FINAL

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Removal Site Evaluation Report
Former East La Harpe Smelter
La Harpe, Kansas

October 18, 2013

ENTACT
environmental services

Former East La Harpe Smelter
La Harpe, Kansas
Final Removal Site Evaluation Investigation Report

TABLE OF CONTENTS

List of Abbreviations iv

Section **Page**

1.0 INTRODUCTION **1**
1.1 PURPOSE AND OBJECTIVES **1**
1.2 SITE BACKGROUND **1**
1.2.1 Operational History and Ownership 1
1.2.2 Site Description and Features 2
1.2.3 Physical Setting 4
1.2.3.1 Regional Geologic and Hydrogeologic Setting *4*
1.2.3.2 Location of Nearest Potable Water Wells and Drinking Water Supplies *5*
1.2.3.3 Hydrologic Setting and Site Drainage *6*
1.3 2005 FOCUSED FORMER SMELTER SITE ASSESSMENT RESULTS AND DATA EVALUATION **6**
1.3.1 2005 Smelter Residue Sample Results 7
1.3.2 2005 Soil Sample Results 8
1.3.3 2005 Ditch Soils or Sediment, Stormwater or Surface Water Sample Results 9
1.3.4 Groundwater 10

2.0 CONTAMINANTS OF CONCERN AND PRELIMINARY SCREENING GOALS **11**

3.0 2013 RSE FIELD INVESTIGATION **13**
3.1 SAMPLE COLLECTION AND IDENTIFICATION SYSTEM **14**
3.2 FIELD INVESTIGATION GRID SYSTEM AND SAMPLING METHODOLOGY **15**
3.2.1 Establishment of Sample Survey Grid 15
3.2.2 Smelter Residue and Soil Sampling 15
3.2.3 Road Ditch Sampling 16
3.2.4 Soil and Stormwater or Surface Water Sampling 17
3.2.5 Monitoring Well Installation and Development 17
3.2.6 Groundwater Sampling 18
3.2.7 Smelter Waste 19
3.2.8 Surveying 19
3.2.9 Trenching 19
3.3 RSE FIELD INVESTIGATION RESULTS **20**
3.3.1 Site-specific Topography, Geology, Hydrogeology and Drainage 20
3.3.2 Soil XRF and Analytical Results and Extent of Contamination 21
3.3.2.1 Analytical Results *21*
3.3.2.2 Extent of Contamination *23*

3.3.3 Smelter Waste XRF and Analytical Results 23
3.3.4 Perimeter Road Ditch Analytical Results and Extent of Contamination 24
3.3.4.1 Analytical Results 24
3.3.4.2 Extent of Contamination 24
3.3.5 Ephemeral Swales, Low-lying Ponded Area and Man-made Retention Pond Soil and Water Analytical Results 24
3.3.6 Groundwater Analytical Results and Extent of Contamination 25

4.0 ENDANGERMENT ASSESSMENT 27
4.1 CURRENT AND FUTURE LAND USE AND PRELIMINARY CLEANUP STANDARDS 28
4.2 EXPOSURE ROUTES AND PATHWAYS 28
4.2.1 Soils Exposure and Air Pathway 28
4.2.2 Stormwater Run-off Pathway 29
4.2.3 Groundwater Exposure Pathway 29
4. 3 CONCLUSIONS 30

5.0 ALTERNATIVE DESCRIPTION AND DEVELOPMENT 31
5.1 ALTERANATIVE DESCRIPTIONS 31
5.2 CRITERIA USED IN THE EVALUATION OF ALTERNATIVES 34
5.2.1 Overall Protection of Human Health and the Environment 34
5.2.2 Compliance with ARARs 34
5.2.3 Long-Term Effectiveness and Permanence 35
5.2.4 Reduction of Toxicity, Mobility, or Volume 35
5.2.5 Short-Term Effectiveness 35
5.2.6 Implementability 35
5.2.7 Cost 35

6.0 ANALYSIS OF ALTERNATIVES 36
6.1 ALTERNATIVE 1 – NO ACTION 36
6.2 ALTERNATIVE 2 – ON-SITE CONSOLIDATION AND COVER 37
6.3 ALTERNATIVE 3 – EXCAVATION AND OFF-SITE DISPOSAL 39

7.0 COMPARISON OF ALTERNATIVES 42

8.0 DESCRIPTION OF PROPOSED REMEDY 45
8.1 COMPONENTS OF THE PROPOSED REMEDIATION 45
8.2 EVALUATION OF THE EFFECTIVENESS OF THE CORRECTIVE ACTION 46

9.0 REFERENCES 47

List of Figures

Figure

1. Site Location
2. Site Features
3. 2005 FFSA and 2013 RSE Sample Locations
4. Coordinate Grid System, and 2013 Smelter Residue and Soil Sample Locations
5. Road Ditch, Drainage Channels and Pond Sample Locations
6. Monitoring Well Locations and Groundwater Flow Direction
7. Lateral Delineation of Lead Exceedences of RSK Criteria
8. Vertical Delineation of Lead Exceedences of RSK Criteria
9. Alternative 2 – Consolidation Cell Location and Areas of Proposed Excavation
10. Alternative 3 – Proposed Excavations for Off-Site Disposal

List of Tables

Table

1. Groundwater Elevation Summary
2. Summary of XRF Analytical Results and Corresponding Laboratory Data
3. Summary of Laboratory Soil Analytical Results
4. Summary of Mercury in Surface Soil Analytical Results
5. Summary of TCLP Waste Analytical Results
6. Summary of Road Ditch Soil and Sediment Analytical Results
7. Summary of Stormwater and Surface Water Analytical Results
8. Summary of Groundwater Analytical Results

List of Embedded Tables in Text

Embedded Table **Page**

A. Preliminary RSK Screening Criteria for Soils 13
B. Preliminary RSK Screening Criteria for Groundwater 14
C. Preliminary Screening Kansas Water Quality Standards 14
D. Sample Identification Nomenclature 16
E. Preliminary Cleanup Criteria 19
F. Main Components of the Three Alternatives 34
G. Comparison of Alternatives to Evaluation Criteria 46

List of Appendices

Appendix

A B&M 2005 FFSA PHASE II REPORT RESULTS

B PHOTO DOCUMENTATION OF FIELD ACTIVITIES

C FIELD DOCUMENTATION FORMS
- C-1 XRF Data Table
- C-2 Soil Boring Logs
- C-3 Monitor Well Boring Logs & Forms WWC-5

C-4 Monitor Well Purge Record Forms

D ANALYTICAL LABORATORY REPORTS

E XRF CORRELATION

LIST OF ACRONYMS

BER	Bureau of Environmental Remediation
bgs	Below ground surface
B&M	Burns & McDonnell
BMPs	Best Management Practices
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
COC	Contaminant of concern
CR	County Road
EUC	Environmental Use Control
FFSA	Focused Former Smelter Assessment
GPS	Global positioning system
H&S	Health and Safety
HASP	Health and Safety Plan
KAR	Kansas Administrative Regulations
KDHE	Kansas Department of Health and Environment
KGS	Kansas Geological Survey
MCL	Maximum Contaminant Level
MKT	Missouri Kansas Texas
MS/MSD	Matrix spike/matrix spike duplicate
mg/kg	Milligrams per Kilogram
mg/l	Milligrams per Liter
NCP	National Contingency Plan
NGVD	National Geodetic Vertical Datum
O&M	Operation & Maintenance
OSHA	Occupational Health and Safety Administration
ppm	Parts per million
PVC	Polyvinyl chloride
PWWSD	Public Wholesale Water Supply District
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RA	Removal Action
RAD	Removal Action Design
RCRA	Resource, Conservation and Recovery Act
RSE	Removal Site Evaluation
RSK	Risk-based Standards for Kansas
SARA	Superfund Amendments and Reauthorization Act of 1986
SSI	Screening Site Inspection
TCLP	Toxicity Characteristics Leaching Procedure
USEPA	United States Environmental Protection Agency
USGS	United State Geological Survey
UST	Underground Storage Tank
XRF	X-Ray Fluorescence

1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVES

On the behalf of Blue Tee Corp., Cyprus Amax Minerals Company and Mueller Industries, Inc. (collectively referred to as the Site Study Conducting Parties), this Removal Site Evaluation (RSE) Investigation Report has been prepared by ENTACT & Associates, LLC, (ENTACT) to describe the results of the April 2013 field investigation conducted at the former East La Harpe Smelter Site (Site), located in La Harpe, Allen County, Kansas. The work was conducted in accordance with the Kansas Department of Health & Environment (KDHE)-approved Final RSE Work Plan to define potentially-affected media at the Site resulting from historic smelting operations.

The field investigation was conducted between April 15 and April 20, 2013, and was designed to supplement earlier investigation findings conducted at the Site including: 1) the June 1993 Preliminary Assessment (PA) and November 1993 Screening Site Inspection (SSI) conducted in and around the Site by the KDHE Pre-Remedial Unit as part of a cooperative agreement with the United States Environmental Protection Agency (USEPA); and, 2) the 2005 Phase I and Phase II Focused Former Smelter Assessment (FFSA) conducted by Burns & McDonnell Engineering Company, Inc. (B&M) for KDHE (B&M, 2005). The field investigation included further defining the vertical and horizontal delineation of constituents of concern (COCs) documented in smelter residues and soil in previous investigations, and determining the concentrations of COCs in other media of concern in order to evaluate potential Removal Actions (RAs) required to protect human health and the environment.

The RSE Report has been prepared in accordance with KDHE BER's *"Policy and Scope for Removal Site Evaluations/Removal Action Design (RAD) and Removal Action (RA)"* (BER Policy #RS-031, revised November 2008). This policy pertains to presumptive remedies for sites that share similar characteristics, such as former smelter sites, that allow for a more streamlined RSE/ Removal Action Design (RAD).

As noted in the signed Environmental Agreement between the KDHE and the Site Study Conducting Parties, the Site Study Conducting Parties are not committing either to conduct a Removal Action or to achieve any particular remediation target levels at this time, but rather reserve the right to discuss and agree with KDHE what appropriate RA goals for this Site might be at a later date in light of the information developed through this RSE.

1.2 SITE BACKGROUND

1.2.1 Operational History and Ownership

The smelter was built in 1902, and went into operation that same year. From 1902 to 1917, the smelter was owned and operated by various entities. The smelter was dismantled in 1918. Information on land title records associated with historical

ownership of the Site is provided in Appendix D of the Phase I FFSA (B&M, 2005) and in Appendix A of the November 2012 Final RSE Work Plan.

From 1992 to 2012 the Site was owned by Mr. John Womack (B&M, 2005a). Mr. Womack used a portion of the Site as a scrap metal salvage yard with the remaining portions of the Site being undeveloped (Figure 2). Mr. Womack leased portions of the Site for use as an equipment storage and/or laydown area. An empty storage tank, tires, and other assorted debris associated with the salvage yard or equipment storage operations are still present on the Site, as discussed in Section 1.2.1. Currently, the Site is owned by Ms. Evelyn Thohoff, who acquired the Site after Mr. Womack passed away. It is unknown whether Ms. Thohoff will continue any of Mr. Womack's operations at the Site though no active salvage yard operations were observed during the April 2013 investigation.

1.2.2 Site Description and Features

The 22-acre Site is located 0.6 miles east of the City of La Harpe, Allen County, Kansas, ½ mile south of the intersection of U.S. Highway 54 and County Road (CR) 2800 in the southeast ¼ of the northeast ¼ of Section 35, Township 24 South, Range 19 East. The Site is bordered on the east by CR 2800, on the south by the former Missouri Pacific Railroad right-of-way, and on the north by the former Missouri Kansas Texas (MKT) Railroad right-of-way, as illustrated on Figure 1. Based on a 1984 U.S. Geological Survey (USGS) topographic map, the topography of the Site drops 10 feet in elevation from the northwest corner to the southeast corner. Land use surrounding the Site is agricultural. Site observations showed evidence of past excavation activities with the occurrence of several small vegetated mounds of soil in the north and west sides of the Site, and piles of retort and slag in the southern portion of the Site. The Site measures approximately 1,200 feet by 800 feet.

The Site is accessible from CR 2800 at the former Missouri Pacific Railroad right-of-way on the southeast corner of the Site as shown on Figure 2. The former Missouri Pacific railroad line bordering the southern Site boundary has been removed, and a partially gravel-covered road extends along this right-of-way in an east to west direction. The former rail line associated with the MKT right-of-way on the north side of the Site has also been removed with the only remaining evidence of this right-of-way being an unkempt dirt road that also runs from west to east. Used railroad ties are stacked or scattered in the north central portion of the Site.

A north-to-south trending unvegetated area covered surficially with slag, retort and other smelter debris (collectively referred to as smelter residues), is approximately 400 feet west of the access road entrance, as shown in Figure 2. This area appears to be a lay-down area associated with the more recent salvage yard operations reportedly conducted at the Site, with evidence of recent vehicular traffic based on a tire-worn path that was observed running through it. On either side of the tire-worn path are scattered piles of used tires, used wooden pallets, and other debris. One salvaged 15,000-gallon capacity empty underground storage tank (UST) was observed at the north end of this area where the unvegetated area intersects the former MKT right-of-way (Figure 2).

Although the south-central portion of the property is largely devoid of vegetation, the remaining sections of the Site are covered with grasses, trees, understory plants, and vines. Trees and small shrubs line the south access road. During the April RSE investigation, the trees or understory plants did not yet have leaves, and abundant rainfall had filled all the low areas of the Site causing widespread ponding of stormwater. These ponded low areas included vehicle ruts and small low lying areas on the southwest and southeast sides of the property, as well as off-Site areas to the north of the Site.

A bermed man-made circular retention pond, approximately 4-feet deep and 35-feet wide, was observed on-Site in the southwest corner of the Site, southwest of the former smelter footprint (Figure 2). This pond was apparently not present during the November 1993 KDHE SSE which reported no surface water bodies were present on Site, but was observed and sampled during the 2005 FFSA (KDHE, 1993, B&M 2005). This indicates that the pond was constructed sometime between 1993 and 2005, and is not a natural surface water feature. No water was observed in this pond during a Site visit conducted in 2012 indicating that this is not a permanent water feature but rather functions to retain rain water.

Shallow vegetated road ditches border the east and south boundary of the Site, draining stormwater from the Site to the south and east. These ditches contain flowing water only during precipitation events. The south perimeter road ditch begins approximately 400 feet from the western Site boundary, and becomes less defined as it traverses east toward CR2800. Stormwater in the south ditch flows in a west-to-east direction, flowing through a small culvert running beneath the Site's accessway from the former Missouri Pacific Railroad right-of-way, and continuing to the southeastern corner of the Site, as shown in Figure 2. From here, stormwater flows through a 4-foot diameter pipe culvert running beneath CR 2800 to the east.

The east perimeter ditch receives stormwater run-off from the easternmost margin of the Site and from CR 2800, which is topographically higher in elevation than the Site. Stormwater flows north to south in this ditch, along the eastern Site boundary, to the southeastern corner, converging with water in the south perimeter ditch before discharging through the pipe culvert beneath CR 2800, as shown on Figure 2.

Several shallow ephemeral swales were present in the eastern portion of the Site that contained stormwater due to the heavy precipitation, as shown in Figure 2. Due to the topography of the Site, these swales were observed to direct stormwater toward a low-lying area in the southeast corner of the Site. During heavy precipitation events, stormwater accumulates in this low-lying area before draining to the south perimeter road ditch through a partially-blocked discharge pipe.

Smelter debris was observed on the ground surface throughout most of the Site. Foundry debris, retort, and slag covers the surface of the south-central part of the Site. Two, 2-foot to 3-foot high piles of refractory material are located on the east and west sides of this area in the general locations shown in Figure 2. Other areas of visible smelter residues included the southeast corner of the property where salvage yard operations were conducted, the ephemeral interior drainage swale area on the east side of the Site, and in the northwest portion of the Site. The northwest area includes the former smelter

footprint, and an area of buried smelter residues (referred to as the Fill Area), located north and east of the smelter footprint (Figure 2).

Smelter debris also was observed in two localized areas to the immediate west and the northwest of the Site. One of these localized areas extended approximately 35 feet beyond the Site's northwestern boundary, and the other localized area extended approximately 10 feet beyond the Site's western boundary (Figure 2). No other areas of visible smelter debris were observed beyond the Site boundary along the remaining north boundary, or to east and south of the Site.

According to Mr. Joseph Olson of British Petroleum (BP), who was on-Site on April 15, 2013, there are two crude oil pipelines that run in a southwest-to-northeast direction across the farmland west and north of the Site at a depth of 2 to 4 feet below ground surface (bgs), but not through the Site itself. The pipelines cross the field approximately 75 yards west of the northwest property boundary. It was formerly reported that two pipelines crossed the Site, an inactive 12-inch diameter line installed in the 1920s and an active 20-inch line installed in the 1940s (B&M, 2005).

In the 2005 FFSA Phase I report, it was reported that two areas on the Site were identified as wetland areas on a 1984 U.S. Department of Interior Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) map. This included a freshwater pond in the southwest corner of the Site and a freshwater emergent wetland in the center of the Site. Due to the amount of land disturbance which has occurred on the Site, it is believed that neither of these areas have been present at the Site since at least 1992, when the 1992 KDHE SSI reported that no wetlands were present within 15 miles of the Site. The only water body remaining on the Site is the small, (<0.3 acre) shallow man-made bermed retention pond constructed in the southwest corner, discussed above, to retain rainwater.

1.2.3 Physical Setting

1.2.3.1 Regional Geologic and Hydrogeologic Setting

Regional soil survey information indicates that the dominant soil composition in the vicinity of the Site is a silty loam associated with the Woodson series characterized by very slow infiltration rates (Class D) which result in ponding of stormwater in low areas during heavy precipitation events (Environmental Data Resources (EDR), 2005). The upper 60 inches of soil consist of fine-grained silts and clays with more than 35 percent passing a No. 200 sieve (EDR, 2005). Permeability rates range from 0.0 inches per hour to 0.60 inches per hour, with the soil exhibiting a low hydraulic conductivity (EDR 2005). The typical pH ranges between 5.60 to 7.80 (EDR, 2005).

Based on borings advanced during the FFSA, approximately 7.6 to 8.5 feet of silty clay soil overlies weathered and unweathered bedrock from the Pennsylvanian System, Missourian Series, Kansas City Group (B&M 2005). The underlying stratified bedrock group has an average thickness of 325 feet, and is composed of interbedded limestone and shale members (B&M, 2005, Kansas Geological Survey, 1965). The general

topographic gradient in the area is toward the south-southeast based on the USGS map (EDR, 2005).

In the vicinity of the Site, unconsolidated deposits are thin to absent, with shallow groundwater encountered in the weathered Iola Limestone or Bonner Springs and Lane Shales found at or near the land surface (KGS, 1965). Shallow groundwater is encountered between 8 to 30 feet below ground surface (bgs) in Allen County (B&M, 2005). Regional literature and area water well records show that the shallow weathered bedrock horizon is not used for potable drinking supplies in the Site area.

Groundwater is also reportedly present in deeper sandstone layers that are hydraulically separated from the surficial weathered limestone and shale by the relatively impermeable unweathered shale layer (Miller, 1969). Groundwater occurs in intraformational sandstone layers within the shale bedrock units (Miller, 1969). The yield of these deeper sandstone layers is low, commonly in the magnitude of 1 to 50 gallons per day (gpd) with most groundwater movement along bedding planes (Miller, 1969).

The B&M FFSA Phase I report indicated that shallow groundwater in the weathered limestone was expected to flow southeasterly toward an unnamed stream. However, regional geologic literature indicates that the greatest percentage of discharge of shallow groundwater in the weathered limestone and shale aquifer located at or near the land surface in this area occurs through direct evaporation and transpiration by plants (Miller, 1969).

1.2.3.2 Location of Nearest Potable Water Wells and Drinking Water Supplies

As indicated in the FFSA, 38 groundwater wells were identified on the Kansas Geological Survey (KGS) Database within a 1-mile radius of the Site, though 36 of these were monitoring wells associated with the Allen County Sanitary Landfill (B&M, 2005, KGS, 2013). The landfill is located approximately one mile south of the Site, off CR2800. The remaining two are private wells used for livestock, or lawn and garden watering, and extend to depths of 80 to 125 feet below ground surface (bgs) (KGS, 2005). The water well records show that the shallow weathered bedrock is not used for potable drinking supplies in the Site area, most likely due to the limited yields and elevated total dissolved solids concentrations which affects the aesthetic quality (taste and odor) of the water (Miller, 1969).

The City of La Harpe receives its drinking water from the Public Wholesale Water Supply District (PWWSD) #5 (B&M 2005). Though the 2005 FFSA indicated that the public supply draws from a well, the 2011 KDHE Public Water Supply Section status report indicates the water is supplied from a surface water intake on the Neosho River (KDHE, 2011). This agrees with information provided in the KDHE 1993 PA, which stated that surface water is used for potable supplies since water well usage in Allen County is limited to livestock and domestic purposes (KDHE, 1993). The water supply intake is situated northeast of the town of Iola, Kansas, approximately five miles west of the Site (B&M 2005).

1.2.3.3 Hydrologic Setting and Site Drainage

Storm run-off across the Site is controlled by topography, road ditches, and shallow ephemeral swales. The Site drainage swales and perimeter road ditches reportedly are dry except during storm events. During precipitation events, the western portion of the Site appears to drain to the south toward the western end of the south perimeter road ditch which directs stormwater from west to east.

On the eastern side of the Site, stormwater flows south through several ephemeral swales toward a low-lying area in the southeast corner that discharges to the southern perimeter road ditch. Stormwater in the south perimeter ditch then flows through a 4-foot diameter pipe culvert that runs beneath CR 2800 and continues to the east to toward an unnamed ephemeral stream located approximately 1/3 mile from the Site, as shown in Figure 1. (USGS, 1984). The unnamed ephemeral stream meets with Elm Creek approximately one mile south of the Site (USGS, 1984). Elm Creek flows southwest for approximately 8 miles before its confluence with the Neosho River beyond the southwestern edge of Iola, Kansas (USGS, 1984b).

Stormwater along the easternmost margin of the Site and from CR 2800 flows to the east perimeter ditch which directs stormwater to the south, to the south perimeter ditch prior to discharging through the pipe culvert.

As discussed above, there are no natural water features on the Site, and the Site is generally dry except in times of precipitation. The only standing surface water body on the Site is the bermed man-made shallow retention pond in the southwest corner that also has been observed to be dry during dry weather conditions. Because this pond is bermed, stormwater run-off from the western portion of the Site was observed to flow around the retention pond toward the south perimeter road ditch.. The pond apparently was constructed to retain rainwater but not to receive stormwater run-off during precipitation events.

The nearest off-Site standing surface water body is a bermed retention pond located on the adjacent property approximately 500 feet east of the Site's eastern boundary. This pond reportedly is used for livestock watering. There is no apparent hydraulic connection between the Site and this off-Site pond as verified by sampling conducted as part of the 2005 FFSA.

1.3 2005 FOCUSED FORMER SMELTER SITE ASSESSMENT RESULTS AND DATA EVALUATION

Between March 22 to April 8, 2005, B&M conducted an extensive Phase II field investigation at the Site to provide information on areas of potential concern (i.e. slag piles, smelter remnants and scattered slag across the Site) which were identified in the February 2005 Phase I FFSA (B&M, 2005). The Phase II sampling included the collection of surface and subsurface soil and smelter residues both on and off the Site for X-Ray Fluorescence (XRF) analysis of total lead, arsenic, zinc, and cadmium, with ten percent of the samples submitted for laboratory analysis to verify the XRF results. Additional soil samples were collected in the south perimeter ditch along with stormwater

samples for laboratory analysis of total lead, arsenic, zinc, and cadmium. Sediment and surface water samples were collected from the on-Site man-made retention pond, and from the pond on the adjacent property for analysis of total and dissolved lead, arsenic, lead, and zinc. Groundwater samples were collected as in-situ samples from temporary Geoprobe borings and field filtered prior to laboratory analysis of dissolved lead, arsenic, cadmium, and zinc. The 2005 FFSA sample location maps and tabulated analytical results from the B&M 2005 FFSA Phase II report are provided in Appendix A. The 2005 FFSA sample locations are also shown in Figure 3.

The 2005 Phase II FFSA showed that lead and arsenic in excess of the Kansas Tier 2 Risk-based Standards for Kansas (RSK) nonresidential criteria and cadmium and zinc in excess of RSK residential criteria were found in surficial smelter residues and surface soil across the majority of the Site, and are typically limited to the upper 2 feet. No appreciable off-Site migration of COCs was found with the exception of an area north of the Site. All other off-Site perimeter soil samples collected beyond the Site boundary had COC concentrations below the applicable RSK criteria. Stormwater samples collected in the south perimeter road ditch and from the man-made retention pond had slight exceedences of Kansas Surface Water Quality Standards (SWQS) (Agricultural Use) but no exceedences were reported in off-Site surface water samples. Shallow groundwater collected from saturated horizons in the upper 7 to 8 feet bgs at three locations on the Site showed exceedences of drinking water standards, but the use of a direct push methodology through contaminated surface soil may have compromised the samples.

Details of the Phase II analytical results were provided in Section 1.3 of the Final RSE Work Plan and summarized in the following sections.

1.3.1 2005 Smelter Residue Sample Results

Six samples of slag (SLAG-1 through SLAG-6) were collected in locations shown on Figure 3-2 in Appendix A as part of the 2005 FFSA for XRF analysis of lead, arsenic, cadmium, and zinc, with one sample (SLAG-1) also submitted for laboratory analysis to confirm the XRF results. The FFSA results are provided in Tables 3-1 and 4-1 in Appendix A.

Lead concentrations of the slag ranged from 589 to 12,000 milligram/kilogram (mg/kg), arsenic concentrations ranged from non-detect to 1,150 mg/kg, cadmium concentrations ranged from non-detect to 345 mg/kg and zinc concentrations ranged from 4,800 to 57,400 mg/kg. All four metals were found in one or more of the smelter residue samples at levels in excess of the residential RSK criteria, with lead and/or arsenic also exceeding the nonresidential RSK criteria.

As part of the RSE field investigation, the lateral and vertical extent of slag and associated affected soil was completed by XRF screening and/or visual observation of smelter waste materials and the estimated volumes of affected material was calculated for use in the development of the removal alternatives.

1.3.2 2005 Soil Sample Results

Surface soil sampling was performed using a systematic sampling grid, consisting of 36 100-foot by 100-foot grid cells that were superimposed over the Site. Biased subsurface soil sampling was conducted at eleven selected locations where the highest metal concentrations were found in surface samples, as shown on Figure 3-2 in Appendix A. Additional soil samples were collected outside of, and surrounding, the Site perimeter as illustrated in Figure 3-3 in Appendix A.

All of the samples were analyzed with an XRF instrument, with fifteen of the samples also submitted for laboratory analysis to confirm the XRF measurements. The results of the XRF analysis of the soil samples and the associated laboratory analytical results are presented in Appendix A, Table 3-1and 4-1, respectively.

In the surface soil samples collected as part of the FFSA lead concentrations ranged from 296 to 13,100 mg/kg, arsenic concentrations ranged from non-detect to 615 mg/kg), cadmium concentrations ranged from non-detect to 468 mg/kg, and zinc concentrations ranged from 1,190 to 93,400 mg/kg. The concentration of one or more of the COCs were found in surface soil samples at levels in excess of residential RSK criteria, with lead and arsenic also found above nonresidential RSK criteria. The concentration of lead and arsenic in the subsurface soil samples was in excess of residential and nonresidential RSK criteria in the majority of the samples, with levels decreasing with depth and typically dropping below RSK criteria at one to two feet below ground surface (bgs). Cadmium and zinc concentrations in the subsurface soil samples were generally above residential, but below nonresidential RSK criteria, with the concentration of these two metals typically dropping below RSK residential criteria at one to two feet bgs.

Concentrations of COCs detected in off-Site perimeter soil samples were below RSK residential criteria in all but one location, PS-1, which was located adjacent to the Site's northern boundary near the former railroad right-of-way. This finding suggests that no significant migration to areas beyond the Site boundary has occurred in the nearly one century since smelting operations ceased.

Mercury was measured as part of the Phase II FFSA with an XRF instrument in some shallow soil samples where lead concentrations were present above the nonresidential RSK criterion. However, no level-of-confidence values (+/- value) were reported for this metal to ascertain the reliability of this data. Because the XRF has a diminished accuracy for mercury due to the low screening threshold and matrix interferences with the primary COCs, the presence of mercury at levels in excess of RSK screening criterion was uncertain.

The objective of the RSE field investigation was to further define the vertical and lateral extent of COCs in soil in excess of the applicable RSK criteria, to determine whether or not mercury was a COC at the Site, and to provide additional data for designing viable remediation options for the Site.

1.3.3 2005 Ditch Soils or Sediment, Stormwater or Surface Water Sample Results

As part of the Phase II FFSA, on-Site ditch soil or "sediment"[1] and water samples were collected from the south perimeter road ditch, and the man-made retention pond in the southwest corner of the Site. This included two samples from the south perimeter ditch (SED-1 and SED-2), two samples of stormwater present in the ditch at the time of sampling (SW-1 and SW-2) and one sample of "sediment" (SED-3) and surface water (SW-3) from the man-made pond in the southwest corner of the Site. In addition, two off-Site sediment samples (SED-4 and SED-5) and two off-Site water samples (SW-4 and SW-5) were collected from the large bermed pond located approximately 500 feet east of the Site. The results of these samples were compared to two background sediment samples (BSED-1 and BSED-2) and two background surface water samples (BKG-SW-1 and BKG-SW-2) collected by B&M from a creek 5.3 miles east of the Site. The sampling locations are shown on Figure 3-3 and Figure 3-4 in Appendix A. The Site ditch soil and "sediment" samples were collected from the upper 3 to 6 inches and analyzed by the XRF for total lead, cadmium, arsenic, and zinc, with 10 percent of the samples submitted for laboratory confirmation. The water samples were submitted for laboratory analysis of total lead, arsenic, cadmium, and zinc. The analytical results for these samples are presented in Tables 4-1 and 4-2 in Appendix A.

The concentration of arsenic, cadmium and lead in the soil from the road ditches (SED-1 and SED-2) were found to be below the nonresidential RSK criteria and only marginally above the residential RSK indicating that migration of metals via stormwater from the Site has not been significant. Sample SED-3 (collected from the man-made retention pond) showed the highest XRF measurements of lead and arsenic found in the sediment samples collected at the Site, exceeding the nonresidential RSK criteria. However, in the corresponding laboratory sample results, the concentrations of all COCs were below the residential RSK criteria indicating the XRF results were biased high. This is most likely due to the high moisture levels in the sediment samples which affect the accuracy of the XRF instrument.

The laboratory results of the storm water or surface water samples collected during the 2005 FFSA showed that the stormwater samples collected in the road ditch and the surface water sample collected from the man-made retention pond had slight exceedences of the cadmium RSK SSWQS for agricultural use (using the lower of the livestock or irrigation standards) with no other metal exceedences. Based on the sample data, the stormwater samples collected in the south ditch or the water sample collected from the pond do not appear to be significantly impacted by the metal concentrations detected in Site soil. There was no evidence of impacts from the Site to the adjacent off-Site pond.

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1 *Per KDHE BER Policy 45 (BER-ARS-45), sediments are defined as: any eroded material which lies below surface water the majority of the time where the surface water is capable or should be capable of providing for an aquatic biota habitat. The ephemeral perimeter ditches are dry most of the time except during precipitation events and therefore do not meet the definition of sediments and are considered soil, even though they were referred to as sediments in the 2005FFSA report.. The man-made pond has no water during dry conditions as observed in 2012 and not likely to be capable of supporting viable aquatic biota communities. Therefore, solid samples collected from this retention pond are referenced as "soil" to indicate the material does not appear to fully meet the KDHE policy definition of sediment.*

The objective of the RSE investigation was to determine both the upgradient and downgradient concentrations of COCs in soils within the south perimeter road ditch that could potentially migrate further downstream to the ephemeral creek. Additional "sediment" and stormwater or surface water samples would be collected as part of the RSE if Site features containing water were observed to verify previous findings that migration of metals from affected soils to surface water has not been significant.

1.3.4 Groundwater

Three groundwater samples were collected as part of the Phase II FFSA from temporary direct push boring locations GP-1 through GP-3 advanced to a depth of 7 to 8 feet bgs where weathered limestone bedrock was encountered. The sample locations are shown on Figure 3-3 in Appendix A. The groundwater samples were field filtered and submitted for laboratory analysis of dissolved lead, arsenic, cadmium, and zinc and the analytical results are provided in Table 4-2 in Appendix A.

The groundwater samples contained concentrations of cadmium , lead, and zinc at levels above the KDHE Tier 2 RSK potable water criteria.

The investigations under the RSE included installation of three conventional monitoring wells to verify the 2005 FFSA results and to provide a more reliable measurement of the metal concentrations in the shallow groundwater at the Site. The groundwater samples were analyzed for both total and dissolved metals to evaluate the presence and mobility of metals in shallow groundwater and total dissolved solids (TDS). Groundwater with a TDS greater than 1,200 mg/L or exhibiting an inadequate well yield (<150 gallons/day) may be considered under KDHE BER Policy #BER-RS-45 to be unpotable.

1.3 COMPONENTS OF THE RSE INVESTIGATION REPORT

The RSE Report consists of the following components:

Component	Location
Introduction and Background	Section 1.0
Preliminary Screening Goals	Section 2.0
2013 RSE Investigation Results	Section 3.0
Endangerment Assessment	Section 4.0
Alternative Description and Development	Section 5.0
Analysis of Alternatives	Section 6.0
Comparison of Alternatives	Section 7.0
Description of Proposed Remedy	Section 8.0
References	Section 9.0
B&M 2005 FFSA Results	Appendix A
Site Photographs	Appendix B
Field Documentation	Appendix C
Laboratory Analytical Reports	Appendix D
XRF Correlation for Lead	Appendix E

2.0 CONTAMINANTS OF CONCERN AND PRELIMINARY SCREENING GOALS

In accordance with the RSE Work Plan, the preliminary screening levels for determining the nature and extent of contamination in the RSE investigation area are based on the Type 2 RSK criteria as outlined in the most recent KDHE-approved RSK Manual. All media were sampled for the COCs identified in previous investigations (lead, arsenic, cadmium, and zinc) and initially screened with both residential and nonresidential RSK criteria, though current land use is, and presumed to remain, non-residential, based on preliminary discussions between the current landowner. Any remedial action alternative considered for the Site will include the necessary environmental use controls to ensure that land use on the Site remains nonresidential.

Smelter residue and soil samples, ephemeral drainage swale soil samples, samples collected beneath area overlain with standing stormwater and the perimeter road ditch samples were compared to the most recent approved Type 2 residential and nonresidential RSK criteria for screening purposes. In addition, samples collected from the bermed man-made shallow retention pond were also compared to the Type 2 RSK criteria since this feature is periodically dry and not likely to meet the definition of sediment as defined in the KDHE BER Sediment Policy (BER Policy#: BER-ARS-045) (See footnote 1). The preliminary screening goals for the soil pathway are summarized below:

Table A: Preliminary RSK Soil Screening Criteria:

Constituent of Concern	**RSK Nonresidential Standards (mg/kg)**	**RSK Residential Standards (mg/Kg)**
Lead	1000	400
Arsenic	63.2	18.9
Cadmium	1000	39
Zinc	613,000	23,500

Groundwater samples were compared to the Type 2 RSK criteria for both residential and nonresidential land use. These criteria are considered to be conservative since the criteria are based on the assumption that the aquifer is potable which does not agree with regional geologic information or as-found shallow groundwater well yield. The preliminary screening goals for the groundwater pathway are summarized below:

Table B: Preliminary RSK Groundwater Screening Criteria:**Constituent of Concern**	**RSK Nonresidential GW Criteria (mg/L)**	**RSK Residential GW Criteria (mg/L)**
Lead	0.015	0.015
Cadmium	0.005	0.005
Arsenic	0.01	0.01
Zinc	30.5	4.67

The Kansas Water Quality Standards are not considered to apply to the Site since the ephemeral locations where water samples were collected do not meet the definition of "waters of the State." However, for comparison purposes only, stormwater or surface water samples collected from the ephemeral interior drainage channels and the bermed man-made retention pond were compared to the following Kansas Water Quality Standards for Agriculture Use for Livestock and Irrigation. These standards were selected as the more reflective of Site conditions since the locations where the samples were collected do not support a viable aquatic habitat and are not a source of drinking water.

Table C: Preliminary Screening Kansas Water Quality Standards (Stormwater/Surface Water):

Constituent of Concern	**Kansas Water Quality Standards (mg/L)**
Lead	0.1
Cadmium	0.01
Arsenic	0.1
Zinc	2.0

3.0 2013 RSE FIELD INVESTIGATION

The RSE field investigation was conducted in accordance with the approved Final RSE Work Plan between April 15 and April 21, 2013. The weather conditions were extremely wet, with heavy precipitation resulting in ponding of stormwater in low depressed areas throughout the west, north, and east sides of the Site limiting access to some areas, including the off-site area north of the Site. Photographs documenting the field investigation activities, and as-found Site conditions are included in Appendix B.

The objective of the 2013 RSE field investigation was to:

- Determine the extent of contamination for all COCs at the Site and evaluate the threat to human health and the environment;
- Assess the migration, if any, and the chemical/physical properties of the COCs; and
- Collect the data necessary to design and evaluate potentially appropriate remedial alternatives.

The April 2013 field activities consisted of the following:

- Surveying and establishing of a coordinate grid system (CGS) for sample documentation,
- Measuring the concentration of COCs in Site surface and subsurface soil using XRF analysis with laboratory confirmation analysis on 10 percent of the samples,
- Collecting surface soil samples in four locations for laboratory analyses of total mercury,
- Sampling of soil beneath stormwater or surface water and sampling of overlying stormwater or surface water, as observed on Site,
- Sampling of road ditch soils at upgradient and downgradient locations in the south perimeter road ditch,
- Collecting two samples of smelter residues that exhibited the highest XRF total lead sample readings, for laboratory analysis of Toxic Characteristic Leaching Procedure (TCLP) for lead, cadmium, arsenic and zinc; and
- Installation of three conventional monitoring wells to the first water-bearing horizon, and collection of a groundwater sample from each well.

The investigation was conducted in general accordance with the safety, sampling and quality control protocol outlined in the Health and Safety Plan (HASP), Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP). Some modifications were made to the Work Plan concerning the assessment of the vertical and lateral extent of COCs, based on field conditions encountered which limited access to some areas, including off-Site areas north of the Site. Where sampling access was limited, visual observation with in-situ XRF screening was used to verify the off-Site extent of smelter residues for purposes of completing off-Site extent of contamination.

In accordance with K.A.R. 28-71-6 (d), ENTACT provided the KDHE Project Manager advanced notice of field activities on April 2, 2013 prior to the initiation of fieldwork in order to allow the KDHE the opportunity to be on Site during the sampling activities. The KDHE Project Manager was on Site on April 16, 2013 to observe surface and subsurface sampling activities, and on April 18, 2013 to obtain split surface samples collected for total mercury analyses.

3.1 SAMPLE COLLECTION AND IDENTIFICATION SYSTEM

As part of the RSE, 108 surface and 156 subsurface smelter residue and soil samples were collected for XRF field screening. Ten percent (27 samples) of the XRF samples were submitted to the approved laboratory, Environmental Science Corp., of Mt. Juliet, Tennessee (ESC), for laboratory analysis of total arsenic, lead, cadmium, and zinc to confirm the accuracy of the XRF results. The RSE sample locations are illustrated in Figure 2.

Two road ditch soil samples (RD-001 and RD-002) were collected from the upgradient and downgradient ends of the south perimeter road ditch bordering the Site for laboratory analysis of total lead, arsenic, cadmium, and zinc.

Three "soil" samples (originally labeled Sed-001 through Sed-003 but revised as Soil-001 thru Soil-003 to better describe the medium) collected from areas that included an ephemeral interior drainage swale, a low area of standing stormwater, and a man-made retention pond. These samples were submitted to the laboratory for analysis of lead, arsenic, cadmium and zinc. These samples were originally labeled as sediment samples because they were collected beneath stormwater or surface water but do not meet the definition of sediment in KDHE-BER Sediment Policy #BER-ARS-45 (See footnote 1).

Three stormwater or surface water samples (SW-001 through SW-003) that were co-located with SOIL -001 through SOIl-003, and three groundwater samples (MW-01 through MW-03) were collected and submitted for laboratory analysis of total and dissolved lead, arsenic, cadmium, and zinc; and total dissolved solids (TDS).

Two samples of smelter residues (W-001 and W-002) were collected for laboratory analyses of TCLP lead, arsenic, cadmium, and zinc from the samples exhibiting the highest XRF total lead concentrations for purposes of evaluating an off-Site disposal remedial option.

The identification numbers used for the samples is as follows:

Table D: Sample Identification Nomenclature:

Sample Types	Identification System
Shallow Soil Samples:	
SS - Grid Number- Grid Quadrant	SS-B1-NW
Subsurface Soil Samples:	
Soil Samples: SB - Grid Number- Grid Quadrant- (Sample interval)	SB-B1-NE (2)

Groundwater Samples:	
Well ID	MW-1
Stormwater or Surface Water Samples:	
SW-sample collection number (i.e 001, 002 etc)	SW-002
Samples Collected Beneath Stormwater or Surface Water	
Soil-sample collection number	Soil-001
Quality Control Samples:	
Field Duplicate Samples	FD-001

3.2 FIELD INVESTIGATION GRID SYSTEM AND SAMPLING METHODOLOGY

3.2.1 Establishment of Sample Survey Grid

A coordinate grid system (CGS) was re-established over the Site area as initially used in the 2005 Phase II FFSA, as illustrated in Figure 2. The CGS provided a system for tracking sampling activities in the field and employed square grids of 100 feet by 100 feet over the area where additional sampling was proposed to complete delineation of COCs on Site and to estimate volumes of impacted materials for use in evaluating the remedial alternatives.

Nomenclature used during the RSE for grid identification labeled grids from west to east as ‘1 through 11’, and from north to south as ‘A through G’. Grids A6 and A7 were located north of the former MKT railroad right-of-way, but within the Site boundary. Each grid was divided into four quadrants and samples collected were referenced according to their respective compass orientation: NW, NE, SW, and SE.

3.2.2 Smelter Residue and Soil Sampling

Based on the comprehensive sampling that has already been conducted at the Site as part of the 2005 FFSA, the RSE sampling activities were designed to complete delineation of the lateral and vertical extent of COCs and to verify previous findings. The combined sample locations for both the 2005 FFSA Phase II and the 2013 RSE are illustrated in Figure 3.

Smelter residue and soil sampling was conducted during the RSE in each of the 36 grids shown on Figure 4. Surface samples (0-6 inches) were collected from a minimum of two and a maximum of three grid quadrants, and one subsurface sample was advanced in the remaining grid quadrant for vertical profiling. The sample locations were selected so that no two subsurface samples were ever collected from adjacent grid quadrants to achieve more representative samples of the vertical profile. The smelter residue and soil samples were collected for XRF analysis of lead, arsenic, cadmium, and zinc in accordance with EPA Method 6200. Because the XRF has a limited accuracy at the lower concentration range associated with the RSK criteria for arsenic and cadmium, lead and zinc measurements were used to guide the vertical extent of soil sampling. The complete

XRF results were recorded in an XRF Sample Logbook which is provided in Appendix C-1.

Surface Samples

Surface samples were collected using a stainless steel trowel or disposable scoop and placed into a clean Ziploc bag, and homogenized prior to analysis with the XRF in accordance with Section 4.2.1 of the Final RSE Work Plan.

In addition, as requested by the KDHE, four surface soil grab samples were collected in four previous FFSA sample locations (SS-3, SS-13, HS-3 and HS-7) where the highest mercury detections were observed with the XRF during the FFSA. The samples were collected for laboratory analysis of mercury to determine whether or not concentrations of mercury exceeded the RSK residential or nonresidential criteria at the Site. Spilt soil samples were collected by KDHE at these four locations.

Subsurface Samples

Subsurface soil borings were advanced to depths ranging from 4 to 8 feet bgs with a Model 6620 track mounted Geoprobe unit. The samples were continuously collected using a 4-foot long, 2-inch diameter MacroCore^{TM,} equipped with disposable plastic liners. Upon opening the liner, the soil was visually classified using the Unified Soil Classification System (USCS) by the field geologist and recorded in a field book. Soil samples collected at each one-foot interval were transferred to a clean Ziploc bag and homogenized prior to XRF analysis. XRF measurements were conducted at each bagged one-foot interval until levels of lead and zinc dropped below RSK screening criteria. All remaining soil was spread on ground surface at the boring locations. Boring logs are presented in Appendix C-2.

In accordance with the QAPP, ten percent of the soil samples analyzed by the XRF were submitted to the Kansas-licensed National Environmental Laboratory Accredited Program (NELAP) laboratory, ESC, as a routine QC check on the accuracy of the XRF instrument. Due to extremely wet conditions that made it difficult to maintain an environment dry enough to ensure optimum accuracy of the XRF instrument, an enclosed, dry, environment was established for the XRF analyses to ensure greater consistency in sample moisture content and readings. Laboratory samples were collected from every tenth field sample to maintain a random sampling population while achieving unbiased results to preserve the intent of the QC check. The statistical approach provided representative data sets from high, medium, and low concentration ranged groups in accordance with the QAPP..

3.2.3 Road Ditch Sampling

Two road ditch soil samples were collected from southern perimeter road ditch with one sample (RD-001) collected from the upgradient end of the road ditch at Grid I5 and one sample (RD-002) collected from the east end of the ditch (downgradient) where stormwater drains from the Site. The locations where the road ditch samples were collected are shown in Figure 5.

The road ditch soil samples were collected as grab samples using a stainless steel trowel, following the procedures outlined in the SAP Section 4.2.2 and Section 4.2.3 of the RSE Work Plan using the sample identification system described in Section 3.1. Samples were collected, packaged and submitted to the approved laboratory for analysis of lead, arsenic, cadmium, and zinc in accordance with the SAP and QAPP

3.2.4 Soil and Stormwater or Surface Water Sampling

Because the RSE field investigation was conducted during a period of abundant rainfall, all the low areas at the Site were covered with standing water. An evaluation was made of the low areas containing standing water to determine which might be temporary and isolated, such as those depressions caused by vehicular traffic or heavy equipment, from those areas of stormwater channeling or ponding such as the southeast corner of the Site where a partially dammed drainage pipe at the access road and CR2800 prevents the rapid drainage of water off Site. A man-made pond in the southwest corner of the Site was observed and sampled in accordance with the Work Plan. It was determined that surface water and soil samples would be collected from locations where stormwater had flowed over a sufficient area such that it might displace smelter debris and retort, or from areas that would retain water for an extended period of time.

Three stormwater/surface water and three soil samples were collected from the bermed man-made pond in grid G2 (Soil-2/SW-002), the ephemeral scoured drainage channel on the east side of the Site leading to the south perimeter road ditch in Grid C11 (Soil-3/SW-003) and a low area of standing stormwater in the southeast corner of the property where water collects after flowing from the northeast corner of the property in Grid H11 (Soil-001/SW-001). Figure 5 illustrates the locations where these samples were collected.

The soil and surface water samples were collected as grab samples using a stainless steel trowel and a clean plastic container, respectively, following the procedures outlined in the SAP Section 4.2.4. Soil samples were collected, packaged and submitted to for laboratory analysis of lead, arsenic, cadmium, and zinc. Stormwater/surface water samples were submitted for laboratory analyses of total and dissolved lead, arsenic, cadmium, and zinc.

Soil samples were also field tested for pH using pH strips. The pH strip was held within the collected soil sample for approximately 45 seconds and pH determination was made by comparing colors found on the strip to those on the strip container.

3.2.5 Monitoring Well Installation and Development

Three monitor wells (MW-1 through MW-3) were installed on Site in Grids A6, G1, and H9, respectively, where in-situ groundwater sampling was conducted during the 2005 FFSA. The wells were installed to determine the concentration of lead, arsenic, cadmium, and zinc in the shallow groundwater beneath the Site, evaluate whether or not the metals are associated with attenuation to suspended fines or present in the dissolved phase and capable of migrating in the subsurface, and to ascertain the groundwater flow direction. The location of the monitoring wells is illustrated in Figure 6.

Monitor wells MW-1, MW-2, and MW-3 were installed to the top of limestone at a depth of 9-feet, 10-feet, and 4.7-feet below ground surface, respectively. Groundwater was not encountered in monitor wells MW-2 and MW-3 borings during well installation. Groundwater was encountered at 5 feet bgs in monitor well MW-1.

Monitor wells MW-1 and MW-2 were constructed with 5 feet, 2-inch diameter, 0.010-inch slot monitor well screen, and to approximately 2-feet above ground surface with 2-inch diameter, screw fit, schedule 40 polyvinyl chloride (PVC) riser. Monitor well MW-3 was constructed with one foot of 2-inch diameter, 0.010-inch slot monitor well screen, and to approximately 2 feet above ground surface with screw fit, schedule 40 PVC riser. Minimal screen length was used for this well so that an adequate bentonite seal could be installed in the well. The water table would also be situated on top of the limestone and intercepted by the monitor well screen.

The wells were completed by placing a 12-20 mixture of fine to medium-grained uniform sand, as a filter pack, in the annular space from the base of the screen to a height of one foot above the top of the screen. The sand was overlain with granular bentonite chips to within one foot of the surface to effectively seal off the well screen from any surface runoff. The details of well construction were documented on the well construction forms provided in Appendix C-3.

The wells were completed above ground surface with a protective steel casing with hinged locking cap. A concrete pad was constructed around the protective casing and sloped away from the well. The top of the PVC casing was surveyed to within 0.01 foot using the National Geodetic Vertical Datum (NGVD) of 1929. The well elevations are presented in Table 1

The monitor wells were developed by pumping and surging. After an interval of 24 to 48 hours to allow for recharging, adequate groundwater was present in monitor well MW-1 to remove approximately 40 gallons of water and the developed groundwater was clear and free of sediment. Monitor wells MW-2 and MW-3 were pumped dry following the removal of approximately 3 to 5 gallons of groundwater. Groundwater was completely evacuated from these wells and allowed to recharge and then pumped dry again for a period of approximately 45 minutes. Though most of the residual sediment was removed from the well bores during this process, not all sediment could be effectively removed due to the slow recharge and limited yield of the wells.

3.2.6 Groundwater Sampling

Groundwater samples were collected from the three newly installed monitoring wells using low flow sampling methodology in accordance with the U.S. EPA Ground Water Issue Paper entitled *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, EPA/540/S-95/504 (April 1996). The methodology is outlined in the SAP, Section 4.3 of the RSE Work Plan.

Prior to sample collection, the static water levels and depth to bottom were measured using an electronic weighted water level tape and recorded on the field forms. During

purging, pH, conductivity, temperature, dissolved oxygen (DO), and oxygen-reduction potential (ORP) measurements were collected. Purging continued until the parameters of pH, conductivity and temperature were stabilized to indicate formation water in monitor well MW-1. Groundwater levels dropped rapidly in monitor wells MW-2 and MW-3 due to poor recharge, and groundwater samples had to be collected prior to the stabilization of all the parameters. All measurements were recorded on the groundwater sampling form provided in Appendix C-4.

The groundwater samples were collected in accordance with the SAP and QAPP and analyzed for total and dissolved lead, arsenic, cadmium, and zinc and total dissolved solids (TDS).

3.2.7 Smelter Waste

Two smelter waste samples were collected for TCLP testing to characterize the waste for use in evaluating remedial options. The samples were collected from smelter wastes with the highest lead concentration, at grid locations B2-NE and B8-NW, as determined by previous XRF measurements. The samples were collected as grab samples from the upper 6 inches of smelter residues and submitted for laboratory analysis of TCLP lead, arsenic, cadmium,
\ and zinc.

3.2.8 Surveying

Surveying was conducted by a Kansas-licensed land surveyor, Cornerstone Regional Surveying LLC of Independence, Kansas, to construct the sampling grid using the Kansas State Plane prior to initiating sampling activities and to survey monitoring well locations once installed for determination of groundwater elevations. Global positioning system (GPS) benchmarks in the immediate vicinity of the Site were used to tie Site survey data to the established regional coordinate system.

A hand-held Trimble GeoExplorer Model GeoXH Global Positioning System (GPS) unit was used to identify all surface sample, subsurface sample, ditch sample, and surface water/soil sample locations during field investigation

3.2.9 Trenching

A track hoe excavator was used to dig seven shallow trenches in the south-central area of the Site where a large quantity of smelter residue was deposited on the ground surface. The trenches were installed in this area to determine depth of, and potential burial of observed smelter residue in the interior of the Site. The locations of the exploration trenches are shown in Figure 4.

Soil was removed from each of the approximately 25-foot long trenches in 0.5-foot lifts and visually inspected for signs of slag and smelter retort. A non-impacted brown to light brown clay was encountered in each trench from 1 to 1.5 foot below ground surface. Photographs were taken at each trench location and then the excavated soil was ‘pushed’ back into the holes.

3.3 RSE FIELD INVESTIGATION RESULTS

3.3.1 Site-specific Topography, Geology, Hydrogeology and Drainage

Geology

The site-specific geology was determined by the installation of the thirty-seven soil borings and three monitoring well borings to depths ranging from 4 feet to 10 feet bgs. The locations of these borings are shown in Figures 6 and 8. The boring lithology generally indicated that the Site was generally overlain by 0.5-feet to 1.5-feet of smelter debris with the exception of the Fill Area. Within the Fill Area, located in north-central portion of the property, smelter residues were observed at depths ranging from 1 foot to 8 feet bgs.

The undisturbed soil profile beneath the smelter debris generally consists of between 0.5-feet to 3.5-feet of dark brown, plastic, organic clay grading into reddish brown to brown plastic clay. The reddish brown to brown clay graded to 0.5 to 3 feet of dark grayish brown clay. Below the dark grayish brown clay was 1 to 3 feet of yellowish brown silty or sandy clay.

Limestone was encountered as shallow as 4.6 feet in the southeast portion of the Site, at the monitor well MW-3 boring location, and at a maximum depth of 10 feet in the western portion of the Site, at monitor well MW-2. The weathered limestone bedrock interface consisted of a white to tan weathered limestone.

Hydrogeology

Groundwater conditions beneath the Site were verified during the RSE by the installation of three conventional monitoring wells at three locations shown in Figure 6. The wells were advanced to depth of 4.7 to 9 feet to the weathered bedrock interface. At the time of sampling, monitor wells MW-1, MW-2 and MW-3 contained 8.05 feet, 1.88 feet, and 3.55 feet of water, respectively.

Groundwater was not encountered during the installation of monitor wells MW-2 and MW-3, but required twenty-four to forty-eight hours following the well installation and development before producing sufficient water to allow for sampling. During sample collection MW-2 and MW-3 were purged dry with a low-flow peristaltic pump (pumping at a flow rate of 150 millimeters/minute (ml/min) or 57 gallons/day (gpd)) and required additional time for groundwater recharge to complete sample collection in two 500-milliliter bottles.

According to BER Policy number BER-RS-45: <u>Considerations for Groundwater Use and Applying RSK Standards to Contaminated Groundwater</u>, “In the event that any groundwater-bearing unit is not capable of producing water at a rate greater than 150 gallons per day to a well with a four inch diameter casing or a relative equivalent sustainable rate in gallons per day from a well with a smaller or larger diameter casing, the BER may determine the groundwater is non-potable due to inadequate yield.” This

verifies regional literature which indicates that the shallow groundwater generally is not a viable potable water source due to limited yield with only one of the three Site wells (MW-1) producing an adequate supply of groundwater to allow for sampling without being pumped dry.

Groundwater elevations as surveyed from the NGVD of 1988, ranged from 1030.58 feet to 1038.64 feet elevation. The groundwater gradient across the Site was from northwest to southeast and follows the general topography of the Site and verifies previous findings.

Site Drainage

The RSE Investigation was conducted during a period of heavy precipitation, and visual observations were made of stormwater flow patterns across and from the Site. The stormwater run-off was observed to be controlled by topography, drainage swales, and road ditches.

The drainage swales, as shown in Figure 2, are located on the east side of the Site and consist of three small swales that converge into one larger swale that directs stormwater run-off from the eastern portion of the Site to the south. The swales terminate approximately 300 feet from the Site's southern boundary, discharging the stormwater to a low-lying area in the southeast corner of the Site, where stormwater accumulates during heavy precipitation events before draining to the south perimeter ditch. From here, the stormwater flows through a 4-foot diameter pipe culvert located at the intersection of CR 2800 and the Site's south access road. This culvert was observed to be partially obstructed with limbs and debris at the time of the RSE field investigation.

Stormwater from the remaining portions of the Site discharge to the south perimeter road ditch, with stormwater flowing in an easterly direction prior to exiting the Site via the culvert mentioned above.

Some stormwater run-off from the easternmost portion of the Site discharges to the east perimeter road ditch which also receives run-off from CR 2800 before also discharging through the pipe culvert under CR 2800.

3.3.2 Soil XRF and Analytical Results and Extent of Contamination

As determined in previous investigations and verified as part of the RSE, the COCs at the Site are lead, arsenic, cadmium, and zinc with lead and arsenic being the primary COCs in terms of occurrence, magnitude of concentration and distribution. Lead and arsenic were found in smelter residues and soils above both residential and nonresidential RSK screening criteria, with cadmium and zinc occurring at lesser frequencies with concentrations typically above residential RSK criteria but below nonresidential RSK criteria. Arsenic, cadmium, and/or zinc, when present above the applicable RSK criteria, are typically co-located with lead, and any action that addresses lead will also adequately address the other COCs.

3.3.2.1 Analytical Results

A total of 213 samples were collected as part of the RSE at the proposed Site locations and analyzed by the XRF instrument for lead, arsenic, cadmium, and zinc. Twenty-seven smelter residue and soil samples analyzed by the XRF were also analyzed by the off-Site laboratory. The XRF results with corresponding laboratory data are presented in Table 2, and the laboratory results for soil samples are summarized in Table 3. The complete laboratory data packages are provided in Appendix D. The sample locations are illustrated in Figure 2.

In surface soil samples, the XRF results show lead concentrations ranging from non-detect to 32,600 mg/kg, with the concentration of the COCs exceeding the residential and/or nonresidential lead criteria of 400 mg/kg and 1,000 mg/kg, respectively in most samples. In subsurface samples, the concentration of lead ranged from non-detect to 23,400 mg/kg. Arsenic concentrations in surface samples ranged from non-detect to 993 mg/kg, exceeding the residential and/or nonresidential RSK criteria of 11.3 mg/kg and 38 mg/kg, respectively in most samples. In subsurface samples the arsenic concentration ranged from non-detect to 4,708 mg/kg. The XRF results along with the associated laboratory results show that the lead and arsenic concentrations generally exceed the RSK nonresidential criteria in smelter residues and the upper 1 to 2 feet of underlying soil across much of the Site where the smelter residue is present.

Cadmium and zinc were found in fewer samples at concentrations above the RSK residential criteria and concentrations of these two metals were typically below nonresidential RSK criteria. The cadmium concentrations ranged from non-detect to 843 mg/kg, with 46 samples having a concentration above the RSK residential criterion of 39 mg/kg. Only one sample had a concentration (1,083 mg/kg) which exceeded the nonresidential criterion of 1,000 mg/kg. Zinc concentrations ranged from 57 mg/kg to 91,533 mg/kg with 29 samples exceeding the residential criterion of 23,500 mg/kg. The concentration of zinc was below the nonresidential criterion of 613,000 mg/kg in all samples.

A correlation study using a linear regression, was conducted for the XRF and associated laboratory data for lead and arsenic. According to EPA Method 6200, a coefficient of correlation of $0.9 > r^2 > 0.7$ can be considered quantitative screening level data, or consistent with OA2 level data established in EPA's *Quality Assurance/Quality Control Guidance for Removal Activities*, EPA 540/G-90/004 of April, 1990, If the correlation coefficient was less than 0.7, the data was characterized as qualitative screening-level data. The overall coefficient of correlation for lead and arsenic were $r^2 = 0.853021755$ and $r^2 = 0.808207835$, respectively indicating that this data could be considered high quality. The coefficient of correlation for cadmium and zinc was calculated as, 0.06569, and 0.397054746, but the high number of non-detects in these samples results are expected to have affected the outcome. The XRF measurements with the laboratory analytical results is presented in Appendix E.
The correlation study results show that the data correlated well for lead and arsenic in the majority of the samples, with the values typically within the same order of magnitude. Lead and arsenic were the primary COCs for the Site in terms of number of exceedences and frequency of occurrence, as shown in Table 2, with cadmium and zinc exceedences occurring far less frequently and, when present, typically co-located with soil containing lead and/or arsenic exceedences.

Four surface soil samples were collected from locations previously exhibiting high mercury concentrations. These confirmation samples, presented in Table 4, indicated that concentrations of total mercury ranged from 0.08 mg/kg to 1.7 mg/kg, below the RSK criteria of 2 mg/kg (residential) and 20 mg/kg (non-residential). This sampling confirms that mercury is not a COC at the Site.

3.3.2.2 Extent of Contamination

Soil sampling was conducted to complete the vertical and lateral delineation of lead, arsenic, cadmium, and zinc in smelter residues and soils at the Site. The lateral extent of lead exceedences of residential and nonresidential RSK criteria, which include co-located exceedences of the remaining COCs, has been defined to be within Site boundaries on the east and south sides of the Site as shown in Figure 7

While the lateral extent of residential and nonresidential exceedences was found to be limited to within the Site boundaries along the east, south and northeastern boundaries, as shown in Figure 7, visible smelter residues were observed and measured in two areas bordering the west and northwestern Site boundaries. The lateral extent of COCs was determined by measuring the extent of visible smelter debris and XRF field screening.
The vertical extent of the residential and nonresidential exceedences has been defined in soil borings to at a depth of 2 to 3 feet across much of the Site with the exception of the Fill Area, as shown in Figure 2. In the Fill Area, where smelter residue has been buried, the vertical extent of RSK residential and nonresidential exceedences extends to depths of 1 to 7 feet as demonstrated by test borings installed during the RSE investigation to define the limits of the Fill Area. The vertical extent of smelter debris in the two localized off-Site areas to the west and northwest could not be verified due to the saturated fields and excessive ponding which limited access to these areas. Therefore the depth of smelter debris and affected soil has been estimated conservatively to be 4 feet, based on as-found vertical extent of contamination in the adjacent Site grids as shown in Figure 8.

The estimated lateral and vertical off-Site extent of contamination on the west and northwestern Site boundaries will be verified during pre-construction sampling or prior to the RAD/RA process. If one or more of the companies decide(s) to conduct the pre-construction sampling activities prior to the RAD/RA process, a workplan will be submitted to KDHE for its review and approval, and the companies will obtain permission from the adjacent off-Site property owner, to verify the estimated extent of contamination shown in Figure 7 of the RSE Report.

3.3.3 Smelter Waste XRF and Analytical Results

Two surface soil samples were collected from the areas that exhibited the highest XRF field sample concentration for TCLP analysis. These locations included sample SS-B2-NE and SB-B8-NW(1) where total lead concentrations were measured at 26,533 mg/kg and 12,500 mg/kg, respectively. The results showed that TCLP lead at SS-B2-NE and SB-B8-NW(1) exceeded the toxicity characteristic concentrations of 5 mg/l with

concentrations of 57 mg/l and 33 mg/l, respectively. The toxicity characteristic concentration for cadmium of 1.0 mg/l was also exceeded in sample SS-B2-NE.with a concentration of 1.4 mg/l (see Table 5).

Although the smelter residues and affected soils meet the definition of solid waste under RCRA, they are specifically exempt from regulation as hazardous wastes under 40 CFR 264.4(b)(7) that states "solid wastes from the extraction, beneficiation, and processing of ores and minerals" are solid wastes not hazardous wastes. This is often referred to as the "Beville Exclusion". Slag from primary zinc processing is specifically listed as an exempt waste. Under the Beville Exclusion, these slag and materials impacted by slag are excluded from RCRA or state requirements related to managing, treating, and transporting hazardous waste. However, under an off-Site disposal remedial alternative, the accepting nonhazardous landfill may require treatment prior to accepting the material to meet the landfill's permit requirements.

