UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

AUG 0 2 2016

MEMORANDUM

SUBJECT: Concurrence with Proposed Plan for Former United Zinc and Associated Smelters, Operable Unit 01
Allen County, Kansas

FROM: Don Bahnke, Remedial Project Manager
Special Emphasis Remedial Section

THRU: Preston Law, Chief
Special Emphasis Remedial Section

TO: Mary P. Peterson, Director
Superfund Division

Please review the attached Proposed Plan for Residential Yard Soils at the Former United Zinc site in Allen County, Kansas. The Preferred Alternative involves the removal of contaminated soil from residential properties. The excavated soil will be disposed of in a sanitary landfill.

The Preferred Alternative is estimated to cost $19,771,534. A public meeting has been set for 6:30 p.m. on August 25, 2016, at the Iola, Kansas Public Library.

If you have any questions regarding this Proposed Plan, please contact Don Bahnke at extension x7747.

Attachment

PROPOSED PLAN

RESIDENTIAL YARD SOILS
FORMER UNITED ZINC AND ASSOCIATED SMELTERS
IOLA, KANSAS

Prepared by:

U. S. Environmental Protection Agency, Region 7
11201 Renner Blvd.
Lenexa, KS 66219

JULY, 2016

PROPOSED PLAN FINAL REMEDIAL ACTION
RESIDENTIAL YARD SOILS FORMER UNITED ZINC AND ASSOCIATED SMELTERS OU1
IOLA, KANSAS

INTRODUCTION

This Proposed Plan for the Former United Zinc and Associated Smelters Operable Unit-1Site (FUZ OU1) is intended to inform and solicit the views of the affected community regarding the U.S. Environmental Protection Agency's preferred alternative to address lead contamination in residential yards. A Proposed Plan fulfills public participation requirements under Section 117(a) of the Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA), as amended, and the Section 300.430(f)(2) of the National Contingency Plan (NCP). The purpose of this Proposed Plan is to:

- Provide basic background information about the Site
- Identify the Preferred Alternative for remedial action at the Site and explain the reasons for the Agency's preference
- Describe the other remedial options considered
- Solicit public review of and comment on all alternatives described, and
- Provide information on how the public can be involved in the remedy selection process

This Proposed Plan highlights key information from the Final Remedial Investigation (July, 2015), Final Baseline Human Health Risk Assessment (May, 2015), Ecological Risk Assessment Final Report (May, 2016) and the Revised Final Feasibility Study (July 2016) also released for public review. These and other documents in the Site Administrative Record are available for additional information regarding the proposed remedial action at the online Administrative Record website:

https://semspub.epa.gov/src/collection/07/AR63756

The EPA is interested in receiving public comment on all alternatives evaluated and on the rationale for the preferred alternative. New information that the EPA receives during the public comment period could result in the selection of a final remedy that differs from the preferred alternative.

SITE BACKGROUND

The FUZ OU1 Site includes residential properties that have been contaminated as a result of air emissions from lead smelting/refining operations in the city of Iola, located in Allen County, Kansas. These properties are located in and around the city limits of Iola. Only properties with soil lead contamination above 400 parts per million (ppm) or soil arsenic contamination above 35 ppm, the site-specific cleanup goals for lead and arsenic, are included in the site definition.

Smelters once located on the IMP Boats, United Zinc and East Iola properties are the sources of residential contamination. Wastes from the smelters may have been disposed on the Coberly property, which may be an additional source of contamination. None of these properties are part of this action and are part of Operable Unit 2 of the Former United Zinc Site.

The city of Iola, Kansas, was an international center for zinc and lead smelting until the end of World War I, with multiple smelters operating in Iola and the adjacent towns of Gas and La Harpe. The development of shallow natural gas fields in the vicinity of Iola at the end of the 19th century, along with existing rail access, helped transition the smelting industry from primarily coal-fired works in the Pittsburg, Kansas, area to areas where natural gas was abundant. Most of the smelters in this area provided zinc for galvanizing; mined zinc was sent to the steel mills of Ohio, Pennsylvania, and New Jersey for further processing. Though lead was often not the primary metal being smelted, it was present as waste in the slag material.

