

**KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
FINAL CORRECTIVE ACTION DECISION
FORMER CHEROKEE LANYON SMELTER SITE
GIRARD, KANSAS**

DECLARATION OF CORRECTIVE ACTION DECISION

SITE NAME AND LOCATION

Former Cherokee Lanyon Smelter Site
Girard, Cherokee County, Kansas

ORIGINAL

STATEMENT OF BASIS AND PURPOSE

The Final Corrective Action Decision document presents the corrective action selected by the Kansas Department of Health and Environment (KDHE) for the Former Cherokee Lanyon Smelter Site located in Girard, Kansas. In the Comprehensive Investigation (CI), it was determined that lead, cadmium, and arsenic are present at elevated concentrations in surface and subsurface soil at the Site, exceeding the corresponding KDHE Tier 2 Risk-Based Screening (RSK) Levels in a residential setting for soil.

In the Corrective Action Study (CAS), various remedial action alternatives were evaluated to address contamination at the site. The remedial action selected for the site was developed on the basis of documents and information contained in the Administrative Record File.

DESCRIPTION OF THE SELECTED REMEDIAL ACTION

KDHE has determined that the selected corrective action, as described and evaluated in the Final Corrective Action Decision, meets the criteria established for selection and will be protective of human health and the environment. The remedial action selected includes excavation of approximately 9,200 cubic yards of contaminated soil and residual smelter debris from the upper 0.5 to 1.0 feet of soils exceeding residential RSK levels. The excavated soils and smelter residues will be placed in the 400-foot by 600-foot Consolidation Cell located over the former landfill. The excavated material will be compacted along with an additional 7,000-8,000 cubic yards of excavated materials from the Girard Zinc Works Site (a former smelter site less than two miles away) and graded to blend into the surrounding topography before placement of a two-foot thick soil and vegetative cap (18 inches fill material, 6 inches top soil) to remove the potential for exposure. An EUC will be placed on the consolidation cell area to prohibit future intrusive activities that may damage the cap and to ensure the land use remains nonresidential. A long-term Operations and Maintenance plan will be developed and will include routine inspections, and repairs will be conducted to ensure long-term effectiveness of the remedy. The cost estimate includes the cost of the EUC and the required long-term operation and maintenance for 30 years.

BER SCANNED

SEP 23 2010

DECLARATION

The selected remedial action is protective of human health and the environment; attains state, federal and local requirements that are applicable or relevant and appropriate to this corrective action; and, provides cost-effective performance. The remedial action will reduce contaminant mobility at the Former Cherokee Lanyon Smelter Site. In selecting and declaring this corrective action, KDHE believes implementation of the remedial action will have a beneficial effect on health and the environment.



Roderick L. Bremby
Secretary

9/7/2010

Date

Attachment: Final Corrective Action Decision

Curtis State Office Building
1000 SW Jackson, Suite 410
Topeka, Kansas 66612-1367

Kansas Department of Health and Environment

**Final
Corrective Action Decision**



**Former Girard Zinc Works Smelter
Girard, Kansas**

September 2010

Bureau of Environmental Remediation

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 PURPOSE OF THE FINAL CORRECTIVE ACTION DECISION.....	1
2.0 SITE BACKGROUND.....	2
2.1 Site Location.....	2
2.2 Site History.....	2
3.0 COMPREHENSIVE INVESTIGATION.....	2
4.0 SITE RISKS.....	3
5.0 REMEDIAL ACTION OBJECTIVES.....	3
5.1 Cleanup Levels.....	4
6.0 SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED.....	4
7.0 DESCRIPTION OF THE SELECTED REMEDY.....	5
8.0 COMMUNITY INVOLVEMENT.....	6
9.0 DOCUMENTATION OF MINOR CHANGES.....	6
10.0 RESPONSE TO COMMENTS SUMMARY.....	6

TABLES

Table 1	Contaminants of Concern and Clean-Up Levels for Soil
Table 2	Contaminants of Concern and Clean-Up Levels for Groundwater
Table 3	Contaminants of Concern and Clean-Up Levels for Sediment