3.3.4 Perimeter Road Ditch Analytical Results and Extent of Contamination

3.3.4.1 Analytical Results

Two surface samples were collected from the southern perimeter ditch located immediately north of the former Missouri Pacific Railroad right-of-way as shown in Figure 5 and were submitted for laboratory analysis of total arsenic, lead, cadmium, and zinc. The analytical results of these road ditch samples are presented in Table 6. Sample RD-001, collected at the most upgradient end of this ditch, showed lead at 260 mg/kg, arsenic at 9.2 mg/kg, cadmium at 2.9 mg/kg and zinc at 830 mg/kg, all below the RSK residential criteria. Sample RD-002, collected at the most downgradient end of the ditch showed lead at 140 mg/kg, arsenic at 2.4 mg/kg, cadmium at 6.7 mg/kg and zinc at 750 mg/kg, all below the RSK residential criteria.

3.3.4.2 Extent of Contamination

The samples collected during the RSE investigation at the upgradient and downgradient ends of the road ditch from the upper 0- to 6-inch interval, support previous findings that no significant migration of metals from Site smelter residue and soils to the ditch has occurred.

3.3.5 Ephemeral Swales, Low-lying Ponded Area and Man-made Retention Pond Soil and Water Analytical Results

The analytical result of the soil samples collected as part of the RSE is presented in Table 6 and shown in Figure 5. The results show that soil concentrations of arsenic, lead, cadmium, and zinc were below the non-residential RSK limit of 38 mg/kg, 1000 mg/kg, 965 mg/kg, and 613,000 mg/kg respectively, in sample Soil-002 (collected from the man-made retention pond in the southwest corner of the Site) and Soil-003 (collected from an interior drainage channel). Soil-001, collected from the low area of standing water in the southeast corner of the Site, showed a lead concentration of 1,100 mg/kg. This is likely to be associated with surficial smelter debris at the base of the standing water.

The analytical result of the stormwater or surface water samples collected as part of the RSE is presented in Table 7. Evaluation of the total and dissolved concentrations of arsenic, lead, cadmium, and zinc in the three water samples SW-001 through SW-003 indicated that both sets of concentrations were generally equivalent, therefore particulate matter influence was not a factor in this sampling event. The stormwater analytical data indicated that concentrations of dissolved cadmium at 0.028 mg/l and 0.021 mg/l in samples collected from SW-001 and SW-003, respectively, slightly exceeded the Kansas Surface Water Quality Standard for Agricultural Use of 0.01 mg/l. Storm water sample SW-001 was collected from the area of low standing water in the southeast corner of the Site, and stormwater sample SW-003 was collected in an ephemeral channel on the east side of the Site. The concentration of cadmium in surface water sample SW-002 collected from the man-made retention pond in the southwest corner of the Site was less than 0.01 mg/l criterion. Concentrations of dissolved zinc at 2.8 mg/l in stormwater sample SW-003 slightly exceeded the Kansas SWQS of 2 mg/l. Concentrations of zinc in stormwater or surface water did not exceed the Kansas SWQS in samples SW-001 and SW-002. There were no exceedences of lead in any of the water samples collected from samples SW-001 through SW-003.

No exceedences of the Kansas SWQSs were found in the man-made retention pond. The results verify previous findings that migration of COCs to Site stormwater and surface water has not been significant with exceedences limited to concentrations of cadmium and zinc just above the conservative Kansas SWQSs only found in stormwater samples collected from the ephemeral swales and the area of standing stormwater in the southeast corner of the Site.

3.3.6 Groundwater Analytical Results and Extent of Contamination

Groundwater samples collected from monitoring wells MW-1 through MW-3 were analyzed for concentrations of total and dissolved arsenic, cadmium, lead, zinc, and total dissolved solids (TDS) at the ESC laboratory. The analytical results are presented in Table 8. The well locations and analytical results are shown in Figure 6.

Groundwater analytical results indicated that total and dissolved arsenic, cadmium, lead, and zinc concentrations were below the RSK Drinking Water Quality Standards of 0.01 mg/l, 0.005 mg/l, 0.015 mg/l, and 5 mg/l respectively, in MW-1 and MW-2. This indicates that previous results from the 2005 FFSA in-situ samples which found exceedences at these locations were biased by the water collection methodology. In MW-3, total and dissolved concentrations of cadmium were 0.022 mg/kg and 0.0083 mg/l, respectively. The higher total cadmium concentration is considered to be associated with suspended fines in the sample since the well was continually purged dry and required time to recharge during development and sampling. The dissolved cadmium concentration in the groundwater from MW-3 was slightly above the RSK screening criteria of 0.005 mg/L and is considered more reflective of actual groundwater quality which is capable of being mobile in the subsurface. The total lead concentration in the groundwater from MW-3 (0.05 mg/l) was slightly above the RSK screening level, but the dissolved lead concentration was below the analytical detection limit of less than 0.005 mg/l indicating that lead in this sample is associated with suspended fines and not present in the dissolved phase.

TDS concentrations were 820 mg/l, 46 mg/l, and 47 mg/l in monitor wells MW-1 through MW-3, respectively. These TDS concentrations are below the level that may render the water to be considered non-potable under KDHE BER Policy #BER-RS-45. However, because of extremely low yields the shallow groundwater at the Site is not considered a viable potable source. This position is supported by regional literature and the area water well survey.

4.0 ENDANGERMENT ASSESSMENT

The results of the field investigations conducted between 2005 and 2013 at the Site have determined the following:

- Lead and arsenic are the primary COCs at the Site in terms of occurrence and magnitude of exceedences of the RSK screening criteria. Arsenic, cadmium, and zinc are typically co-located with lead exceedences of RSK criteria and any action that addresses lead should adequately address the remaining metals.
- The source of lead, arsenic, cadmium, and/or zinc documented at the Site is associated with observed smelter residue, including slag and retort that is believed to have originated from historic smelting operations conducted at the Site in the early 1900s;
- The lateral and vertical extent of lead, cadmium, and arsenic present in Site smelter residue and soil has been delineated adequately and found to be within the Site boundaries on the south, east and northeast and extending off-Site approximately 10 feet to 35 feet on the west and northwest boundaries of the Site, respectively;
- There has been limited migration of metals outside the Site boundaries to the perimeter road ditch soils along the south property line, with clean road ditch soils on the upgradient and downgradient end of the ditch and in off-Site areas south and east of the Site;
- Arsenic, cadmium, and/or lead were found in soil samples collected from the ephemeral swales, and an area of standing stormwater which are eroded through, or overlay, the surficial smelter residue and affected soil that cover the majority of the Site;
- Exceedences of the Kansas SWQSs were found in stormwater samples collected from the ephemeral swale and the area of standing stormwater in the southeast portion of the Site. This indicates that some migration of COCs from surficial smelter residue and affected soil has occurred via stormwater run-off. Sampling of stormwater in the south perimeter ditch in the 2005 FFSA showed no exceedences of these standards in the south perimeter road ditch which channels stormwater from the Site to off-Site areas east of the Site. This indicates that while some limited migration of COCs via stormwater run-off has occurred on-Site, there has been no appreciable off-Site migration of COCs; and
- Due to low permeability of the underlying natives clays, no significant migration of COCs from surficial smelter residue and affected soil has occurred to shallow groundwater, with only one well, MW-03, located in the southeastern corner of the Site showing a slight exceedence of the RSK Tier 2 potable water criterion for dissolved cadmium of 0.005 mg/l. There are no on-Site or downgradient receptors of shallow groundwater and regional literature, supported by the RSE investigation results, show that the shallow groundwater does not provide adequate yield for feasible use as a potable supply.

4.1 CURRENT AND FUTURE LAND USE AND PRELIMINARY CLEANUP STANDARDS

Current land use is, and presumed to remain, non-residential based on previous conversations with the current Property Owner. Any remedial action alternative considered for the Site will include the necessary environmental use controls to ensure that land use remains nonresidential for perpetuity. Based on conversations with the current Property Owner, land use restrictions maintaining nonresidential land use on Site is acceptable.

For off-Site affected areas, the preliminary cleanup criteria likely would be based on generic residential RSK criteria, to eliminate having to secure permission from adjoining property owners to allow for land use restrictions on parts of their property, as listed in Section 2.0.

While the preliminary proposed cleanup criteria were used to develop and evaluate the remedial alternatives for purposes of this report, both on-Site and off-Site preliminary cleanup standards may be revised to incorporate derived site-specific cleanup criteria
For the purposes of this report, the preliminary cleanup criteria proposed for soils on Site are as follows:

Table E: Preliminary Cleanup Criteria:

Constituent of Concern	**On-Site: RSK Nonresidential Criteria (mg/Kg)**	**Off-Site: RSK Residential Criteria (mg/Kg)**
Lead	1,000	400
Cadmium	1,000	39
Arsenic	63.2	18.9
Zinc	613,000	23,000

4.2 EXPOSURE ROUTES AND PATHWAYS

4.2.1 Soil Exposure and Air Pathway

Lead, and co-located arsenic and cadmium, were present in smelter residue and soil samples at concentrations that exceeded the nonresidential RSK direct contact criteria in areas identified in Figures 7 and 8. Under current conditions, there is a complete exposure pathway to Site smelter residue and soil for the Site owner, visitors, Site workers or utility workers who may conduct occasional activities on the Site, or to persons who trespass onto the unfenced Site. The direct contact pathway is considered to be the most significant exposure pathway of concern at the Site.

The majority of the Site is covered with vegetation or coarse slag and retort which limit the potential for inhalation of dust containing metals. The limited extent of off-Site migration of metal COCs in smelter residue or soil beyond the Site boundary supports the fact that no significant migration of these metals through airborne migration has occurred.

A potential does exist for inhalation of metals if future activities are conducted on the Site that would involve disturbance of soils, particularly in the dry summer months. The inhalation pathway is considered to be a potential exposure pathway of concern at the Site during dry and dusty conditions or when land disturbing activities are being conducted on the Site.

4.2.2 Stormwater Run-off Pathway

Limited migration of COCs from smelter residue and soil has occurred via stormwater run-off. This indicates that during periods of heavy rainfall, COCs associated with the surficial smelter residue and affected soil are mobilized via stormwater run-off and carried to low-lying areas on the Site either as dissolved metals or through adsorption to fine grained soil particles. Due to low metal concentrations in the south perimeter road ditch at the western and eastern Site boundaries, it appears migration of metals from the Site through stormwater run-off leaving the Site is limited in areal extent and therefore poses no significant risk to the human health and the environment off-Site.

There is, however, a potential for the Property Owner, workers or trespassers to come in contact with the COCs during wet conditions. Sampling conducted as part of the RSE and the previous investigations has shown that no appreciable off-Site migration of COCs via stormwater run-off has occurred. Therefore, any action that addresses the surficial smelter residue and underlying affected soil will adequately address the limited migration of COCs via stormwater run-off and eliminate any potential for future off-Site migration.

While the stormwater run-off pathway is considered a complete potential exposure route , any action which addresses the surficial smelter residue and underlying affected soil will adequately address the limited migration of COCs via stormwater run-off to the ephemeral interior drainage features.

4.2.3 Groundwater Exposure Pathway

As discussed in Section 3.3.6, dissolved cadmium was found only in one of the three wells installed as part of the RSE at levels slightly over the Tier 2 RSK screening criteria. This indicates that though some migration of the more mobile metal COCs (cadmium) has occurred in localized areas, the migration of metals to shallow groundwater has not been significant in the nearly 100 years that surficial smelter residues have been present on the surface.

There are no primary drinking water targets on the Site or on surrounding property within 1.0 mile of the Site (B&M, 2005). The City of La Harpe receives its drinking water from the Public Wholesale Water Supply District (PWWSD) #5 which is supplied from a surface water intake on the Neosho River northeast of the town of Iola, Kansas, approximately five miles west of the Site (KDHE, 2011). Well depths from the three closest wells that are used for livestock watering are installed at depths over 100 feet bgs (B&M, 2005). These wells are considered to be hydraulically separate from the shallow groundwater at the Site based on the underlying geologic conditions.

Since there is no current or future potential for use of the shallow groundwater as a potable supply in the Site area, and based on the limited yield of shallow groundwater found on Site and supported by regional literature, this exposure pathway is not considered complete and is eliminated as an exposure pathway of concern at the Site.

4. 3 CONCLUSIONS

Based on the analytical results and the exposure pathway evaluation, the direct contact exposure pathway and stormwater run-off pathway are the primary pathways of concern at the Site, with smelter residue and affected soil considered the primary media of concern.

5.0 ALTERNATIVE DESCRIPTION AND DEVELOPMENT

The presumptive remedies for metal-in-soils sites have been defined for high volume, low-level threat wastes (such as smelter residues and slag) by the United States Environmental Protection Agency in the September 1999 USEPA Office of Solid Waste and Emergency Response (OSWER) guidance document "Presumptive Remedies for Metal-in-Soil Sites (OSWER 9355.0-72FS/ EPA 540F-98-54). These remedies include on-site consolidation and capping or off-site removal. The three alternatives analyzed for this Site include the following:

- Alternative #1: No Action
- Alternative #2: On-Site Consolidation and Cover
- Alternative #3: Excavation and/or Stabilization and Off-Site Disposal

The main components of each of the three alternatives evaluated for the Site are summarized in the following table:

***Table F: Main Components of the Three Alternatives*:**

	Alternative #1: No Action	**Alternative #2:** On-Site Consolidation and Cover	**Alternative #3:** Excavation and/or Treatment, and Off-Site Disposal
Soils/Air:			
Soil Excavation		●	●
On-Site Stabilization[1]			●
Off-Site Disposal			●
Soil/Vegetative Cap		●	
Others:			
Institutional Controls and land use restrictions		●	●
Fence		●	
Operation and Maintenance (O&M)		●	

NOTE:
[1]: The smelter residue is considered Bevill exempt and therefore RCRA regulations pertaining to hazardous waste treatment, transport and on-Site disposal do not apply. However, for off-Site disposal, the landfill may require treatment to meet the RCRA characteristically nonhazardous levels before the waste can be accepted.

5.1 ALTERANATIVE DESCRIPTIONS

Alternative 1: No Action

The No Action alternative is used as a baseline for comparing other remedial alternatives, as required under KDHE regulations. Because no remedial activities would be implemented under the No Action alternative, long-term human health and/or environment risks for the Site would be the same as those identified in the endangerment assessment for the Site (Section 4.0).

ternative 2: On-Site Consolidation and Cover

Alternative 2 includes the excavation of all smelter residue and affected soil exceeding the appropriate RSK soil criteria not located within the footprint of the defined Consolidation Cell for placement and consolidation in an 500-foot by 700-foot Consolidation Cell constructed on top of the Fill Area footprint on the north end of the Site. The nonresidential RSK criteria will be used for the cleanup of the area within the boundaries of the Site and the residential RSK will be used for the cleanup of the limited area outside the boundaries of the Site.

As shown on Figure 9, the majority of the Consolidation Cell will be located over the former Fill Area and expanded as necessary to meet slope requirements and prevent long-term maintenance issues. Based on the lateral extents and depths shown in Figures 7 and 8, approximately 27,000 cubic yards of excavated material would be compacted, including excavated materials from off-Site impacted areas to the north and west and graded to blend into the surrounding topography before placement of a two-foot thick soil and vegetative cap to remove the potential for exposure to soil containing metals in excess of non\residential RSK criteria.

Following removal of the affected soil to the delineated vertical extents, confirmatory samples would be collected for off-Site laboratory analysis at the base of the excavation, and along sidewalls if excavation exceeds 1.0 feet, to verify compliance with the applicable cleanup objectives. Upon confirmation, the excavated areas would be backfilled with on-Site borrow material or imported fill, if necessary, and graded to promote positive drainage across the Site. Because of the existing uneven grade at the Site the excavated areas would be graded to promote positive drainage in accordance with the final design drawings to be submitted as part of the Remedial Action Design (RAD).

Alternative 2 includes the use on on-Site borrow material to supply most or all of the fill materials necessary for grading the excavations and for construction of the Consolidation Cell's soil cover. The borrow material will be obtained from a drainage basin to be constructed in the southwest corner of the Site where the native low permeable clays overlying bedrock were found to be thickest during the RSE field investigation, and where a retention pond already exists (Figure 9). The borrow material would be excavated from the boundaries of the drainage basin following excavation and on-site consolidation of the overlying impacted smelter residues and soil. The approximate dimensions of the drainage basin are shown in Figure 9. This final dimensions and depths of the drainage will be determined as part of the RAD. A drainage channel will also be constructed around the Consolidation Cell to divert stormwater run-off around the Cell to the constructed drainage basin. A fence will be constructed around the Consolidation Cell to limit access to this area, as shown in Figure 9.

Because impacted soil would not be treated or transported off-Site, dust control measures would only be necessary when excavation and cell construction activities are occurring. Haul trucks carrying any required imported fill would be the only vehicles that will be routed through public highways. If off-Site borrow material is necessary, a transport route for truck haulage would be coordinated with the City of La Harpe and Allen County to minimize adverse impacts associated with noise and truck traffic.

Based on the engineering estimate, the estimated field duration for implementing Alternative 2 is 15 weeks.

An Environmental Use Control (EUC) will be established on the entire Site to prohibit intrusive activities within the Consolidation Cell, and to ensure the Site land use remains nonresidential. Based on preliminary discussions with the property owner, these land restrictions are acceptable. Under Alternative 2, an Operation and Maintenance (O&M) Plan will be developed and implemented to detail routine inspection and repairs of the Consolidation Cover, fence, drainage basin and drainage channels to ensure the long-term integrity of the remedy.

Alternative 3: Excavation and/or Stabilization and Off-Site Disposal

Alternative 3 consists of the excavation of all surficial smelter residues and affected soil exceeding the appropriate RSK soil criteria for on-Site treatment (as necessary) and off-Site disposal at an approved Subtitle D landfill. The nonresidential RSK criteria will be used for the cleanup of the area within the boundaries of the Site and the residential RSK will be used for the cleanup of the limited area outside the boundaries of the Site. The removal areas are illustrated in Figure 10.

Approximately 63,000 CYs of smelter residue and soil would be excavated from the Site with conventional earth-moving equipment and staged in the designated staging area on-Site for testing and/or treatment (based on landfill permit requirements) prior to off-Site disposal at an approved nonhazardous landfill.

Following removal of the affected soils to the delineated vertical extents, confirmatory samples would be collected for off-Site laboratory analysis at the base of the excavation, and along sidewalls if excavation exceeds 1.0 feet, to verify compliance with the applicable cleanup objectives. Upon confirmation, the excavated areas would be graded to promote positive drainage across the Site to a configuration to be included in the RAD..

Alternative #3 assumes that some or none of the backfill would be obtained from an on-site borrow source depending on whether a drainage basin is constructed. The conceptual design shown in Figure 10 shows no drainage basin, but a basin could be constructed in the southwest corner as shown for Alternative 2 based on input by the Property Owner.

This alternative would involve the managing and transporting of approximately 63,000 cubic yards of impacted soil or smelter residue from the Site to an approved Subtitle D landfill. This material would have to be transported through the city roads and highways in route to the tentatively-identified closest approved landfill capable of receiving this special waste, which is located approximately 50 miles from the Site. As such, an acceptable transport route would have to be coordinated with the City of La Harpe and Allen County, and controls would have to be put into place to minimize dust generation with an estimated 3,500 haul truck trips from the Site to the landfill for final disposal, with each truck carrying approximately 20 cubic yards of lead-impacted materials.

The alternative would also require coordination with local fire departments or emergency agencies to develop response procedures in the event of an accident or spill during loading or transport associated with hauling the impacted material. Dust controls and erosion control measures would also be required to ensure that soil disturbed during excavation or handling activities do not migrate off-Site via stormwater or air migration.

All excavation, staging, treatment, and sampling would be conducted in accordance with federal, state and local regulations governing the handling and management, testing, and transport and disposal of solid and hazardous waste. Based on the engineering estimate, the estimated field duration for implementing Alternative 3 is 24 weeks.

An EUC would be required to ensure the Site land use remains nonresidential.

5.2 CRITERIA USED IN THE EVALUATION OF ALTERNATIVES

The process used to analyze the three remedial alternatives follows U.S. EPA guidance and the requirements of the Bureau of Remediation (BER) pursuant to the Kansas Administrative Regulations (KAR) promulgated by the KDHE and the Kansas Statutes Annotated (KSA), Chapter 65, Article 34. The seven evaluation criteria described in Sections 5.2.1 through 5.2.7 serve as the basis for conducting the detailed analysis of the alternatives.

5.2.1 Overall Protection of Human Health and the Environment

This criterion assesses the overall protection afforded by each alternative, considering long-term effectiveness and permanence, short-term effectiveness, and compliance with RSKs. Protection of human health is assessed by evaluating how site risks from each identified exposure pathway are eliminated, reduced or controlled through the specific alternative. This evaluation takes into account short-term and cross-media impacts that may result from remedial activity.

5.2.2 Compliance with ARARs

The remedial alternative must be in compliance with all applicable, relevant and appropriate regulations (ARARs) including all relevant federal, state and local regulations. The remedial action will be designed in accordance with U.S. EPA Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the KSA Chapter 65, Article 34 (Solid and Hazardous Waste) and all other applicable federal, state and local regulations, and in consideration of KDHE policy guidance pertaining to the work including, but not limited to, the RSE process, groundwater, and sediment.

The selected remedial action will be designed to achieve cleanup levels for the defined metal COCs that are consistent with the appropriate RSK soil criteria. The remedial alternative also will be designed to meet all applicable ARARs associated with implementation of the remedy such as those related to land disturbance and erosion and sediment controls, stormwater run-off and air quality standards, both within the work areas and at the Site and the transportation routes to the landfill.

5.2.3 Long-Term Effectiveness and Permanence

The focus of evaluating long-term effectiveness and permanence is to determine the extent and effectiveness of each alternative with respect to the risk remaining at the Site after the remedial action is implemented. Components of this criterion may include: the magnitude of residual risk from the alternative; the likelihood that the alternative will meet process efficiencies and performance specifications; and the adequacy and reliability of long-term monitoring controls in providing continued protection from residual contamination.

5.2.4 Reduction of Toxicity, Mobility, or Volume

This criterion evaluates the quantity of contaminants treated and destroyed; the degree of reduction in containment toxicity, mobility, and/or volume; the degree to which the treatment is irreversible; the type and quantity of residuals remaining; and how the principal threat is addressed through treatment.

5.2.5 Short-Term Effectiveness

The short-term effectiveness of each alternative is assessed based on the risk to the community, workers, and the environment associated with implementing the remedial action, and the time required to achieve the response objectives. Measures that can mitigate or compensate for this risk during implementation of the remedy are a key issue in this determination.

5.2.6 Implementability

This criterion analyzes technical feasibility, administrative feasibility, and availability of services and materials. This includes assessing the difficulty of constructing or operating a particular alternative and the unknowns associated with a technology, coordinating all appropriate offices and agencies for the implementation of the alternative, and assessing whether all required materials and services will be available at the scheduled time the alternative is to be implemented.

Important in the determination of implementability is the reliability of the technology based on the likelihood of technical problems that could lead to project delays. The ability to monitor the effectiveness of the alternative is also considered. Finally, the risk of exposure should the monitoring plan not detect a system failure is evaluated to assess a worst-case scenario.

5.2.7 Cost

The total cost of each alternative is based on the sum of the direct capital costs (materials, equipment, and labor) indirect capital costs (engineering, construction monitoring, and construction oversight), and the present worth of annual O&M costs.

6.0 ANALYSIS OF ALTERNATIVES

This section evaluates each of the three alternatives based on the seven criteria defined in Section 5.2.

6.1 ALTERNATIVE 1 – NO ACTION

Overall Protection of Human Health and the Environment

The No Action alternative provides no added control or reduction of exposure to contaminated smelter residue and soil, and no reduction in potential risk to human health. Therefore, potential risks to human health through direct contact, inhalation and ingestion of smelter residue and soil containing elevated levels of metals or inhalation of air-borne particulates containing metals during soil disturbances would continue to be present and pose an unacceptable risk.

Compliance with ARARs

Some of the materials and soil at the Site under the No Action alternative would not meet any of the applicable or relevant and appropriate regulations (ARARs) including, but not limited to, the generic RSK soil criteria for lead, cadmium, or arsenic in soils.

Long-Term Effectiveness and Permanence

No controls for exposure would be achieved under this alternative. All current and future potential risks would remain.

There are no controls for exposure to hazardous substances and no long-term management measures associated with the No Action Alternative. While there has been no significant off-Site migration of COCs from the Site based on previous investigations and the RSE results, the no-action alternative does not reduce or eliminate the potential for future transport of COCs via stormwater run-off.

Reduction of Toxicity, Mobility, or Volume

The COCs at the Site are heavy metals that are not amenable to physical, chemical or biological degradation and which tend to be relatively immobile in the environment. Under the No Action alternative, the toxicity and volume of the heavy metals are not reduced through any measure. There is no reduction in mobility as there are no measures to cover or remove the impacted surface smelter residue or to reduce or eliminate the potential for migration of heavy metals via stormwater run-off.

Short-Term Effectiveness

Under this alternative, there is no need for measures to provide short-term protection to workers or the surrounding community during implementation of the remedy.

Implementability

The No Action alternative can be easily implemented.

Cost

There is no cost associated with the No Action alternative..

6.2 ALTERNATIVE 2 – ON-SITE CONSOLIDATION AND COVER

Overall Protection of Human Health and the Environment

This alternative provides overall protection of human health and the environment at the Site through the consolidation and capping of smelter residues and affected soil containing metals in excess of the applicable RSK criteria outside the Consolidation Cell footprint. The consolidation and capping of the smelter residues and affected soil would effectively eliminate potential risks of exposure to metals through the direct contact or air-borne or stormwater migration exposure pathways. Under Alternative 2, the excavated materials will be placed and consolidated in a 500 foot by 700 foot on-Site Consolidation Cell and covered with a 2-foot thick soil and vegetative cap to prevent potential exposure risks over the long-term.

An EUC will be used to ensure land use on the Site remains nonresidential and controls will be placed on the Consolidation Cell area to prohibit future intrusive activities without prior notification to and approval by KDHE. This alternative will require routine O&M to ensure the long-term integrity of the soil and vegetative cover.

Compliance with ARARs

This alternative would be in compliance with ARARs. The excavation and on-Site consolidation of smelter residues and soils will be conducted to adhere to all applicable federal, state and municipal regulations. Materials on Site that exceed the applicable RSK criteria outside the Consolidation Cell would be excavated for placement within the cell along with off-Site materials to the north and west of the Site that exceed preliminary residential RSK. The areas outside the Consolidation Cell from which impacted materials are removed would be sampled to verify the soils are below the applicable RSK criteria prior to these areas being backfilled and restored.

During implementation of Alternative #2, ARARs for surface water will be met in stormwater run-off through the use of erosion and sediment controls.

Fugitive dust emissions during the implementation of Alternative 2 have a potential of exceeding the ARARs for air. However dust control measures capable of preventing these exceedences are readily implementable.

All requirements governing the placement of an EUC will be followed to ensure land use on Site remains nonresidential for perpetuity and to prohibit intrusive activities within the Consolidation Cell area without prior notification and approval by KDHE.

Long-Term Effectiveness and Permanence

Alternative 2 will provide long-term protection of human health and the environment through routine inspections and corrective actions to maintain the integrity of the Consolidation Cell cover and an approved EUC to prevent unauthorized intrusive activities and residential land use. This will ensure that the protective soil and vegetative cover on the Consolidation Cell will not be disturbed or eroded over the long term, thereby eliminating the potential for direct contact to the underlying residue and soil containing COCs in excess of the applicable RSK criteria. It will also eliminate the potential for migration of COCs via stormwater run-off through the placement of surficial smelter residues and affected soils under a constructed cover.

Reduction of Toxicity, Mobility, or Volume

The COCs at the Site are included in the category of heavy metals (any metallic chemical element that has a relatively high density) that are not amenable to physical, chemical or biological degradation and which tend to be relatively immobile in the environment. Although consolidation of material does not reduce the volume or toxicity of the impacted material, consolidation would provide a reduction in the lateral extent of the impacted soils, eliminate potential exposure through direct contact, inhalation and ingestion and reduce the mobility of metals in exposed smelter residues and surface soils through stormwater run-off or wind. The placement of a clean soil fill cover over impacted soils and debris within the Consolidation Cell would eliminate the potential for migration of soils containing lead, cadmium, arsenic, and zinc over the applicable RSK criteria via air transport or stormwater run-off.

Short-Term Effectiveness

Short-term adverse impacts under this alternative would include a potential for exposure to metal-impacted materials or airborne contaminants by Site workers and surrounding residents during implementation of the remedy. To minimize these potential impacts, best management practices (BMPs) and engineering controls will be implemented. These include restricting access to the Site to authorized personnel only, implementing sediment and erosion controls to minimize migration of metals off-Site via stormwater, and use of dust suppression controls during the handling and movement of potentially impacted materials to minimize air-born migration of metals. Site workers would be required to wear personal protective equipment as part of health and safety protocol. Air monitoring would be conducted in work areas and along the Site perimeter.

Under Alternative 2, the excavated material is kept on-Site, eliminating short-term adverse impacts associated with transporting the materials from the Site over public roads and highways to an off-Site disposal facility. Use of on-Site borrow material for most of the necessary cap material would reduce haul truck traffic associated with importing borrow material into the Site.

Implementability

Alternative 2 can be easily and effectively implemented at the Site and is a proven and presumptive approach to addressing smelter-related contamination at similar sites in Kansas and throughout the U.S. Since the impacted material would remain on-Site, the outside resources required to implement the remedy would be limited to the field crew performing the work, and licensed haulers transporting any necessary imported clean fill and topsoil for cover material. Since off-Site transport to the approved landfill, treatment of soil and landfill verification sampling would not be required under this alternative, and most or all of the fill materials will be obtained from on-Site, the timeframe for implementation of this alternative would be 15 weeks.

Cost

The cost associated with Alternative 2 is estimated between 1.5 Million and 1.7 Million dollars. The cost estimate includes direct costs and long-term O&M for a period of 30 years.

6.3 ALTERNATIVE 3 – EXCAVATION AND OFF-SITE DISPOSAL

Overall Protection of Human Health and the Environment

Complete removal of Site smelter residue and affected soil exceeding the appropriate RSK criteria achieves effective long-term protection of human health and the environment at the Site by ultimately eliminating potential risks associated with direct contact or potential air-borne transport of metals in soils. Under this alternative, soil containing lead, cadmium, and arsenic above the applicable RSK criteria would be excavated and staged for on-Site treatment, if necessary, and transported to an approved Subtitle D nonhazardous disposal facility. Because this alternative requires excavating the Fill Area where the depth of smelter residues and affected soils extending to depths of 7 feet, some of the excavated areas would need to be backfilled in order to achieve final design grades, and the entire Site graded to promote positive drainage. This will allow future nonresidential land use on Site and unrestricted land use in the delineated off-Site areas.

Compliance with ARARs

This alternative would achieve compliance with ARARs through removal of smelter residue and soil in excess of the applicable RSK criteria for transport and disposal at an approved Subtitle D landfill. Post-excavation confirmatory sampling would be conducted in the delineated removal areas outlined in Figure 9 to verify that the cleanup criteria have been met.

During implementation of Alternative 3, ARARs for surface water will be met in stormwater run-off through the use of erosion and sediment controls.

Fugitive dust emissions during the implementation of Alternative 3 have a potential of exceeding the ARARs for air. However dust control measures capable of preventing these exceedences are readily implementable.

Deed restrictions in the form of EUCs will be needed to ensure Site land use remains nonresidential and to comply with ARARs. No O&M would be necessary since under this alternative as all smelter residues and soils with metals in excess of the applicable RSK criteria will be removed.

Long-Term Effectiveness and Permanence

Excavation and off-Site disposal would provide long-term effectiveness and permanence since all impacted material and affected soil above the applicable RSK criteria would be removed. The use of EUCs would ensure that Site is restricted to nonresidential land use.

Reduction of Toxicity, Mobility, or Volume

Toxicity, mobility, and volume of impacted materials would be reduced at the Site under Alternative 3 because all smelter residue and soil containing levels of metals over applicable RSK criteria will be removed. Some material excavated from the Site may require treatment to render the materials nonhazardous prior to transport and disposal, which would partially reduce the toxicity and mobility of the materials when disposed of at the landfill. However, the volume of total lead, cadmium, or arsenic in the excavated materials arriving at the off-Site landfill facility would not be reduced under this alternative.

Short-Term Effectiveness

Alternative 3 includes excavating and stockpiling approximately 63,000 cubic yards of smelter residues and metal-impacted soil for treatment (as required by the landfill) prior to off-Site disposal which will create a potential for short-term adverse impacts to workers and the surrounding area during implementation of the remedy. An estimated 3,500 truck trips over public roads will be necessary to transport impacted materials to the closest identified landfill capable of receiving special waste which poses some risk of off-Site spills, increased noise, and vehicular traffic for the surrounding community.

These impacts can be minimized through the use of site controls to control access onto the Site during remedial activities, erosion and sediment controls to minimize potential of off-Site migration of metals via stormwater run-off, dust suppression systems to prevent airborne dust emissions from leaving the excavation and load out areas, personnel air monitoring and respiratory protection for Site workers within the removal areas, and perimeter air monitoring to monitor the Site perimeter for airborne contaminants that may pose a risk to surrounding off-Site areas.

During transport and disposal, the waste material will be handled appropriately to protect the surrounding community along the transport route and the truck operators and landfill workers who handle, receive, and move this material. Transport and disposal of excavated and/or stabilized soils would be conducted in compliance with all regulatory

requirements and all federal, state or municipal laws, codes and ordinances which govern the transportation and disposal of material.

Implementability

On-Site staging, treatment, transport, and disposal of impacted materials are standard industry practices, and can be effectively implemented at the Site. The nearest identified landfill capable of accepting this volume of special waste is located approximately 50 miles from the Site which increases the time for needed to implement the remedy.

Cost

The estimated cost range for this alternative is S5.8 Million and $6.2 Million dollars. The cost includes direct capital costs associated with implementation of the remedy under the assumption that 40 percent of the material will require treatment and all material will be disposed of as non-hazardous special waste and that some of the required fill will be obtained from on-Site sources. The alternative will not require long-term maintenance.

7.0 COMPARISON OF ALTERNATIVES

A comparative analysis of the three alternatives was conducted to evaluate the relative performance of each alternative in relation to each of the specific evaluation criteria. The purpose of this analysis is to identify the advantages and disadvantages of each alternative relative to one another so the key tradeoffs the decision maker must make can be identified.

Table G: Comparison of Alternatives to Evaluation Criteria:

	Alternative 1: No Action	**Alternative 2:** On-Site Consolidation and Cover	**Alternative 3:** Excavation and/or Treatment, and Off-Site Disposal
Overall protection of human health and the environment	Not met	This alternative would achieve overall protection of human health and the environment by removing direct contact and air transport exposures. An O&M Long Term Care Agreement providing for routine inspection of areas where residual subsurface contamination remains in place would be required.	This alternative would achieve overall protection of human health and the environment.
Compliance with ARARs	Not met	Alternative 2 is in compliance with ARARs.	Alternative 3 is in compliance with ARARs
Long-term effectiveness and permanence	Not achieved	Consolidation and covering of the smelter residue and impacted soil and use of EUCs, perimeter fencing, and routine O&M would ensure long-term effectiveness and permanence of remedy.	Removal of soil for off-Site disposal would ensure long-term effectiveness and permanence of remedy.
Reduction of toxicity, mobility or volume	No Reduction	Alternative 2 would reduce the mobility of metals by decreasing the areal extent of smelter residue and soil containing metals over RSK criteria by the removal and consolidation of materials into the Consolidation Cell. Mobility via stormwater run-off or air transport would be also be eliminated by placement of soil and vegetative cover system over the consolidated material. Alternative 2 would not result in a reduction in toxicity or volume.	Alternative 3 would achieve reduction of toxicity, volume and mobility of metals at the Site through removal of smelter residue and affected soil. When the materials are disposed of at an off-Site landfill, the toxicity and mobility will be partially reduced for the excavated materials that are treated, but the volume of metals in the excavated material will not be reduced.

	Alternative 1: No Action	**Alternative 2:** On-Site Consolidation and Cover	**Alternative 3:** Excavation and/or Treatment, and Off-Site Disposal
Short-term effectiveness	No adverse impacts	Short-term adverse impacts associated this alternative would be less than with Alternative 3 since there will be no on-Site treatment or transport of impacted materials to an off-Site facility, and most or all of the fill material will be from on-Site borrow.	Short-term adverse impacts would be associated with movement, stockpiling, treating and loading of approximately 63,000 cubic yards of smelter residue and affected soil. Additional impacts are associated with transporting and disposal of materials at the approved off-Site landfill. These impacts can be minimized by use of engineering controls.
Implementability	Not applicable	This alternative can be easily implemented and has been accepted as the presumptive remedy for former smelter Sites in Kansas and across the U.S. Timeframe for completion will be less than Alternative 3 due to elimination of stockpiling, treatment, and off-Site transport and disposal.	This alternative is a standard remedial approach and can be easily implemented. Will require multi-agency coordination for developing transport routes and emergency response procedures to address accidental spills. Timeframe for completion dependent on receipt of TCLP testing results associated with the treatment of characteristic wastes and the availability of haul trucks to transport the special wastes to the Subtitle D landfill.
Timeframe for field implementation of remedy	Not applicable	15 weeks	24 weeks
Cost	$0	$1.5 to $1.7 Million	$5.8 to 6.2 Million

Of the seven criteria, overall protection of human health and the environment, and compliance with ARARs serve as threshold determinations which must be met in order to be eligible for selection. Alternative 1 does not meet this requirement and is eliminated from further evaluation.

As shown above in the table, with the exception of costs, there are only minor differences between Alternatives 2 and 3. The direct cost for Alternative 3 is significantly higher than Alternative 2 due primarily to the additional expenses associated with the treatment, transportation, and off-Site disposal of the excavated materials. Both alternatives are

protective of human health and the environment, meet ARARs, are easily implementable, and can achieve long-term effectiveness and permanence. Both Alternatives will require land use restrictions on Site to ensure that land use remains nonresidential. Alternative 2 will require a EUC for the Consolidation Cell to require notification and authorization prior to conducting any intrusive activities within the Consolidation Cell and routine inspection and/or repair of the cover to ensure the integrity of the remedy.

Alternative 3 would achieve a greater reduction in the toxicity, volume and mobility of material on-Site than Alternative 2 because impacted material would be removed and transported to a Subtitle D landfill under Alternative 3. The toxicity and mobility of the material removed from the Site will be partially reduced through treatment of a portion of the material, if required by the landfill, though the volume of metals in the material at the final disposal will not be reduced. Potential short-term adverse impacts during implementation are greater for Alternative 3 than for Alternative 2 due to transport of affected materials to the off-Site disposal facility that will also increase the timeframe for implementation of Alternative 3.

Based on this comparison, the selected remedy for the Site is Alternative 2 (On-Site Consolidation and Cover). This remedy provides the best balance between protectiveness of human health and the environment over the long and short term, timeframe for implementation and overall cost. The proposed remedy provides an effective design to eliminate the direct contact exposure to soils containing lead, cadmium, and arsenic at levels above the applicable RSK criteria. EUCs will be used to ensure land use remains nonresidential, as previously discussed with the current Property Owner.

8.0 DESCRIPTION OF PROPOSED REMEDY

The area of the Site where concentrations of COCs are in excess of the nonresidential RSK criteria is approximately 17.9 acres, as illustrated in Figure 9. The off-Site area where concentrations of COCs are in excess of residential RSK criteria is approximately 0.02 acres.

Under the proposed remedy, a 500-foot by 700-foot Consolidation Cell will be placed on the north side of the Site over an existing Fill Area, adjacent to the northern boundary of the Site. Areas of residual smelter debris or soil exceeding the nonresidential RSK criteria outside the Consolidation Cell would be excavated for placement within the Consolidation Cell. The material deposited in the Consolidation Cell will be compacted and graded to blend with the surrounding topography. The consolidated materials will be covered with a 2-foot thick soil and vegetative cover to remove the potential for exposure to COCs in excess of the applicable RSK criteria.

An EUC will be established to ensure Site land use remains nonresidential, and to prohibit intrusive activities within the area containing the Consolidation Cell. Routine inspections and/or repairs will be performed to ensure the long-term effectiveness of the remedy. The details of the long-term O&M will be included as part of the RAD.

8.1 COMPONENTS OF THE PROPOSED REMEDIATION

The proposed remedy was designed to eliminate the potential exposure to lead, cadmium, and arsenic over applicable cleanup objectives, and includes the following major components:

1. Obtain access agreements from adjacent property owners and conduct pre-construction off-Site soil sampling to the west and northwest of the Site boundaries to verify the estimated extent of contamination. This will be done as either as part of the RAD/RA process, or prior to the RAD/RA process. If one or more of the companies decide(s) to conduct the pre-construction sampling activities prior to the RAD/RA process, a workplan will be submitted to KDHE for its review and approval.
2. Clearing and grubbing, as necessary, in areas where removal activities and construction of Consolidation Cell are slated to be conducted.
3. Installation of site controls and work zones to control access.
4. Installation of erosion and surface water run-off controls around excavation areas and the Consolidation Cell to minimize the potential for transport of soil during construction and to capture and contain any stormwater that comes into contact with excavated soil that exceed the applicable RSK criteria prior to completion of the cover.
5. Use of dust control measures, as necessary, to minimize generation of dust during construction.
6. Re-establishment of a coordinate grid system over areas outside the Consolidation Cell where removal activities are slated for excavation and sampling documentation purposes.

7. Removal and consolidation of the delineated smelter residue and affected soil that exceed the applicable RSK criteria for placement and consolidation in the designated Consolidation Cell as illustrated in Figure 9.
8. Use of an XRF instrument for field screening to guide the lateral and vertical extents of the excavation, followed by confirmatory sampling to verify the applicable RSK criteria have been met.
9. Grading of the Consolidation Cell to promote positive drainage and blend it into the existing topography to the extent possible.
10. Constructing the cover system with 2 feet of compacted clean fill followed by seeding. The KDHE BER Policy BER-RS-054 Design Guidance for Encapsulation Cells will be considered during the design of the cover system as part of the RAD.
11. Placement of a EUC on the Site to ensure land use remains nonresidential and to prohibit intrusive activities on the Consolidation Cell without prior notification and approval of the KDHE and to provide the framework for routine inspections and maintenance.
12. Developing a Long Term Care Agreement that details regular inspection and maintenance procedures to ensure the integrity of the remedy.

8.2 EVALUATION OF THE EFFECTIVENESS OF THE CORRECTIVE ACTION

Based on the detailed analysis of the alternatives, Alternative 2 is the recommended removal action for the Site. This remedy was determined to be protective of human health and the environment, compliant with ARARs, and easily implementable, while at the same time, able to achieve long-term effectiveness and permanence through the use of EUCs and routine maintenance. The proposed alternative was also determined to create less short-term adverse impacts during implementation, and could be completed in a shorter timeframe and at less cost than Alternative 3.

9.0 REFERENCES

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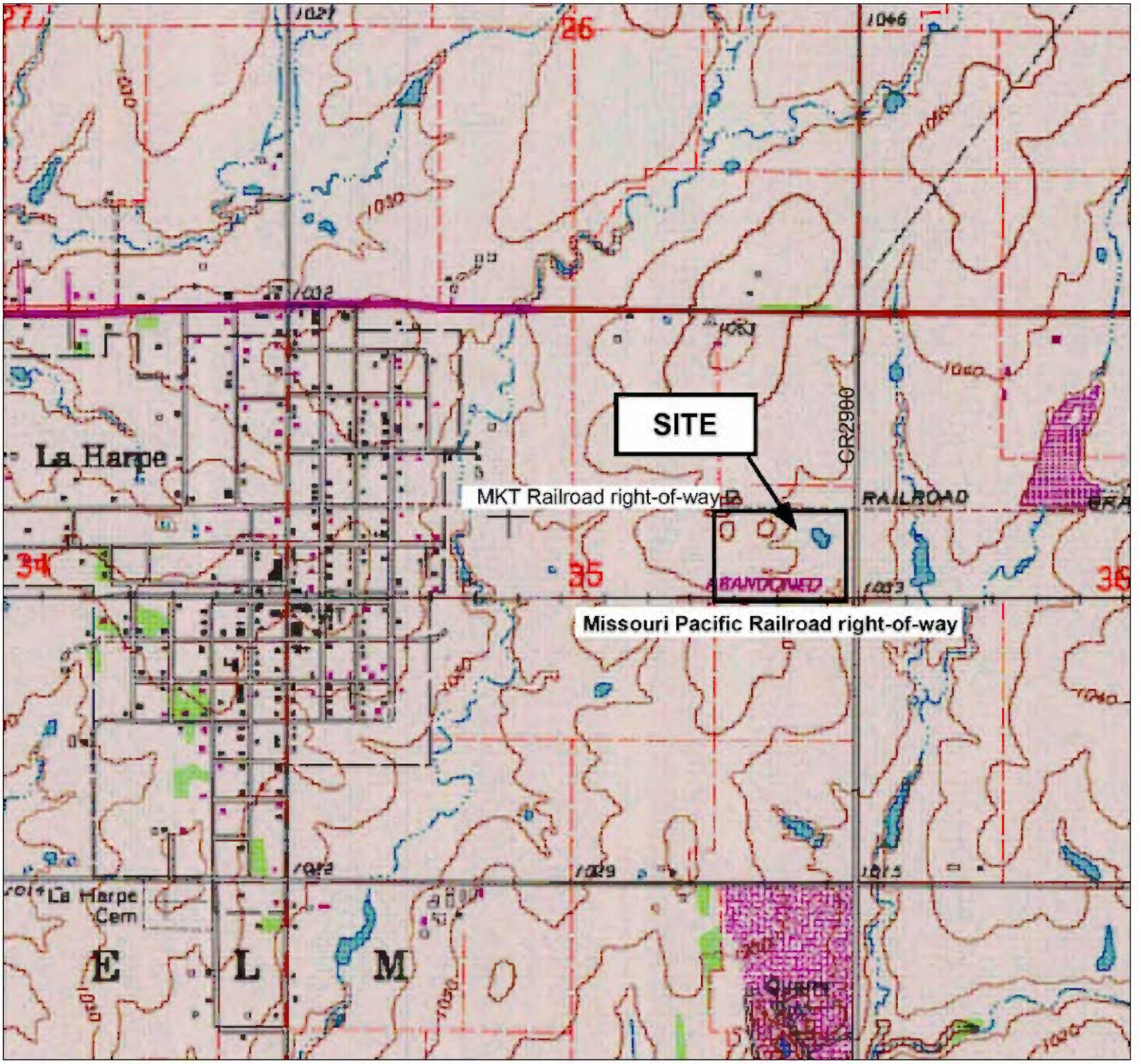
USGS, 1984. *Iola Topographic Map*, 7.5 Minute Series., 7.5 Minute Series, Scale 1:24000

FIGURES



SOURCE: LAHARPE U.S.G.S. TOPOGRAPHIC MAP 1964, 7.5 MINUTE QUADRANGLE, 1:24,000 SCALE

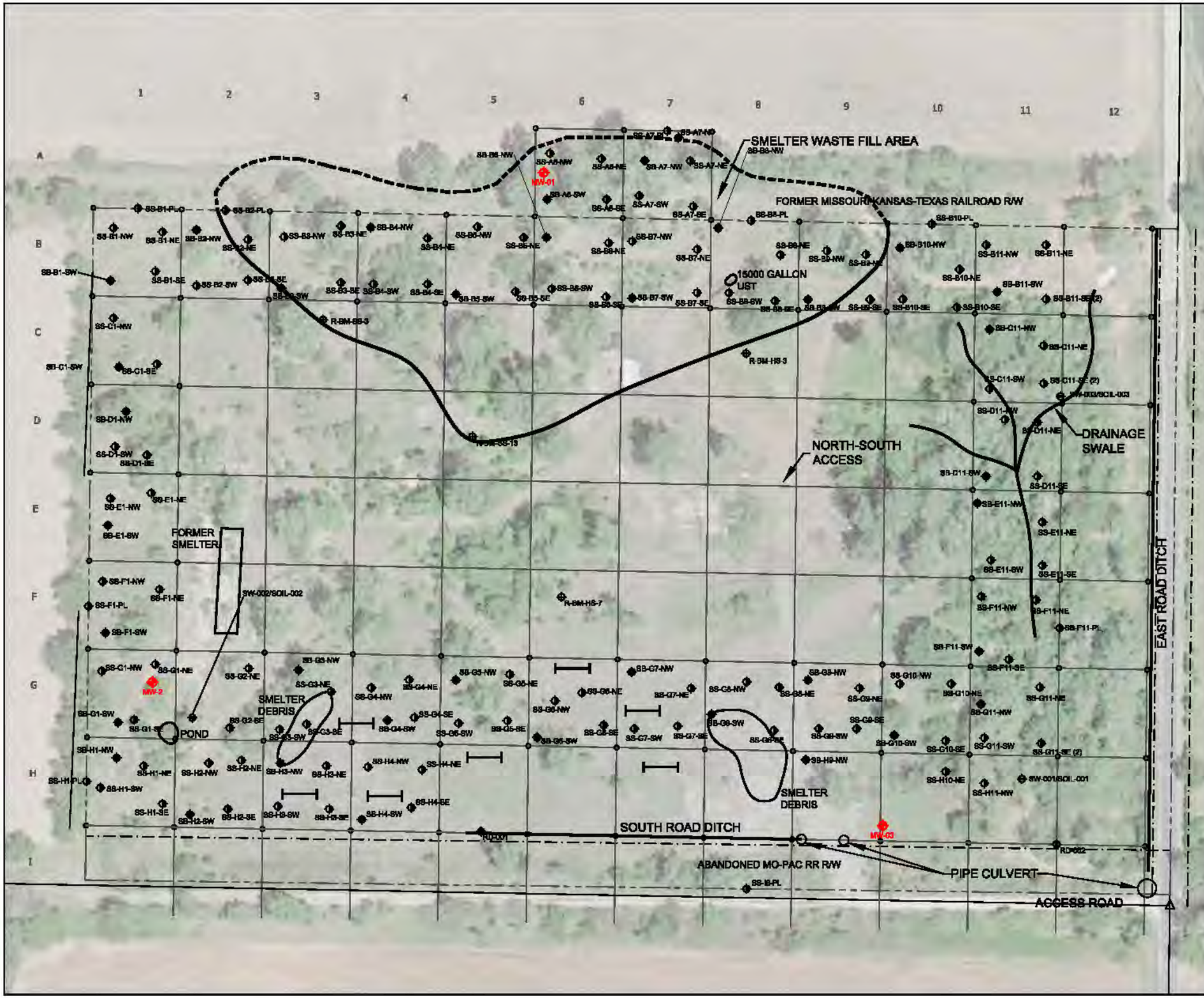
FORMER EAST LA HARPE SMELTER SITE
LA HARPE, KANSAS

N

SITE LOCATION	EAST LA HARPE, ALLEN COUNTY, KANSAS	NO.	DATE	REVISION	APP.
	FIGURE 1				

Scale: Drawn By: Checked By: Date:

ENTACT



LEGEND

- 100 FT BY 100 FT GRID
- MONITOR WELLS
- SURFACE SOIL SAMPLES
- SOIL BORING SAMPLES
- SURFACE SAMPLE FOR MERCURY
- ROAD DITCH SOIL SAMPLES
- SURFACE WATER / SOIL SAMPLE
- TRENCH
- SMELTER WASTE FILL AREA BOUNDARY

N

0 100 200 300

SCALE IN FEET

ENTACT

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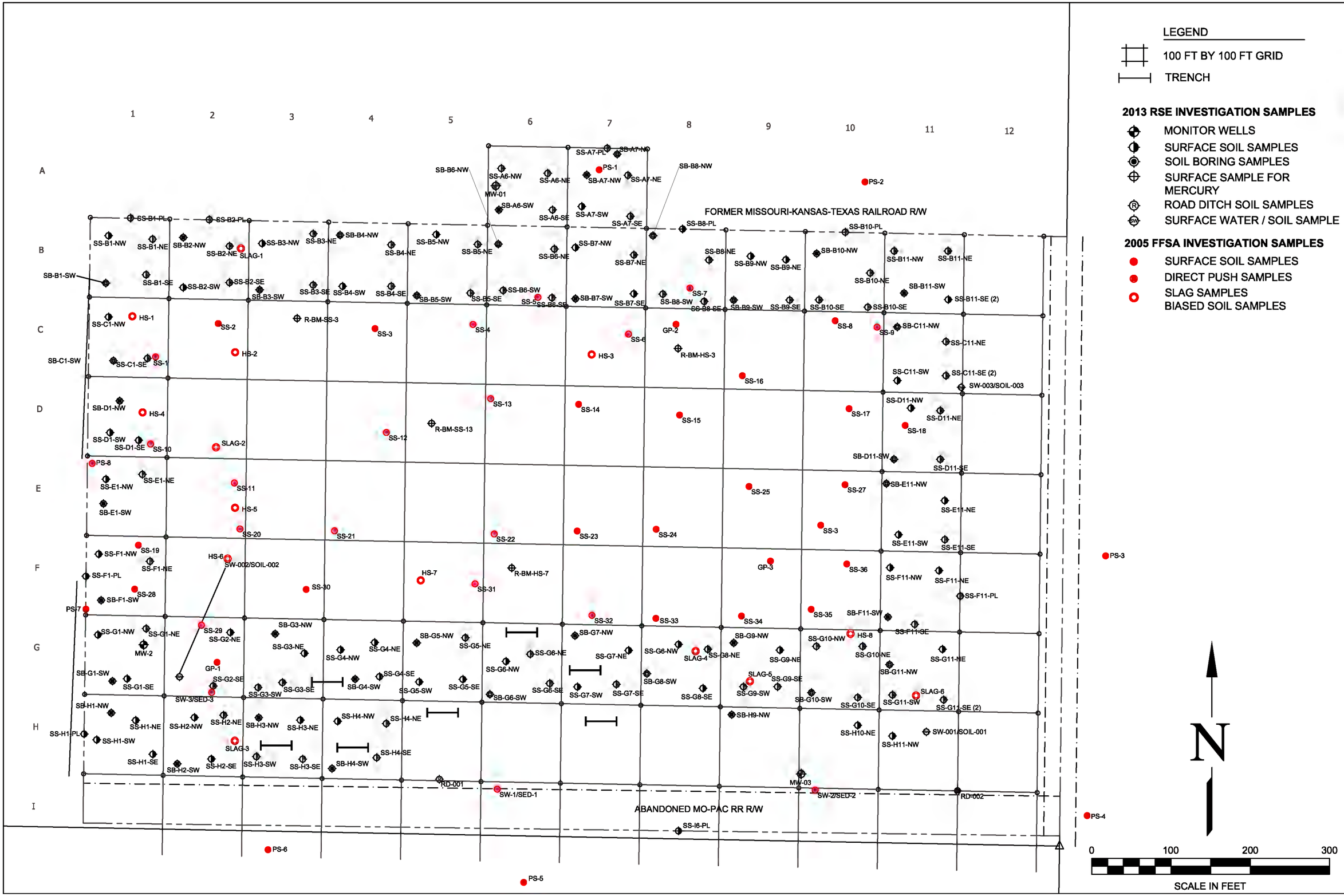
Scale: AS_SHOWN Drawn By: MA Checked By: MO Date: 05/28/13

EAST LA HARPE, ALLEN COUNTY, KANSAS

FIGURE 2

SITE FEATURES



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EAST LA HARPE,
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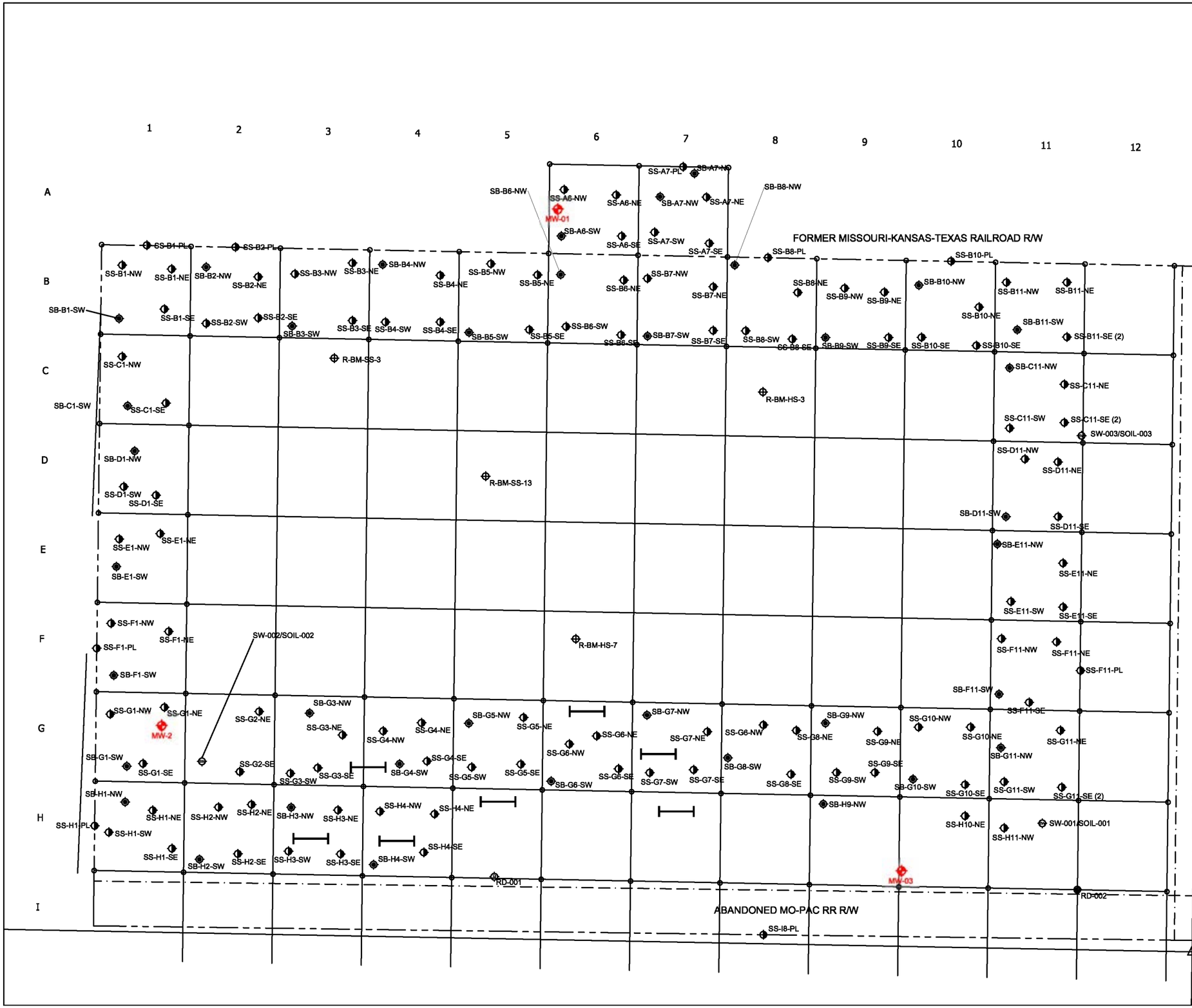
KANSAS

FIGURE 3

2005 FFSA AND 2013 RSE SAMPLE LOCATIONS



LEGEND

- 100 FT BY 100 FT GRID
- TRENCH
- MONITOR WELLS
- SURFACE SOIL SAMPLES
- SOIL BORING SAMPLES
- SURFACE SAMPLE FOR MERCURY
- ROAD DITCH SOIL SAMPLES
- SURFACE WATER / SOIL SAMPLE

N

0 100 200 300

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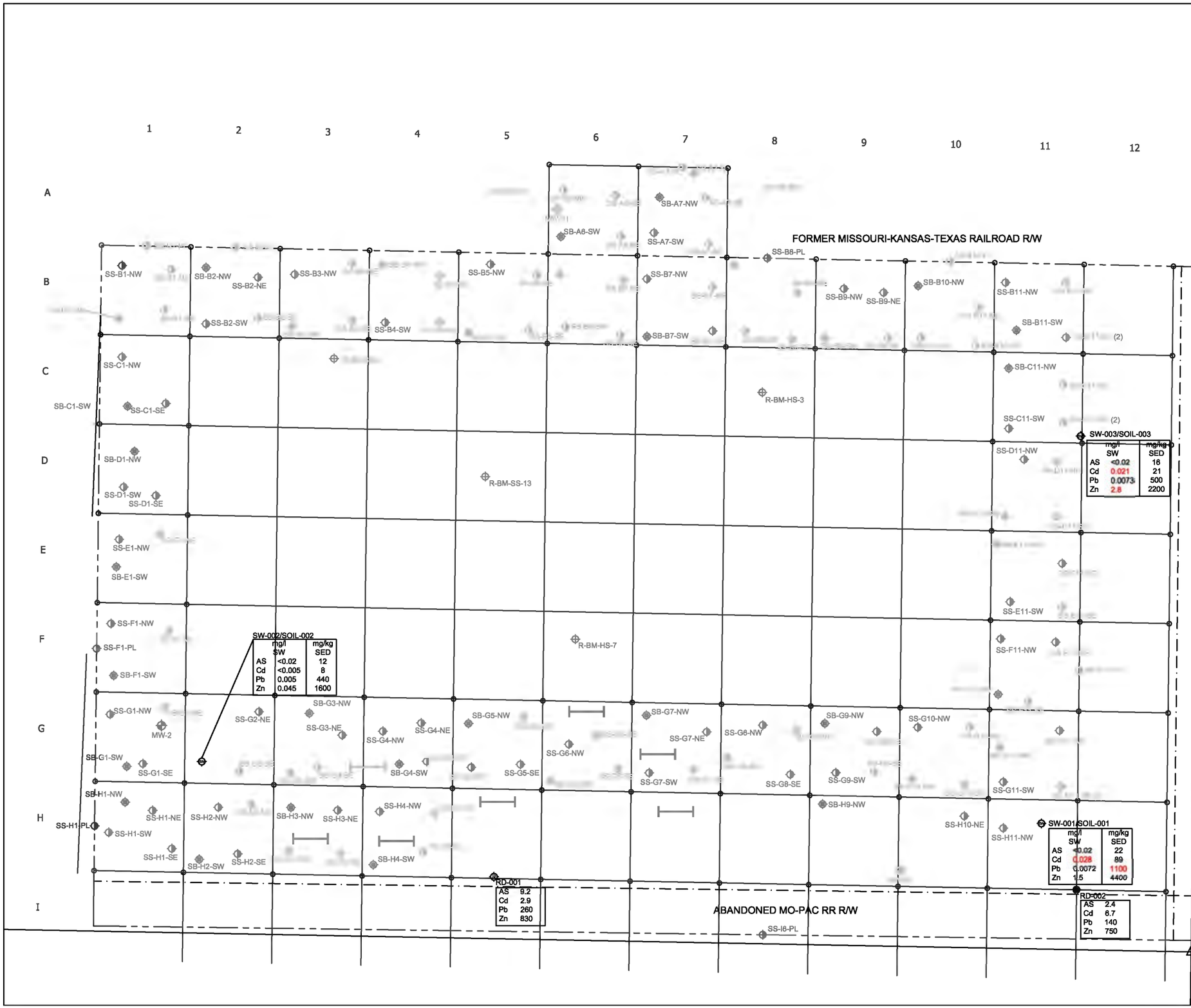
FIGURE 4

COORDINATE GRID SYSTEM, SMELTER RESIDUE AND SOIL SAMPLE LOCATIONS



LEGEND

- 100 FT BY 100 FT GRID
- SURFACE WATER / SOIL SAMPLE
- ROAD DITCH SOIL SAMPLES

NONRESIDENTIAL RSK (mg/kg)

AS	38
Cd	965
Pb	1000
Zn	613,000

KANSAS SURFACE WATER QUALITY STANDARDS (mg/l)

