w/ LS + shale fragments.

WP 12
1540 20-22.5 - Coal, friable, rust nodules, layered @ ≈ 22'
22.5-23' - Grades to gray siltstone, moist @ interface, friable, gritty.

1543 Set Peizometer
TD-24' Screen 18'-23'

1600 WP6 (At runoff area between WP4 & WP6)
0-3' kloste material, moist @ 3', blue fluff material present
3'-4' LS, tan, weathered, brwn clay intermixed

Sampled waste @ 2.5-3' 1616
3-3.5' 1618
3.5-4' 1620

1703 WP4
0-6" Waste material, blue/gray @ 4-6"
6"-4'- Brwn clay w/ LS fragments, intermixed w/ coal fragments
4'- Gray LS

Sampled 4"-6" - 1713 2-3.5 1711
6"-1' - 1710 3.5-4 1707
1-2' - 1709

WP 32
1757 0-4' - Waste material, bluff fluff intermixed
4'-8' - AA
8'-9' - Slough
9'-10' - Waste, white fluff intermixed
10-10.5 - Gray weathered, fractured LS
10.5-12' - Brwn clay, stiff, mottled w/ LS fragments intermixed.
Sampled 0-4' 1757 4'-8'-1801
9'-10' 1807
10.5-12 1809

1815 - Finished & Left site Deanna Ross 5/4/11

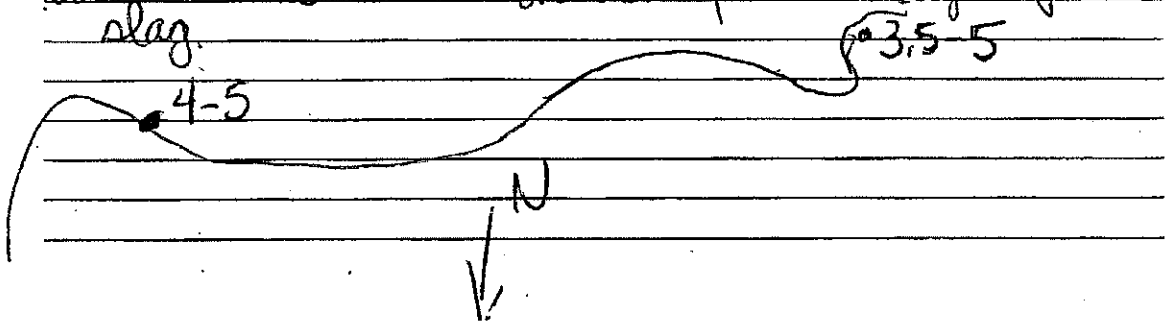
BER SCANNE...
NOV 16 2011

1347 Collect sample 1-1-1

	Location	Time	Collectors
	1-1-	1347	Carey, Costlow
GPS	1-2-	1352	
	1-3-	1356	
	1-4-	1359	
	1-5-	1403	
	1-6-	1409	
	1-7-	1413	
	1-8-	1417	
	1-9-	1424	
Waste	1-10-	1432	
Waste	1-11-	1437	
	1-12-	1445	
Waste, GPS	3-10-	1447	
GPS	3-11-	1453	
	2-11-	1458	
Empty Drums	2-12-	1501	
	1-13-	1504	
	2-13-	1507	
	3-12-	1522	
	4-11-	1526	
GPS	5-11-	1529	
	5-10-	1534	
	6-11-	1540	
GPS	6-10-	1546	
GPS	7-9-	1557	
GPS	7-8-	1556	
GPS	7-7-	1604	
GPS	7-6-	1611	
GPS	4-1-	1633	
GPS	5-1-	1637	
GPS	5-2-	1642	

	Sample	Time	Collector
GPS	6-1-1	1653	Carey Costlow
GPS	7-1-1	1655	
GPS	8-1-1	1658	
GPS	8-2-1	1704	
GPS	7-2-1	1708	
GPS	8-3-1	1715	
GPS	8-4-1	1719	
GPS	8-5-1	1730	
GPS	7-5-1	1740	
GPS	7-4-1	1745	
GPS	7-3-1	1749	
GPS	6-2-1	1753	
GPS	6-3-1	1758	
GPS	6-4-1	1801	
GPS	6-6-1	1810	
GPS	6-7-1	1815	
GPS	6-8-1	1820	
GPS	6-9-1	1824	
GPS	4-8-1	1833	
GPS	2-6-1	1846	
May 5, 2011			
	3-13.3-1	911	
	3-3.12-1	915	
	1-9.5-1	925	
	0.5-10-1	934	
	1-10.5-1	943	
	4-4.5-1	1121	
	3.5-5-1	1125	

Note: 4-5 is located on clean patch at edge of slag.



Sample	Time	Collector
3.5-6-1	1139	Costlow/Carey
2-7.5-1	1413	
2-9.5-1	1150	
3-9.5-1	1436	
3.5-10-1	1439	
3-10.5-1	1443	
2-21.5-1	1457	
2.5-5-1	501	
1.5-2-1	1513	

To collect tomorrow:
2-10.5-1 + many others

May 4th

	2-2.5-1	838	Carey, Peterson
	3.5-6-1	843	
	3-6.5-1	852	
	2.5-6.5-1	855	
	2-6.5-1	900	
	2.5-7-1	904	
	2-10.5-1	0915	Carey, Peterson, Ross
	5-6-1	925	
Waste	5-8-1	928	
	5-5-1	0930	
Waste	5.4-1	934	
	5-3-1	945	
	4-1.5-1	1255	Carey, Peterson, O'Halloran
	3.5-2-1	1258	
	4-2.5-1	1303	
	4.5-2-1	1305	
	5-2.5-1	1308	
	6-2.5-1	1310	
	6.5-3-1	1312	
	6-3.5-1	1313	
	5-3.5-1	1315	
	4.5-3-1	1317	
	4.5-4-1	1330	

	Sample	Time	
	5-4.5	1335	
	7-5.5	1337	
	7.5-6	1345	~~Paterson, Corey~~
	7-6.5	1348	
	6.5-6	1350	
	6-6.5	1351	
	6.5-7	1354	~~Paterson~~
	3.25-10	1409	Paterson, Corey
	3-10.25	1414	
	3-9.75	1417	
	3-9.75	1419	
	2-10.25	1422	
	1-10.25	1430	
	0.75-10	1433	
	1.5-7	1449	
waste	3.5-6	1502	
	3.5-5	1507	
	3.5-4	1513	
	3-3.75	1519	
	2.5-3	1523	
	2-3.5	1528	
	1.75-4	1531	
waste	1.5-3	1534	

BER SCANNED
NOV 16 2011

PROJECT INFORMATION

Project Name: Wade's Aluminum

Project Number: _____

Address: _____

City: Fort Scott

County: _____

Project Manager: _____
Telephone #: ___-___-_____

Team Members: _____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____

Key Contacts:
Property Owner: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
City Contact: _____ Telephone #: ___-___-_____

Project Start Date: May 2, 2011 Project End Date: _____

Book _____ of _____.

Recorder: Stuart Aller, KDHE/BER May 2, 2011
Weather: overcast, 58°F, wind @ 5 mph out of NW
* Deconned metal trowels prior to sampling and after each drum group.*

Sampler	Building	Sample ID	Date	Time	Location in Building	Composition
Rick B.	Bldg. 2	W-1	5/2/2011	1330 hrs	SW corner (floor)	clayey, iron red no odor
Rick B.	Bldg. 2	W-2	5/2/2011	1335 hrs	NW Corner (floor)	dark, black fine-grained no odor
Rick B.	Bldg. 2	Drum Grp. A	5/2/2011	1339 hrs	North-center	Dross, white precipitate
Rick B.	Bldg. 2	Drum Grp. B	5/2/2011	1342 hrs	North-center	Dross, white precipitate
Rick B.	Bldg. 2	Drum Grp. C	5/2/2011	1343 hrs	North-Center	Dross, white precipitate
Rick B.	Bldg 2	Drum Grp. D	5/2/2011	1347 hrs	North-Center	Dross, white precipit
Rick B.	Bldg. 2	Drm Grp. E	5/2/2011	1355 hrs	North-Center	Dross white prec aqua blue color in one drum.
Rick B.	Bldg. 2.	Drum Grp. F	5/2/2011	1358 hrs	North-Center	Dross, white prec
Rick B.	Bldg 2	Drm Grp. G	5/2/2011	1405 hrs	Northeast	Dross, white prec.
Rick B.	Bldg. 2	Drum Grp. H	5/2/2011	1407 hrs	Northeast	Dross, white prec.
Rick B.	Bldg 2	Drum Grp. I	5/2/2011	1410 hrs	Northeast	Dross, Blue, yella white prec.

* Deconned metal trowels prior to sampling and after each drum group *

* Deconned metal trowels prior to sampling and after each drum group. *

ampler	Building #/ Location in Building	Sample ID	Date	Time	Composition
ick B.	2/Northeast	Drum Grp J	5/2/2011	1412 hrs	Dross, white prec and iron staining.
ick B.	2/N-center	Drum Grp. K	5/2/2011	1413 hrs	Dross white precipitate
Rick B.	2/N-center	Drum Grp. L	5/2/2011	1415 hrs.	Dross, white precipitate iron staining.
ick B.	2/N-Center	Drm Grp. M	5/2/2011	1418 hrs	Dross, white precipitate iron staining.
Rick B.	2/N-Center	Drum Grp N (3 drums)	5/2/2011	1426 hrs	Dross, very white precip. Very fine material
..k B.	2/S-East	Drum Grp. O (6 drums)	5/2/2011	1430 hrs	Dross, greenish tint 2 of drums in corrugated liner.
Rick B.	2/Outside East of North wing of Bldg 2.	Drum Grp. P (9 drums)	5/2/2011	1435 hrs	Dross, white greenish tint somewhat solidified pure white prec. throughout located just outside of North wing
Rick B	2/South of North wing of Bldg. 2	Drum Grp Q (4 drums)	5/2/2011	1438 hrs.	Dross, white-grey tint. alot of white speckles

* Deconned metal trowels prior to sampling and after each drum group.

May 4, 2011

①

Weather: partly cloudy, 70°F, very slight breeze

* Decanted metal trowels prior to sampling.

Sampler	Location	Sample ID	Time	Composition	Notes
S. Aller	Near to creek (W)	Drum Grp. R ~8-10 drums	1040	Fine grain mixed w dirt chunks of coal, aluminum, and aqua Blue material	Drum pile, partially buried material out
Aller	North of R	Drum Group S 8-10	10:43	SAME More Blue material	Same as above
Aller	North of S	Drum Group T 5-8	10:45	SAME More coal	Same as above
Aller	North of T	Drum Group U 12 drums	10:48	Coal Coarser material	Drums at surface poor shape, rusted
Aller	South Bldg #2 actually was in S. part of building Co Hopped	Drum Group V	1115	Very fine material Glued white specks	10 drums Same material
Aller	North of V	Drum Group W	1120	SAME as V more white some green	4 drums
Aller	Pile east of ~~bldg~~ NE of WL	Waste Near 17	11:30	pile with more green than others	~~Spot composite~~ 27x21x5' heigh aqua green dark-chrome green
Aller	Building E of S-6	Waste 00	11:45	Blue contents on floor of BUILDING near dock	looks like material was dumped from a drum
Aller	South of above bldg	Drums X	11:50	Blue gray material HORDER	2 drums
Aller	East of Bldg 2	Drum Y	2:00	HARD SLAG (Ash)	~8 drums Acc 13ft N 37°52.356 W 094°41.514 10 ft Nay
Aller	East of Bldg 2	Drum Z	2:05	Material [illegible] Blue material	3 drums Acc. 12 ft

GPS Coordinates for Waste-0 (W-0) N 37°52.340' W 094°41.553'

5/4/11

(2)

Allen	Inside Furnace area	WOOD	2:25	White material on floor Powdery	Inside concrete Structure on floor	A 20 N 37° 52.282 W 94° 41.523
Allen	Drum AA W. of Furnace	Drum AA	2:30	Aqua green & grey material bottom half	Located west of Concrete Structure Furnace Edge	Nails & Aluminum Shoving pole 6 drums
✓		Edge of Quarry			GPS for AA	A 16' N 37° 52.282 W 94 41.587
	By 4-7 10' N	Drums BB	No Samples	Inaccessible empty solids	4 5	10' North of 4-7 9 Drums
Allen		SW-1 SD-1	2-water Hardness & Sed 3:10 pm		Stream clear 1-2' deep 6' wide	up gradient Sample S. Side Nobel St Bridge
		GPS	A 13' N 37 52.219 W 94 41.528	2 pics taken		
Allen		SW-2 SD-2	3:45 pm	2 pics taken	no water flow pooled 2 ft wide	pooled area heat to concrete Silos
			A 15 N 37° 52.278 W 94.41.458			Below (W side) Railroad bridge. Rocky bottom
Allen		SW-3 SD-3	4:00	2 pics	45 ft wide 3 ft deep Clear	from Railroad
			A 16 N 37, 52.417 W 94.41.478			
Allen		SW-4 SD-4	4:15	2 pics	Spring 1 inch deep 1 ft wide	Took sample at spring just downstream
			A 15 N 37 52.447 W 94.41.472			
Allen		Drum CC	4:30	GPS on pit most empty		40+ drums S. BANK Creek

S14/A

GPS

East opening Bldg 2 where drums are located
A 14'
N 37° 52.366
W 094° 41.516

GPS

South side Bldg 2 Drums V W
A 17'
N 37° 52.361
W 094° 41.513

Southeast Side Bldg 3 green metal on floor
A 14'
N 37° 52.332 W 00
W 94° 41.528

Near drum pile R, S, + T
Airway 19'
N 37° 52.254'
W 094° 41.509'

Drum CC
Large Drum Pile South bank of Creek (2 piles)
Approximately 40 plus drums
most empty
A 17
N 37.52.425
W 094.41.577

BER SCANNED
NOV 16 2011

PROJECT INFORMATION

Project Name: Wade's Aluminum

Project Number: _____

Address: _____

City: _____

County: _____

Project Manager: _____
Telephone #: ___-___-_____

Team Members: _____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____
_____ Function: _____

Key Contacts:
Property Owner: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Utility Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
Other Contact: _____ Telephone #: ___-___-_____
City Contact: _____ Telephone #: ___-___-_____

Project Start Date: _____ Project End Date: _____

Book _____ of _____.

5/2/11

Peterson & Ottallona on site ~ 11:00. Bean & Allen already there. Schneider, Carey & Costlow on site. Safety meeting. Off site to eat. Ottallona Peterson & Schneider to bury to offload equipment. Meet up w/ Brown. Back to site to collect samples.

Ottallona & Peterson, surface grid samples

3-1 @ 13:45
3-2 @ 13:55
3-3 @ 14:00

Marty Pearson on site - as long as we leave something @ business, he'll leave it open for us to lock up. Marty off site to buy bags. LaBuda calls, told him to send both kind of wipes.

3-4 @ 14:10 - waste pile
3-5 @ 14:15 - waste pile
3-6 @ 14:25 - (waste pile ~ 50 ft west)
3-7 @ 14:30
3-8 @ 14:35 - between waste piles
3-9 @ 14:37 next to waste pile

Offsite to deliver samples & prepare. Back to site.

2-1 @ 17:00
2-2 @ 17:05
2-3 @ 17:10 edge of quarry waste pile
2-4 @ 17:15
2-5 @ 17:20
skip 2-6, needs to be relocated
2-7 @ 17:30 scattered light blue bits on surface
2-8 @ 17:35 one blue/gray powder area, rest thermos
2-9 @ 17:40
2-10 @ 17:45 on top of waste pile
4-10 @ 17:50
4-9 @ 17:55
no 4-8
4-7 @ 18:00 mostly bs pile, grades to slag to the south

4-6 @ 18:05 on slag pile
4-5 @ 18:10 on slag pile
4-4 @ 18:15 beside gutted drive
4-3 @ 18:20 10' from barrel w/ solidified waste
4-2 @ 18:23
take samples to barn @17:00. ~~Process samples.~~
All offsite (lock up bus barn) @ 20:15

7:50-5:50 8
5:30 to 20:15
4.75

On site @ 7:45 May 3
WP-1 – brownish gray w/ turquoise bits &
@ 11:20 iron oxide chunks, scattered aluminum filings and whitish powder here & there in pile. East of furnace bldg all piles in this area virtually similar

WP-2 pile by 4-3. Very ashy, similar to WP-1
@ 11:25

WP-3 grayish brown. less iron oxide than
@ 11:30 WP-1 – almost none, and fewer

WP-4 gray w/ brown overtones. sparse turquoise
@ 11:35 pieces. Sample is composite from N-M-S of very large waste pile west of open-bay shed

WP-5 gray w/ considerable iron oxide, very
@ 11:40 little turquoise. Speculate that this was dumped on top of ls pile (WP-6)

WP-6 ls pile directly west of shed. cream to
@ 11:45 light yellow brown

Off site @ 12:20, back @ 13:15

WP-7 small pile grayish brown, blue surface
13:25 due to small pieces & powdered turquoise color

WP-8 pile by shaker. Gray w/ considerable number of
13:30 pieces of coal (small), small amount of turquoise, moss growing on pile

WP-9 linear pile following creek, gray/brown but
13:35 with limestone on top

WP-10 pile next to northernmost concrete silo
13:45 very weathered. gray w/ ls pieces on top.