FIGURES

Figure 1	Site Location
Figure 2	Site Boundary

1.0 PURPOSE OF THE FINAL CORRECTIVE ACTION DECISION

The primary purposes of the Final Corrective Action Decision (CAD) for the former Girard Zinc Works Smelter Site (Site) are to: 1) summarize information from the key site documents including the Comprehensive Investigation (CI) and Corrective Action Study (CAS) reports; 2) briefly describe the alternatives for site remediation detailed in the CAS report; 3) identify and describe KDHE's selected remedy for the soil, sediment, and groundwater contamination; and 4) document comments and KDHE's responses to the public comments received regarding the draft CAD.

KDHE has selected a final remedy for the Site after reviewing and considering all information submitted during the 30-day public comment period (July 13 to August 12, 2010). The public was encouraged to review and comment on the preferred remedy presented in the draft CAD. KDHE held a public availability session on July 22, 2010, at the Girard Public Library to present information regarding the preferred remedy and solicit public participation. A news release was issued in the *Pittsburg Morning Sun* on July 13, 2010.

ENTACT, LLC, the consultant for United States Steel Corporation (U.S. Steel), prepared the key documents for the Site. Work performed during the CI and CAS process followed the terms outlined in the April 2007 Consent Agreement between U.S. Steel and KDHE. The public was encouraged to review and comment on the technical information presented in the CI and CAS reports and other documents contained in the Administrative Record file. The Administrative Record file includes all pertinent documents and site information that form the basis and rationale for selecting the final remedy. KDHE encouraged the public to review the Administrative Record file, which was available for public review and copying during normal business hours at the following location:

Kansas Department of Health and Environment
Bureau of Environmental Remediation
1000 SW Jackson St., Suite 410
Topeka, Kansas 66612-1367
CONTACT: Pamela Green, Project Manager
Telephone Number: (785) 296-1935
E-mail: pgreen@kdheks.gov

For convenience to interested members of the public, copies of the CI and CAS reports, as well as the draft CAD, were also available for review and copying during normal business hours at the following location:

Girard Public Library
128 W. Prairie Ave
Girard, Kansas 66743
Telephone Number: (620) 724-4317

2.0 SITE BACKGROUND

2.1 Site Location

The Site is located in Girard, Kansas in Crawford County in a rural area, approximately 1.6 miles east-southeast of the Girard City limits as shown in Figure 1. The approximate boundaries of the Site are 2,000 feet east of 160th Street and extending east-southeast as illustrated in Figure 2. The Site is bounded on the north by a former Atchison-Topeka-Santa Fe railroad easement and a gravel road along the south. Occupying approximately 4.8 acres in size, the Site is part of a larger triangular-shaped 13-acre parcel recently purchased by U.S. Steel from Jim and Connie Vaughn. According to property tax records, the Site is currently zoned for agricultural with residential use.

2.2 Site History

The Site was historically used for zinc smelting between the 1890's and 1901 as evidenced by the 2.2-acre historic former smelter footprint on historical Sanborn maps (1902). The former smelter was constructed in the late 1880's and consisted of a blacksmith shop, a dry room for retorts with a furnace below, a pottery room used to make clay retorts, a flat roast kiln, a furnace building, a crusher and mining room, and a large boarding house for smelter workers. The furnaces were built along the drainageway. Operations ceased in 1901.

While the Site is largely undeveloped and vegetated, visible smelter residues and assorted junk are scattered within the former smelter footprint, particularly in the approximate locations of the former ore roasting plant and furnaces. Some smelter residues also have been observed in drainage areas, the low-lying area, and along the former railroad easement.