AS	0.1
Cd	0.01
Pb	1
Zn	2

N

0 100 200 300

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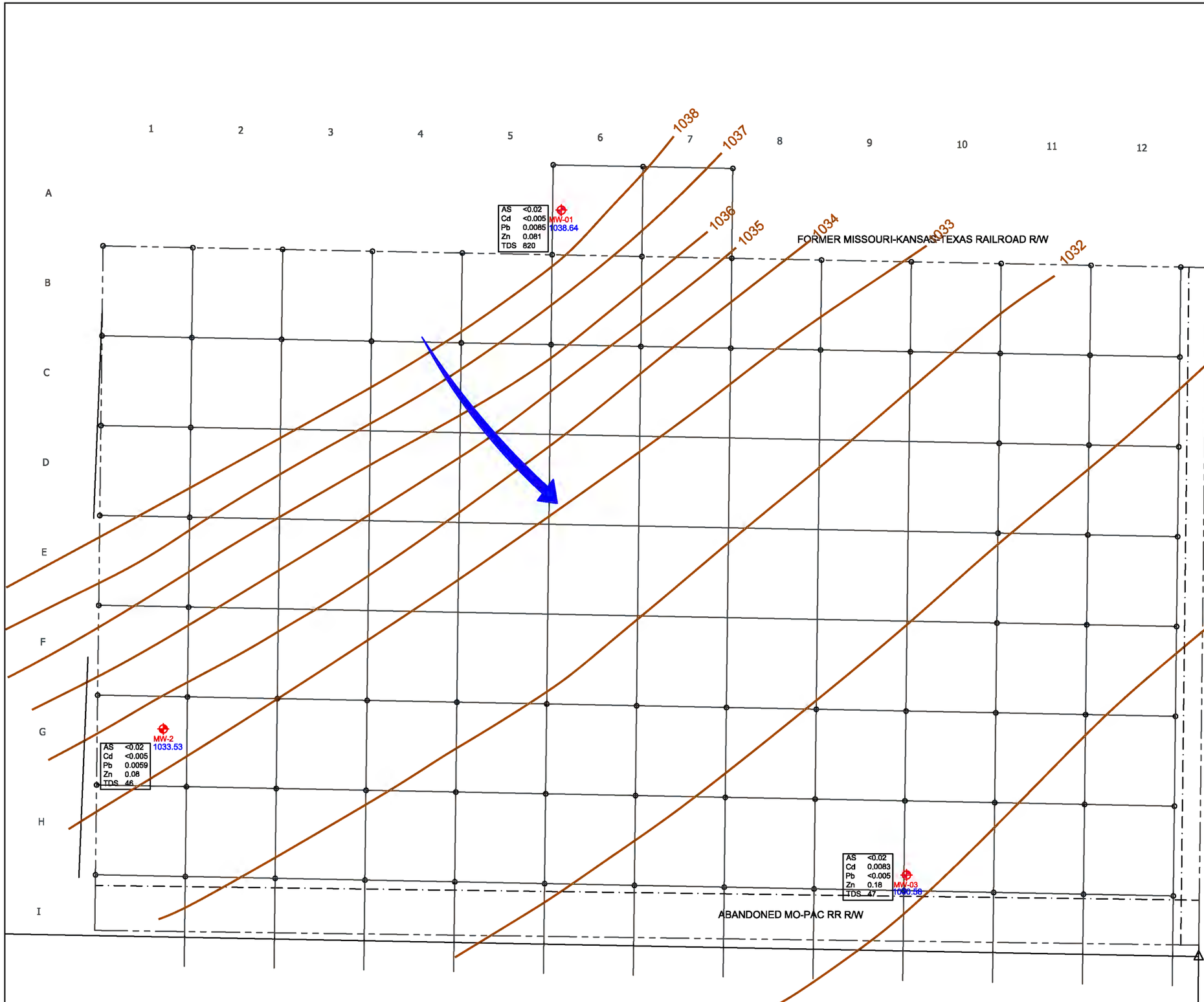
FIGURE 5

ROAD DITCH, DRAINAGE CHANNELS, AND POND SAMPLE LOCATIONS



LEGEND

- 100 FT BY 100 FT GRID
- MONITOR WELLS
- 342.3 GROUNDWATER ELEVATION
- GROUNDWATER GRADIENT CONTOUR
- GROUNDWATER FLOW DIRECTION

N

0 100 200 300

SCALE IN FEET

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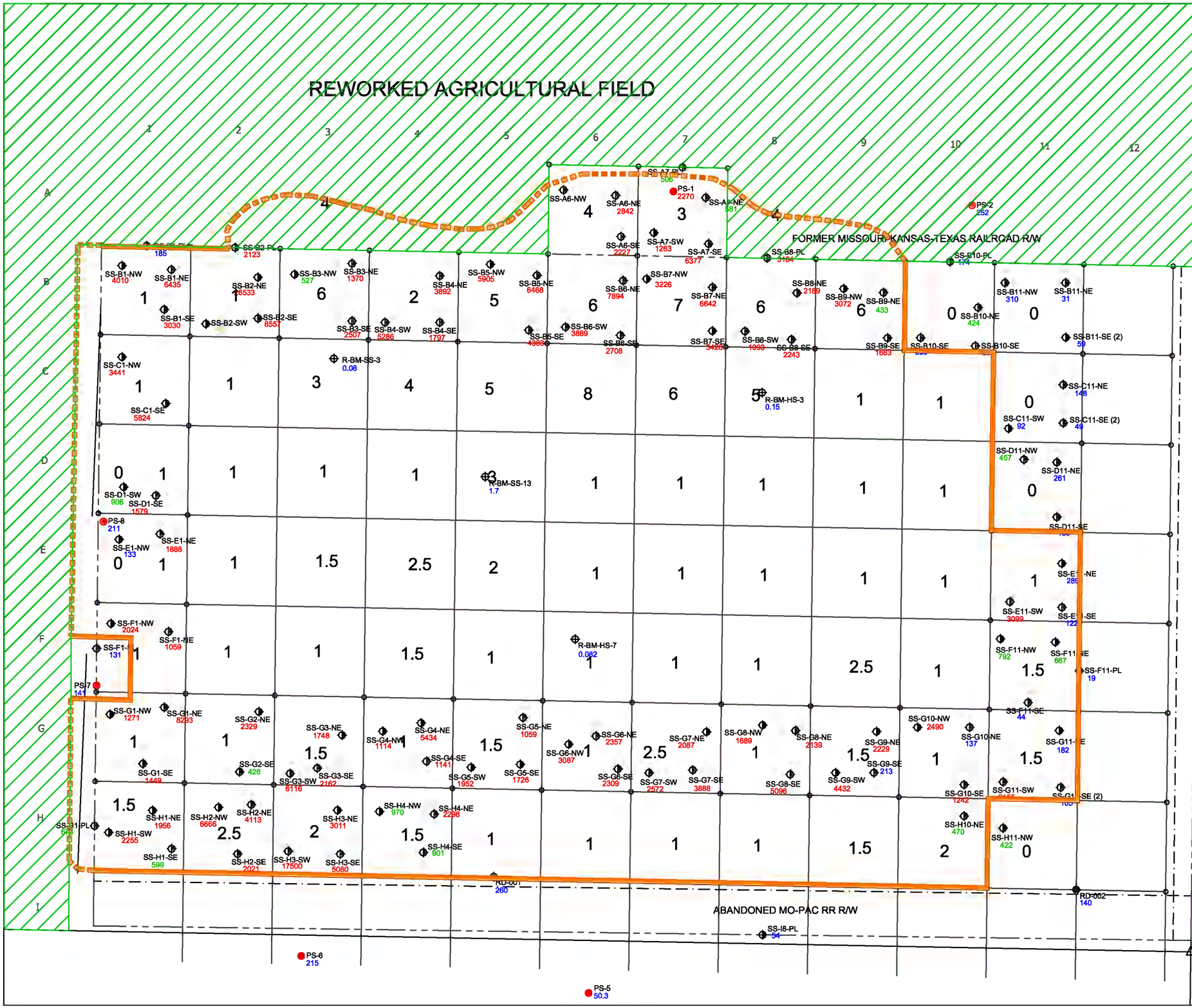
EAST LA HARPE, ALLEN COUNTY, KANSAS

FIGURE 6

MONITOR WELL LOCATIONS AND GROUNDWATER FLOW DIRECTION



LEGEND

- 100 FT BY 100 FT GRID
- TRENCH
- REWORKED AGRICULTURAL FIELD
- SURFACE SOIL SAMPLES
- FFSA 2005 SAMPLE LOCATIONS
- SURFACE SAMPLE FOR MERCURY

SS-C11-SW — SAMPLE LOCATION AND SAMPLE CONCENTRATION LEAD

RD-001/RD-002 — ROAD DITCH SAMPLE RESULTS ANALYZED AT LAB (mg/kg)

2300 CONCENTRATION EXCEEDED THE NON-RESIDENTIAL RSK OF 1000 mg/kg

450 CONCENTRATION EXCEEDED THE RESIDENTIAL RSK OF 400 mg/kg

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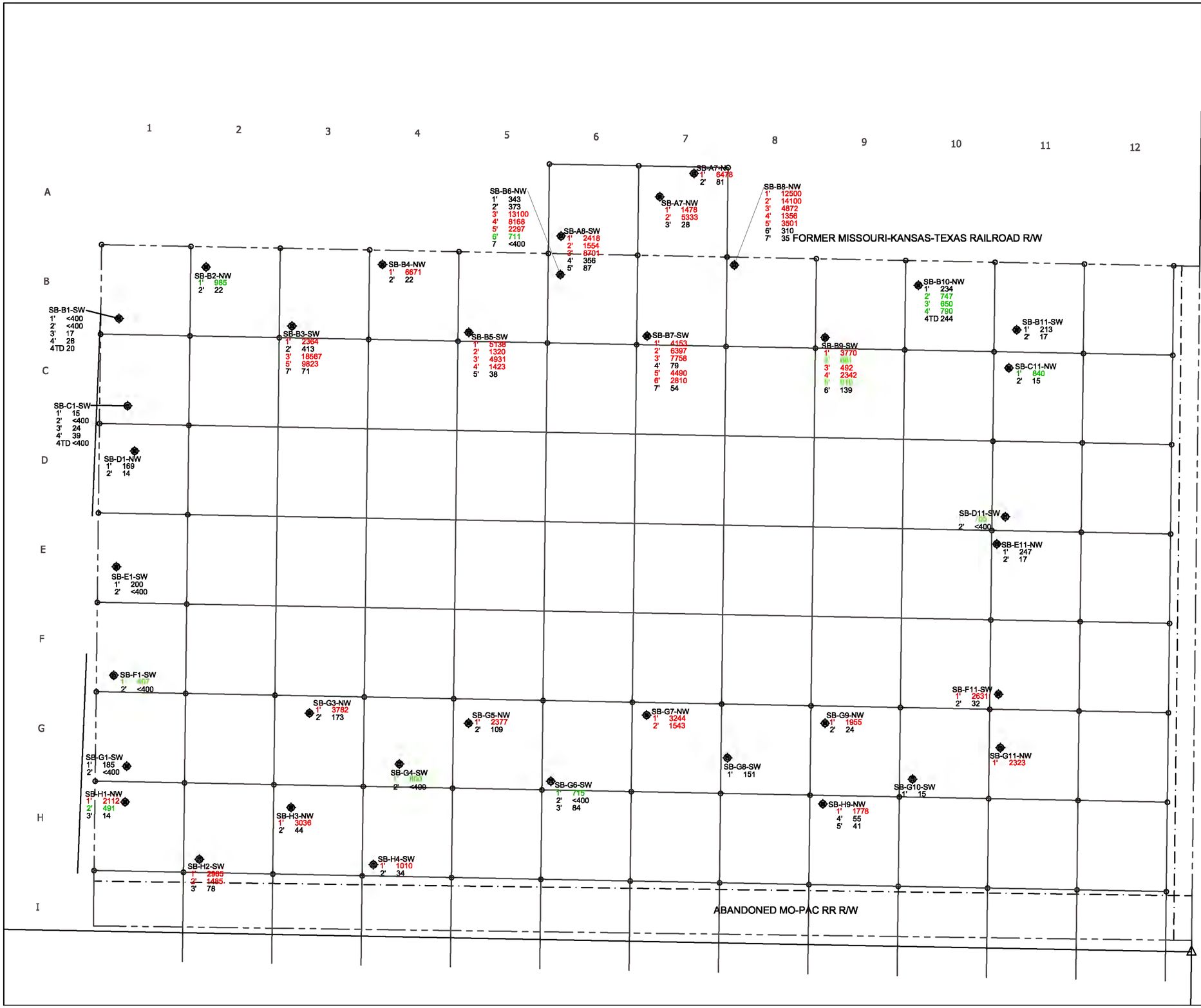
EAST LA HARPE, ALLEN COUNTY, KANSAS

FIGURE 7

LATERAL DELINEATION OF LEAD EXCEEDENCE OF RSK CRITERIA



LEGEND

100 FT BY 100 FT GRID

SOIL BORING SAMPLES

1' - SAMPLE DEPTH

1500 CONCENTRATION EXCEEDED THE NON-RESIDENTIAL RSK OF 1000 mg/kg

450 CONCENTRATION EXCEEDED THE RESIDENTIAL RSK OF 400 mg/lg

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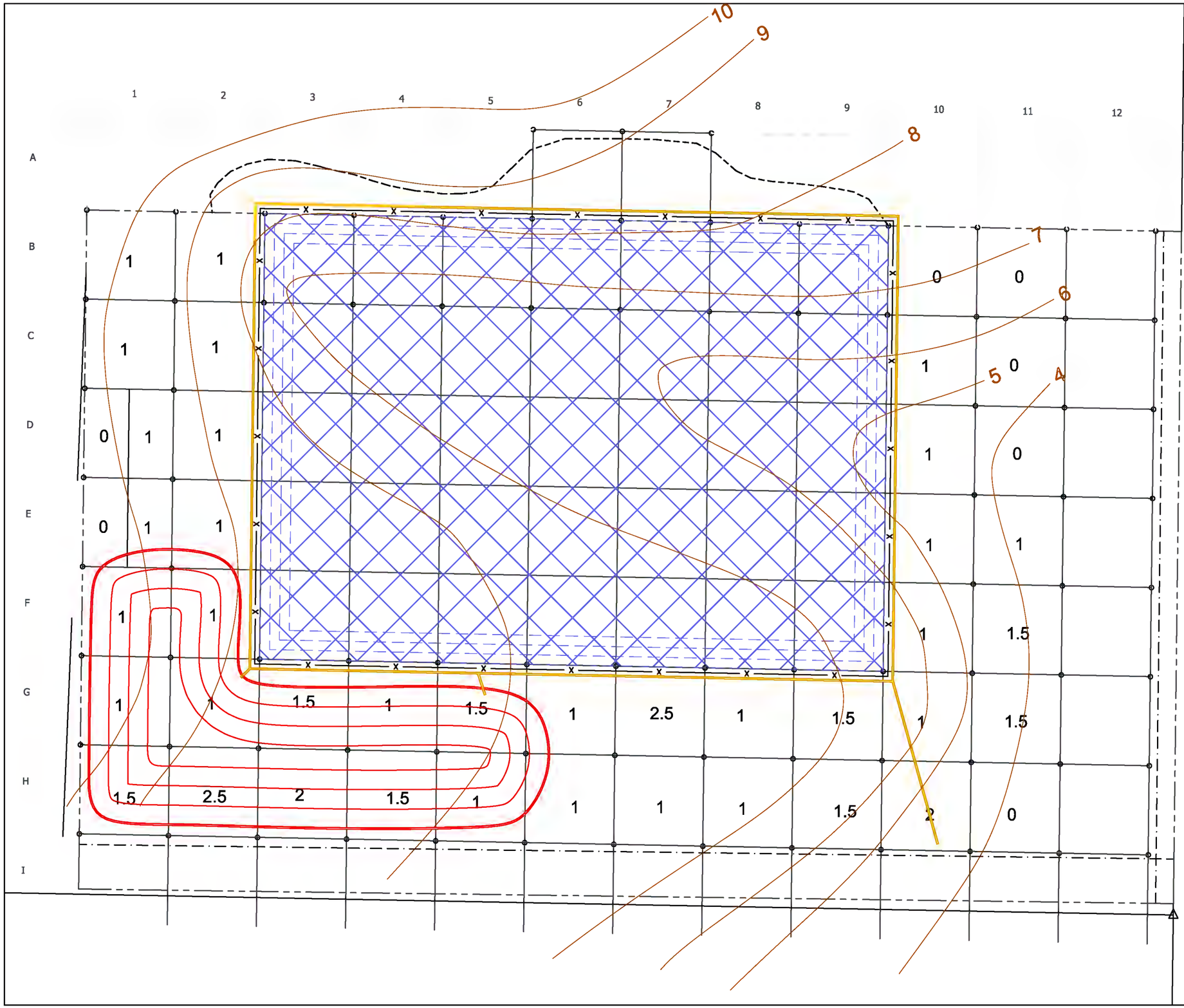
EAST LA HARPE, ALLEN COUNTY, KANSAS

FIGURE 8

VERTICAL DELINEATION OF LEAD EXCEEDENCES OF RSK



LEGEND

- 100 FT BY 100 FT GRID
- 4 — FEET OF IMPACTED SOIL TO REMOVE
- 500' x 700' REPOSITORY WITH 2' CLAY CAP
- PERIMETER FENCE
- DRAINAGE SWALE
- 7 — DEPTH TO TOP OF LIMESTONE ISOPLETH
- GENERAL LOCATION OF RETENTION BASIN AND SOURCE OF ON-SITE BORROW MATERIAL

N

0 100 200 300

SCALE IN FEET

ENTACT
environmental services
3135 Base Pro Drive • Grapevine, TX 76051
(972) 560-1323 • Fax (972) 560-7484

NO.	DATE	REVISION	APP.

Scale: SEE_DWG Drawn By: MA Checked By: MC Date: 10/2013

EAST LA HARPE,
ALLEN COUNTY,
KANSAS

FIGURE 9

ALTERNATIVE 2 - CONSOLIDATION CELL LOCATION AND AREAS OF PROPOSED EXCAVATION

TABLES

TABLE 1
GROUNDWATER ELEVATION SUMMARY
FORMER LA HARPE, KS SMELTER

Well ID	Gauging Date	Total Well Depth (feet)	TOC Elevation ASE (feet)	Depth to Water (feet)	Groundwater Elevation (feet)
MW-1	4/19/2013	12.15	1044.13	4.10	1040.03
MW-2	4/19/2013	12.27	1047.01	10.39	1033.74
MW-3	4/19/2013	7.76	1034.09	4.21	1029.88

TABLE 2
Former East La Harpe, KS Smelter
Summary of XRF Analytical Results and Corresponding Laboratory Data

			Average Raw XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)			400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)			1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample Name	**Sample Date**	**Sample Depth (ft)**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**
Surface Soil Samples										
SS-A6-NE	4/15/2013	0.5	2,842	215	<LOD	10,512				
SS-A6-SE	4/15/2013	0.5	1,943	43	<LOD	5,075				
SS-A6-NW	4/15/2013	0.5	2,227	<LOD	10	7,929				
SS-A7-SW	4/15/2013	0.5	1,263	<LOD	10	5,248				
SS-A7-NE	4/15/2013	0.5	581	66	<LOD	3,904				
SS-A7-SE	4/15/2013	0.5	6,377	281	64	49,133				
SS-B1-NW	4/15/2013	0.5	4,010	571	29	28,667				
SS-B1-NE	4/15/2013	0.5	6,435	263	<LOD	14,033				
SS-B1-SE	4/15/2013	0.5	3,030	125	23	18,933				
SS-B2-NE	4/15/2013	0.5	26,533	666	47	66,867	46,000	260	76	36,000
SS-B2-SE	4/15/2013	0.5	8,557	83	24	15,900				
SS-B2-SW	4/15/2013	0.5	475	22	9	2,391				
SS-B3-NW	4/15/2013	0.5	527	24	<LOD	1,866				
SS-B3-SE	4/15/2013	0.5	2,507	22	9	91,533				
SS-B3-NE	4/15/2013	0.5	1,370	30	<LOD	6,037				
SS-B4-NE	4/15/2013	0.5	3,892	114	27	18,267				
SS-B4-SE	4/15/2013	0.5	1,797	73	11	6,777				
SS-B4-SW	4/15/2013	0.5	5,286	413	272	72,767				
SS-B5-NW	4/15/2013	0.5	5,905	238	48	27,600				
SS-B5-NE	4/15/2013	0.5	6,468	101	13	15,800	4,600	120	40	15,000
SS-B5-SE	4/15/2013	0.5	4,383	355	814	56,133				
SS-B6-SE	4/15/2013	0.5	2,708	169	455	30,667				
SS-B6-SW	4/15/2013	0.5	3,889	240	1,095	56,267				
SS-B6-NE	4/15/2013	0.5	7,894	227	44	38,667				
SS-B7-NW	4/16/2013	0.5	3,226	106	18	14,533				
SS-B7-SE	4/16/2013	0.5	3,428	142	48	54,800				
SS-B7-NE	4/16/2013	0.5	6,642	387	78	63,133				
SS-B8-NE	4/16/2013	0.5	2,189	90	20	15,595				
SS-B8-SE	4/16/2013	0.5	2,243	78	110	16,367				
SS-B8-SW	4/16/2013	0.5	1,093	83	39	5,365	93	6	37	860
SS-B9-NW	4/16/2013	0.5	3,072	81	82	30,500				
SS-B9-SE	4/16/2013	0.5	1,663	<LOD	32	8,638				
SS-B9-NE	4/16/2013	0.5	433	21	<LOD	2,376				
SS-B10-NE	4/16/2013	0.5	424	24	<LOD	2,140				
SS-B10-SE	4/16/2013	0.5	361	27	<LOD	1,737				
SS-B10-SW	4/16/2013	0.5	289	<LOD	<LOD	2,074				
SS-B11-SE	4/18/2013	0.5	59	14	<LOD	304				
SS-B11-NW	4/18/2013	0.5	310	33	<LOD	1,212				
SS-B11-NE	4/18/2013	0.5	31	11	<LOD	306				
SS-B11-SE	4/18/2013	0.5	662	30	<LOD	2,817				
SS-C1-NW	4/18/2013	0.5	3,441	244	51	27,000				
SS-C1-SE	4/18/2013	0.5	5,824	232	<LOD	22,100				
SS-C11-SW	4/17/2013	0.5	92	14	<LOD	1,290				
SS-C11-NE	4/17/2013	0.5	148	20	<LOD	887	130	7.3	2.3	650
SS-C11-SE	4/18/2013	0.5	49	<LOD	<LOD	207	61	8.10	0.39	210

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			Average Raw XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)			400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)			1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample Name	**Sample Date**	**Sample Depth (ft)**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**
SS-D1-SW	4/18/2013	0.5	**906**	<LOD	15	2,431				
SS-D1-SE	4/18/2013	0.5	**1,579**	<LOD	14	10,700				
SS-D11-NW	4/17/2013	0.5	**457**	**26**	<LOD	1,498				
SS-D11-NE	4/17/2013	0.5	261	<LOD	<LOD	1,100				
SS-D11-SE	4/17/2013	0.5	135	<LOD	<LOD	659				
SS-E1-NW	4/18/2013	0.5	133	**22**	**94**	1,465				
SS-E1-NE	4/18/2013	0.5	**1,888**	**103**	**67**	**24,833**	**1,900**	**21**	**120**	14,000
SS-E11-NE	4/18/2013	0.5	289	**18**	<LOD	1,003				
SS-E11-SE	4/18/2013	0.5	122	**14**	<LOD	607				
SS-E11-SW	4/18/2013	0.5	**3,099**	**114**	34	10,484				
SS-F1-NW	4/18/2013	0.5	**2,024**	<LOD	17	6,944				
SS-F1-NE	4/18/2013	0.5	**1,059**	<LOD	16	7,135				
SS-F11-NW	4/18/2013	0.5	**792**	**46**	18	5,158				
SS-F11-NE	4/18/2013	0.5	**667**	**30**	18	4,278	**540**	**25**	28	3,000
SS-F11-SE	4/18/2013	0.5	44	**15**	<LOD	312				
SS-F11-SE[2]	4/18/2013	0.5	48	<LOD	<LOD	224				
SS-G1-NW	4/18/2013	0.5	**1,271**	**47**	16	5,338				
SS-G1-SE	4/18/2013	0.5	**1,449**	**78**	**82**	7,289				
SS-G1-NE	4/18/2013	0.5	**8,293**	**305**	**47**	**30,800**				
SS-G2-SE	4/18/2013	0.5	**426**	**28**	<LOD	2,794				
SS-G2-NE	4/18/2013	0.5	**2,329**	<LOD	**46**	14,500				
SS-G3-SE	4/18/2013	0.5	**2,162**	**310**	<LOD	6,449				
SS-G3-SW	4/18/2013	0.5	**6,116**	**339**	26	**35,200**				
SS-G3-NE	4/18/2013	0.5	**1,748**	**60**	<LOD	5,404	**970**	**30**	17	3,400
SS-G4-SE	4/18/2013	0.5	**1,141**	**96**	**268**	20,400				
SS-G4-NE	4/18/2013	0.5	**5,434**	**361**	**274**	**31,300**				
SS-G4-NW	4/18/2013	0.5	**1,114**	<LOD	**96**	7,717				
SS-G5-SE	4/18/2013	0.5	**1,726**	**46**	**71**	7,617				
SS-G5-SW	4/18/2013	0.5	**1,952**	**162**	**166**	22,700				
SS-G5-NE	4/18/2013	0.5	**1,059**	**71**	**40**	13,567				
SS-G6-SE	4/18/2013	0.5	**2,309**	**215**	**42**	**26,000**				
SS-G6-NE	4/18/2013	0.5	**2,357**	**228**	**54**	13,100	**2,400**	**190**	**48**	8,900
SS-G6-NW	4/18/2013	0.5	**3,087**	**247**	**69**	13,700				
SS-G7-SE	4/18/2013	0.5	**3,888**	**389**	**70**	21,200				
SS-G7-SW	4/18/2013	0.5	**2,572**	**230**	**106**	17,900				
SS-G7-NE	4/18/2013	0.5	**2,087**	**275**	**180**	**29,800**				
SS-G8-SE	4/18/2013	0.5	**5,096**	**613**	**304**	**53,300**				
SS-G8-NE	4/18/2013	0.5	**2,139**	**265**	**61**	15,600				
SS-G8-NW	4/18/2013	0.5	**1,689**	**142**	**130**	19,100				
SS-G9-SE	4/18/2013	0.5	213	**46**	<LOD	3,337				
SS-G9-SW	4/18/2013	0.5	**4,432**	**256**	**87**	**37,867**				
SS-G9-NE	4/18/2013	0.5	**2,229**	<LOD	**55**	4,771	**3,900**	**99**	**100**	18,000
SS-G10-SE	4/18/2013	0.5	**1,242**	<LOD	25	5,582				
SS-G10-NE	4/18/2013	0.5	137	**14**	<LOD	1,347				
SS-G10-NW	4/18/2013	0.5	**2,490**	**187**	**254**	**29,100**				
SS-G11-NE	4/18/2013	0.5	182	<LOD	<LOD	692				

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			Average Raw XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)			400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)			1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample Name	**Sample Date**	**Sample Depth (ft)**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**
SS-G11-SE	4/18/2013	0.5	**454**	**25**	<LOD	1,593				
SS-G11-SW	4/18/2013	0.5	**2,155**	<LOD	**59**	8,237				
SS-G11-SE[2]	4/18/2013	0.5	105	**14**	<LOD	516				
SS-H1-SE	4/18/2013	0.5	**599**	**27**	<LOD	2,124				
SS-H1-SW	4/18/2013	0.5	**2,255**	<LOD	28	12,000				
SS-H1-NE	4/18/2013	0.5	**1,956**	**121**	**41**	9,148				
SS-H2-SE	4/18/2013	0.5	**2,021**	**155**	<LOD	17,100				
SS-H2-NW	4/18/2013	0.5	**6,666**	**341**	**103**	**50,600**				
SS-H2-NE	4/18/2013	0.5	**4,113**	**193**	**134**	**28,800**	**2,600**	**44**	**120**	18,000
SS-H3-SE	4/18/2013	0.5	**5,080**	**367**	**40**	18,300				
SS-H3-SW	4/18/2013	0.5	**17,500**	**993**	<LOD	**31,000**				
SS-H3-NE	4/18/2013	0.5	**3,011**	**71**	**71**	12,400				
SS-H4-NE	4/18/2013	0.5	**2,296**	**101**	**853**	**31,400**				
SS-H4-SE	4/18/2013	0.5	**901**	**66**	**845**	**40,400**				
SS-H4-NW	4/18/2013	0.5	**970**	**41**	**225**	12,200				
SS-H10-NE	4/18/2013	0.5	**470**	<LOD	24	1,184				
SS-H11-NW	4/18/2013	0.5	**422**	<LOD	17	4,518				
Subsurface Samples for Vertical Delineation										
SB-A6-SW(1)	4/17/2013	0-1	**2,418**	**92**	18	8,158				
SB-A6-SW(2)	4/17/2013	1-2	**1,554**	**76**	<LOD	7,993				
SB-A6-SW(3)	4/17/2013	2-3	**8,701**	**206**	31	**31,967**				
SB-A6-SW(4)	4/17/2013	3-4	356	**30**	<LOD	2,686				
SB-A6-SW(5)	4/17/2013	4-5	87	**16**	<LOD	214				
SB-A7-NW(1)	4/17/2013	0-1	**1,478**	**81**	<LOD	4,560				
SB-A7-NW(2)	4/17/2013	1-2	**5,333**	**136**	23	**27,400**				
SB-A7-NW(3)	4/17/2013	2-3	28	9	<LOD	980	13	3.9	5.1	610
SB-A7-N(1)	4/19/2013	0-1	**6,478**	**323**	33	**28,800**				
SB-A7-N(2)	4/19/2013	1-2	81	**13**	17	1,570				
SB-B1-SW(1)	4/16/2013	0-1	<LOD	11	<LOD	1,113				
SB-B1-SW(2)	4/16/2013	1-2	<LOD	11	<LOD	1,171				
SB-B1-SW(3)	4/16/2013	2-3	17	**17**	<LOD	461				
SB-B1-SW(4)	4/16/2013	3-4	28	11	<LOD	172				
SB-B1-SW(4TD)	4/16/2013	4	20	**15**	<LOD	96				
SB-B2-NW(1)	4/17/2013	0-1	**985**	**50**	26	5,881				
SB-B2-NW(2)	4/17/2013	1-2	22	**20**	<LOD	862				
SB-B3-SW(1)	4/17/2013	0-1	**2,364**	**84**	16	6,494				
SB-B3-SW(2)	4/17/2013	1-2	**413**	**45**	<LOD	1,614				
SB-B3-SW(3)	4/17/2013	2-3	**18,567**	**835**	**90**	**84,400**				
SB-B3-SW(5)	4/17/2013	4-5	**9,823**	**273**	**63**	**39,933**				
SB-B3-SW(7)	4/17/2013	6-7	71	**20**	<LOD	335				
SB-B4-NW(1)	4/17/2013	0-1	**6,671**	**272**	28	20,310				

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Residential Risk (mg/kg)			400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)			1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample Name	**Sample Date**	**Sample Depth (ft)**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**
SB-B4-NW(2)	4/17/2013	1-2	22	**14**	<LOD	1,798				
SB-B5-SW(1)	4/18/2013	0-1	**5,138**	**287**	**189**	**41,000**				
SB-B5-SW(2)	4/18/2013	1-2	**1,320**	**162**	**1,080**	**54,900**				
SB-B5-SW(3)	4/18/2013	2-3	**4,931**	**140**	**260**	21,300	**4,700**	**24**	**310**	17,000
SB-B5-SW(4)	4/18/2013	3-4	**1,423**	**62**	**201**	16,500				
SB-B5-SW(5)	4/18/2013	4-5	38	**14**	<LOD	515				
SB-B6-NW(1)	4/18/2013	0-1	343	**21**	18	3,038				
SB-B6-NW(2)	4/18/2013	1-2	373	**42**	<LOD	3,926				
SB-B6-NW(3)	4/18/2013	2-3	**13,100**	**425**	**39**	**32,900**	**13,000**	**2,200**	**67**	22,000
SB-B6-NW(4)	4/18/2013	3-4	**8,168**	**423**	**52**	**33,700**				
SB-B6-NW(5)	4/18/2013	4-5	**2,297**	**196**	21	12,500				
SB-B6-NW(6)	4/18/2013	5-6	**711**	**75**	<LOD	3,409				
SB-B6-NW(7)	4/18/2013	6-7	<LOD	<LOD	<LOD	42	**630**	3.5	5.1	1,400
SB-B7-NW(1)	4/18/2013	0-1	**4,153**	**281**	**96**	**45,000**				
SB-B7-NW(2)	4/18/2013	1-2	**6,397**	**368**	**54**	**53,600**				
SB-B7-NW(3)	4/18/2013	2-3	**7,758**	**148**	17	10,200				
SB-B7-NW(4)	4/18/2013	3-4	79	**22**	<LOD	770				
SB-B7-NW(5)	4/18/2013	4-5	**4,490**	<LOD	30	19,300				
SB-B7-NW(6)	4/18/2013	5-6	**2,810**	**109**	<LOD	8,151				
SB-B7-NW(7)	4/18/2013	6-7	54	**21**	<LOD	349				
SB-B8-NW(1)	4/18/2013	0-1	**12,500**	**442**	**55**	**63,500**				
SB-B8-NW(2)	4/18/2013	1-2	**14,100**	**872**	28	**76,700**				
SB-B8-NW(3)	4/18/2013	2-3	**4,872**	**4,708**	**90**	**59,600**	**6,100**	**4,300**	<50	44,000
SB-B8-NW(4)	4/18/2013	3-4	**1,356**	**1,140**	**112**	13,000	330	**190**	**190**	5,000
SB-B8-NW(5)	4/18/2013	4-5	**3,501**	**2,649**	**60**	**50,400**	**4,200**	**3,100**	**68**	32,000
SB-B8-NW(6)	4/18/2013	5-6	310	**315**	15	3,478				
SB-B8-NW(7)	4/18/2013	6-7	35	**29**	18	136	71	**30**	<0.25	340
SB-B10-NW(1)	4/17/2013	0-1	234	**32**	<LOD	615				
SB-B10-NW(2)	4/17/2013	1-2	**747**	**44**	<LOD	4,525				
SB-B10-NW(3)	4/17/2013	2-3	**650**	<LOD	16	2,924				
SB-B10-NW(4)	4/17/2013	3-4	**790**	**93**	16	3,013				
SB-B10-NW(4TD)	4/17/2013	4	244	**35**	<LOD	1,855				
SB-B11-SW(1)	4/17/2013	0-1	213	**14**	<LOD	1,162				
SB-B11-SW(2)	4/17/2013	1-2	17	**12**	<LOD	340				
SB-C1-SW(1)	4/16/2013	0-1	15	**12**	<LOD	244				
SB-C1-SW(2)	4/16/2013	1-2	<LOD	9	<LOD	57				
SB-C1-SW(3)	4/16/2013	2-3	24	**12**	<LOD	70				
SB-C1-SW(4)	4/16/2013	3-4	39	**15**	<LOD	102				
SB-C1-SW(4TD)	4/16/2013	4	<LOD	**11**	<LOD	204	22	<1.0	0.29	76
SB-C9-SW(1)	4/17/2013	0-1	**3,770**	**165**	**214**	**34,400**				
SB-C9-SW(2)	4/17/2013	1-2	**681**	**63**	<LOD	4,490				
SB-C9-SW(3)	4/17/2013	2-3	**492**	**80**	**39**	5,838				
SB-C9-SW(4)	4/17/2013	3-4	**2,352**	**104**	38	11,500				
SB-C9-SW(5)	4/17/2013	4-5	**919**	**80**	<LOD	7,851				
SB-C9-SW(6)	4/17/2013	5-6	139	**37**	<LOD	1,819				
SB-C11-NW(1)	4/17/2013	0-1	**840**	**49**	23	3,359				
SB-C11-NW(2)	4/17/2013	1-2	15	**14**	<LOD	407				
SB-D1-NW(1)	4/16/2013	0-1	163	**13**	<LOD	1,019				
SB-D1-NW(2)	4/16/2013	1-2	14	11	<LOD	620				
SB-D11-SW(1)	4/16/2013	0-1	**705**	**42**	24	7,330				
SB-D11-SW(2)	4/16/2013	1-2	<LOD	11	<LOD	852				
SB-E1-SW(1)	4/16/2013	0-1	200	11	<LOD	579				
SB-E1-SW(2)	4/16/2013	1-2	<LOD	**14**	<LOD	191				
SB-E11-NW(1)	4/16/2013	0-1	247	<LOD	<LOD	1,500				
SB-E11-NW(2)	4/16/2013	1-2	17	**12**	<LOD	124				

TABLE 2
Former East La Harpe, KS Smelter
Summary of XRF Analytical Results and Corresponding Laboratory Data

			Average Raw XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)			400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)			1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample Name	**Sample Date**	**Sample Depth (ft)**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**	**Lead**	**Arsenic**	**Cadmium**	**Zinc**
SB-F1-SW(1)	4/16/2013	0-1	**407**	<LOD	20	1,847				
SB-F1-SW(2)	4/16/2013	1-2	<LOD	11	<LOD	387				
SB-F11-SW(1)	4/17/2013	0-1	**2,631**	**114**	**100**	17,500				
SB-F11-SW(2)	4/17/2013	1-2	32	**11**	<LOD	601	19	2.4	13	840
SB-G1-SW(1)	4/16/2013	0-1	185	**25**	<LOD	3,311	**550**	**16**	23	5,700
SB-G1-SW(2)	4/16/2013	1-2	<LOD	10	<LOD	739				
SB-G3-NW(1)	4/17/2013	0-1	**3,762**	**228**	**70**	**32,967**				
SB-G3-NW(2)	4/17/2013	1-2	173	**20**	17	1,285				
SB-G4-SW(1)	4/17/2013	0-1	**800**	<LOD	19	6,870				
SB-G4-SW(2)	4/17/2013	1-2	<LOD	9	<LOD	277				
SB-G5-NW(1)	4/17/2013	0-1	**2,377**	**216**	**46**	**26,633**				
SB-G5-NW(2)	4/17/2013	1-2	109	9	30	1,022				
SB-G6-SW(1)	4/17/2013	0-1	**715**	<LOD	**53**	3,140				
SB-G6-SW(2)	4/17/2013	1-2	<LOD	**15**	<LOD	734				
SB-G6-NW(3)	4/17/2013	2-3	84	9	<LOD	1,075				
SB-G7-NW(1)	4/17/2013	0-1	**3,244**	**192**	**94**	16,633				
SB-G7-NW(2)	4/17/2013	1-2	**1,543**	**131**	**57**	7,506				
SB-G8-SW(1)	4/17/2013	0-1	151	**14**	**75**	3,936				
SB-G9-NW(1)	4/17/2013	0-1	**1,955**	**159**	**119**	**29,800**				
SB-G9-NW(2)	4/17/2013	2-3	24	9	<LOD	838	11	2.4	5.1	210
SB-G10-NW(1)	4/17/2013	0-1	15	9	<LOD	625				
SB-G11-NW(1)	4/17/2013	0-1	**2,323**	**102**	**70**	10,806				
SB-H1-NW(1)	4/16/2013	0-1	**2,112**	<LOD	**44**	15,533				
SB-H1-NW(2)	4/16/2013	1-2	**491**	**45**	20	4,793				
SB-H1-NW(3)	4/16/2013	2-3	14	11	31	1,354				
SB-H2-SW(1)	4/16/2013	0-1	**2,985**	**74**	<LOD	4,595				
SB-H2-SW(2)	4/16/2013	1-2	**1,485**	**91**	33	6,208				
SB-H2-SW(3)	4/16/2013	2-3	78	**19**	<LOD	502				
SB-H3-NW(1)	4/16/2013	0-1	**3,036**	**149**	**80**	**64,500**	**2,900**	**17**	**74**	33,000
SB-H3-NW(3)	4/16/2013	2-3	44	**13**	<LOD	646	54	6	8.6	620
SB-H4-SW(1)	4/17/2013	0-1	**1,010**	**88**	**145**	**28,821**				
SB-H4-SW(2)	4/17/2013	1-2	34	**12**	**60**	2,170				
SB-H9-NW(1)	4/18/2013	0-1	**1,778**	**811**	**71**	**37,600**				
SB-H9-NW(4)	4/18/2013	3-4	55	**26**	<LOD	874				
SB-MW-1(1)	4/18/2013	0-1	**6,162**	**139**	**52**	20,500				
SB-MW-1(3)-NE	4/18/2013	1-2	<LOD	11	<LOD	566	13	2.3	3.8	930

Black bolded values indicate exceedences of residential RSK criteria

Red bolded values indicate exceedences of nonresidential RSK criteria

In calculating average concentrations where values were measured as below the level of detection (<LOD), one half of the detection limit (+/- value) was used.

Table 3
Former East La Harpe, KS Smelter
Summary of Laboratory Soil Analytical Results (mg/kg)

				Laboratory Results			
Sample ID	**Sample Location**	**Sample Date**		**Arsenic***	**Cadmium**	**Lead**	**Zinc**
			RSK Non-Residential	38	965	1000	613,000
	(depth)		RSK Residential	11.3	39	400	23,500
SS-FD-001	SS-B2-NE	4/15/2013		**260**	**76**	**46,000**	**36,000**
SS-FD-002	SS-B5-NE	4/15/2013		**120**	**40**	**4,600**	**15,000**
SS-FD-003	SS-B8-SW	4/15/2013		6	37	93	860
SS-FD-004	SS-C11-NE	4/15/2013		7.3	2.3	130	650
SS-FD-005	SS-F11-NE	4/15/2013		**25**	28	**540**	3000
SS-FD-006	SS-E1-NE	4/16/2013		**21**	**120**	**1900**	14000
SS-FD-007	SS-H2-NE	4/16/2013		**44**	**120**	**2600**	18000
SS-FD-008	SS-G3-NE	4/17/2013		**30**	17	**970**	3400
SS-FD-009	SS-G6-NE	4/17/2013		**190**	**48**	**2400**	8900
SS-FD-010	SS-G9-NE	4/17/2013		**99**	**100**	**3900**	18000
SS-FD-011	SS-C11-SE	4/18/2013		8.1	0.39	61	210
SB-FD-001	SB-C1-SW(4TD)	4/15/2013		<1.0	0.29	22	76
SB-FD-002	SB-E1_SW(4TD)	4/15/2013		<1.0	<0.25	6.2	4.8
SB-FD-003	SB-G1-SW(4TD)	4/15/2013		<1.0	<0.25	8.4	17
SB-FD-004	SB-H3-NW(1)	4/15/2013		**17**	**74**	**2900**	**33000**
SB-FD-005	SB-G4-SW(4)	4/16/2013		<1.0	<0.25	14	16
SB-FD-006	SB-G5-NW(4)	4/16/2013		1.9	<0.25	14	10
SB-FD-007	SB-G7_NW(4)	4/16/2013		1.7	<0.25	16	17
SB-FD-008	SB-G9-NW(2)	4/16/2013		2.4	5.1	11	210
SB-FD-009	SB-F11-SW(2)	4/16/2013		2.4	13	19	840
SB-FD-010	SB-D11-SW(3)	4/16/2013		1.9	0.28	13	110
SB-FD-011	SB-B11-SW(4)	4/16/2013		<1.0	<0.25	13	11
SB-FD-012	SB-B8-NW(3)	4/17/2013		**2800**	<25	**6800**	**39000**
SB-FD-013	SB-A7-NW(3)	4/17/2013		3.9	5.1	13	610
SB-FD-014	SB-B6-NW(7)	4/17/2013		3.5	5.1	**630**	1400
SB-FD-015	SB-B4-NW(3)	4/17/2013		2.4	<0.25	13	130
SB-FD-016	SB-B2-NW(3)	4/17/2013		2.6	<0.25	11	160
SB-FD-017	SB-MW-1(3)-NE	4/18/2013		2.3	3.8	13	930
SB-A6-SW4		4/17/2013		4.9	10	270	2500
SB-B8-NW3	blind dup for lab QC			**4300**	<50	**6100**	**44000**
SB-B8-NW4				**190**	**190**	330	5000
SB-B8-NW5				**3100**	**68**	**4200**	**32000**
SB-B8-NW7				**30**	<0.25	71	340
SB-B5-NW3				**24**	**310**	**4700**	17000
SB-B6-NW3				**2200**	**67**	**13000**	**22000**
SB-H3-NW3				6	8.6	54	620
SB-H9-NW5				9.1	0.26	41	97
SB-G1-SW1				**16**	23	**550**	5700

* the RSK value may change to reflect the most recent KDHE criteria

Table 4
Former East La Harpe, KS Smelter
Summary of Mercury in Surface Soil Analytical Results (mg/kg)

Sample ID	Sample Date	Mercury	Location
Soil Pathway - Non residential		**20 mg/kg**	
Soil Pathway - Residential		2 mg/kg	
R-BM-SS-3	4/18/2013	0.08	Grid C3 NE
R-BM-SS-13	4/18/2013	1.7	Grid D5 SW
R-BM-HS-7	4/18/2013	0.082	Grid F6 NW
R-BM-HS-3	4/18/2013	0.15	Grid C8 NW

Table 5 Former East La Harpe, KS Smelter Summary of TCLP Waste Analytical Results (mg/l)						
Sample ID	**Sample Date**	**Arsenic**	**Cadmium**	**Lead**	**Zinc**	**Location**
Toxicity Characteristic Concentrations		5	1	5		
Alternative Treatment Standard					43	
W-001	4/19/2013	<0.05	1.4	57	260	Grid B2 NE
W-002	4/19/2013	<0.05	0.95	33	260	Grid B5 NW

* the treatment standards are based on the toxicity characteristic concentrations at 40 CFR §261.24 Table 1
for zinc, the alternative treatment standard for contaminated soils is being used

Table 6
Former East La Harpe, KS Smelter
Summary of Road Ditch Soil and Sediment Analytical Results (mg/kg)

Sample ID	Sample Date	Arsenic*	Cadmium	Lead	Zinc	Location
RSK Non-Residential		38	965	1000	613,000	
RSK Residential		11.3	39	400	23,500	
RD-001	4/18/2013	9.2	2.9	260	830	Grid I5 NW
RD-002	4/19/2013	2.4	6.7	140	750	Grid I12 NW
Soil-001	4/18/2013	**22**	89	**1100**	4400	Grid H11 NW
Soil-002	4/19/2013	**12**	8	440	1600	Grid G2 SW
Soil-003	4/19/2013	**16**	21	500	2200	Grid E10 NE

* the RSK value may change to reflect the most recent KDHE criteria

TABLE 7
Former East La Harpe, KS Smelter
Summary of Stormwater and Surface Water Analytical Results

Sample ID	Sample Date	Arsenic		Cadmium		Lead		Zinc		Location
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	
Kansas Surface Water Quality Standards (mg/l)		0.1		0.01		0.1		2		
SW-001	4/18/2013	<0.02	<0.02	**0.029**	**0.028**	<0.005	0.0072	1.6	1.5	Grid H11 NW
SW-002	4/19/2013	<0.02	<0.02	<0.005	<0.005	0.0058	0.005	0.071	0.045	Grid G2 SW
SW-003	4/19/2013	<0.02	<0.02	**0.022**	**0.021**	<0.005	0.0073	**2.7**	**2.8**	Grid E10 NE

Table 8
Former East La Harpe, KS Smelter
Summary of Groundwater Analytical Results (mg/l)

Sample ID	Sample Date	Arsenic		Cadmium		Lead		Zinc		TDS	Location
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved		
RSK Drinking Water Quality Standards (mg/l)		0.01		0.005		0.015		5		1,200	
MW-1	4/20/2013	<0.02	<0.02	<0.005	<0.005	<0.005	0.0085	0.82	0.81	820	Grid A6 NW
MW-2	4/20/2013	<0.02	<0.02	<0.005	<0.005	0.0053	0.0059	0.084	0.06	46	Grid G1 NE
MW-3	4/20/2013	<0.02	<0.02	**0.022**	**0.0083**	**0.05**	<0.005	0.97	0.18	47	Grid H9 SW

APPENDIX A

B&M 2005 FFSA PHASE II REPORT

SCANNED
JUN 22 2010

RECEIVED
JUL 12 2005
BUREAU OF
ENVIRONMENTAL REMEDIATION

Burns & McDonnell
SINCE 1898

PHASE II
FOCUSED FORMER SMELTER ASSESSMENT
OF THE
FORMER EAST LA HARPE SMELTER
LA HARPE, KANSAS

JULY 2005

Burns & McDonnell Project No. 35833
Kansas Department of Health & Environment
State Water Plan Program
KDHE Project #C3-001-03005

RECEIVED
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BUREAU OF
ENVIRONMENTAL REMEDIATION

Burns & McDonnell Engineering Company, Inc.
Engineers-Geologists-Scientists
Kansas City, Missouri

SCANNED
JUN 22 2010

TABLE OF CONTENTS

		Page No.
LIST OF FIGURES		TC-3
LIST OF TABLES		TC-3
LIST OF ACRONYMS AND ABBREVIATIONS		TC-4
1.0	INTRODUCTION	1-1
1.1	Personnel	1-2
2.0	SITE INFORMATION	2-1
2.1	Site Location and Description	2-1
2.2	Background	2-1
3.0	INVESTIGATION ACTIVITIES	3-1
3.1	Utility Clearance	3-1
3.2	Field Sampling	3-1
3.2.1	On-Site Grid – Unbiased Surface Soil	3-2
3.2.2	On-Site Grid – Biased Subsurface Soil	3-3
3.2.3	Smelter Waste	3-3
3.2.4	Surface Water	3-3
3.2.5	Sediment	3-3
3.2.6	Off-Site Surface Soil	3-4
3.2.7	Direct-Push	3-4
3.2.8	Background	3-4
3.2.9	Quality Control	3-5
3.3	Borehole Abandonment	3-5
3.4	IDW Management	3-5
4.0	SAMPLE RESULTS	4-1
4.1	Background Samples	4-1
4.1.1	XRF Results	4-1
4.1.2	Laboratory Results	4-2
4.2	On-Site Grid – Unbiased Surface Soil Samples	4-2
4.2.1	XRF Results	4-2
4.2.2	Laboratory Results	4-2
4.3	On-Site Grid – Biased Subsurface Soil Samples	4-3
4.3.1	XRF Results	4-3
4.3.2	Laboratory Results	4-3
4.4	Smelter Waste Samples	4-3
4.4.1	XRF Results	4-3
4.4.2	Laboratory Results	4-4
4.5	Surface Water Samples	4-4
4.6	Sediment Samples	4-4
4.6.1	XRF Results	4-4
4.6.2	Laboratory Results	4-4

TABLE OF CONTENTS (continued)

4.7 Off-Site Surface Soil Samples 4-5
4.7.1 XRF Results 4-5
4.7.2 Laboratory Results 4-5
4.8 Direct-Push Samples 4-5
4.8.1 XRF Results 4-5
4.8.2 Laboratory Results 4-5
4.9 Quality Control Samples 4-6

5.0 CONCLUSIONS AND RECOMMENDATIONS 5-1
5.1 Conclusions 5-1
5.2 Recommendations 5-2

APPENDICES

A – Field Logbook
B – Color Photographic Log
C – XRF Results – Field Log Sheets
D – Boring Logs
E – Laboratory Analytical Results

LIST OF FIGURES

(All figures follow text of the Phase II FFSA)

Figure No.	Title
1-1	Regional Map
3-1	Unbiased Surface Soil Sample Locations
3-2	Biased Soil and Smelter Waste Sample Locations
3-3	Sediment and Surface Water Sample Locations
3-4	Off-Site Surface Soil and Direct-Push Sample Locations
3-5	Background Sample Locations

LIST OF TABLES

(All tables follow figures of the Phase II FFSA)

Table No.	Table
3-1	Sample Results with XRF
4-1	Soil Laboratory Analytical Results
4-2	Water Laboratory Analytical Results

LIST OF ACRONYMS AND ABBREVIATIONS

BER	Bureau of Environmental Remediation
bgs	Below ground surface
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CR	County Road
EPS	Environmental Priority Service, Inc. of Salina, Kansas
EPA	Environmental Protection Agency
ESC	Environmental Science Corporation of Mt. Juliet, Tennessee
°C	Degrees Celcius
FFSA	Focused Former Smelter Assessment
GPS	Global positioning system
HPLC	High performance liquid chromatography
IDW	Investigation derived waste
KDHE	Kansas Department of Health and Environment
mg/kg	Milligrams per kilogram
mg/l	Milligrams per liter
RSK	Kansas risk-based standards
Site	Former East La Harpe Smelter, La Harpe, Kansas
WP	Work Plan
XRF	X-ray fluorescence technology

* * * * *

1.0 INTRODUCTION

The following report presents the results of Phase II Focused Former Smelter Assessment (FFSA) investigation activities conducted by Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) personnel from March 22 to April 8, 2005, at the former East La Harpe Smelter, located ½ mile south of the intersection of US Highway 54 and County Road (CR) 2800, La Harpe, Allen County, Kansas (Site). Burns & McDonnell submitted a Work Plan, dated March 2004, for Phase II Smelter Assessments (Group C) at thirteen former smelter sites in Cherokee, Girard, Pittsburg, Scammon, Weir, Iola, and La Harpe, Kansas, to the Kansas Department of Health of Environment (KDHE) Bureau of Environmental Remediation (BER). KDHE BER approved the Work Plan (WP) in a letter dated March 29, 2004. Figure 1-1 illustrates the general location of the Site.

This report provides a summary of the field activities, and associated field and laboratory analytical results obtained during the Phase II FFSA. The objectives of the Phase II FFSA were as follows:

1. Provide information regarding areas of *Recognized Environmental Conditions* and areas of concern that were identified during the Phase I FFSA.

These objectives were met by sampling soil, smelter waste, groundwater, surface water, and sediment at on-Site and off-Site locations. Soil, smelter waste, and sediment samples were analyzed using x-ray fluorescence (XRF) technology. The portable XRF provided arsenic, cadmium, lead, and zinc concentrations in the samples following United States Environmental Protection Agency (EPA) Method 6200. Select soil, smelter waste, groundwater, surface water, and sediment samples were submitted to Environmental Science Corporation (ESC) of Mt. Juliet, Tennessee, for laboratory analysis of arsenic, cadmium, lead, and zinc using EPA Method 6010B.

On April 1, 2005, Burns & McDonnell personnel and personnel from Environmental Priority Service, Inc. (EPS) of Salina, Kansas, mobilized to the Site to perform direct-push sampling activities. A total of four soil samples (including 1 duplicate sample) were collected by direct-push sampling techniques and submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc.

All field work was conducted in accordance with the KDHE approved Burns & McDonnell WP dated March 2004.

1.1 PERSONNEL

The following is a listing of project personnel and subcontractors:

Bridget Wilson, KDHE Project Manager

Pam Chaffee, KDHE Project Member

Jon Vopata, KDHE Project Member

Chris Conrad, KDHE Project Member

Randy Brown, KDHE Project Field Advisor

Steve Hoffine, Burns & McDonnell Project Manager

Keith Schutte, Burns & McDonnell Field Site Manager

EPS of Salina, Kansas, Direct-push Contractor

ESC of Mt. Juliet, Tennessee, Analytical Laboratory Contractor

* * * * *

2.0 SITE INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The Site is located ½ mile south of the intersection of US Highway 54 and CR 2800, La Harpe, Allen County, Kansas. The Site encompasses 22.5 acres and the geographic description of the Site is the southeast ¼ of the northeast ¼ of Section 35, Township 24 South, Range 19 East. Based on field measurements using a Trimble® Pro-XRS global positioning system (GPS) backpack unit, the latitude and longitude of the central part of the Site is N 37° 16' 56.54", W 95° 16' 59.72". An area map depicting the Site location regionally is included as Figure 1-1.

2.2 BACKGROUND

Burns & McDonnell conducted a Phase I FFSA of the Site and a *Recognized Environmental Condition* was revealed. During the Phase I FFSA Site reconnaissance conducted in March 2005, slag piles and scattered slag were found across the Site and appeared to have impacted vegetation growth in the area of former smelter operations. The Phase I FFSA report, dated May 2005, summarizing the full Site history is on file with KDHE. The property is currently owned by Mr. John Womack, owner of the property since 1992.

* * * * *

3.0 INVESTIGATION ACTIVITIES

The following sections provide a description of the field activities conducted as part of the Phase II FFSA from March 22 to April 8, 2005. Field activities included soil, smelter waste, groundwater, surface water, and sediment sampling, borehole abandonment, and investigation derived waste (IDW) management. Field activities were recorded in the field logbook, a copy of which is provided in Appendix A. Photographs of the Site and activities are provided in Appendix B.

3.1 UTILITY CLEARANCE

Prior to commencement of any direct-push sampling, representatives of the utilities were contacted through Kansas One-Call. An on-Site meeting between Burns & McDonnell personnel and utility representatives was arranged and utility representatives were questioned regarding utility locations.

3.2 FIELD SAMPLING

On March 22, KDHE and Burns & McDonnell personnel, mobilized to the Site to perform field sampling activities. KDHE personnel analyzed soil and smelter waste samples at the Site using XRF technology. KDHE personnel calibrated the portable XRF at the beginning of each day, during active sample analyses, and at the end of the day. Per EPA Method 6200 guidelines, the XRF was allowed to warm up for 15 to 30 minutes prior to use. The portable XRF provided arsenic, cadmium, lead, and zinc concentrations in the samples following EPA Method 6200. Select soil, smelter waste, groundwater, surface water, and sediment samples were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc using EPA Method 6010B.

Smelter waste samples were screened in-situ using the portable XRF. In-situ screening of surface soil did not take place at this Site due to one or both of the following reasons:

- Surface soil at the Site was wet (high moisture content in soil may obstruct proper XRF analysis).
- The portable XRF was not available to allow for in-situ screening.

Surface soil samples were collected and placed in clean zip lock bags, exposed to heat, and allowed to "dry" to damp conditions before being screened with the portable XRF. Subsurface soil and sediment samples were "prepared" before XRF analysis. The samples were "prepared" in the following manner:

- Approximately 8 ounces (375 grams) of sample was thoroughly mixed and homogenized prior to analysis.
- Approximately 20 to 50 grams of sample was then dried using an oven to a temperature not greater than 150 °C (degrees Celsius) for approximately 2 to 4 hours.
- Samples were then ground, using a mortar and pestle, and sieved using 60-mesh (0.25 millimeter) stainless steel, nylon or equivalent mesh prior to field XRF analysis, as specified in EPA Method 6200.
- A portion of the sample was then placed in a clean zip lock bag and analyzed using the portable XRF.

Field screening results were recorded on a field log sheet, with the sample name, date, time of reading, and metal concentration (See Appendix C). Field screening results are summarized in Table 3-1.

On April 1, 2005, Burns & McDonnell, EPS, and KDHE personnel mobilized to the Site to perform direct-push sampling activities. Recovered soil was field screened by KDHE personnel using the portable XRF. A total of four soil samples (including one duplicate) were collected by direct-push sampling techniques and submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Temporary piezometers were installed in the boreholes following soil sampling activities.

On April 8, 2005, Burns & McDonnell personnel remobilized to the Site and collected groundwater samples from the temporary piezometers. The groundwater samples were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc.

A Trimble® Pro-XRS GPS backpack unit was used to record sample locations in the field. All field work was conducted in accordance with the KDHE approved Burns & McDonnell WP dated March 2004.

3.2.1 On-Site Grid – Unbiased Surface Soil

An approximate 100-foot sampling grid was created at the Site and 36 surface soil sample locations (SS-1 through SS-36) were designated. Surface soil samples were analyzed using the portable XRF for arsenic, cadmium, lead, and zinc. In addition, Soil Samples SS-1, SS-11, and SS-15 were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc.

At each grid location three soil samples were collected over a 1- to 2-foot radius. Surface soil samples were placed in clean zip lock bags, exposed to heat, and allowed to "dry" to damp conditions before being screened with the portable XRF. Any large or non-representative debris was removed from the soil sample before analysis. Unbiased surface soil sample locations are illustrated on Figure 3-1.

3.2.2 On-Site Grid – Biased Subsurface Soil

After obtaining unbiased grid samples, biased shallow subsurface soil samples were collected at 8 locations (HS-1 and HS-8) in the vicinity of the highest metal concentrations observed during field screening. The biased soil samples were "prepared" for field XRF analysis. Soil Samples HS-1/SS-1, HS-1/SS-2, HS-2/SS-1, HS-3/SS-1, and HS-7/SS-1 were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Biased soil sample locations are illustrated on Figure 3-2.

The biased soil samples were collected by Burns & McDonnell personnel using a decontaminated, stainless steel Oakfield Probe. Shallow subsurface soil samples were collected using the Oakfield probe from depths of 0 to 3 feet below ground surface (bgs) at 1-foot intervals, with the exception of Boring HS-6 where refusal was encountered at 2 feet bgs.

3.2.3 Smelter Waste

Smelter waste samples were collected from 6 locations (Slag-1 through Slag-6) at the Site. Smelter waste samples were field screened in-situ using XRF technology and Smelter Waste Sample Slag-1 was submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Smelter waste sample locations are illustrated on Figure 3-2.

3.2.4 Surface Water

A total of 5 surface water samples were collected from on-Site and off-Site locations. Surface Water Samples SW-1 through SW-5 were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Surface water sample locations are illustrated on Figure 3-3.

3.2.5 Sediment

A total of 5 sediment samples (Sediment Samples SED-1 through SED-5) were collected, "prepared", and analyzed in the field using the portable XRF. In addition, Sediment Samples SED-1, SED-2, and

SED-3 were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Sediment sample locations are illustrated on Figure 3-3.

3.2.6 Off-Site Surface Soil

A total of 8 off-Site surface soil sample locations (PS-1 through PS-8) were designated for sampling. At each location three soil samples were collected over a 1- to 2-foot radius. The off-Site surface soil samples were collected and analyzed with the XRF in the same manner as the on-Site surface soil samples. No off-Site surface soil samples were collected for laboratory analysis. Off-Site surface soil sample locations are illustrated on Figure 3-4.

3.2.7 Direct-Push

A total of three direct-push borings (Borings GP-1 through GP-3) were completed at the Site. Each location was continuously sampled to bedrock refusal; bedrock was encountered from 7.6-8.5 feet bgs in the borings. One soil sample was collected approximately every 2 feet for field XRF analysis. The sample from each borehole exhibiting the highest concentration of metals based on field screening (Soil Samples GP-1/SS-1, GP-2/SS-1, and GP-3/SS-1) was collected for submittal to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc.

Groundwater samples were collected from Temporary Piezometers GP-1, GP-2 and GP-3, field filtered, and submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Boring logs of the direct-push sample locations are included in Appendix D and direct-push sample locations are illustrated on Figure 3-4.

3.2.8 Background

Background surface soil was screened in-situ using the portable XRF. Background subsurface soil and sediment samples (with the exception of Background Sediment Sample SED-3) were "prepared" and analyzed using the portable XRF. Background Sediment Sample SED-3 was collected on November 5, 2004, after the rented XRF was returned to the manufacturer. Background Sediment Sample SED-3 and Background Surface Water Samples BKG-1/SW-1 and BKG-2/SW-2 were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Background sample locations are illustrated on Figure 3-5.

3.2.9 Quality Control

Duplicate Sample DUP-1/SS-1 was collected as a split of Soil Sample GP-3/SS-1 and submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. Duplicate Sample Dup-2/GW-1, duplicate of Groundwater Sample GP-2/GW-1, was collected and submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. A rinsate blank sample was collected on April 1, 2005, during the direct-push sampling activities. High performance liquid chromatography (HPLC) grade water was used to rinse the decontaminated equipment and collect the rinsate blank. The rinsate blank was submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc.