WP-11 inside open hangar-type shed. Gray,
13:50 sandy, no clasts in particular

WP-12 northernmost extent of pile that runs out
13:55 of east edge of hangar (WP-11) but with some green pieces slightly greener than turquoise

WP-13 northern of pile ending @ lone chimney
14:00 grayish w/ ls on top (weathered parallel shape & size)

concrete pile north of 6-6 poured pile of concrete (Gad Batch?)

WP-14 very gray on surface, gray/brown below
14:05 small amount of turquoise
some crushed ls

WP-15 composite from three northern piles
14:15 from very large area of piles south of 4-4

WP-16 @ 14:35 — Average of six piles in this area gray w/ surface pea gravel, very little else

WP-17 @ 14:40 — very weathered pile, gray w/ small amount of green particles. Collected to see if weathered status changes readings

WP-18 @ 14:45 — crushed 1s pile, similar to another between it and building which runs length of building - some make up as sample 5-8

limestone waste pile similar to WP-18 & 5-8

WP-19 @ 15:00 — limestone(?) chert(?) pile by tall concrete foundation - sandy, silty clay underneath

WP-20 @ 15:15 — ~~overburden~~ > very weathered, fluffy, at west end of northernmost building, very small amounts green & metallic

WP-21 15:25 — large pile w/ trees growing in it. Ashy but very little pea gravel & green & turquoise. Directly NW of ~~[illegible]~~ 4-11

WP-22 @ 15:50 — low spread waste pile north of shingle dump. Some pea gravel, some small amount of turquoise & green

2-10 probably representative of large pile to north

WP-23
@ 16:00 waste pile with Al(?) shavings, some iron nodules & very little turquoise

same @ WP-23 – GPS'd – east across road from WP-23

WP-24 extensive low pile directly SE of 2-9
@ 16:04

WP-25 weathered fluffy ash, very small amounts
@ 16:10 of very fine gravel and very little small green & turquoise. Composite of 3 largish piles east of road

WP-26 weathered fluffy ash from extensive
@ 16:20 low piles west of WP-17

WP-27 composite of similar piles to 3.5-5,
@ 16:25 will see if XRF's same

WP-28 very weathered, not much surface gravel
@ 16:30 some small amount of green/turquoise

WP-29 gray, lots of surface gravel, iron nodules
@ 16:35 and larger green pieces (1/2-3/4")

WP-30 brownish gray, large amounts of
@ 16:40 surface iron (next to 3-4)

– Julie collects two bag samples by flag 2-4

WP-31 pile w/ large amount of shavings
@ 16:45

Talk to west prop owner, have permission to use his drive to north end of quarry; samples to bus barn off site @ 18:07)

4:45 8 1.75

May 4 '11
Cistlow & O'Halloran grouts w/ grapple.
Recon to find gwp locations. Start GWP-1
@ 9:00 refusal @ 14' @ 9:14
photo — top left surface to refusal bottom right

0-4" soil
4"-8" crushed ls
8"-12" dark gray moist clay
12"-30" mottled yellow clay plastic
30"-48" same, dryer mixed w/ crushed ls & limestone dust for color change to buff
48"-60" same as above
6'-8' alternating clay as for 12"-30" w/ friable black coal
8'-9' yellow mottled clay discoloring to black thin plates of ? shale ? coal, 2" at 9'
9'-12' less discoloring of clay, but very platey & friable
12'-13' more of same
13'-14' weathered very friable platy medium gray, expanded in macrocore

put in temporary casing 5' screen loose in hole, bentonite seal at surface

Start GWP-2 @ 10:00 refusal @ 1.5'

0'-12" friable brown clay w/ gravel
12"-18" gradating to yellow/gray
18" limestone

GWP-3

0'-4' 3' recovery

0'-6" clayey topsoil mixed w/ crushed ls
6"-18" 24" soft friable silty clay, gray-brown
~~18"-24"~~ gray-brown stiff plastic clay
24-30
30-36 thin native ls ~ 2" overlying fissile, dry ? black shale & coal

4-8' 3' recovery

12" fissile shale/coal
2" ls
12" hard yellow clay w/ mottling, mottled area friable
12" fissile coal/shale

8'-12' 3' recovery alternating mottled clay fissile coal/shale w/ grading

12'-16' 3.5' recovery - all very friable dark gray/black coal/shale(s)

refusal @ 18'

16-16.5 fissile, platy coal/shale

16.5-16.75 hard of tight clayey material - gray

16.75-18' dry, crumbly gray mudstone(?) slightly gritty

Off site @ 19:00

May 5, 2011

Schneider, Costlow, Ross & O'Halloran on site @ 8:30, loaded unused equipment @ bus barn
collected Transformer Area Sample @ 9:20
Costlow pulls top casing; all holes dry
take photographs
Ross & O'Halloran off site (~11:20)

June 25, 2011 Sunny, 85°

O'Halloran arrived @ site @ ~~15:30~~ 15:30
Collect SW-2a at flag locating SW-2 from May.
Collect SW-3a at west side of RR bridge @ 15:54
Collect SW-4a directly downstream of spring on south side of Wolverine Creek. Water in spring inadequate for sample.
Collect SW-1a off ~~south~~ north side of ~~drainage~~ bridge over drainage @ Noble Road
SW-1a @ 16:26
Off site @ 16:40

Sept 8 2010
Sunny/ partly cloudy 80°

J. Carey & O'Halloran on site @ 11:30.
Compared air photo to poly on site
Determined depth of topsoil - in almost all cases sharpshooter encountered rock (or resistance of sgr sand) @ 6" to 12"
Took photos of WP-7, W-00 and W-0.
Collected surface samples for hexavalent chromium analysis into 4-qt ziplock bags

Drum Group F - Cr @ 15:25
WP-14 - Cr @ 15:33
S3-7 - Cr @ 15:40
WP-30 - Cr @ 15:46
S6-3 - Cr @ 15:50

All hexavalent samples were collected in same location as original samples WP-14, S3-7, etc.

Located coordinates of ~~[illegible]~~ fenceline west of Wolverine creek that will be used as northern property boundary

Off site @ 16:00

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NOV 16 2011

5-2-11: Nicholas Schneider running Inner-X XRF

Sample ID	Pb	Cd	As	Zn	other
NIST 2702	137	<32	25	404	
Building 2	111	<22	<14	977	
Drum A	155	<22	<16	3238	Cu-3447
5-2-11 13:39	77	<21	<11	1105	Cu-1259
Building 2	86	<23	<12	473	
Drum B	79	<24	<12	731	
5-2-11 13:42	64	<22	<11	422	
Building 2	98	<23	<13	789	
Drum C	78	<22	<12	607	
5-2-11 13:43	70	<22	<11	332	
Building 2	68	<21	<11	346	
Drum D	82	<22	<12	336	
5-2-11 13:47	71	<22	<12	402	
Building 2	178	<24	<18	7641	Cu-7278 Cr-479 Ni-231
Drum E	142	<24	<16	7600	Cu-6057 Cr-319 Ni-175
5-2-11 13:53	187	<25	<20	9092	Cu-8210 Cr-374 Ni-199
Building 2	192	<23	<18	9141	Cu-9345 Cr-383 Ni-199
Drum F	181	<23	<18	8648	Cu-8876 Cr-449 Ni-206
5-2-11 13:58	226	<23	<20	9149	Cu-8488 Cr-452 Ni-175
Building 2	140	<21	<15	5387	Cu-5709 Cr-204
Drum G	182	<22	<17	7498	Cu-7624 Cr-448
5-2-11 14:05	62	<21	40	1388	Cu-1609
Building 2	103	44	<13	574	Cu-1029
Drum H	77	31	41	559	
5-2-11 14:09	131	<22	<15	5032	Cr-336

Sample ID	Pb	Cd	As	Zn	Other
NBST 2702	117	<29	34	431	
Building 2	160	<26	<19	7236	Cr-382
Drum I	143	<26	<18	5876	Cr-296
5-2-11 14:10	137	<25	<18	6161	Cr-289
Building 2	44	25	<9	308	
Drum J	61	<22	<11	589	
5-2-11 14:14	53	<24	<11	348	
Building 2	39	<24	14	402	
Drum K	67	24	<11	612	
5-2-11 14:13	70	<23	<11	413	
Building 2	74	<24	<12	477	
Drum L	67	<23	<11	395	
5-2-11 14:15	46	<22	<10	405	
Building 2	69	<21	<11	365	
Drum M	43	<21	<10	528	
5-2-11 14:18	35	<20	<8	317	
Building 2	74	<22	<12	446	
Drum N	82	<22	<12	447	
5-2-11 14:26	83	<22	<12	497	
Building 2	32	<20	<8	484	
Drum O	23	<20	<8	345	
5-2-11 14:30	17	<21	<7	140	
Building 2	29	<20	<7	134	
Drum P	22	<20	<8	232	
5-2-11 14:35	29	<20	<8	211	
Building 2	11	<19	<5.6	106	
Drum Q	9	<19	<6	97	
5-2-11 14:38	18	<19	<6	131	

Sample ID	Pb	Cd	As	Zn	Other
NIST 2702	140	<32	<23	367	
Building 2	1039	<51	<62	662	Cr-2475 Hg-219
SW Corner W-1	372	<37	<33	963	Cr-1337 Hg-90
5-2-11 13:30	556	<42	<42	941	Cr-1787 Hg-144
Building 2	23	<23	<9	587	
NW Corner W-2	22	<23	<9	322	Cr-247
5-2-11 13:35	12	<22	<8	115	

Notes on XRF results for grid soil samples:
1-10-1 : Cr - 248, 419
1-11-1 : Cr - 332, 260, 245
1-12-1 : Cr - 356, 268
1-9-1 : Cr - 267, 252
3-4-1 : Cr - 383
3-5-1 : Cr - 401, 582
3-6-1 : Cr - 291

NIST 2702 Standard at the end of 5-2-11 : Pb - 136 Zn - 359
5-3-11 8:00 Nicholas Schneider running XRF. Calibrated on table mount
NIST 2702 Pb - 148 Zn - 433
NIST 2781 Pb - 174 Zn - 996
Notes:
7-6-1 : Hg - 46 Cr - 245
4-9-1 : Hg - 38
5-2-1 : Cr - 459
5-1-1 : Cr - 289, 296
Test #48 : NIST 2781 Standard: Pb - 140 Zn - 805 Pb and Zn too low
2702 Standard: Pb - 111 Zn - 296 Pb and Zn too low
Recalibrated XRF - passed
NIST 2781 Standard: Pb - 157 Zn - 952 still low
NIST 2702 Standard: Pb - 126 Zn - 361 Pb ok, Zn low
4-2-1 : Cr - 295, 424, 577
4-3-1 : Cr - 222
4-4-1 : Cr - 323
4-5-1 : Cr - 308
4-6-1 : Cr - 280
Ran XRF on paper cups. Red cup read 81 ppm for lead, white read 120 ppm. Propped white cup up onto a cardboard box and it read 43 ppm. XRF must have been going through to underlying table. Going to try propping soil samples on top of cardboard box for future tests.
2-3-1 : Cr - 352, 265, 283
2-4-1 : Cr - 557, 376
2-6-1 : Cr - 245
1-13-1 : Cr - 302

2-12-1: Hg-31, 41
2-11-1: Cr-290
3-7-1: Cr-283
3-8-1: Cr-252, 310
3-9-1: Cr-372, 489
W-1: Cr-4542, Hg-237, 237, 269 renamed W-X in computer
4026, 4266
W-2: Hg-69, 116, 64 Cr-785, 1526, 1716
Test # 129 NIST 2702 Standard: Pb-127 Zn-350
Test # 130 NIST 2781 Standard: Pb-177 Zn-1016
Database saying we already entered 1-1-1, so we're entering it in the computer as 1-1B-1.
1-4-1: Cr-249
3-10-1: Cr-413, 405, 540
6-10-1: Cr-337
6-2-1: Cr-188, 211
6-3-1: ~~25~~ Cr-251, 432, 360
6-4-1: Cr-198
6-6-1: Cr-227 320
Test # 192 NIST 2702 Standard: Pb-127 Zn-446
6-8-1: Hg-35
7-1-1: Cr-271 Hg-30
7-3-1: Cr-207, 261
7-5-1: Cr-203
8-1-1: Cr-326, 301
8-2-1: Cr-235, 214
8-3-1: Cr-254
8-5-1: Hg-33
WP-3: Cr-212, 215
WP-4: 289 Cr
WP-5: Cr-197 204
Test # 247 - NIST 2702 Standard: Pb-124 Zn-436
Test # 248 - NIST 2781 Standard: Pb-181 Zn-1093
.5-10: Hg-37
1-9.5: Cr-351 Hg-30
3-3.5: Cr-462, 380, 471

2-9.5 : Cr - 282
3.5-5 : Cr - 361, 242, 182
3.5-6 : Cr-369, 327
4-4.5 : Cr - 323, 265
WP-7 : Cu-73,000, 72,600, 76,300
Cr-595, 714
Ag-72, 83, 81
WP-8 : Cr - 344, 218, 311
WP-9 : Cr - 371, 362, 421
WP-10 : Cr-260, 174
WP-12 : Cr-392
WP-14 : Cr-174
Test #311 : NIST 2702 Standard : Pb-140 Zn-386
WP-17 : Cr-183
3-9.5-1 : Cr-257
3-10.5-1 : Cr-214
2-4.5-1 : Cr-236, 168, 228
Test #334 : NIST 2781 Standard : Pb-180 Zn-1066
18:00 - end of day

5-4-11 7:45 - Nicholas Schneider running Innov-X XRF
Passed calibration check
NIST 2702 Standard : Pb-127 Zn-427
NIST 2781 Standard : Pb-169 Zn-1094

1.5-4-1 Test #4 : Pb-83 Cd-ND As-ND Zn-675 0805 hrs
" #5 Pb-68 Cd-ND As-ND Zn-531
" #6 Pb-86 Cd-ND As-ND Zn-709

WP-19 Test #7 : Pb-ND Cd-ND As-ND Zn-119 Hg-58 0807 hrs
" #8 Pb-ND Cd-ND As-ND Zn-91 Hg-53
" #10 Pb-ND Cd-ND As-ND Zn-97 Hg-ND

WP-20 Test #11 Pb-1468 Cd-ND As-56 Zn-8369 Cr-369 0810 hrs
" #12 Pb-1480 Cd-ND As-ND Zn-8088 Cr-685
" #13 Pb-1498 Cd-ND As-ND Zn-8266 Cr-426

NIST 2702 - As - 45.7 ± 1.8 Cr - 352 ± 22 Ni - 75.4 ± 1.5
2881 - As - 7.82 ± 0.28 Cr - none Ni -

WP-21: Cr - 297, 286, 383
WP-23: Cr - 372, 251, 359
WP-25: Cr - 334, 330
WP-26: Cr - 282
WP-27: Cr - 316, 365, 350
WP-28: Cr - 450, 1326, 576
WP-29: Cr - 344
WP-30: Cr - 287
WP-31: Cr - 408, 279

W-3	Test # 48:	Pb - 119	Cd - Nd	As - 33	Zn - 2799	
	" # 49:	Pb - 376	Cd - Nd	As - Nd	Zn - 3416	
	# 50:	Pb - 140	Cd - Nd	As - Nd	Zn - 1927	
W-4	Test # 51:	Pb - 2017	Cd - Nd	As - Nd	Zn - >10%	Ag - 69 Cu - >10%
	" 52:	Pb - 2886	Cd - Nd	As - Nd	Zn - 37,800	Cu - >10%
	# 53:	Pb - 3402	Cd - Nd	As - Nd	Zn - >10%	Cu - >10%
W-5	Test # 54:	Pb - 531	Cd - 24	As - Nd	Zn - 3314	
	# 55:	Pb - 350	Cd - 25	As - 46	Zn - 3735	
	# 56:	Pb - 446	Cd - Nd	As - Nd	Zn - 2435	
W-6	Test # 57:	Pb - 350	Cd - Nd	As - 63	Zn - 1217	
	# 58:	Pb - 133	Cd - Nd	As - Nd	Zn - 484	
	# 59:	Pb - 248	Cd - Nd	As - 58	Zn - 905	

Test #60 - NIST 2702 Standard: Pb - 143 Zn - 429
Test #62 - NIST 2702 Standard: Pb - 128 As - 43 Cr - 379 Zn - 411
Test #63 - NIST 2781 Standard: Pb - 193 As - <19 Cr - Zn - 1101

2-6.5-1: Cr - 353, 321, 193
2-10.5-1: Cr - 348, 189, 311
2.5-6.5-1: Cr - 267, 170, 288
5-3: Cr - 218
5-4: Cr - 337, 523
3-6.5-1: Cr - 286, 196

Sample ID	Pb	Cd	As	Zn	other
Drum R	461	Nd	Nd	4683	Cr - 405
5-4-4	437	Nd	ND	4861	Cr - 263
10:40	393	ND	ND	4172	