3.0 COMPREHENSIVE INVESTIGATION

U.S. Steel contracted ENTACT, LLC, to perform the CI/CAS at the Site in order to supplement the 2003 and 2004 Focused Former Smelter Assessment (FFSA) conducted by KDHE and its contractor, Burns & McDonnell. A CI Work Plan was approved by KDHE in November 2007, and CI activities were performed in December 2007 and January 2008. The objectives of the CI process include:

- identification and characterization of all source areas;
- delineation of the vertical and horizontal extent of contamination for each of the impacted environmental media at the site;
- characterization of the physical and chemical properties of the contaminants, their mobility and persistence in the environment, and their important fate and transport mechanisms;
- identification of human and environmental targets that may be threatened or affected by contaminants at the site; and
- development of an initial list of remedial alternatives.

The field activities consisted of the collection of the following samples for lead, arsenic, cadmium, and zinc:

- Approximately 30 surface soil samples
- Approximately 106 subsurface soil samples
- Six surface water samples and six sediment samples
- One groundwater sample

The results of investigations are provided in the *Final Comprehensive Investigation Report*, August 2008. The following is a brief summary of the results:

- Lead, cadmium, arsenic, and zinc have been detected in smelter residues (slag and retort fragments) in excess of the Risk-Based Standards for Kansas (RSK).
- Lead, cadmium, arsenic, and zinc are present in surface and subsurface soils above the residential RSK.
- Arsenic was detected in soils above the residential RSK within the ephemeral South Drainageway but below background levels.
- Zinc was detected in sediment above the Probable Effects Concentration (PEC) in Second Cow Creek, but was not detected in the surface water.
- No significant impacts to surface water were detected. Zinc was detected in the surface water of the South Drainageway at 0.04 mg/L, slightly above background levels of <0.02 mg/L, but was not detected above residential RSK in the soil of the South Drainageway.
- Cadmium and zinc were detected in shallow groundwater above the RSK in 2004 and 2008, but below RSK in samples collected on March 3, 2010.

4.0 SITE RISKS

Information collected from the investigations at the Site have documented the potential risks to human health and environment if no cleanup actions were performed at the Site. Risks are subsequently used as one of several criteria to evaluate proposed remedial alternatives and establish remedial action objectives. The general purpose of a recommended remedial action at the Site is to protect human health and the environment from exposure to contaminants of concern.

Contaminants of concern at this Site are lead, arsenic, zinc, and cadmium. The primary route of potential exposure to contaminants at the Site is through contact with dust from soil and sediment contaminated with lead, arsenic, cadmium, and zinc via ingestion or inhalation. On-site groundwater is not currently used in the area and while there are no current routes of exposure, it is a potential source as a future potable water supply.

5.0 REMEDIAL ACTION OBJECTIVES

Based on the information collected during the CI, the following remedial action objectives (RAOs) were developed:

- Prevent human exposure through contact with dust from contaminated soil and sediment via inhalation or ingestion.
- Prevent further degradation of groundwater.

5.1 Cleanup Levels

The results of the CI indicate that soil and groundwater contaminated with metals present a human health risk that exceeds EPA's recommended risk range. KDHE has calculated risk-based Tier 2 Levels for soil and groundwater for the protection of human health. The risk-based Tier 2 Levels and methods of calculation are identified in KDHE's *Risk-Based Standards for Kansas, RSK Manual* and are provided in Table 1 (soil) and Table 2 (groundwater) along with maximum concentrations detected for the contaminants of concern at this Site. The cleanup goal will be at residential RSK levels for Site contaminants in order to allow for unrestricted future use of property.

Results indicate that sediment in Second Cow Creek is contaminated with zinc. Probable Effect Concentrations (PECs) are used to identify sediments that are likely to be toxic to sediment-dwelling organisms. KDHE has selected PECs as the cleanup levels for sediment in Second Cow Creek, which are provided in Table 3 for the contaminants of concern at this Site. PECs are derived from the document "Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems," by D.D. Mac Donald et. al., *Archives of Environmental Contamination and Toxicology*, 39, 20-31 (2000).

The conclusions of the CI, the formulation of RAOs, and the determination of cleanup levels for soil and sediment provide the basis for selecting a preferred remedial alternative.