There were three smelting facilities each owned by different companies during different times. The three facilities were the former United Zinc, East Iola, and Lanyon 1 & 2. The Lanyon 1 & 2 smelters were located on property that is now commonly known as IMP Boats. All of these smelters were closed after World War I when lead and zinc were no longer in high demand. In addition, it is suspected that smelter waste from the former United Zinc facility was disposed on the nearby Coberly property, where a brick company and iron foundry were located.

Each of the three smelter sites in or near Iola are considered potential source areas. A source area is defined as a smelter site where waste was released as part of the manufacturing process. All smelter site structures including buildings, building foundations, and rail systems have been removed, graded, and leveled. Some of the properties have been redeveloped for commercial purposes unrelated to smelting.

The United Zinc and East Iola former smelter properties are all within the city limits and are located in close proximity to each other in the eastern portion of the city. The former United Zinc property lies between the Coberly waste disposal area and East Iola smelter property, with Coberly being approximately 100 feet west of the former United Zinc property and East Iola approximately 600 feet east of former United Zinc. The Lanyon 1 & 2 property is in the western portion of the city about 1.2 miles west-northwest of the Coberly property. (See Figure 1.2.) The location of Lanyon 1 & 2 is labeled IMP Boats in Figure 1.2.

Former United Zinc: The 16.1-acre property is zoned for commercial and industrial use. It consists of eight parcels with the following addresses: 1520 and 1602 East Street; 0, 1402, 1420, 1505, and 1508 Monroe Street; and 0 Rt 3. Residential properties border the former smelter property to the north and commercial properties border it to the south, east and west. Smelting at this location began in 1901 and ceased in 1912. Analysis of samples collected from the property indicates lead levels as high as 49,000 parts per million (ppm).

East Iola: The 3-acre property consists of two parcels with the following addresses: 1802 and 1806 East Street. The property is classified as commercial. Residential properties border the property to the north with commercial properties bordering to south, east and west. The smelter at the East Iola property operated between 1899 and 1925. Analysis of samples collected from the property indicates lead levels as high as 7,972 ppm.

Lanyon 1 & 2: Approximately 31 acres of the 42.7-acre Lanyon 1 & 2 property are within the city limits; the remaining 12 acres along the southwestern portion of the property are outside the city limits. The property is zoned for commercial or industrial use. It consists of 13 parcels with the following addresses: 0, 500, and 505 Lincoln; 0 Railroad; 0, 713, and 801 Industrial; and 0 Rt 1. Smelting began at this property in approximately 1896 and continued until sometime in the 1920s. Analysis of samples collected from the property indicates lead levels as high as 54,593 ppm.

Coberly: The 3.4-acre property is zoned for commercial or industrial use. It consists of three parcels. The parcel addresses are 1206 East, 1 Kentucky and 117 Kentucky Street. Commercial properties surround the entire property. No smelting was known to have occurred at the Coberly property. However, previous investigations reveal that the property had a pile of smelter waste on it at one time. The pile has been removed, but contamination remains. A 500-gallon underground storage tank (UST) was removed from the property in 1992. Soil samples collected during the UST removal show lead as high as 47,000 ppm.

Response to Off-Site Contamination: In June 2005, the Kansas Department of Health and Environment (KDHE) completed an investigation that focused on an Iola preschool, McKinley Elementary School, and 50 residential properties located southwest and northeast of the Former United Zinc and East Iola smelter sites and the Coberly suspected waste disposal area. The 50 residences were randomly sampled and located between the schools. Of the 50 residences sampled, 18 exceeded the 400 ppm Regional Screening Level (RSL) for lead in soil. Lead was found at levels up to 2,020 ppm in soil samples (KDHE, 2005a).

KDHE completed a Preliminary Removal Site Evaluation (RSE) in September 2005, which included the collection of samples from the schools sampled in June 2005. Lead concentrations exceeding the RSL value were reported for samples collected from the McKinley School and adjacent areas. However, the lead concentrations reported for the samples collected from the preschool were less than the 400 ppm RSL. The Preliminary RSE recommended further site evaluation and, potentially, a remedial action (KDHE, 2005b).