Sample ID	Pb	Cd	As	Zn	Other
Drum S	462	ND	ND	4520	
5-4-11	497	ND	ND	4565	
10:43	431	ND	ND	4283	
Drum T	480	ND	42	4306	Cr-309
5-4-11	637	ND	42	5007	Cr-431
10:45	504	ND	ND	4254	Cr-215
Waste sample 00	13,000	ND	924	50,400	Ag-84 Cu->10%
5-4-11	13,300	ND	598	46,800	Ag-51 Cu->10%
11:45	14,600	ND	900	60,300	Ag-66 Cu->10%
Waste sample W-0	1110	ND	59	5468	
5-4-11	1362	ND	ND	5253	
11:30	953	ND	ND	5286	
Drum U	356	ND	ND	6012	Cr-516
5-4-11	589	~~34~~ ND	34	4615	Cr-179
10:50	495	ND	ND	4024	Cr-376
Drum V	30	ND	ND	201	
5-4-11	45	ND	ND	434	
11:15	31	ND	ND	171	
Drum W	30	ND	ND	263	
5-4-11	29	ND	ND	251	
11:20	32	ND	ND	224	
Drum X	2755	ND	ND	13,900	
5-4-11	9063	ND	697	37,800	Ag-46 Cu->10%
11:50	1799	ND	ND	18,400	Cu-20,600
Drum X-crushed	26	ND	ND	30,300	Cr-723
5-4-11	27	ND	ND	36,000	Cr-670
11:50	31	ND	ND	24,800	Cr-623

XRF'd green pieces

mostly gray pieces

Test # 132: NIST 2202 Standard: Pb-137 As-44 Cr-454 Zn-367

7.5-6-1 : Cr - 417
6-3.5-1 : Cr - 206, 340, 275
6-2.5-1 : Cr - 1059, 675, 528
4.5-3-1 : Cr - 269
5-4.5-1 : Cr - 317, 440, 344 Hg - 34
6.5-3-1 : Cr - 191, 249, 174
4-3.5-1 : Cr - 209
4-2.5-1 : Cr - 260, 217, 430
Test # 192 NIST 2702 Standard : Pb - 112 As - 30 Cr - 378 Zn - 271
Test # 192 NIST 2781 Standard : Pb - 163 Zn - 963
5-6-1 : Cr - 248, 223
WP-12 - 0.5-1.5 : Cr - 611, 770
WP-7 - .5-1.5 : Hg - 44, 42, 48
W-0 - .5-1.5 : Cr - 282
2-9.75-1 : Cr - 459, 270
Test #251 NIST 2702 Standard : Pb - 124 As - 41 Cr: 423 Zn - 369
2-10.25-1 : Cr - 306
3-3.75-1 : Cr - 327, 373, 338
DA-CC : Cr - 291, 195
3.5-4-1 : Cr - 211
WP 6 - 2.5-3 : Cr - 277, 219
Test #299 NIST 2702 Standard : Pb - 148 As - 40 Cr - 627 Zn - 399
Test #300 NIST 2781 Standard : Pb - 174 Zn - 1079
18:45 : End of day

8-5-11 8:30 - Nicholas Schneider running Innov-X XRF
XRF cal check passed
Test #2 : NIST 2702 Standard : Pb - 138 As - 43 Cr - 501 Zn - 421
Test #3 : NIST 2781 Standard : Pb - 196 Zn - 1081
WP-12 - 1.5-2 : Cr - 361, 287, 318
WP-32 - 10-12 : Hg - 30
WP-4 - 4-6" interface : Cr - 316
WP-32 - 4-8" : Cr - 241, 304, 283
WP-32 - 0-4" : Cr - 213, 243

Sample ID	Pb	Cd	As	Zn	Other	
Drum Y	11,100	ND	475	>10%	Cu - >10%	Cr - 2646
5-4-11	16,000	ND	502	>10%	Cu - >10%	Cr - 2825
14:00	21,900	77	570	>10%	Cu - >10%	Cr - 3013
Drum 2	6317	ND	609	>10%	Cu - >10%	
5-4-11	5246	ND	437	>10%	Cu - >10%	
14:05	5383	ND	301	>10%	Cu - >10%	Ag - 51
NIST 2702	130	ND	53	403	Cr - 547	
NIST 2781	168	ND	23	1066		

9:35 - left shop

BER SCANNED

NOV 16 2011

PROJECT INFORMATION

Project Name: Wade's Aluminum Smelter

Project Number: _____

Address: _____

City: Ft Scott, KS

County: Bourbon

Project Manager: Maura O'Halloran

Telephone #: ___-___-_____

Team Members: Probe Logging - Deanna Ross Function: _____

_____ Function: _____

_____ Function: _____

_____ Function: _____

_____ Function: _____

_____ Function: _____

Key Contacts:

Property Owner: _____ Telephone #: ___-___-_____

Utility Contact: _____ Telephone #: ___-___-_____

Utility Contact: _____ Telephone #: ___-___-_____

Utility Contact: _____ Telephone #: ___-___-_____

Other Contact: _____ Telephone #: ___-___-_____

Other Contact: _____ Telephone #: ___-___-_____

City Contact: _____ Telephone #: ___-___-_____

Project Start Date: _____ Project End Date: _____

Book _____ of _____

5/4/11 Waste Piles - Probe Installation

1405 → WP17
0-2.5' - Waste material
2.5'-3' - Brwn silty clay, friable, scattered LS rubble.
3'-4' - Brwn clayey silt, very friable
4' - Gray LS intermixed w/ clayey silt, moist ½p

1419 → WP0
0-2' - Waste material
2-2.5' - Brwn/Gry silty clay, scattered LS fragments
2.5-3.5' - AA
3.5-4' - AA, Tan LS @ ≈ 3'8"
Sampled 6"-1.5 1425

1435 → WP7
0-2' - Waste material
2-2.5' - Brwn clay, sparse, intermixed w/ LS rubble
2.5-3.5' - Black coal, friable, LS intermixed
3.5-4' - Brwn clay w/ rust intermixed, red brick fragments, shff, LS fragments.

1502 → WP12
0-2' - Waste material
2-2.5' - Brwn clayey silt w/ LS fragments
2.5-3.5 - Black coal, shale seams
3.5-4' - Coal w/ brwn clay intermixed
4'-8' - Silty clay, brwn, intermixed rust, dry, shff, coal fragments intermixed
8'-9' - AA
9'-9.5' - Tan LS, fragmented
9.5-12' - AA - intermixed w/ tan clay
12'-13' - Coal, 1" LS stringer at 13'1"
13'-16' - Brwn clay, black/red nodules, dry, shff, LS stringer @ 15'
16' - Tan LS ≈ 2"
1530 16'2"-18' - Brwn clay, rust nodules, black nodules, shff,
18'-19' - Gray siltstone, very friable w/ LS fragments
19'-20' - Coal, friable, intermixed w/ LS & shale fragments.

WP 12
1540 20-22.5 - Coal, friable, rust nodules, layered @ ≈ 22'
22.5-23' - Grades to gray siltstone, moist @ interface, friable, gritty.

1543 Set Piezometer
TD-24' Screen 18'-23'

1600 WP6 (At runoff area between WP4 & WP6),
0-3' Waste material, moist @ 3', blue Fluff material present
3'-4' LS, tan, weathered, brown clay intermixed

Sampled waste @ 2.5-3' 1616
3-3.5' 1618
3.5-4' 1620

1703 WP4
0-6" Waste material, blue/gray @ 4-6"
6"-4' - Brown clay w/ LS fragments, intermixed w/ coal fragments
4' - Gray LS

Sampled 4"-6" - 1713 2-3.5 1711
6"-1' - 1710 3.5-4 1707
1-2' - 1709

WP 32
1757 0-4' - Waste material, bluff Fluff intermixed
4'-8' - AA
8'-9' - Slough
9'-10' - Waste, white Fluff intermixed
10-10.5 - Gray weathered, fractured LS
10.5-12' - Brown clay, stiff, mottled w/ LS fragments intermixed.
Sampled 0-4' 1757 4'-8'-1801
9'-10' 1807
10.5-12 1809

1815 - Finished & Left site Deanna Lass 5/4/11

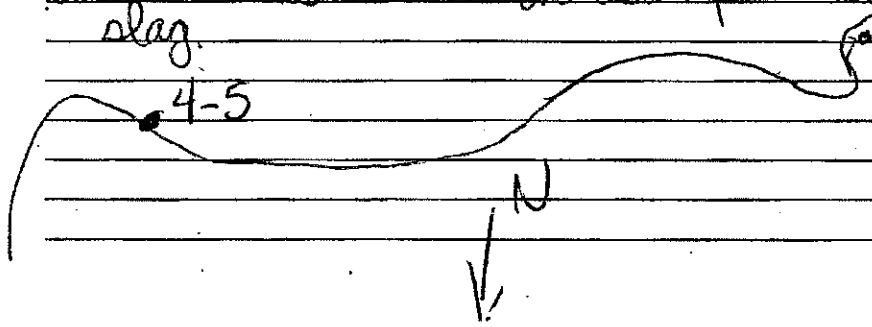
BER SCANNED
NOV 16 2011

1347 Collect sample 1-1-1

	Location	Time	Collectors
	1-1-1	1347	Carey, Costlow
GPS	1-2-1	1352	
	1-3-1	1356	
	1-4-1	1359	
	1-5-1	1403	
	1-6-1	1409	
	1-7-1	1413	
	1-8-1	1417	
	1-9-1	1424	
Waste	1-10-1	1432	
Waste	1-11-1	1437	
	1-12-1	1445	
Waste, GPS	3-10-1	1447	
GPS	3-11-1	1453	
	2-11-1	1458	
Empty Drums	2-12-1	1501	
	1-13-1	1514	
	2-13-1	1517	
	3-12-1	1522	
	4-11-1	1526	
GPS	5-11-1	1529	
	5-10-1	1534	
	6-11-1	1540	
GPS	6-10-1	1546	
GPS	7-9-1	1552	
GPS	7-8-1	1556	
GPS	7-7-1	1604	
GPS	7-6-1	1611	
GPS	4-1-1	1633	
GPS	5-1-1	1637	
GPS	5-2-1	1642	

	Sample	Time	Collector
GPS	6-1-	1653	Carey Cordlow
GPS	7-1-1	1655	
GPS	8-1-1	1658	
GPS	8-2-1	1704	
GPS	7-2-1	1708	
GPS	8-3-1	1715	
GPS	8-4-1	1719	
GPS	8-5-1	1730	
GPS	7-5-1	1740	
GPS	7-4-1	1745	
GPS	7-3-1	1749	
GPS	6-2-1	1753	
GPS	6-3-1	1758	
GPS	6-4-1	1801	
GPS	6-6-1	1810	
GPS	6-7-1	1815	
GPS	6-8-1	1820	
GPS	6-9-1	1824	
GPS	7-8-1	1835	
GPS	7-6-1	1846	
May 5, 2011			
	3-13.3-1	911	
	3-3.12-1	915	
	1-9.5-1	925	
	0.5-10-1	934	
	1-10.5-1	943	
	4-4.5-1	1121	
	3.5-5-1	1125	

Note: 4-5 is located on clean patch at edge of slag.



Sample	Time	Collector
3.5-6-1	1139	Costlow/Carey
2-7.5-1	1145	
2-9.5-1	1150	
3-9.5-1	1436	
3.5-10-1	1439	
3-10.5-1	1443	
2-21.5-1	1457	
2.5-5-1	501	
1.5-2-1	1513	

To collect tomorrow:
2-10.5-1 + many others

May 4th

	2-2.5-1	838	Carey, Peterson
	2.5-6-1	845	
	3-6.5-1	852	
	2.5-6.5-1	855	
	2-6.5-1	900	
	2.5-7-1	904	
	2-10.5-1	0915	Carey, Peterson, Ross
	5-6-1	925	
Waste	5-8-1	928	
	5-5-1	0930	
Waste	5.4-1	934	
	5-3-1	945	
	4-1.5-1	1255	Carey, Peterson, O'Halloran
	3.5-2-1	1258	
	4-2.5-1	1303	
	4.5-2-1	1305	
	5-2.5-1	1308	
	6-2.5-1	1310	
	6.5-3-1	1312	
	6-3.5-1	1313	
	5-3.5-1	1315	
	4.5-3-1	1317	
	4.5-4-1	1330	

	Sample	Time	
	5-4.75	1335	
	7-5.5	1337	
	7.5-6	1345	~~Peterson, Corey~~
	7-6.5	1348	
	6.5-6	1350	
	6-6.5	1351	
	6.5-7	1354	~~Robert~~
	3.25-10	1409	Peterson, Corey
	3-10.25	1414	
	3-9.75	1417	
	2-9.75	1419	
	2-10.25	1422	
	1-10.25	1430	
	0.75-10	1433	
	1.5-7	1449	
waste	3.5-6	1502	
	3.5-5	1507	
	3.5-4	1513	
	3-3.75	1519	
	2.5-3	1523	
	2-3.5	1528	
	1.75-4	1531	
waste	1.5-3	1534	

APPENDIX B PHOTOGRAPHS

Site Investigation
Wade's Aluminum
May 2011

Photo 1
View: Northeast
Date: 5/5/2011
Photo by: Maura O'Hallorar
Comments: Waste Pile 7 in front of concrete block

Photo 2
View:South
Date: 5/5/2011
Photo by: Maura O'Hallorar
Comments: Waste Pile 20

Site Investigation
Wade's Aluminum
May 2011

Photo 3
View: South
Date: 5/5/2011
Photo by: Maura O'Hallorar
Comments: Waste Pile 21

Photo 4
View:North
Date: 5/5/2011
Photo by: Maura O'Hallorar
Comments: Waste Pile 31

Site Investigation
Wade's Aluminum
May 2011

Photo 5
View: South
Date: 5/4/2011
Photo by: Rick Bean
Comments: Collecting sample in area of drum pile

Photo 6
View:West
Date: 5/5/2011
Photo by: Maura O'Halloran
Comments: Drums grouped by flags

Site Investigation
Wade's Aluminum
May 2011

Photo 7
View: Northeast
Date: 5/5/2011
Photo by: Maura O'Halloran
Comments: Drum Y, which failed TCLP for lead

Photo 8
View:Northeast
Date: 5/5/2011
Photo by: Maura O'Halloran
Comments: Drum Z, which failed TCLP for lead

Site Investigation
Wade's Aluminum
May 2011

Photo 9
Date: 5/5/2011
Photo by: Maura O'Hallorar
Comments: Boring GWP-1

Photo 10
View:South
Date: 5/5/2011
Photo by: Maura O'Hallorar
Comments: GWP-2

Site Investigation
Wade's Aluminum
May 2011

Photo 11
View: Northeast
Date: 5/4/2011
Photo by: Rick Bean
Comments: Location of surface water sample SW-4

Photo 12
View:West
Date: 5/4/2011
Photo by: Rick Bean
Comments: Flag in front of piling designates SED-4

Site Investigation
Wade's Aluminum
May 2011

Photo 13
View: East
Date: 5/5/2011
Photo by: Maura O'Halloran
Comments: Former transformer location

Photo 14
View:West
Date: 5/5/2011
Photo by: Maura O'Halloran
Comments: Drum containing diesel fuel

APPENDIX C ANALYTICAL DATA

APPENDIX C

TOXIC SUBSTANCES FACTS SHEETS

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ALUMINUM
CAS # 7429-90-5

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about aluminum. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Everyone is exposed to low levels of aluminum from food, air, and water. Exposure to high levels of aluminum may result in respiratory problems. Aluminum has been found in at least 427 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is aluminum?

(Pronounced ə-lōō′mə-nəm)

Aluminum occurs naturally and makes up about 8% of the surface of the earth. It is always found combined with other elements such as oxygen, silicon, and fluorine.

Aluminum metal is silver-white and flexible. It is often used in cooking utensils, containers, appliances, and building materials. It is also used in paints and fireworks; to produce glass, rubber, and ceramics; and in consumer products such as antacids, astringents, buffered aspirin, food additives, and antiperspirants.

What happens to aluminum when it enters the environment?

- It binds to particles in the air.
- It can dissolve in lakes, streams, and rivers depending on the quality of the water.
- Acid rain may dissolve aluminum from soil and rocks.
- It can be taken up into some plants from soil.
- It is not known to bioconcentrate up the food chain.

How might I be exposed to aluminum?

- Eating small amounts of aluminum in food.
- Breathing higher levels of aluminum dust in workplace air.
- Drinking water with high levels of aluminum near waste sites, manufacturing plants, or areas naturally high in aluminum.
- Eating substances containing high levels of aluminum (such as antacids) especially when eating or drinking citrus products at the same time.
- Very little enters your body from aluminum cooking utensils.

How can aluminum affect my health?

Low-level exposure to aluminum from food, air, water, or contact with skin is not thought to harm your health. Aluminum, however, is not a necessary substance for our bodies and too much may be harmful.

People who are exposed to high levels of aluminum in air may have respiratory problems including coughing and asthma from breathing dust.