3.3 BOREHOLE ABANDONMENT

Following completion of sample collection at the direct-push sample locations, the temporary piezometers were removed from the boreholes and the boreholes were abandoned by filling the hole with bentonite. The upper 6 inches of each borehole was returned to its original condition.

3.4 IDW MANAGEMENT

The minimal amounts of soil cuttings generated during the Phase II FFSA were spread on-Site and the purge and decontamination water generated was discharged to the ground surface. All other IDW generated, including personal protective equipment, paper towels, etc., was placed in trash bags and left in an appropriate solid waste receptacle.

* * * * *

4.0 SAMPLE RESULTS

Analytical results for arsenic were compared to the KDHE Risk-Based Standards for Kansas (RSK) Residential Soil to Ground Water Protection Pathway. Because KDHE RSK Residential Soil to Ground Water Protection Pathway are not available for cadmium, lead, and zinc, KDHE RSK Residential Soil Pathway were used for comparison of cadmium, lead, and zinc concentrations. The applicable KDHE RSK for soil [in milligrams per kilogram (mg/kg)] and water [in milligrams per liter (mg/l)] for the Site follow:

Analyte Name	KDHE RSK (soil)	KDHE RSK (water)
Arsenic	5.84 mg/kg	0.01 mg/l
Cadmium	39 mg/kg	0.005 mg/l
Lead	400 mg/kg	0.015 mg/l
Zinc	23,000 mg/kg	5 mg/l

Section 4.1 discusses metals detected in samples collected from background locations. The remaining sections discuss arsenic and metals concentrations in samples that exceed KDHE RSK levels. Detection limits for arsenic and cadmium in the samples analyzed with the XRF were generally above KDHE RSK for arsenic and cadmium. Sample results obtained with the portable XRF are summarized in Table 3-1. Laboratory analytical results of soil samples are summarized in Table 4-1 and laboratory analytical results of water samples are summarized in Table 4-2. Field log sheets summarizing results obtained with the portable XRF are included in Appendix C and laboratory analytical reports are included in Appendix E.

4.1 BACKGROUND SAMPLES

4.1.1 XRF Results

Field XRF results indicate arsenic was not detected in background surface, subsurface, and sediment samples. Cadmium was detected at Background Surface Soil Sample Locations SS1 and SS2 at concentrations of 203 mg/kg and 54 mg/kg, respectively. Cadmium was detected in Background Subsurface Soil Samples BGS-1/SS-1 (118 mg/kg), BGS-1/SS-2 (122 mg/kg), and BGS-2/SS-1 (93 mg/kg). Cadmium was not detected in the background sediment samples. Lead was detected at Background Surface Soil Sample Location SS1 at concentration of 32 mg/kg. Lead was detected in the background subsurface soil samples at concentrations ranging from 30 mg/kg in Sample BGS-1/SS-2 to

52 mg/kg in Sample BGS-2/SS-2 to. Lead was detected in Background Sediment Samples BSED-1 and BSED-2 at concentrations of 72 mg/kg and 49 mg/kg, respectively. Zinc was detected in Background Surface Soil Sample Locations SS1 and SS2 at concentrations of 70 mg/kg and 88 mg/kg, respectively. Zinc was detected in the background subsurface soil samples at concentrations ranging from 50 mg/kg in Sample BGS-2/SS-2 to 108 mg/kg in Sample BGS-2/SS-1. Zinc was detected in Background Sediment Samples BSED-1 and BSED-2 at concentrations of 73 mg/kg and 125 mg/kg, respectively.

4.1.2 Laboratory Results

Laboratory analytical results of Background Surface Water Samples BKG-1/SW-1 and BKG-2/SW-2 indicate arsenic and cadmium were not detected above laboratory reporting limits. Lead was detected in Samples BKG-1/SW-1 and BKG-2/SW-2 at concentrations of 0.010 mg/l and 0.0070 mg/l, respectively. Zinc was detected in Sample BKG-2/SW-2 at a concentration of 0.042 mg/l. Zinc was not detected above laboratory reporting limits in Background Surface Water Sample BKG-1/SW-1.

4.2 ON-SITE GRID – UNBIASED SURFACE SOIL SAMPLES

4.2.1 XRF Results

Field screening results obtained using the portable XRF indicated arsenic was detected at concentrations exceeding KDHE RSK for arsenic at 18 unbiased surface soil sample locations with concentrations ranging from 107 mg/kg at Sample Location SS-34 to 615 mg/kg at Sample Location SS-13. Cadmium concentrations exceeded KDHE RSK for cadmium at 32 unbiased surface soil sample locations with concentrations ranging from 54.6 mg/kg at Sample Location SS-23 to 468 mg/kg at Sample Location SS-6. Lead concentrations exceeded KDHE RSK for lead at all 36 unbiased surface soil sample locations with concentrations ranging from 405 mg/kg at Sample Location SS-9 to 13,100 mg/kg at Sample Location SS-27. Zinc was detected at concentrations exceeding KDHE RSK for zinc at 12 of the unbiased surface soil sample locations with concentrations ranging from 23,500 mg/kg at Sample Location SS-2 to 93,400 mg/kg at Sample Location SS-11.

4.2.2 Laboratory Results

Laboratory analytical results of Soil Samples SS-1, SS-11, and SS-15 indicate arsenic was detected at concentrations of 340, 97, and 76 mg/kg, respectively, exceeding KDHE RSK for arsenic. Cadmium concentrations exceeded KDHE RSK for cadmium in Soil Samples SS-1 (94 mg/kg), SS-11 (110 mg/kg), and SS-15 (180 mg/kg). Lead was detected in Soil Samples SS-1, SS-11, and SS-15 at concentrations of 4,700; 8,800; and 2,200 mg/kg, respectively, exceeding KDHE RSK for lead. Zinc concentrations

exceeded KDHE RSK for zinc in Soil Samples SS-1 and SS-11 at concentrations of 30,000 and 48,000 mg/kg, respectively.

4.3 ON-SITE GRID – BIASED SUBSURFACE SOIL SAMPLES

4.3.1 XRF Results

Results of the biased shallow subsurface soil samples indicate the arsenic concentrations exceeded KDHE RSK for arsenic in 6 soil samples with concentrations ranging from 92.4 mg/kg in Soil Sample HS-1/SS-1 to 654 mg/kg in Soil Sample HS-3/SS-1. Cadmium concentrations exceeded KDHE RSK for cadmium in 10 biased soil samples with concentrations ranging from 63.8 mg/kg in Soil Sample HS-1/SS-3 to 224 mg/kg in Soil Sample HS-7/SS-2. Lead concentrations exceeded KDHE RSK for lead in 15 biased soil samples with concentrations ranging from 509 mg/kg in Soil Sample HS-5/SS-2 to 22,600 mg/kg in Soil Sample HS-7/SS-1. Zinc concentrations exceeded KDHE RSK for zinc in 5 biased soil sample locations with concentrations ranging from 55,300 mg/kg in Soil Sample HS-3/SS-1 to 98,100 mg/kg in Soil Sample HS-5/SS-1.

4.3.2 Laboratory Results

Laboratory analytical results of the "prepared" biased subsurface soil samples indicate arsenic was detected at concentrations exceeding KDHE RSK for arsenic in every sample with concentrations ranging from 12 mg/kg in Sample HS-1/SS-2 to 110 mg/kg in Sample HS-3/SS-1. Cadmium concentrations exceed KDHE RSK in Soil Samples HS-1/SS-1 (43 mg/kg), HS-3/SS-1 (55 mg/kg), and HS-7/SS-1 (55mg/kg). Lead concentrations were found to exceed KDHE RSK in 4 samples ranging from 1,200 mg/kg in Sample HS-2/SS-1 to 12,000 mg/kg in Sample HS-7/SS-1. Zinc concentrations in all of the biased subsurface samples were below KDHE RSKs.

4.4 SMELTER WASTE SAMPLES

4.4.1 XRF Results

Field screening results of the smelter waste samples obtained using the portable XRF indicate arsenic was detected at concentrations exceeding KDHE RSK for arsenic in 4 smelter waste samples at concentrations ranging from 291 mg/kg in Sample Slag-6 to 1,150 mg/kg in Sample Slag-1. Cadmium was detected in Samples Slag-2 at a concentration of 345 mg/kg and Slag-5 at a concentration of 172 mg/kg, exceeding the KDHE RSK for cadmium. Lead concentrations exceeded KDHE RSK for lead in every smelter waste sample with concentrations ranging from 589 mg/kg in Sample Slag-6 to 12,000

mg/kg in Sample Slag-1. Zinc was detected at concentrations exceeding KDHE RSK for zinc in Samples Slag-1 (30,800 mg/kg), Slag-2 (57,400 mg/kg), and Slag-3 (28,100 mg/kg).

4.4.2 Laboratory Results

Laboratory analytical results of Sample Slag-1 indicate arsenic (460 mg/kg), cadmium (130 mg/kg), lead (29,000 mg/kg), and zinc (44,000 mg/kg) were detected at concentrations exceeding their respective KDHE RSK.

4.5 SURFACE WATER SAMPLES

Laboratory analytical results of Surface Water Samples SW-2 and SW-3 indicate cadmium was detected at concentrations of 0.041 mg/l and 0.055 mg/l, respectively, exceeding KDHE RSK for cadmium. There were no other exceedences of KDHE RSK in any of the other surface water samples.

4.6 SEDIMENT SAMPLES

4.6.1 XRF Results

Field screening results of sediment samples indicate arsenic was detected in each sediment sample with concentrations ranging from 9 mg/kg in Sample SED-4 to 62 mg/kg in Sample SED-3. Cadmium was detected in Sediment Samples SED-1 and SED-2 at concentrations of 73 mg/kg and 102 mg/kg, respectively, exceeding KDHE RSK for cadmium. Lead was detected in Sediment Samples SED-2 and SED-3 at concentrations of 515 mg/kg and 2,731 mg/kg, respectively, exceeded KDHE RSK for lead. Zinc was detected in the sediment samples at concentrations below KDHE RSK.

4.6.2 Laboratory Results

Laboratory analytical results of Sediment Samples SED-1 through SED-3 indicate arsenic concentrations above KDHE RSK at all three sample locations, with concentrations of 5.9 mg/kg, 13 mg/kg, and 10 mg/kg, respectively. Cadmium concentrations exceeded KDHE RSK for cadmium in Sediment Samples SED-1 (41 mg/kg) and SED-2 (60 mg/kg). Sediment Sample SED-3 exceeded the KDHE RSK for lead with a concentration of 400 mg/kg. Zinc was not detected in the sediment samples at concentrations exceeding the KDHE RSK for zinc.

4.7 OFF-SITE SURFACE SOIL SAMPLES

4.7.1 XRF Results

Field screening results obtained using the portable XRF indicate arsenic was detected at Sample Location PS-1 at a concentration of 157 mg/kg, exceeding the KDHE RSK for arsenic. Lead was detected at Sample Location PS-1 at a concentration of 2,270 mg/kg, exceeded KDHE RSK for lead. There were no other exceedences of KDHE RSK in any of the other off-Site surface soil sample locations.

4.7.2 Laboratory Results

No off-Site surface soil samples were collected for laboratory analysis. Approximately 15 percent of the soil samples collected at the Site were collected as splits and submitted for laboratory analysis; however, Burns & McDonnell personnel did not collect a split of an off-Site surface soil for laboratory analysis.

4.8 DIRECT-PUSH SAMPLES

4.8.1 XRF Results

Field screening results of subsurface soil samples collected using direct-push sampling techniques indicate arsenic was detected at concentrations exceeding KDHE RSK for arsenic in 13 soil samples at concentrations ranging from 7 mg/kg in Samples GP-1/SS-3 to 279 mg/kg in Sample GP-1/SS-1. Cadmium was detected at concentrations exceeding KDHE RSK for cadmium in 4 soil samples with concentrations ranging from 97 mg/kg in Sample GP-2/SS-2 to 841 mg/kg in Sample GP-2/SS-1. Lead was detected at concentrations exceeding KDHE RSK in 4 direct-push soil samples with concentrations ranging from 928 mg/kg in Sample GP-3/SS-1 to 12,065 mg/kg in Sample GP-1/SS-1. Zinc was detected in Soil Sample GP-2/SS-1 at a concentration of 47,474 mg/kg, exceeding KDHE RSK for zinc. Zinc was also detected over the range of the instrument in Sample GP-1/SS-1; Sample GP-1/SS-1 is composed of greater than 10% zinc.

4.8.2 Laboratory Results

Soil

Laboratory analytical results of the soil samples collected using direct-push techniques indicate arsenic was detected at 85 mg/kg in Sample GP-1/SS-1, exceeding KDHE RSK for arsenic. Soil Samples GP-1/SS-1 and GP-2/SS-2 exhibited cadmium concentrations of 57 mg/kg and 71 mg/kg, respectively, exceeding KDHE RSK for cadmium. The lead concentration of 9,400 mg/kg in Soil Sample GP-1/SS-1

exceeded KDHE RSK for lead. Zinc was detected in Soil Sample GP-1/SS-1 at a concentration of 61,000 mg/kg exceeding KDHE RSK for zinc.

Groundwater

Laboratory analytical results of the groundwater samples collected from the temporary piezometers indicate cadmium was detected in Groundwater Samples GP-1/GW-1 (0.20 mg/l), GP-2/GW-1 (0.048 mg/l), and DUP-2/GW-1 (0.049 mg/l) at concentrations exceeding KDHE RSK for cadmium. Lead was detected in Groundwater Sample GP-1/GW-1 at a concentration of 0.037 mg/l, exceeding KDHE RSK for lead. Zinc was detected in Groundwater Sample GP-1/GW-1 at a concentration of 35 mg/l, exceeding KDHE RSK for zinc.

4.9 QUALITY CONTROL SAMPLES

Laboratory analytical results of Duplicate Samples DUP-1/SS-1 and DUP-2/GW-1 indicated acceptable correlation with the original samples (Soil Sample GP-3/SS-1 and Groundwater Sample GP-2/GW-1, respectively). Arsenic, cadmium, lead, and zinc were not detected in the rinsate blank sample.

* * * * *

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

During the Phase I FFSA Site reconnaissance conducted in March 2005, slag piles and scattered slag were found across the Site and appeared to have impacted vegetation growth in the area of former smelter operations. From March 22 to April 8, 2005, Burns & McDonnell personnel conducted a Phase II FFSA at the Site.

A portable XRF was used to analyze surface soil, subsurface soil, smelter waste, and sediment samples for arsenic, cadmium, lead, and zinc. Selected samples were submitted to ESC for laboratory analysis of arsenic, cadmium, lead, and zinc. The following samples were collected as part of the Phase II FFSA:

XRF Analysis

- 109 on-Site grid, unbiased surface soil samples
- 24 on-Site grid, biased soil samples ("prepared")
- 24 off-Site, surface soil samples
- 6 smelter waste samples (in-situ)
- 10 sediment samples ("prepared")
- 17 soil samples collected by direct-push sampling techniques ("prepared")

Laboratory Analysis

- 3 on-Site grid, unbiased surface soil samples
- 5 on-Site grid, biased soil samples
- 1 smelter waste sample
- 3 sediment samples
- 4 soil samples collected by direct-push sampling techniques
- 4 groundwater samples collected from temporary piezometers
- 5 surface water samples
- 1 rinsate blank sample

Soil samples collected at the Site indicate surface and shallow subsurface soil at the Site is impacted with metals (arsenic, cadmium, lead, and zinc). Results of slag analysis suggests elevated metals in the soil are likely related to historical smelter operations. Field screening results obtained using the portable XRF indicate surface soil at the Site exceeds KDHE RSK for arsenic, cadmium, lead and zinc. Arsenic was detected at concentrations exceeding KDHE RSK for arsenic at 18 unbiased surface soil sample locations with concentrations ranging from 107 mg/kg at Sample Location SS-34 to 615 mg/kg at Sample Location SS-13. Cadmium concentrations exceeded KDHE RSK for cadmium at 32 unbiased surface soil sample locations with concentrations ranging from 54.6 mg/kg at Sample Location SS-23 to 468 mg/kg at Sample Location SS-6. Lead concentrations exceeded KDHE RSK for lead at all 36 unbiased surface soil sample locations with concentrations ranging from 405 mg/kg at Sample Location SS-9 to 13,100 mg/kg at Sample Location SS-27. Zinc was detected at concentrations exceeding KDHE RSK for zinc at 12 of the unbiased surface soil sample locations with concentrations ranging from 23,500 mg/kg at Sample Location SS-2 to 93,400 mg/kg at Sample Location SS-11. Soil samples collected at the Site generally exhibited arsenic, cadmium, lead, and zinc concentrations well above metals concentrations observed in background soil samples. One surface soil sample collected from a nearby off-Site location exhibited lead and arsenic concentrations in exceedence of KDHE RSK. Groundwater was encountered in all 3 direct-push borings conducted at the Site and laboratory analytical results indicate cadmium, lead, and zinc is present in on-Site groundwater at concentrations exceeding KDHE RSKs.

5.2 RECOMMENDATIONS

Based on the elevated metals concentrations in the surface and shallow subsurface soil at the Site, Burns & McDonnell recommends additional soil sampling to delineate the horizontal and vertical extent of metals impact in the soil at the Site. Laboratory analytical results of the groundwater sample collected at the Site indicate cadmium, lead, and zinc were detected at concentrations exceeding KDHE RSKs. Burns & McDonnell recommends additional groundwater sampling to delineate the horizontal extent of metals-impacted groundwater at the Site.

* * * * *

Tables

Table 3-1
Sample Results with XRF
Phase II Investigation
Former East La Harpe Smelter
La Harpe, Kansas

Sample ID	Date	Sample Depth (ft.bgs)	Analyte with KDHE RSK			
			Arsenic 5.84	Cadmium 39	Lead 400	Zinc 23,000
SS-1 A	3/22/2005	0-0.5	**255**	**94.2**	**3,610**	**42,000**
SS-1 B	3/22/2005	0-0.5	**372**	**75.0**	**3,770**	**36,300**
SS-1 C	3/22/2005	0-0.5	110 U	**76.2**	**2,150**	17,400
SS-2 A	3/22/2005	0-0.5	**241**	**194**	**7,310**	**30,600**
SS-2 B	3/22/2005	0-0.5	**303**	**210**	**6,520**	**27,500**
SS-2 C	3/22/2005	0-0.5	**256**	**178**	**6,440**	**23,500**
SS-3 A	3/22/2005	0-0.5	**471**	67 U	**7,200**	**42,000**
SS-3 B	3/22/2005	0-0.5	**526**	**113**	**7,860**	**49,000**
SS-3 C	3/22/2005	0-0.5	**392**	**85.4**	**9,060**	**44,000**
SS-4 A	3/22/2005	0-0.5	68 U	56 U	**1,070**	4,800
SS-4 B	3/22/2005	0-0.5	95 U	65 U	**1,770**	6,960
SS-4 C	3/22/2005	0-0.5	64 U	49 U	**930**	3,540
SS-5 A	3/22/2005	0-0.5	72 U	**438**	**1,140**	11,200
SS-5 B	3/22/2005	0-0.5	76 U	**422**	**1,300**	11,500
SS-5 C	3/22/2005	0-0.5	**149**	**460**	**1,820**	22,300
SS-6 A	3/22/2005	0-0.5	63 U	**306**	**1,110**	7,930
SS-6 B	3/22/2005	0-0.5	110 U	**468**	**2,250**	18,800
SS-6 C	3/22/2005	0-0.5	110 U	**178**	**2,690**	15,900
SS-7 A	3/22/2005	0-0.5	130 U	**239**	**2,630**	18,300
SS-7 B	3/22/2005	0-0.5	100 U	**170**	**1,850**	18,400
SS-7 C	3/22/2005	0-0.5	110 U	**173**	**2,300**	16,300
SS-8 A	3/22/2005	0-0.5	99 U	**142**	**2,080**	10,800
SS-8 B	3/22/2005	0-0.5	78 U	**136**	**1,370**	7,160
SS-8 C	3/22/2005	0-0.5	71 U	**132**	**1,270**	5,870
SS-9 A	3/22/2005	0-0.5	48 U	48 U	**436**	1,700
SS-9 B	3/22/2005	0-0.5	44 U	**65.2**	389	1,230
SS-9 C	3/22/2005	0-0.5	41 U	44 U	**405**	1,190
SS-10 A	3/23/2005	0-0.5	**394**	49 U	**5,830**	15,300
SS-10 B	3/23/2005	0-0.5	**462**	58 U	**6,600**	18,700
SS-10 C	3/23/2005	0-0.5	**314**	56 U	**5,740**	15,700
SS-11 A	3/23/2005	0-0.5	**313**	**94.4**	**8,270**	**93,400**
SS-11 B	3/23/2005	0-0.5	**272**	**94.9**	**7,810**	**89,000**
SS-11 C	3/23/2005	0-0.5	**271**	**158**	**7,860**	**87,400**
SS-12 A	3/23/2005	0-0.5	210 U	**177**	**6,050**	**36,900**
SS-12 B	3/23/2005	0-0.5	190 U	**209**	**5,700**	**37,100**
SS-12 C	3/23/2005	0-0.5	180 U	**185**	**4,970**	**32,300**
SS-13A	3/23/2005	0-0.5	**615**	**137**	**5,850**	**57,100**
SS-13 B	3/23/2005	0-0.5	**533**	**184**	**5,910**	**55,700**
SS-13 C	3/23/2005	0-0.5	**581**	**226**	**5,420**	**55,100**
SS-14 A	3/23/2005	0-0.5	120 U	**216**	**2,210**	16,400
SS-14 B	3/23/2005	0-0.5	120 U	**187**	**2,360**	16,500
SS-14 C	3/23/2005	0-0.5	130 U	**172**	**2,560**	17,700
SS-15 A	3/23/2005	0-0.5	130 U	**277**	**2,940**	**34,000**
SS-15 B	3/23/2005	0-0.5	**183**	**305**	**3,910**	**41,500**
SS-15 C	3/23/2005	0-0.5	130 U	**273**	**2,840**	**33,600**
SS-16 A	3/23/2005	0-0.5	**248**	**193**	**4,230**	**36,600**
SS-16 B	3/23/2005	0-0.5	**266**	**206**	**4,340**	**36,100**
SS-16 C	3/23/2005	0-0.5	**314**	**201**	**4,490**	**36,600**
SS-17 A	3/23/2005	0-0.5	120 U	**126**	**2,330**	**27,100**
SS-17 B	3/23/2005	0-0.5	**126**	**130**	**2,280**	**24,100**
SS-17 C 1	3/23/2005	0-0.5	120 U	**163**	**2,330**	**28,900**
SS-17 C 2	3/23/2005	0-0.5	--	**170**	--	--
SS-18 A	3/23/2005	0-0.5	52 U	**67**	**482**	2,410
SS-18 B	3/23/2005	0-0.5	58 U	58 U	**562**	2,350
SS-18 C	3/23/2005	0-0.5	56 U	64 U	**570**	2,200
SS-19 A	3/23/2005	0-0.5	63 U	**58.4**	**1,020**	4,280
SS-19 B	3/23/2005	0-0.5	70 U	52 U	**1,150**	4,120
SS-19 C	3/23/2005	0-0.5	66 U	**59.7**	**1,150**	4,350
SS-20 A	3/23/2005	0-0.5	**395**	**78.7**	**12,500**	20,300
SS-20 B	3/23/2005	0-0.5	**516**	**110**	**12,100**	19,600
SS-20 C	3/23/2005	0-0.5	**449**	**96**	**12,200**	21,100
SS-21 A	3/23/2005	0-0.5	59 U	44 U	**569**	1,820
SS-21 B	3/23/2005	0-0.5	63 U	40 U	**610**	2,310
SS-21 C	3/23/2005	0-0.5	55 U	49 U	**485**	1,530
SS-22 A	3/23/2005	0-0.5	150 U	**66.9**	**4,260**	17,300
SS-22 B	3/23/2005	0-0.5	140 U	**106**	**4,080**	15,000
SS-22 C	3/23/2005	0-0.5	140 U	53 U	**3,770**	14,300
SS-23 A	3/23/2005	0-0.5	87 U	**54.6**	**1,850**	12,600
SS-23 B	3/23/2005	0-0.5	96 U	**86.6**	**2,130**	13,200
SS-23 C	3/23/2005	0-0.5	88 U	**79.5**	**1,680**	12,400
SS-24 A	3/23/2005	0-0.5	**511**	**170**	**4,560**	**28,500**
SS-24 B	3/23/2005	0-0.5	**328**	**209**	**4,820**	**30,100**
SS-24 C	3/23/2005	0-0.5	**393**	**124**	**4,680**	**29,300**

Unbiased Surface Soil Samples

Table 3-1
Sample Results with XRF
Phase II Investigation
Former East La Harpe Smelter
La Harpe, Kansas

Sample ID	Date	Sample Depth (ft.bgs)	Analyte with KDHE RSK				
			Arsenic 5.84	Cadmium 39	Lead 400	Zinc 23,000	
SS-25 A	3/23/2005	0-0.5	**137**	**276**	**3,340**	12,600	Unbiased Surface Soil Samples (Continued)
SS-25 B	3/23/2005	0-0.5	**203**	**218**	**4,060**	15,200	
SS-25 C	3/23/2005	0-0.5	**152**	**237**	**4,400**	15,900	
SS-26 A	3/23/2005	0-0.5	110 U	**68**	**2,600**	8,010	
SS-26 B	3/23/2005	0-0.5	110 U	**77**	**2,700**	7,760	
SS-26 C	3/23/2005	0-0.5	**129**	**79.3**	**2,910**	8,920	
SS-27 A	3/23/2005	0-0.5	**280**	**155**	**9,620**	**40,900**	
SS-27 B	3/23/2005	0-0.5	310 U	**100**	**13,100**	**54,200**	
SS-27 C	3/23/2005	0-0.5	270 U	**156**	**10,600**	**42,600**	
SS-28 A	3/23/2005	0-0.5	82 U	49 U	**1,400**	4,080	
SS-28 B	3/23/2005	0-0.5	82 U	56 U	**1,390**	3,940	
SS-28 C	3/23/2005	0-0.5	--	**105**	**1,380**	4,140	
SS-29 A	3/23/2005	0-0.5	190 U	55 U	**5,220**	**26,900**	
SS-29 B	3/23/2005	0-0.5	210 U	66 U	**6,730**	**32,500**	
SS-29 C	3/23/2005	0-0.5	**244**	64 U	**6,590**	**36,300**	
SS-30 A	3/23/2005	0-0.5	130 U	**102**	**2,830**	18,000	
SS-30 B	3/23/2005	0-0.5	140 U	**81**	**3,170**	20,700	
SS-30 C	3/23/2005	0-0.5	120 U	**81.2**	**2,540**	17,200	
SS-31 A	3/23/2005	0-0.5	34 U	49 U	344	3,620	
SS-31 B	3/23/2005	0-0.5	35 U	**77.2**	342	3,710	
SS-31 C	3/23/2005	0-0.5	--	**57.7**	**439**	3,800	
SS-32 A	3/23/2005	0-0.5	90 U	**69.5**	**1,680**	12,600	
SS-32 B	3/23/2005	0-0.5	100 U	57 U	**1,980**	13,900	
SS-32 C	3/23/2005	0-0.5	64 U	**83.1**	**1,120**	7,220	
SS-33 A	3/23/2005	0-0.5	**159**	**223**	**2,150**	14,400	
SS-33 B	3/23/2005	0-0.5	**145**	**203**	**2,160**	18,400	
SS-33 C	3/23/2005	0-0.5	**108**	**137**	**1,880**	13,500	
SS-34 A	3/23/2005	0-0.5	**107**	**129**	**1,820**	12,700	
SS-34 B	3/23/2005	0-0.5	89 U	**167**	**1,960**	11,300	
SS-34 C	3/23/2005	0-0.5	70 U	**106**	**1,290**	9,180	
SS-35 A	3/23/2005	0-0.5	39 U	**196**	**466**	6,920	
SS-35 B	3/23/2005	0-0.5	39 U	**111**	**423**	4,900	
SS-35 C	3/23/2005	0-0.5	--	**218**	296	5,430	
SS-36 A	3/23/2005	0-0.5	75 U	**92.2**	**1,210**	15,800	
SS-36 B	3/23/2005	0-0.5	68 U	**83.8**	**1,060**	13,000	
SS-36 C	3/23/2005	0-0.5	56 U	**108**	**812**	14,500	
HS-1 SS-1	3/30/2005	0-1	**92.4**	**91.2**	**1,070**	8,990	Biased Subsurface Soil Samples (Prepared)
HS-1 SS-2	3/30/2005	1-2	40 U	49 U	169	1,210	
HS-1 SS-3	3/30/2005	2-3	42 U	**63.8**	184	1,350	
HS-2 SS-1 A	3/30/2005	0-1	**189**	72 U	**4,210**	20,100	
HS-2 SS-1 B	3/30/2005	1-2	180 U	--	**3,970**	19,300	
HS-2 SS-2	3/30/2005	2-3	49 U	51 U	300	903	
HS-2 SS-3	3/30/2005	3-4	35 U	55 U	109	310	
HS-3 SS-1	3/30/2005	0-1	**654**	75 U	**10,700**	**55,300**	
HS-3 SS-2	3/30/2005	1-2	**596**	**130**	**11,700**	**71,900**	
HS-3 SS-3	3/30/2005	2-3	**608**	**112**	**10,300**	**62,000**	
HS-4 SS-1	3/30/2005	0-1	60 U	64 U	**1,040**	4,090	
HS-4 SS-2	3/30/2005	1-2	28 U	50 U	79.4	804	
HS-4 SS-3	3/30/2005	2-3	34 U	53 U	132	501	
HS-5 SS-1	3/30/2005	0-1	270 U	**147**	**6,510**	**98,100**	
HS-5 SS-2	3/30/2005	1-2	58 U	54 U	**509**	3,290	
HS-5 SS-3	3/30/2005	2-3	48 U	55 U	331	3,720	
HS-6 SS-1	3/30/2005	0-1	89 U	**64.7**	**1,290**	1,990	
HS-6 SS-2	3/30/2005	1-2	95 U	**173**	**1,370**	10,600	
HS-7 SS-1	3/30/2005	0-1	540 U	**153**	**22,600**	**87,000**	
HS-7 SS-2	3/30/2005	1-2	150 U	**224**	**2,900**	22,200	
HS-7 SS-3	3/30/2005	2-3	61 U	55 U	**541**	1,980	
HS-8 SS-1	3/30/2005	0-1	**110**	**162**	**1,650**	10,500	
HS-8 SS-2	3/30/2005	1-2	34 U	47 U	105	724	
HS-8 SS-3	3/30/2005	2-3	37 U	49 U	178	688	

Table 3-1
Sample Results with XRF
Phase II Investigation
Former East La Harpe Smelter
La Harpe, Kansas

Sample ID	Date	Sample Depth (ft.bgs)	Analyte with KDHE RSK				
			Arsenic 5.84	Cadmium 39	Lead 400	Zinc 23,000	
PS-1 A	3/23/2005	0-0.5	120 U	62 U	**2,010**	7,060	Off-Site Surface Soil Samples
PS-1 B	3/23/2005	0-0.5	**157**	59 U	**2,270**	7,880	
PS-1 C	3/23/2005	0-0.5	110 U	60 U	**2,060**	7,420	
PS-2 A	3/23/2005	0-0.5	42 U	50 U	252	737	
PS-2 B	3/23/2005	0-0.5	40 U	36 U	212	678	
PS-2 C	3/23/2005	0-0.5	38 U	50 U	225	662	
PS-3 A	3/23/2005	0-0.5	39 U	47 U	58.6	416	
PS-3 B	3/23/2005	0-0.5	--	45 U	82.0	534	
PS-3 C	3/23/2005	0-0.5	37 U	49 U	83.3	336	
PS-4 A	3/23/2005	0-0.5	34 U	42 U	92.0	618	
PS-4 B	3/23/2005	0-0.5	--	41 U	110	352	
PS-4 C	3/23/2005	0-0.5	32 U	46 U	85.5	379	
PS-5 A	3/23/2005	0-0.5	20 U	44 U	40	185	
PS-5 B	3/23/2005	0-0.5	18 U	41 U	30.5	176	
PS-5 C	3/23/2005	0-0.5	22 U	44 U	50.3	195	
PS-6 A	3/23/2005	0-0.5	--	45 U	191	757	
PS-6 B	3/23/2005	0-0.5	32 U	48 U	179	736	
PS-6 C	3/23/2005	0-0.5	32 U	43 U	215	842	
PS-7 A	3/23/2005	0-0.5	--	34 U	141	450	
PS-7 B	3/23/2005	0-0.5	29 U	44 U	112	440	
PS-7 C	3/23/2005	0-0.5	29 U	38 U	140	332	
PS-8 A	3/23/2005	0-0.5	--	37 U	184	501	
PS-8 B	3/23/2005	0-0.5	--	43 U	211	598	
PS-8 C	3/23/2005	0-0.5	--	36 U	187	525	
SLAG-1	3/23/2005	NA	**1,150**	96 U	**12,000**	**30,800**	Slag Samples
SLAG-2	3/23/2005	NA	370 U	**345**	**5,090**	**57,400**	
SLAG-3	3/23/2005	NA	**862**	93 U	**4,390**	**28,100**	
SLAG-4	3/23/2005	NA	84 U	61 U	**833**	4,800	
SLAG-5	3/23/2005	NA	**319**	**172**	**2,050**	22,000	
SLAG-6	3/23/2005	NA	**291**	65 U	**589**	16,100	
SED-1A	3/31/2005	NA	**13**	**73**	186	2,087	Sediment Samples (Prepared)
SED-1B	3/31/2005	NA	**16**	59 U	190	2,109	
SED-2A	3/31/2005	NA	**24**	**102**	**498**	4,434	
SED-2B	3/31/2005	NA	**19**	**89**	**515**	4,481	
SED-3 A	3/31/2005	NA	**52**	63 U	**2,731**	9,805	
SED-3 B	3/31/2005	NA	**62**	62 U	**2,622**	9,032	
SED-4 A	3/31/2005	NA	**10**	56 U	84	469	
SED-4 B	3/31/2005	NA	**9**	56 U	85	459	
SED-5 A	3/31/2005	NA	**12**	57 U	91	285	
SED-5 B	3/31/2005	NA	**11**	57 U	83	280	
GP-1/SS-1	4/1/2005	0.1	**279**	118 U	**12,065**	**>10% ***	Direct-Push Samples
GP-1/SS-2	4/1/2005	1	**42**	67 U	324	2,660	
GP-1/SS-3	4/1/2005	2	**7**	68 U	21	1,258	
GP-1/SS-4	4/1/2005	4	**9**	67 U	13	1,810	
GP-1/SS-5	4/1/2005	5	8 U	69 U	29	3,836	
GP-1/SS-6	4/1/2005	7	7 U	75 U	11 U	3,327	
GP-2/SS-1	4/1/2005	0.5	**163**	**841**	**3,095**	**47,474**	
GP-2/SS-2	4/1/2005	1.5	**19**	**97**	64	3,242	
GP-2/SS-3	4/1/2005	4	8 U	77 U	23	228	
GP-2/SS-4	4/1/2005	5	**12**	67 U	19	66	
GP-2/SS-5	4/1/2005	8	**10**	69 U	10 U	52	
GP-3/SS-1	4/1/2005	0-0.5	**107**	**200**	**928**	19,794	
GP-3/SS-2	4/1/2005	2	**45**	**109**	**1,366**	7,885	
GP-3/SS-3	4/1/2005	3	**9**	66 U	9	76	
GP-3/SS-4	4/1/2005	4	**7**	67 U	16	65	
GP-3/SS-5	4/1/2005	5	**9**	67 U	14	53	
GP-3/SS-6	4/1/2005	7	6 U	65 U	18	52	
BGS-1/SS-1	10/30/2004	0-1	<22.92	**118**	37	83	Background Subsurface Soil Samples (Prepared)
BGS-1/SS-2	10/30/2004	1-2	<19.89	**122**	30	70	
BGS-1/SS-3	10/30/2004	2-3	<17.95	<53.45	40	78	
BGS-2/SS-1	10/30/2004	0-1	<23.61	**93**	<33.57	108	
BGS-2/SS-2	10/30/2004	1-2	<24.70	<62.12	52	50	
BSED-1	10/30/2004	NA	<27.39	<54.19	72	73	Background Sediment Samples (Prepared)
BSED-2	10/30/2004	NA	<21.51	<54.09	49	125	
SS1 A	10/30/2004	0-0.5	<18.75	**203**	<30.62	53	Background Surface Soil Samples
SS1 B	10/30/2004	0-0.5	<14.49	<48.24	26	63	
SS1 C	10/30/2004	0-0.5	<17.17	<50.54	32	70	
SS2 A	10/30/2004	0-0.5	<20.22	<59.46	<30.53	85	
SS2 B	10/30/2004	0-0.5	<15.48	**54**	<21.31	72	
SS2 C	10/30/2004	0-0.5	<20.46	<65.06	<29.08	88	

Bold values exceed KDHE Tier 2 RSK values
All results in milligrams per kilogram
NA - Not applicable
* Instrument over-range; material composed of >10% zinc
-- Reading not taken

Table 4-1
Soil Laboratory Analytical Results
Phase II Investigation
Former East La Harpe Smelter
La Harpe, Kansas

Sample ID	Date	Sample Depth (ft.bgs)	Sample Matrix	Analyte with KDHE RSK			
				Arsenic 5.84	Cadmium 39	Lead 400	Zinc 23,000
SS-1	3/24/2005	0-0.5	Surface Soil	**340**	**94**	**4,700**	**30,000**
SS-11	3/24/2005	0-0.5	Surface Soil	**97**	**110**	**8,800**	**48,000**
SS-15	3/24/2005	0-0.5	Surface Soil	**76**	**180**	**2,200**	18,000
GP-1/SS-1	4/1/2005	0.5-1	Soil (direct-push)	**85**	**57**	**9,400**	**61,000**
GP-2/SS-1	4/1/2005	2-2.5	Soil (direct-push)	1.9	**71**	95	2,400
GP-3/SS-1	4/1/2005	2.5-3.5	Soil (direct-push)	1.0 U	1.1	11	260
DUP-1/SS-1	4/1/2005	0-0.5	Surface Soil	1.0 U	0.87	7.1	71
HS-1/SS-1	3/23/2005	0-1	Subsurface Soil	**91**	**43**	**1,400**	12,000
HS-1/SS-2	3/23/2005	1-2	Subsurface Soil	**12**	2.3	76	560
HS-2/SS-1	3/23/2005	0-1	Subsurface Soil	**40**	20	**1,200**	6,900
HS-3/SS-1	3/23/2005	0-1	Subsurface Soil	**110**	**55**	**5,900**	18,000
HS-7/SS-1	3/24/2005	0-1	Subsurface Soil	**42**	**55**	**12,000**	19,000
Slag-1	3/23/2005	0-1	Smelter Waste	**460**	**130**	**29,000**	**44,000**
SED-1	3/22/2005	NA	Sediment Sample	**5.9**	**41**	100	1,000
SED-2	3/22/2005	NA	Sediment Sample	**13**	**60**	240	3,600
SED-3	3/24/2005	NA	Sediment Sample	**10**	24	**400**	11,000

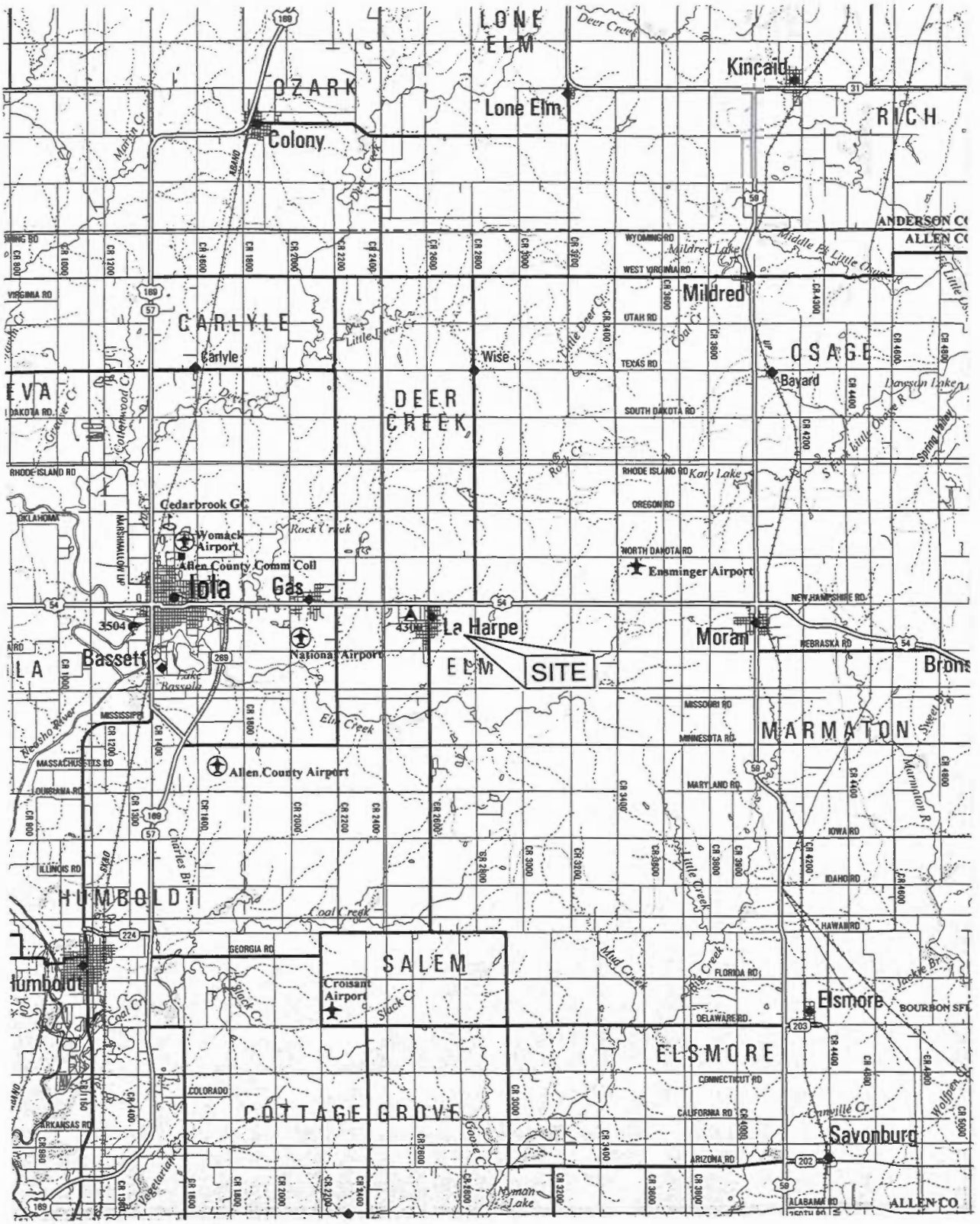
Bold results indicate exceedence of KDHE Tier 2 RSK values
Results in milligrams per kilogram
NA - Not applicable
Sample DUP-1/SS-1 is a duplicate of Sample GP-3/SS-1

Table 4-2
Water Laboratory Analytical Results
Phase II Investigation
Former East La Harpe Smelter
La Harpe, Kansas

Sample ID	Date	Sample Matrix	Analyte with KDHE RSK			
			Arsenic 0.01	Cadmium 0.005	Lead 0.015	Zinc 5
GP-1/GW-1	4/8/2005	Groundwater	0.020 U	**0.20**	**0.037**	**35**
GP-2/GW-1	4/8/2005	Groundwater	0.020 U	**0.048**	0.0085	1.3
GP-3/GW-1	4/8/2005	Groundwater	0.020 U	0.0050 U	0.013	1.7
DUP-2/GW-1	4/8/2005	Groundwater	0.020 U	**0.049**	0.0092	1.2
SW-1	3/22/2005	Surface Water	0.020 U	0.0050 U	0.0050 U	0.069
SW-2	3/22/2005	Surface Water	0.020 U	**0.041**	0.0050 U	1.8
SW-3	3/24/2005	Surface Water	0.020 U	**0.055**	0.0050 U	1.8
SW-4	3/24/2005	Surface Water	0.020 U	0.0050 U	0.0050 U	0.078
SW-5	3/24/2005	Surface Water	0.020 U	0.0050 U	0.0050 U	0.046
Rinsate Blank	4/1/2005	Rinsate Blank	0.020 U	0.0050 U	0.0050 U	0.030 U
BKG-1/SW-1	10/30/2004	Surface Water (Background)	0.010 U	0.0050 U	0.010	0.030 U
BKG-2/SW-2	10/30/2004	Surface Water (Background)	0.010 U	0.0050 U	0.0070	0.042

Bold results exceed KDHE Tier 2 RSK values
Results in milligrams per liter (mg/l)
0.010 U - Analyte not detected above reporting limit (0.010 U)
Sample DUP-2/GW-1 is a duplicate of Sample GP-2/GW-1

Figures



Taken from DeLorme, Kansas Atlas and Gazetteer, 1997.

NORTH

3.2 0 3.2 6.4

SCALE IN MILES

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SINCE 1898

Figure 1-1

REGIONAL MAP
EAST LA HARPE SMELTER
KDHESWP
LA HARPE, KANSAS

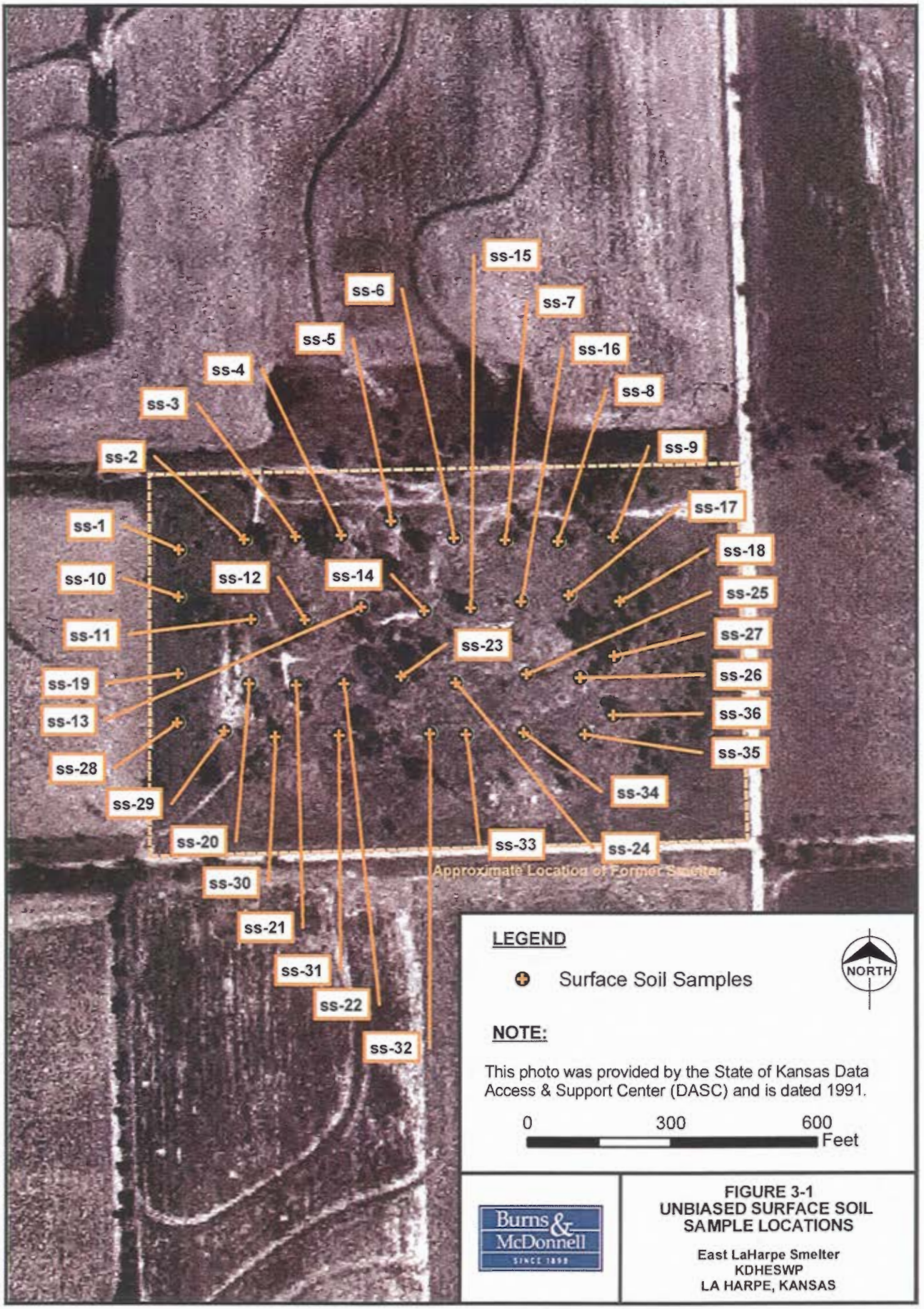
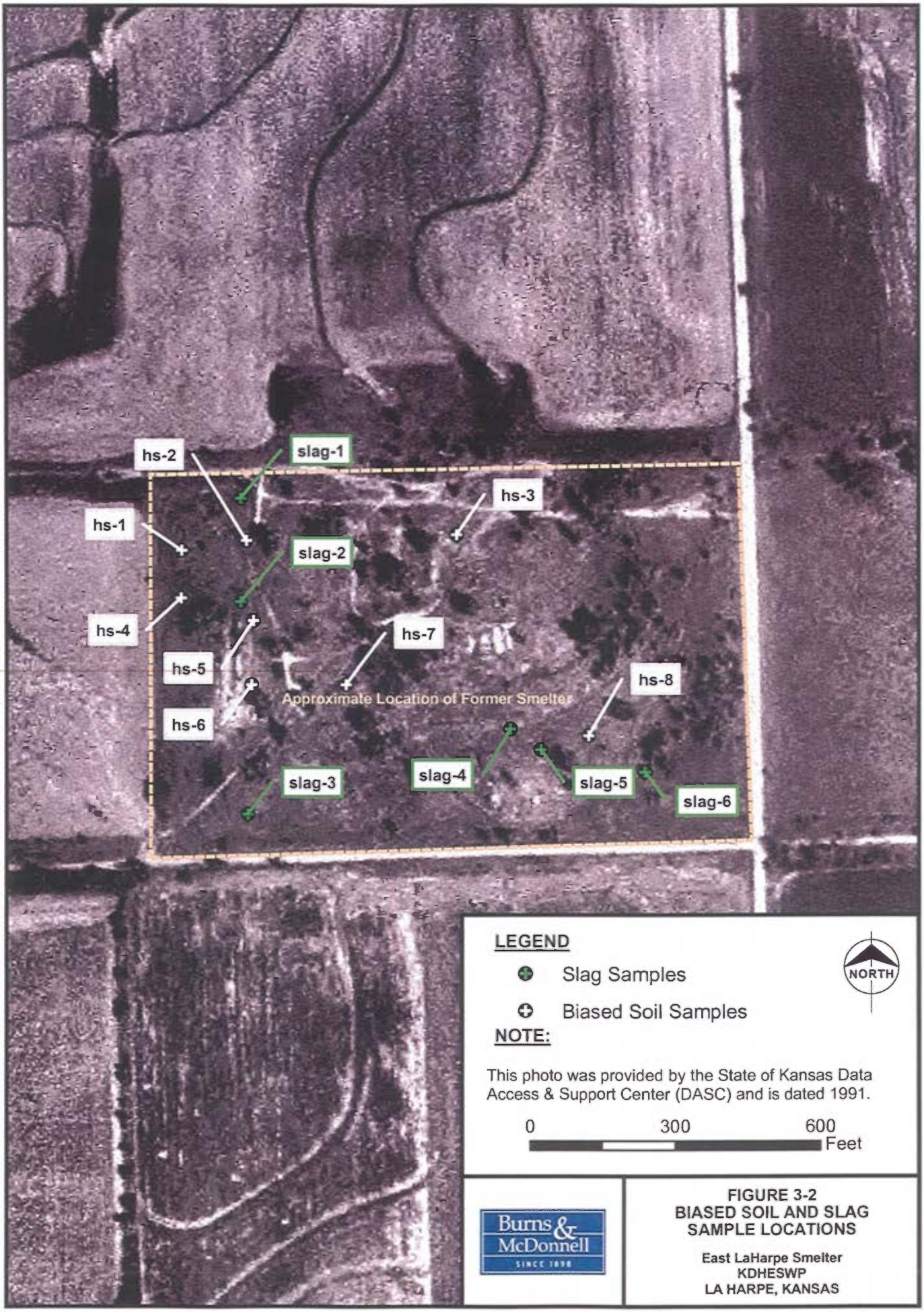


FIGURE 3-1
UNBIASED SURFACE SOIL SAMPLE LOCATIONS

East LaHarpe Smelter
KDHESWP
LA HARPE, KANSAS



Burns & McDonnell
SINCE 1898

FIGURE 3-2
BIASED SOIL AND SLAG SAMPLE LOCATIONS

East LaHarpe Smelter
KDHESWP
LA HARPE, KANSAS

\\gissrv\projects\smelter\ARCArcDocs\Site_Aerialeastlaharpe_figure3-2.mxd May 4, 2005 3:04:28 PM

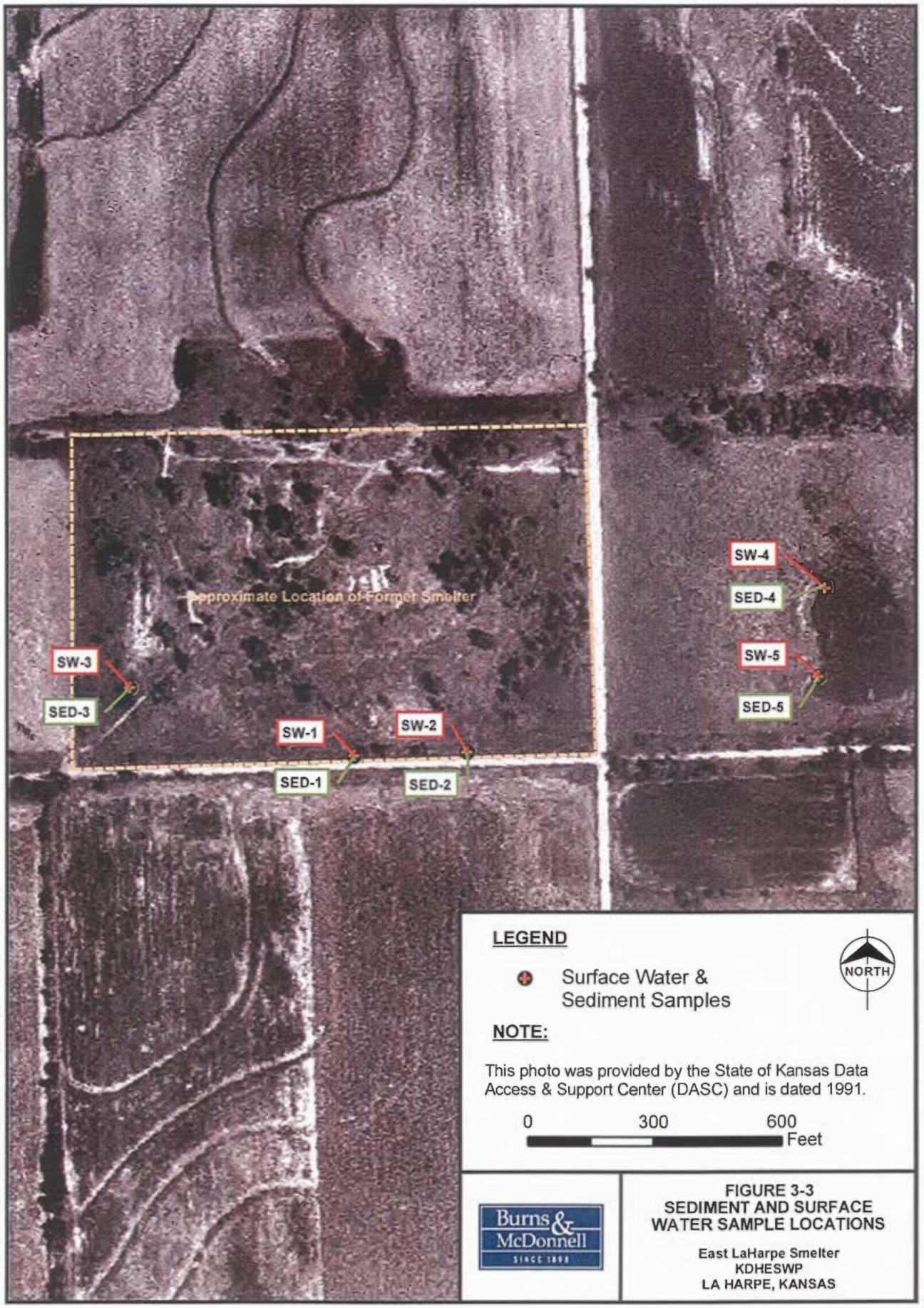


FIGURE 3-3
SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS

East LaHarpe Smelter
KDHESWP
LA HARPE, KANSAS

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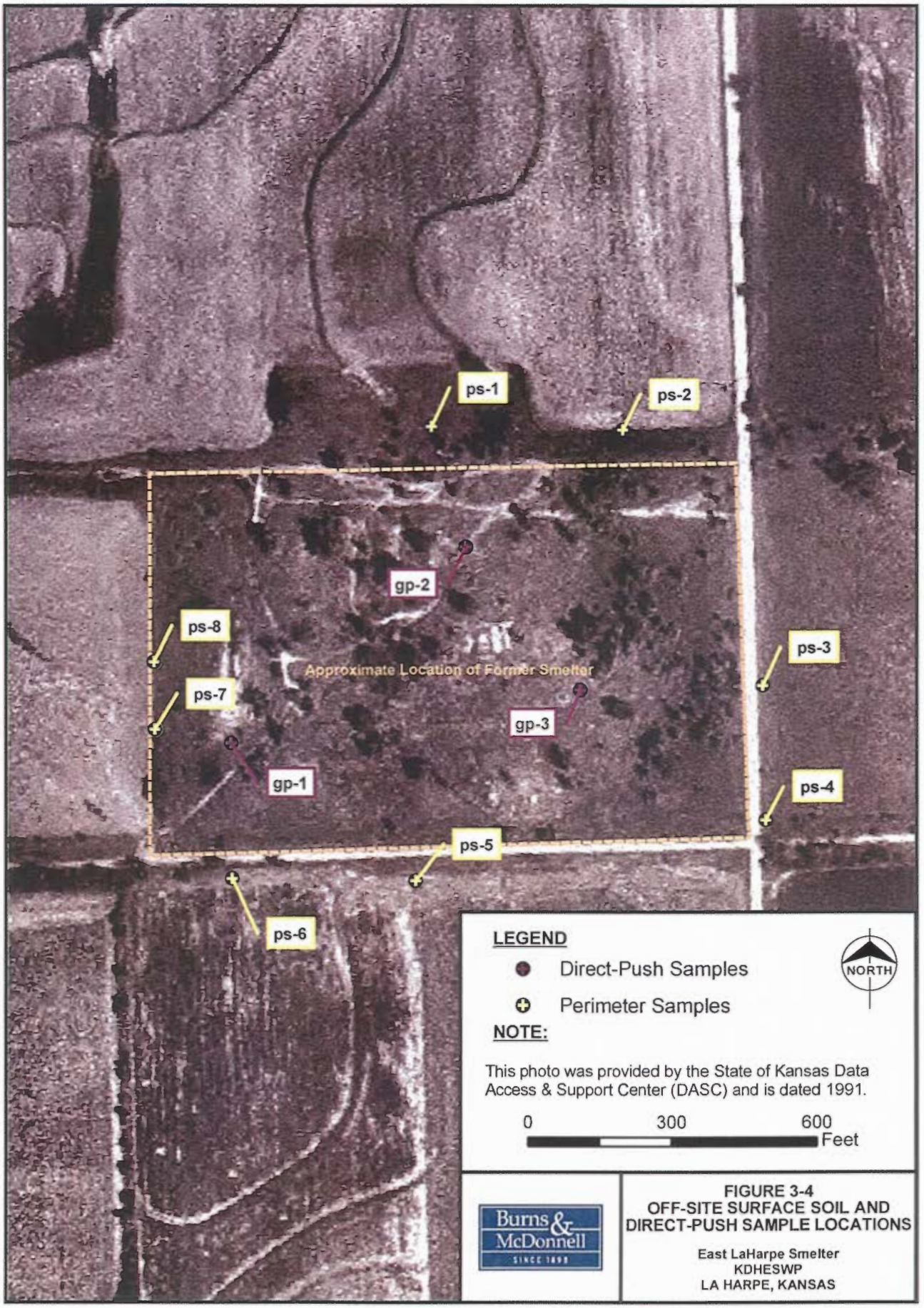

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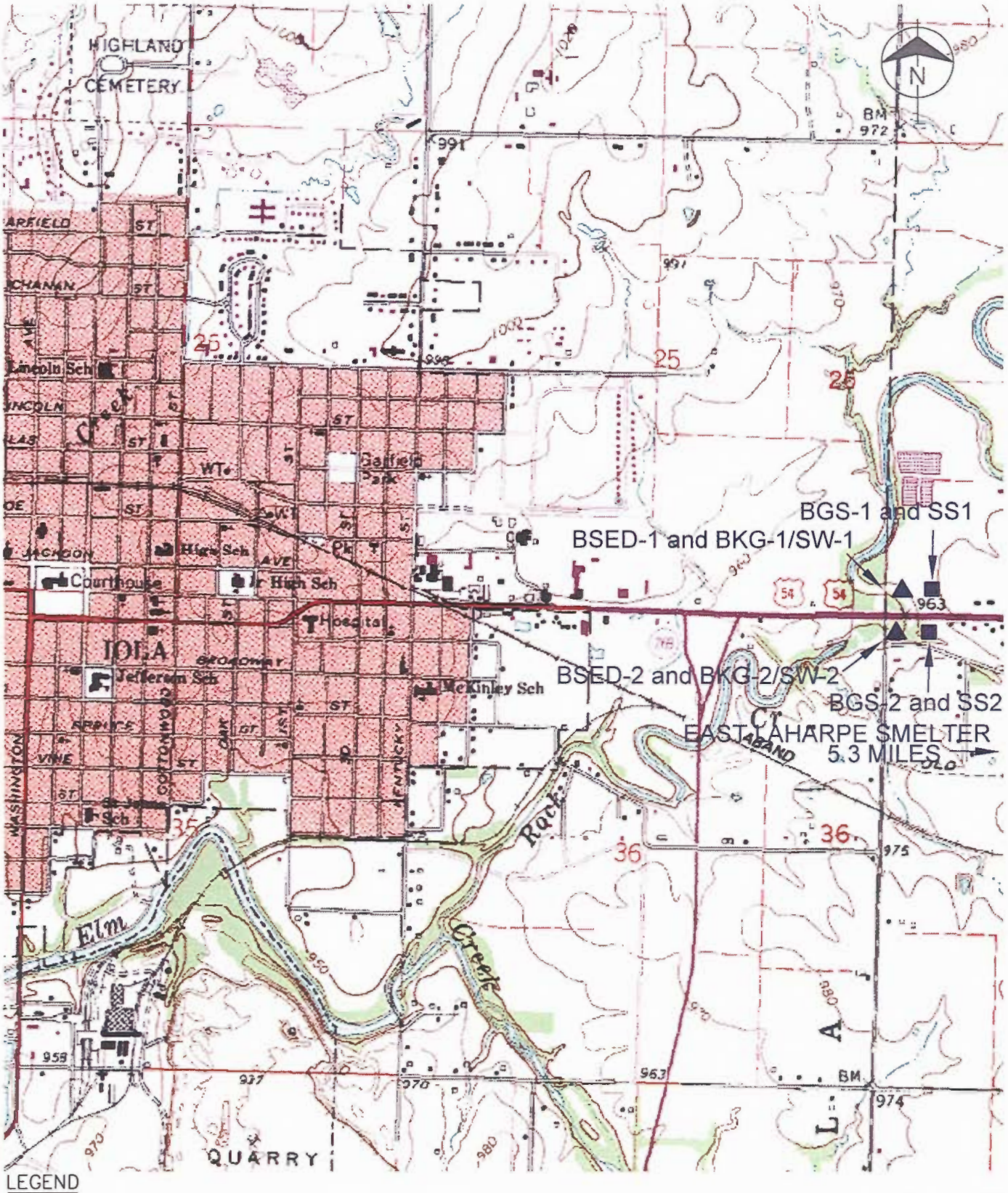
FIGURE 3-4
OFF-SITE SURFACE SOIL AND DIRECT-PUSH SAMPLE LOCATIONS

East LaHarpe Smelter
KDHESWP
LA HARPE, KANSAS

\\gissrv\projects\smelter\ARC\ArcDocs\Site_Aerial\eastlaharpe_figure3-4.mxd May 4, 2005 3:06:41 PM



LEGEND

▲ BACKGROUND SEDIMENT & SURFACE WATER SAMPLES

■ BACKGROUND SURFACE & SUBSURFACE SOIL SAMPLES

APPROXIMATE SCALE IN FEET: 1600 0 1600 3200

Burns & McDonnell SINCE 1898

Figure 3-5
BACKGROUND SAMPLE LOCATIONS
EAST LA HARPE SMELTER
KDHESWP
LA HARPE, KANSAS

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APPENDIX A

Field Logbook

3-22-05 La HARPE SMELTER Schutte

0715 ARRIVE on site @ Former La Harpe Smelter. WEATHER is RAINY, 42°F. Slight breeze from the SE. SITE has gotten muddy from RAIN LAST NIGHT + yesterday.