6.0 SUMMARY OF REMEDIAL ALTERNATIVES EVALUATED

In accordance with KDHE's CI/CAS Scope of Work, several remedial action alternatives were developed and evaluated in detail. Each remedial alternative was evaluated using the following criteria: 1) overall protection of human health and the environment; 2) compliance with Federal and State ARARs (applicable or relevant and appropriate requirements); 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility, and volume through treatment; 5) short-term effectiveness; 6) implementability; and 7) cost.

The following remedial alternatives were evaluated in the CAS:

- Alternative 1: No Action (\$30,000 for annual routine site inspections for a period of 30 years)
- Alternative 2: Excavation and Off-Site Disposal to a Subtitle D Landfill (\$820,000 - \$920,000 assuming 25% of material will require treatment)
- Alternative 3: Excavation and Off-Site Consolidation and Cover (\$275,000 - \$315,000)

7.0 DESCRIPTION OF THE SELECTED REMEDY

KDHE has determined that the selected remedy for the Site, outlined below, satisfies or meets the criteria established by both State and Federal programs and will be protective of human health and the environment. The remedial alternatives were evaluated based on the seven criteria discussed in Section 6.0.

KDHE has selected Alternative 3 as the preferred remedy for addressing the contaminated soil. Approximately 7,000 to 8,000 cubic yards will be excavated from the upper 0.5 to 4.0 feet of soils exceeding residential RSK levels. The extent of contamination will be delineated to the east/southeast, to the north/northwest, and along the portion of the re-worked South Drainageway and on the north access road. Following removal of soils, confirmatory samples would be collected at the base of the excavation area and along outside sidewalls where excavation exceeds greater than 1.0 foot. The extent of excavation is intended to achieve the residential RSK levels for Site contaminants to allow for unrestricted future use of property.

The excavated soils will be transported to the constructed Consolidation Cell situated within the footprint of a former 5-acre landfill at the former smelter site (former Cherokee Lanyon Smelter) located approximately 2 miles northwest of the Site and 0.3 miles east of South 150th Street and north of Highway 610 (See Figure 2). The excavated soils will be graded to blend into the surrounding topography before placement of a two-foot thick soil and vegetative cap (18 inches fill material, 6 inches top soil) to remove the potential for exposure.

The following activities will be conducted:

- The extent of contaminated sediment will be determined during pre-construction activities and excavated if PEC levels are exceeded. Additional engineering controls will be used as necessary to minimize transport of affected sediments to downstream areas of the creek during excavation. KDHE is willing to consider the request to place excavated sediments as fill on-site if contaminants are below residential RSK levels for soil.
- Surface water will be sampled periodically during and after removal activities at an upstream location, the South Drainageway, and Second Cow Creek to ensure that installed erosion and sediment controls are effective and that no adverse impacts to water quality have occurred. Results will be compared to background levels.
- Groundwater samples will be obtained during removal activities and periodically thereafter to establish a pattern of concentrations below RSK levels for metals in groundwater.
- Authorization will be obtained from the KDHE Bureau of Water to discharge storm water runoff under the construction storm water general permit. Best Management Practices that control erosion and sediment discharges and reduce the potential for contamination of storm water runoff associated with construction activities will be implemented. Erosion and surface water run-off controls will be installed around excavation areas to minimize the potential of transport of soils and sediment during construction and to capture and contain any storm water that comes into contact with excavated soils that exceed RSK levels. Dust control measures will be used to minimize dust generation during excavation and construction.

- X-Ray Fluorescence (XRF) field screening will be used to guide the lateral and vertical extents of excavation, followed by confirmatory sampling to verify that metal concentrations do not exceed residential RSK values.
- Transportation of excavated soil and smelter debris to the Consolidation Cell will be coordinated with the City of Girard. Controls will be implemented related to traffic concerns, noise, and dust generation.
- All necessary site control measures, including site security and access, dust control, and sediment and erosion control, will be implemented during all removal activities to ensure that soils disturbed on Site during excavation or handling activities do not migrate off-Site via storm water or air migration.
- Excavated areas from which impacted soil is removed will be graded with clean soil to maintain and improve existing drainage toward the ephemeral drainageways and Second Cow Creek.