Some studies show that people with Alzheimer's disease have more aluminum than usual in their brains. We do not know whether aluminum causes the disease or whether the buildup of aluminum happens to people who already have the disease. Infants and adults who received large doses of aluminum as a treatment for another problem developed bone

diseases, which suggests that aluminum may cause skeletal problems. Some sensitive people develop skin rashes from using aluminum chlorohydrate deodorants.

How likely is aluminum to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the EPA have not classified aluminum for carcinogenicity. Aluminum has not been shown to cause cancer in animals.

How can aluminum affect children?

Children with kidney problems who were given aluminum in their medical treatments developed bone diseases. Other health effects of aluminum on children have not been studied. It is not known whether aluminum affects children differently than adults, or what the long-term effects might be in adults exposed as children. Large amounts of aluminum have been shown to be harmful to unborn and developing animals because it can cause delays in skeletal and neurological development. Aluminum has been shown to cause lower birthweights in some animals.

How can families reduce the risk of exposure to aluminum?

The most important way families can lower exposure to aluminum is to know about the sources of aluminum and lessen exposure to these sources. Since aluminum is so common and widespread in the environment, families cannot avoid exposure to aluminum. Exposure to the low levels of aluminum that are naturally present in food and water and the forms of aluminum present in dirt and aluminum cookware is generally not harmful. The best way to reduce exposure to aluminum is to avoid taking large quantities of soluble forms of aluminum such as aluminum-containing antacids and buffered aspirin. Make sure these products have child-proof caps so children will not accidentally eat them. Some soy-based formulas may contain high levels of aluminum, so parents may want to consult with their physician when choosing an infant formula.

Is there a medical test to show whether I've been exposed to aluminum?

There are tests to measure aluminum in blood, urine, and feces. The amount in your urine can tell you whether you have been exposed to higher than normal levels of aluminum. Tests can also detect aluminum in your hair and fingernails. Not all of these tests are routinely performed at your doctor's office, but your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

EPA requires that spills or accidental releases of 5,000 pounds or more of aluminum sulfate be reported. Special regulations are set for aluminum phosphide because it is a pesticide.

EPA recommends that the concentration of aluminum in drinking water not exceed 0.2 parts of aluminum per million parts of water (0.2 ppm) because of aesthetic effects, such as taste and odor problems.

The Food and Drug Administration (FDA) has determined that aluminum cooking utensils, aluminum foil, antiperspirants, antacids, and other aluminum products are generally safe.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for aluminum. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ANTIMONY
CAS # 7440-36-0

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about antimony. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to antimony occurs in the workplace or from skin contact with soil at hazardous waste sites. Breathing high levels of antimony for a long time can irritate the eyes and lungs, and can cause problems with the lungs, heart, and stomach. This chemical has been found in at least 403 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is antimony?

(Pronounced ăn′tə-mō′nē)

Antimony is a silvery-white metal that is found in the earth's crust. Antimony ores are mined and then mixed with other metals to form antimony alloys or combined with oxygen to form antimony oxide.

Little antimony is currently mined in the United States. It is brought into this country from other countries for processing. However, there are companies in the United States that produce antimony as a by-product of smelting lead and other metals.

Antimony isn't used alone because it breaks easily, but when mixed into alloys, it is used in lead storage batteries, solder, sheet and pipe metal, bearings, castings, and pewter. Antimony oxide is added to textiles and plastics to prevent them from catching fire. It is also used in paints, ceramics, and fireworks, and as enamels for plastics, metal, and glass.

What happens to antimony when it enters the environment?

- Antimony is released to the environment from natural sources and from industry.
- In the air, antimony is attached to very small particles that may stay in the air for many days.
- Most antimony ends up in soil, where it attaches strongly to particles that contain iron, manganese, or aluminum.
- Antimony is found at low levels in some rivers, lakes, and streams.

How might I be exposed to antimony?

- Because antimony is found naturally in the environment, the general population is exposed to low levels of it every day, primarily in food, drinking water, and air.
- It may be found in air near industries that process or release it, such as smelters, coal-fired plants, and refuse incinerators.
- In polluted areas containing high levels of antimony, it may be found in the air, water, and soil.
- Workers in industries that process it or use antimony ore may be exposed to higher levels.

How can antimony affect my health?

Exposure to antimony at high levels can result in a variety of adverse health effects.

Breathing high levels for a long time can irritate your eyes and lungs and can cause heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers.

In short-term studies, animals that breathed very high levels of antimony died. Animals that breathed high levels

had lung, heart, liver, and kidney damage. In long-term studies, animals that breathed very low levels of antimony had eye irritation, hair loss, lung damage, and heart problems. Problems with fertility were also noted. In animal studies, problems with fertility have been seen when rats breathed very high levels of antimony for a few months.

Ingesting large doses of antimony can cause vomiting. We don't know what other effects may be caused by ingesting it. Long-term animal studies have reported liver damage and blood changes when animals ingested antimony. Antimony can irritate the skin if it is left on it.

Antimony can have beneficial effects when used for medical reasons. It has been used as a medicine to treat people infected with parasites.

How likely is antimony to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified antimony as to its human carcinogenicity.

Lung cancer has been observed in some studies of rats that breathed high levels of antimony. No human studies are available. We don't know whether antimony will cause cancer in people.

Is there a medical test to show whether I've been exposed to antimony?

Tests are available to measure antimony levels in the body. Antimony can be measured in the urine, feces, and blood for several days after exposure. However, these tests cannot tell you how much antimony you have been exposed to or whether you will experience any health effects. Some tests are not usually performed in most doctors' offices and may require special equipment to conduct them.

Has the federal government made recommendations to protect human health?

The EPA allows 0.006 parts of antimony per million parts of drinking water (0.006 ppm). The EPA requires that discharges or spills into the environment of 5,000 pounds or more of antimony be reported.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 0.5 milligrams of antimony per cubic meter of air (0.5 mg/m^3) for an 8-hour workday, 40-hour workweek.

The American Conference of Governmental Industrial Hygienists (ACGIH) and the National Institute for Occupational Safety and Health (NIOSH) currently recommend the same guidelines for the workplace as OSHA.

Glossary

Carcinogenicity: Ability to cause cancer.
CAS: Chemical Abstracts Service.
Ingestion: Taking food or drink into your body.
Long-term: Lasting one year or more.
Milligram (mg): One thousandth of a gram.
Parasite: An organism living in or on another organism.
ppm: Parts per million.
Short-term: Lasting 14 days or less.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for antimony. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

BERYLLIUM

CAS #7440-41-7

Division of Toxicology ToxFAQs™ September 2002

This fact sheet answers the most frequently asked health questions (FAQs) about beryllium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: People working or living near beryllium industries have the greatest potential for exposure to beryllium. Lung damage has been observed in people exposed to high levels of beryllium in the air. About 1-15% of all people occupationally-exposed to beryllium in air become sensitive to beryllium and may develop chronic beryllium disease (CBD), an irreversible and sometimes fatal scarring of the lungs. CBD may be completely asymptomatic or begin with coughing, chest pain, shortness of breath, weakness, and/or fatigue. Beryllium has been found in at least 535 of the 1,613 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is beryllium?

Beryllium is a hard, grayish metal naturally found in mineral rocks, coal, soil, and volcanic dust. Beryllium ore is mined, and the beryllium is purified for use in nuclear weapons and reactors, aircraft and space vehicle structures, instruments, x-ray machines, and mirrors. Beryllium oxide is used to make speciality ceramics for electrical and high-technology applications. Beryllium alloys are used in automobiles, computers, sports equipment (golf clubs), and dental bridges.

What happens to beryllium when it enters the environment?

❑ Beryllium dust enters the air from burning coal and oil. This beryllium dust will eventually settle over the land and water.

❑ It enters water from erosion of rocks and soil, and from industrial waste. Some beryllium compounds will dissolve in water, but most stick to particles and settle to the bottom.

❑ Most beryllium in soil does not dissolve in water and remains bound to soil.

❑ Beryllium does not accumulate in the food chain.

How might I be exposed to beryllium?

❑ The general population is normally exposed to low levels of beryllium in air, food, and water.

❑ People working in industries where beryllium is mined, processed, machined, or converted into metal, alloys, and other chemicals may be exposed to high levels of beryllium. People living near these industries may also be exposed to higher than normal levels of beryllium in air.

❑ People living near uncontrolled hazardous waste sites may be exposed to higher than normal levels of beryllium.

How can beryllium affect my health?

Beryllium can be harmful if you breathe it. The effects depend on how much you are exposed to, for how long, and individual susceptibility. If beryllium air levels are high enough (greater than 1000 ug/m^3), an acute condition can result. This condition resembles pneumonia and is called acute beryllium disease Occupational and community air standards are effective in preventing acute lung damage.

Some exposed workers (1-15%) become sensitive to beryllium. These individuals may develop an inflammatory reaction in the respiratory system. This condition is called chronic beryllium disease (CBD), and can occur years after exposure to higher than normal levels of beryllium (greater than 0.2 ug/m^3). This disease can make you feel weak and tired, and can cause difficulty in breathing. It can also result in anorexia, weight loss, and may also lead to right side heart

enlargement and heart disease in advanced cases. Some people who are sensitized to beryllium may not have any symptoms. The general population is unlikely to develop chronic beryllium disease because ambient air levels of beryllium are normally very low (0.00003-0.0002 ug/m^3).

Swallowing beryllium has not been reported to cause effects in humans because very little beryllium is absorbed from the stomach and intestines. Ulcers have been seen in dogs ingesting beryllium in the diet. Beryllium contact with skin that has been scraped or cut may cause rashes or ulcers.

How likely is beryllium to cause cancer?

Long term exposure to beryllium can increase the risk of developing lung cancer in people.

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have determined that beryllium is a human carcinogen. The EPA has determined that beryllium is a probable human carcinogen. EPA has estimated that lifetime exposure to 0.04 ug/m^3 beryllium can result in a one in a thousand chance of developing cancer.

How can beryllium affect children?

It is likely that the health effects seen in children exposed to beryllium will be similar to the effects seen in adults. We do not know whether children differ from adults in their susceptibility to beryllium.

We do not know if exposure to beryllium will result in birth defects or other developmental effects in people. The studies on developmental effects in animals are not conclusive.

How can families reduce the risk of exposure to beryllium?

❑ Individuals working at facilities that use beryllium should make sure that contaminated clothing and objects are not brought home.

❑ Children should avoid playing in soils near uncontrolled hazardous waste sites where beryllium may have been discarded.

Is there a medical test to show whether I've been exposed to beryllium?

Beryllium can be measured in samples from your blood, urine, skin, or lungs. These tests are rarely done because they are not reliable measures of your exposure over time. Also, these tests do not show if you have become sensitized to beryllium.

Another test, the beryllium lymphocyte proliferation test (BeLPT), can help your doctor decide if you are sensitized to beryllium. This test is only done in a few specialized laboratories, but doctors familiar with the test can collect blood samples and send them for testing by overnight carrier. The BeLPT is most often done for people who work with beryllium. It is also useful for separating chronic beryllium disease from diagnoses that resemble it (for example, sarcoidosis). Depending on your exposure history, clinical findings, and test results, your doctor may also recommend additional specialized testing.

Has the federal government made recommendations to protect human health?

The EPA restricts the amount of beryllium that industries may release into the air to 0.01 ug/m^3, averaged over a 30-day period.

The Occupational Safety and Health Administration (OSHA) sets a limit of 2 ug/m^3 for an 8-hour work shift measured as a personal sample.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological Profile for Beryllium Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

BORON
CAS # 7440-42-8

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about boron. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to boron occurs in the workplace or from using certain consumer products. Breathing moderate levels of boron irritates the nose, throat, and eyes. This chemical has been found in at least 142 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is boron?
(Pronounced bôr′ŏn′)

Boron is a compound that occurs in nature. It is often found combined with other substances to form compounds called borates. Common borate compounds include boric acid, salts of borates, and boron oxide.

Several companies in the United States produce most of the world's borates by processing boron compounds. Borates are used mostly to produce glass. They are also used in fire retardants, leather tanning industries, cosmetics, photographic materials, soaps and cleaners, and for high-energy fuel. Some pesticides used for cockroach control and some wood preservatives also contain borates.

What happens to boron when it enters the environment?

- Boron is released to the environment from natural sources such as oceans, volcanoes, and geothermal steam.
- Boron is also released from industries that use it.
- No information is available on how long boron remains in air, water, or soil.
- Boron does not appear to accumulate in fish or other organisms in water.
- Boron accumulates in plants and is found in foods, mainly fruits and vegetables.

How might I be exposed to boron?

- In air, water, and food at low levels.
- Drinking water that contains it from areas where boron is found naturally at high levels in the earth.
- Eating foods containing high levels.
- Working in borax mining and refining plants and at sites where boric acid is manufactured.
- Using consumer products that contain it, such as cosmetics and laundry products.

How can boron affect my health?

There is little information on the health effects of long-term exposure to boron. Most of the studies are on short-term exposures.

Breathing moderate levels of boron can result in irritation of the nose, throat, and eyes. Reproductive effects, such as low sperm count, were seen in men exposed to boron over the long-term. Animal studies have shown effects on the lungs from breathing high levels of boron.

Ingesting large amounts of boron over short periods of time can harm the stomach, intestines, liver, kidney, and

brain. Animal studies of ingestion of boron found effects on the testes in male animals. Birth defects were also seen in the offspring of female animals exposed during pregnancy.

We don't know what the effects are in people from skin contact with boron. Animal studies have found skin irritation when boron was applied directly to the skin.

How likely is boron to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified boron as to its human carcinogenicity.

One animal study found no evidence of cancer after lifetime exposure to boric acid in food. No human studies are available.

Is there a medical test to show whether I've been exposed to boron?

Tests are available to measure boron levels in blood and urine. These tests must be done shortly after exposure, because most excess boron leaves the body through the urine within a few days of exposure.

These tests are not usually performed in doctors' offices because special equipment is needed to conduct them. It is not known whether boron levels measured in the body can be used to predict whether health problems will occur.

Has the federal government made recommendations to protect human health?

The EPA allows no more than 30 parts of boron per million parts of cottonseed oil (30 ppm) and 8 ppm of boron in or on citrus fruits.

The EPA requires that discharges or spills into the environment of 100 pounds of more of boron trichloride and boron trifluoride be reported.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 15 milligrams per cubic meter (15 mg/m^3) for boron oxide dust in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) currently recommends an occupational exposure limit of 10 mg/m^3 for boron oxide dust.

NIOSH also recommends that 25 ppm boron trifluoride be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

The Food and Drug Administration (FDA) allows no more than 310 ppm of boron as a food additive.

Glossary

Carcinogenicity: Ability to cause cancer.

Ingesting: Taking food or drink into your body.

Long-term: Lasting one year or longer.

Milligram (mg): One thousandth of a gram.

Pesticides: Chemicals used to kill pests.

ppm: Parts per million.

Short-term: Lasting 14 days or less.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for boron. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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CADMIUM
CAS # 7440-43-9

Agency for Toxic Substances and Disease Registry ToxFAQs June 1999

This fact sheet answers the most frequently asked health questions (FAQs) about cadmium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to cadmium happens mostly in the workplace where cadmium products are made. The general population is exposed from breathing cigarette smoke or eating cadmium contaminated foods. Cadmium damages the lungs, can cause kidney disease, and may irritate the digestive tract. This substance has been found in at least 776 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is cadmium?

(Pronounced kăd′mē-əm)

Cadmium is a natural element in the earth's crust. It is usually found as a mineral combined with other elements such as oxygen (cadmium oxide), chlorine (cadmium chloride), or sulfur (cadmium sulfate, cadmium sulfide).

All soils and rocks, including coal and mineral fertilizers, contain some cadmium. Most cadmium used in the United States is extracted during the production of other metals like zinc, lead, and copper. Cadmium does not corrode easily and has many uses, including batteries, pigments, metal coatings, and plastics.

What happens to cadmium when it enters the environment?

- Cadmium enters air from mining, industry, and burning coal and household wastes.
- Cadmium particles in air can travel long distances before falling to the ground or water.
- It enters water and soil from waste disposal and spills or leaks at hazardous waste sites.
- It binds strongly to soil particles.
- Some cadmium dissolves in water.
- It doesn't break down in the environment, but can change forms.
- Fish, plants, and animals take up cadmium from the environment.
- Cadmium stays in the body a very long time and can build up from many years of exposure to low levels.

How might I be exposed to cadmium?

- Breathing contaminated workplace air (battery manufacturing, metal soldering or welding).
- Eating foods containing it; low levels in all foods (highest in shellfish, liver, and kidney meats).
- Breathing cadmium in cigarette smoke (doubles the average daily intake).
- Drinking contaminated water.
- Breathing contaminated air near the burning of fossil fuels or municipal waste.

How can cadmium affect my health?

Breathing high levels of cadmium severely damages the lungs and can cause death. Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhea. Long-term exposure to lower levels of cadmium in air, food, or water leads to a buildup of cadmium in the kidneys and possible kidney disease.

Other long-term effects are lung damage and fragile bones. Animals given cadmium in food or water had high blood pressure, iron-poor blood, liver disease, and nerve or brain damage.