0723 Continue finishing SITE WALK.

WALKING in thicket AREA on eastern side of SITE. Ground is SOFT and it appeared on older Topo MAPS to have had a pond. No Pond observed, possibly filled in, 4 low spots in AREA where WATER IS STANDING. 1/2' of WATER in low spots. Surface WATER on eastern side Flows south as it appears to flow to MARSH AREA @ SE side of site.

* LOCATED 2 DRUMS on North Central Part of site. Both empty, one is being used as a TRASH Receptacle.
* LOCATED 1 Vehicle fuel tank (APPROX 20 gallon CAPACITY → it too was empty)

3-22-05 East Carthage Smelter Schutt

0750 Setting out GRID LOCATIONS onsite.

0830 Call Trevor + let him know that some of the GRID locations will be offset due to standing WATER ARSEAS which are now abundant on the site w/ the rains.

0845 Two guys onsite in a Jeep cherokee. I question them on what they are here for. They SAID Mr WOMACK gave them permission to come out. They appear to be no-drinking around the site.

0915 HAD to pull 2 guys out w/ their Jeep w/ my tow-STRAP. Asked them if they would leave the site, cause I would not pull them out again if they got stuck.

0930 Continue w/ grid location set-up.

1020 Call Pam w/ KDHE, she is getting ready to leave

3-22-05 East Carthage Smelter Schutt

1045 offsite for ice + batteries

1125 Back onsite, Talked w/ Trevor and he told me to go ahead + start bagging up some of the SAMPLES

1155 Putting bagged samples of surface soil on Dash w/ Defrost on.

1225 Talked w/ Pam from KDHE, she said they were approx 45 min to an hour AWAY.

1300 Have collected SUR SS-1 thru SUR SS-9. AWAITING KDHE as I dry samples in truck w/ Defrost + Heater. These ARE NON-Biased samples, and do not need to be prepped.

1310 KDHE onsite

PAM CHAFFEE, RANDY BROWN, John Mike Voppe

1330 Let them know where nearest hospital is as I give them short Tailgate.

MAIN TOPIC SLIDE + Falls.

MOB KOHE has both Innovex + Niton XRF equipments Calibrating both of them now.

1430 Randy instructs Pam on how to use Niton as Innovex Gun is not working

1500 I go out to collect more surface SAMPLES to be READ by Niton.

1545 WORK SAMPLES in TRUCK, DRAIN

1600 Go out to collect SURFACE WATER and Sediment SAMPLES ONS-7

1610 Collect SW-1 (Drainage Ditch - source)

1615 Collect SED-1 @ SW-1 Location

1625 Collect SW-2 (Downstream Drainage)

1630 Collect SED-2 @ SW-2 Location

1650 Randy + Pam offsite

1700 Finishing collecting SURFACE SAMPLES in 2nd Row. SUR SS-14 thru SUR SS-18

1715 Observed 2 of the Tanks on south side of site had a yellowish

sludge in them, one of the tanks may have been leaking into the Drainage Ditch. Randy asks me to make a note of this for possible clean up problems w/ former smelter wash. Pam + Randy offsite

1738 Keith and John w/ KOHE offsite

3-22-05

3-23-05 E. La Hoyle Schuttle

0728 onsite @ Former East La Hoyle SMELTER

WEATHER CONDITIONS: 40°F, mostly cloudy

chance of RAIN, slight wind from the North.

0735 Prepare to start bagging surface samples

for KDHE to run, we have had to dry

surface samples due to the RAIN creating

moisture in the soil that may block the

READING from the NITON as water is a beta

alpha and gamma shield.

0755 John w/ KDHE onsite to pick up SAMPLES

I have collected. He will be a courier to

PAM whom will run XRF-NITON @ Hotel.

0900 Finish w/ GRID SAMPLES FOR SURFACE

analysis.

0905 John and I observe one AST north

of SUR-SS-7 w/ Asphalt TAR when

it that has leaked onto the ground.

0930 John talking samples to PAM,

I tell him to come back and

3-23-05 E. La Hoyle Schuttle

I will get him SMELTER WASTE SAMPLES

for Pam to analyze.

950 Collect SLAG-1 (SMELTER waste SAMPLE)

LOCATED NW side of site

955 Collect Slag-2 (SMELTER waste) north

of main structure @ west side of site

958 Collect SLAG-3 (SMELTER waste)

south of structures

005 Collect SLAG-4 (SMELTER waste sample)

located @ central PART of SITE

1007 Collect SLAG-5 (SMELTER waste)

located @ site center.

1010 Collect SLAG-6 (smelter waste)

Located SE side of site, west of MARSH.

1030 John w/ KDHE onsite as he helps

me w/ Perimeter sampling (8 offsite

surface samples) SUR PS-1 thru SUR PS-8

1050 Notice 6 batteries (car batteries) on

NE area of site (photo)

3-23-05 E. La Harpe Schutte

while collecting offsite surface samples PS-3, PS-4 notice that RURAL WATER line markers running north + south on east side of 2800 Rd.

1120 John offsite while I continue collecting 4 remaining offsite surface sample locations for XRF analysis.

1150 Done w/ Perimeter surface samples for XRF RUN.

1157 Take 2 photos of Tank lying on side in Drainage Ditch @ SE side of site. WATER appears to have a slight sheen 10' downgradient of tank.

1205 OFFSITE to take last surface samples to PAM @ Tola., Take lunch offsite also.

1215 Get final readings for hand auger locations From PAM

1355 Back onsite, set up Decon bucket w/ DI + Liquinox SOAP.

1400 Prepare to take 0-3' SAMPLES

3-23-05 E. La Harpe Schutte

1405 Collect HS-1 / SS-1 (0-1' bgs) silty clay, trace clays. (@ SUR SS-1 LOCATION)

1410 Collect HS-1 / SS-2 (1-2' bgs) silty clay

1415 Collect HS-1 / SS-3 (2-3' bgs) clays - sandy

1422 Decon Push Probe in 5 gal Bucket w/ D.I + Liquinox SOAP.

1430 John w/ KDHE onsite

1440 Collect HS-2 / SS-1 (0-1') silty - sandy clay @ SUR SS-2 LOCATION

1445 Collect HS-2 / SS-2 (1-2') sandy clay

1450 Collect HS-2 / SS-3 (2-3') sandy clay

1500 Decon w/ DI + Liquinox SOAP

1510 Collect HS-3 / SS-1 (0-1') slag LOCATION is 10' North of SUR SS-6.

1515 Collect HS-3 / SS-2 (1-2') slag

1520 Collect HS-3 / SS-3 (2-3') slag

1530 Decon Probe w/ D.I WATER and Liquinox SOAP.

1540 Collect HS-4 / SS-1 (0-1') @ SUR SS-10 LOCATION

3-23-05 EAST La Harpe Schuth

1545 Collect HS-4/SS-2 (1-2') Clay

1550 Collect HS-4/SS-3 (2-3') sandy clay, w

1600 Decon HAND Probe w/ DI water

+ Liquinox SOAP

1610 John and I drive to property to the east @ 2861 54 Hwy to see if they know who owns the pond to the east of the site, Noone answers the door-bell, appears noone is home.

1640 Called Steve Hothem, let him know we will be done tomorrow.

1710 off site w/ John from KDHE

3-23-05

3-24-05 East La Harpe Schuth

0710 ARRIVE @ 2861 54 Hwy, Knock on Door.

0715 Resident says they own property w/ POND

* Barbara Diehl

I give her my info + card for Bridgett Wilson. She tells me that pond wasn't there when SMELTER was there. But she tells me I can get a couple samples. She would like a copy of the analytical on her pond's Data though.

0720 ARRIVE on site @ Former SMELTER.

WEATHER: 40° F, cloudy, calm.

0725 Prepare to Finish w/ subsurface Samples.

0730 Collect HS-5/SS-1 (0-1') @ SUR-SS-11 LOCATION (SILTS)

0735 Collect HS-5/SS-2 (1-2') SILTY CLAY

0740 Collect HS-5/SS-3 (2-3') clay, some silt, wet

Rain is picking up as I decon Probe w/ DI + Liquinox

3-24-05 East La Harpe Schuttle

0750 collect HS-6/SS-1 (0-1') @ SUR SS-20 location (sandy clay)

0755 collect HS-6/SS-2 (1-1.5' Refusal) Possible sandstone? (sandy clay, gravel)

Decon Probe w/ Decon water (D.I) + Liquinox.

0805 collect HS-7/SS-1 (0-1') @ SUR SS-22 location (silty clay)

0810 collect HS-7/SS-2 (1-2') silty clay

0815 collect HS-7/SS-3 (2-3') silty clay, w/

Decon Probe w/ DI and Liquinox

0820 call Trevor + update him on work

0825 collect HS-8/SS-1 (0-1') @ SUR SS-35 location, clay, some silt

0830 Collect HS-8/SS-2 (1-2') silty clay, wet

0835 collect HS-8/SS-3 (2-3') silty clay, wet

0845 collect SURFACE WATER (SW-3) @ small Pond southwest of old runway structure of smelter

0850 collect SED-3 @ same location.

3-24-05 East La Harpe Smelter Schuttle

855 Take SPLIT of SUR SS-1 sample

900 Take SPLIT of SUR SS-11 sample

905 Take split of SUR SS-15 sample

910 Dumping bags of surface soil sample onsite

Notice a large # of shotgun shells onsite from skeet shooting as I have seen 2 broken clay pigeons. Noting this because of possible lead from shells

920 Collect SURface water (SW-4) on north side of pond east of site

925 collect SED-4 @ same location

930 Collect SW-5 @ south side of pond east of site

935 collect SED-5 @ same location

945 OFFSite

3-24-05

4-1-05 E. La Harpe

1306 arrive onsite @ E. La Harpe Smelter, weather is 65°F, wind out of west @ 10 mph, clear skies

1315 Drillers said they saw two rattlesnakes, I did not see them, set out Geoprobe locations

1335 Begin Probe GP-1

1350 End @ Refusal 7.5' bgs (location)

1400 Sample GP-1/SS-1 0.5-1.0' bgs

1420 Start Probe GP-2 location

1445 Sample GP-2/SS-1 (2-2.5' bgs)

Begin Probe GP-3

1500 End @ 6.0' bgs Refusal

1510 Sample GP-3/SS-1 + DUP-1/SS-1 (2.5 to 3.5')

1515 GPS locations

1520 Grab Rinsate SAMPLE (Lot # 046143) HPLC

1530 Pull GPS GRID

1630 off site

4-8-05 E. La Hope Schuth

1445 Arrive onsite @ E. La Hope Seal 75a

Weather: 68°F, slight wind from west, partly cloudy.

1500 GP-1 WL = 3.56' From TOC; 3.30' BGS

Purge 1/2 gal from Piezometer.

1515 Sample GP-1/GW-1

1525 Arrive @ GP-2 WL = 2.42 From TOC 2.19' bgs

1530 Purge 1/2 gal

1535 Sample GP-2/GW-1 + DUP-2/GW-1

1540 @ GP-3 WL = 1.27' TOC 1.05' BGS

1543 Purge 1/2 gal

1550 Sample GP-3/GW-1

1555 ALL Holes ABANDONED by pulling up Piezometers + Bentonite Hole to surface.

1605 OFF site

4-8-05

APPENDIX B

Color Photographic Log

PHOTO LOG

Photograph	Description
	Looking west at an on-Site drainage ditch on the south side of the site. Old tires, two USTs, an oil reclaiming tank, and various other debris were located in the ditch.
	Looking northeast at I-beams and air stacks, presumably from the smelter, piled on-Site.

PHOTO LOG

Photograph	Description
	Looking southwest at a large smelter waste pile located in the south-central area of the Site.
	Looking northwest at EPS personnel probing Boring GP-1. Boring GP-1 was conducted south of a former smelter structure remaining on-Site.

PHOTO LOG

Photograph	Description
	Looking northwest at a various assortment of tanks stored on the northeast side of the Site.
	Looking northeast at a large smelter waste pile on-Site.

PHOTO LOG

Photograph	Description
	Looking west at an on-Site AST leaking orange sludge into a drainage ditch on the SE corner of the Site.
	Looking down at an asphalt/tar tank that is leaking. The tank is located on the northeastern portion of the Site.

PHOTO LOG

Photograph	Description
	Looking down at KDHE personnel using a portable XRF to scan a soil core for arsenic, cadmium, lead, and zinc. The soil core was recovered from an on-Site boring using direct-push sampling techniques.
	Looking west at structures of the former smelter remaining on-Site.

APPENDIX C

XRF Results – Field Log Sheets

Red Cd
Yellow Am

Site: E. Latharpe Smelter

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc	Other
Cd	30	3/22/05	2:18	SUR SS-1A	255.		3610.	42.1K	Hg 85.8
	33		2:21	SUR SS-1B	372.		3770.	36.3K	Hg 109.
	30		2:25	SUR SS-1C	<110.		2150.	17.4K	
Am	62		2:29	SUR SS-1A		94.2			
	31		2:31	SUR SS-1B		75.0			
	32		2:33	SUR SS-1C		76.2			
	32		2:34	SUR SS-2A		194.0			
	31		2:35	SUR SS-2B		210.0			
	31		2:37	SUR SS-2C		178.			
Cd	30		2:39	SUR SS-2A	241.		7310.	30.6K	
	35		2:43	SUR SS-2B	303.		6520.	27.5K	
	30		2:45	SUR SS-2C	256.		6440.	23.5K	
	31		2:49	SUR SS-3A	471.		7200.	42.0K	
	30		2:51	SUR SS-3B	526		7860.	49.1K	Hg 144.
	30		2:54	SUR SS-3C	392.		9060.	44.K	
Am	30		2:56	SUR SS-3A		<67.			
	31		2:58	SUR SS-3B		113.			
	31		2:59	SUR SS-3C		85.4			
	31		3:03	SUR SS-4A		<56.			
	32		3:04	SUR SS-4B		<65.			
	31		3:05	SUR SS-4C		<49			
Cd	30		3:08	SUR SS-4A	<68		1070	4800	
	31		3:11	SUR SS-4B	<95		1770	6960	
	31		3:14	SUR SS-4C	<64		930.	3540	
	30		3:18	SUR SS-5A	<72		1140	11.2K	
	30		3:21	SUR SS-5B	<76		1300	11.5K	
	31		3:24	SUR SS-5C	149		1820	22.3K	
Am	32		3:25	SUR SS-5A		438.			
	32		3:27	SUR SS-5B		422.			
	31		3:28	SUR SS-5C		460.			
	31		3:29	SUR SS-6A		306			
	31		3:31	SUR SS-6B		468			
	44		3:32	SUR SS-6C		178			

Site: E. LaHarpe Smelter

Red Cd
Yellow Am

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc	Other
Cd	30	3/22/05	3:35p	SUR SS-6A	<63.		1110	7930.	
	30		3:38	SUR SS-6B	<110		2250	18.8K	Hg 49.
	30		3:41	SUR SS-6C	<110		2690	15.9K	Hg 55.1
	31		3:45	SUR SS-7A	<130		2630	18.3K	Hg 69.6
	30		3:47	SUR SS-7C	<110		2300	16.3K	Hg 55.5
	31		3:50	SUR SS-7B	<100		1850	18.4K	
Am	32		3:52	SUR SS-7A		239.			
	32		3:53	SUR SS-7C		173.			
	32		3:54	SUR SS-7B		170.			
	31		3:56	SUR SS-8A		142.			
	32		3:57	SUR SS-8B		136.			
	32		3:58	SUR SS-8C		132.			
Cd	30		4:00	SUR SS-8A	<99		2080	10.8K	
	31		4:04	SUR-SS-8B	<78.		1370	7166	
	30		4:06	SUR SS-8C	<71		1270	5870	
	33		4:10	SUR SS-9A	<48.		436.	1700	
	31		4:12	SUR SS-9B	<44		389	1230	
	31		4:15	SUR SS-9C	<41		405	1190	
Am	31		4:17	SUR SS-9A		<48			
	32		4:19	SUR SS-9B		65.2			
	32		4:20	SUR SS-9C		<44.			
Cd	30	3/23/05	7:54A	SUR SS-10A	394.		5830	15.3K	
	30		7:57	SUR SS-10B	462		6600	18.7K	
	30		7:59	SUR SS-10C	314		5740	15.7K	
	31		8:03	SUR SS-11A	313.		8270	93.4K	
	31		8:06	SUR SS-11B	272.		7810.	89.0K	
	31		8:09	SUR SS-11C	271.		7860	87.4K	
Am	31		8:10	SUR SS-11A		94.4			
	32		8:22	SUR SS-11B		94.9			
	32		8:23	SUR SS-11C		158.			
	32		8:24	SUR SS-10A		<49			
	32		8:26	SUR SS-10B		<58			
	33			SUR SS-10C		<56.			

Red Cd
Yellow Am

Site: E. LaHarpe Smelter

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc	Other
Am	31	3/23/05	8:29A	SVR SS-12A		177.			
	32		8:30	SVR SS-12B		209			
	32		8:31	SVR SS-12C		185.			
Cd	30		8:33	SVR SS-12A	<210		6050	36.9K	Hg 84.9//Cu 1160.
	30		8:37	SVR SS-12B	<190		5700	37.1K	Cu 1180
	30		8:39	SVR SS-12C	<180		4970	32.3K	Cu 1070
	30		8:42	SVR SS-13A	615		5850	57.1K	Hg 116//Cu 249
	31		8:45	SVR SS-13B	533.		5910	55.7K	Cu 2080
	30		8:47	SVR SS-13C	581.		5420.	55.1K	Hg 95.3// Cu 222
Am	31		8:50	SVR SS-13A		137			
	32		8:51	SVR SS-13B		184.			
	31		8:52	SVR SS-13C		226			
	31		8:54	SVR SS-14A		216			
	31		8:55	SVR SS-14B		187			
	31		8:56	SVR SS-14C		172.			
Cd	31		8:58	SVR SS-14A	<120		2210	16.4K	
	31		9:00	SVR-SS-14B	<120		2360	16.5K	
	30		9:03	SVR SS-14C	<130		2560	17.7K	
	30		9:06	SVR-SS-15A	<130		2940	34.0K	Cu 1100
	30		9:09	SVR-SS-15B	183		3910	41.5K	Hg 95.5/Cu 1140
	30		9:12	SVR SS-15C	<130		2840	33.6K	Cu 925.
Am	32		9:13	SVR SS-15A		277			
	31		9:14	SVR-SS-15B		305.			
	32		9:15	SVR SS-15C		273.			
	31		9:18	SVR SS-16A		193			
	32		9:19	SVR SS-16B		206			
	32		9:20	SVR SS-16C		201.			
Cd	30		9:22	SVR SS-16A	248		4230	36.6K	Cu 1450.
	30		9:25	SVR SS-16B	266		4340	36.1K	Cu 1650
	30		9:27	SVR SS-16C	314		4490	36.6K	Cu 1730
	30		9:31	SVR SS-17A	<120		2330	27.1K	
	30		9:33	SVR SS-17B	126		2280	24.1K	
	30		9:36	SVR SS-17C	<120		2330	28.9K	

Site: E. Lafarpe Smelter

Red Cd
Yellow Am

	SS	Date	Time	Sample Location	Arsenic	Cadmium (ppm)	Lead	Zinc	other
Am	31	3/23/05	9:39	SUR SS-17A		126.			
	31		9:40	SUR SS-17B		130			
	30		9:41	SUR SS-17C		163			
	32		9:42	SUR SS-17C		170			
	31		9:45	SUR SS-18A		67			
	31		9:46	SUR SS-18B		<58			
	31		9:47	SUR SS-18C		<64			
Cd	31		9:49	SUR SS-18A	<52		482	2410	
	31		9:52	SUR SS-18B	<58		562.	2350	
	31		9:55	SUR SS-18C	<56		570	2200	
	30		10:25	SUR SS-20A	395		12.5K	20.3K	
	30		10:28	SUR SS-20B	516		12.1K	19.6K	
	30		10:30	SUR SS-20C	449		12.2K	21.1K	Hg 100.
Am	31		10:32	SUR SS-20A		78.7			
	31		10:33	SUR SS-20B		110.			Sb
	32		10:34	SUR SS-20C		96			101
	31		10:37	SUR SS-21A		<44			
	31		10:38	SUR SS-21B		<40			
	31		10:39	SUR SS-21C		<49			
Cd	31		10:44	SUR SS-21A	<59.		569	1820	
	31		10:46	SUR SS-21B	<63.		610.	2310	
	31		10:49	SUR SS-21C	<55.		485	1530	
	30		11:12	SUR SS-19A	<63		1020	4280	
	31		11:15	SUR SS-19B	<70		1150	4120	
	30		11:17	SUR SS-19C	<66.		1150	4350	
Am	32		11:19	SUR SS-19A		58.4			
	31		11:20	SUR SS-19B		<52			
	31		11:21	SUR SS-19C		59.7			
	31		11:22	SUR SS-22A		66.9			
	31		11:23	SUR SS-22B		106			
	31		11:24	SUR SS-22C		<53.			
Cd	30		11:27	SUR SS-22A	<150		4260	17.3K	
	30		11:29	SUR SS-22B	<140		4080	15.0K	
	30		11:33	SUR SS-22C	<140		3770	14.3K	Hg 56.3

Site: E. LaHarpe Smelter

Rd Cd
Yellow Am

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc	
Cd	30	3/23/05	11:37	SUR SS-23A			~~2130~~		
	30		11:40	SUR SS-23B	<96		2130	13.2K	
	30		11:43	SUR SS-23A	<87		1850	12.6K	Hg 57.5
	30		11:45	SUR SS-23C	<88.		1680	12.4K	
Am	32		11:47	SUR SS-23A		54.6			
	31		11:48	SUR SS-23B		86.6			
	31		11:50	SUR SS-23C		79.5			
	32		11:53	SUR SS-24A		170			
	31		11:54	SUR SS-24B		209.			
	31		11:55	SUR SS-24C		124			
Cd	30		12:05	SUR SS-24A	511.		4560	28.5K	Cu 1380
	30		12:07	SUR SS-24B	328		4820	30.1K	
	30		12:10	SUR SS-24C	393.		4680	29.3K	Cu 1660
	30		12:13	SUR SS-25A	137		3340	12.6K	
	30		12:17	SUR SS-25B	203		4060	15.2K	
	30		12:19	SUR SS-25C	152		4400	15.9K	
Am	32		12:20	SUR SS-25A		276			
	31		12:22	SUR SS-25B		218			
	32		12:23	SUR SS-25C		237			
	31		12:26	SUR SS-26A		68.			
	31		12:27	SUR SS-26B		77.			
	31		12:28	SUR SS-26C		79.3			
Cd	30		12:30	SUR SS-26A	<110		2600	8010	
	30		12:33	SUR SS-26B	<110		2700	7760	
	30		12:35	SUR SS-26C	129		2910	8920	
	32		12:41	SUR SS-27A	280		9620	40.9K	
	31		12:44	SUR SS-27B	<310		13.1K	54.2K	
	31		12:47	SUR SS-27C	<270		10.6K	42.6K	
Am	31		12:49	SUR SS-27A		155.			
	31		12:50	SUR SS-27B		100.			
	31		12:51	SUR SS-27C		156.			
	31		12:53	SUR SS-29A		<55.			
	31		12:55	SUR SS-29B		<66			
	30		12:56	SUR SS-29C		<64			

Site: E. La Harpe Smelter

Red Cd
Yellow Am

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc
Cd	30	3/23/05	1:00p	SVR SS-29A	<190		5220	26.9K
	30		1:03	SVR SS-29B	<210		6730.	32.5K
				~~SVR SS-29C~~				
	30	3/23/05	2:32	SVR SS-29C	244		6590	36.3K
	31		2:36	SVR SS-28A	<82		1400	4080
	31		2:38	SVR SS-28B	<82		1390	3940
	30		2:44	SVR SS-28C	—		1380	4140
Am	31		2:47	SVR SS-28A		<49.		
	31		2:48	SVR SS-28B		<56		
	31		2:49	SVR SS-28C		105		
	31		2:50	SVR SS-30A		102		
	31		2:51	SVR SS-30B		81.		
	31		2:52	SVR SS-30C		81.2		
Cd	30		2:54	SVR SS-30A	<130		2830	18.K
	30		2:57	SVR SS-30B	<140		3170	20.7K
	30		3:03	SVR SS-30C	<120		2540	17.2K
	30		3:07	SVR SS-31A	<34		344	3620
	30		3:10	SVR SS-31B	<35		342	3710
	30		3:12	SVR SS-31C	—		439	3800
Am	31		3:14	SVR SS-31A		<49		
	31		3:15	SVR SS-31B		77.2		
	31		3:16	SVR SS-31C		57.7		
	31		3:18	SVR SS-32A		69.5		
	31		3:19	SVR SS-32B		<57.		
	31		3:20	SVR SS-32C		83.1		
Cd	30		3:23	SVR SS-32A	<90		1680	12.6K
	30		3:25	SVR SS-32B	<100		1980	13.9K
	30		3:28	SVR SS-32C	<64		1120	7220
	30		3:31	SVR SS-33A	159		2150	14.4K
	30		3:33	SVR SS-33B	145		2160	18.4K
	31		3:37	SVR SS-33C	108		1880	13.5K
Am	31		3:38	SVR SS-33A	~~223~~ 223			
	31		3:39	SVR SS-33B	~~203~~ 203			
	31		3:40	SVR SS-33C		137		

Red Cd
Yellow Am

Site: E. La Harpe Smelter

	SS	Date	Time	Sample Location	Arsenic (ppm)	Cadmium	Lead	Zinc	
Am	31	3/23/05	3:44p	SUR SS-34 A		129.			
	31		3:45	SUR SS-34 B		167.			
	32		3:46	SUR SS-34 C		106			
Cd	30		3:48	SUR SS-34 A	107		1820	12.7K	
	30		3:50	SUR SS-34B	<89		1960	11.3K	
	30		3:53	SUR SS-34C	<70		1290	9180	
	30		3:57	SUR SS-35A	<39		466	6920	
	30		4:00	SUR SS-35B	<39		423	4900	
	30		4:02	SUR SS-35C	—		296	5430	
Am	31		4:03	SUR SS-35A		196			
	30		4:04	SUR SS-35B		111			
	31		4:06	SUR SS-35C		218			
	31		4:07	SUR SS-36A		92.2			
	31		4:08	SUR SS-36B		83.8			
	31		4:09	SUR SS-36C		108.			
Cd	30		4:11	SUR SS-36A	<75		1210	15.8K	
	30		4:13	SUR SS-36B	<68		1060	13.0K	
	30		4:16	SUR SS-36C	<56		812.	14.5K	
Cd	30		4:19	SLAG-5	319		2050	22.0K	
	30		4:21	SLAG-1	1150		12.0K	30.8K	
	30		4:24	SLAG-2	<370		5090	57.4K	Cu 2020
	30		4:27	SLAG-3	862		4390	28.1K	Cu 1540
	30		4:30	SLAG-4	<84		833	4800	
	30		4:32	SLAG-4	<180 ~~<130~~		1630	10.8K	
	30		4:35	SLAG-6	291		589	16.1K	
AM			4:45	SLAG-6	~~<65~~	<65			
	31		4:47	SLAG-5		172			
	31		4:48	SLAG-4		<61			
	31		4:50	SLAG-3		<93			
	31		4:51	SLAG-2		345			
	30		4:52	SLAG-1		<96			
	31		4:54	SUR PS-1A		<62			
	31		4:55	SUR PS-1B		<59			
	31		4:56	SUR PS-1C		<60			

Site: E. LaHarpe Smelter

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc
Cd	30	3/23/05	4:59p	SUR PS-1A	<120		2010	7060
	31		5:01	SUR PS-1B	157		2270	7880
	31		5:03	SUR PS-1C	<110		2060	7420
	31		5:06	SUR PS-2A	<42		252	737
	30		5:08	SUR PS-2B	<40		212	678
	31		5:11	SUR PS-2C	<38		225	662
Am	31		5:12	SUR PS-2A		<50		
	31		5:13	SUR PS-2B		<36		
	31		5:14	SUR PS-2C		<50		
	31		5:15	SUR-PS-3A		<47		
	31		5:16	SUR-PS-3B		<45		
	31		5:17	SUR-PS-3C		<49		
Cd	30		5:19	SUR-PS-3A	<39		58.6	416
	30		5:22	SUR PS-3B	—		82.0	534
	30		5:24	SUR PS-3C	<37		83.3	336
	30		5:27	SUR PS-4A	<34		92.0	618.
	30		5:29	SUR PS-4B	—		110.	352.
	30		5:31	SUR PS-4C	<32		85.5	379.
Am	31		5:33	SUR PS-4A		<42		
	31		5:34	SUR PS-4B		<41		
	30		5:35	SUR PS-4C		<46		
	32		5:37	SUR PS-5A		<44		
	31		5:38	SUR PS-5B		<41		
	31		5:39	SUR PS-5C		<44		
Cd	31		5:42	SUR PS-5A	<20		40.	185.
	31		5:44	SUR PS-5B	<18		30.5	176
	31		5:47	SUR PS-5C	<22		50.3	195
	31		5:50	SUR PS-6A	—		191.	757
	31		5:52	SUR PS-6B	<32		179	736
	31		5:55	SUR PS-6C	<32		215.	842
Am	31		5:56	SUR PS-6A		<45		
	31		5:57	SUR PS-6B		<48		
	31		5:58	SUR PS-6C		<43		

Site: E. LaHarpe Smelter

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc
Am	36	3/23/05	6:01	SUR PS-7A		<34		
	31		6:02	SUR PS-7B		<44		
	31		6:03	SUR PS-7C		<38.		
Cd	31		6:05	SUR PS-7A	—		141	450.
	31		6:08	SUR PS-7B	<29		112	440
	30		6:13	SUR PS-7C	<29		140	332
	31		6:16	SUR PS-8A	—		184.	501
	31		6:18	SUR PS-8B	—		211	598
	31		6:21	SUR PS-8C	—		187	525
Am	31		6:22	SUR PS-8A		<37		
	31		6:23	SUR PS-8B		<43		
	31		6:24	SUR PS-8C		<36		

Site: E. LaHarpe Smelter

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc	
Cd	31	3/30/05	12:06A	HS-1 SS-1	92.4		1070	8990	
	31		12:08	HS-1 SS-2	<40		169	1210	
	30		12:11	HS-1 SS-3	<42		184	1350	
	44		12:15	HS-2 SS-1	189		4210	20.1K	
	31		12:17	HS-2 SS-1	<180		3970	19.3K	
	31		12:20	HS-2 SS-2	<49		300.	903	
	30		12:23	HS-2 SS-3	<35		109.	310	
	30		12:25	HS-3 SS-1	654		10.7K	55.3K	Hg 341
	31		12:29	HS-3 SS-2	596		11.7K	71.9K	Cu 2150
	30		12:32	HS-3 SS-3	608		10.3K	62 K	Hg 365/Cu 2090
Am	32		12:44	HS-1 SS-1		91.2			
	31		12:46	HS-1 SS-2		<49			
	31		12:47	HS-1 SS-3		63.8			
	30		12:48	HS-2 SS-1		<72			
	32		12:49	HS-2 SS-2		<51			
	31		12:51	HS-2 SS-3		<55			
	31		12:52	HS-3 SS-1		<75			
	32		12:53	HS-3 SS-2		130			
	31		12:55	HS-3 SS-3		112			
Cd	57		~~7:45A~~	~~HS-4 SS-1~~	<60		1040	4090	
	31		7:49A	HS-4 SS-2	<28		79.4	804	
	31		7:52	HS-4 SS-3	<34		132	501	
0-1'	31		7:55	HS-5 SS-1	<270		6510	98.1K	
1-2'	31		7:58	HS-5 SS-2	<58		509	3290	
2-3'	31		8:01	HS-5 SS-3	<48		331	3720	
	31		8:04	HS-6 SS-1	<89		1290	1990	
	31		8:07	HS-6 SS-2	<95		1370	10.6K	
Am	31		8:08	HS-4 SS-1		<64			
	31		8:09	HS-4 SS-2		<50			
	31		8:10	HS-4 SS-3		<53			
	31		8:12	HS-5 SS-1		147.			
	32		8:13	HS-5 SS-2		<54			
	31		8:14	HS-5 SS-3		<55			

Site: E. LaHarpe Smelter

	SS	Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc	
Am	32	3/30/05	8:15 A	HS-6 SS-1		64.7			
1'-1½' B	31		8:17	HS-6 SS-2		173.			
	32		8:29	HS-7 SS-1		153			
	31		8:31	HS-7 SS-2		224			
	31		8:32	HS-7 SS-3		<55			
Cd	31		8:34	HS-7 SS-1	<540		22.6 K	87.0 K	Hg 323/CU 3670
	31		8:37	HS-7 SS-2	<150		2900	22.2 K	Cu 1260
	31		8:40	HS-7 SS-3	<61		541	1980	
	31		8:57	HS-8 SS-1	110		1650	10.5 K	
	31		8:59	HS-8 SS-2	<34		105	724	
	31		9:02	HS-8 SS-3	<37		178	688	
Am	32		9:03	HS-8 SS-1		162			
	31		9:04	HS-8 SS-2		<47			
	32		9:05	HS-8 SS-3		<49			

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Client _____ Page _____ of _____

Project _____ Date _____ Made By _____

Checked By _____

122199 Form GCO-28

Preliminary _____ Final _____

Time	Sample	Pb	Zn	Cd	As
1:31	HS-3 SS-1 (0-1)	426/10	2490/33	<75	<21
21:20					
22:00	HS4 SS1 (0-1)	573/15	2195/38	<94	<30
	HS4 SS2 (1-2)	109/6	887/16	<75	18/4
	HS4-SS3 (2-3)	61/5	5139/52	<72	<9
	HS5-SS1 (0-1)	2039/32	17385/180	<96	<54
2:	HS5-SS2 (1-2)	1953/33	18370/205	<103	92/19

End 3/31/05 std at 1:55 Pb 1124/18, Zn 324/11

4/1/05 GP1 As 85/12, Cd <75

2:00	GP1 0.1'	12,065/163	>10%	<118	279/56	10% Z
4:02	2.0	21/3	1258/20	<68	7/2	
05	1.0	324/9	2660/32	<67	42/6	
14:10	4.0	13/3	1810/25	<67	9/2	
14:12	5.0	29/4	3836/42	<69	<8	
14:15	7.0	<11	3327/41	<75	<7	

LaHarp 2

4WD trip to location -

14:30	GP2	3095/39	47474/422	891/32	163/21
	0.5'	64/4	3242/34	97/21	19/3
	1.5	23/4	228/10	<77	<8
	4.0	19/3	66/5	<67	12/2
	5.0	<10	52/5	<69	10/2
	8.0				

LaHarpe

Site Name	Date	Operator	XRF/Niton	Page #
LA Harp	4/1/05	Conkel		

Persons on Site	Representing Company	Weather Data
1		Cost. Nice windy
2		
3		3:00pm
4		
5		

Sample #	Pb	Cd	Zn	Cr	Hg	As	Ba	Se	Ag	Notes	
~~GP3 (0.5)~~											
GP3 (0-0.5)	428	200	19794			107				3:10	SlAg
±STD	13	19	133			9					
(2.0)	1366	109	7885			45				SlAg	
±	18	22	66			11					
(3.0)	9	<66	76			9				3:15	
±	3		5			2					
(4.0)	16	<67	65			7					
±	3		5			2					
(5.0)	14	<67	53			9					
±	3		5			2					
(7.0)	18	<65	52			<6					
±	3		5								
End of Cores											
Start Bagging			3:25 pm								
SH LaHarp											
A SlAg-2	1655	<74	10369			118					DAMP
±	24		101			15					
B	2575	<66	12360			178					
±	28		101			16					
A PS-8 LAnyon	140	73	649			<12					DAMP
	6	22	14								
B	154	<69	737			<13				3:40	
	6		16								
A PS-5 LAnyon	16	<74	252			<7				4:00	DAMP
±	4		10								
B	20	<67	160			9				4:02	
	3		7			2					
A PS-2 LAnyon	147	<63	1725			<12				4:06	DAMP
±	6		23								
B	206	<75	1899			18					
	8		30			5					
A PS-6 LAnyon	13	<70	288			11					DAMP
	3		10			2					
B	15	<61	281			<6					
	3		9								
A PS-7 LAnyon	352	<70	1532			19					DAMP
	9		24			6					
B	333	<69	1381			<18					
	9		23								

LaHarpe

Site: W+J Canyon Smelter / East LaHarpe

Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc	Notes
3/30	20:00	SURSS -15 A	<15	57/17	427/8	3605/51	wet
3/30	20:10	SURSS - 15 A	32/7	<68	442/10	4892/49	2-SS-15A?
		B	35/8	<68	649/12	5535/52	2-SS-13A
		C	36/8	<66	758/13	7713/67	4 see next page
	20:25	HA2551 #8 (0-1)	68/11	<79	1010/18	11482/111	Not Prep/sieve
	20:30		99/15	<91	1267/24	31670/325	
	20:35		68/11	<75	922/17	8479/85	
	20:45	SURSS - 14 A	86/14	<70	1434/24	12847/107	
	20:52	B	79/14	72/23	2162/25	15342/123	
	20:55	C	64/15	150/24	2589/26	20658/164	
	21:00	SURSS - 16 A	<10	<62	117/5	669/13	Ag 69/13
	21:05	B	<11	<61	143/5	910/15	Ag 50/13
	21:10	C	12/3	<65	112/5	803/15	Ag 77/13
	21:15	D	<9	<62	92/5	667/13	
	21:17	SURSS - 13 A	149/20	111/23	4453/41	22908/172	
	21:20	B	97/22	88/24	4924/48	24132/195	
	21:25	C	120/20	<76	3601/40	17689/155	
	21:30	SURSS - 19 A	24/6	<58	422/8	1869/22	
		B	<14	<58	283/7	1236/18	
		C	<14	<57	307/7	1952/23	
	21:44	SURSS -20 A	<15	<68	240/7	1282/20	
		B	26/7	<68	393/9	1700/24	
		C	22/6	<68	322/8	1391/21	
	22:00	SURSS - 17 A	11/3	<60	91/4	616/12	
	22:02	B	14/3	<61	63/4	411/10	
	22:05	C	12/3	<60	112/5	649/13	
	22:15	SURSS - 18 A	24/7	<60	632/11	4045/39	
		B	37/8	<64	685/12	4618/44	
		C	42/7	<64	631/11	3893/39	
East LaHarp	3/31	8:05	Sed - 1 A	13/4	73/20	186/6	2087/24
		8:09	B	16/4	<59	190/6	2109/24
East LaHarp		8:12	Sed - 2 A	24/6	102/20	498/9	4434/40
		8:15	B	19/6	89/20	~~[illegible]~~	4481/30
					515/9		

Site: WJS Canyon Smelter / East Calhorp / SH Canyon

	Date	Time	Sample Location		Arsenic	Cadmium	Lead	Zinc	Notes
East Calhorp SEDIMENTS	3/31/05	8:26	Sed -3	A	52/14	<63	2731/26	9805/76	
	3/31/05	8:28	Sed -3	B	62/14	<62	2622/25	9032/70	
	3/31/05	8:30	Sed -4	A	10/3	<56	84/4	469/10	
	3/31/05	8:32	Sed -4	B	9/3	<56	85/4	459/10	
	3/31	8:34	Sed -5	A	12/3	<57	91/4	285/8	
	3/31	8:36	Sed -5	B	11/3	<57	83/4	280/8	
WJS Prepped	3/31	8:38	HS2-SS1 #8 (0-1)	A	71/10	<71	936/15	5261/52	Sived - other sample was wet
	3/31	8:40		B	66/11	94/25	1077/17	6217/62	
SH Canyon Prepped	3/31	8:47	HS2SS3 (2-3')	A	14/3	<58	46/4	318/8	
	3/31	8:50		B	14/3	<59	49/4	269/8	
	3/31	8:55	HS1SS3 (2-3')	A	9/2	<57	36/3	1578/19	open
	3/31	8:58		B	11/2	<56	42/3	1695/20	open
	3/31	9:03		C	8/2	<58	43/3	1884/22	Bagged
	3/31	9:05	HS1SS1 (0-1)	A	11/3	<60	134/5	2047/23	
	3/31	9:12		B	15/3	<59	130/5	2327/25	
	3/31	9:15	HS1SS2 (1-2)	A	17/3	<66	44/4	1412/21	
	3/31	9:17		B	18/3	<65	40/4	1664/23	
	3/31	9:20	HS2SS1 (0-1)	A	20	<56	136/5	15441/114	? Fe?
	3/31	9:25		B	14/3	<56	138/5	1033/15	
	3/31	9:30		C	<10	<56	128/5	973/14	
	3/31	9:35	HS4SS3 (2-3')	A	15/3	<60	63/4	779/14	
	3/31	9:37		B	12/3	<60	73/4	743/13	
	3/31	9:45	HS4SS2 (1-2')	A	<14	<61	276/7	2457/27	
	3/31	10:00	HS4SS1 (0-1)	A	<13	<64	267/6	1823/21	
	3/31	10:05	HS3SS1 (0-1)	A	48/6	<75	304/9	2041/29	
	3/31	10:15	HS1SS1 (0-1)	A	<9	<56	109/4	552/11	
	3/31	10:25	HS1SS2 (1-2)	A	10/2	<58	29/3	506/10	
	3/31	10:30	HS1SS3 (2-3)	A	13/3	<62	48/4	468/11	Ag 84/13

RSK Values					
	Res →	11	39	400	23000
	Non Res →	38	1600	1600	610000

Calibration

Site: E. LaHarpe Smelter

Red - Cd 109 - Pb
Yellow - Am 241 - Cd

Date	Time	Sample Location	Arsenic	Cadmium	Lead	Zinc
3/22/05	2:08p	MED STD	88.1		1060	304.
	4:22	MED STD		91.7		
	4:25	MED STD	85.		1060	331
		Pb PD	8.8%			
		Leak Check 1630 OK				
3/23/05	7:48A	MED STD	95.		1080.	317
	2:25p	MED STD	86.8		1110	331
	4:42p	MED STD	<84		1120	318
	6:31p	MED STD	<81		1120	325
3/28/05	3:00p	MED STD			1060	
3/29/05	11:58p	Med Std	119		1100	317
3/30/05	1:05A	Med Std	132		1070	308
3/30/05	7:39A	Med Std	<84		1150	310
3/30/05	9:13A	Med Std	104		1040	309
w+5 ~~3/30~~	~~22:30~~	~~Med Std~~	~~95/10~~	~~90/21~~	~~1153/15~~	~~327/9~~

APPENDIX D

Boring Logs

Drilling Log

Project Name	Project Number	Boring Number
KDHE - East La Harpe	35833	GP-1

Ground Elevation	Location	Page
	La Harpe, KS	1

Air Monitoring Equipment	Total Footage
NA	~~4.05~~ 7.6'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
DIRECT-PUSH	2"				

Drilling Company	Driller(s)
EPS	Ryan Wood, Sean Estrella

Drilling Rig	Type of Sampler
TRUCK-MOUNTED GEOPROBE	MACROCORE

Date	To	Field Observer(s)
4-1-05	4-1-05	K. Schutte, C. Conard

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	SILTS, TRACE GRAVELS, BLACK (10YR2/1), NON PLASTIC, SOFT, DAMP. - BRICK FRAGMENTS.									START: 1335'
1	SANDY CLAY W/ SILT, Light Brown (5YR5/6), NON-PLASTIC, SOFT, DRY.			2.8/4.0						
2	SILTY CLAY, MODERATE BROWN (5YR4/4), MED PLASTIC, MED CONSISTENCY, DRY to DAMP.									
3										
4	SANDY CLAY, Light Brown (5YR5/6), MED. PLASTIC, MED. CONSISTENCY, DAMP.									
5				3.0/4.0						
6	- DAMP to MOIST.									
7	LIMESTONE CHUNKS									END: 1350
8	Refusal @ 7.6' bgs									
9										
10										
11										
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

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051601 Form WCD-2-1

Drilling Log

Project Name	Project Number	Boring Number
KDHE - East La Harpe	35833	GP-2

Ground Elevation	Location	Page
	LA HARPE, KS	1

Air Monitoring Equipment	Total Footage
NA	8.5'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
DIRECT-PUSH	2"				

Drilling Company	Driller(s)
EPS	R. Weisel, S. Estrada

Drilling Rig	Type of Sampler
TRUCK-MOUNTED GEOPROBE	MACROCORE

Date	To	Field Observer(s)
4-1-05	4-1-05	K. Schutte, C. Conrad

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	PID (ppm) BH	PID (ppm) S	Remarks/ Water Levels
	FILL MATERIAL, SILTS, DARK (10 YR 2/1), NON-PLASTIC, SOFT, DAMP.									START: 1420
1	- PIECES OF SLAG.			3.6/4.0						
	- CHUNKS OF GLASS									
2	SILTY CLAY, VERY DARK BROWN (10 YR 2/2), MED. PLASTIC, DAMP, SOFT CONSISTENCY,					SS-1 2.0-2.5'				
3	- TRACE SAND.									
4	CLAY, TRACE SILT, TRACE SAND, BROWN (10 YR 4/3) TRACE to MOD. PLASTIC, DRY to DAMP.									
5										
6				3.5/4.0						
7										
8	CLAY, REDDISH BROWN, Highly Plastic, MOD. CONSISTENCY, DAMP. LIMESTONE CHUNKS									END: 1435
	refusal @ 8.5' BGS									
9										
10										
11										
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell SINCE 1898

051601 Form WCD-2-1

Drilling Log

Project Name	Project Number	Boring Number
KDHE - East La Harpe	35833	GP-3

Ground Elevation	Location	Page
	La Harpe, KS	1

Air Monitoring Equipment	Total Footage
NA	8.0'

Drilling Type	Hole Size	Overburden Footage	Bedrock Footage	No. of Samples	No. of Core Boxes
Direct-Push	2"				

Drilling Company	Driller(s)
EPS	J. Estrell, R. Wieser.

Drilling Rig	Type of Sampler
Truck-mounted Geoprobe	Macrocore

Date	To	Field Observer(s)
4-1-05	4-1-05	K. Schotte, C. Conrad

Depth (feet)	Description	Class	Blow Count	Recov.	Run/ Time	Sample Desig.	PID (ppm) BZ	BH	S	Remarks/ Water Levels
	Fill material, coal embers?									Start: 1445'
1	Silty clay, dark brown (10YR 3/2), med plastic, damp, stiff consistency - Retort - slag waste -			3.6/4.0						
2	Silts, trace brick fragments, black (10YR 2/1), non plastic, soft, damp. - Damp to moist -									
3	Silty clay, very dark brown (10YR 2/2), higher plastic, soft to med. consistency, damp to moist.				1510	SS-1 + Dup-1				
4										
5				2.7/4.0						
6	- trace sand.									
7	- Limestone chunks.									End: 1500
8	Refusal @ 8.0' bgs									
9										
10										
11										
12										
13										
14										

BZ=Breathing Zone BH=Bore Hole S=Sample

Burns & McDonnell Since 1898

051601 Form WCD-2-1

APPENDIX E

Laboratory Analytical Results

ENVIRONMENTAL
SCIENCE CORP.

12065 Lebanon Rd.
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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-01

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SED-1

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/22/05 16:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	5.9	1.0	mg/kg	6010B	03/31/05	1
Cadmium	41.	0.25	mg/kg	6010B	03/31/05	1
Lead	100	0.25	mg/kg	6010B	03/31/05	1
Zinc	1000	1.5	mg/kg	6010B	03/31/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

Note:
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-02

Site ID :

Project # : 35833

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Sample ID : SED-2

Collected By : Keith Schutte
Collection Date : 03/22/05 16:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	13.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	60.	0.25	mg/kg	6010B	03/31/05	1
Lead	240	0.25	mg/kg	6010B	03/31/05	1
Zinc	3600	15.	mg/kg	6010B	03/31/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-03

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SLAG-1

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/23/05 09:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	460	1.0	mg/kg	6010B	03/31/05	1
Cadmium	130	0.25	mg/kg	6010B	03/31/05	1
Lead	29000	25.	mg/kg	6010B	03/31/05	100
Zinc	44000	150	mg/kg	6010B	03/31/05	100

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-04

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : HS-1 SS-1 0-1 FT

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/23/05 14:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	91.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	43.	0.25	mg/kg	6010B	03/31/05	1
Lead	1400	0.25	mg/kg	6010B	03/31/05	1
Zinc	12000	15.	mg/kg	6010B	03/31/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-05

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : HS-1 SS-2 1-2 FT

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/23/05 14:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	12.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	2.3	0.25	mg/kg	6010B	03/31/05	1
Lead	76.	0.25	mg/kg	6010B	03/31/05	1
Zinc	560	1.5	mg/kg	6010B	03/31/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-06

Site ID :

Project # : 35833

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Sample ID : HS-2 SS-1 0-1 FT

Collected By : Keith Schutte
Collection Date : 03/23/05 14:40

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	40.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	20.	0.25	mg/kg	6010B	03/31/05	1
Lead	1200	0.25	mg/kg	6010B	03/31/05	1
Zinc	6900	15.	mg/kg	6010B	03/31/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-07

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : HS-3 SS-1 0-1 FT

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/23/05 15:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	110	1.0	mg/kg	6010B	03/31/05	1
Cadmium	55.	0.25	mg/kg	6010B	03/31/05	1
Lead	5900	2.5	mg/kg	6010B	03/31/05	10
Zinc	18000	15.	mg/kg	6010B	03/31/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-08

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : HS-7 SS-1 0-1 FT

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/24/05 08:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	42.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	55.	0.25	mg/kg	6010B	03/31/05	1
Lead	12000	2.5	mg/kg	6010B	03/31/05	10
Zinc	19000	15.	mg/kg	6010B	03/31/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-09

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SED-3

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/24/05 08:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	10.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	24.	0.25	mg/kg	6010B	03/31/05	1
Lead	400	0.25	mg/kg	6010B	03/31/05	1
Zinc	11000	15.	mg/kg	6010B	03/31/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-10

Site ID :

Project # : 35833

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Sample ID : SUR SS-1

Collected By : Keith Schutte
Collection Date : 03/24/05 08:55

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	340	1.0	mg/kg	6010B	03/31/05	1
Cadmium	94.	0.25	mg/kg	6010B	03/31/05	1
Lead	4700	2.5	mg/kg	6010B	03/31/05	10
Zinc	30000	150	mg/kg	6010B	04/02/05	100

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-11

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SUR SS-11

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/24/05 09:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	97.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	110	0.25	mg/kg	6010B	03/31/05	1
Lead	8800	2.5	mg/kg	6010B	03/31/05	10
Zinc	48000	150	mg/kg	6010B	04/02/05	100

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
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AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193049-12

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SUR SS-15

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/24/05 09:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	76.	1.0	mg/kg	6010B	03/31/05	1
Cadmium	180	0.25	mg/kg	6010B	03/31/05	1
Lead	2200	0.25	mg/kg	6010B	03/31/05	1
Zinc	18000	15.	mg/kg	6010B	04/01/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
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Note:
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Reported: 04/02/05 18:02 Printed: 04/04/05 11:56

Burns & McDonnell
SINCE 1898

Request for Chemical Analysis and Chain of Custody Record

Burns & McDonnell Engineering
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Attention: Trevor Gustafson

Laboratory: ESC
Address: 12065 Lebanon Rd
City/State/Zip: Mt. Juliet, TN 37122
Telephone:

Document Control No:
Lab. Reference No. or Episode No.:

Project Number: 35833
Client Name: KDHE- LA HARPE SMELTER

Sample Number: Group or SWMU Name	Sample Number: Sample Point	Sample Number: Sample Designator	Sample Event: Round	Sample Event: Year	Sample Depth (in feet): From	Sample Depth (in feet): To	Sample Collected: Date	Sample Collected: Time	Sample Type: Matrix: Liquid	Sample Type: Matrix: Solid	Sample Type: Matrix: Gas	Number of Containers	Analysis: Lead	Analysis: Zinc	Analysis: Cadmium	Analysis: Arsenic			Remarks
	SED-1						3-22	1615		X		1	X	X					L193049-01
	SED-2						3-22	1630		X		1	X	X					-02
	SLAG-1						3-23	0950		X		1	X	X					-03
	HS-1	SS-1			0'	1'	3-23	1405		X		1	X	X					-04
	HS-1	SS-2			1'	2'	3-23	1410		X		1	X	X					-05
	HS-2	SS-1			0'	1'	3-23	1440		X		1	X	X					-06
	HS-3	SS-1			0'	1'	3-23	1510		X		1	X	X					-07
	HS-7	SS-1			0'	1'	3-24	0805		X		1	X	X					-08
	SED-3						3-24	0850		X		1	X	X					-09
	SUR SS-1						3-24	0855		X		1	X	X					-10
	SUR SS-11						3-24	0900		X		1	X	X					-11
	SUR SS-15						3-24	0905		X		1	X	X					-12

Sampler (signature): Keith Schwthe
Sampler (signature):
Special Instructions: dk

Relinquished By (signature): 1. Date/Time 3-25/1815
Received By (signature): Date/Time
Relinquished By (signature): 2. Date/Time
Received By (signature): Date/Time 3/24/05

Ice Present in Container: Yes ☐ No ☐
Temperature Upon Receipt:
Laboratory Comments: 10:00 SWK 12 containers 3.1°

ENVIRONMENTAL
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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 16, 2005

ESC Sample # : L194335-01

Date Received : April 06, 2005
Description : KDHE - East La Harpe

Site ID :

Sample ID : GP-1 SS-1 .5-1FT

Project # : 35833

Collected By :
Collection Date : 04/01/05 14:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	85.	1.0	mg/kg	6010B	04/13/05	1
Cadmium	57.	0.25	mg/kg	6010B	04/12/05	1
Lead	9400	2.5	mg/kg	6010B	04/13/05	10
Zinc	61000	150	mg/kg	6010B	04/15/05	100

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

Note:
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Reported: 04/16/05 11:07 Printed: 04/16/05 11:09

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Mt. Juliet, TN 37122
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1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 16, 2005

ESC Sample # : L194335-02

Site ID :

Project # : 35833

Date Received : April 06, 2005
Description : KDHE - East La Harpe

Sample ID : GP-2 SS-1 2-2.5FT

Collected By :
Collection Date : 04/01/05 14:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	1.9	1.0	mg/kg	6010B	04/13/05	1
Cadmium	71.	0.25	mg/kg	6010B	04/12/05	1
Lead	95.	0.25	mg/kg	6010B	04/12/05	1
Zinc	2400	1.5	mg/kg	6010B	04/13/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 16, 2005

ESC Sample # : L194335-03

Date Received : April 06, 2005
Description : KDHE - East La Harpe

Site ID :

Sample ID : GP-3 SS-1 2.5-3.5F

Project # : 35833

Collected By :
Collection Date : 04/01/05 15:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	1.0	mg/kg	6010B	04/13/05	1
Cadmium	1.1	0.25	mg/kg	6010B	04/12/05	1
Lead	11.	0.25	mg/kg	6010B	04/12/05	1
Zinc	260	1.5	mg/kg	6010B	04/13/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 16, 2005

ESC Sample # : L194335-04

Date Received : April 06, 2005
Description : KDHE - East La Harpe

Site ID :

Sample ID : DUP-1 SS-1

Project # : 35833

Collected By :
Collection Date : 04/01/05 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	1.0	mg/kg	6010B	04/13/05	1
Cadmium	0.87	0.25	mg/kg	6010B	04/12/05	1
Lead	7.1	0.25	mg/kg	6010B	04/12/05	1
Zinc	71.	1.5	mg/kg	6010B	04/13/05	1

Tom Merlette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 16, 2005

ESC Sample # : L194335-05

Date Received : April 06, 2005
Description : KDHE - East La Harpe

Site ID :

Sample ID : RINSATE BLANK

Project # : 35833

Collected By :
Collection Date : 04/01/05 15:20

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/09/05	1
Cadmium	BDL	0.0050	mg/l	6010B	04/09/05	1
Lead	BDL	0.0050	mg/l	6010B	04/09/05	1
Zinc	BDL	0.030	mg/l	6010B	04/09/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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Attachment A
List of Analytes with QC Qualifiers

Sample #	Analyte	Qualifier
L194335-01	Arsenic	J3
L194335-02	Arsenic	J3
L194335-03	Arsenic	J3
L194335-04	Arsenic	J3

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
J3	The associated batch QC was outside the established quality control range for precision.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable unless qualified as 'R' (Rejected).