The EPA sampled and screened properties in the Iola community from April to May 2006 as part of a Removal Site Evaluation (RSE). The RSE evaluated properties throughout the city to identify trends or potential pathways of contamination. During the RSE, 234 residential properties, 15 daycare centers, 5 public school yards, 2 churches, and 4 commercial areas were evaluated. Results showed elevated lead concentrations throughout the city, with the higher concentrations more prevalent in older neighborhoods. Ninety-one properties had lead concentrations between 400 and 800 ppm. Of those properties, 34 were identified as warranting a time critical removal action (TCRA). The 34 properties included 19 private residences, 10 daycare facilities, 2 elementary schools, and 3 commercial properties. Lead was found in surface soil at levels up to 2,290 ppm at residential properties and 6,433 ppm at commercial properties.

The EPA began a TCRA in August 2006 to address the highly contaminated residential properties and schools in Iola. A total of 1,686 properties were sampled during the removal action. Approximately one-third had lead contamination at or above 400 ppm. Residential properties with lead concentrations above 800 ppm were eligible to have their soil excavated and replaced with uncontaminated soil. A total of 129 properties were cleaned up during the removal action.

The removal action concluded in May 2007. Soil sampled during the removal revealed a large number of properties with lead concentrations between 400 and 800 ppm. Lead contamination in this range poses a continuing risk to children. Review of removal data reveals approximately 1,300 additional residential properties still not tested for soil contamination. In order to continue the investigation and cleanup, the EPA added the Former United Zinc Site to the National Priorities List (NPL) on May 21, 2013. NPL listing allows the EPA to continue work on large complex sites that could not be completed using removal authority.

A Remedial Investigation (RI) began in the spring of 2013. This investigation is part of the remedial process for addressing residential soil contamination remaining at the Site. The EPA tested 1,000 of the 1,300 unsampled residential properties from spring 2013 through January 2014. Three hundred properties remained untested because owners either could not be found or declined to give the EPA permission. Results from this sampling event revealed 350 additional properties with lead at or above the removal action level of 800 ppm. The EPA resumed removal action on properties in August, 2015. As of May 20, 2016, the EPA has completed cleanup of 104 properties during the 2015-2016 removal action. The removal work is ongoing.

Arsenic was also found co-located with high lead concentrations. Results from the 2006-2007 removal action show arsenic above 35 ppm only when lead is above 400 ppm. Although the presence of high arsenic with low lead is rare, the EPA continued to look for arsenic during the 2013 sampling event.

A total of 7,398 soil samples were collected in 2013 and analyzed with the XRF analyzer. Of these, 771 were sent to the laboratory for confirmation analysis. A comparison of XRF and lab data shows that the arsenic XRF results did not correlate well with the lab results. Therefore, for the presence of arsenic the EPA relied on lab results. Two of the 771 samples analyzed in the laboratory had high levels of arsenic when lead was low. This is a frequency of 0.26%.

Acting with an abundance of caution, the EPA reanalyzed 2,822 of the 7,398 samples archived from the 2013 sampling event. These samples were selected from the archive because the first analysis showed low lead concentrations. The XRF analysis was repeated with double the number of source seconds (120 instead of 60 seconds) in the hope that a longer source time would improve arsenic measurements. Three hundred thirty of the 2,822 samples were sent to the laboratory for confirmation analysis. The arsenic XRF results were compared to lab results and, just as it did with the first analysis, the XRF analysis did not correlate well with the lab results.

Review of the laboratory data from the reanalyzed samples shows that, in general, arsenic occurs in high concentrations only when lead is also high. There were only two exceptions to this pattern out of the set of 330 samples sent to the laboratory. Further details regarding the arsenic study can be found in the Remedial Investigation report.

Consideration of all data collected from the FUZ Site shows that arsenic is found throughout the Site. But cases where arsenic is above 35 ppm while lead is below 400 are very rare. This suggests that the elevated arsenic at these exceptional locations is not due to releases from the smelters that operated in the past.