We don't know if humans get any of these diseases from eating or drinking cadmium. Skin contact with cadmium is not known to cause health effects in humans or animals.

How likely is cadmium to cause cancer?

The Department of Health and Human Services (DHHS) has determined that cadmium and cadmium compounds may reasonably be anticipated to be carcinogens.

How can cadmium affect children?

The health effects in children are expected to be similar to those in adults (kidney, lung and intestinal damage).

We don't know if cadmium causes birth defects in people. Cadmium does not readily go from a pregnant woman's body into the developing child, but some portion can cross the placenta. It can also be found in breast milk. The babies of animals exposed to high levels of cadmium during pregnancy had changes in behavior and learning ability. Cadmium may also affect birth weight and the skeleton in developing animals.

Animal studies also indicate that more cadmium is absorbed into the body if the diet is low in calcium, protein, or iron, or is high in fat. A few studies show that younger animals absorb more cadmium and are more likely to lose bone and bone strength than adults.

How can families reduce the risk of exposure to cadmium?

In the home, store substances that contain cadmium safely, and keep nickel-cadmium batteries out of reach of young children. If you work with cadmium, use all safety precautions to avoid carrying cadmium-containing dust home from work on your clothing, skin, hair, or tools.

A balanced diet can reduce the amount of cadmium taken into the body from food and drink.

Is there a medical test to show whether I've been exposed to cadmium?

Tests are available in some medical laboratories that measure cadmium in blood, urine, hair, or nails. Blood levels show recent exposure to cadmium, and urine levels show both recent and earlier exposure. The reliability of tests for cadmium levels in hair or nails is unknown.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 5 parts of cadmium per billion parts of drinking water (5 ppb). EPA doesn't allow cadmium in pesticides.

The Food and Drug Administration (FDA) limits the amount of cadmium in food colors to 15 parts per million (15 ppm).

The Occupational Safety and Health Administration (OSHA) limits workplace air to 100 micrograms cadmium per cubic meter (100 $\mu g/m^3$) as cadmium fumes and 200 μg cadmium/m^3 as cadmium dust.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for cadmium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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CALCIUM HYPOCHLORITE
CAS #7778-54-3
SODIUM HYPOCHLORITE
CAS #7681-52-9

Division of Toxicology ToxFAQs™ April 2002

This fact sheet answers the most frequently asked health questions (FAQs) about sodium and calcium hypochlorite. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: The general public can be exposed to small amounts of sodium and calcium hypochlorite by using household products that contain these chemicals. Workers in occupations that use these chemicals have the highest risk of being exposed. Sodium and calcium hypochlorite can cause irritation of the eyes, skin, respiratory and gastrointestinal tract. Exposure to high levels can result in severe corrosive damage to the eyes, skin, respiratory and gastrointestinal tissues and can be fatal. Sodium and calcium hypochlorite have been found 6 times each in the 1,585 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What are sodium and calcium hypochlorite?

Sodium hypochlorite is generally used dissolved in water at various concentrations. Although available, solid sodium hypochlorite is not commercially used. Sodium hypochlorite solutions are clear, greenish to yellow liquids with an odor of chlorine. Calcium hypochlorite is a white solid that readily decomposes in water releasing oxygen and chlorine. It also has a strong chlorine odor. Neither compound occur naturally in the environment.

Sodium and calcium hypochlorite are used primarily as bleaching agents or disinfectants. They are components of commercial bleaches, cleaning solutions, and disinfectants for drinking water and waste water purification systems and swimming pools.

What happens to sodium and calcium hypochlorite when they enter the environment?

❑ When released to air, sodium and calcium hypochlorite are broken down by sunlight and compounds commonly found in the air.
❑ In water and soil, sodium and calcium hypochlorite separate into sodium, calcium and hypochlorite ions (an ion is an electrically charged atom or molecule). These ions may react with other substances found in the water.
❑ Sodium and calcium hypochlorite do not accumulate in the food chain.

How might I be exposed to sodium and calcium hypochlorite?

❑ You can be exposed to low levels of sodium and calcium hypochlorite if you use disinfectants like household bleach.
❑ You can also be exposed by swimming in pools where these chemicals were added to kill bacteria.
❑ Drinking water from public drinking water supplies where these chemicals were added to kill bacteria.
❑ Workers employed in occupations where these compounds are used to bleach paper and textiles may be subject to slightly higher levels of exposure.

How can sodium and calcium hypochlorite affect my health?

The toxic effects of sodium and calcium hypochlorite are due primarily to the corrosive properties of hypochlorite. If you ingest a small amount of household bleaches (3-6%

hypochlorite) you may experience gastrointestinal irritation. If you ingest a more concentrated commercial bleach (10% or higher hypochlorite) or hypochlorite powder you may suffer severe corrosive injuries to the mouth, throat, esophagus and stomach with bleeding, perforation, and eventually death. Permanent scars and narrowing of the esophagus may occur in survivors of severe intoxication.

If you inhale chlorine gas released from concentrated hypochlorite solutions you may experience nasal irritation, sore throat, and coughing. Contact of strong hypochlorite solutions with your skin may cause burning pain, inflammation, and blisters. Contact of the eye with mild bleach solutions may cause mild and transitory irritation. More concentrated solutions may cause severe eye injuries. Long-term exposure to low levels of hypochlorite can cause dermal irritation.

We do not know if exposure to chlorine can result in reproductive effects.

How likely are sodium and calcium hypochlorite to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that hypochlorite salts are not classifiable as to their carcinogenicity to humans.

How can sodium and calcium hypochlorite affect children?

Children are probably affected by exposure to sodium and calcium hypochlorite in the same ways as adults. We do not know whether children differ from adults in their susceptibility to sodium and calcium hypochlorite. In general, children may be more vulnerable to corrosive agents than adults because of the smaller diameter of their airways.

We do not know if exposure to sodium and calcium hypochlorite can result in birth defects or other developmental effects.

How can families reduce the risk of exposure to sodium and calcium hypochlorite?

❑ Most families will not be exposed to high levels of sodium or calcium hypochlorite.
❑ Household products containing sodium or calcium hypochlorite should be stored in safe locations, out of the reach of children.

Is there a medical test to show whether I've been exposed to sodium and calcium hypochlorite?

Specific tests for the presence of sodium, calcium or chlorine in the blood or urine are not generally useful. If a severe exposure has occurred, blood and urine analyses and other tests may show whether damage has occurred to the lungs and gastrointestinal tract. Some of these tests can be performed in a doctor's office. Some testing may require hospital facilities.

Has the federal government made recommendations to protect human health?

The Food and Drug Administration (FDA) has set a limit for chlorine, as sodium hypochlorite or calcium hypochlorite, not to exceed 0.0082 or 0.0.036 pounds, respectively, of chlorine per pound of dry food starch.

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We do not know if exposure to sodium and calcium hypochlorite can result in birth defects or other developmental effects.

How can families reduce the risk of exposure to sodium and calcium hypochlorite?

❑ Most families will not be exposed to high levels of sodium or calcium hypochlorite.
❑ Household products containing sodium or calcium hypochlorite should be stored in safe locations, out of the reach of children.

Is there a medical test to show whether I've been exposed to sodium and calcium hypochlorite?

Specific tests for the presence of sodium, calcium or chlorine in the blood or urine are not generally useful. If a severe exposure has occurred, blood and urine analyses and other tests may show whether damage has occurred to the lungs and gastrointestinal tract. Some of these tests can be performed in a doctor's office. Some testing may require hospital facilities.

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

CHROMIUM
CAS # 7440-47-3

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about chromium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to chromium occurs from ingesting contaminated food or drinking water or breathing contaminated workplace air. Chromium(VI) at high levels can damage the nose and can cause cancer. Chromium has been found at 1,036 of the 1,591 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is chromium?

Chromium is a naturally occurring element found in rocks, animals, plants, soil, and in volcanic dust and gases. Chromium is present in the environment in several different forms. The most common forms are chromium(0), chromium(III), and chromium(VI). No taste or odor is associated with chromium compounds.

Chromium(III) occurs naturally in the environment and is an essential nutrient. Chromium(VI) and chromium(0) are generally produced by industrial processes.

The metal chromium, which is the chromium(0) form, is used for making steel. Chromium(VI) and chromium(III) are used for chrome plating, dyes and pigments, leather tanning, and wood preserving.

What happens to chromium when it enters the environment?

- Chromium enters the air, water, and soil mostly in the chromium(III) and chromium(VI) forms.
- In air, chromium compounds are present mostly as fine dust particles which eventually settle over land and water.
- Chromium can strongly attach to soil and only a small amount can dissolve in water and move deeper in the soil to underground water.
- Fish do not accumulate much chromium in their bodies from water.

How might I be exposed to chromium?

- Eating food containing chromium(III).
- Breathing contaminated workplace air or skin contact during use in the workplace.
- Drinking contaminated well water.
- Living near uncontrolled hazardous waste sites containing chromium or industries that use chromium.

How can chromium affect my health?

Chromium(III) is an essential nutrient that helps the body use sugar, protein, and fat.

Breathing high levels of chromium(VI) can cause irritation to the nose, such as runny nose, nosebleeds, and ulcers and holes in the nasal septum.

Ingesting large amounts of chromium(VI) can cause stomach upsets and ulcers, convulsions, kidney and liver damage, and even death.

Skin contact with certain chromium(VI) compounds can cause skin ulcers. Some people are extremely sensitive to chromium(VI) or chromium(III). Allergic reactions consisting of severe redness and swelling of the skin have been noted.

How likely is chromium to cause cancer?

Several studies have shown that chromium(VI) compounds can increase the risk of lung cancer. Animal studies have also shown an increased risk of cancer.

The World Health Organization (WHO) has determined that chromium(VI) is a human carcinogen.

The Department of Health and Human Services (DHHS) has determined that certain chromium(VI) compounds are known to cause cancer in humans.

The EPA has determined that chromium(VI) in air is a human carcinogen.

How can chromium affect children?

We do not know if exposure to chromium will result in birth defects or other developmental effects in people. Birth defects have been observed in animals exposed to chromium(VI).

It is likely that health effects seen in children exposed to high amounts of chromium will be similar to the effects seen in adults.

How can families reduce the risk of exposure to chromium?

❑ Children should avoid playing in soils near uncontrolled hazardous waste sites where chromium may have been discarded.

❑ Although chromium(III) is an essential nutrient, you should avoid excessive use of dietary supplements containing chromium.

Is there a medical test to show whether I've been exposed to chromium?

Since chromium(III) is an essential element and naturally occurs in food, there will always be some level of chromium in your body. There are tests to measure the level of chromium in hair, urine, and blood. These tests are most useful for people exposed to high levels. These tests cannot determine the exact levels of chromium that you may have been exposed to or predict how the levels in your tissues will affect your health.

Has the federal government made recommendations to protect human health?

EPA has set a limit of 100 μg chromium(III) and chromium(VI) per liter of drinking water (100 μg/L).

The Occupational Safety and Health Administration (OSHA) has set limits of 500 μg water soluble chromium(III) compounds per cubic meter of workplace air (500 $\mu g/m^3$), 1,000 $\mu g/m^3$ for metallic chromium(0) and insoluble chromium compounds, and 52 $\mu g/m^3$ for chromium(VI) compounds for 8-hour work shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Chromium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

COPPER

CAS # 7440-50-8

Division of Toxicology ToxFAQs™ September 2004

This fact sheet answers the most frequently asked health questions (FAQs) about copper. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Copper is a metal that occurs naturally in the environment, and also in plants and animals. Low levels of copper are essential for maintaining good health. High levels can cause harmful effects such as irritation of the nose, mouth and eyes, vomiting, diarrhea, stomach cramps, nausea, and even death. Copper has been found in at least 906 of the 1,647 National Priority Sites identified by the Environmental Protection Agency (EPA).

What is copper?

Copper is a metal that occurs naturally throughout the environment, in rocks, soil, water, and air. Copper is an essential element in plants and animals (including humans), which means it is necessary for us to live. Therefore, plants and animals must absorb some copper from eating, drinking, and breathing.

Copper is used to make many different kinds of products like wire, plumbing pipes, and sheet metal. U.S. pennies made before 1982 are made of copper, while those made after 1982 are only coated with copper. Copper is also combined with other metals to make brass and bronze pipes and faucets.

Copper compounds are commonly used in agriculture to treat plant diseases like mildew, for water treatment and, as preservatives for wood, leather, and fabrics.

What happens to copper when it enters the environment?

❑ Copper is released into the environment by mining, farming, and manufacturing operations and through waste water releases into rivers and lakes. Copper is also released from natural sources, like volcanoes, windblown dusts, decaying vegetation, and forest fires.

❑ Copper released into the environment usually attaches to particles made of organic matter, clay, soil, or sand.

❑ Copper does not break down in the environment. Copper compounds can break down and release free copper into the air, water, and foods.

How might I be exposed to copper?

❑ You may be exposed to copper from breathing air, drinking water, eating foods, or having skin contact with copper, particulates attached to copper, or copper-containing compounds.

❑ Drinking water may have high levels of copper if your house has copper pipes and acidic water.

❑ Lakes and rivers that have been treated with copper compounds to control algae, or that receive cooling water from power plants, can have high levels of copper. Soils can also contain high levels of copper, especially if they are near copper smelting plants.

❑ You may be exposed to copper by ingesting copper-containing fungicides, or if you live near a copper mine or where copper is processed into bronze or brass.

❑ You may be exposed to copper if you work in copper mines or if you grind metals containing copper.

How can copper affect my health?

Everyone must absorb small amounts of copper every day because copper is essential for good health. High levels of copper can be harmful. Breathing high levels of copper can cause irritation of your nose and throat. Ingesting high levels of copper can cause nausea, vomiting, and diarrhea. Very-high doses of copper can cause damage to your liver and kidneys, and can even cause death.

How likely is copper to cause cancer?

We do not know whether copper can cause cancer in humans. The EPA has determined that copper is not classifiable as to human carcinogenicity.

How can copper affect children?

Exposure to high levels of copper will result in the same type of effects in children and adults. We do not know if these effects would occur at the same dose level in children and adults. Studies in animals suggest that the young children may have more severe effects than adults, but we don't know if this would also be true in humans. There is a very small percentage of infants and children who are unusually sensitive to copper.

We do not know if copper can cause birth defects or other developmental effects in humans. Studies in animals suggest that high levels of copper may cause a decrease in fetal growth.

How can families reduce the risk of exposure to copper?

The most likely place to be exposed to copper is through drinking water, especially if your water is corrosive and you have copper pipes in your house. The best way to lower the level of copper in your drinking water is to let the water run for at least 15 seconds first thing in the morning before drinking or using it. This reduces the levels of copper in tap water dramatically.

If you work with copper, wear the necessary protective clothing and equipment, and always follow safety procedures. Shower and change your clothes before going home each day.

Is there a medical test to show whether I've been exposed to copper?

Copper is found throughout the body; in hair, nails, blood, urine, and other tissues. High levels of copper in these samples can show that you have been exposed to higher-than normal levels of copper. These tests cannot tell whether you will experience harmful effects. Tests to measure copper levels in the body are not usually available at a doctor's office because they require special equipment, but the doctor can send samples to a specialty laboratory.

Has the federal government made recommendations to protect human health?

The EPA requires that levels of copper in drinking water be less than 1.3 mg of copper per one liter of drinking water (1.3 mg/L).

The U.S. Department of Agriculture has set the recommended daily allowance for copper at 900 micrograms of copper per day (μg/day) for people older than eight years old.

The Occupational Safety and Health Administration (OSHA) requires that levels of copper in the air in workplaces not exceed 0.1 mg of copper fumes per cubic meter of air (0.1 mg/m^3) and 1.0 mg/m^3 for copper dusts.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Toxicological Profile for Copper. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

PUBLIC HEALTH STATEMENT
Lead
CAS#: 7439-92-1

Division of Toxicology and Environmental Medicine September 2005

This Public Health Statement is the summary chapter from the Toxicological Profile for Lead. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™, is also available. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present. For more information, call the ATSDR Information Center at 1-888-422-8737.

This public health statement tells you about lead and the effects of exposure to it.

The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Lead has been found in at least 1,280 of the 1,662 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which lead is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may harm you.

When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact.

If you are exposed to lead, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

1.1 WHAT IS LEAD?

Lead is a heavy, low melting, bluish-gray metal that occurs naturally in the Earth's crust. However, it is rarely found naturally as a metal. It is usually found combined with two or more other elements to form lead compounds.

Metallic lead is resistant to corrosion (i.e., not easily attacked by air or water). When exposed to air or water, thin films of lead compounds are formed that protect the metal from further attack. Lead is easily molded and shaped. Lead can be combined with other metals to form alloys. Lead and lead alloys are commonly found in pipes, storage batteries, weights, shot and ammunition, cable covers, and sheets used to shield us from radiation. The largest use for lead is in storage batteries in cars and other vehicles.