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

	Control Limits				(AQ)	(SS)
2-Fluorophenol	31-119	Nitrobenzene-d5	43-118	Dibromfluoromethane	79-126	83-119
Phenol-d5	12-134	2-Fluorobiphenyl	45-128	Toluene-d8	81-114	82-116
2,4,6-Tribromophenol	51-141	Terphenyl-d14	43-137	4-Bromofluorobenzene	65-129	72-126

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Burns & McDonnell
SINCE 1898

Request for Chemical Analysis and Chain of Custody Record

8418 3713 8784

Burns & McDonnell Engineering
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Attention: TREVOR GUSTAFSON

Laboratory: ESC
Address:
City/State/Zip:
Telephone:

Document Control No:
Lab. Reference No. or Episode No.:

Project Number: 35833

Client Name: KDHE - EAST La Harpe SITE

Sample Number: Group or SWMU Name	Sample Number: Sample Point	Sample Number: Sample Designator	Sample Event: Round	Sample Event: Year	Sample Depth (in feet): From	Sample Depth (in feet): To	Sample Collected: Date	Sample Collected: Time	Matrix: Liquid	Matrix: Solid	Matrix: Gas	Number of Containers	Analysis: ~~PCB~~	Analysis: Lead	Analysis: Zinc	Analysis: Arsenic	Analysis: Cadmium	Analysis:	Remarks
	GP-1	SS-1			0.5'	1.0'	4-1-05	1400		X		1	X	X					L194335-01
	GP-2	SS-1			2.0'	2.5'	"	1445		X		1	X	X					02
	GP-3	SS-1			2.5'	3.5'	"	1510		X		1	X	X					03
	DUP-1	SS-1			—	—	"	—		X		1	X	X					04
	RINSATE	BLANK			—	—	4-1	1520	X			1	X	X					NOT FILTERED (HNO3) 05

Sampler (signature):

Sampler (signature):

Special Instructions: Each sample seals in seperate ziplock

Relinquished By (signature):	Date/Time	Received By (signature):	Date/Time
1.	4-5 1700		
2.		4/6/05 9:00	

Ice Present in Container: Yes ☐ No ☐

Temperature Upon Receipt:

Laboratory Comments: custody seal in tact. 5 containers 3.5° 1<2

052501 Form WCD-KC1

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Est. 1970

REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 15, 2005

ESC Sample # : L194952-01

Date Received : April 12, 2005
Description : KDHE - East LA HARPE

Site ID :

Sample ID : GP-1

Project # : 35833

Collected By :
Collection Date : 04/08/05 15:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	04/13/05	1
Cadmium,Dissolved	0.20	0.0050	mg/l	6010B	04/13/05	1
Lead,Dissolved	0.037	0.0050	mg/l	6010B	04/13/05	1
Zinc,Dissolved	35.	0.30	mg/l	6010B	04/15/05	10

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

Note:
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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 15, 2005

ESC Sample # : L194952-02

Date Received : April 12, 2005
Description : KDHE - East LA HARPE

Site ID :

Sample ID : GP-2

Project # : 35833

Collected By :
Collection Date : 04/08/05 15:35

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	04/13/05	1
Cadmium,Dissolved	0.048	0.0050	mg/l	6010B	04/13/05	1
Lead,Dissolved	0.0085	0.0050	mg/l	6010B	04/13/05	1
Zinc,Dissolved	1.3	0.030	mg/l	6010B	04/13/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 15, 2005

ESC Sample # : L194952-03

Date Received : April 12, 2005
Description : KDHE - East LA HARPE

Site ID :

Sample ID : GP-3

Project # : 35833

Collected By :
Collection Date : 04/08/05 15:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	04/13/05	1
Cadmium,Dissolved	BDL	0.0050	mg/l	6010B	04/13/05	1
Lead,Dissolved	0.013	0.0050	mg/l	6010B	04/13/05	1
Zinc,Dissolved	1.7	0.030	mg/l	6010B	04/13/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 15, 2005

ESC Sample # : L194952-04

Date Received : April 12, 2005
Description : KDHE - East LA HARPE

Site ID :

Sample ID : DUP-2

Project # : 35833

Collected By :
Collection Date : 04/08/05 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	04/13/05	1
Cadmium,Dissolved	0.049	0.0050	mg/l	6010B	04/13/05	1
Lead,Dissolved	0.0092	0.0050	mg/l	6010B	04/13/05	1
Zinc,Dissolved	1.2	0.030	mg/l	6010B	04/13/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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Burns & McDonnell
SINCE 1898

Request for Chemical Analysis and Chain of Custody Record

BURNSMCKC- KDHE

Burns & McDonnell Engineering
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Attention: TREVOR GUSTAFSON

Laboratory: ESC
Address: 12065 Lebanon Rd
City/State/Zip: Mt. Juliet, TN 37122
Telephone: 800 767 5859

Document Control No:
Lab. Reference No. or Episode No.:

Project Number: 35833
Client Name: KDHE- East La HARPE

Sample Number			Sample Event		Sample Depth (in feet)		Sample Collected		Sample Type: Matrix			Number of Containers	Analysis: LEAD	Analysis: Arsenic	Analysis: Cadmium	Analysis: Zinc			L194952 Remarks
Group or SWMU Name	Sample Point	Sample Designator	Round	Year	From	To	Date	Time	Liquid	Solid	Gas								
	GP-1	GW-1					4-8	1515	X			1	X	X					Filtered -01
	GP-2	GW-1					4-8	1535	X			1	X	X					Filtered -02
	GP-3	GW-1					4-8	1550	X			1	X	X					Filtered -03
	DUP-2	GW-1					4-8	—	X			1	X	X					Filtered -04

Sampler (signature):

Sampler (signature):

Special Instructions: All samples field filtered

Relinquished By (signature)	Date/Time	Received By (signature)	Date/Time
1. Trevor Gustafson	4/10/05 0900	[illegible]	
2.		[illegible]	4-12-05 07:45

Ice Present in Container: Yes ☐ No ☐

Temperature Upon Receipt: 3.2°C

Laboratory Comments:

(2) U-RR

(dc)

052501 Form WCD-KC1

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193054-01

Site ID :

Project # : 35833

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Sample ID : SW-1

Collected By : Keith Schutte
Collection Date : 03/22/05 16:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/02/05	1
Cadmium	BDL	0.0050	mg/l	6010B	04/02/05	1
Lead	BDL	0.0050	mg/l	6010B	04/02/05	1
Zinc	0.069	0.030	mg/l	6010B	04/02/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193054-02

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SW-2

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/22/05 16:25

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/02/05	1
Cadmium	0.041	0.0050	mg/l	6010B	04/02/05	1
Lead	BDL	0.0050	mg/l	6010B	04/02/05	1
Zinc	1.8	0.030	mg/l	6010B	04/02/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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Est. 1970

REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193054-03

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SW-3

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/24/05 08:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/02/05	1
Cadmium	0.055	0.0050	mg/l	6010B	04/02/05	1
Lead	BDL	0.0050	mg/l	6010B	04/02/05	1
Zinc	1.8	0.030	mg/l	6010B	04/02/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

Note:
The reported analytical results relate only to the sample submitted.
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12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193054-04

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SW-4

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/24/05 09:20

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/01/05	1
Cadmium	BDL	0.0050	mg/l	6010B	04/01/05	1
Lead	BDL	0.0050	mg/l	6010B	04/01/05	1
Zinc	0.078	0.030	mg/l	6010B	04/01/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

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REPORT OF ANALYSIS

Trevor Gustafson
Burns & McDonnell
9400 Ward Parkway
Kansas City, MO 64114

April 04, 2005

ESC Sample # : L193054-05

Date Received : March 26, 2005
Description : KDHE - La Harpe Smelter

Site ID :

Sample ID : SW-5

Project # : 35833

Collected By : Keith Schutte
Collection Date : 03/24/05 09:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/01/05	1
Cadmium	BDL	0.0050	mg/l	6010B	04/01/05	1
Lead	BDL	0.0050	mg/l	6010B	04/01/05	1
Zinc	0.046	0.030	mg/l	6010B	04/01/05	1

Tom Mellette, ESC Representative

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)

Laboratory Certification Numbers:
AIHA - 100789, AL - 40660, CA - I-2327, CT- PH-0197, FL - E87487, GA - 923, IN - C-TN-01
KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ -0612, MN - 047-999-395, NY - 11742, NJ - 81002, WI - 998093910

Note:
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Reported: 04/04/05 13:46 Printed: 04/04/05 17:30

Burns & McDonnell SINCE 1898

Request for Chemical Analysis and Chain of Custody Record

Burns & McDonnell Engineering
9400 Ward Parkway
Kansas City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Attention: TREVOR GUSTAFSON

Laboratory: ESC
Address: 12065 Lebanon Rd
City/State/Zip: Mt. Juliet, TN 37122
Telephone:

Document Control No:
Lab. Reference No. or Episode No.:

Project Number: 35833

Client Name: KOHE - LA HARPE SMELTER

Sample Number: Group or SWMU Name	Sample Number: Sample Point	Sample Number: Sample Designator	Sample Event: Round	Sample Event: Year	Sample Depth (in feet): From	Sample Depth (in feet): To	Sample Collected: Date	Sample Collected: Time	Sample Type: Matrix: Liquid	Matrix: Solid	Matrix: Gas	Number of Containers	Analysis: Lead	Analysis: Zinc	Analysis: Cadmium	Analysis: Arsenic				Remarks
																				L193054
	SW-1						3-22	1610	X			1	X	X						w/ HNO_3 -01
	SW-2						3-22	1625	X			1	X	X						w/ HNO_3 -02
	SW-3						3-24	0845	X			1	X	X						w/ HNO_3 -03
	SW-4						3-24	0920	X			1	X	X						w/ HNO_3 -04
	SW-5						3-24	0930	X			1	X	X						w/ HNO_3 -05

Sampler (signature): Keith Schutte

Sampler (signature):

Special Instructions:

Relinquished By (signature): 1. — Date/Time: 3/25 / 1815

Received By (signature): — Date/Time:

Relinquished By (signature): 2. — Date/Time:

Received By (signature): — Date/Time: 3/24/05

Ice Present in Container: Yes ☐ No ☐

Temperature Upon Receipt:

Laboratory Comments: 10:00 SWA SBR / < 2 / 3.1°

APPENDIX B

PHOTO DOCUMENTATION OF FIELD ACTIVITIES

Photo #1 - Looking W at access road

Photo #2 - SE corner of the site looking NE

Photo #3 - Looking N at workstation

Photo #4 - Looking W from refractory pile

Photograph #13 - Sampling SS-H11-NW, XRF

Photograph #14 - Looking E at foundary waste pile

Photograph #15 - Trench grid H4 looking E

Photograph # 16 - Trench grid H6 sidewall

Photograph #5 - Looking W from NW Property Boundary

Photograph #6 - Looking N at Grid A8

Photograph # 7 - Looking S from Grid B1

Photograph #8 - Looking E at foundary foundation

Photograph #9 - Looking W from Grid marker B2

Photograph #10 - Grid G2 stock pond

Photograph #11 - Looking E, sampling SS-A7-SW

Photograph #12 - Waste sample SB-B8-NW location

Photograph #17 - Looking W at monitor well MW-3

APPENDIX C

FIELD DOCUMENTATION FORMS

APPENDIX C1

XRF DATA TABLE

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	Sample Date	Sample Depth (ft)	XRF ID	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SS-A6-NE	4/15/2013	0.5	9	2,906	278	<LOD	13,400				
		0.5	10	2,854	195	<LOD	9,365				
		0.5	11	2,766	172	<LOD	8,772				
			AVERAGE READING	2,842	215	<LOD	10,512				
SS-A6-SE	4/15/2013	0.5	12	2,052	<LOD	<LOD	5,852				
		0.5	13	2,083	<LOD	<LOD	4,770				
		0.5	14	1,693	56	<LOD	4,602				
			AVERAGE READING	1,943		<LOD	5,075				
SS-A6-NW	4/15/2013	0.5	15	2,543	<LOD	12	8,310				
		0.5	16	2,103	<LOD	<LOD	7,409				
		0.5	17	2,035	<LOD	<LOD	8,069				
			AVERAGE READING	2,227	<LOD		7,929				
SS-A7-SW	4/15/2013	0.5	18	1,671	<LOD	<LOD	7,460				
		0.5	19	1,183	40	<LOD	4,344				
		0.5	20	935	<LOD	<LOD	3,941				
			AVERAGE READING	1,263			5,248				
SS-A7-NE	4/15/2013	0.5	21	530	42	<LOD	3,434				
		0.5	22	494	80	<LOD	3,850				
		0.5	23	718	77	<LOD	4,427				
			AVERAGE READING	581	66	<LOD	3,904				
SS-A7-SE	4/15/2013	0.5	24	6,269	263	61	47,500				
		0.5	25	7,281	373	65	50,700				
		0.5	26	5,580	207	65	49,200				
			AVERAGE READING	6,377	281	64	49,133				
SS-B1-NW	4/15/2013	0.5	27	4,864	807	46	30,200				
		0.5	28	3,101	418	20	25,400				
		0.5	29	4,064	488	22	30,400				
			AVERAGE READING	4,010	571	29	28,667				
SS-B1-NE	4/15/2013	0.5	30	5,871	298	<LOD	14,800				
		0.5	31	7,430	<LOD	<LOD	13,700				
		0.5	33	6,005		<LOD	13,600				
			AVERAGE READING	6,435		<LOD	14,033				
SS-B1-SE	4/15/2013	0.5	34	2,711	125	10	14,800				
		0.5	35	3,224	92	16	16,800				
		0.5	36	3,154	157	44	25,200				
			AVERAGE READING	3,030	125	23	18,933				
SS-B2-NE	4/15/2013	0.5	37	29,800	614	15	59,700				
		0.5	38	32,600	775	96	86,300				
		0.5	39	17,200	608	30	54,600				
			AVERAGE READING	26,533	666	47	66,867	46,000	260	76	36,000
SS-B2-SE	4/15/2013	0.5	40	7,608	<LOD	21	14,700				
		0.5	41	9,571	89	<LOD	16,500				
		0.5	42	8,491	<LOD	38	16,500				
			AVERAGE READING	8,557		24	15,900				
SS-B2-SW	4/15/2013	0.5	43	647	22	<LOD	2,932				
		0.5	44	575	<LOD	10	2,772				
		0.5	45	203	24	<LOD	1,470				
			AVERAGE READING	475	22		2,391				
SS-B3-NW	4/15/2013	0.5	46	430	28	<LOD	1,535				
		0.5	47	490	22	<LOD	1,870				
		0.5	48	662	22	<LOD	2,194				
			AVERAGE READING	527	24	<LOD	1,866				
SS-B3-SE	4/15/2013	0.5	49	2,842	151	159	120,200				
		0.5	50	1,939	117	118	61,800				
		0.5	51	2,740	170	154	92,600				
			AVERAGE READING	2,507	146	144	91,533				
SS-B3-NE	4/15/2013	0.5	52	1,568	<LOD	<LOD	6,433				
		0.5	53	1,241	<LOD	<LOD	6,145				
		0.5	54	1,302	35	<LOD	5,532				
			AVERAGE READING	1,370		<LOD	6,037				
SS-B4-NE	4/15/2013	0.5	55	4,130	163	15	19,400				
		0.5	56	3,568	108	33	17,400				
		0.5	57	3,979	71	33	18,000				
			AVERAGE READING	3,892	114	27	18,267				
SS-B4-SE	4/15/2013	0.5	58	1,229	46	<LOD	5,952				
		0.5	59	1,403	74	14	6,094				
		0.5	60	2,758	98	<LOD	8,284				
			AVERAGE READING	1,797	73		6,777				
SS-B4-SW	4/15/2013	0.5	61	5,096	344	266	64,300				
		0.5	62	5,183	460	302	90,600				
		0.5	63	5,578	436	248	63,400				
			AVERAGE READING	5,286	413	272	72,767				
SS-B5-NW	4/15/2013	0.5	64	3,252	185	35	15,100				
		0.5	65	6,848	218	47	30,700				
		0.5	66	7,616	310	61	37,000				
			AVERAGE READING	5,905	238	48	27,600				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	Sample Date	Sample Depth (ft)	XRF ID	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SS-B5-NE	4/15/2013	0.5	67	7,004	<LOD	14	15,800				
		0.5	68	6,027	<LOD	<LOD	16,000				
		0.5	69	6,372	164	16	15,600				
			AVERAGE READING	6,468		13	15,800	4,600	120	40	15,000
SS-B5-SE	4/15/2013	0.5	70	4,246	315	755	52,100				
		0.5	71	4,320	397	1,019	62,600				
		0.5	72	4,582	352	668	53,700				
			AVERAGE READING	4,383	355	814	56,133				
SS-B6-SE	4/15/2013	0.5	73	2,206	137	426	25,600				
		0.5	74	2,484	123	443	26,300				
		0.5	75	3,434	247	497	40,100				
			AVERAGE READING	2,708	169	455	30,667				
SS-B6-SW	4/15/2013	0.5	76	3,949	304	1,185	55,600				
		0.5	77	3,799	273	1,089	54,800				
		0.5	78	3,918	142	1,011	58,400				
			AVERAGE READING	3,889	240	1,095	56,267				
SS-B6-NE	4/15/2013	0.5	79	7,975	134	36	41,400				
		0.5	80	8,094	279	54	39,400				
		0.5	81	7,612	269	41	35,200				
			AVERAGE READING	7,894	227	44	38,667				
SS-B7-NW	4/16/2013	0.5	90	3,924	<LOD	17	15,600				
		0.5	91	2,556	157	20	11,400				
		0.5	92	3,198	82	<LOD	16,600				
			AVERAGE READING	3,226	106	18	14,533				
SS-B7-SE	4/16/2013	0.5	93	2,591	230	49	53,500				
		0.5	94	5,052	<LOD		61,900				
		0.5	95	2,641	171	47	49,000				
			AVERAGE READING	3,428	142	48	54,800				
SS-B7-NE	4/16/2013	0.5	96	6,839	393	79	62,800				
		0.5	98	6,826	455	79	69,600				
		0.5	99	6,260	313	76	57,000				
			AVERAGE READING	6,642	387	78	63,133				
SS-B8-NE	4/16/2013	0.5	100	703	<LOD	<LOD	4,486				
		0.5	101	2,843	110	23	20,700				
		0.5	102	3,020	139	28	21,600				
			AVERAGE READING	2,189	90	20	15,595				
SS-B8-SE	4/16/2013	0.5	103	2,544	129	117	17,100				
		0.5	104	2,153	<LOD	104	16,500				
		0.5	105	2,032	<LOD	109	15,500				
			AVERAGE READING	2,243		110	16,367				
SS-B8-SW	4/16/2013	0.5	106	2,032	<LOD	28	7,598				
		0.5	107	770	83	36	4,982				
		0.5	108	477	<LOD	54	3,516				
			AVERAGE READING	1,093		39	5,365	93	6	37	860
SS-B9-NW	4/16/2013	0.5	109	3,382	98	<LOD	26,000				
		0.5	110	3,261	63	131	38,000				
		0.5	111	2,572	<LOD	32	27,500				
			AVERAGE READING	3,072	81	82	30,500				
SS-B9-SE	4/16/2013	0.5	112	1,495	<LOD	27	7,552				
		0.5	113	1,319	<LOD	31	7,661				
		0.5	114	2,175	<LOD	38	10,700				
			AVERAGE READING	1,663	<LOD	32	8,638				
SS-B9-NE	4/16/2013	0.5	115	332	21	<LOD	1,747				
		0.5	116	358	<LOD	<LOD	2,055				
		0.5	117	608	<LOD	<LOD	3,326				
			AVERAGE READING	433		<LOD	2,376				
SS-B10-NE	4/16/2013	0.5	118	357	<LOD	<LOD	2,291				
		0.5	119	410	24	<LOD	1,559				
		0.5	120	506	<LOD	<LOD	2,571				
			AVERAGE READING	424		<LOD	2,140				
SS-B10-SE	4/16/2013	0.5	121	380	<LOD	<LOD	1,664				
		0.5	122	496	25	<LOD	2,679				
		0.5	123	206	28	<LOD	867				
			AVERAGE READING	361	27	<LOD	1,737				
SS-B10-SW	4/16/2013	0.5	124	124	<LOD	<LOD	1,119				
		0.5	125	246	<LOD	<LOD	1,997				
		0.5	126	497	<LOD	<LOD	3,106				
			AVERAGE READING	289	<LOD	<LOD	2,074				
SS-B11-NW	4/18/2013	0.5	458	274	29	<LOD	1,501				
		0.5	459	308	33	<LOD	1,032				
		0.5	460	349	36	<LOD	1,104				
			AVERAGE READING	310	33	<LOD	1,212				
SS-B11-NE	4/18/2013	0.5	461	23	11	<LOD	338				
		0.5	462	32	<LOD	<LOD	271				
		0.5	463	38	10	<LOD	310				
			AVERAGE READING	31	11	<LOD	306				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	**Sample Date**	**Sample Depth (ft)**	**XRF ID**	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SS-B11-SE[2]	4/18/2013	0.5	578	59	**14**	<LOD	345				
		0.5	579	54	**14**	<LOD	284				
		0.5	580	64	<LOD	<LOD	284				
			AVERAGE READING	59	**14**	<LOD	304				
SS-B11-SE	4/18/2013	0.5	464	**676**	<LOD	<LOD	2,957				
		0.5	465	**675**	**30**	<LOD	2,617				
		0.5	466	**636**	<LOD	<LOD	2,876				
			AVERAGE READING	**662**		<LOD	2,817				
SS-C1-NW	4/18/2013	0.5	569	**3,441**	**244**	**51**	**27,000**				
SS-C1-SE	4/18/2013	0.5	570	**5,824**	**232**	<LOD	22,100				
SS-C11-SW	4/17/2013	0.5	337	92	<LOD	<LOD	1,242				
		0.5	338	118	**14**	<LOD	1,468				
		0.5	339	66	<LOD	<LOD	1,159				
			AVERAGE READING	92		<LOD	1,290				
SS-C11-NE	4/17/2013	0.5	340	140	<LOD	<LOD	868				
		0.5	341	141	**20**	<LOD	895				
		0.5	342	164	<LOD	<LOD	899				
			AVERAGE READING	148		<LOD	887	130	7	2	650
SS-C11-SE	4/17/2013	0.5	343	**450**	<LOD	<LOD	1,629				
		0.5	344	**411**	<LOD	<LOD	1,369				
		0.5	345	**424**	<LOD	<LOD	1,428				
			AVERAGE READING	**428**	<LOD	<LOD	1,475				
SS-C11-SE[2]	4/18/2013	0.5	581	64	<LOD	<LOD	252				
		0.5	582	46	<LOD	<LOD	196				
		0.5	583	37	<LOD	<LOD	173				
			AVERAGE READING	49	<LOD	<LOD	207	61	8	0	210
SS-D1-SW	4/18/2013	0.5	565	**940**	<LOD	15	2,753				
		0.5	566	**694**	<LOD	<LOD	2,027				
		0.5	567	**1,084**	<LOD	<LOD	2,513				
			AVERAGE READING	**906**	<LOD		2,431				
SS-D1-SE	4/18/2013	0.5	568	**1,579**	<LOD	14	10,700				
SS-D11-NW	4/17/2013	0.5	346	**601**	<LOD	<LOD	1,571				
		0.5	347	**404**	**25**	<LOD	1,460				
		0.5	348	366	**26**	<LOD	1,463				
			AVERAGE READING	**457**	**26**		1,498				
SS-D11-NE	4/17/2013	0.5	349	238	<LOD	<LOD	999				
		0.5	350	271	<LOD	<LOD	880				
		0.5	351	273	<LOD	<LOD	1,422				
			AVERAGE READING	261	<LOD	<LOD	1,100				
SS-D11-SE	4/17/2013	0.5	352	98	<LOD	<LOD	565				
		0.5	353	116	<LOD	<LOD	551				
		0.5	354	190	<LOD	<LOD	861				
			AVERAGE READING	135	<LOD	<LOD	659				
SS-E1-NW	4/18/2013	0.5	559	204	22	**87**	1,902				
		0.5	560	106	<LOD	**108**	1,498				
		0.5	561	89	<LOD	**87**	994				
			AVERAGE READING	133		**94**	1,465				
SS-E1-NE	4/18/2013	0.5	562	**1,447**	**53**	**65**	17,000				
		0.5	563	**1,879**	**148**	**51**	**27,200**				
		0.5	564	**2,339**	**109**	**84**	**30,300**				
			AVERAGE READING	**1,888**	**103**	**67**	**24,833**	**1,900**	**21**	**120**	14,000
SS-E11-NE	4/18/2013	0.5	467	187	**15**	<LOD	801				
		0.5	468	356	<LOD	<LOD	1,109				
		0.5	469	323	**20**	<LOD	1,098				
			AVERAGE READING	289	**18**	<LOD	1,003				
SS-E11-SE	4/18/2013	0.5	470	116	**14**	<LOD	600				
		0.5	471	135	<LOD	<LOD	654				
		0.5	472	115	<LOD	<LOD	567				
			AVERAGE READING	122		<LOD	607				
SS-E11-SW	4/18/2013	0.5	473	**2,673**	**61**	36	10,300				
		0.5	474	**3,025**	**139**	39	11,800				
		0.5	475	**3,600**	**143**	27	9,351				
			AVERAGE READING	**3,099**	**114**	34	10,484				
SS-F1-NW	4/18/2013	0.5	555	**2,024**	<LOD	17	6,944				
SS-F1-NE	4/18/2013	0.5	556	**1,362**	<LOD	<LOD	8,332				
		0.5	557	**763**	<LOD	<LOD	5,562				
		0.5	558	**1,053**	<LOD	16	7,510				
			AVERAGE READING	**1,059**	<LOD		7,135				
SS-F11-NW	4/18/2013	0.5	476	**771**	**37**	<LOD	4,886				
		0.5	477	**786**	**52**	18	5,204				
		0.5	478	**818**	**48**	<LOD	5,383				
			AVERAGE READING	**792**	**46**		5,158				
SS-F11-NE	4/18/2013	0.5	479	**665**	**29**	17	4,127				
		0.5	480	**661**	<LOD	16	4,303				
		0.5	481	**675**	**31**	22	4,404				
			AVERAGE READING	**667**	**30**	18	4,278	**540**	**25**	28	3,000

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	Sample Date	Sample Depth (ft)	XRF ID	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SS-F11-SE	4/18/2013	0.5	482	657	34	23	4,424				
		0.5	483	55	15	<LOD	377				
		0.5	484	40	17	<LOD	295				
		0.5	485	36	12	<LOD	265				
			AVERAGE READING	44	15	<LOD	312				
SS-F11-SE[2]	4/18/2013	0.5	593	52	<LOD	<LOD	256				
		0.5	594	39	<LOD	<LOD	227				
		0.5	595	52	<LOD	<LOD	190				
			AVERAGE READING	48	<LOD	<LOD	224				
SS-G1-NW	4/18/2013	0.5	548	1,241	<LOD	16	4,905				
		0.5	549	1,320	56	<LOD	5,383				
		0.5	550	1,252	38	<LOD	5,727				
			AVERAGE READING	1,271	38		5,338				
SS-G1-SE	4/18/2013	0.5	551	627	31	<LOD	5,517				
		0.5	552	2,769	125	82	12,200				
		0.5	553	951	<LOD	<LOD	4,150				
			AVERAGE READING	1,449	78	82	7,289				
SS-G1-NE	4/18/2013	0.5	554	8,293	305	47	30,800				
SS-G2-SE	4/18/2013	0.5	571	520	29	<LOD	2,438				
		0.5	572	416	26	<LOD	3,610				
		0.5	573	341	<LOD	<LOD	2,334				
			AVERAGE READING	426	28	<LOD	2,794				
SS-G2-NE	4/18/2013	0.5	574	2,329	<LOD	46	14,500				
SS-G3-SE	4/18/2013	0.5	575	2,162	310	<LOD	6,449				
SS-G3-SW	4/18/2013	0.5	576	6,116	339	26	35,200				
SS-G3-NE	4/18/2013	0.5	577	1,748	60	<LOD	5,404	970	30	17	3,400
SS-G4-SE	4/18/2013	0.5	527	1,141	96	268	20,400				
SS-G4-NE	4/18/2013	0.5	528	5,434	361	274	31,300				
SS-G4-NW	4/18/2013	0.5	529	827	<LOD	108	8,032				
		0.5	530	1,478	<LOD	84	6,106				
		0.5	531	1,036	<LOD	96	9,012				
			AVERAGE READING	1,114	<LOD	96	7,717				
SS-G5-SE	4/18/2013	0.5	522	1,726	46	71	7,617				
SS-G5-SW	4/18/2013	0.5	523	1,952	162	166	22,700				
SS-G5-NE	4/18/2013	0.5	524	1,144	49	37	13,200				
		0.5	525	1,101	75	42	14,600				
		0.5	526	932	90	<LOD	12,900				
			AVERAGE READING	1,059	71	40	13,567				
SS-G6-NE	4/18/2013	0.5	518	2,619	279	59	12,100				
		0.5	519	2,264	211	60	16,500				
		0.5	520	2,188	195	44	10,700				
			AVERAGE READING	2,357	228	54	13,100	2,400	190	48	8,900
SS-G6-NW	4/18/2013	0.5	521	3,087	247	69	13,700				
SS-G7-SE	4/18/2013	0.5	514	3,888	389	70	21,200				
SS-G7-SW	4/18/2013	0.5	515	2,572	230	106	17,900				
SS-G7-NE	4/18/2013	0.5	516	2,087	275	180	29,800				
SS-G6-SE	4/18/2013	0.5	517	2,309	215	42	26,000				
SS-G8-SE	4/18/2013	0.5	509	4,937	534	308	84,100				
		0.5	510	5,481	691	350	33,300				
		0.5	511	4,869	615	254	42,500				
			AVERAGE READING	5,096	613	304	53,300				
SS-G8-NE	4/18/2013	0.5	512	2,139	265	61	15,600				
SS-G8-NW	4/18/2013	0.5	513	1,689	142	130	19,100				
SS-G9-SE	4/18/2013	0.5	502	253	39	<LOD	3,355				
		0.5	503	194	45	<LOD	2,881				
		0.5	504	191	54	<LOD	3,776				
			AVERAGE READING	213	46	<LOD	3,337				
SS-G9-SW	4/18/2013	0.5	505	4,020	208	102	33,900				
		0.5	506	3,856	243	62	33,100				
		0.5	504	5,421	318	98	46,600				
			AVERAGE READING	4,432	256	87	37,867				
SS-G9-NE	4/18/2013	0.5	508	2,229	<LOD	55	4,771	3,900	99	100	18,000
SS-G10-SE	4/18/2013	0.5	495	1,226	<LOD	24	5,459				
		0.5	496	1,237	<LOD	25	5,633				
		0.5	497	1,264	<LOD	26	5,655				
			AVERAGE READING	1,242	<LOD	25	5,582				
SS-G10-NE	4/18/2013	0.5	498	121	14	<LOD	1,200				
		0.5	499	146	<LOD	<LOD	1,376				
		0.5	500	143	<LOD	<LOD	1,465				
			AVERAGE READING	137		<LOD	1,347				
SS-G10-NW	4/18/2013	0.5	501	2,490	187	254	29,100				
SS-G11-NE	4/18/2013	0.5	486	187	<LOD	<LOD	719				
		0.5	487	186	<LOD	<LOD	691				
		0.5	488	173	<LOD	<LOD	665				
			AVERAGE READING	182	<LOD	<LOD	692				
SS-G11-SE	4/18/2013	0.5	489	452	25	<LOD	1,622				
		0.5	490	466	<LOD	<LOD	1,549				
		0.5	491	443	<LOD	<LOD	1,609				
			AVERAGE READING	454		<LOD	1,593				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	**Sample Date**	**Sample Depth (ft)**	**XRF ID**	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SS-G11-SE[2]	4/18/2013	0.5	590	114	<LOD	<LOD	520				
		0.5	591	104	<LOD	<LOD	511				
		0.5	592	97	14	<LOD	517				
		AVERAGE READING		105		<LOD	516				
SS-G11-SW	4/18/2013	0.5	492	**2,126**	<LOD	**65**	8,254				
		0.5	493	**2,113**	<LOD	**48**	8,140				
		0.5	494	**2,226**	<LOD	**65**	8,317				
		AVERAGE READING		**2,155**	<LOD	**59**	8,237				
SS-H1-SE	4/18/2013	0.5	543	**612**	<LOD	<LOD	2,018				
		0.5	544	**605**	**28**	<LOD	2,108				
		0.5	545	**580**	**25**	<LOD	2,247				
		AVERAGE READING		**599**	**27**	<LOD	2,124				
SS-H1-SW	4/18/2013	0.5	546	**2,255**	<LOD	28	12,000				
SS-H1-NE	4/18/2013	0.5	547	**1,956**	**121**	**41**	9,148				
SS-H2-SE	4/18/2013	0.5	538	**2,021**	**155**	<LOD	17,100				
SS-H2-NW	4/18/2013	0.5	539	**6,666**	**341**	**103**	**50,600**				
SS-H2-NE	4/18/2013	0.5	540	**4,691**	**337**	**126**	**31,800**				
		0.5	541	**4,327**	**83**	**173**	**30,900**				
		0.5	542	**3,322**	**160**	**104**	**23,700**				
		AVERAGE READING		**4,113**	**193**	**134**	**28,800**	**2,600**	**44**	**120**	18,000
SS-H3-SE	4/18/2013	0.5	535	**5,080**	**367**	**40**	18,300				
SS-H3-SW	4/18/2013	0.5	536	**17,500**	**993**	<LOD	**31,000**				
SS-H3-NE	4/18/2013	0.5	537	**3,011**	**71**	**71**	12,400				
SS-H4-NE	4/18/2013	0.5	532	**2,296**	**101**	**853**	**31,400**				
SS-H4-SE	4/18/2013	0.5	533	**901**	**66**	**845**	**40,400**				
SS-H4-NW	4/18/2013	0.5	534	**970**	**41**	**225**	12,200				
SS-H10-NE	4/18/2013	0.5	584	**499**	<LOD	27	1,259				
		0.5	585	381	<LOD	<LOD	1,132				
		0.5	586	**530**	<LOD	20	1,160				
		AVERAGE READING		**470**	<LOD	24	1,184				
SS-H11-NW	4/18/2013	0.5	587	221	<LOD	<LOD	2,101				
		0.5	588	**501**	<LOD	<LOD	5,291				
		0.5	589	**543**	<LOD	17	6,163				
		AVERAGE READING		**422**	<LOD		4,518				
Subsurface Samples for Vertical Delineation											
SB-A6-SW(1)	4/17/2013	0-1	382	**2,770**	<LOD	18	8,580				
		0-1	383	**1,892**	**92**	<LOD	5,494				
		0-1	384	**2,592**	<LOD	<LOD	10,400				
		AVERAGE READING		**2,418**			8,158				
SB-A6-SW(2)	4/17/2013	1-2	385	**1,725**	**76**	<LOD	8,609				
		1-2	386	**1,942**	<LOD	<LOD	10,300				
		1-2	387	**994**	<LOD	<LOD	5,071				
		AVERAGE READING		**1,554**		<LOD	7,993				
SB-A6-SW(3)	4/17/2013	2-3	388	**8,430**	**201**	**42**	**32,200**				
		2-3	389	**8,676**	**260**	29	**31,900**				
		2-3	390	**8,998**	**156**	23	**31,800**				
		AVERAGE READING		**8,701**	**206**	31	**31,967**				
SB-A6-SW(4)	4/17/2013	3-4	392	23	<LOD	<LOD	2,338				
		3-4	393	337	**30**	<LOD	2,831				
		3-4	394	**707**	<LOD	<LOD	2,889				
		AVERAGE READING		356		<LOD	2,686				
SB-A6-SW(5)	4/17/2013	4-5	395	103	<LOD	<LOD	272				
		4-5	396	<LOD	**16**	<LOD	88				
		4-5	397	71	**16**	<LOD	283				
		AVERAGE READING		87	**16**	<LOD	214				
SB-A7-NW(1)	4/17/2013	0-1	398	**1,478**	**81**	<LOD	4,560				
SB-A7-NW(2)	4/17/2013	1-2	399	**5,333**	**136**	23	**27,400**				
SB-A7-NW(3)	4/17/2013	2-3	400	20	9	<LOD	974				
		2-3	401	<LOD	<LOD	<LOD	957				
		2-3	402	35	<LOD	<LOD	1,009				
		AVERAGE READING		28		<LOD	980				
SB-A7-N(1)	4/19/2013	0-1	600	**6,478**	**323**	33	**28,800**				
SB-A7-N(2)	4/19/2013	1-2	601	<LOD	**13**	17	1,282				
		1-2	602	84	<LOD	<LOD	1,780				
		1-2	603	77	<LOD	<LOD	1,647				
		AVERAGE READING		81			1,570				
SB-B1-SW(1)	4/16/2013	0-1	127	<LOD	11	<LOD	1,136				
		0-1	128	<LOD	9	<LOD	1,126				
		0-1	129	<LOD	**13**	<LOD	1,077				
		AVERAGE READING		<LOD	11	<LOD	1,113				
SB-B1-SW(2)	4/16/2013	1-2	130	<LOD	**12**	<LOD	1,177				
		1-2	131	<LOD	10	<LOD	1,136				
		1-2	132	<LOD	11	<LOD	1,199				
		AVERAGE READING		<LOD	11	<LOD	1,171				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	Sample Date	Sample Depth (ft)	XRF ID	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SB-B1-SW(3)	4/16/2013	2-3	133	17	20	<LOD	627				
		2-3	134	<LOD	14	<LOD	151				
		2-3	135	<LOD	18		606				
		AVERAGE READING		17	17	<LOD	461				
SB-B1-SW(4)	4/16/2013	3-4	136	<LOD	<LOD	<LOD	71				
		3-4	137	37	<LOD	<LOD	254				
		3-4	138	18	11	<LOD	191				
		AVERAGE READING		28		<LOD	172				
SB-B1-SW(4TD)	4/16/2013	4	139	23	<LOD	<LOD	97				
		4	140	<LOD	15	<LOD	80				
		4	141	17	15	<LOD	111				
		AVERAGE READING		20	15	<LOD	96				
SB-B2-NW(1)	4/17/2013	0-1	355	1,041	<LOD	21	6,538				
		0-1	356	1,376	50	31	7,679				
		0-1	357	539	<LOD	<LOD	3,427				
		AVERAGE READING		985		26	5,881				
SB-B2-NW(2)	4/17/2013	1-2	358	<LOD	34	<LOD	911				
		1-2	359	30	17	<LOD	823				
		1-2	360	13	10	<LOD	852				
		AVERAGE READING		22	20	<LOD	862				
SB-B3-SW(1)	4/17/2013	0-1	361	2,982	<LOD	16	7,453				
		0-1	362	1,019	<LOD	<LOD	4,109				
		0-1	363	3,091	84	<LOD	7,920				
		AVERAGE READING		2,364			6,494				
SB-B3-SW(2)	4/17/2013	1-2	364	632	53	<LOD	2,037				
		1-2	365	338	<LOD	<LOD	1,356				
		1-2	366	268	36	<LOD	1,450				
		AVERAGE READING		413	45	<LOD	1,614				
SB-B3-SW(3)	4/17/2013	2-3	367	19,600	<LOD	<LOD	85,500				
		2-3	368	23,400	835	93	89,200				
		2-3	369	12,700	<LOD	87	78,500				
		AVERAGE READING		18,567		90	84,400				
SB-B3-SW(5)	4/17/2013	4-5	370	9,368	178	49	42,900				
		4-5	371	10,100	255	70	39,900				
		4-5	372	10,000	386	71	37,000				
		AVERAGE READING		9,823	273	63	39,933				
SB-B3-SW(7)	4/17/2013	6-7	373	77	<LOD	<LOD	425				
		6-7	374	21	<LOD	<LOD	150				
		6-7	375	114	20	<LOD	430				
		AVERAGE READING		71		<LOD	335				
SB-B4-NW(1)	4/17/2013	0-1	376	5,758	<LOD	25	30				
		0-1	377	5,454	<LOD	30	21,700				
		0-1	378	8,802	272	<LOD	39,200				
		AVERAGE READING		6,671		28	20,310				
SB-B4-NW(2)	4/17/2013	1-2	379	<LOD	19	<LOD	1,843				
		1-2	380	22	12	<LOD	2,216				
		1-2	381	<LOD	10	<LOD	1,335				
		AVERAGE READING		22	14	<LOD	1,798				
SB-B5-SW(1)	4/18/2013	0-1	403	5,138	287	189	41,000				
SB-B5-SW(2)	4/18/2013	1-2	404	1,320	162	1,080	54,900				
SB-B5-SW(3)	4/18/2013	2-3	405	4,931	140	260	21,300				
SB-B5-SW(4)	4/18/2013	3-4	406	1,423	62	201	16,500				
SB-B5-SW(5)	4/18/2013	4-5	407	40	13	<LOD	636				
		4-5	408	51	18	<LOD	558				
		4-5	409	23	11	<LOD	352				
		AVERAGE READING		38	14	<LOD	515				
SB-B6-NW(1)	4/18/2013	0-1	421	67	21	<LOD	2,474				
		0-1	422	513	<LOD	18	3,002				
		0-1	423	450	<LOD	17	3,637				
		AVERAGE READING		343			3,038				
SB-B6-NW(2)	4/18/2013	1-2	424	408	37	<LOD	4,054				
		1-2	425	368	47	<LOD	3,874				
		1-2	426	343	42	<LOD	3,850				
		AVERAGE READING		373	42	<LOD	3,926				
SB-B6-NW(3)	4/18/2013	2-3	427	13,100	425	39	32,900				
SB-B6-NW(4)	4/18/2013	3-4	428	8,168	423	52	33,700				
SB-B6-NW(5)	4/18/2013	4-5	429	2,297	196	21	12,500				
SB-B6-NW(6)	4/18/2013	5-6	430	648	53	<LOD	2,488				
		5-6	431	609	85	<LOD	4,450				
		5-6	432	875	86	<LOD	3,288				
		AVERAGE READING		711	75	<LOD	3,409				
SB-B6-NW(7)	4/18/2013	6-7	433	<LOD	<LOD	<LOD	41				
		6-7	434	<LOD	<LOD	<LOD	44				
		6-7	435	<LOD	<LOD	<LOD	42				
		AVERAGE READING		<LOD	<LOD	<LOD	42				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	**Sample Date**	**Sample Depth (ft)**	**XRF ID**	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SB-B7-NW(1)	4/18/2013	0-1	436	**4,153**	**281**	**96**	**45,000**				
SB-B7-NW(2)	4/18/2013	1-2	437	**6,397**	**368**	**54**	**53,600**				
SB-B7-NW(3)	4/18/2013	2-3	438	**7,758**	**148**	17	10,200				
SB-B7-NW(4)	4/18/2013	3-4	439	79	**39**	<LOD	1,223				
		3-4	440	<LOD	11	<LOD	602				
		3-4	441	<LOD	**15**	<LOD	484				
		AVERAGE READING		79	**22**	<LOD	770				
SB-B7-NW(5)	4/18/2013	4-5	442	**4,490**	<LOD	30	19,300				
SB-B7-NW(6)	4/18/2013	5-6	443	**2,810**	**109**	<LOD	8,151				
SB-B7-NW(7)	4/18/2013	6-7	444	23	**17**	<LOD	346				
		6-7	445	83	**28**	<LOD	422				
		6-7	446	57	**18**	<LOD	278				
		AVERAGE READING		54	**21**	<LOD	349				
SB-B8-NW(1)	4/18/2013	0-1	447	**12,500**	**442**	**55**	**63,500**				
SB-B8-NW(2)	4/18/2013	1-2	448	**14,100**	**872**	28	**76,700**				
SB-B8-NW(3)	4/18/2013	2-3	449	**4,872**	**4,708**	**90**	**59,600**				
SB-B8-NW(4)	4/18/2013	3-4	450	**1,356**	**1,140**	**112**	13,000				
SB-B8-NW(5)	4/18/2013	4-5	451	**3,501**	**2,649**	**60**	**50,400**				
SB-B8-NW(6)	4/18/2013	5-6	452	360	**405**	<LOD	3,594				
		5-6	453	286	**261**	15	3,443				
		5-6	454	285	**279**	<LOD	3,397				
		AVERAGE READING		310	**315**		3,478				
SB-B8-NW(7)	4/18/2013	6-7	455	43	**29**	18	143				
		6-7	456	26	**26**	<LOD	130				
		6-7	457	37	**33**	<LOD	136				
		AVERAGE READING		35	**29**		136				
SB-B10-NW(1)	4/17/2013	0-1	265	293	**32**	<LOD	776				
		0-1	266	150	<LOD	<LOD	447				
		0-1	267	258	<LOD	<LOD	623				
		AVERAGE READING		234		<LOD	615				
SB-B10-NW(2)	4/17/2013	1-2	268	**720**	<LOD	<LOD	4,253				
		1-2	269	**973**	**53**	<LOD	5,308				
		1-2	270	**548**	**34**	<LOD	4,013				
		AVERAGE READING		**747**	**44**	<LOD	4,525				
SB-B10-NW(3)	4/17/2013	2-3	271	**635**	<LOD	<LOD	2,701				
		2-3	272	**719**	<LOD	16	3,092				
		2-3	273	**596**	<LOD	<LOD	2,980				
		AVERAGE READING		**650**	<LOD		2,924				
SB-B10-NW(4)	4/17/2013	3-4	274	**650**	**30**	<LOD	2,718				
		3-4	275	**845**	**130**	16	3,185				
		3-4	276	**875**	**120**	<LOD	3,136				
		AVERAGE READING		**790**	**93**		3,013				
SB-B10-NW(4TD)	4/17/2013	4	277	221	<LOD	<LOD	1,700				
		4	278	288	<LOD	<LOD	1,635				
		4	279	223	**35**	<LOD	2,229				
		AVERAGE READING		244		<LOD	1,855				
SB-B11-SW(1)	4/17/2013	0-1	280	199	<LOD	<LOD	1,122				
		0-1	281	153	**14**	<LOD	980				
		0-1	282	287	<LOD	<LOD	1,383				
		AVERAGE READING		213		<LOD	1,162				
SB-B11-SW(2)	4/17/2013	1-2	283	17	11	<LOD	389				
		1-2	284	<LOD	11	<LOD	287				
		1-2	285	17	**13**	<LOD	343				
		AVERAGE READING		17	**12**	<LOD	340				
SB-C1-SW(1)	4/16/2013	0-1	142	13	<LOD	<LOD	246				
		0-1	143	<LOD	**13**	<LOD	235				
		0-1	144	16	10	<LOD	250				
		AVERAGE READING		15		<LOD	244				
SB-C1-SW(2)	4/16/2013	1-2	145	<LOD	9	<LOD	69				
		1-2	146	<LOD	<LOD	<LOD	56				
		1-2	147	<LOD	8	<LOD	46				
		AVERAGE READING		<LOD		<LOD	57				
SB-C1-SW(3)	4/16/2013	2-3	148	24	**14**	<LOD	121				
		2-3	149	<LOD	10	<LOD	44				
		2-3	150	<LOD	11	<LOD	45				
		AVERAGE READING		24	**12**	<LOD	70				
SB-C1-SW(4)	4/16/2013	3-4	151	59	**15**	<LOD	170				
		3-4	152	18	<LOD	<LOD	99				
		3-4	153	<LOD	<LOD	<LOD	36				
		AVERAGE READING		39		<LOD	102				
SB-C1-SW(4TD)	4/16/2013	4	154	<LOD	14	<LOD	232				
		4	155	<LOD	10	<LOD	188				
		4	156	<LOD	10	<LOD	192				
		AVERAGE READING		<LOD	11	<LOD	204	22	<1.0	0.29	76
SB-C9-SW(1)	4/17/2013	0-1	247	**5,187**	**158**	**243**	**39,900**				
		0-1	248	**1,929**	**187**	**202**	**26,900**				
		0-1	249	**4,195**	**149**	**197**	**36,400**				
		AVERAGE READING		**3,770**	**165**	**214**	**34,400**				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	Sample Date	Sample Depth (ft)	XRF ID	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SB-C9-SW(2)	4/17/2013	1-2	250	700	<LOD	<LOD	4,249				
		1-2	251	1,015	<LOD	<LOD	5,854				
		1-2	252	329	63	<LOD	3,366				
		AVERAGE READING		681		<LOD	4,490				
SB-C9-SW(3)	4/17/2013	2-3	253	465	<LOD	39	6,142				
		2-3	254	726	80	<LOD	7,541				
		2-3	255	285	<LOD	<LOD	3,831				
		AVERAGE READING		492			5,838				
SB-C9-SW(4)	4/17/2013	3-4	256	2,143	107	33	12,000				
		3-4	257	2,119	101	40	12,200				
		3-4	258	2,793	<LOD	41	10,300				
		AVERAGE READING		2,352	104	38	11,500				
SB-C9-SW(5)	4/17/2013	4-5	259	901	41	<LOD	7,892				
		4-5	260	782	91	<LOD	8,606				
		4-5	261	1,075	109	<LOD	7,056				
		AVERAGE READING		919	80	<LOD	7,851				
SB-C9-SW(6)	4/17/2013	5-6	262	169	46	<LOD	2,411				
		5-6	263	27	18	<LOD	370				
		5-6	264	220	46	<LOD	2,676				
		AVERAGE READING		139	37	<LOD	1,819				
SB-C11-NW(1)	4/17/2013	0-1	286	984	<LOD	<LOD	3,778				
		0-1	287	476	26	<LOD	2,069				
		0-1	288	1,060	71	23	4,231				
		AVERAGE READING		840	49		3,359				
SB-C11-NW(2)	4/17/2013	1-2	289	<LOD	10	<LOD	389				
		1-2	290	<LOD	13	<LOD	370				
		1-2	291	15	20	<LOD	463				
		AVERAGE READING		15	14	<LOD	407				
SB-D1-NW(1)	4/16/2013	0-1	158	228	<LOD	<LOD	1,139				
		0-1	159	96	13	<LOD	859				
		0-1	160	164	<LOD	<LOD	1,060				
		AVERAGE READING		163		<LOD	1,019				
SB-D1-NW(2)	4/16/2013	1-2	161	<LOD	11	<LOD	564				
		1-2	162	14	10	<LOD	705				
		1-2	163	<LOD	<LOD	<LOD	590				
		AVERAGE READING			11	<LOD	620				
SB-D11-SW(1)	4/17/2013	0-1	292	1,010	42	<LOD	11,700				
		0-1	293	257	<LOD	24	5,295				
		0-1	294	847	<LOD	<LOD	4,994				
		AVERAGE READING		705			7,330				
SB-D11-SW(2)	4/17/2013	1-2	295	<LOD	12	<LOD	956				
		1-2	296	<LOD	10	<LOD	887				
		1-2	297	<LOD	10	<LOD	713				
		AVERAGE READING		<LOD	11	<LOD	852				
SB-E1-SW(1)	4/16/2013	0-1	164	<LOD	9	<LOD	485				
		0-1	165	361	<LOD	<LOD	746				
		0-1	166	38	13	<LOD	506				
		AVERAGE READING		200	11	<LOD	579				
SB-E1-SW(2)	4/16/2013	1-2	167	<LOD	<LOD	<LOD	254				
		1-2	168	<LOD	15	<LOD	237				
		1-2	169	<LOD	12	<LOD	82				
		AVERAGE READING		<LOD	12	<LOD	191				
SB-E11-NW(1)	4/17/2013	0-1	298	516	<LOD	<LOD	2,582				
		0-1	299	140	<LOD	<LOD	1,276				
		0-1	300	85	<LOD	<LOD	643				
		AVERAGE READING		247	<LOD	<LOD	1,500				
SB-E11-NW(2)	4/17/2013	1-2	301	<LOD	12	<LOD	88				
		1-2	302	17	12	<LOD	129				
		1-2	303	<LOD	11	<LOD	155				
		AVERAGE READING		17	12	<LOD	124				
SB-F1-SW(1)	4/16/2013	0-1	170	560	<LOD	<LOD	1,924				
		0-1	171	137	<LOD	20	1,065				
		0-1	172	523	<LOD	<LOD	2,551				
		AVERAGE READING		407	<LOD		1,847				
SB-F1-SW(2)	4/16/2013	1-2	173	<LOD	9	<LOD	386				
		1-2	174	<LOD	<LOD	<LOD	359				
		1-2	175	<LOD	12	<LOD	415				
		AVERAGE READING		<LOD	11	<LOD	387				
SB-F11-SW(1)	4/17/2013	0-1	304	2,128	95	87	16,400				
		0-1	305	3,534	149	98	16,400				
		0-1	306	2,231	97	114	19,700				
		AVERAGE READING		2,631	114	100	17,500				
SB-F11-SW(2)	4/17/2013	1-2	307	32	15	<LOD	36				
		1-2	308	<LOD	10	<LOD	791				
		1-2	309	<LOD	9	<LOD	976				
		AVERAGE READING		32	11	<LOD	601				
SB-G1-SW(1)	4/16/2013	0-1	176	160	25	<LOD	3,105				
		0-1	177	142	<LOD	<LOD	3,195				
		0-1	178	254	<LOD	<LOD	3,633				
		AVERAGE READING		185		<LOD	3,311				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	Sample Date	Sample Depth (ft)	XRF ID	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SB-G1-SW(2)	4/16/2013	1-2	179	<LOD	<LOD	<LOD	714				
		1-2	180	<LOD	8	<LOD	744				
		1-2	181	<LOD	11	<LOD	760				
		AVERAGE READING		<LOD	10	<LOD	739				
SB-G3-NW(1)	4/17/2013	0-1	223	**5,483**	**151**	**88**	**28,000**				
		0-1	225	**3,050**	**273**	**64**	**35,800**				
		0-1	226	**2,754**	**260**	**57**	**35,100**				
		AVERAGE READING		**3,762**	**228**	**70**	**32,967**				
SB-G3-NW(2)	4/17/2013	1-2	224	217	<LOD	18	1,675				
		1-2	227	160	**16**	15	1,186				
		1-2	228	143	**24**	<LOD	994				
		AVERAGE READING		173	**20**	17	1,285				
SB-G4-SW(1)	4/17/2013	0-1	229	**755**	<LOD	16	6,434				
		0-1	230	**533**	<LOD	<LOD	6,607				
		0-1	231	**1,113**	<LOD	21	7,569				
		AVERAGE READING		**800**	<LOD	19	6,870				
SB-G4-SW(2)	4/17/2013	1-2	232	<LOD	10	<LOD	279				
		1-2	233	<LOD	8	<LOD	259				
		1-2	234	<LOD	9	<LOD	294				
		AVERAGE READING		<LOD	9	<LOD	277				
SB-G5-NW(1)	4/17/2013	0-1	235	**2,395**	**219**	21	15,400				
		0-1	236	**2,153**	**177**	**90**	12,400				
		0-1	237	**2,583**	**253**	28	**52,100**				
		AVERAGE READING		**2,377**	**216**	**46**	**26,633**				
SB-G5-NW(2)	4/17/2013	1-2	238	215	<LOD	30	1,380				
		1-2	239	98	<LOD	<LOD	1,027				
		1-2	240	15	9	<LOD	658				
		AVERAGE READING		109			1,022				
SB-G6-SW(1)	4/17/2013	0-1	241	**427**	<LOD	**44**	2,815				
		0-1	242	**737**	<LOD	**50**	3,343				
		0-1	243	**980**	<LOD	**66**	3,261				
		AVERAGE READING		**715**	<LOD	**53**	3,140				
SB-G6-SW(2)	4/17/2013	1-2	244	<LOD	<LOD	<LOD	652				
		1-2	245	<LOD	**17**	<LOD	964				
		1-2	246	<LOD	**12**	<LOD	585				
		AVERAGE READING		<LOD	**15**	<LOD	734				
SB-G6-NW(3)	4/17/2013	2-3	310	78	<LOD	<LOD	1,206				
		2-3	311	<LOD	9	<LOD	881				
		2-3	312	90	<LOD	<LOD	1,137				
		AVERAGE READING		84		<LOD	1,075				
SB-G7-NW(1)	4/17/2013	0-1	313	**3,156**	**210**	**96**	17,500				
		0-1	314	**2,968**	**192**	**107**	18,500				
		0-1	315	**3,609**	**174**	**80**	13,900				
		AVERAGE READING		**3,244**	**192**	**94**	16,633				
SB-G7-NW(2)	4/17/2013	1-2	316	**2,225**	**131**	**83**	10,900				
		1-2	317	**1,059**	<LOD	31	4,994				
		1-2	318	**1,346**	<LOD	<LOD	6,625				
		AVERAGE READING		**1,543**		**57**	7,506				
SB-G8-SW(1)	4/17/2013	0-1	319	<LOD	<LOD	**74**	4,079				
		0-1	320	44	**14**	**59**	3,070				
		0-1	321	258	<LOD	**92**	4,658				
		AVERAGE READING		151		**75**	3,936				
SB-G9-NW(1)	4/17/2013	0-1	322	**2,133**	**204**	**73**	35,100				
		0-1	323	**1,520**	**64**	**110**	13,200				
		0-1	324	**2,211**	**210**	**173**	**41,100**				
		AVERAGE READING		1,955	**159**	**119**	**29,800**				
SB-G9-NW(2)	4/17/2013	1-2	325	<LOD	8	<LOD	215				
		1-2	326	24	10	<LOD	2,085				
		1-2	327	<LOD	<LOD	<LOD	214				
		AVERAGE READING		24	**9**	<LOD	838				
SB-G10-NW(1)	4/17/2013	0-1	328	13	9	<LOD	545				
		0-1	329	18	<LOD	<LOD	646				
		0-1	330	13	<LOD	<LOD	684				
		AVERAGE READING		15		<LOD	625				
SB-G11-NW(1)	4/17/2013	0-1	331	**3,200**	**155**	82	12,500				
		0-1	332	**2,384**	<LOD	79	12,300				
		0-1	333	**1,386**	**48**	50	7,617				
		AVERAGE READING		**2,323**	**102**	**70**	10,806				
SB-G11-NW(2)	4/17/2013	1-2	334	16	**13**	<LOD	175				
		1-2	335	<LOD	11	<LOD	121				
		1-2	336	<LOD	**19**	<LOD	155				
		AVERAGE READING		16	**14**	<LOD	150				
SB-H1-NW(1)	4/16/2013	0-1	182	**2,613**	<LOD	**60**	16,900				
		0-1	183	**2,184**	<LOD	34	13,800				
		0-1	184	**1,539**	<LOD	38	15,900				
		AVERAGE READING		**2,112**	<LOD	**44**	15,533				
SB-H1-NW(2)	4/16/2013	1-2	185	**477**	<LOD	<LOD	4,375				
		1-2	186	**483**	**34**	<LOD	4,911				
		1-2	187	**512**	**56**	20	5,093				
		AVERAGE READING		**491**	**45**		4,793				

				XRF Data (mg/kg)				Laboratory Data (mg/kg)			
Residential Risk (mg/kg)				400	11.3	39	23,500	400	11.3	39	23,500
Non-Residential Risk (mg/kg)				1,000	38	1,000	613,000	1,000	38	1,000	613,000
Sample ID	**Sample Date**	**Sample Depth (ft)**	**XRF ID**	Pb	As	Cd	Zn	Pb	As	Cd	Zn
Surface Soil Samples											
SB-H1-NW(3)	4/16/2013	2-3	188	<LOD	9	<LOD	1,512				
		2-3	189	14	<LOD	31	1,205				
		2-3	190	<LOD	**13**	<LOD	1,344				
		AVERAGE READING		14	**11**		1,354				
SB-H2-SW(1)	4/16/2013	0-1	191	**2,601**	**74**	<LOD	4,144				
		0-1	192	**2,549**	<LOD	<LOD	4,186				
		0-1	193	**3,805**	<LOD	<LOD	5,456				
		AVERAGE READING		**2,985**		<LOD	4,595				
SB-H2-SW(2)	4/16/2013	1-2	194	**1,018**	<LOD	27	5,765				
		1-2	195	**1,185**	**66**	**52**	5,806				
		1-2	196	**2,252**	**115**	19	7,053				
		AVERAGE READING		**1,485**	**91**	33	6,208				
SB-H2-SW(3)	4/16/2013	2-3	197	<LOD	<LOD	<LOD	461				
		2-3	198	<LOD	<LOD	<LOD	428				
		2-3	199	78	**19**	<LOD	617				
		AVERAGE READING		78		<LOD	502				
SB-H3-NW(1)	4/16/2013	0-1	200	4,327	**209**	**90**	**33,300**				
		0-1	201	619	**104**	**40**	**126,700**				
		0-1	202	4,163	**135**	**109**	**33,500**				
		AVERAGE READING		**3,036**	**149**	**80**	**64,500**				
SB-H3-NW(3)	4/16/2013	2-3	203	44	<LOD	<LOD	777				
		2-3	204	<LOD	**13**	<LOD	578				
		2-3	205	<LOD	**13**	<LOD	584				
		AVERAGE READING		44	**13**	<LOD	646				
SB-H4-SW(1)	4/17/2013	0-1	217	**2,141**	**183**	**207**	**65,900**				
		0-1	218	**525**	**38**	<LOD	11,500				
		0-1	219	363	**44**	**82**	9,063				
		AVERAGE READING		**1,010**	**88**	**145**	**28,821**				
SB-H4-SW(2)	4/17/2013	1-2	220	37	<LOD	**63**	1,700				
		1-2	221	26	**12**	**60**	2,239				
		1-2	222	38	11	**58**	2,572				
		AVERAGE READING		34	**12**	**60**	2,170				
SB-H9-NW(1)	4/18/2013	0-1	604	398	**41**	18	4,121				
	4/18/2013	0-1	605	**1,778**	**811**	**71**	**37,600**				
SB-H9-NW(4)	4/18/2013	3-4	606	<LOD	10	<LOD	61				
		3-4	607	55	**53**	<LOD	2,358				
		3-4	608	<LOD	**16**	<LOD	204				
		AVERAGE READING		55	**26**	<LOD	874				
MW-1(1)	4/18/2013		596	**6,162**	**139**	**52**	20,500				
MW-1(2)	4/18/2013	1-2	597	<LOD	<LOD	<LOD	522				
		1-2	598	<LOD	11	<LOD	575				
		1-2	599	<LOD	10	<LOD	602				
		AVERAGE READING		<LOD	11	<LOD	566				

Black bolded values indicate exceedences of residential RSK criteria

Red bolded values indicate exceedences of nonresidential RSK criteria

In calculating average concentrations where values were measured as below the level of detection (<LOD), one half of the detection limit (+/- value) was used.

[2] - Soil reading taken adjacent to scheduled sampling location for additional delineation

APPENDIX C2

SOIL BORING LOGS

LOG OF BORING SB-H4-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; brown to dark brown, rootlets		CG		
	CLAY; very wet, soft, dark brown				Soil boring located in the southwestern portion of the property immediately north of the former Missouri Pacific RR. The ground surface was rocky and recovery was approximately 2-feet. The boring was 'pushed' to 4 feet. Two composite soil samples were collected for XRF analyses.
1					
2	reddish brown, minor rootlets, plastic		CL		
3					
4					

LOG OF BORING SB-H3-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMETER DEBRIS; black to reddish brown, fine gravel to fine grained, clayey		CG	SB-FD-004	Soil boring located near the southwest property boundary immediately north of the former Missouri Pacific RR. Smelter debris and slag evident on the ground surface. The boring was 'pushed' to 4 feet. Two composite soil samples were collected for XRF analyses. Soil sample SB-FD-004 (SB-H3-NW(1)) collected from this boring.
1	CLAY; silty, brown, slightly plastic		CL		
2	reddish brown, plastic				
3					
4					

07-10-2013 \\entact-da\Projects\Projects\East La Harpe, KS\Boring Logs\SB-H3-NW.bor

LOG OF BORING SB-H2-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; black to reddish brown, clayey		CG		
	CLAY; silty, brown		CL		Soil boring located near the southwest property boundary. Smelter debris and slag covered the ground surface. The boring was 'pushed' to 4 feet. Three composite soil samples were collected for XRF analyses.
1					
2					
3	reddish brown, silty				
4					

LOG OF BORING SB-H1-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; black, reddish brown, minor rootlets		CG		Soil boring located along the southwest property boundary. Smelter debris and slag covered the ground surface. The boring was 'pushed' to 4 feet with recovery only approximately 1.5 feet. Three composite soil samples were collected for XRF analyses.
1					
	CLAY; no recovery		CL		
2					
3					
4					

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LOG OF BORING SB-G11-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; fine grained, dark brown		CG		Soil boring located in the southeastern portion of the property and standing water surrounded the location. Smelter waste was scattered and evident on the ground surface. The boring was 'pushed' to 4 feet, and two samples were analyzed by the XRF.
1					
	CLAY; dark brown, rootlets, wet		CL		
2	plastic, brown				
3	yellowish brown to orange, plastic,				
4					

LOG OF BORING SB-G10-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; fine to coarse grained, dark brown		CG		
	CLAY; dark brown, rootlets				Soil boring located in the southeastern portion of the property. Smelter waste is evident on the ground surface. The boring was 'pushed' to 4 feet, and one sample was analyzed by the XRF.
1	brown to reddish brown, rare rootlets				
2			CL		
3	plastic, increased reddish brown color				
4					

07-10-2013 \\entact-da\Projects\Projects\East La Harpe, KS\Boring Logs\SB-G10-SW.bor

LOG OF BORING SB-G9-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, fine to coarse grained		CG		Soil boring located in the southeastern portion of the property. The groundsurface is covered with coarse grained smelter debris. The boring was 'pushed' to 4 feet, but recovery was only 2.0 feet.. Two composite soil sample was collected for XRF analyses. One soil sample, SB-FD-008 (SB-G9-NW(2)) was collected for laboratory analyses of total lead, arsenic, selenium, and cadmium.
1	CLAY; brown, slightly plastic		CL		
2				SB-FD-008	
3					
4					

LOG OF BORING SB-G8-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown to reddish brown, fine to coarse grained		CG		Soil boring located in the southeastern portion of the property. The groundsurface is covered with coarse grained smelter debris. Some rocky fragments exhibited a purple coloration. A coarse grained slag pile was located immediately south of the boring location. The boring was 'pushed' to 4 feet, but recovery was only 1.5 feet.. One composite soil sample was collected for XRF analyses.
1					
	CLAY; reddish brown, plastic		CL		
2					
3					
4					

LOG OF BORING SB-G7-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, coarse grained		CG		
	CLAY; dark brown, slightly plastic				Soil boring located in the southcentral portion of the property. Smelter debris is visible on the ground surface. The boring was 'pushed' to 4 feet. Two composite soil samples were collected for XRF analyses. A soil sample was collected from 4 feet for analyses of total lead, arsenic, selenium, and cadmium
1					
2	CLAY; brown, plastic		CL		
3					
	reddish brown, plastic			SB-FD-007	
4					

LOG OF BORING SB-G6-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; coarse grained, dark brown		CG		
	CLAY; dark brown				Soil boring located near the southcentral portion of the property. Smelter waste was evident on the ground surface. The boring was 'pushed' to 4 feet. Two composite soil samples were collected for XRF analyses.
1	brown, minor rootlets				
2	brown to reddish brown		CL		
3					
4					

07-10-2013 \\entact-da\Projects\Projects\East La Harpe, KS\Boring Logs\SB-G6-SW.bor

LOG OF BORING SB-G5-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; rootlets, dark brown		CG		Soil boring located near the southcentral portion of the property. Smelter debris is visible on the ground surface. The boring was 'pushed' to 4 feet. Two composite soil samples were collected for XRF analyses. Soil sample SB-FD-006 (SB-G5-SW(4) was collected for laboratory analyses of lead, arsenic, selenium, and cadmium.
	CLAY; dark reddish brown, minor rootlets		CL		
1					
2	rare reddish brown slag fragment				
3					
	reddish brown, plastic			SB-FD-006	
4					

LOG OF BORING SB-G4-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; surficial, fine to coarse grained, dark brown		CG		
	CLAY; rootlets, brown				
	silty, slightly plastic				Soil boring located in the southwestern portion of the property. Smelter debris and slag evident on the ground surface. A limestone rock pile is west of this location. The boring was 'pushed' to 4 feet. Two composite soil samples were collected for XRF analyses.A soil sample, SB-FD-005 (SB-G4-SW(4)) was collected from this boring for analyses of total lead, arsenic, selenium, and cadmium.
1	reddish brown, minor rootlets,silty				
2			CL		
3	slightly plastic, becoming more red and plastic with depth				
				SB-FD-005	
4					

07-10-2013 \\entact-da\Projects\Projects\East La Harpe, KS\Boring Logs\SB-G4-SW.bor

LOG OF BORING SB-G3-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; black to reddish brown, fine gravel to coarse grained, clayey		CG		
	CLAY; silty, grayish brown				Soil boring located near the southwest property boundary approximately 100 feet east of the pond. Smelter debris and slag evident on the ground surface. The boring was 'pushed' to 4 feet. Two composite soil samples were collected for XRF analyses.
1	reddish brown, plastic				
2			CL		
3					
4					

LOG OF BORING SB-G1-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; black, rootlets, friable		CG		
	CLAY; dark brown, slightly plastic				Soil boring located along the west property boundary. The area of low standing water (pond) was to the east. The boring was completed at 4-feet bgs. Two composite soil samples were collected for XRF analyses. Soil sample SB-FD-003 (SB-G1-SW 4TD) was sent to the laboratory for analyses of total lead, arsenic, cadmium, and selenium
1	7.5 YR 4/3 brown, slightly plastic				
2	7.5 YR 5/4 reddish brown, rare silt		CL		
3	10 YR 5/4 yelllowish brown				
				SB-FD-003	
4					

07-10-2013 \\entact-da\Projects\East La Harpe, KS\Boring Logs\SB-G1-SW.bor

LOG OF BORING SB-F11-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, fine grained		CG		Soil boring located in the southeastern corner of the property and standing water surrounded the location. Smelter waste was scattered and evident on the ground surface. The boring was 'pushed' to 4 feet, and two samples were analyzed by the XRF. Soil sample SB-FD-009 was collected from the 2-3 foot interval.
	CLAY; dark brown, rootlets, wet		CL		
1	becoming brown, plastic				
2	yellowish brown			SB-FD-009	
3					
4					

07-10-2013 \\entact-da\Projects\East La Harpe, KS\Boring Logs\SB-F11-SW.bor

LOG OF BORING SB-F1-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, clayey, moist		CG		
	CLAY; organic, moist, sightly plastic, dark brown, rootlets				Soil boring located along the west property boundary. The ground was wet on the surface. It was completed at 4-feet bgs. Two composite soil samples were collected for XRF analyses.
1	7.5 YR 4/3 brown, minor rootlets				
2	10 YR 4/4 reddish brown, rare rootlets		CL		
3	7.5 YR 4/3 brown with <1% yellowish brown weathering				
4					

LOG OF BORING SB-E11-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, clayey		CG		
	CLAY; dark brown, rootlets, and woodchips, wet				Soil boring located in the eastern portion of the property. The boring was located between a flowing bifurcated stream channel. Abundant smelter waste was visible in the channels and evident on the ground surface. The boring was 'pushed' to 4 feet, and two samples were analyzed by the XRF.
1	becoming brown, plastic, rare rootlets				
2			CL		
	yellowish brown				
3					
4					

LOG OF BORING SB-E1-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, clayey		CG		
	CLAY; wet to approximately 0.4-feet, dark brown, plastic, abundant rootlets -1.2 7.5 YR 5/3 reddish brown, plastic				Soil boring located along the west property boundary. The boring was installed west of the concrete slab of the former smelter. The ground was wet to the east. It was completed at 4-feet bgs. Two composite soil samples were collected for XRF analyses. A soil sample was collected for analyses at 4 feet depth. SB-E1-SW 4TD - SB-FD-002
1					
2	10 YR 6/4 light yellowish brown, minor weathered slag nodules		CL		
3	10YR 5/6 yellowish brown, slightly silty				
				SB-FD-002	
4					

LOG OF BORING SB-D11-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, rootlets, wet, fine to medium grained slag		CG		
	CLAY; dark brown, rootlets, wet, rare limestone granules		CL		Soil boring located in the eastern portion of the property. The boring was located adjacent to a flowing stream channel. Abundant smelter waste was visible on the ground surface. The boring was 'pushed' to refusal at 4 feet where limestone was present. Two samples were analyzed by the XRF. One soil sample was collected for analyses at 3 feet below ground surface (SB-FD-010).
1	becoming brown, plastic				
2	yellowish brown				
3	with minor 1/16-inch LS			SB-FD-010	
	white to yellowish brown weathered LS				
4					

07-10-2013 \\entact-dal\Projects\Projects\East La Harpe, KS\Boring Logs\SB-D11-SW.bor

LOG OF BORING SB-D1-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, clayey, abundant rootlets,		CG		
	CLAY; brown to dark brown, plastic		CL		Soil boring located along the west property boundary. The boring was installed on a wet surface with standing water to the west and the concrete slab of the former smelter to the south. It was completed at 4-feet bgs. Two composite soil samples were collected for XRF analyses. .
1	5 YR 5/3 reddish brown, rootlets				
2					
3	10YR 6/4 light yellowish brown				
4					

LOG OF BORING SB-C11-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; dark brown, clayey, friable, fine to medium grained to 1.5 feet, wet		CG		Soil boring located near the northeast corner of the property immediately south of a southwestwardly flowing intermittant stream. Smelter waste was visible on the ground surface. The boring was 'pushed' to 4 feet bgs. Two samples were analyzed by the XRF.
1					
	CLAY; becoming brown, plastic		CL		
2					
3	yellowish brown				
4					

LOG OF BORING SB-C1-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	CLAY; dark brown, plastic, abundant rootlets, wet				Soil boring located along the west property boundary. The boring was installed on a wet surface with standing water adjacent to this location. It was completed at 4-feet bgs. Composite soil samples were collected each foot and at the total depth fo XRF analyses. Soil sample SB-C1-SW 4TD was collected as SB-FD-001 for analyses of total lead, arsenic, cadmium, and selenium
1	10 YR 5/2 gray brown				
2	10 YR 6/4 yellow brown, plastic,		CL		
3					
	10YR 7/4 pale brown			SB-FD-001	
4					

07-10-2013 \\entact-dal\Projects\Projects\East La Harpe, KS\Boring Logs\SB-C1-SW.bor

LOG OF BORING SB-B11-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS; course and medium grained fragments		CG		
	CLAY; dark brown, rootlets, minor slag, wet				Soil boring located near the northeast corner of the property adjacent to an intermittent stream. Smelter waste was scattered and visible on the ground surface. The boring was 'pushed' to 4 feet bgs. Two samples were analyzed by the XRF. One sample, SB-FD-011 (SB-B11_SW(4)), was submitted to the laboratory for analyses of total lead, arsenic, selenium, and cadmium.
1	becoming brown, plastic, minor rootlets				
2	reddish brown		CL		
3	becoming yellowish brown, plastic				
				SB-FD-011	
4					

LOG OF BORING SB-B10-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	CLAY; dark brown, rootlets, minor wood fragments				Soil boring located near the northeast corner of the property. Very minimum smelter waste was visible on the ground surface. The boring was 'pushed' to 4 feet bgs. Five samples were analyzed by the XRF.
1					
2			CL		
	0.5 foot wet zone				
3	brown to reddish brown				
4					

07-10-2013 \\entact-dal\Projects\Projects\East La Harpe, KS\Boring Logs\SB-B10-NW.bor

LOG OF BORING SB-B9-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 16, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)
0	SMELTER DEBRIS & FILL; coarse grained gravel, purple hue, LS rk, dark gray clay			
1	intermittent fine gravel beds			
2	dark gray clay, plastic			
3			CG	
4	fine gravel and saturated coarse grained sand			
5				
6	CLAY; yellowish brown, tight		CL	
7	LIMESTONE; weathered, white to yellowish brown			
	TD			
8				

Comments

Soil boring located in the northeast portion of the property. Smelter debris with a purple hue, LS on the ground surface. The boring was 'pushed' to 7 feet bgs to refusal where weathered LS was encountered . No samples were logged as being analyzed by XRF.