8.0 COMMUNITY INVOLVEMENT

KDHE encouraged public input and comment. Public notice of the availability of the draft Corrective Action Decision was published in the *Pittsburg Morning Sun*.

KDHE selected a final remedy after reviewing and considering all information submitted during the 30-day public comment period. The public was encouraged to review and comment on the preferred remedy presented in the draft CAD. KDHE held a public availability session during the public comment period (July 13-August 12, 2010) to present information regarding the preferred remedy and solicit public participation on July 22, 2010, at the Girard Public Library.

All comments that were received by KDHE prior to the end of the public comment period are addressed by KDHE in the Response to Comments Summary Section of this Final Corrective Action Decision.

9.0 DOCUMENTATION OF MINOR CHANGES

One written comment letter containing 2 specific comments were received by KDHE during the public comment period. In response to the comments received, KDHE has amended the CAD document as specified in Section 10.0.

10.0 RESPONSE TO COMMENTS SUMMARY

The purpose of this section is to review and provide responses to comments made by private citizens and other interested parties during the public comment period for the Draft CAD. One comment letter was received, from Entact Environmental Services, consultant for U.S. Steel. Comments and KDHE's responses are included below.

Comment 1: On Page 5, bullet one, it states sediment with metal concentration exceeding the PECs will be removed from Second Cow Creek, transported and placed in the Consolidation Cell. This is not completely accurate. As discussed in previous correspondence with KDHE dated January 16, 2009 and stated in Section 4.3.1 of the approved Final CAS, an additional three sediment samples (SD-07 through SD-09) would be collected in the Second Cow Creek channel between the 2007 CI sample locations SD-03 and SD-01 for use in calculating an average zinc concentration for comparison to the PEC criterion for zinc to determine if any removal in the creek channel is needed. If the sampling shows that the average zinc concentration is below the PEC for zinc, no sediment removal is considered necessary since the zinc concentrations in the stretch of the stream closest to the discharge locations are within a range that does not pose a potential ecological risk. If the average zinc concentration is found to exceed the PEC for zinc, sediments with elevated zinc will need to be addressed. Based on previous sampling results (Table 5 of the CAD) which show no exceedences of RSK residential criteria for lead, cadmium or zinc or background levels for arsenic, excavated sediments could potentially be used as fill on the Site and not need to be incorporated into the off-Site Consolidation Cell.

KDHE Response: The CAD has been revised to indicate that the extent of contaminated sediment will be determined during pre-construction activities and excavated if PEC levels are exceeded; however, averaging sample results will not be conducted to determine if PEC levels are exceeded. KDHE is willing to consider the request to place excavated sediments as fill on-site if contaminants are below residential RSK levels for soil. The CAD has been revised accordingly.

Comment 2: On Page 5, bullet one, there is a reference to construction of a "sediment catchment structure" downstream of the confluence of Second Cow Creek and the South Drainageway to protect downstream Second Cow Creek from contamination released during excavation. The approved CAS indicated that temporary engineering controls (i.e. silt fencing, diversion controls, and/or check dams) would be established within the South Drainageway adjacent to and immediately downgradient of the work areas to prevent sediments entrained in surface water run-off from reaching the creek. This will adequately protect the channel and eliminate any potential discharge of impacted soils to the creek during soil disturbing activities which are expected to be completed within 10 days. The Site is drained primarily by the ephemeral South Drainageway with approximately 800 feet of lateral channel between the outer boundary of the removal area and the discharge location in Second Cow Creek. Any additional overland stormwater flow from the removal areas to the low-lying, heavily vegetated area east of the removal areas will be addressed with Best Management Practices (BMPs) and standard erosion, sediment and stormwater controls. If sediment removal within the creek is found to be necessary, additional engineering controls will be used as necessary to minimize transport of affected sediments to downstream areas of the creek. No permanent catchment structures will be installed.