Lead compounds are used as a pigment in paints, dyes, and ceramic glazes and in caulk. The amount of lead used in these products has been reduced in recent years to minimize lead's harmful effect on people and animals. Tetraethyl lead and tetramethyl lead were once used in the United States as gasoline

additives to increase octane rating. However, their use was phased out in the United States in the 1980s, and lead was banned for use in gasoline for motor vehicles beginning January 1, 1996. Tetraethyl lead may still be used in gasoline for off-road vehicles and airplanes. It is also still used in a number of developing countries. Lead used in ammunition, which is the largest non-battery end-use, has remained fairly constant in recent years. However, even the use of lead in bullets and shot as well as in sinkers is being reduced because of its harm to the environment.

Most lead used by industry comes from mined ores ("primary") or from recycled scrap metal or batteries ("secondary"). Lead is mined in the United States, primarily in Alaska and Missouri. However, most lead today is "secondary" lead obtained from lead-acid batteries. It is reported that 97% of these batteries are recycled.

1.2 WHAT HAPPENS TO LEAD WHEN IT ENTERS THE ENVIRONMENT?

Lead occurs naturally in the environment. However, most of the high levels found throughout the environment come from human activities. Environmental levels of lead have increased more than 1,000-fold over the past three centuries as a result of human activity. The greatest increase occurred between the years 1950 and 2000, and reflected increasing worldwide use of leaded gasoline. Lead can enter the environment through releases from mining lead and other metals, and from factories that make or use lead, lead alloys, or lead compounds. Lead is released into the air during burning coal, oil, or waste. Before the use of leaded gasoline was banned, most of the lead released into the U.S. environment came from vehicle exhaust. In 1979, cars released 94.6 million kilograms (kg; 1 kg equals 2.2 pounds) of lead into the air in the United States. In 1989, when the use of lead was limited but not banned, cars released only 2.2 million kg to the air. Since EPA banned the use of leaded gasoline for highway transportation in 1996, the amount of lead released into the air has decreased further. Before the 1950s, lead was used in pesticides applied to fruit orchards. Once lead gets into the atmosphere, it may travel long distances if the lead particles are very small. Lead is removed from the air by rain and by particles falling to land or into surface water.

Sources of lead in dust and soil include lead that falls to the ground from the air, and weathering and chipping of lead-based paint from buildings, bridges, and other structures. Landfills may contain waste from lead ore mining, ammunition manufacturing, or other industrial activities such as battery production. Disposal of lead-containing products contribute to lead in municipal landfills. Past uses of lead such as its use in gasoline are a major contributor to lead in soil, and higher levels of lead in soil are found near roadways. Most of the lead in inner city soils comes from old houses with paint containing lead and previous automotive exhaust emitted when gasoline contained lead.

Once lead falls onto soil, it sticks strongly to soil particles and remains in the upper layer of soil. That is why past uses of lead such as lead in gasoline, house paint, and pesticides are so important in the amount of lead found in soil.

Small amounts of lead may enter rivers, lakes, and streams when soil particles are moved by rainwater.

Small amounts of lead from lead pipe or solder may be released into water when the water is acidic or "soft". Lead may remain stuck to soil particles or sediment in water for many years. Movement of lead from soil particles into groundwater is unlikely unless the rain falling on the soil is acidic or "soft". Movement of lead from soil will also depend on the type of lead salt or compound and on the physical and chemical characteristics of the soil.

Sources of lead in surface water or sediment include deposits of lead-containing dust from the atmosphere, waste water from industries that handle lead (primarily iron and steel industries and lead producers), urban runoff, and mining piles.

Some lead compounds are changed into other forms of lead by sunlight, air, and water. However, elemental lead cannot be broken down.

The levels of lead may build up in plants and animals from areas where air, water, or soil are contaminated with lead. If animals eat contaminated plants or animals, most of the lead that they eat will pass through their bodies.

1.3 HOW MIGHT I BE EXPOSED TO LEAD?

Lead is commonly found in soil especially near roadways, older houses, old orchards, mining areas, industrial sites, near power plants, incinerators, landfills, and hazardous waste sites. People living near hazardous waste sites may be exposed to lead and chemicals that contain lead by breathing air, drinking water, eating foods, or swallowing dust or dirt that contain lead. People may be exposed to lead by eating food or drinking water that contains lead. Drinking water in houses containing lead pipes may contain lead, especially if the water is acidic or "soft". If one is not certain whether an older building contains lead pipes, it is best to let the water run a while before drinking it so that any lead formed in the pipes can be flushed out. People living in areas where there are old houses that have been painted with lead paint may be exposed to higher levels of lead in dust and soil. Similarly, people who live near busy highways or on old orchard land where lead arsenate pesticides were used in the past may be exposed to higher levels of lead. People may also be exposed to lead when they work in jobs where lead is used or have hobbies in which lead is used, such as making stained glass.

Foods may contain small amounts of lead. However, since lead solder is no longer used in cans, very little lead is found in food. Leafy fresh vegetables may have lead-containing dust on them and should be washed well before consuming. Lead may also enter foods if they are put into improperly glazed pottery or ceramic dishes and from leaded-crystal glassware. Illegal whiskey made using stills that contain lead-soldered parts (such as truck radiators) may also contain lead. Cigarette smoke may also contain small amounts of lead. The amount of lead found in canned foods decreased 87% from 1980 to 1988 in the United States, which indicates that the chance of exposure to lead in canned food from lead-soldered containers has been greatly reduced. Lead-soldered cans are still used in some other nations. In the most recent studies, lead was not detectable in most foods and the average dietary intake of lead was about 1 microgram (a microgram is a millionth of a gram) per kilogram of body weight/day. Children may be

exposed to lead by hand-to-mouth contact after exposure to lead-containing soil or dust.

In general, very little lead is found in lakes, rivers, or groundwater used to supply the public with drinking water. More than 99% of all publicly supplied drinking water contains less than 0.005 parts of lead per million parts of water (ppm). However, the amount of lead taken into your body through drinking water can be higher in communities with acidic water supplies. Acidic water makes it easier for the lead found in pipes, leaded solder, and brass faucets to be dissolved and to enter the water we drink. Public water treatment systems are now required to use control measures to make water less acidic. Plumbing that contains lead may be found in public drinking water systems, and in houses, apartment buildings, and public buildings that are more than 20 years old. However, as buildings age, mineral deposits form a coating on the inside of the water pipes that insulates the water from lead in the pipe or solder, thus reducing the amount of lead that can leach into the water. Since 1988, regulations require that drinking water coolers must not contain lead in parts that come into contact with drinking water.

Breathing in, or swallowing airborne dust and dirt, is another way you can be exposed to lead. In 1984, burning leaded gasoline was the single largest source of lead emissions. Very little lead in the air comes from gasoline now because EPA has banned its use in gasoline for motor vehicles. Other sources of lead in the air include releases to the air from industries involved in iron and steel production, lead-acid-battery manufacturing, and non-ferrous (brass and bronze) foundries. Lead released into air may also come from burning of solid waste that contains lead, windblown dust, volcanoes, exhaust from workroom air, burning or weathering of lead-painted surfaces, fumes and exhaust from leaded gasoline, and cigarette smoke.

Skin contact with dust and dirt containing lead occurs every day. Recent data have shown that inexpensive cosmetic jewelry pieces sold to the general public may contain high levels of lead which may be transferred to the skin through routine handling. However, not much lead can get into your body through your skin.

In the home, you or your children may be exposed to lead if you take some types of home remedy medicines that contain lead compounds. Lead compounds are in some non-Western cosmetics, such as surma and kohl. Some types of hair colorants, cosmetics, and dyes contain lead acetate. Read the labels on hair coloring products, use them with caution, and keep them away from children.

People who are exposed at work are usually exposed by breathing in air that contains lead particles. Exposure to lead occurs in many jobs. People who work in lead smelting and refining industries, brass/bronze foundries, rubber products and plastics industries, soldering, steel welding and cutting operations, battery manufacturing plants, and lead compound manufacturing industries may be exposed to lead. Construction and demolition workers and people who work at municipal waste incinerators, pottery and ceramics industries, radiator repair shops, and other industries that use lead solder may also be exposed. Painters who sand or scrape old paint may be exposed to lead in dust. Between 0.5 and 1.5 million workers are exposed to lead in the workplace. In California alone, more than 200,000 workers are exposed to lead. Families of workers may be exposed to higher levels of lead

when workers bring home lead dust on their work clothes.

You may also be exposed to lead in the home if you work with stained glass as a hobby, make lead fishing weights or ammunition, or if you are involved in home renovation that involves the removal of old lead-based paint.

1.4 HOW CAN LEAD ENTER AND LEAVE MY BODY?

Some of the lead that enters your body comes from breathing in dust or chemicals that contain lead. Once this lead gets into your lungs, it goes quickly to other parts of the body in your blood.

Larger particles that are too large to get into your lungs can be coughed up and swallowed. You may also swallow lead by eating food and drinking liquids that contain it. Most of the lead that enters your body comes through swallowing, even though very little of the amount you swallow actually enters your blood and other parts of your body. The amount that gets into your body from your stomach partially depends on when you ate your last meal. It also depends on how old you are and how well the lead particles you ate dissolved in your stomach juices. Experiments using adult volunteers showed that, for adults who had just eaten, the amount of lead that got into the blood from the stomach was only about 6% of the total amount taken in. In adults who had not eaten for a day, about 60–80% of the lead from the stomach got into their blood. In general, if adults and children swallow the same amount of lead, a bigger proportion of the amount swallowed will enter the blood in children than in adults. Children absorb about 50% of ingested lead.

Dust and soil that contain lead may get on your skin, but only a small portion of the lead will pass through your skin and enter your blood if it is not washed off. You can, however, accidentally swallow lead that is on your hands when you eat, drink, smoke, or apply cosmetics (for example, lip balm). More lead can pass through skin that has been damaged (for example, by scrapes, scratches, and wounds). The only kinds of lead compounds that easily penetrate the skin are the additives in leaded gasoline, which is no longer sold to the general public. Therefore, the general public is not likely to encounter lead that can enter through the skin.

Shortly after lead gets into your body, it travels in the blood to the "soft tissues" and organs (such as the liver, kidneys, lungs, brain, spleen, muscles, and heart). After several weeks, most of the lead moves into your bones and teeth. In adults, about 94% of the total amount of lead in the body is contained in the bones and teeth. About 73% of the lead in children's bodies is stored in their bones. Some of the lead can stay in your bones for decades; however, some lead can leave your bones and reenter your blood and organs under certain circumstances (e.g., during pregnancy and periods of breast feeding, after a bone is broken, and during advancing age).

Your body does not change lead into any other form. Once it is taken in and distributed to your organs, the lead that is not stored in your bones leaves your body in your urine or your feces. About 99% of the amount of lead taken into the body of an adult will leave in the waste within a couple of

weeks, but only about 32% of the lead taken into the body of a child will leave in the waste. Under conditions of continued exposure, not all of the lead that enters the body will be eliminated, and this may result in accumulation of lead in body tissues, especially bone.

1.5 HOW CAN LEAD AFFECT MY HEALTH?

Scientists use many tests to protect the public from harmful effects of toxic chemicals and to find ways for treating persons who have been harmed.

One way to learn whether a chemical will harm people is to determine how the body absorbs, uses, and releases the chemical. For some chemicals, animal testing may be necessary. Animal testing may also help identify health effects such as cancer or birth defects. Without laboratory animals, scientists would lose a basic method for getting information needed to make wise decisions that protect public health. Scientists have the responsibility to treat research animals with care and compassion. Scientists must comply with strict animal care guidelines because laws today protect the welfare of research animals.

The effects of lead are the same whether it enters the body through breathing or swallowing. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults to lead at work has resulted in decreased performance in some tests that measure functions of the nervous system. Lead exposure may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people. Lead exposure may also cause anemia. At high levels of exposure, lead can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

We have no conclusive proof that lead causes cancer (is carcinogenic) in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens based on limited evidence from studies in humans and sufficient evidence from animal studies, and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans. IARC determined that organic lead compounds are not classifiable as to their carcinogenicity in humans based on inadequate evidence from studies in humans and in animals. See Chapters 2 and 3 for more information on the health effects of lead.

1.6 HOW CAN LEAD AFFECT CHILDREN?

This section discusses potential health effects in humans from exposures during the period from conception to maturity at 18 years of age. Potential effects on children resulting from exposures of the parents are also considered.

Studies carried out by the Centers for Disease Control and Prevention (CDC) show that the levels of lead in the blood of U.S. children have been getting lower and lower. This result is because lead is banned from gasoline, residential paint, and solder used for food cans and water pipes. However, about 310,000 U.S. children between the ages of 1 and 5 years are believed to have blood lead levels equal or greater than 10 μg/dL, the level targeted for elimination among young children in the Unites States by 2010.

Children are more vulnerable to lead poisoning than adults. Children are exposed to lead all through their lives. They can be exposed to lead in the womb if their mothers have lead in their bodies. Babies can swallow lead when they breast feed, or eat other foods, and drink water that contains lead. Babies and children can swallow and breathe lead in dirt, dust, or sand while they play on the floor or ground. These activities make it easier for children to be exposed to lead than adults. The dirt or dust on their hands, toys, and other items may have lead particles in it. In some cases, children swallow nonfood items such as paint chips; these may contain very large amounts of lead, particularly in and around older houses that were painted with lead-based paint. The paint in these houses often chips off and mixes with dust and dirt. Some old paint contains as much as 50% lead. Also, compared with adults, a bigger proportion of the amount of lead swallowed will enter the blood in children.

Children are more sensitive to the health effects of lead than adults. No safe blood lead level in children has been determined. Lead affects children in different ways depending on how much lead a child swallows. A child who swallows large amounts of lead may develop anemia, kidney damage, colic (severe "stomach ache"), muscle weakness, and brain damage, which ultimately can kill the child. In some cases, the amount of lead in the child's body can be lowered by giving the child certain drugs that help eliminate lead from the body. If a child swallows smaller amounts of lead, such as dust containing lead from paint, much less severe but still important effects on blood, development, and behavior may occur. In this case, recovery is likely once the child is removed from the source of lead exposure, but there is no guarantee that the child will completely avoid all long-term consequences of lead exposure. At still lower levels of exposure, lead can affect a child's mental and physical growth. Fetuses exposed to lead in the womb, because their mothers had a lot of lead in their bodies, may be born prematurely and have lower weights at birth. Exposure in the womb, in infancy, or in early childhood also may slow mental development and cause lower intelligence later in childhood. There is evidence that these effects may persist beyond childhood.

Children with high blood lead levels do not have specific symptoms. However, health workers can find out whether a child may have been exposed to harmful levels of lead by taking a blood sample. They can also find out how much lead is in a child's bones by taking a special type of X-ray of the finger, knee, or elbow. This type of test, however, is not routine.

1.7 HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO LEAD?

If your doctor finds that you have been exposed to substantial amounts of lead, ask whether your children might also have been exposed. Your doctor might need to ask your state health department to investigate.

The most important way families can lower exposures to lead is to know about the sources of lead in their homes and avoid exposure to these sources. Some homes or day-care facilities may have more lead in them than others. Families who live in or visit these places may be exposed to higher amounts of lead. These include homes built before 1978 that may have been painted with paint that contains lead (lead-based paint). If you are buying a home that was built before 1978, you may want to know if it contains lead based paint. Federal government regulations require a person selling a home to tell the real estate agent or person buying the home of any known lead-based hazards on the property. Adding lead to paint is no longer allowed. If your house was built before 1978, it may have been painted with lead-based paint. This lead may still be on walls, floors, ceilings, and window sills, or on the outside walls of the house. The paint may have been scraped off by a previous owner, but paint chips and lead-containing dust may still be in the yard soil. Decaying, peeling, or flaking paint can introduce lead into household dust and the area where this is occurring should be repainted. If your paint is decaying or your child has symptoms of lead poisoning, you may want to have your house tested for lead. In some states, homeowners can have the paint in their homes tested for lead by their local health departments. The National Lead Information Center (1-800-532-3394) has a listing of approved risk assessors (people who have met certain criteria and are qualified to assess the potential risks of a site) and of approved testing laboratories (for soil, paint, and dust).

Sanding surfaces painted with lead-based paint or using heat to peel the paint may cause exposure to high levels of lead. Many cases of lead poisoning have resulted from do-it-yourself home renovations. Therefore, any renovations should be performed by a licensed contractor who will minimize exposure to household members. It is important for the area being renovated to be isolated from the rest of the house because of lead-containing dust. The federal government requires that contractors who test for or remove lead must be certified by the EPA or an EPA-approved state program. Ask to see certifications of potential contractors. Your state health department or environmental protection division should be able to identify certified contractors for you. The National Lead Abatement Council (P.O. Box 535; Olney, MD 20932; telephone 301-924-5490) can also send you a list of certified contractors.

Families can lower the possibility of children swallowing paint chips by discouraging their children from chewing or putting these painted surfaces in their mouths and making sure that they wash their hands often, especially before eating. Lead can be found in dirt and dust. Areas where levels of lead in dirt might be especially high are near old houses, highways, or old orchards. Some children have the habit of eating dirt (the term for this activity is pica). Discourage your children from eating dirt and other hand-to-mouth activity.