LOG OF BORING SB-B8-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; black and dark brown, coarse grained, minor reddish brown fine to med grained slag		CG	SB-FD-012 (3 feet)	Soil boring located near the north central portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 8 feet where weathered LS was encountered . Three samples were collected for XRF analyses. A soil sample was collected at 3 feet bgs for laboratory analyses of lead, arsenic, cadmium, and selenium.
1					
2					
3					
4	CLAY; gray, plastic, 0.5 feet sandy, fine grained, saturated		CL		
5					
6	light brown, plastic				
7					
8	yellowish brown; weathered LS at 8 feet bgs				

LOG OF BORING SB-B7-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; black and dark brown, fine to coarse grained, clayey, rootlets		CG		Soil boring located near the north central portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 8 feet bgs. Two samples were collected for XRF analyses.
1					
2					
3					
4	CLAY; 2.5Y 4/1 dark gray, plastic, sandy, fine grained, saturated		CL		
5					
6	yellowish brown				
7					
8					

LOG OF BORING SB-B6-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)
0	SMELTER DEBRIS & FILL;			
1	clayey, 7.5 YR 4/3 brown, plastic			
2			CG	
3	dark brown clay and fine grained slag			
4	sandy clay, wet, with glass shards			
5	CLAY; 10 YR 6/4 yellowish brown, wet			
6			CL	
7	10 YR 7/6 yellow			SB-FD-014
8	clay and weathered LS			

Comments

Soil boring located in the north central portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 8 feet bgs. Five samples were collected for XRF analyses. Soil sample SB-FD-014 was collected from 7 feet bgs for laboratory analyses of total lead, arsenic, cadmium, and selenium.

LOG OF BORING SB-B5-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; clayey, black, rootlets, fine to medium grained slag				Soil boring located in the northwestern portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 8 feet bgs. Three samples were collected for XRF analyses.
1	sandy clay, 10 YR 7/3 very pale brown, plastic		CG		
2	slag and black clay				
3					
4	CLAY; brown, moist		CL		
5					
6					
7	10 YR 4/2 dark grayish brown				
8					

07-10-2013 \\entact-da\Projects\Projects\East La Harpe, KS\Boring Logs\SB-B5-SW.bor

LOG OF BORING SB-B4-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; clayey, black, rootlets, fine to medium grained slag		CG		Soil boring located in the northwestern portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 4 feet bgs. Three samples were collected for XRF analyses. Soil sample SB-FD-015 was collected from this boring from 3 feet bgs for analyses of total lead, cadmium, arsenic, and selenium.
1	CLAY; 7.5 YR 5/4 brown, silty		CL		
2					
3				SB-FD-015	
4					

LOG OF BORING SB-B3-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; wood chips, rootlets, brown				Soil boring located in the northwestern portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 8 feet bgs. Five samples were collected for XRF analyses.
1	color grading to 10 YR 6/2 light brownish gray, with fine gravel, clayey				
2					
3	fine to medium grained slag, black clayey, damp		CG		
4					
5	black coarse grained sand, saturated				
6					
7	LIMESTONE; weathered, dry, pale yellow				
8					

07-10-2013 \\entact-da\Projects\East La Harpe, KS\Boring Logs\SB-B3-SW.bor

LOG OF BORING SB-B2-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; clayey, black, fine to medium grained slag		CG		
	CLAY; 10 YR 5/2 grayish brown and 10 YR 6/4 light yellowish brown		CL		Soil boring located in the northwestern corner of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 4 feet bgs. Two samples were collected for XRF analyses. Soil sample SB-FD-016 was collected from 3 feet bgs.
1					
2					
3	silty 10 YR 6/2 light brownish gray			SB-FD-015	
4					

07-10-2013 \\entact-dal\Projects\Projects\East La Harpe, KS\Boring Logs\SB-B2-NW.bor

LOG OF BORING SB-B1-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 15, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER WASTE & FILL; clayey, black, fine to medium grained slag		BR		
	CLAY; dark brown, plastic, abundant rootlets				Soil boring located in the northwest corner of the property. It was completed at 4-feet bgs. Composite soil samples were collected each foot and at the total depth for XRF analyses. .
1	7.5 YR 5/1 brown with rare reddish brown slag inclusions				
2	7.5 YR 5/3 brown, plastic, rare 1/8-inch slag nodules		CL		
3					
	2.5Y 5/3 light olive brown				
4					

07-10-2013 \\entact-da\Projects\East La Harpe, KS\Boring Logs\SB-B1-SW.bor

LOG OF BORING SB-A7-NW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; black, fine to medium grained		CG		Soil boring located in the north central portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 8 feet bgs. Three samples were collected for XRF analyses. Soil sample SB-FD-013 was collected from 3 feet bgs for laboratory analyses of total lead, arsenic, cadmium, and selenium.
1					
	CLAY; 10 YR 3/1 very dark gray brown, minor rootlets		CL		
2					
3				SB-FD-013	
4					
5	10 YR 5/2 grayish brown, plastic				
6					
	10 YR 5/3 brown, silty				
7					
	10 YR 6/8 brownish yellow and 10 YR 5/2 grayish brown				
8					

LOG OF BORING SB-A6-SW

Former East La Harpe Smelter
La Harpe, Kansas
ENTACT Project # E8110

Date Drilled	: March 17, 2013	Driller	: Jeff Jaquay
Boring Diameter	: 3.0 inches	ENTACT Geologist	: Marty Cox, PG
Drilling Method	: Geoprobe		
Sampling Method	: continuous		
Drilling Company	: Environmental Priority Svc		

Depth in Feet	Description	Graphic Log	USCS	Sample Depth (feet)	Comments
0	SMELTER DEBRIS & FILL; 10 YR 4/2 dark grayish brown				Soil boring located in the north central portion of the property. Surficial smelter debris is scattered on the ground surface. The boring was 'pushed' to 8 feet bgs. Five samples were collected for XRF analyses.
1	clayey, 10 YR 3/1 very dark gray and fine grained slag		CG		
2					
3					
4	CLAY; 10 YR 4/2 dark grayish brown, plastic, 10 YR 5/6 yellowish brown, plastic		CL		
5					
6					
7					
8					

07-10-2013 \\entact-da\Projects\Projects\East La Harpe, KS\Boring Logs\SB-A6-SW.bor

APPENDIX C3

MONITOR WELL BORING LOGS & FORMS WWC-5

LOG OF BORING MW - 3

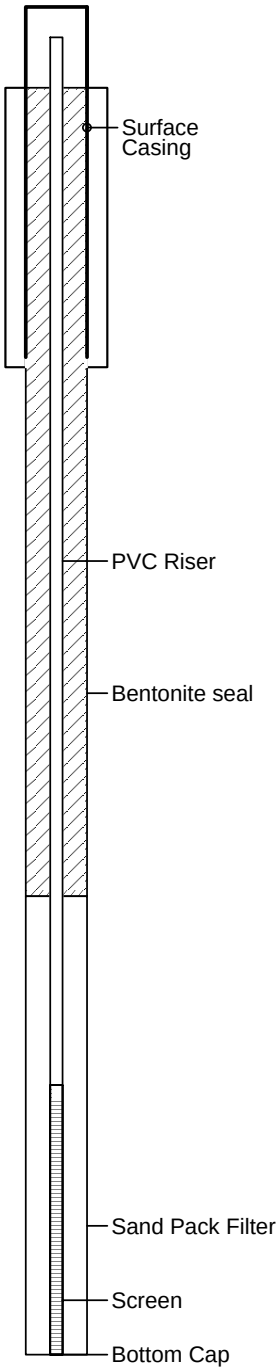
Former East La Harpe Smelter
La Harpe, Kansas

ENTACT Project # E8110

DATE COMPLETED	: April 17, 2013	DRILLING COMPANY	: Env. Priority Svc
HOLE DIAMETER	: 8.0 inches	DRILLER	: Jeff Jaquay
DRILLING METHOD	: Hollow Stem		
DRILLING TYPE	: Auger		
ENTACT REP.	: Marty Cox		

Depth in feet	DESCRIPTION	GRAPHIC	USCS
0	SMELTER DEBRIS; dark brown, fine to coarse grained, clayey		CG
	CLAY; brown to dark brown, plastic		CL
	brown, slightly plastic		
2			
4	light brown to tan		
	LIMESTONE; weathered, white to tan		
	TD		

Well: MW-3
Elev.:



Well Construction Information

WELL CONSTRUCTION

DATE COMPLETED	: 4/17/2013
HOLE DIAMETER	: 8 inches
DRILLING METHOD	: Hollow Stem
ENTACT REP.	: Marty Cox

WELL CASING

MATERIAL	: PVC
DIAMETER	: 2 inch
JOINTS	: Screw-Coupled

WELL SCREEN

MATERIAL	: PVC
DIAMETER	: 2 inches
JOINTS	: Screw-Coupled
OPENING	: .010 Slot
SAND PACK	: 12/20 quartz
ANNULUS SEAL	: Bentonite chip

Monitor well boring completed at top of limestone approximately 4.7 feet bgs. There was no water in the well after it was drilled. Well completed above grade with a protective steel cover set in 3 foot by 3 foot concrete pad.

LOG OF BORING MW - 2

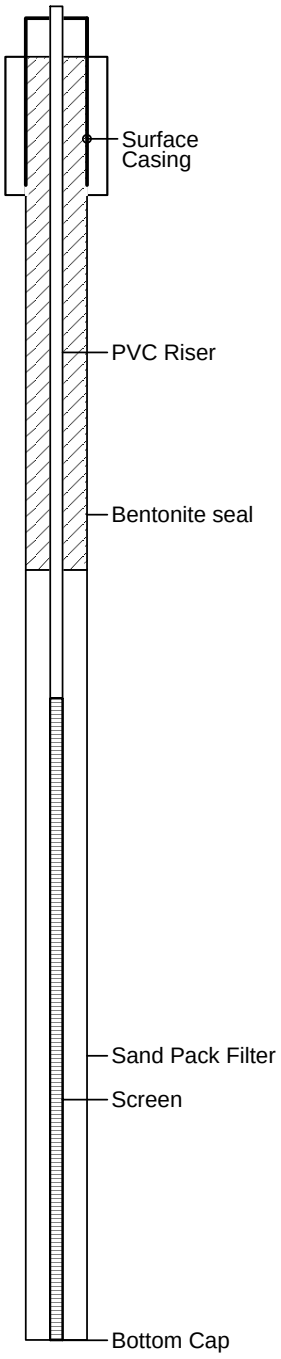
Former East La Harpe Smelter
La Harpe, Kansas

ENTACT Project # E8110

DATE COMPLETED	: April 17, 2013	DRILLING COMPANY	: Env. Priority Svc
HOLE DIAMETER	: 8.0 inches	DRILLER	: Jeff Jaquay
DRILLING METHOD	: Hollow Stem		
DRILLING TYPE	: Auger		
ENTACT REP.	: Marty Cox		

Depth in feet	DESCRIPTION	GRAPHIC	USCS
0	SMELTER DEBRIS; dark brown to black, fine to coarse grained, clayey with rootlets		CG
	CLAY; brown to dark brown, plastic		CL
	brown, slightly plastic		
2	reddish brown, rare silt		
	yellowish brown		
4			
6			
8			
	tan, slightly plastic, with ls fragments		
10	LIMESTONE; weathered, white to tan		
	TD		

Well: MW-2
Elev.:



WELL CONSTRUCTION information

WELL CONSTRUCTION

DATE COMPLETED	: 4/17/2013
HOLE DIAMETER	: 8 inches
DRILLING METHOD	: Hollow Stem
ENTACT REP.	: Marty Cox

WELL CASING

MATERIAL	: PVC
DIAMETER	: 2 inch
JOINTS	: Screw-Coupled

WELL SCREEN

MATERIAL	: PVC
DIAMETER	: 2 inches
JOINTS	: Screw-Coupled
OPENING	: .010 Slot
SAND PACK	: 12/20 quartz
ANNULUS SEAL	: Bentonite chip

Monitor well boring completed at top of limestone approximately 10 feet bgs. There was no water in the well after it was drilled. Well completed above grade with a protective steel cover set in 3 foot by 3 foot concrete pad.

07-10-2013 \\entact-dal\Projects\Projects\East La Harpe, KS\Boring Logs\MW-2.bor

LOG OF BORING MW - 1

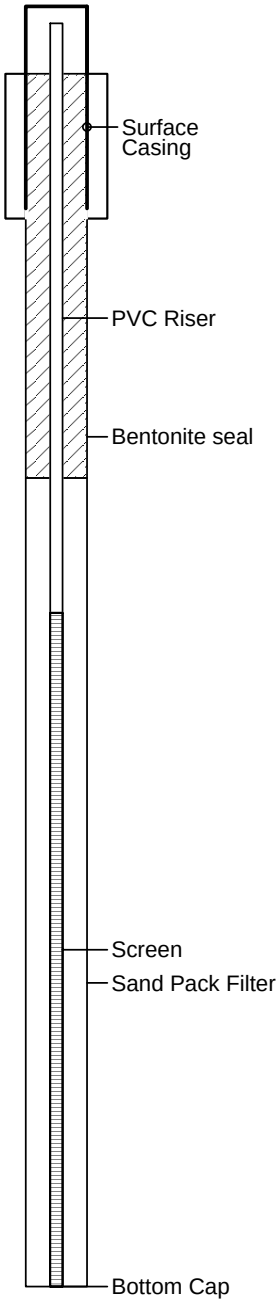
Former East La Harpe Smelter
La Harpe, Kansas

ENTACT Project # E8110

DATE COMPLETED	: April 18, 2013	DRILLING COMPANY	: Env. Priority Svc
HOLE DIAMETER	: 8.0 inches	DRILLER	: Jeff Jaquay
DRILLING METHOD	: Hollow Stem		
DRILLING TYPE	: Auger		
ENTACT REP.	: Marty Cox		

Depth in feet	DESCRIPTION	GRAPHIC	USCS
0	CLAY; dark brown, with minor fine to medium grained smelter debris, rootlets		
2			
	brown to reddish brown, plastic		
4	yellowish brown		CL
6			
	bcoming tan to light brown, with minor ls fragments		
8			
	LIMESTONE; weathered, white to tan		
	TD		
10			

Well: MW-1
Elev.:



Well Construction Information

WELL CONSTRUCTION

DATE COMPLETED	: 4/18/2013
HOLE DIAMETER	: 8 inches
DRILLING METHOD	: Hollow Stem
ENTACT REP.	: Marty Cox

WELL CASING

MATERIAL	: PVC
DIAMETER	: 2 inch
JOINTS	: Screw-Coupled

WELL SCREEN

MATERIAL	: PVC
DIAMETER	: 2 inches
JOINTS	: Screw-Coupled
OPENING	: .010 Slot
SAND PACK	: 12/20 quartz
ANNULUS SEAL	: Bentonite chip

Monitor well boring completed at top of limestone approximately 9 feet bgs. Well completed above grade with a protective steel cover set in 3 foot by 3 foot concrete pad.

MW-1

WATER WELL RECORD

Form WWC-5

Division of Water Resources App. No. ____

1 LOCATION OF WATER WELL: County: Allen

Fraction: ¼ ¼ SE ¼ NE ¼

Section Number: 35 | Township No. T 24 S | Range Number R 19 ☒E ☐W

Street/Rural Address of Well Location; if unknown, distance & direction from nearest town or intersection: If at owner's address, check here ☐.
0.6 miles east of LaHarpe, ½ mi. south of intersection of US Hwy 54 + co. road 2500

Global Positioning System (GPS) information:
Latitude: 37°55'00.2914" N (in decimal degrees)
Longitude: 95°16'58.246" W (in decimal degrees)
Elevation: .....
Datum: ☐ WGS 84, ☐ NAD 83, ☐ NAD 27
Collection Method:
☐ GPS unit (Make/Model: .....)
☐ Digital Map/Photo, ☐ Topographic Map, ☐ Land Survey
Est. Accuracy: ☐ <3 m, ☐ 3-5 m, ☐ 5-15 m, ☐ >15 m

2 WATER WELL OWNER:
RR#, Street Address, Box #: EN TACT
City, State, ZIP Code: 3129 Bass Pro Drive, Grapevine, TX. 76051

3 LOCATE WELL WITH AN "X" IN SECTION BOX:

N
W | NW | NE (X) | E
SW | SE
S
|——1 mile——|

4 DEPTH OF COMPLETED WELL 9 ft.
Depth(s) Groundwater Encountered (1) 4.22 ft. (2) ..... ft. (3) ..... ft.
WELL'S STATIC WATER LEVEL 4.22 ft. below land surface measured on mo/day/yr .....
Pump test data: Well water was ..... ft. after ..... hours pumping ..... gpm
EST. YIELD ..... gpm. Well water was ..... ft. after ..... hours pumping ..... gpm
Bore Hole Diameter 8 in. to 9 ft., and ..... in. to ..... ft.
WELL WATER TO BE USED AS: ☐ Public water supply ☐ Geothermal ☐ Injection well
☐ Domestic ☐ Feedlot ☐ Oil field water supply ☐ Dewatering ☐ Other (Specify below)
☐ Irrigation ☐ Industrial ☐ Domestic-lawn & garden ☒ Monitoring well .....
Was a chemical/bacteriological sample submitted to Department? ☐ Yes ☒ No
If yes, mo/day/yr sample was submitted .....
Water well disinfected? ☐ Yes ☒ No

5 TYPE OF CASING USED: ☐ Steel ☒ PVC ☐ Other .....
CASING JOINTS: ☐ Glued ☐ Clamped ☐ Welded ☒ Threaded
Casing diameter 2 in. to 4 ft., Diameter ..... in. to ..... ft., Diameter ..... in. to ..... ft.
Casing height above land surface 36 in., Weight ..... lbs./ft., Wall thickness or gauge No. Sch 40
TYPE OF SCREEN OR PERFORATION MATERIAL:
☐ Steel ☐ Stainless Steel ☒ PVC ☐ Other (Specify) .....
☐ Brass ☐ Galvanized Steel ☐ None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE:
☐ Continuous slot ☒ Mill slot ☐ Gauze wrapped ☐ Torch cut ☐ Drilled holes ☐ None (open hole)
☐ Louvered shutter ☐ Key punched ☐ Wire wrapped ☐ Saw cut ☐ Other (specify) .....
SCREEN-PERFORATED INTERVALS: From 4 ft. to 9 ft., From ..... ft. to ..... ft.
From ..... ft. to ..... ft., From ..... ft. to ..... ft.
GRAVEL PACK INTERVALS: From 3 ft. to 9 ft., From ..... ft. to ..... ft.
From ..... ft. to ..... ft., From ..... ft. to ..... ft.

6 GROUT MATERIAL: ☐ Neat cement ☐ Cement grout ☒ Bentonite ☐ Other .....
Grout Intervals: From 0 ft. to 3 ft., From ..... ft. to ..... ft., From ..... ft. to ..... ft.
What is the nearest source of possible contamination:
☐ Septic tank ☐ Lateral lines ☐ Pit privy ☐ Livestock pens ☐ Insecticide storage ☐ Other (specify below)
☐ Sewer lines ☐ Cesspool ☐ Sewage lagoon ☐ Fuel storage ☐ Abandoned water well
☐ Watertight sewer lines ☐ Seepage pit ☐ Feedyard ☐ Fertilizer storage ☐ Oil well/gas well .....
Direction from well ..... Distance from well .....

FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	4	Clay, brown-red brown, plastic			
4	8.5	Clay, brown-yellow brown, plastic			
8.5	9.0	Limestone, tan, weathered			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was ☒ constructed, ☐ reconstructed, or ☐ plugged under my jurisdiction and was completed on (mo/day/year) 4-18-11 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 629 This Water Well Record was completed on (mo/day/year) 5/16/13 under the business name of Environmental Probe Service, Inc. by (signature) [signature]

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks and check the correct answers. Send three copies (white, blue, pink) to Kansas Department of Health and Environment, Bureau of Water, Geology Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Telephone 785-296-5524. Send one copy to WATER WELL OWNER and retain one for your records. Include fee of $5.00 for each constructed well. Visit us at http://www.kdheks.gov/waterwell/index.html.

KSA 82a-1212

Check: ☐ White Copy, ☐ Blue Copy, ☐ Pink Copy

MW-2

WATER WELL RECORD

Form WWC-5

Division of Water Resources App. No.

1 LOCATION OF WATER WELL: County: Allen

Fraction: ¼ ¼SE ¼NE ¼

Section Number: 35

Township No.: T 24 S

Range Number: R 19 ☒E ☐W

Street/Rural Address of Well Location; if unknown, distance & direction from nearest town or intersection: If at owner's address, check here ☐.
0.6 miles east of LaHarpe, ½ mi. south of intersection of US Hwy 54 + Co. road 2800

Global Positioning System (GPS) Information:
Latitude: 37°.54'.55.288"N. (in decimal degrees)
Longitude: 95°.12'.05.028"W. (in decimal degrees)
Elevation: .....
Datum: ☐ WGS 84, ☐ NAD 83, ☐ NAD 27
Collection Method:
☐ GPS unit (Make/Model: .....)
☐ Digital Map/Photo, ☐ Topographic Map, ☐ Land Survey
Est. Accuracy: ☐ <3 m, ☐ 3-5 m, ☐ 5-15 m, ☐ >15 m

2 WATER WELL OWNER: ENTACT
RR#, Street Address, Box #: 3128 Bass Pro Drive
City, State, ZIP Code: Grapevine, TX. 76051

3 LOCATE WELL WITH AN "X" IN SECTION BOX:

N
NW | NE
W X E
SW | SE
S
|——1 mile——|

4 DEPTH OF COMPLETED WELL .....10..... ft.
Depth(s) Groundwater Encountered (1)..... ft. (2)..... ft. (3)..... ft.
WELL'S STATIC WATER LEVEL....7.2.4...ft. below land surface measured on mo/day/yr.....
Pump test data: Well water was.....ft. after..... hours pumping..... gpm
EST. YIELD.....gpm. Well water was.....ft. after..... hours pumping..... gpm
Bore Hole Diameter ....8.....in. to .....10.....ft., and .....in. to .....ft.
WELL WATER TO BE USED AS: ☐ Public water supply ☐ Geothermal ☐ Injection well
☐ Domestic ☐ Feedlot ☐ Oil field water supply ☐ Dewatering ☐ Other (Specify below)
☐ Irrigation ☐ Industrial ☐ Domestic-lawn & garden ☒ Monitoring well .....
Was a chemical/bacteriological sample submitted to Department? ☐ Yes ☒ No
If yes, mo/day/yr sample was submitted.....
Water well disinfected? ☐ Yes ☒ No

5 TYPE OF CASING USED: ☐ Steel ☒ PVC ☐ Other .....
CASING JOINTS: ☐ Glued ☐ Clamped ☐ Welded ☒ Threaded
Casing diameter ....2.....in. to ....5.....ft., Diameter .....in. to .....ft., Diameter .....in. to .....ft.
Casing height above land surface.....36.....in., Weight .....lbs./ft., Wall thickness or gauge No. ..Sch. 40.....
TYPE OF SCREEN OR PERFORATION MATERIAL:
☐ Steel ☐ Stainless Steel ☒ PVC ☐ Other (Specify) .....
☐ Brass ☐ Galvanized Steel ☐ None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE:
☐ Continuous slot ☒ Mill slot ☐ Gauze wrapped ☐ Torch cut ☐ Drilled holes ☐ None (open hole)
☐ Louvered shutter ☐ Key punched ☐ Wire wrapped ☐ Saw cut ☐ Other (specify) .....
SCREEN-PERFORATED INTERVALS: From.....5.....ft. to .....10.....ft., From .....ft. to .....ft.
From.....ft. to .....ft., From .....ft. to .....ft.
GRAVEL PACK INTERVALS: From.....4.....ft. to .....10.....ft., From .....ft. to .....ft.
From.....ft. to .....ft., From .....ft. to .....ft.

6 GROUT MATERIAL: ☐ Neat cement ☐ Cement grout ☒ Bentonite ☐ Other .....
Grout Intervals: From .....0.....ft. to .....4.....ft., From .....ft. to .....ft., From .....ft. to .....ft.
What is the nearest source of possible contamination:
☐ Septic tank ☐ Lateral lines ☐ Pit privy ☐ Livestock pens ☐ Insecticide storage ☐ Other (specify below)
☐ Sewer lines ☐ Cesspool ☐ Sewage lagoon ☐ Fuel storage ☐ Abandoned water well
☐ Watertight sewer lines ☐ Seepage pit ☐ Feedyard ☐ Fertilizer storage ☐ Oil well/gas well .....
Direction from well ..... Distance from well .....

FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	3	Clay, brown to red brown, plastic			
3	9	Clay, yellow brown, plastic			
9	9.8	Clay, tan, plastic			
9.8	10	Limestone, white to tan, weathered			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was ☐ constructed, ☐ reconstructed, or ☐ plugged under my jurisdiction and was completed on (mo/day/year) ...4-18-17..... and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. ..604..... This Water Well Record was completed on (mo/day/year) ....7/10/13..... under the business name of Environmental Protection Service, Inc. by (signature) .....

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks and check the correct answers. Send three copies (white, blue, pink) to Kansas Department of Health and Environment, Bureau of Water, Geology Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Telephone 785-296-5524. Send one copy to WATER WELL OWNER and retain one for your records. Include fee of $5.00 for each constructed well. Visit us at http://www.kdheks.gov/waterwell/index.html.

Check: ☐ White Copy, ☐ Blue Copy, ☐ Pink Copy

KSA 82a-1212

MW-3

WATER WELL RECORD

Form WWC-5

Division of Water Resources App. No. ____

1 LOCATION OF WATER WELL: County: Allen

Fraction: ¼ ¼ SE ¼ NE ¼

Section Number: 35 | Township No.: T 24 S | Range Number: R 19 ☒E ☐W

Street/Rural Address of Well Location; if unknown, distance & direction from nearest town or intersection: If at owner's address, check here ☐.
0.6 miles east of Latharpe, ½ mi. south of intersection of US Hwy. 54 + Co. road 2800

Global Positioning System (GPS) information:
Latitude: 37°57'55.2286"N. (in decimal degrees)
Longitude: 95°16'57.6020"W. (in decimal degrees)
Elevation: .....
Datum: ☐ WGS 84, ☐ NAD 83, ☐ NAD 27
Collection Method:
☐ GPS unit (Make/Model: .....)
☐ Digital Map/Photo, ☐ Topographic Map, ☐ Land Survey
Est. Accuracy: ☐ <3 m, ☐ 3-5 m, ☐ 5-15 m, ☐ >15 m

2 WATER WELL OWNER: ENTACT
RR#, Street Address, Box #: 3129 Bass Pro Drive
City, State, ZIP Code: Grapevine, TX. 76051

3 LOCATE WELL WITH AN "X" IN SECTION BOX:

N
W: -- NW -- | -- NE -- (X)
E: -- SW -- | -- SE --
S
|---------1 mile---------|

4 DEPTH OF COMPLETED WELL .....4.7..... ft.
Depth(s) Groundwater Encountered (1)..... ft. (2)..... ft. (3)..... ft.
WELL'S STATIC WATER LEVEL N/A.....ft. below land surface measured on mo/day/yr.....
Pump test data: Well water was.....ft. after..... hours pumping..... gpm
EST. YIELD.....gpm. Well water was.....ft. after..... hours pumping..... gpm
Bore Hole Diameter ....8.....in. to .....4.7.....ft., and .....in. to .....ft.
WELL WATER TO BE USED AS: ☐ Public water supply ☐ Geothermal ☐ Injection well
☐ Domestic ☐ Feedlot ☐ Oil field water supply ☐ Dewatering ☐ Other (Specify below)
☐ Irrigation ☐ Industrial ☐ Domestic-lawn & garden ☒ Monitoring well .....
Was a chemical/bacteriological sample submitted to Department? ☐ Yes ☒ No
If yes, mo/day/yr sample was submitted.....
Water well disinfected? ☐ Yes ☒ No

5 TYPE OF CASING USED: ☐ Steel ☒ PVC ☐ Other .....
CASING JOINTS: ☐ Glued ☐ Clamped ☐ Welded ☒ Threaded
Casing diameter .....2.....in. to .....3.7..... ft., Diameter ..... in. to ..... ft., Diameter ..... in. to ..... ft.
Casing height above land surface.....3.6..... in., Weight .....lbs./ft., Wall thickness or gauge No. Sch. 40
TYPE OF SCREEN OR PERFORATION MATERIAL:
☐ Steel ☐ Stainless Steel ☒ PVC ☐ Other (Specify) .....
☐ Brass ☐ Galvanized Steel ☐ None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE:
☐ Continuous slot ☐ Mill slot ☐ Gauze wrapped ☐ Torch cut ☐ Drilled holes ☐ None (open hole)
☐ Louvered shutter ☐ Key punched ☐ Wire wrapped ☐ Saw cut ☐ Other (specify) .....
SCREEN-PERFORATED INTERVALS: From.....3.7..... ft. to .....4.7..... ft., From ..... ft. to ..... ft.
From..... ft. to ..... ft., From ..... ft. to ..... ft.
GRAVEL PACK INTERVALS: From.....2.7..... ft. to .....4.7..... ft., From ..... ft. to ..... ft.
From..... ft. to ..... ft., From ..... ft. to ..... ft.

6 GROUT MATERIAL: ☐ Neat cement ☐ Cement grout ☒ Bentonite ☐ Other .....
Grout Intervals: From .....0..... ft. to .....2.7..... ft., From ..... ft. to ..... ft., From ..... ft. to .....ft.
What is the nearest source of possible contamination:
☐ Septic tank ☐ Lateral lines ☐ Pit privy ☐ Livestock pens ☐ Insecticide storage ☐ Other (specify below)
☐ Sewer lines ☐ Cesspool ☐ Sewage lagoon ☐ Fuel storage ☐ Abandoned water well
☐ Watertight sewer lines ☐ Seepage pit ☐ Feedyard ☐ Fertilizer storage ☐ Oil well/gas well .....
Direction from well ..... Distance from well .....

FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	4	Clay, brown, sl plastic			
4	4.6	Clay, tan, plastic			
4.6	4.7	Limestone, white to tan, weathered			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was ☒ constructed, ☐ reconstructed, or ☐ plugged under my jurisdiction and was completed on (mo/day/year) .4-18-13..... and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. .604..... This Water Well Record was completed on (mo/day/year) .....5/12/13..... under the business name of .Environmental Projects Service, Inc.... by (signature) .....[signature]

INSTRUCTIONS: Use typewriter or ball point pen. *PLEASE PRESS FIRMLY* and *PRINT* clearly. Please fill in blanks and check the correct answers. Send three copies (white, blue, pink) to Kansas Department of Health and Environment, Bureau of Water, Geology Section, 1000 SW Jackson St., Suite 420, Topeka, Kansas 66612-1367. Telephone 785-296-5524. Send one copy to WATER WELL OWNER and retain one for your records. Include fee of $5.00 for each constructed well. Visit us at http://www.kdheks.gov/waterwell/index.html.

KSA 82a-1212

Check: ☐ White Copy, ☐ Blue Copy, ☐ Pink Copy

APPENDIX C4

MONITOR WELL PURGE RECORD FORMS

Groundwater Sampling Record

Site	~~Beaumont~~ La Harpe	Technician	~~Tom Wilson~~	Method Used	Low Flow
Client	~~Halliburton~~ BLUE TEE	Well Number	MW-1	Time	0920
Project Number	~~H136~~ E8110	Equipment		Date	4-20-2013
		YSI, DR/890, Peristaltic, Durham, 2100P		Weather	

Well Condition: Locked?	Steel casing condition?	Inner PVC casing condition?	Concrete Pad/Above Ground Case?
Well Depth 12.14	Screen Interval	TOC Elevation	
Water Level Prior to Pruging* 4.22	Water Level after Sampling	Sampling Depth	Amount Purged 1.75 gal
Sample Time 1005	Flow Rate 200 ml/min	Barometer	

Time	0935	0945	0950	1000								
Clarity of Water		clear	clear	clear								
Temperature °C	start	9.11	9.38	9.77								
Conductivity (mS/cm)	pump	1.25	1.23	1.20								
TDS (g/L)		31.2	15.4	8.4								
Salinity (%)		~~1.25~~										
DO (mg/L)		5.47	4.12	3.57								
PH		7.52	7.55	7.60								
ORP (mv)		124	143	148								
Turbidity (ntu)		25.2	13.4	8.36								
Samples Taken:	VOC (8260B)											
Preservative	HCL											
Containers Used	3 X VOA											

Comments/Notes: 4.72 4.80 4.80

12.14
4.22

Groundwater Sampling Record

Site	~~Beaumont~~ E LaHarpe	**Technician**	Tom Wilson	**Method Used**	Low Flow
Client	~~Halliburton~~ Blue Tec	**Well Number**	MW-2	**Time**	1045
Project Number	~~H136~~ E8	**Equipment**		**Date**	4-20-2013
		YSI, DR/890, Peristaltic, Durham, 2100P		**Weather**	

Well Condition: Locked?	Steel casing condition?	Inner PVC casing condition?	Concrete Pad/Above Ground Case?
Well Depth 12.26	Screen Interval	TOC Elevation	
Water Level Prior to Pruging* 10.24	Water Level after Sampling	Sampling Depth	Amount Purged 0.75 gal
Sample Time 1100	Flow Rate 150 ml/min	Barometer	

Time	1045	1050	1055									
Clarity of Water		turbid	turbid									
Temperature °C	start	11.94	12.19									
Conductivity (mS/cm)	pump	0.776	0.774									
TDS (g/L)		181	140									
Salinity (%)												
DO (mg/L)		10.44	8.94									
PH		7.79	7.49									
ORP (mv)		138	139									
Turbidity (ntu)		121	81.6									
Samples Taken:	VOC (8260B)											
Preservative	HCL											
Containers Used	3 X VOA											

Comments/Notes: 1066 10.9

12.26
10.24
2.02

sample - water levels dropping rapidly poor recharge

Groundwater Sampling Record

Site	~~Beaumont~~ La Harpe	Technician	~~Tom Wilson~~ Rox	Method Used	Low Flow
Client	~~Halliburton~~ BLUE TEE	Well Number	MW-3	Time	
Project Number	~~H136~~ E8110	Equipment		Date	4-20-2013
		YSI, DR/890, Peristaltic, Durham, 2100P		Weather	

Well Condition: Locked?	Steel casing condition?	Inner PVC casing condition?	Concrete Pad/Above Ground Case?
Well Depth 7.60	Screen Interval	TOC Elevation	
Water Level Prior to Pruging* 4.8	Water Level after Sampling	Sampling Depth	Amount Purged 0.50 g
Sample Time 1205	Flow Rate 150 ml/min	Barometer	

Time	1153	1155	1200									
Clarity of Water		~~turbid~~	~~turbid~~									
Temperature °C	start	14.42	14.45									
Conductivity (mS/cm)	pump	0.001	0.001									
TDS (g/L)		157	161									
Salinity (%)												
DO (mg/L)		12.72	11.74									
PH		8.49	8.50									
ORP (mv)		94	95									
Turbidity (ntu)		208	155									
Samples Taken:	VOC (8260B)											
Preservative	HCL											
Containers Used	3 X VOA											

Comments/Notes:

5.8 6.2

7.60
4.80
2.80

APPENDIX D

LABORATORY ANALYTICAL REPORTS

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Report Summary

Thursday May 02, 2013

Report Number: L632145
Samples Received: 04/24/13
Client Project: E8110

Description: Former East La Harpe Smelter Investigation

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: John Hawkins

John Hawkins , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-01

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-A6-SW4

Collected By : M. Cox
Collection Date : 04/17/13 10:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	4.9	1.0	mg/kg	6010B	05/01/13	1
Cadmium	10.	0.25	mg/kg	6010B	05/01/13	1
Lead	270	0.25	mg/kg	6010B	05/01/13	1
Zinc	2500	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-02

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-B8-NW4

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 08:25

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	190	1.0	mg/kg	6010B	05/01/13	1
Cadmium	190	0.25	mg/kg	6010B	05/01/13	1
Lead	330	0.25	mg/kg	6010B	05/01/13	1
Zinc	5000	3.0	mg/kg	6010B	05/01/13	2

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-03

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-B8-NW7

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 08:35

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	30.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/01/13	1
Lead	71.	0.25	mg/kg	6010B	05/01/13	1
Zinc	340	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
ENTACT
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-04

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-B8-NW5

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 08:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	3100	1.0	mg/kg	6010B	05/01/13	1
Cadmium	68.	0.25	mg/kg	6010B	05/01/13	1
Lead	4200	0.25	mg/kg	6010B	05/01/13	1
Zinc	32000	30.	mg/kg	6010B	05/01/13	20

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-05

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-H3-NW3

Collected By : M. Cox
Collection Date : 04/15/13 17:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	6.0	1.0	mg/kg	6010B	05/01/13	1
Cadmium	8.6	0.25	mg/kg	6010B	05/01/13	1
Lead	54.	0.25	mg/kg	6010B	05/01/13	1
Zinc	620	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-06

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-B6-NW3

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 11:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	220	1.0	mg/kg	6010B	05/01/13	1
Cadmium	67.	0.25	mg/kg	6010B	05/01/13	1
Lead	13000	1.2	mg/kg	6010B	05/01/13	5
Zinc	22000	15.	mg/kg	6010B	05/01/13	10

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Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-07

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-G1-SW1

Project # : E8110

Collected By : M. Cox
Collection Date : 04/15/13 15:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	16.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	23.	0.25	mg/kg	6010B	05/01/13	1
Lead	550	0.25	mg/kg	6010B	05/01/13	1
Zinc	5700	3.0	mg/kg	6010B	05/01/13	2

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

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May 02, 2013

ESC Sample # : L632145-08

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-B8-NW3

Collected By : M. Cox
Collection Date : 04/17/13 08:20

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	4300	1.0	mg/kg	6010B	05/01/13	1
Cadmium	BDL	50.	mg/kg	6010B	05/01/13	200
Lead	6100	0.25	mg/kg	6010B	05/01/13	1
Zinc	44000	30.	mg/kg	6010B	05/01/13	20

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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May 02, 2013

ESC Sample # : L632145-09

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-B5-NW3

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 11:55

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	24.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	310	0.25	mg/kg	6010B	05/01/13	1
Lead	4700	0.25	mg/kg	6010B	05/01/13	1
Zinc	17000	15.	mg/kg	6010B	05/01/13	10

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632145-10

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-H9-NW5

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 15:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	9.1	1.0	mg/kg	6010B	05/01/13	1
Cadmium	0.26	0.25	mg/kg	6010B	05/01/13	1
Lead	41.	0.25	mg/kg	6010B	05/01/13	1
Zinc	97.	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Reported: 05/02/13 08:25 Printed: 05/02/13 08:59

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L632145-08	WG658335	SAMP	Cadmium	R2641740	O

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
O	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

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ENTACT
Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632145

May 02, 2013

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Arsenic	< 1	mg/kg			WG658217	04/26/13 16:57
Cadmium	< .25	mg/kg			WG658217	04/26/13 16:57
Lead	< .25	mg/kg			WG658217	04/26/13 16:57
Zinc	< 1.5	mg/kg			WG658217	04/26/13 16:57
Arsenic	< 1	mg/kg			WG658335	04/26/13 13:34
Cadmium	< .25	mg/kg			WG658335	04/26/13 13:34
Lead	< .25	mg/kg			WG658335	04/26/13 13:34
Zinc	< 1.5	mg/kg			WG658335	04/26/13 13:34

Duplicate

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Arsenic	mg/kg	3.90	3.90	0	20	L632275-01	WG658217
Cadmium	mg/kg	0	0	0	20	L632275-01	WG658217
Lead	mg/kg	31.0	30.0	3.28	20	L632275-01	WG658217
Zinc	mg/kg	27.0	27.4	1.47	20	L632275-01	WG658217
Arsenic	mg/kg	270.	260.	3.77	20	L632189-01	WG658335
Cadmium	mg/kg	59.0	76.0	25.2*	20	L632189-01	WG658335
Lead	mg/kg	37000	46000	21.7*	20	L632189-01	WG658335
Zinc	mg/kg	31000	36000	14.9	20	L632189-01	WG658335

Laboratory Control Sample

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Arsenic	mg/kg	237	230.	97.0	83.1-117	WG658217
Cadmium	mg/kg	191	192.	101.	83.2-117	WG658217
Lead	mg/kg	103	97.7	94.9	83.1-117	WG658217
Zinc	mg/kg	183	179.	97.8	82-118	WG658217
Arsenic	mg/kg	237	232.	97.9	83.1-117	WG658335
Cadmium	mg/kg	191	192.	101.	83.2-117	WG658335
Lead	mg/kg	103	97.0	94.2	83.1-117	WG658335
Zinc	mg/kg	183	176.	96.2	82-118	WG658335

Matrix Spike

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Arsenic	mg/kg	47.5	3.90	50	87.2	75-125	L632275-01	WG658217
Cadmium	mg/kg	45.4	0	50	90.8	75-125	L632275-01	WG658217
Lead	mg/kg	73.8	30.0	50	87.6	75-125	L632275-01	WG658217
Zinc	mg/kg	70.8	27.4	50	86.8	75-125	L632275-01	WG658217
Arsenic	mg/kg	355.	260.	5	190.*	75-125	L632189-01	WG658335
Cadmium	mg/kg	112.	76.0	5	72.0*	75-125	L632189-01	WG658335
Lead	mg/kg	46800	46000	5	1600*	75-125	L632189-01	WG658335
Zinc	mg/kg	27200	36000	2.5	0*	75-125	L632189-01	WG658335

Matrix Spike Duplicate

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Arsenic	mg/kg	47.8	47.5	87.8	75-125	0.630	20	L632275-01	WG658217
Cadmium	mg/kg	45.5	45.4	91.0	75-125	0.220	20	L632275-01	WG658217
Lead	mg/kg	79.2	73.8	98.4	75-125	7.06	20	L632275-01	WG658217

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632145

May 02, 2013

Analyte	Units	Matrix Spike Duplicate MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Zinc	mg/kg	70.9	70.8	87.0	75-125	0.141	20	L632275-01	WG658217
Arsenic	mg/kg	217.	355.	0*	75-125	48.3*	20	L632189-01	WG658335
Cadmium	mg/kg	96.0	112.	40.0*	75-125	15.4	20	L632189-01	WG658335
Lead	mg/kg	34500	46800	0*	75-125	30.3*	20	L632189-01	WG658335
Zinc	mg/kg	30200	27200	0*	75-125	10.5	20	L632189-01	WG658335

Batch number /Run number / Sample number cross reference

WG658217: R2641121: L632145-01 02 03 04 05 06 07
WG658335: R2641740: L632145-08 09 10

* * Calculations are performed prior to rounding of reported values.
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Westmont, IL 60559

Quality Assurance Report
Level II

L632145

May 02, 2013

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Company Name/Address:
ENTACT

1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Billing Information
Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

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Mt. Juliet, TN 37122
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Phone: (615) 758-5858
Fax: (615) 758-5859
G174

Report to: Pat Thompson
Email to: pthompson@entact.com
Project Description:
City/State Collected: La Harpe, KS
Phone: (630) 986-2900
FAX:
Client Project #: E8110
ESC Key:
Collected by (print): M Cox
Site/Facility ID#:
P.O.# E8110
Collected by (signature): Monty Cox
Immediately Packed on Ice N ___ Y

Rush? (Lab MUST Be Notified)
___ Same Day ... 200%
___ Next Day ... 100%
___ Two Day ... 50%
___ Three Day ... 25%
Date Results Needed:
Email? __No__Yes
FAX? __No__Yes

CoCode ENTACT (lab use only)
Template/Prelogin
Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	Total Pb, Zn, Cd, As	Remarks/Contaminant	Sample # (lab only)
SB-A6-SW4	Grab	SS	4	4-17-13	1030	1	✓		L632145-01
SB-B8-NW4	Grab	SS	4	4-17-13	0825	1	✓		02
SB-B8-NW7	Grab	SS	7	4-17-13	0835	1	✓		03
SB-B8-NW5	Grab	SS	5	4-17-13	0830	1	✓		04
SB-H3 NW3	Grab	SS	3	4-15-13	1715	1	✓		05
SB-B4 NW3	Grab	SS	3	4-17-13	1110	1	✓		06
SB G1 SW1	Grab	SS	1	4-15-13	1550	1	✓		07
SB-B8 NW3	Grab	SS	3	4-17-13	0820	1	✓		08
SB-B5 SW3	Grab	SS	3	4-17-13	1155	1	✓		09

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks: 5547 0239 3982

pH ___ Temp ___
Flow ___ Other ___

Relinquished by (Signature)	Date	Time	Received by (Signature)
Monty Cox	4/23/13	1006	
Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Relinquished by: (Signature)	Date	Time	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☑ FedEx ☐ Courier ☐ ___

Temp:	Bottles Received:
3.1°C	10 6oz
Date:	Time:
4-24-13	0900

Condition: (lab use only) for TD
CoC Seals Intact ✓ Y ___ N ___ NA
pH Checked:
NCF:

Company Name/Address:

ENTACT

1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Billing Information:

Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

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12065 Lebanon Road
Mt. Juliet, TN 37122

Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

Report to: Pat Thompson

Email to: pthompson@entact.com

Project Description:

City/State Collected: La Harpe, KS

Phone: (630) 986-2900

FAX:

Client Project #: E8110

ESC Key:

Collected by: (print) M COX

Site/Facility ID#:

P.O.#: E8110

Collected by (signature): Marty Cox

Immediately Packed on Ice N Y

Rush? (Lab MUST Be Notified)

___ Same Day..... 200%
___ Next Day..... 100%
___ Two Day..... 50%
___ Three Day..... 25%

Date Results Needed:

Email? __No__Yes

FAX? __No__Yes

CoCode **ENTACT** (lab use only)

Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No of Ctrs	Total Pb, Zn, Cd, As	Remarks/Contaminant	Sample # (lab only)
SB-49-NW@5	Grab	SS	5	4-18-13	1510	1	✓		1632145-10

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Relinquished by (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ _____	Condition: (lab use only)
Marty Cox	4/23/13	1600			TD
Relinquished by: (Signature)	Date	Time:	Received by: (Signature)	Temp: 3.1° / Bottles Received: 10 ziplock bags	CoC Seals Intact ✓ Y ___ N ___ NA
Relinquished by: (Signature)	Date:	Time	Received for lab by: (Signature)	Date: 4-24-13 / Time: 0900	pH Checked: / NCF:

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Marty Cox
ENTACT
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Westmont, IL 60559

Report Summary

Thursday May 02, 2013

Report Number: L632156
Samples Received: 04/24/13
Client Project: E8110

Description: Former East La Harpe Smelter Investigation

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: John Hawkins

John Hawkins , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632156-01

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : MW-1 10FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/20/13 10:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Dissolved Solids	820	10.	mg/l	2540 C-2011	04/30/13	1
Arsenic	BDL	0.020	mg/l	6010B	05/02/13	1
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	BDL	0.0050	mg/l	6010B	05/02/13	1
Cadmium,Dissolved	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead	BDL	0.0050	mg/l	6010B	05/02/13	1
Lead,Dissolved	0.0085	0.0050	mg/l	6010B	05/01/13	1
Zinc	0.82	0.030	mg/l	6010B	05/02/13	1
Zinc,Dissolved	0.81	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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Reported: 05/02/13 11:48 Printed: 05/02/13 11:50

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632156-02

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : MW-2 8FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/20/13 11:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Dissolved Solids	46.	10.	mg/l	2540 C-2011	04/30/13	1
Arsenic	BDL	0.020	mg/l	6010B	05/02/13	1
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	BDL	0.0050	mg/l	6010B	05/02/13	1
Cadmium,Dissolved	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead	0.0053	0.0050	mg/l	6010B	05/02/13	1
Lead,Dissolved	0.0059	0.0050	mg/l	6010B	05/01/13	1
Zinc	0.084	0.030	mg/l	6010B	05/02/13	1
Zinc,Dissolved	0.060	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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Reported: 05/02/13 11:48 Printed: 05/02/13 11:50

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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632156-03

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : MW-3 7FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/20/13 12:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Dissolved Solids	47.	10.	mg/l	2540 C-2011	04/30/13	1
Arsenic	BDL	0.020	mg/l	6010B	05/02/13	1
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	0.022	0.0050	mg/l	6010B	05/02/13	1
Cadmium,Dissolved	0.0083	0.0050	mg/l	6010B	05/01/13	1
Lead	0.050	0.0050	mg/l	6010B	05/02/13	1
Lead,Dissolved	BDL	0.0050	mg/l	6010B	05/01/13	1
Zinc	0.97	0.030	mg/l	6010B	05/02/13	1
Zinc,Dissolved	0.18	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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Reported: 05/02/13 11:48 Printed: 05/02/13 11:50

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Quality Assurance Report
Level II

L632156

May 02, 2013

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Dissolved Solids	< 10	mg/l			WG658266	04/30/13 16:14
Arsenic,Dissolved	< .02	mg/l			WG658734	04/30/13 12:37
Cadmium,Dissolved	< .005	mg/l			WG658734	04/30/13 12:37
Lead,Dissolved	< .005	mg/l			WG658734	04/30/13 12:37
Zinc,Dissolved	< .03	mg/l			WG658734	04/30/13 12:37
Arsenic	< .02	mg/l			WG658410	05/02/13 01:27
Cadmium	< .005	mg/l			WG658410	05/02/13 01:27
Lead	< .005	mg/l			WG658410	05/02/13 01:27
Zinc	< .03	mg/l			WG658410	05/02/13 01:27

Duplicate

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Dissolved Solids	mg/l	1100	1190	4.50	5	L632045-01	WG658266
Arsenic,Dissolved	mg/l	0	0	0	20	L632355-13	WG658734
Cadmium,Dissolved	mg/l	0	0	0	20	L632355-13	WG658734
Lead,Dissolved	mg/l	0	0.000930	NA	20	L632355-13	WG658734
Zinc,Dissolved	mg/l	0	0.0185	NA	20	L632355-13	WG658734
Arsenic	mg/l	0	0.00510	NA	20	L632187-05	WG658410
Cadmium	mg/l	0	0.000620	NA	20	L632187-05	WG658410
Lead	mg/l	0	0	0	20	L632187-05	WG658410
Zinc	mg/l	0.0410	0.0410	0	20	L632187-05	WG658410

Laboratory Control Sample

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Dissolved Solids	mg/l	8800	8760	99.5	85-115	WG658266
Arsenic,Dissolved	mg/l	1.11	1.10	99.1	85-115	WG658734
Cadmium,Dissolved	mg/l	1.11	1.20	108.	85-115	WG658734
Lead,Dissolved	mg/l	1.11	1.20	108.	85-115	WG658734
Zinc,Dissolved	mg/l	1.11	1.15	104.	85-115	WG658734
Arsenic	mg/l	1.11	1.10	99.1	85-115	WG658410
Cadmium	mg/l	1.11	1.15	104.	85-115	WG658410
Lead	mg/l	1.11	1.16	105.	85-115	WG658410
Zinc	mg/l	1.11	1.12	101.	85-115	WG658410

Laboratory Control Sample Duplicate

Analyte	Units	Result	Ref	%Rec	Limit	RPD	Limit	Batch
Dissolved Solids	mg/l	8760	8760	100.	85-115	0	5	WG658266

Matrix Spike

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Arsenic,Dissolved	mg/l	1.15	0	1.11	104.	75-125	L632355-13	WG658734
Cadmium,Dissolved	mg/l	1.17	0	1.11	105.	75-125	L632355-13	WG658734
Lead,Dissolved	mg/l	1.18	0.000930	1.11	106.	75-125	L632355-13	WG658734

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632156

May 02, 2013

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
		Matrix Spike						
Zinc,Dissolved	mg/l	1.20	0.0185	1.11	106.	75-125	L632355-13	WG658734
Arsenic	mg/l	1.12	0.00510	1.11	100.	75-125	L632187-05	WG658410
Cadmium	mg/l	1.12	0.000620	1.11	101.	75-125	L632187-05	WG658410
Lead	mg/l	1.13	0	1.11	102.	75-125	L632187-05	WG658410
Zinc	mg/l	1.20	0.0410	1.11	104.	75-125	L632187-05	WG658410

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
		Matrix Spike Duplicate							
Arsenic,Dissolved	mg/l	1.10	1.15	99.1	75-125	4.44	20	L632355-13	WG658734
Cadmium,Dissolved	mg/l	1.14	1.17	103.	75-125	2.60	20	L632355-13	WG658734
Lead,Dissolved	mg/l	1.14	1.18	103.	75-125	3.45	20	L632355-13	WG658734
Zinc,Dissolved	mg/l	1.17	1.20	104.	75-125	2.53	20	L632355-13	WG658734
Arsenic	mg/l	1.11	1.12	99.5	75-125	0.897	20	L632187-05	WG658410
Cadmium	mg/l	1.12	1.12	101.	75-125	0	20	L632187-05	WG658410
Lead	mg/l	1.12	1.13	101.	75-125	0.889	20	L632187-05	WG658410
Zinc	mg/l	1.19	1.20	104.	75-125	0.837	20	L632187-05	WG658410

Batch number /Run number / Sample number cross reference

WG658266: R2645424: L632156-01 02 03
WG658734: R2646500: L632156-01 02 03
WG658410: R2648720: L632156-01 02 03

* * Calculations are performed prior to rounding of reported values.
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632156

May 02, 2013

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Company Name/Address:
ENTACT

1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Billing Information

Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Report to: Pat Thompson
Email to: pthompson@entact.com
Project Description:
City/State Collected
Phone: (630) 986-2900
FAX:
Client Project #: E8110
ESC Key:
Collected by (print): M Cox
Site/Facility ID#:
P.O.#: E8110
Collected by (signature): Marty Cox
Immediately Packed on Ice N __ (Y)

Rush? (Lab MUST Be Notified)
____ Same Day..... 200%
____ Next Day..... 100%
____ Two Day..... 50%
____ Three Day..... 25%

Date Results Needed: ____
Email? __No__Yes
FAX? __No__Yes

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

ESC LAB SCIENCES
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Mt Juliet, TN 37122
Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859
G178

CoCode ENTACT (lab use only)
Template/Prelogin
Shipped Via.