KDHE Response: The KDHE concurs. Language requiring the installation of a permanent catchment structure has been removed from the Final CAD. Additional engineering controls will be used as necessary to minimize transport of affected sediments to downstream areas of the creek during excavation. The CAD has been revised.

**Table 1: Contaminants of Concern and Clean-Up Levels for Soil
Former Girard Zinc Works Smelter**

Contaminant of Concern	Residential RSK Soil (mg/kg)	Maximum Concentration Detected (mg/kg)
Arsenic	11	56
Cadmium	39	120
Lead	400	8,800
Zinc	23,000	120,000

Bold Font indicates concentrations higher than Clean-Up Levels, laboratory analysis only
 mg/kg = milligrams per kilogram
 RSK = Risk-Based Standards for Kansas

**Table 2: Contaminants of Concern and Clean-Up Levels for Groundwater
Former Girard Zinc Works Smelter**

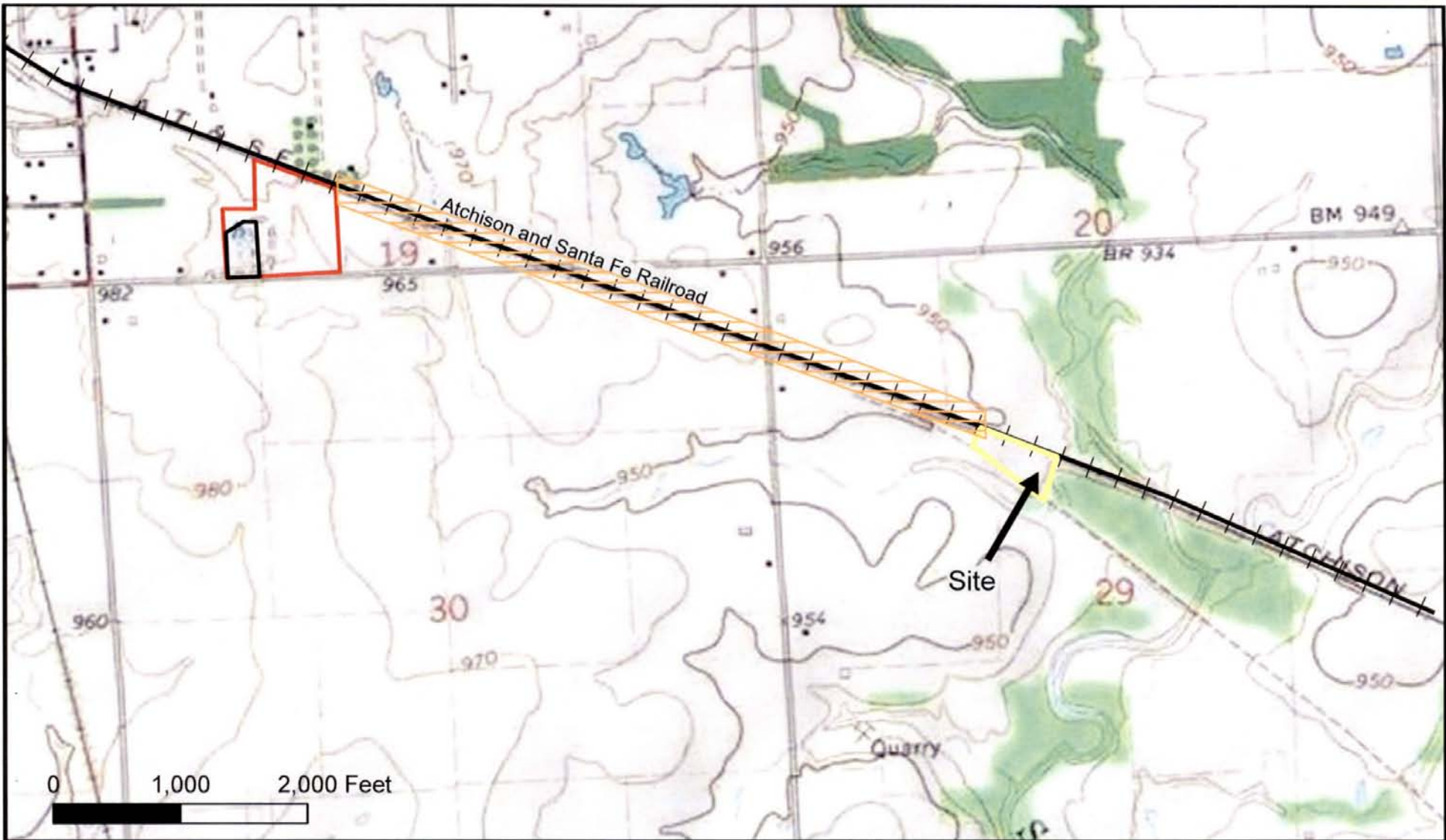
Contaminant of Concern (Dissolved)	RSK Groundwater (mg/L)	Maximum Concentration Detected (mg/L)	Concentration Detected (mg/L) in 2010
Arsenic	.01	<.02	<.001
Cadmium	.005	.066	.0024
Lead	.015	.013	<.005
Zinc	5	13	4.6