Non-Western folk remedies used to treat diarrhea or other ailments may contain substantial amounts of lead. Examples of these include: Alarcon, Ghasard, Alkohl, Greta, Azarcon, Liga, Bali Goli, Pay-loo-ah, Coral, and Rueda. If you give your children these substances or if you are pregnant or nursing, you may expose your children to lead. It is wise to know the ingredients of any medicines that you or your children use.

Older homes that have plumbing containing lead may have higher amounts of lead in drinking water. Inside plumbing installed before 1930 is most likely to contain high levels of lead. Copper pipes have replaced lead pipes in most residential plumbing. You cannot see, taste, or smell lead in water, and boiling your water will not get rid of lead. If you have a water-lead problem, EPA recommends that anytime water in a particular faucet has not been used for 6 hours or longer, you should flush your cold water pipes by running water until it is cold (5 seconds–2 minutes). Because lead dissolves more easily in warm water than in cold water, you should only use cold water for drinking, cooking, and preparing baby formula. You can contact your local health department or water supplier to find out about testing your water for lead. If your water tests indicate a significant presence of lead, consult your water supplier or local health department about possible remedies.

You can bring lead home in the dust on your hands or clothes if lead is used in the place where you work. Lead dust is likely to be found in places where lead is mined or smelted, where car batteries are made or recycled, where electric cable sheathing is made, where fine crystal glass is made, or where certain types of ceramic pottery are made. Pets can also bring lead into the home in dust or dirt on their fur or feet if they spend time in places that have high levels of lead in the soil.

Swallowing of lead in house dust or soil is a very important exposure pathway for children. This problem can be reduced in many ways. Regular hand and face washing to remove lead dusts and soil, especially before meals, can lower the possibility that lead on the skin is accidentally swallowed while eating. Families can lower exposures to lead by regularly cleaning the home of dust and tracked in soil. Door mats can help lower the amount of soil that is tracked into the home; removing your shoes before entering the home will also help. Planting grass and shrubs over bare soil areas in the yard can lower contact that children and pets may have with soil and the tracking of soil into the home.

Families whose members are exposed to lead dusts at work can keep these dusts out of reach of children by showering and changing clothes before leaving work, and bagging their work clothes before they are brought into the home for cleaning. Proper ventilation and cleaning—during and after hobby activities, home or auto repair activities, and hair coloring with products that contain lead—will decrease the possibility of exposure.

Lead-containing dust may be deposited on plant surfaces and lead may be taken up in certain edible plants from the soil by the roots; therefore, home gardening may also contribute to exposure if the produce is grown in soils that have high lead concentrations. Vegetables should be well washed before eating to remove surface deposits. Certain hobbies and home or car repair activities like radiator repair can add lead to the home as well. These include soldering glass or metal, making

bullets or slugs, or glazing pottery. Some types of paints and pigments that are used as facial make-up or hair coloring contain lead. Cosmetics that contain lead include surma and kohl, which are popular in certain Asian countries. Read the labels on hair coloring products, and keep hair dyes that contain lead acetate away from children. Do not allow children to touch hair that has been colored with lead-containing dyes or any surfaces that have come into contact with these dyes because lead compounds can rub off onto their hands and be transferred to their mouths.

It is important that children have proper nutrition and eat a balanced diet of foods that supply adequate amounts of vitamins and minerals, especially calcium and iron. Good nutrition lowers the amount of swallowed lead that passes to the bloodstream and also may lower some of the toxic effects of lead.

1.8 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO LEAD?

The amount of total lead in the blood can be measured to determine if exposure to lead has occurred. This test shows if you have been recently exposed to lead. Lead can be measured in teeth or bones by X-ray techniques, but these methods are not widely available. These tests show long-term exposures to lead. The primary screening method is measurement of blood lead. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (μg/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

1.9 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government develops regulations and recommendations to protect public health. Regulations *can* be enforced by law. The EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that develop regulations for toxic substances. Recommendations provide valuable guidelines to protect public health, but *cannot* be enforced by law. The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) are two federal organizations that develop recommendations for toxic substances.

Regulations and recommendations can be expressed as "not-to-exceed" levels, that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value that is usually based on levels that affect animals; they are then adjusted to levels that will help protect humans. Sometimes these not-to-exceed levels differ among federal organizations because they used different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or other factors.

Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that provides it. Some regulations and recommendations for lead include the following:

CDC recommends that states develop a plan to find children who may be exposed to lead and have their blood tested for lead. CDC recommends that the states test children:

- at ages 1 and 2 years;
- at ages 3–6 years if they have never been tested for lead;
- if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children;
- if they live in a building or frequently visit a house built before 1950;
- if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or
- if they have a brother, sister, or playmate who has had lead poisoning.

CDC considers children to have an elevated level of lead if the amount of lead in the blood is at least 10 μg/dL. Many states or local programs provide intervention to individual children with blood lead levels equal to or greater than 10 μg/dL. Medical evaluation and environmental investigation and remediation should be done for all children with blood lead levels equal to or greater than 20 μg/dL. Medical treatment (i.e., chelation therapy) may be necessary in children if the lead concentration in blood is higher than 45 μg/dL.

EPA requires that the concentration of lead in air that the public breathes be no higher than 1.5 micrograms per cubic meter ($\mu g/m^3$) averaged over 3 months. EPA regulations no longer allow lead in gasoline. The Clean Air Act Amendments (CAAA) of 1990 banned the sale of leaded gasoline as of December 31, 1995.

EPA regulations also limit lead in drinking water to 0.015 milligrams per liter (mg/L), although the goal is that drinking water be free of lead. The 1988 Lead Contamination Control Act requires the Consumer Product Safety Commission (CPSC), EPA, and the states to recall or repair water coolers containing lead. This law also requires new coolers to be lead-free. In addition, drinking water in schools must be tested for lead, and the sources of lead in this water must be removed.

To help protect small children, CPSC requires that the concentration of lead in most paints available through normal consumer channels be not more than 0.06%. The Federal Hazardous Substance Act (FHSA) bans children's products containing hazardous amounts of lead.

The Department of Housing and Urban Development (HUD) develops recommendations and regulations to prevent exposure to lead. HUD requires that federally funded housing and renovations, Public and Indian housing be tested for lead-based paint hazards and that such hazards be fixed by covering the paint or removing it. When determining whether lead-based paint applied to interior or exterior painted surfaces of dwellings

should be removed, the standard used by EPA and HUD is that paint with a lead concentration equal to or greater than 1.0 milligram per square centimeter (mg/cm^2) of surface area should be removed or otherwise treated. HUD is carrying out demonstration projects to determine the best ways of covering or removing lead-based paint in housing.

EPA has developed standards for lead-paint hazards, lead in dust, and lead in soil. To educate parents, homeowners, and tenants about lead hazards, lead poisoning prevention in the home, and the lead abatement process, EPA has published several general information pamphlets. Copies of these pamphlets can be obtained from the National Lead Information Center or from various Internet sites, including http://www.epa.gov/opptintr/lead.

OSHA regulations limit the concentration of lead in workroom air to 50 $\mu g/m^3$ for an 8-hour workday. If a worker has a blood lead level of 50 µg/dL or higher, then OSHA requires that the worker be removed from the workroom where lead exposure is occurring.

FDA includes lead on its list of poisonous and deleterious substances. FDA considers foods packaged in cans containing lead solders to be unsafe. Tin-coated lead foil has been used as a covering applied over the cork and neck areas of wine bottles for decorative purposes and to prevent insect infestations. Because it can be reasonably expected that lead could become a component of the wine, the use of such foil is also a violation of the Federal Food, Drug, and Cosmetic Act. FDA has reviewed several direct human food ingredients (i.e., food dyes) and has determined them to be "generally recognized as safe" when used in accordance with current good manufacturing practices. Some of these ingredients contain allowable lead concentrations that range from 0.1 to 10 ppm.

1.10 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department, your regional Nuclear Regulatory Commission office, or contact ATSDR at the address and phone number below.

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses resulting from exposure to hazardous substances.

Toxicological profiles are also available on-line at www.atsdr.cdc.gov and on CD-ROM. You may request a copy of the ATSDR ToxProfiles CD-ROM by calling the information and technical assistance toll-free number at 1-888-42ATSDR (1-888-422-8737), by email at atsdric@cdc.gov, or by writing to:

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Environmental Medicine
1600 Clifton Road NE
Mailstop F-32
Atlanta, GA 30333
Fax: 1-770-488-4178

For-profit organizations may request a copy of final profiles from the following:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: 1-800-553-6847 or 1-703-605-6000

Web site: http://www.ntis.gov/

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

MANGANESE
CAS # 127-18-4

Division of Toxicology ToxFAQs™ February 2001

This fact sheet answers the most frequently asked health questions (FAQs) about manganese. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Manganese is a trace element and eating a small amount from food or water is needed to stay healthy. Exposure to excess levels of manganese may occur from breathing air, particularly where manganese is used in manufacturing, and from drinking water and eating food. At high levels, it can cause damage to the brain, liver, kidneys, and the developing fetus. This chemical has been found in at least 603 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is manganese?
(Pronounced măng′ gə-nēz′)

Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese can also be combined with carbon to make organic manganese compounds. Common organic manganese compounds include pesticides, such as maneb or mancozeb, and methylcyclopentadienyl manganese tricarbonyl (MMT), a fuel additive in some gasolines. Manganese is an essential trace element and is necessary for good health. Manganese can be found in several food items, including grains and cereals, and is found in high amounts in other foods, such as tea.

What happens to manganese when it enters the environment?

❑ Manganese can enter the air from iron, steel, and power plants, coke ovens, and from dust from mining operations.
❑ It can enter the water and soil from natural deposits, disposal of wastes or deposits from airborne sources.
❑ Manganese exists naturally in rivers, lakes, and under-ground water.
❑ Plants in the water can take up some of the manganese from water and concentrate it.

How might I be exposed to manganese?

❑ Everyone is exposed to small amounts of manganese in air, water, and food.
❑ Individuals who work in occupations that mine or use manganese are likely to be exposed to excess levels in their work environment.
❑ People who improperly use pesticides such as maneb and mancozeb, may be exposed to excess levels.

How can manganese affect my health?

Some individuals exposed to very high levels of manganese for long periods of time in their work developed mental and emotional disturbances and slow and clumsy body movements.
This combination of symptoms is a disease called "manganism." Workers usually do not develop symptoms of manganism unless they have been exposed to manganese for many months or years. Manganism occurs because too much manganese injures a part of the brain that helps control body movements.

Exposure to high levels of airborne manganese, such as in a manganese foundry or battery plant, can affect motor skills such as holding one's hand steady, performing fast hand movements, and maintaining balance. Exposure to high levels of the metal may also cause respiratory problems and sexual dysfunction.

How likely is manganese to cause cancer?

There are no human cancer data available for manganese. Exposure to high levels of manganese in food resulted in a slightly increased incidence of pancreatic tumors in male rats and thyroid tumors in male and female mice.

The EPA has determined that manganese is not classifiable as to human carcinogenicity.

How can manganese affect children?

Daily intake of small amounts of manganese is needed for growth and good health in children. Manganese is constantly present in the mother and is available to the developing fetus during pregnancy. Manganese is also transferred from a nursing mother to her infant in breast milk at levels that are appropriate for proper development.

Children, as well as adults, who lose the ability to remove excess manganese from their bodies develop nervous system problems. Because at certain ages children take in more than adults, there is concern that children may be more susceptible to the toxic effects of excess manganese.

Animal studies indicate that exposure to high levels of manganese can cause birth defects in the unborn. There is no information on whether mothers exposed to excess levels of manganese can transfer the excess to their developing fetus during pregnancy or to their nursing infant in breast milk.

How can families reduce the risk of exposure to manganese?

In most situations, there is no need to reduce one's exposure to manganese because it is an essential nutrient for good health.

Excess levels of manganese may be present in soils, especially at or near hazardous waste sites. Therefore, it is important to discourage hand-to-mouth activity in young children, especially near hazardous waste sites or in areas that may have increased manganese levels in the soil.

Manganese is also present in pesticides that may be used around the home. These pesticides should be used in a manner consistent with manufacturer's instructions.

Is there a medical test to show whether I've been exposed to manganese?

Tests are available that show levels of manganese in different body fluids. Measurements of manganese in blood, urine, feces, and scalp hair can be used to determine exposure to excess levels of manganese by testing whether levels of the metal in your body tissues are greater than normal. However, these tests cannot predict how the levels in your tissues will affect your health. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a non-enforceable guideline for the level of manganese in drinking water at 0.05 milligrams per liter (0.05 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 5 milligrams manganese per cubic meter (5 mg/m 3) of workplace air for the average amount of manganese during an 8-hour workday, 40-hour workweek.

The National Research Council has recommended safe and adequate daily intake levels for manganese that range from 0.3 to 1 mg/day for children up to 1 year, 1 to 2 mg/day for children up to age 10, and 2 to 5 mg/day for children 10 and older.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for manganese. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

MERCURY
CAS # 7439-97-6

Agency for Toxic Substances and Disease Registry ToxFAQs April 1999

This fact sheet answers the most frequently asked health questions (FAQs) about mercury. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to mercury occurs from breathing contaminated air, ingesting contaminated water and food, and having dental and medical treatments. Mercury, at high levels, may damage the brain, kidneys, and developing fetus. This chemical has been found in at least 714 of 1,467 National Priorities List sites identified by the Environmental Protection Agency.

What is mercury?
(Pronounced mŭr′kyə-rē)

Mercury is a naturally occurring metal which has several forms. The metallic mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas.

Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common one, methylmercury, is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make.

Metallic mercury is used to produce chlorine gas and caustic soda, and is also used in thermometers, dental fillings, and batteries. Mercury salts are sometimes used in skin lightening creams and as antiseptic creams and ointments.

What happens to mercury when it enters the environment?

- ❑ Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants.
- ❑ It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
- ❑ Methylmercury may be formed in water and soil by small organisms called bacteria.
- ❑ Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury.

How might I be exposed to mercury?

- ❑ Eating fish or shellfish contaminated with methylmercury.
- ❑ Breathing vapors in air from spills, incinerators, and industries that burn mercury-containing fuels.
- ❑ Release of mercury from dental work and medical treatments.
- ❑ Breathing contaminated workplace air or skin contact during use in the workplace (dental, health services, chemical, and other industries that use mercury).
- ❑ Practicing rituals that include mercury.

How can mercury affect my health?

The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems.

Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea,

vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation.

How likely is mercury to cause cancer?

There are inadequate human cancer data available for all forms of mercury. Mercuric chloride has caused increases in several types of tumors in rats and mice, and methylmercury has caused kidney tumors in male mice. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.

How can mercury affect children?

Very young children are more sensitive to mercury than adults. Mercury in the mother's body passes to the fetus and may accumulate there. It can also can pass to a nursing infant through breast milk. However, the benefits of breast feeding may be greater than the possible adverse effects of mercury in breast milk.

Mercury's harmful effects that may be passed from the mother to the fetus include brain damage, mental retardation, incoordination, blindness, seizures, and inability to speak. Children poisoned by mercury may develop problems of their nervous and digestive systems, and kidney damage.

How can families reduce the risk of exposure to mercury?

Carefully handle and dispose of products that contain mercury, such as thermometers or fluorescent light bulbs. Do not vacuum up spilled mercury, because it will vaporize and increase exposure. If a large amount of mercury has been spilled, contact your health department. Teach children not to play with shiny, silver liquids.

Properly dispose of older medicines that contain mercury. Keep all mercury-containing medicines away from children.

Pregnant women and children should keep away from rooms where liquid mercury has been used.

Learn about wildlife and fish advisories in your area from your public health or natural resources department.

Is there a medical test to show whether I've been exposed to mercury?

Tests are available to measure mercury levels in the body. Blood or urine samples are used to test for exposure to metallic mercury and to inorganic forms of mercury. Mercury in whole blood or in scalp hair is measured to determine exposure to methylmercury. Your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

The EPA has set a limit of 2 parts of mercury per billion parts of drinking water (2 ppb).

The Food and Drug Administration (FDA) has set a maximum permissible level of 1 part of methylmercury in a million parts of seafood (1 ppm).

The Occupational Safety and Health Administration (OSHA) has set limits of 0.1 milligram of organic mercury per cubic meter of workplace air (0.1 mg/m^3) and 0.05 mg/m^3 of metallic mercury vapor for 8-hour shifts and 40-hour work weeks.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

NICKEL

CAS # 7440-02-0

Division of Toxicology ToxFAQs™ September 2003

This fact sheet answers the most frequently asked health questions (FAQs) about nickel. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Nickel is a naturally occurring element. Pure nickel is a hard, silvery-white metal used to make stainless steel and other metal alloys. Skin effects are the most common effects in people who are sensitive to nickel. Workers who breathed very large amounts of nickel compounds developed chronic bronchitis and lung and nasal sinus cancers. Ingesting large amounts of nickel affected the reproduction and development in rats and mice. Nickel has been found in at least 862 of the 1,636 National Priority List sites identified by the Environmental Protection Agency (EPA).

What is nickel?

Nickel is a very abundant natural element. Pure nickel is a hard, silvery-white metal. Nickel can be combined with other metals, such as iron, copper, chromium, and zinc, to form alloys. These alloys are used to make coins, jewelry, and items such as valves and heat exchangers. Most nickel is used to make stainless steel.