SITE CHARACTERISTICS

The city of Iola was a center for zinc and lead smelting from 1900 until approximately 1925. Releases from smelter smokestacks contained lead and arsenic. These releases were distributed by wind and settled on the ground surface.

Soil sampling conducted by KDHE and the EPA shows surface contamination of residential properties throughout the city. In general, concentrations of lead in soil are greatest near the smelter locations. Residential properties located between the smelter locations frequently have lead concentrations that exceed the site-specific cleanup goal of 400 ppm. Arsenic is also found above the cleanup goal of 35 ppm and, in all but a few rare instances, is co-located with lead above 400ppm.

The FUZ Site is defined as residential and residential-type properties where soil sampling results indicate that mid-yard lead concentrations exceed the established action level of 400 ppm. Most of the sampling has been focused on residences within the Iola city limits. The TCRA begun in 2005 established an action level for lead in soil of 800 ppm at typical residential properties, and 400 ppm at high-child impact properties including child-care facilities and properties where children with elevated blood lead levels reside. The removal action resumed in 2013 to address properties above 800 ppm identified by the 2013 sampling event.

Sampling of residential properties is performed according to the Superfund Lead-Contaminated Residential Sites Handbook, August, 2003. Four composite soil samples are generally collected from mid-yard areas at each property. At a typical residential property, the front yard and back yard are each divided in half. Five individual aliquots are collected at a 0-1 inch depth from each of the four quadrants and combined to form the four composite samples. An additional four-aliquot composite sample is generally collected from the drip zone area (6 to 30 inches from the foundation wall) by combining one aliquot collected from exposed soil on each side of the residence.

When a mid-yard quadrant concentration exceeds an appropriate action level (800 ppm for typical residential properties or 400 ppm for high-child impact properties), the property is determined to be eligible for removal response, which includes removal of all quadrant and drip zone soils that exceed 400 ppm in the upper foot and those that exceed 1,200 ppm if excavation continues beyond a depth of one foot.

The preferred alternative for a final remedy presented in this Proposed Plan would lower the lead action level to 400 ppm for all residential properties. In addition, an action level of 35 ppm for arsenic would be added.

Soils exceeding these action levels in the upper foot would be removed. Excavation below one foot of depth would continue if the lead concentration is 1,200 ppm or more until a depth of two feet is reached. A marker barrier would be laid at the bottom of all two foot excavations before backfilling with clean soil.

As of June 2016 approximately 2,684 individual properties have been tested for lead contamination. Of these, 479 have lead contamination above 800 ppm in one or more quadrants of the yard. In addition, 763 have lead contamination between 400 ppm and 800 ppm.

SCOPE AND ROLE OF RESPONSE ACTION

This Proposed Plan describes the final remedy preferred by the EPA to address residential properties that have been contaminated with lead and arsenic by industries located in or near Iola, Kansas. These industries no longer exist; however, they processed lead on a large scale and released large amounts of lead-contaminated particulate matter to the atmosphere.

Residential-type properties that are contaminated with lead and arsenic resulting from historic industrial emissions are the only type of properties that will be addressed by this cleanup. By addressing all of the residential properties with lead concentrations of 400 ppm or greater, we will also be addressing those properties with elevated arsenic concentrations as a result of historic industrial emissions. In addition, the remedy will address any non-foundation soil having arsenic above 35 ppm with lead below 400 ppm.

Residential properties are defined as any area with high accessibility to sensitive populations (children under seven years of age and pregnant or nursing women), and includes properties containing single and multi-family dwellings, apartment complexes, vacant lots in residential areas, schools, child care facilities, community centers, parks, green ways, and any other areas where children may be exposed to site-related contaminated media. Residential yards contaminated solely from other sources, such as lead-based paint, will not be addressed under CERCLA authority and will not be addressed by this cleanup action.

The lead and arsenic contamination is located in surface soils at residential properties that comprise the FUZ Site. Concentrations of these metals vary from property to property and within individual properties. Approximately half of the residential properties that the EPA has tested to date have soil concentrations that exceed the 400 ppm lead action level. Arsenic is co-located with lead and is rarely above 35 ppm when lead is below 400 ppm.