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No of Ctrs	Total Pb, Cd, Zn, As *	Dissolved Pb, Cd, Zn, As	TDS				Remarks/Contaminant	Sample # (lab only)
MW-1	Grab	GW	10	4-20-13	1010	3	✓	✓	✓					L632156-01
MW-2	Grab	GW	8	4-20-13	1100	3	✓	✓	✓					-02
MW-3	Grab	GW	7	4-20-13	1205	3	✓	✓	✓					-03

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other _____ 5547 0237 6582 pH _____ Temp _____

Remarks:

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ _____	Condition: (lab use only) pH adjusted in lab to at 15lbs
Marty Cox	4/23/13	1400			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.1 / Bottles Received: 9	CoC Seals Intact __Y __N __N (OK)
Relinquished by: (Signature)	Date	Time:	Received for lab by: (Signature)	Date: 4-24-13 / Time: 0900	pH Checked: / NCF:

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Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Report Summary

Wednesday July 10, 2013

Report Number: L632157
Samples Received: 04/24/13
Client Project: E8110

Description: Former East La Harpe Smelter Investigation

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: John Hawkins

John Hawkins , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

July 10, 2013

ESC Sample # : L632157-01

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SW-001

Project # : E8110

Collected By : M Cox
Collection Date : 04/18/13 17:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/30/13	1
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	0.029	0.0050	mg/l	6010B	04/30/13	1
Cadmium,Dissolved	0.028	0.0050	mg/l	6010B	05/01/13	1
Lead	BDL	0.0050	mg/l	6010B	04/30/13	1
Lead,Dissolved	0.0072	0.0050	mg/l	6010B	05/01/13	1
Zinc	1.6	0.030	mg/l	6010B	04/30/13	1
Zinc,Dissolved	1.5	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Reported: 05/02/13 11:50 Revised: 07/10/13 19:06

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

July 10, 2013

ESC Sample # : L632157-02

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SOIL-001

Project # : E8110

Collected By : M Cox
Collection Date : 04/18/13 17:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	22.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	89.	0.25	mg/kg	6010B	05/01/13	1
Lead	1100	0.25	mg/kg	6010B	05/01/13	1
Zinc	4400	3.0	mg/kg	6010B	05/01/13	2

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

July 10, 2013

ESC Sample # : L632157-03

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SW-002

Project # : E8110

Collected By : M Cox
Collection Date : 04/19/13 09:55

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/30/13	1
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	BDL	0.0050	mg/l	6010B	04/30/13	1
Cadmium,Dissolved	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead	0.0058	0.0050	mg/l	6010B	04/30/13	1
Lead,Dissolved	0.0050	0.0050	mg/l	6010B	05/01/13	1
Zinc	0.071	0.030	mg/l	6010B	04/30/13	1
Zinc,Dissolved	0.045	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

July 10,2013

ESC Sample # : L632157-04

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SOIL-002

Project # : E8110

Collected By : M Cox
Collection Date : 04/19/13 10:10

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	12.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	8.0	0.25	mg/kg	6010B	05/01/13	1
Lead	440	0.25	mg/kg	6010B	05/01/13	1
Zinc	1600	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
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July 10,2013

ESC Sample # : L632157-05

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : W-001 B2-NE

Project : E8110

Collected By : M Cox
Collection Date : 04/19/13 14:33

Parameter	Result	Det. Limit	Units	Limit	Method	Date/Time	By	Dil
TCLP Extraction	-				1311	04/26/13 0721	MVE	1
Arsenic	BDL	0.050	mg/l	5.0	6010B	05/01/13 0533	WBD	1
Cadmium	1.4	0.050	mg/l	1.0	6010B	05/01/13 0533	WBD	1
Lead	57.	0.050	mg/l	5.0	6010B	05/01/13 0533	WBD	1
Zinc	260	0.25	mg/l		6010B	05/01/13 1008	WBD	5

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)
Limit - Maximum Contaminant Level as established by the US EPA
Note:
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REPORT OF ANALYSIS

Marty Cox
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July 10, 2013

ESC Sample # : L632157-06

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : W-002 B5 NW

Project : E8110

Collected By : M Cox
Collection Date : 04/19/13 14:40

Parameter	Result	Det. Limit	Units	Limit	Method	Date/Time	By	Dil
TCLP Extraction	-				1311	04/26/13 0721	MVE	1
Arsenic	BDL	0.050	mg/l	5.0	6010B	04/28/13 1124	WBD	1
Cadmium	0.95	0.050	mg/l	1.0	6010B	04/28/13 1124	WBD	1
Lead	33.	0.050	mg/l	5.0	6010B	04/28/13 1124	WBD	1
Zinc	360	0.25	mg/l		6010B	04/28/13 1248	WBD	5

BDL - Below Detection Limit
Det. Limit - Estimated Quantitation Limit(EQL)
Limit - Maximum Contaminant Level as established by the US EPA
Note:
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Reported: 05/02/13 11:50 Revised: 07/10/13 19:06

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REPORT OF ANALYSIS

Marty Cox
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July 10, 2013

ESC Sample # : L632157-07

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SW-003

Project # : E8110

Collected By : M Cox
Collection Date : 04/19/13 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	05/01/13	1
Arsenic,Dissolved	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	0.022	0.0050	mg/l	6010B	05/01/13	1
Cadmium,Dissolved	0.021	0.0050	mg/l	6010B	05/01/13	1
Lead	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead,Dissolved	0.0073	0.0050	mg/l	6010B	05/01/13	1
Zinc	2.7	0.030	mg/l	6010B	05/01/13	1
Zinc,Dissolved	2.8	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Reported: 05/02/13 11:50 Revised: 07/10/13 19:06

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REPORT OF ANALYSIS

Marty Cox
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July 10, 2013

ESC Sample # : L632157-08

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SOIL-003

Project # : E8110

Collected By : M Cox
Collection Date : 04/19/13 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	16.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	21.	0.25	mg/kg	6010B	05/01/13	1
Lead	500	0.25	mg/kg	6010B	05/01/13	1
Zinc	2200	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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.
Reported: 05/02/13 11:50 Revised: 07/10/13 19:06

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L632157-06	WG658443	SAMP	Lead	R2643420	V
	WG658443	SAMP	Zinc	R2643420	V

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

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ENTACT
Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632157

July 10, 2013

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Arsenic	< 1	mg/kg			WG658335	04/26/13 13:34
Cadmium	< .25	mg/kg			WG658335	04/26/13 13:34
Lead	< .25	mg/kg			WG658335	04/26/13 13:34
Zinc	< 1.5	mg/kg			WG658335	04/26/13 13:34
Arsenic	< .05	mg/l			WG658443	04/28/13 11:17
Cadmium	< .05	mg/l			WG658443	04/28/13 11:17
Lead	< .05	mg/l			WG658443	04/28/13 11:17
Zinc	< .05	mg/l			WG658443	04/28/13 11:17
Arsenic,Dissolved	< .02	mg/l			WG658734	04/30/13 12:37
Cadmium,Dissolved	< .005	mg/l			WG658734	04/30/13 12:37
Lead,Dissolved	< .005	mg/l			WG658734	04/30/13 12:37
Zinc,Dissolved	< .03	mg/l			WG658734	04/30/13 12:37
Arsenic	< .02	mg/l			WG658527	04/30/13 21:01
Cadmium	< .005	mg/l			WG658527	04/30/13 21:01
Lead	< .005	mg/l			WG658527	04/30/13 21:01
Zinc	< .03	mg/l			WG658527	04/30/13 21:01
Arsenic	< .02	mg/l			WG658612	05/01/13 22:58
Cadmium	< .005	mg/l			WG658612	05/01/13 22:58
Lead	< .005	mg/l			WG658612	05/01/13 22:58
Zinc	< .03	mg/l			WG658612	05/01/13 22:58

Duplicate

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Arsenic	mg/kg	270.	260.	3.77	20	L632189-01	WG658335
Cadmium	mg/kg	59.0	76.0	25.2*	20	L632189-01	WG658335
Lead	mg/kg	37000	46000	21.7*	20	L632189-01	WG658335
Zinc	mg/kg	31000	36000	14.9	20	L632189-01	WG658335
Arsenic	mg/l	0	0	0	20	L632157-06	WG658443
Cadmium	mg/l	0.960	0.950	1.05	20	L632157-06	WG658443
Lead	mg/l	33.0	33.0	0	20	L632157-06	WG658443
Zinc	mg/l	370.	360.	2.74	20	L632157-06	WG658443
Arsenic,Dissolved	mg/l	0	0	0	20	L632355-13	WG658734
Cadmium,Dissolved	mg/l	0	0	0	20	L632355-13	WG658734
Lead,Dissolved	mg/l	0	0.000930	NA	20	L632355-13	WG658734
Zinc,Dissolved	mg/l	0	0.0185	NA	20	L632355-13	WG658734
Arsenic	mg/l	0	0	0	20	L632157-01	WG658527
Cadmium	mg/l	0.0300	0.0290	3.39	20	L632157-01	WG658527
Lead	mg/l	0	0	0	20	L632157-01	WG658527
Zinc	mg/l	1.60	1.60	0	20	L632157-01	WG658527
Arsenic	mg/l	0	0	0	20	L632189-14	WG658612
Cadmium	mg/l	0	0	0	20	L632189-14	WG658612
Lead	mg/l	0	0	0	20	L632189-14	WG658612

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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ENTACT
Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632157

July 10, 2013

Analyte	Units	Duplicate Result	Duplicate	RPD	Limit	Ref Samp	Batch
Zinc	mg/l	0	0	0	20	L632189-14	WG658612

Analyte	Units	Laboratory Control Sample Known Val	Result	% Rec	Limit	Batch
Arsenic	mg/kg	237	232.	97.9	83.1-117	WG658335
Cadmium	mg/kg	191	192.	101.	83.2-117	WG658335
Lead	mg/kg	103	97.0	94.2	83.1-117	WG658335
Zinc	mg/kg	183	176.	96.2	82-118	WG658335
Arsenic	mg/l	1.11	1.10	99.1	85-115	WG658443
Cadmium	mg/l	1.11	1.08	97.3	85-115	WG658443
Lead	mg/l	1.11	1.10	99.1	85-115	WG658443
Zinc	mg/l	1.11	1.06	95.5	85-115	WG658443
Arsenic,Dissolved	mg/l	1.11	1.10	99.1	85-115	WG658734
Cadmium,Dissolved	mg/l	1.11	1.20	108.	85-115	WG658734
Lead,Dissolved	mg/l	1.11	1.20	108.	85-115	WG658734
Zinc,Dissolved	mg/l	1.11	1.15	104.	85-115	WG658734
Arsenic	mg/l	1.11	1.10	99.1	85-115	WG658527
Cadmium	mg/l	1.11	1.15	104.	85-115	WG658527
Lead	mg/l	1.11	1.17	105.	85-115	WG658527
Zinc	mg/l	1.11	1.15	104.	85-115	WG658527
Arsenic	mg/l	1.11	1.11	100.	85-115	WG658612
Cadmium	mg/l	1.11	1.15	104.	85-115	WG658612
Lead	mg/l	1.11	1.18	106.	85-115	WG658612
Zinc	mg/l	1.11	1.14	103.	85-115	WG658612

Analyte	Units	Matrix Spike MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Arsenic	mg/kg	355.	260.	5	190.*	75-125	L632189-01	WG658335
Cadmium	mg/kg	112.	76.0	5	72.0*	75-125	L632189-01	WG658335
Lead	mg/kg	46800	46000	5	1600*	75-125	L632189-01	WG658335
Zinc	mg/kg	27200	36000	2.5	0*	75-125	L632189-01	WG658335
Arsenic	mg/l	1.10	0	1.11	99.1	75-125	L632157-06	WG658443
Cadmium	mg/l	2.04	0.950	1.11	98.2	75-125	L632157-06	WG658443
Lead	mg/l	33.2	33.0	1.11	18.0*	75-125	L632157-06	WG658443
Zinc	mg/l	379.	360.	.222	1710*	75-125	L632157-06	WG658443
Arsenic,Dissolved	mg/l	1.15	0	1.11	104.	75-125	L632355-13	WG658734
Cadmium,Dissolved	mg/l	1.17	0	1.11	105.	75-125	L632355-13	WG658734
Lead,Dissolved	mg/l	1.18	0.000930	1.11	106.	75-125	L632355-13	WG658734
Zinc,Dissolved	mg/l	1.20	0.0185	1.11	106.	75-125	L632355-13	WG658734
Arsenic	mg/l	1.28	0	1.11	115.	75-125	L632105-01	WG658443
Cadmium	mg/l	1.21	0	1.11	109.	75-125	L632105-01	WG658443
Lead	mg/l	1.16	0	1.11	104.	75-125	L632105-01	WG658443

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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ENTACT
Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632157

July 10, 2013

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
		Matrix Spike						
Arsenic	mg/l	1.16	0	1.11	104.	75-125	L632157-01	WG658527
Cadmium	mg/l	1.18	0.0290	1.11	104.	75-125	L632157-01	WG658527
Lead	mg/l	1.18	0	1.11	106.	75-125	L632157-01	WG658527
Zinc	mg/l	2.80	1.60	1.11	108.	75-125	L632157-01	WG658527
Arsenic	mg/l	1.10	0	1.11	99.1	75-125	L632189-14	WG658612
Cadmium	mg/l	1.14	0	1.11	103.	75-125	L632189-14	WG658612
Lead	mg/l	1.18	0	1.11	106.	75-125	L632189-14	WG658612
Zinc	mg/l	1.13	0	1.11	102.	75-125	L632189-14	WG658612

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
		Matrix Spike Duplicate							
Arsenic	mg/kg	217.	355.	0*	75-125	48.3*	20	L632189-01	WG658335
Cadmium	mg/kg	96.0	112.	40.0*	75-125	15.4	20	L632189-01	WG658335
Lead	mg/kg	34500	46800	0*	75-125	30.3*	20	L632189-01	WG658335
Zinc	mg/kg	30200	27200	0*	75-125	10.5	20	L632189-01	WG658335
Arsenic	mg/l	1.04	1.10	93.7	75-125	5.61	20	L632157-06	WG658443
Cadmium	mg/l	2.04	2.04	98.2	75-125	0	20	L632157-06	WG658443
Lead	mg/l	32.9	33.2	0*	75-125	0.908	20	L632157-06	WG658443
Zinc	mg/l	372.	379.	1080*	75-125	1.86	20	L632157-06	WG658443
Arsenic,Dissolved	mg/l	1.10	1.15	99.1	75-125	4.44	20	L632355-13	WG658734
Cadmium,Dissolved	mg/l	1.14	1.17	103.	75-125	2.60	20	L632355-13	WG658734
Lead,Dissolved	mg/l	1.14	1.18	103.	75-125	3.45	20	L632355-13	WG658734
Zinc,Dissolved	mg/l	1.17	1.20	104.	75-125	2.53	20	L632355-13	WG658734
Arsenic	mg/l	1.28	1.28	115.	75-125	0	20	L632105-01	WG658443
Cadmium	mg/l	1.21	1.21	109.	75-125	0	20	L632105-01	WG658443
Lead	mg/l	1.15	1.16	104.	75-125	0.866	20	L632105-01	WG658443
Arsenic	mg/l	1.13	1.16	102.	75-125	2.62	20	L632157-01	WG658527
Cadmium	mg/l	1.18	1.18	104.	75-125	0	20	L632157-01	WG658527
Lead	mg/l	1.13	1.18	102.	75-125	4.33	20	L632157-01	WG658527
Zinc	mg/l	2.74	2.80	103.	75-125	2.17	20	L632157-01	WG658527
Arsenic	mg/l	1.10	1.10	99.1	75-125	0	20	L632189-14	WG658612
Cadmium	mg/l	1.14	1.14	103.	75-125	0	20	L632189-14	WG658612
Lead	mg/l	1.18	1.18	106.	75-125	0	20	L632189-14	WG658612
Zinc	mg/l	1.13	1.13	102.	75-125	0	20	L632189-14	WG658612

Batch number /Run number / Sample number cross reference

WG658125: R2639540: L632157-05 06
WG658335: R2641740: L632157-02 04 08
WG658443: R2643420: L632157-05 06
WG658734: R2646500: L632157-01 03 07
WG658527: R2647540: L632157-01 03
WG658612: R2648384: L632157-07

* * Calculations are performed prior to rounding of reported values.
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Quality Assurance Report
Level II

L632157

July 10, 2013

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Company Name/Address:

ENTACT

1 Oak Hill Drive, Suite 102
Westmont,IL 60559

Billing Information:

Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102
Westmont,IL 60559

Report to: Pat Thompson

Email to: pthompson@entact.com

Project Description:

City State Collected: La Harpe, KS

Phone: (630) 986-2900

FAX:

Client Project #: E8110

ESC Key:

Collected by: (print): M Cox

Site/Facility ID#:

P.O.#: E8110

Collected by (signature): Monty Cox

Immediately Packed on Ice N. (Y)

Rush? (Lab MUST Be Notified)
- ___ Same Day 200%
- ___ Next Day.....100%
- ___ Two Day 50%
- ___ Three Day.....25%

Date Results Needed:

Email? __No__Yes

FAX? __No__Yes

Analysis/Container/Preservative

Chain of Custody Page ___ of ___

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G179

CoCode: ENTACT (lab use only)

Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No of Cntrs	Total + Dissolved Pb, Zn, Cd, As	Total Pb, Zn, As, Cd	TCLP Pb, As, Zn, Cd	Remarks/Contaminant	Sample # (lab only)
SW-001	Grab	OT	0.0	4-18-13	1700	2	✓			1632157	-01
Sed-001	Grab	SS	0.5	4-18-13	1710	1		✓			-02
SW-002	Grab	OT	0.0	4-19-13	0955	2	✓				-03
Sed-002	Grab	SS	0.5	4-19-13	1010	1		✓			-04
W-001 B2-NE	Grab	SS	0.5	4-19-13	1433	1			✓		-05
W-002 B5 NW	Grab	SS	0.5	4-19-13	1440	1			✓		-06

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other Surface water

Remarks: 5547 0237 6498

pH ___ Temp ___

Flow ___ Other ___

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Monty Cox	4/23/13	1400	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐

Temp: 3.1 C

Bottles Received: 11

Date: 4-24-13

Time: 0900

Condition: pH adjusted in lab at ✓ (lab use only)

CoC Seals Intact ___ Y ___ N ___ NA

pH Checked:

NCF:

ESC

L·A·B S·C·I·E·N·C·E·S

NON-CONFORMANCE FORM

Login No.: L632157

Date: 4-24-13

Evaluated by: Troy

Client: ENTACT

Non-Conformance (check applicable items)

- [ ] Parameter(s) past holding time
- [ ] Improper temperature
- [ ] Improper container type
- [ ] Improper preservation
- [ ] Container lid not intact
- [X] Login Clarification Needed
- [ ] Chain of custody is incomplete
- [ ] Chain of Custody is missing (see below)
- [ ] Broken container(s) (See below)
- [ ] Broken container; sufficient sample volume remains for analysis requested (See below)

If no COC: Received by
Date: Time:
Temp: Cont. Rec pH:
[ ] Fedex [ ] UPS [ ] SWA [ ] Other
Tracking #

- [ ] Insufficient packing material around container
- [ ] Insufficient packing material inside cooler
- [ ] Improper handling by carrier (FedEx / UPS / Courier
- [ ] Sample was frozen

Comments: Received one 500ml-HDPE-HNO3 and one 500ml-HDPE-Napcs and one 2oz container (soil) for SW-003 not on the COC.
SW-003

Login Instructions:

TSR Initials: JV

Client informed by call / email / fax / voice mail date: 4/24/2013 time:

Client contact:

SW-003 for Sam Pantin
add to COC

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Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Report Summary

Thursday May 02, 2013

Report Number: L632164
Samples Received: 04/24/13
Client Project: E8110

Description: Former East La Harpe Smelter Investigation

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: John Hawkins

John Hawkins , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632164-01

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : RD-001 0.5FT

Collected By : M. Cox
Collection Date : 04/18/13 10:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	9.2	1.0	mg/kg	6010B	05/01/13	1
Cadmium	2.9	0.25	mg/kg	6010B	05/01/13	1
Lead	260	0.25	mg/kg	6010B	05/01/13	1
Zinc	830	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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.
Reported: 05/02/13 10:18 Printed: 05/02/13 11:54

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REPORT OF ANALYSIS

Marty Cox
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632164-02

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : RD-002 0.5FT

Collected By : M. Cox
Collection Date : 04/18/13 10:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	2.4	1.0	mg/kg	6010B	05/02/13	1
Cadmium	6.7	0.25	mg/kg	6010B	05/02/13	1
Lead	140	0.25	mg/kg	6010B	05/02/13	1
Zinc	750	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632164-03

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : R-BM-SS-3 0.5FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/18/13 15:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	0.080	0.020	mg/kg	7471	04/26/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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Reported: 05/02/13 10:18 Printed: 05/02/13 11:54

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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632164-04

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : R-BM-SS-13 0.5FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/18/13 16:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	1.7	0.10	mg/kg	7471	04/26/13	5

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Reported: 05/02/13 10:18 Printed: 05/02/13 11:54

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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632164-05

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : R-BM-HS-7 0.5FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/18/13 16:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	0.082	0.020	mg/kg	7471	04/26/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Reported: 05/02/13 10:18 Printed: 05/02/13 11:54

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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632164-06

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : R-BM-HS-3 0.5FT

Collected By : M. Cox
Collection Date : 04/18/13 16:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Mercury	0.15	0.020	mg/kg	7471	04/26/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Reported: 05/02/13 10:18 Printed: 05/02/13 11:54

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Quality Assurance Report
Level II

L632164

May 02, 2013

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Mercury	< .02	mg/kg			WG658068	04/26/13 09:08
Arsenic	< 1	mg/kg			WG658335	04/26/13 13:34
Cadmium	< .25	mg/kg			WG658335	04/26/13 13:34
Lead	< .25	mg/kg			WG658335	04/26/13 13:34
Zinc	< 1.5	mg/kg			WG658335	04/26/13 13:34
Arsenic	< 1	mg/kg			WG658337	05/02/13 01:05
Cadmium	< .25	mg/kg			WG658337	05/02/13 01:05
Lead	< .25	mg/kg			WG658337	05/02/13 01:05
Zinc	< 1.5	mg/kg			WG658337	05/02/13 01:05

Duplicate

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Mercury	mg/kg	0.0860	0.0680	22.9*	20	L632054-02	WG658068
Arsenic	mg/kg	270.	260.	3.77	20	L632189-01	WG658335
Cadmium	mg/kg	59.0	76.0	25.2*	20	L632189-01	WG658335
Lead	mg/kg	37000	46000	21.7*	20	L632189-01	WG658335
Zinc	mg/kg	31000	36000	14.9	20	L632189-01	WG658335
Arsenic	mg/kg	1.70	3.50	69.2*	20	L632174-14	WG658337
Cadmium	mg/kg	1.90	5.10	91.4*	20	L632174-14	WG658337
Lead	mg/kg	380.	630.	49.5*	20	L632174-14	WG658337
Zinc	mg/kg	720.	1400	64.2*	20	L632174-14	WG658337

Laboratory Control Sample

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Mercury	mg/kg	12.4	14.5	117.	71.6-127.7	WG658068
Arsenic	mg/kg	237	232.	97.9	83.1-117	WG658335
Cadmium	mg/kg	191	192.	101.	83.2-117	WG658335
Lead	mg/kg	103	97.0	94.2	83.1-117	WG658335
Zinc	mg/kg	183	176.	96.2	82-118	WG658335
Arsenic	mg/kg	237	201.	84.8	83.1-117	WG658337
Cadmium	mg/kg	191	179.	93.7	83.2-117	WG658337
Lead	mg/kg	103	94.0	91.3	83.1-117	WG658337
Zinc	mg/kg	183	152.	83.1	82-118	WG658337

Matrix Spike

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Mercury	mg/kg	0.394	0.0680	.25	130.*	80-120	L632054-02	WG658068
Arsenic	mg/kg	355.	260.	5	190.*	75-125	L632189-01	WG658335
Cadmium	mg/kg	112.	76.0	5	72.0*	75-125	L632189-01	WG658335
Lead	mg/kg	46800	46000	5	1600*	75-125	L632189-01	WG658335
Zinc	mg/kg	27200	36000	2.5	0*	75-125	L632189-01	WG658335

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Quality Assurance Report
Level II

L632164

May 02, 2013

Matrix Spike

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Arsenic	mg/kg	7.51	3.50	50	8.02*	75-125	L632174-14	WG658337
Cadmium	mg/kg	42.8	5.10	50	75.4	75-125	L632174-14	WG658337
Lead	mg/kg	375.	630.	50	0*	75-125	L632174-14	WG658337
Zinc	mg/kg	661.	1400	50	0*	75-125	L632174-14	WG658337

Matrix Spike Duplicate

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Mercury	mg/kg	0.339	0.394	108.	80-120	14.9	20	L632054-02	WG658068
Arsenic	mg/kg	217.	355.	0*	75-125	48.3*	20	L632189-01	WG658335
Cadmium	mg/kg	96.0	112.	40.0*	75-125	15.4	20	L632189-01	WG658335
Lead	mg/kg	34500	46800	0*	75-125	30.3*	20	L632189-01	WG658335
Zinc	mg/kg	30200	27200	0*	75-125	10.5	20	L632189-01	WG658335
Arsenic	mg/kg	9.12	7.51	11.2*	75-125	19.4	20	L632174-14	WG658337
Cadmium	mg/kg	43.2	42.8	76.2	75-125	0.930	20	L632174-14	WG658337
Lead	mg/kg	434.	375.	0*	75-125	14.6	20	L632174-14	WG658337
Zinc	mg/kg	1220	661.	0*	75-125	59.4*	20	L632174-14	WG658337

Serial Dilution

Batch number /Run number / Sample number cross reference

WG658068: R2638980: L632164-03 04 05 06
WG658335: R2641740: L632164-01
WG658337: R2648421: L632164-02

* * Calculations are performed prior to rounding of reported values.
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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ENTACT
Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632164

May 02, 2013

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Company Name/Address:
ENTACT

1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Billing Information:

Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

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Mt. Juliet, TN 37122

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Fax: (615) 758-5859

G176

Report to: Pat Thompson
Email to: pthompson@entact.com
Project Description:
City State Collected: LaHarpe, KS
Phone: (630) 986-2900
Client Project #: E8110
ESC Key:
FAX:
Collected by (print): M Cox
Site/Facility ID#:
P.O.#: E8110
Collected by (signature): Monty Cox
Immediately Packed on Ice N (Y)

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day.....100%
___ Two Day 50%
___ Three Day.....25%

Date Results Needed:
Email? __No__Yes
FAX? __No__Yes

CoCode **ENTACT** (lab use only)
Template/Prelogin
Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No of Ctns	Total Pb, Zn, Cd, As	Total Hg	Remarks/Contaminant	Sample # (lab only)
RD-001	Grab	SS	0.5	4-18-13	1015	1	✓			L632164-01
RD-002	Grab	SS	0.5	4-18-13	1030	1	✓			-02
R-BM-SS-3	Grab	SS	0.5	4-18-13	1550	1	✓	✓		-03
R-BM-SS-13	Grab	SS	0.5	4-18-13	1600	1	✓	✓		-04
R-BM-HS-7	Grab	SS	0.5	4-18-13	1415	1	✓	✓		-05
R-BM-HS-3	Grab	SS	0.5	4-18-13	1630	1	✓	✓		-06

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: 5547 0237 6502

pH _____ Temp _____
Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐	Condition: (lab use only)
Monty Cox	4/23/13	1400			OK
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.1° / Bottles Received: 6	CoC Seals Intact ✓ Y ___ N ___ NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 4-24-13 / Time: 0900	pH Checked / NCF:

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Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Report Summary

Thursday May 02, 2013

Report Number: L632174
Samples Received: 04/24/13
Client Project: E8110

Description: Former East La Harpe Smelter Investigation

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: John Hawkins

John Hawkins , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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REPORT OF ANALYSIS

Marty Cox
ENTACT
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May 02, 2013

ESC Sample # : L632174-01

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-001

Collected By : Cox
Collection Date : 04/15/13 14:55

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	1.0	mg/kg	6010B	05/02/13	1
Cadmium	0.29	0.25	mg/kg	6010B	05/02/13	1
Lead	22.	0.25	mg/kg	6010B	05/02/13	1
Zinc	76.	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

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May 02, 2013

ESC Sample # : L632174-02

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-002

Collected By : Cox
Collection Date : 04/15/13 15:25

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	6.2	0.25	mg/kg	6010B	05/02/13	1
Zinc	4.8	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632174-03

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-003

Collected By : Cox
Collection Date : 04/15/13 16:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	8.4	0.25	mg/kg	6010B	05/02/13	1
Zinc	17.	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632174-04

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-004

Collected By : Cox
Collection Date : 04/15/13 17:20

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	17.	1.0	mg/kg	6010B	05/02/13	1
Cadmium	74.	0.25	mg/kg	6010B	05/02/13	1
Lead	2900	0.25	mg/kg	6010B	05/02/13	1
Zinc	33000	15.	mg/kg	6010B	05/02/13	10

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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May 02, 2013

ESC Sample # : L632174-05

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-005

Collected By : Cox
Collection Date : 04/16/13 09:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	14.	0.25	mg/kg	6010B	05/02/13	1
Zinc	16.	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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May 02, 2013

ESC Sample # : L632174-06

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-006

Collected By : Cox
Collection Date : 04/16/13 10:20

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	1.9	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	14.	0.25	mg/kg	6010B	05/02/13	1
Zinc	10.	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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May 02, 2013

ESC Sample # : L632174-07

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-007

Collected By : Cox
Collection Date : 04/16/13 11:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	1.7	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	16.	0.25	mg/kg	6010B	05/02/13	1
Zinc	17.	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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May 02, 2013

ESC Sample # : L632174-08

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-008

Collected By : Cox
Collection Date : 04/16/13 12:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	2.4	1.0	mg/kg	6010B	05/02/13	1
Cadmium	5.1	0.25	mg/kg	6010B	05/02/13	1
Lead	11.	0.25	mg/kg	6010B	05/02/13	1
Zinc	210	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

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May 02, 2013

ESC Sample # : L632174-09

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-009

Collected By : Cox
Collection Date : 04/16/13 14:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	2.4	1.0	mg/kg	6010B	05/02/13	1
Cadmium	13.	0.25	mg/kg	6010B	05/02/13	1
Lead	19.	0.25	mg/kg	6010B	05/02/13	1
Zinc	840	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632174-10

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-010

Collected By : Cox
Collection Date : 04/16/13 14:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	1.8	1.0	mg/kg	6010B	05/02/13	1
Cadmium	0.28	0.25	mg/kg	6010B	05/02/13	1
Lead	13.	0.25	mg/kg	6010B	05/02/13	1
Zinc	110	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
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May 02, 2013

ESC Sample # : L632174-11

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-FD-011

Project # : E8110

Collected By : Cox
Collection Date : 04/16/13 15:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	13.	0.25	mg/kg	6010B	05/02/13	1
Zinc	11.	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632174-12

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-012

Collected By : Cox
Collection Date : 04/17/13 08:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	2800	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	25.	mg/kg	6010B	05/02/13	99
Lead	6800	2.5	mg/kg	6010B	05/02/13	10
Zinc	39000	30.	mg/kg	6010B	05/02/13	20

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
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May 02, 2013

ESC Sample # : L632174-13

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-013

Collected By : Cox
Collection Date : 04/17/13 10:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	3.9	1.0	mg/kg	6010B	05/02/13	1
Cadmium	5.1	0.25	mg/kg	6010B	05/02/13	1
Lead	13.	0.25	mg/kg	6010B	05/02/13	1
Zinc	610	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
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1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632174-14

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-014

Collected By : Cox
Collection Date : 04/17/13 10:30

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	3.5	1.0	mg/kg	6010B	05/02/13	1
Cadmium	5.1	0.25	mg/kg	6010B	05/02/13	1
Lead	630	0.25	mg/kg	6010B	05/02/13	1
Zinc	1400	1.5	mg/kg	6010B	05/02/13	1

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Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632174-15

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SB-FD-015

Project # : E8110

Collected By : Cox
Collection Date : 04/17/13 12:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	2.4	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	13.	0.25	mg/kg	6010B	05/02/13	1
Zinc	130	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632174-16

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-016

Collected By : Cox
Collection Date : 04/17/13 12:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	2.6	1.0	mg/kg	6010B	05/02/13	1
Cadmium	BDL	0.25	mg/kg	6010B	05/02/13	1
Lead	11.	0.25	mg/kg	6010B	05/02/13	1
Zinc	160	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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.
Reported: 05/02/13 10:18 Printed: 05/02/13 11:40

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(615) 758-5858
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Fax (615) 758-5859

Tax I.D. 62-0814289

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632174-17

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SB-FD-017

Collected By : Cox
Collection Date : 04/18/13 08:40

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	2.3	1.0	mg/kg	6010B	05/02/13	1
Cadmium	3.8	0.25	mg/kg	6010B	05/02/13	1
Lead	13.	0.25	mg/kg	6010B	05/02/13	1
Zinc	930	1.5	mg/kg	6010B	05/02/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.
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Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L632174-12	WG658337	SAMP	Cadmium	R2648421	O
L632174-14	WG658337	SAMP	Arsenic	R2648421	J3J6
	WG658337	SAMP	Lead	R2648421	J3V
	WG658337	SAMP	Zinc	R2648421	J3V

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low
O	(ESC) Sample diluted due to matrix interferences that impaired the ability to make an accurate analytical determination. The detection limit is elevated in order to reflect the necessary dilution.
V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed
05/02/13 at 11:40:26

TSR Signing Reports: 341
R5 - Desired TAT

Sample: L632174-01 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-02 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-03 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-04 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-05 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-06 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-07 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-08 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-09 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-10 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-11 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-12 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-13 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-14 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-15 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-16 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

Sample: L632174-17 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 10:18

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Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632174

May 02, 2013

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Arsenic	< 1	mg/kg			WG658337	05/02/13 01:05
Cadmium	< .25	mg/kg			WG658337	05/02/13 01:05
Lead	< .25	mg/kg			WG658337	05/02/13 01:05
Zinc	< 1.5	mg/kg			WG658337	05/02/13 01:05

Duplicate

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Arsenic	mg/kg	1.70	3.50	69.2*	20	L632174-14	WG658337
Cadmium	mg/kg	1.90	5.10	91.4*	20	L632174-14	WG658337
Lead	mg/kg	380.	630.	49.5*	20	L632174-14	WG658337
Zinc	mg/kg	720.	1400	64.2*	20	L632174-14	WG658337

Laboratory Control Sample

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Arsenic	mg/kg	237	201.	84.8	83.1-117	WG658337
Cadmium	mg/kg	191	179.	93.7	83.2-117	WG658337
Lead	mg/kg	103	94.0	91.3	83.1-117	WG658337
Zinc	mg/kg	183	152.	83.1	82-118	WG658337

Matrix Spike

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Arsenic	mg/kg	7.51	3.50	50	8.02*	75-125	L632174-14	WG658337
Cadmium	mg/kg	42.8	5.10	50	75.4	75-125	L632174-14	WG658337
Lead	mg/kg	375.	630.	50	0*	75-125	L632174-14	WG658337
Zinc	mg/kg	661.	1400	50	0*	75-125	L632174-14	WG658337

Matrix Spike Duplicate

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Arsenic	mg/kg	9.12	7.51	11.2*	75-125	19.4	20	L632174-14	WG658337
Cadmium	mg/kg	43.2	42.8	76.2	75-125	0.930	20	L632174-14	WG658337
Lead	mg/kg	434.	375.	0*	75-125	14.6	20	L632174-14	WG658337
Zinc	mg/kg	1220	661.	0*	75-125	59.4*	20	L632174-14	WG658337

Batch number /Run number / Sample number cross reference

WG658337: R2648421 R2648422: L632174-02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 01

* * Calculations are performed prior to rounding of reported values.
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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ENTACT
Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632174

May 02, 2013

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Company Name/Address:
ENTACT

1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Billing Information

Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

ESC LAB SCIENCES
12065 Lebanon Road
Mt. Juliet, TN 37122

Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

G177

Report to: Pat Thompson

Email to: pthompson@entact.com

Project Description:

City/State Collected:

Phone: (630) 986-2900

FAX:

Client Project #: E8110

ESC Key:

Collected by: (print): cox

Site/Facility ID#:

P.O.#: E8110

Collected by (signature): Marty Cox

Immediately Packed on Ice N. (Y)

Rush? (Lab MUST Be Notified)
___ Same Day..... 200%
___ Next Day..... 100%
___ Two Day..... 50%
___ Three Day..... 25%

Date Results Needed:

Email? __No ✓Yes

FAX? __No __Yes

CoCode: ENTACT (lab use only)

Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No of Cntrs	Lead, Arsenic, Cadmium, Zinc	Remarks/Contaminant	Sample # (lab only)
SB-FD-001	Grab	SS	4	4-15-13	1455	1	✓	L632174	-01
SB-FD-002	Grab	SS	4	4-15-13	1525	1	✓		-02
SB-FD-003	Grab	SS	4	4-15-13	1600	1	✓		-03
SB-FD-004	Grab	SS	4	4-15-13	1720	1	✓		-04
SB-FD-005	Grab	SS	4	4-16-13	0945	1	✓		-05
SB-FD-006	Grab	SS	4	4-16-13	1020	1	✓		-06
SB-FD-007	Grab	SS	4	4-16-13	1130	1	✓		-07
SB-FD-008	Grab	SS	2	4-16-13	1200	1	✓		-08
SB-FD-009	Grab	SS	3	4-16-13	1400	1	✓		-09

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

5547 0278 3982

pH ___ Temp ___

Remarks:

Flow ___ Other ___

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐	Condition: (lab use only)
Marty Cox	4/23/13	1600			TD
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 3.6° / Bottles Received: 17	CoC Seals Intact ✓Y ___N ___NA
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 4-24-13 / Time: 0900	pH Checked: / NCF: ✓

Company Name/Address:
ENTACT

1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Billing Information:
Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

ESC LAB SCIENCES
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Phone: (615) 758-5858
Fax: (615) 758-5859

Report to: Pat Thompson
Email to: pthompson@entact.com
Project Description:
City/State Collected: LaHarpe, KS
Phone: (630) 986-2900
FAX:
Client Project #: E811Q
ESC Key:
Collected by (print): Marty Cox
Site/Facility ID#:
P.O.#: E811Q
Collected by (signature): Marty Cox
Immediately Packed on Ice N (Y)

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed:
Email? __No __Yes
FAX? __No __Yes

CoCode: ENTACT (lab use only)
Template/Prelogin:
Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Cntrs	Lead, Cadmium, Zinc, Arsenic	Remarks/Contaminant	Sample # (lab only)
SB-FD-010	Grab	SS	3	4-16-13	1445	1	✓	632174	-10
SB-FD-011	Grab	SS	4	4-16-13	1530	1	✓		-11
SB-FD-012	Grab	SS	3	4-17-13	0845	1	✓		-12
SB-FD-013	Grab	SS	3	4-17-13	1015	1	✓		-13
SB-FD-014	Grab	SS	7	4-17-13	1130	1	✓		-14
SB-FD-015	Grab	SS	3	4-17-13	1215	1	✓		-15
SB-FD-016	Grab	SS	3	4-17-13	1245	1	✓		-16
SB-FD-017		SS		4-18-13	0840	1	✓		-17
per NCF									

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks:

pH ___ Temp ___
Flow ___ Other ___

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Marty Cox	4/23/13	1000	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___

Temp:	Bottles Received:
3.1°	17
Date: 4-24-13	Time: 0900

Condition: (lab use only) ok TO
CoC Seals Intact: ✓ Y ___ N ___ NA
pH Checked:
NCF: ✓

ESC

L·A·B S·C·I·E·N·C·E·S

NON-CONFORMANCE FORM

Login No.: L638174

Date: 4-24-13

Evaluated by: Troy Cup

Client: ENTACT

Non-Conformance (check applicable items)

- [ ] Parameter(s) past holding time
- [ ] Improper temperature
- [ ] Improper container type
- [ ] Improper preservation
- [ ] Container lid not intact
- [X] Login Clarification Needed
- [ ] Chain of custody is incomplete
- [ ] Chain of Custody is missing (see below)
- [ ] Broken container(s) (See below)
- [ ] Broken container: sufficient sample volume remains for analysis requested (See below)

If no COC: Received by ____
Date: ____ Time: ____
Temp: ____ Cont. Rec ____ pH: ____
[ ] Fedex [ ] UPS [ ] SWA [ ] Other
Tracking #

- [ ] Insufficient packing material around container
- [ ] Insufficient packing material inside cooler
- [ ] Improper handling by carrier (FedEx / UPS / Courier
- [ ] Sample was frozen

Comments: Received SB-FD-017 not on the COC.

Login Instructions:

TSR Initials: QH

Client informed by call / email / fax / voice mail date: 4/24/2013 time: ____

Client contact: ____

SB-FD-017

add to Chain Log for Lab panel

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Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Report Summary

Thursday May 02, 2013

Report Number: L632189
Samples Received: 04/24/13
Client Project: E8110

Description: Former East La Harpe Smelter Investigation

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: John Hawkins

John Hawkins , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.
Note: The use of the preparatory EPA Method 3511 is not approved or endorsed by the CA ELAP.

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Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
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May 02, 2013

ESC Sample # : L632189-01

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SS-FD-001 0-6FT

Collected By : M. Cox
Collection Date : 04/15/13 13:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	260	10.	mg/kg	6010B	04/26/13	10
Cadmium	76.	2.5	mg/kg	6010B	04/26/13	10
Lead	46000	2.5	mg/kg	6010B	04/26/13	10
Zinc	36000	30.	mg/kg	6010B	04/26/13	20

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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May 02, 2013

ESC Sample # : L632189-02

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-002 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/15/13 14:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	120	1.0	mg/kg	6010B	05/01/13	1
Cadmium	40.	0.25	mg/kg	6010B	05/01/13	1
Lead	4600	0.25	mg/kg	6010B	05/01/13	1
Zinc	15000	15.	mg/kg	6010B	05/01/13	10

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-03

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SS-FB-001 0-6FT

Collected By : M. Cox
Collection Date : 04/15/13 13:58

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	04/30/13	1
Cadmium	BDL	0.0050	mg/l	6010B	04/30/13	1
Lead	BDL	0.0050	mg/l	6010B	04/30/13	1
Zinc	BDL	0.030	mg/l	6010B	04/30/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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May 02, 2013

ESC Sample # : L632189-04

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SS-FD-003 0-6FT

Collected By : M. Cox
Collection Date : 04/15/13 15:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	6.0	1.0	mg/kg	6010B	05/01/13	1
Cadmium	37.	0.25	mg/kg	6010B	05/01/13	1
Lead	93.	0.25	mg/kg	6010B	05/01/13	1
Zinc	860	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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.
Reported: 05/02/13 09:40 Printed: 05/02/13 09:41

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1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-05

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-004 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/15/13 16:55

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	7.3	1.0	mg/kg	6010B	05/01/13	1
Cadmium	2.3	0.25	mg/kg	6010B	05/01/13	1
Lead	130	0.25	mg/kg	6010B	05/01/13	1
Zinc	650	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-06

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FB-002 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/15/13 17:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead	BDL	0.0050	mg/l	6010B	05/01/13	1
Zinc	BDL	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-07

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-005 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/15/13 18:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	25.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	28.	0.25	mg/kg	6010B	05/01/13	1
Lead	540	0.25	mg/kg	6010B	05/01/13	1
Zinc	3000	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-08

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-006 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/16/13 08:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	21.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	120	0.25	mg/kg	6010B	05/01/13	1
Lead	1900	0.25	mg/kg	6010B	05/01/13	1
Zinc	14000	7.5	mg/kg	6010B	05/01/13	5

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

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ENTACT
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-09

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SS-FB-003 0-6FT

Collected By : M. Cox
Collection Date : 04/16/13 08:55

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead	BDL	0.0050	mg/l	6010B	05/01/13	1
Zinc	BDL	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-10

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-007 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/16/13 10:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	44.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	120	0.25	mg/kg	6010B	05/01/13	1
Lead	2600	0.25	mg/kg	6010B	05/01/13	1
Zinc	18000	15.	mg/kg	6010B	05/01/13	10

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-11

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SS-FD-008 0-6FT

Collected By : M. Cox
Collection Date : 04/17/13 10:25

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	30.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	17.	0.25	mg/kg	6010B	05/01/13	1
Lead	970	0.25	mg/kg	6010B	05/01/13	1
Zinc	3400	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-12

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SS-FB-004 0-6FT

Collected By : M. Cox
Collection Date : 04/17/13 10:17

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead	BDL	0.0050	mg/l	6010B	05/01/13	1
Zinc	BDL	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-13

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-009 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 11:15

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	190	1.0	mg/kg	6010B	05/01/13	1
Cadmium	48.	0.25	mg/kg	6010B	05/01/13	1
Lead	2400	0.25	mg/kg	6010B	05/01/13	1
Zinc	8900	7.5	mg/kg	6010B	05/01/13	5

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
ENTACT
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Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-14

Site ID : EAST LA HARPE, KS

Project # : E8110

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Sample ID : SS-FB-005 0-6FT

Collected By : M. Cox
Collection Date : 04/17/13 12:05

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	BDL	0.020	mg/l	6010B	05/01/13	1
Cadmium	BDL	0.0050	mg/l	6010B	05/01/13	1
Lead	BDL	0.0050	mg/l	6010B	05/01/13	1
Zinc	BDL	0.030	mg/l	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-15

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-010 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/17/13 12:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	99.	1.0	mg/kg	6010B	05/01/13	1
Cadmium	100	0.25	mg/kg	6010B	05/01/13	1
Lead	3900	0.25	mg/kg	6010B	05/01/13	1
Zinc	18000	15.	mg/kg	6010B	05/01/13	10

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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REPORT OF ANALYSIS

Marty Cox
ENTACT
1 Oak Hill Drive, Suite 102
Westmont, IL 60559

May 02, 2013

ESC Sample # : L632189-16

Date Received : April 24, 2013
Description : Former East La Harpe Smelter Investigation

Site ID : EAST LA HARPE, KS

Sample ID : SS-FD-011 0-6FT

Project # : E8110

Collected By : M. Cox
Collection Date : 04/18/13 14:55

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	8.1	1.0	mg/kg	6010B	05/01/13	1
Cadmium	0.39	0.25	mg/kg	6010B	05/01/13	1
Lead	61.	0.25	mg/kg	6010B	05/01/13	1
Zinc	210	1.5	mg/kg	6010B	05/01/13	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L632189-01	WG658335	SAMP	Arsenic	R2641740	J6J5J3
	WG658335	SAMP	Cadmium	R2641740	J3J6
	WG658335	SAMP	Lead	R2641740	VJ3
	WG658335	SAMP	Zinc	R2641740	V

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low
V	(ESC) - Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed
05/02/13 at 09:41:08

TSR Signing Reports: 341
R5 - Desired TAT

Sample: L632189-01 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-02 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-03 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40
pH adjusted in Login at 1522 on 4/24
Sample: L632189-04 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-05 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-06 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40
pH adjusted in Login at 1522 on 4/24
Sample: L632189-07 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-08 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-09 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40
pH adjusted in Login at 1522 on 4/24
Sample: L632189-10 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-11 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-12 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40
pH adjusted in Login at 1522 on 4/24
Sample: L632189-13 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-14 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40
pH adjusted in Login at 1522 on 4/24
Sample: L632189-15 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

Sample: L632189-16 Account: ENTACT Received: 04/24/13 09:00 Due Date: 05/01/13 00:00 RPT Date: 05/02/13 09:40

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ENTACT
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Westmont, IL 60559

Quality Assurance Report
Level II

L632189

May 02, 2013

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Arsenic	< 1	mg/kg			WG658374	04/26/13 18:42
Cadmium	< .25	mg/kg			WG658374	04/26/13 18:42
Lead	< .25	mg/kg			WG658374	04/26/13 18:42
Zinc	< 1.5	mg/kg			WG658374	04/26/13 18:42
Arsenic	< 1	mg/kg			WG658335	04/26/13 13:34
Cadmium	< .25	mg/kg			WG658335	04/26/13 13:34
Lead	< .25	mg/kg			WG658335	04/26/13 13:34
Zinc	< 1.5	mg/kg			WG658335	04/26/13 13:34
Arsenic	< .02	mg/l			WG658527	04/30/13 21:01
Cadmium	< .005	mg/l			WG658527	04/30/13 21:01
Lead	< .005	mg/l			WG658527	04/30/13 21:01
Zinc	< .03	mg/l			WG658527	04/30/13 21:01
Arsenic	< .02	mg/l			WG658612	05/01/13 22:58
Cadmium	< .005	mg/l			WG658612	05/01/13 22:58
Lead	< .005	mg/l			WG658612	05/01/13 22:58
Zinc	< .03	mg/l			WG658612	05/01/13 22:58

Duplicate

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Arsenic	mg/kg	2.10	2.10	0	20	L632445-01	WG658374
Cadmium	mg/kg	0	0.170	NA	20	L632445-01	WG658374
Lead	mg/kg	5.00	5.62	11.7	20	L632445-01	WG658374
Zinc	mg/kg	12.0	13.0	8.00	20	L632445-01	WG658374
Arsenic	mg/kg	270.	260.	3.77	20	L632189-01	WG658335
Cadmium	mg/kg	59.0	76.0	25.2*	20	L632189-01	WG658335
Lead	mg/kg	37000	46000	21.7*	20	L632189-01	WG658335
Zinc	mg/kg	31000	36000	14.9	20	L632189-01	WG658335
Arsenic	mg/l	0	0	0	20	L632157-01	WG658527
Cadmium	mg/l	0.0300	0.0290	3.39	20	L632157-01	WG658527
Lead	mg/l	0	0	0	20	L632157-01	WG658527
Zinc	mg/l	1.60	1.60	0	20	L632157-01	WG658527
Arsenic	mg/l	0	0	0	20	L632189-14	WG658612
Cadmium	mg/l	0	0	0	20	L632189-14	WG658612
Lead	mg/l	0	0	0	20	L632189-14	WG658612
Zinc	mg/l	0	0	0	20	L632189-14	WG658612

Laboratory Control Sample

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Arsenic	mg/kg	237	221.	93.2	83.1-117	WG658374
Cadmium	mg/kg	191	179.	93.7	83.2-117	WG658374
Lead	mg/kg	103	93.4	90.7	83.1-117	WG658374
Zinc	mg/kg	183	165.	90.2	82-118	WG658374
Arsenic	mg/kg	237	232.	97.9	83.1-117	WG658335

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Westmont, IL 60559

Quality Assurance Report
Level II

L632189

May 02, 2013

Analyte	Units	Laboratory Control Sample Known Val	Result	% Rec	Limit	Batch
Cadmium	mg/kg	191	192.	101.	83.2-117	WG658335
Lead	mg/kg	103	97.0	94.2	83.1-117	WG658335
Zinc	mg/kg	183	176.	96.2	82-118	WG658335
Arsenic	mg/l	1.11	1.10	99.1	85-115	WG658527
Cadmium	mg/l	1.11	1.15	104.	85-115	WG658527
Lead	mg/l	1.11	1.17	105.	85-115	WG658527
Zinc	mg/l	1.11	1.15	104.	85-115	WG658527
Arsenic	mg/l	1.11	1.11	100.	85-115	WG658612
Cadmium	mg/l	1.11	1.15	104.	85-115	WG658612
Lead	mg/l	1.11	1.18	106.	85-115	WG658612
Zinc	mg/l	1.11	1.14	103.	85-115	WG658612

Analyte	Units	Matrix Spike MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Arsenic	mg/kg	49.8	2.10	50	95.4	75-125	L632445-01	WG658374
Cadmium	mg/kg	55.3	0.170	50	110.	75-125	L632445-01	WG658374
Lead	mg/kg	57.7	5.62	50	104.	75-125	L632445-01	WG658374
Zinc	mg/kg	65.2	13.0	50	104.	75-125	L632445-01	WG658374
Arsenic	mg/kg	355.	260.	5	190.*	75-125	L632189-01	WG658335
Cadmium	mg/kg	112.	76.0	5	72.0*	75-125	L632189-01	WG658335
Lead	mg/kg	46800	46000	5	1600*	75-125	L632189-01	WG658335
Zinc	mg/kg	27200	36000	2.5	0*	75-125	L632189-01	WG658335
Arsenic	mg/l	1.16	0	1.11	104.	75-125	L632157-01	WG658527
Cadmium	mg/l	1.18	0.0290	1.11	104.	75-125	L632157-01	WG658527
Lead	mg/l	1.18	0	1.11	106.	75-125	L632157-01	WG658527
Zinc	mg/l	2.80	1.60	1.11	108.	75-125	L632157-01	WG658527
Arsenic	mg/l	1.10	0	1.11	99.1	75-125	L632189-14	WG658612
Cadmium	mg/l	1.14	0	1.11	103.	75-125	L632189-14	WG658612
Lead	mg/l	1.18	0	1.11	106.	75-125	L632189-14	WG658612
Zinc	mg/l	1.13	0	1.11	102.	75-125	L632189-14	WG658612

Analyte	Units	Matrix Spike Duplicate MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Arsenic	mg/kg	51.5	49.8	98.8	75-125	3.36	20	L632445-01	WG658374
Cadmium	mg/kg	55.6	55.3	111.	75-125	0.541	20	L632445-01	WG658374
Lead	mg/kg	59.0	57.7	107.	75-125	2.23	20	L632445-01	WG658374
Zinc	mg/kg	68.4	65.2	111.	75-125	4.79	20	L632445-01	WG658374
Arsenic	mg/kg	217.	355.	0*	75-125	48.3*	20	L632189-01	WG658335
Cadmium	mg/kg	96.0	112.	40.0*	75-125	15.4	20	L632189-01	WG658335
Lead	mg/kg	34500	46800	0*	75-125	30.3*	20	L632189-01	WG658335
Zinc	mg/kg	30200	27200	0*	75-125	10.5	20	L632189-01	WG658335
Arsenic	mg/l	1.10	1.10	99.1	75-125	0	20	L632189-14	WG658612
Cadmium	mg/l	1.14	1.14	103.	75-125	0	20	L632189-14	WG658612

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

ENTACT
Marty Cox
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Quality Assurance Report
Level II

L632189

May 02, 2013

		Matrix Spike Duplicate							
Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Lead	mg/l	1.18	1.18	106.	75-125	0	20	L632189-14	WG658612
Zinc	mg/l	1.13	1.13	102.	75-125	0	20	L632189-14	WG658612

Batch number /Run number / Sample number cross reference

WG658374: R2641122: L632189-02 04 05 07 08 10 11 13 15 16
WG658335: R2641740: L632189-01
WG658527: R2647540: L632189-03
WG658612: R2648384: L632189-06 09 12 14

* * Calculations are performed prior to rounding of reported values.
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Westmont, IL 60559

Quality Assurance Report
Level II

L632189

May 02, 2013

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Company Name/Address:
ENTACT

1 Oak Hill Drive. Suite 102
Westmont.IL 60559

Billing Information

Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102

Westmont,IL 60559

Report to: Pat Thompson

Email to: Pthompson@entact.com

Project Description:

City State Collected: LA HARPE, KS

Phone: (630) 986-2900

FAX:

Client Project #: E8110

ESC Key:

Collected by: (print) JC

Site/Facility ID#:

P.O #: E8110

Collected by (signature): M COX Marty Cox

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day.....200%
___ Next Day.....100%
___ Two Day.....50%
___ Three Day.....25%

Date Results Needed:

Email? __No ✓Yes

FAX? __No __Yes

Analysis/Container/Preservative: Arsenic, Lead, Cadmium, Zinc

Chain of Custody Page ___ of ___

ESC LAB SCIENCES
12065 Lebanon Road
Mt Juliet, TN 37122

Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

G175

CoCode ENTACT (lab use only)

Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No of Cntrs	Arsenic, Lead, Cadmium, Zinc	Remarks/Contaminant	Sample # (lab only)
SS-FD-001	GRAB	SOIL	0-6	15 Apr 13	1315	1	X		L632189-01
SS-FD-002	GRAB	SOIL	0-6	15 Apr 13	1405	1	X		-02
SS-FB-001	Grab	SSGW	0-6	15 Apr 13	1358	1	✓		-03
SS-FD-003	GRAB	SOIL	0-6	15 Apr 13	1505	1	X		-04
SS-FD-004	GRAB	SOIL	0-6	15 Apr 13	1655	1	X		-05
SS-FB-002	Grab	SSGW	0-6	15 Apr 13	1700	1	✓		-06
SS-FD-005	GRAB	SOIL	0-6	15 Apr 13	1805	1	X		-07
SS-FD-006	GRAB	SOIL	0-6	16 Apr 13	0850	1	X		-08
SS-FB-003	Grab	SSGW	0-6	16 Apr 13	0855	1	✓		-09

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other 5547 0237 6502

pH ___ Temp ___

Remarks:

Flow ___ Other ___

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Marty Cox	4/23/13	1600	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ ___

Temp: 3.1°

Bottles Received: ~~#~~ 16

Date: 4-24-13

Time: 0900

Condition: pH adjusted in lab at 1500. (lab use only)

CoC Seals Intact ___ Y ___ N ___ NA (ok)

pH Checked:

NCF:

Company Name/Address:

ENTACT

1 Oak Hill Drive, Suite 102
Westmont, IL 60559

Billing Information:

Accounts Payable- Wendy Murra
1 Oak Hill Drive, Suite 102

Westmont, IL 60559

Analysis/Container/Preservative

Chain of Custody
Page ___ of ___

ESC LAB SCIENCES
12065 Lebanon Road
Mt. Juliet, TN 37122

Phone: (800) 767-5859
Phone: (615) 758-5858
Fax: (615) 758-5859

Report to: Pat Thompson

Email to: pthompson@entact.com

Project Description:

City/State Collected: La Harpe, KS

Phone: (630) 986-2900

FAX:

Client Project #: E 8110

ESC Key

Collected by: (print) M COX

Site/Facility ID#:

P.O.#: E 8110

Collected by (signature): Marty Cox

Immediately Packed on Ice N _ Y _

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed:

Email? __No__Yes

FAX? __No__Yes

CoCode **ENTACT** (lab use only)

Template/Prelogin

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No. of Ctrs	Total Cd, Zn, As, Pb	Remarks/Contaminant	Sample # (lab only)
~~SS-HZ-NE~~ SS-FD-007	GRAB	SOIL	0-6	16APR13	1005	1	J		L632189-10
SS-FD-008	GRAB	SOIL	0-6	17APR13	1025	1	J		-11
SS-FD-004	Grab	~~SS~~ GW	0-6	17APR13	1017	1	J		-12
SS-FD-009	GRAB	SOIL	0-6	17APR13	1115	1	J		-13
SS-FD-005	Grab	~~SS~~ GW	0-6	17APR13	1205	1	J		-14
SS-FD-010	GRAB	SOIL	0-6	17APR13	1200	1	J		-15
SS-FD-011	GRAB	SOIL	0-6	18APR13	1455	1	J		-16

*Matrix: SS - Soil/Solid GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Marty Cox	4/23/13	1403	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☒ FedEx ☐ Courier ☐ _____

Temp: 3.1°

Bottles Received: 16

Date: 4-24-13

Time: 0900

Condition: (lab use only) pH adjusted in lab at 1522. (OK)

CoC Seals Intact: ___ Y ___ N ___ NA

pH Checked:

NCF:

APPENDIX E

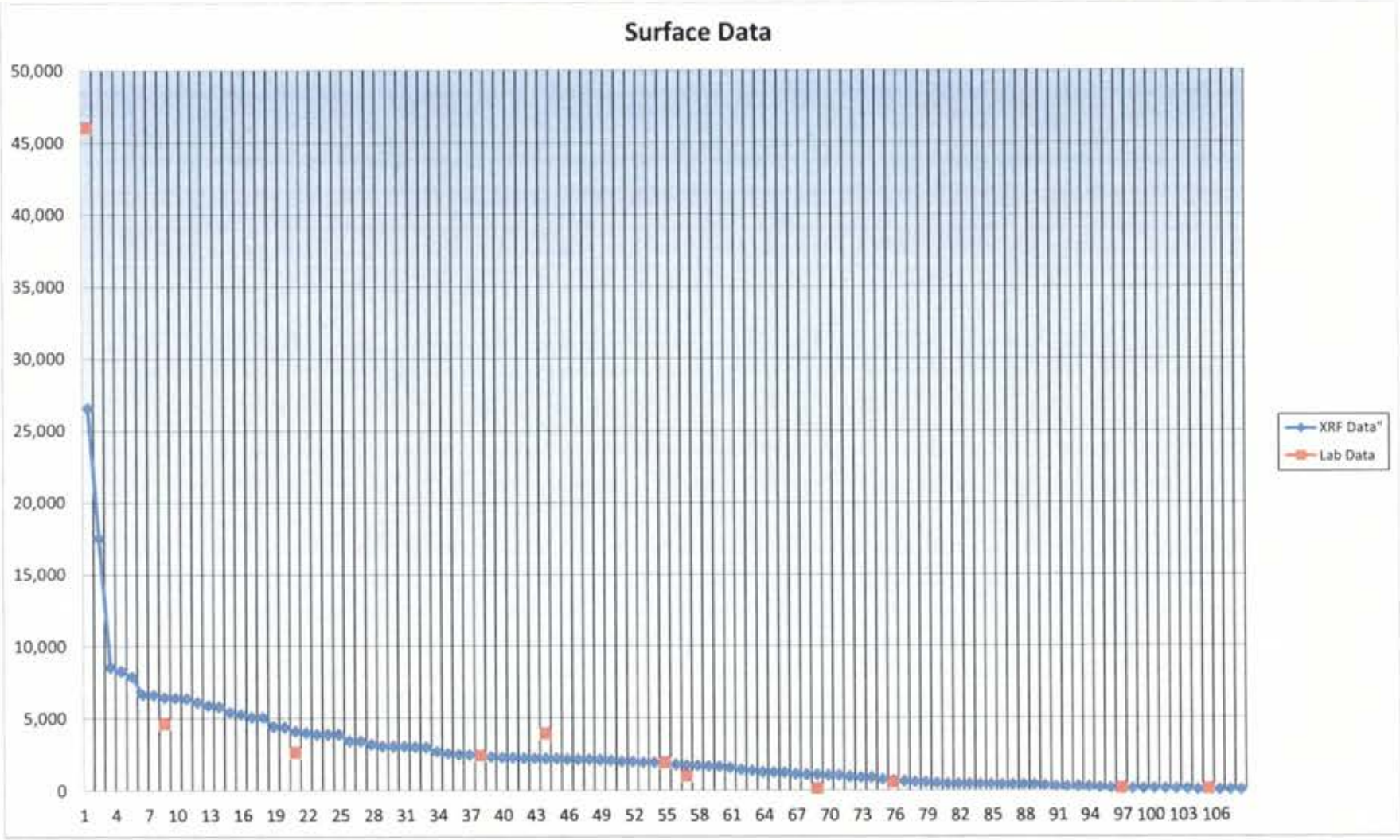
XRF CORRELATION FOR LEAD

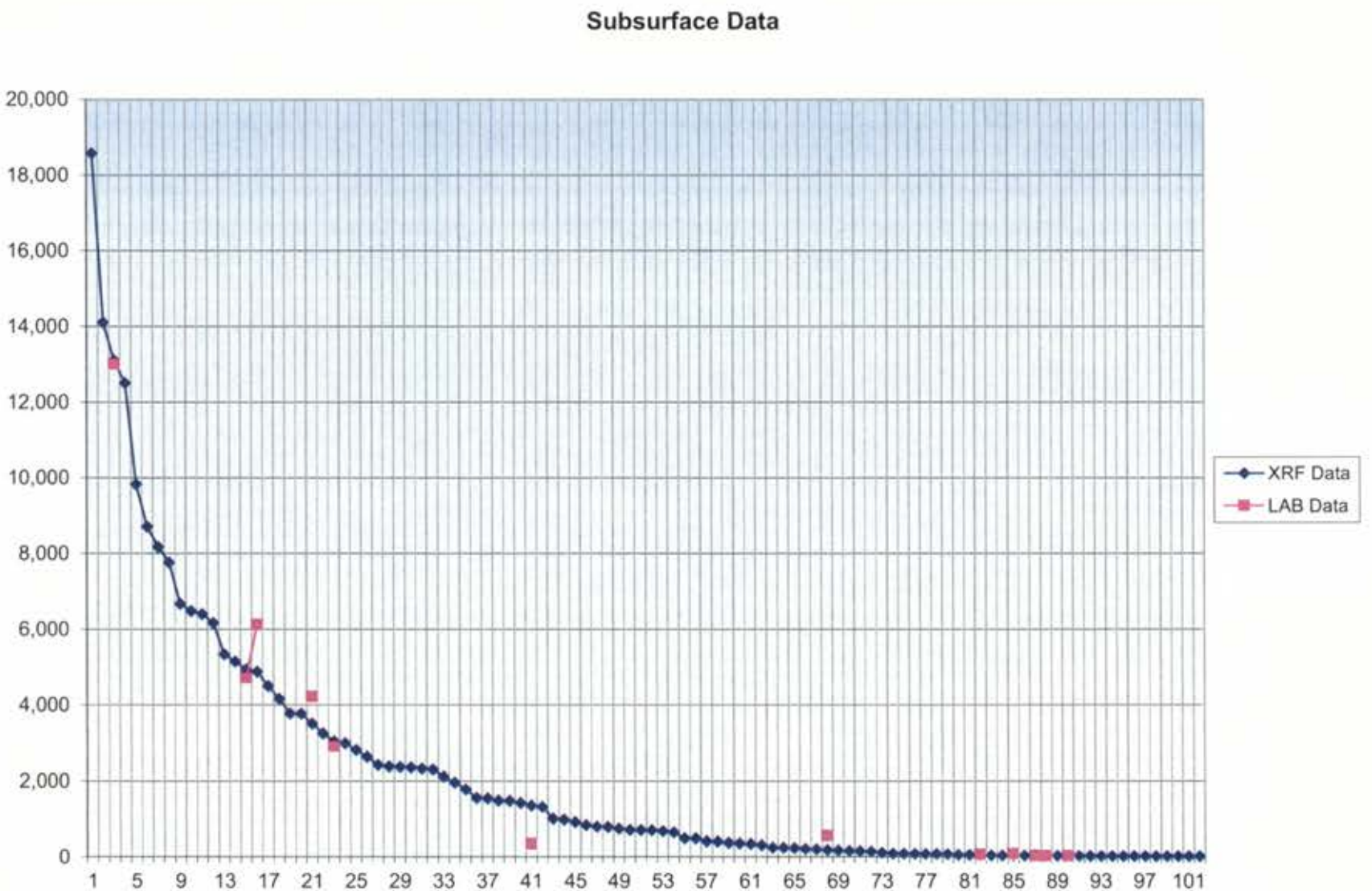
Comparison of XRF and Laboratory Data

A linear regression was calculated for the XRF vs. laboratory arsenic and lead data obtained at this site. According to EPA Method 6200, a coefficient of correlation of $0.9 > r^2 > 0.7$ can be considered **quantitative screening level data**, or consistent with OA2 level data established in EPA's *Quality assurance/Quality Control Guidance for Removal Activities*, EPA 540/G-90/004 of April, 1990, If the correlation coefficient was less than 0.7, the data was characterized as qualitative screening-level data.

The overall coefficient of correlation for lead and arsenic were $r^2 = 0.853021755$ and $r^2 = 0.808207835$, respectively indicating that this data could be considered high quality. The coefficient of correlation for cadmium and zinc was calculated as, 0.06569, and 0.397054746, respectively. The high number of non-detects in these samples results could have affected the outcome

In general, it was observed that where concentrations of lead and/or arsenic exceeded RSK criteria, concentrations of cadmium and zinc were also exceeded. Therefore it is considered that the lab data for lead and arsenic correlated well with the XRF results, and the XRF data is useable for this RSE investigation. It should also be noted that none of the XRF samples were dried, and because of the persistent rain, all samples were moist to damp.


Surface Data
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67 70 73 76 79 82 85 88 91 94 97 100 103 106
XRF Data"
Lab Data


Subsurface Data
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97 101
XRF Data
LAB Data