Nickel can combine with other elements such as chlorine, sulfur, and oxygen to form nickel compounds. Many nickel compounds dissolve fairly easy in water and have a green color. Nickel compounds are used for nickel plating, to color ceramics, to make some batteries, and as substances known as catalysts that increase the rate of chemical reactions. Nickel is found in all soil and is emitted from volcanoes. Nickel is also found in meteorites and on the ocean floor. Nickel and its compounds have no characteristic odor or taste.

What happens to nickel when it enters the environment?

- Nickel is released into the atmosphere by industries that make or use nickel, nickel alloys, or nickel compounds. It is also released into the atmosphere by oil-burning power plants, coal-burning power plants, and trash incinerators.
- In the air, it attaches to small particles of dust that settle to the ground or are taken out of the air in rain or snow; this usually takes many days.
- Nickel released in industrial waste water ends up in soil or sediment where it strongly attaches to particles containing iron or manganese.
- Nickel does not appear to accumulate in fish or in other animals used as food.

How might I be exposed to nickel?

- By eating food containing nickel, which is the major source of exposure for most people.
- By skin contact with soil, bath or shower water, or metals containing nickel, as well as by handling coins or touching jewelry containing nickel.
- By drinking water that contains small amounts of nickel.
- By breathing air or smoking tobacco containing nickel.
- Higher exposure may occur if you work in industries that process or use nickel.

How can nickel affect my health?

The most common harmful health effect of nickel in humans is an allergic reaction. Approximately 10-15% of the population is sensitive to nickel. People can become sensitive to nickel when jewelry or other things containing it are in direct contact with the skin. Once a person is sensitized to nickel, further contact with the metal will produce a reaction. The most common reaction is a skin rash at the site of contact. The skin rash may also occur at

a site away from the site of contact. Less frequently, some people who are sensitive to nickel have asthma attacks following exposure to nickel. Some sensitized people react when they eat nickel in food or water or breathe dust containing it.

People working in nickel refineries or nickel-processing plants have experienced chronic bronchitis and reduced lung function. These persons breathed amounts of nickel much higher than levels found in the environment. Workers who drank water containing high amounts of nickel had stomach aches and suffered adverse effects to their blood and kidneys.

Damage to the lung and nasal cavity has been observed in rats and mice breathing nickel compounds. Eating or drinking large amounts of nickel has caused lung disease in dogs and rats and has affected the stomach, blood, liver, kidneys, and immune system in rats and mice, as well as their reproduction and development.

How likely is nickel to cause cancer?

Cancers of the lung and nasal sinus have resulted when workers breathed dust containing high levels of nickel compounds while working in nickel refineries or nickel processing plants. The Department of Health and Human Services (DHHS) has determined that nickel metal may reasonably be anticipated to be a carcinogen and that nickel compounds are known human carcinogens. The International Agency for Research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined that nickel refinery dust and nickel subsulfide are human carcinogens.

How can nickel affect children?

It is likely that the health effects seen in children exposed to nickel will be similar to those seen in adults. We do not know whether children differ from adults in their susceptibility to nickel. Human studies that examined whether nickel can harm the fetus are inconclusive. Animal studies have found increases in newborn deaths and decreased newborn weight after ingesting very high amounts of nickel. Nickel can be transferred from the mother to an infant in breast milk and can cross the placenta.

How can families reduce the risks of exposure to nickel?

- Avoiding jewelry containing nickel will eliminate risks of exposure to this source of the metal.
- Exposures of the general population from other sources, such as foods and drinking water, are almost always too low to be of concern.

Is there a medical test to determine whether I've been exposed to nickel?

There are tests available to measure nickel in your blood, feces, and urine. More nickel was measured in the urine of workers who were exposed to nickel compounds that dissolve easily in water than in the urine of workers exposed to nickel compounds that are hard to dissolve. This means that it is easier to tell if you have been exposed to soluble nickel compounds than less-soluble compounds. The nickel measurements do not accurately predict potential health effects from exposure to nickel.

Has the federal government made recommendations to protect human health?

The EPA recommends that drinking water should contain no more than 0.7 milligrams of nickel per liter of water (0.7 mg/L). To protect workers, the Occupational Safety and Health Administration (OSHA) has set a limit of 1 mg of nickel per cubic meter of air (1 mg/m^3) for metallic nickel and nickel compounds in workplace air during an 8-hour workday, 40-hour workweek

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2003. Toxicological Profile for Nickel (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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SILVER
CAS # 7440-22-4

Agency for Toxic Substances and Disease Registry ToxFAQs July 1999

This fact sheet answers the most frequently asked health questions (FAQs) about silver. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Silver is an element found naturally in the environment. At very high levels, it may cause argyria, a blue-gray discoloration of the skin and other organs. This chemical has been found in at least 27 of the 1,177 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is silver?
(Pronounced sĭl′vər)

Silver is a naturally occurring element. It is found in the environment combined with other elements such as sulfide, chloride, and nitrate. Pure silver is "silver" colored, but silver nitrate and silver chloride are powdery white and silver sulfide and silver oxide are dark-gray to black. Silver is often found as a by-product during the retrieval of copper, lead, zinc, and gold ores.

Silver is used to make jewelry, silverware, electronic equipment, and dental fillings. It is also used to make photographs, in brazing alloys and solders, to disinfect drinking water and water in swimming pools, and as an antibacterial agent. Silver has also been used in lozenges and chewing gum to help people stop smoking.

What happens to silver when is enters the environment?

- ❑ Silver may be released into the air and water through natural processes such as the weathering of rocks.
- ❑ Human activities such as the processing of ores, cement manufacture, and the burning of fossil fuel may release silver into the air.
- ❑ It may be released into water from photographic processing.
- ❑ Rain may wash silver out of soil into the groundwater.
- ❑ Silver does not appear to concentrate to a significant extent in aquatic animals.

How might I be exposed to silver?

- ❑ Breathing low levels in air.
- ❑ Swallowing it in food or drinking water.
- ❑ Carrying out activities such as jewelry-making, soldering, and photography.
- ❑ Using anti-smoking lozenges or other medicines containing it.

How can silver affect my health?

Exposure to high levels of silver for a long period of time may result in a condition called arygria, a blue-gray discoloration of the skin and other body tissues. Lower-level exposures to silver may also cause silver to be deposited in the skin and other parts of the body; however, this is not known to be harmful. Argyria is a permanent effect, but it appears to be a cosmetic problem that may not be otherwise harmful to health.

Exposure to high levels of silver in the air has resulted in breathing problems, lung and throat irritation, and stomach pains. Skin contact with silver can cause mild allergic reactions such as rash, swelling, and inflammation in some people.

Animal studies have shown that swallowing silver results in the deposit of silver in the skin. One study in mice found that the animals exposed to silver in drinking water were less active than unexposed animals.

No studies are available on whether silver affects reproduction or causes developmental problems in people.

How likely is silver to cause cancer?

No studies are available on whether silver may cause cancer in people. The only available animal studies showed both positive and negative results when silver was implanted under the skin.

The EPA has determined that silver is not classifiable as to human carcinogenicity.

Is there a medical test to show whether I've been exposed to silver?

Silver can be measured in the blood, urine, feces, and body tissues of exposed people. Silver builds up in the body, and the best way to learn if past exposure has occurred is to look for silver in samples of skin. Tests for silver are not commonly done at a doctor's office because they require special equipment. Although doctors can find out if a person has been exposed to silver by doing these tests, they cannot tell whether any health effects will occur.

Has the federal government made recommendations to protect human health?

The EPA recommends that the concentration of silver in drinking water not exceed 0.10 milligrams per liter of water (0.10 mg/L) because of the skin discoloration that may occur.

The EPA requires that spills or accidental releases of 1,000 pounds or more of silver be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) limits silver in workplace air to 0.01 milligrams per cubic meter (0.01 mg/m^3) for an 8-hour workday, 40-hour workweek. The National Institute of Occupational Safety and Health (NIOSH) also recommends that workplace air contain no more that 0.01 mg/m^3 silver.

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends that workplace air contain no more than 0.1 mg/m^3 silver metal and 0.01 mg/m^3 soluble silver compounds.

The federal recommendations have been updated as of July 1999.

Glossary

Carcinogenicity: Ability to cause cancer.

CAS: Chemcial Abstracts Service.

Milligram (mg): One thousandth of a gram.

National Priorities List: A list of the nation's worst hazardous waste sites.

Soluble: Capable of being dissolved in water.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1990. Toxicological profile for silver. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

VANADIUM
CAS # 7440-62-2

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about vanadium. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Everyone is exposed to low levels of vanadium in air, water, and food; however, most people are exposed mainly from food. Breathing high levels of vanadium may cause lung irritation, chest pain, coughing, and other effects. This chemical has been found in at least 385 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is vanadium?
(Pronounced və-nā′dē-əm)

Vanadium is a compound that occurs in nature as a white-to-gray metal, and is often found as crystals. Pure vanadium has no smell. It usually combines with other elements such as oxygen, sodium, sulfur, or chloride. Vanadium and vanadium compounds can be found in the earth's crust and in rocks, some iron ores, and crude petroleum deposits.

Vanadium is mostly combined with other metals to make special metal mixtures called alloys. Vanadium in the form of vanadium oxide is a component in special kinds of steel that is used for automobile parts, springs, and ball bearings. Most of the vanadium used in the United States is used to make steel. Vanadium oxide is a yellow-orange powder, dark-gray flakes, or yellow crystals. Vanadium is also mixed with iron to make important parts for aircraft engines.

Small amounts of vanadium are used in making rubber, plastics, ceramics, and other chemicals.

What happens to vanadium when it enters the environment?

- Vanadium mainly enters the environment from natural sources and from the burning of fuel oils.
- It stays in the air, water, and soil for a long time.
- It does not dissolve well in water.
- It combines with other elements and particles.
- It sticks to soil sediments.
- Low levels have been found in plants, but it is not likely to build up in the tissues of animals.

How might I be exposed to vanadium?

- Exposure to very low levels in air, water, and food.
- Eating higher levels of it in certain foods.
- Breathing air near an industry that burns fuel oil or coal; these industries release vanadium oxide into the air.
- Working in industries that process it or make products containing it.
- Breathing contaminated air or drinking contaminated water near waste sites or landfills containing vanadium.
- Vanadium is not readily absorbed by the body from the stomach, gut, or contact with the skin.

How can vanadium affect my health?

Exposure to high levels of vanadium can cause harmful health effects. The major effects from breathing high levels of vanadium are on the lungs, throat, and eyes. Workers who breathed it for short and long periods sometimes had lung irritation, coughing, wheezing, chest pain, runny nose, and a

sore throat. These effects stopped soon after they stopped breathing the contaminated air. Similar effects have been observed in animal studies. No other significant health effects of vanadium have been found in people.

We do not know the health effects in people of ingesting vanadium. Animals that ingested very large doses have died. Lower, but still high levels of vanadium in the water of pregnant animals resulted in minor birth defects. Some animals that breathed or ingested vanadium over a long term had minor kidney and liver changes.

The amounts of vanadium given in these animal studies that resulted in harmful effects are much higher than those likely to occur in the environment.

How likely is vanadium to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified vanadium as to its human carcinogenicity.

No human studies are available on the carcinogenicity of vanadium. No increase in tumors was noted in a long-term animal study where the animals were exposed to vanadium in the drinking water.

Is there a medical test to show whether I've been exposed to vanadium?

There are medical tests available to measure levels of vanadium in urine and blood. These tests are not routinely performed at doctors' offices because they require special equipment, but your doctor can take samples and send them to a testing laboratory. These tests can't determine if harmful health effects will occur from the exposure to vanadium.

Another indicator of high vanadium exposure in people is that their tongues may have a green color on top.

Has the federal government made recommendations to protect human health?

The EPA requires discharges or spills of 1,000 pounds or more of vanadium into the environment to be reported.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 0.05 milligrams per cubic meter (0.05 mg/m^3) for vanadium pentoxide dust and 0.1 mg/m^3 for vanadium pentoxide fumes in workplace air for an 8-hour workday, 40-hour workweek.

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an occupational exposure limit of 0.05 mg/m^3 for vanadium pentoxide.

The National Institute for Occupational Safety and Health (NIOSH) has recommended that 35 mg/m^3 of vanadium be considered immediately dangerous to life and health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

Glossary

Carcinogenicity: Ability to cause cancer.

Ingesting: Taking food or drink into your body.

Long-term: Lasting one year or longer.

Milligram (mg): One thousandth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Toxicological profile for vanadium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

ZINC
CAS # 7440-66-6

Agency for Toxic Substances and Disease Registry ToxFAQs September 1995

This fact sheet answers the most frequently asked health questions (FAQs) about zinc. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

SUMMARY: Exposure to high levels of zinc occurs mostly from eating food, drinking water, or breathing workplace air that is contaminated. Exposure to large amounts of zinc can be harmful. However, zinc is an essential element for our bodies, so too little zinc can also be harmful. This chemical has been found in at least 801 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

What is zinc?
(Pronounced zĭngk)

Zinc is one of the most common elements in the earth's crust. It's found in air, soil, and water, and is present in all foods. Pure zinc is a bluish-white shiny metal.

Zinc has many commercial uses as coatings to prevent rust, in dry cell batteries, and mixed with other metals to make alloys like brass and bronze. A zinc and copper alloy is used to make pennies in the United States.

Zinc combines with other elements to form zinc compounds. Common zinc compounds found at hazardous waste sites include zinc chloride, zinc oxide, zinc sulfate, and zinc sulfide. Zinc compounds are widely used in industry to make paint, rubber, dye, wood preservatives, and ointments.

What happens to zinc when it enters the environment?

- Some is released into the environment by natural processes, but most comes from activities of people like mining, steel production, coal burning, and burning of waste.
- It attaches to soil, sediments, and dust particles in the air.
- Rain and snow remove zinc dust particles from the air.
- Zinc compounds can move into the groundwater and into lakes, streams, and rivers.
- Most of the zinc in soil stays bound to soil particles.
- It builds up in fish and other organisms, but it doesn't build up in plants.

How might I be exposed to zinc?

- Ingesting small amounts present in your food and water.
- Drinking contaminated water near manufacturing or waste sites.
- Drinking contaminated water or a beverage that has been stored in metal containers or flows through pipes that have been coated with zinc to resist rust.
- Eating too many dietary supplements that contain zinc.
- Breathing zinc particles in the air at manufacturing sites.

How can zinc affect my health?

Zinc is an essential element in our diet. **Too** little zinc can cause health problems, but too much zinc is also harmful.

The recommended dietary allowance (RDA) for zinc is 15 milligrams a day for men (15 mg/day); 12 mg/day for women; 10 mg/day for children; and 5 mg/day for infants. Not enough zinc in your diet can result in a loss of appetite, a decreased sense of taste and smell, slow wound healing and

skin sores, or a damaged immune system. Young men who don't get enough zinc may have poorly developed sex organs and slow growth. If a pregnant woman doesn't get enough zinc, her babies may have growth retardation.

Too much zinc, however, can also be damaging to your health. Harmful health effects generally begin at levels from 10-15 times the RDA (in the 100 to 250 mg/day range). Eating large amounts of zinc, even for a short time, can cause stomach cramps, nausea, and vomiting. Taken longer, it can cause anemia, pancreas damage, and lower levels of high density lipoprotein cholesterol (the good form of cholesterol).

Breathing large amounts of zinc (as dust or fumes) can cause a specific short-term disease called metal fume fever. This is believed to be an immune response affecting the lungs and body temperature. We do not know the long-term effects of breathing high levels of zinc.

It is not known if high levels of zinc affect human reproduction or cause birth defects. Rats that were fed large amounts of zinc became infertile or had smaller babies. Irritation was also observed on the skin of rabbits, guinea pigs, and mice when exposed to some zinc compounds. Skin irritation will probably occur in people.

How likely is zinc to cause cancer?

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified zinc for carcinogenicity.

Is there a medical test to show whether I've been exposed to zinc?

Zinc can be measured in your blood or feces. This can tell you how much zinc you have been exposed to. Zinc can also be measured in urine, saliva, and hair. The amount of zinc in your hair tells us something about long-term exposure, but the relationship between levels in your hair and the amount that you were exposed to is not clear. These tests are not routinely performed at doctors' offices, but your doctor can take samples and send them to a testing laboratory.

Has the federal government made recommendations to protect human health?

EPA recommends that there be no more than 5 parts of zinc in 1 million parts of drinking water (5 ppm) because of taste. EPA also requires that releases of more than 1,000 (or in some cases 5,000) pounds of zinc or its compounds into the environment be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum concentration limit for zinc chloride fumes in workplace air of 1 milligram of zinc per cubic meter of air (1 mg/m^3) for an 8-hour workday over a 40-hour work week and 5 mg/m^3 for zinc oxide fumes. The National Institute for Occupational Safety and Health (NIOSH) has set the same standards for up to a 10-hour workday over a 40-hour workweek.

Glossary

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogenicity: Ability to cause cancer.

Milligram (mg): One thousandth of a gram.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for zinc. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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