Modification of residential yards over the past century resulting from filling, grading, or other earth-disturbing activities has had the potential to either cover or dilute surface lead contamination. These earth-disturbing activities would be expected to be highly variable from property to property and within individual properties. Due to the high degree of variability in surface lead concentrations, the EPA has defined the Site to include only those properties that have soil lead concentrations that meet or exceed a soil lead action level.

SUMMARY OF SITE RISKS

A Baseline Human Health Risk Assessment (HHRA) was conducted for the Site by the EPA. The May 2015 HHRA assesses the potential risks to humans, both present and past, from site-related contaminants present in environmental media including surface soil, indoor dust, sediment, surface water, groundwater, and fish tissue. The HHRA assumes that no steps are taken to remediate the environment or to reduce human contact with contaminated environmental media. The results of the HHRA are intended to inform risk managers and the public about potential human health risks attributable to site-related contaminants and to help determine if there is a need for action at the Site.

The HHRA identified lead and arsenic as the primary contaminants of concern (COC) for FUZ OU1. Arsenic is co-located with high lead. Where arsenic is high, lead is also high. Therefore, the focus of this Proposed Plan is the risk associated with lead because it is the primary COC for residential properties at the Site. For further information, please refer to the HHRA in the Administrative Record (AR).

It is the EPA's current judgment that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health from actual exposure to lead and arsenic.

DETERMINATION OF PRELIMINARY SOIL CLEANUP GOALS

Young children (typically defined as seven years of age or younger) are the most sensitive population group potentially exposed to lead contamination at the Site. Young children are most susceptible to lead exposure because they have higher contact rates with soil and dust, absorb lead more readily than adults, and are more sensitive to the adverse effects of lead than older children and adults. Exposure to lead contamination can cause impairment of the nervous system. These impairments include learning deficits, lowered intelligence, and adverse effects on behavior.

The risk for adverse health effects from exposure to lead contamination is evaluated using a different approach than for most other metals. Because lead is widespread in the environment, exposure can occur by many different pathways. Thus, the risk of exposure to lead is based on consideration of total exposure (all pathways) rather than just site-related exposure. In addition, because most studies of lead exposures and the resultant health effects in humans have traditionally been described in terms of the resulting level of lead in the blood (expressed in micrograms/deciliter [µg/dl]), lead exposures and risks are typically assessed using mathematical models.

In determining the acceptable soil clean up level for residential yards at the Site, the HHRA used the EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children to estimate the distribution of blood lead levels in a population of residential children exposed to lead at the Site. As set forth above, the focus of a risk assessment for lead in a residential setting is on children because they are a more sensitive population than older children or adults. Thus, the IEUBK model was used to evaluate the risks posed to young children (6 to 84 months) as a result of exposure to lead contamination at the Site.

The EPA's health protection goal is that there should be no more than a 5% chance of exceeding a blood lead level of 10 µg/dl in a given child or group of similarly-exposed children.

The IEUBK model uses site-specific and default inputs (e.g., soil concentration, indoor dust concentration, bioavailability) to estimate the probability that a child's blood lead level might exceed 10 µg/dl.

For a residential child, the IEUBK model used available site-specific data, including lead concentrations in residential property soil, indoor dust, and groundwater. In addition, testing was performed to estimate the relative bioavailability of the lead present at the Site. Bioavailability testing measures the amount of lead absorbed into the body following incidental ingestion of soil. The results indicate that bioavailability of lead at the Site is greater than the IEUBK model default value of 30%. Based on results of site-specific measurements of *in vivo* bioavailability and *in vitro* bioaccessibility, the bioavailability of lead in soil and dust was estimated at 31%.

Risk Estimates for Residents from Soil

The IEUBK model was used to assess lead exposures to young children at the Site. Based on site-specific information, the EPA's IEUBK model predicts that a young child residing at the Site will have greater than a 5% chance of having a blood lead level exceeding 10 µg/dl if the lead soil concentrations to which he or she is exposed are above 423 ppm under the assumed exposure conditions. This value is based on a site-specific absolute bioavailability of 31%.