Bold Font indicates concentrations higher than Clean-Up Levels, laboratory analysis only
 mg/L = milligrams per liter
 RSK = Risk-Based Standards for Kansas

**Table 3: Contaminants of Concern and Clean-Up Levels for Sediment
Former Girard Zinc Works Smelter**

Contaminant of Concern	PECs (mg/kg)	Maximum Concentration Detected (mg/kg)
Arsenic	33	15
Cadmium	4.98	4.2
Lead	128	58
Zinc	459	510

Bold Font indicates concentrations higher than Clean-Up Levels, laboratory analysis only
 mg/kg = milligrams per kilogram
 PEC = Probable Effects Concentration







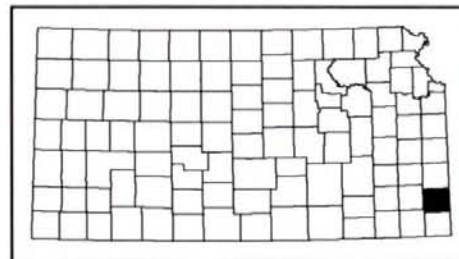
Crawford County, KS

Figure 1: Site Location

Former Girard Zinc Works Site
Girard, Kansas



-  Girard Zinc Works Site Boundary
 -  Railroad Connecting Two Smelters
 -  Proposed Consolidation Cell
 -  Cherokee Lanyon Site Boundary
- Boundaries are approximate



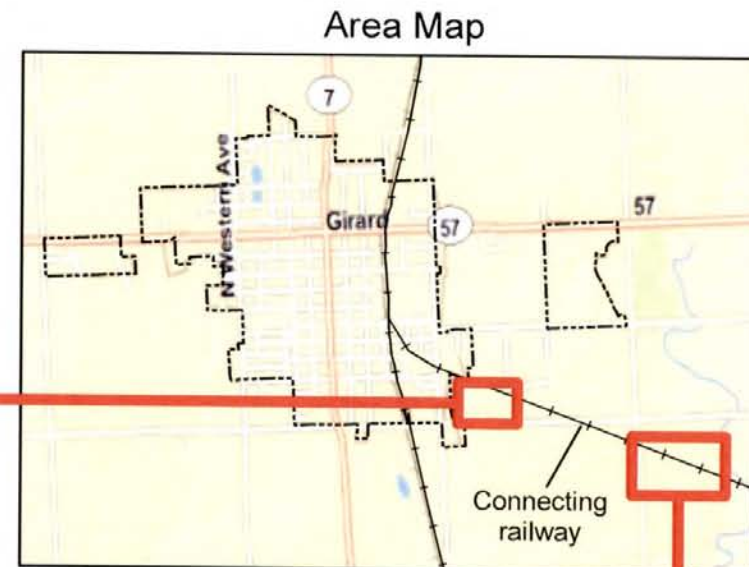


Figure 2

Former Girard Zinc Works Site
Girard, Kansas