The EPA has selected 400 ppm as the lead cleanup goal for the Site. Cleanup of properties with lead soil contamination at 400 ppm or greater is anticipated to bring the yard-wide average well below 400 ppm. The cleanup of surface soils at or above 400 ppm is anticipated to reduce child blood lead levels to meet the Remedial Action Objective (RAO) and provide a protective remedy for the community. Also, the use of 400 ppm is consistent with the removal action currently ongoing.

The cleanup goal for arsenic in residential soil represents the average concentration of arsenic in a residential yard that is associated with a non-cancer hazard quotient of 1. The cleanup goal for arsenic at the FUZ Site was determined to be 35 ppm. As previously stated, lead almost always exceeds

400 ppm when arsenic is above 35 ppm. However, the EPA will also excavate soil that only exceeds the arsenic cleanup goal wherever it is found.

This Proposed Plan only addresses human health risk at residential properties within the Site. Risks posed by properties where smelting was performed (i.e., IMP Boats, United Zinc and East Iola) and the property that once stored smelter waste (Coberly) are not included in this action. These properties will be addressed as a separate Operable Unit (OU2) at a later date.

REMEDIAL ACTION OBJECTIVES

Consistent with EPA policy, two RAOs have been developed for residential soils in Iola:

1) Reduce the risk of exposure of young children to lead such that an individual child, or group of similarly exposed children, have no greater than a 5 percent chance of having a blood-lead concentration exceeding 10 µg/dl.

2) Reduce the risk of exposure to soils containing arsenic such that levels do not exceed the carcinogenic risk of 1×10^{-4} and a non-cancer total HI of 1.

SUMMARY OF ALTERNATIVE CLEANUP PLANS CONSIDERED

Alternative 1: No Action

Time to Construct: 0 years
Capitol Cost: $0
Operation and Maintenance Cost: $60,000
Total Present Worth Cost: $27,820

The EPA is required by the NCP, 40 C.F.R. § 300.430(e)(6), to evaluate the No Action Alternative. The No Action Alternative may be appropriate at some sites where a removal action has already occurred which reduced risks to human health and the environment. Although a response action to address lead-contaminated soils is ongoing at the FUZ Site, excessive residual risks to human health remain, as documented in the HHRA.

Under the No Action Alternative, the ongoing removal action would cease when all properties with lead contamination above 800 ppm have been cleaned up. Properties with contamination between 400 and 800 ppm would remain and present a continuing risk to children. The No Action Alternative is therefore not protective of human health.

Alternative 2: Excavation with Health Education and Institutional Controls

Time To Construct: 1.5 years
Capitol Cost: $18,887,101
Operation and Maintenance Cost: $884,432
Total Present Worth Cost: $19,771,534

Under this alternative, residential property soils with at least one non-drip zone sample greater than 400 ppm lead will be excavated and disposed. Excavation would continue until the lead concentrations at the exposed surface are less than 400 ppm within the first 12 inches. Excavation will stop if lead levels are less than 1,200 ppm at depths of 12 to 24 inches. Should it be determined that lead levels below 1,200 ppm cannot be reached at an excavation depth of 24 inches, excavation will cease and a warning barrier will be placed to alert the property owner to the existence of high lead levels.

Excavation will also be performed on the very few quadrants that have arsenic above 35 ppm while lead is below 400. It is unlikely that arsenic will remain above 35 ppm below the first 12 inches of excavation. Provided that lead remains below 400 at 12 inches, excavation will stop at 12 inches in this case.

The EPA is confident that risk from arsenic contamination will be addressed by excavation of soil having more than 400 ppm lead. However, the EPA will continue to send ten percent of all property assessment samples for laboratory analysis. Any properties found with 35 ppm arsenic or more would be added to the list for cleanup.

Properties where only the drip zone soil exceeds 400 ppm lead or 35 ppm arsenic would not be addressed under this action. The EPA estimates that there are approximately 902 residential properties that contain soils with lead and/or arsenic concentrations that exceed the respective 400 and 35 ppm PRGs and will not have been remediated by the ongoing removal action. Excavated soil would be disposed at the existing sanitary landfill in Eureka, Kansas, or at a new repository.

The EPA anticipates that approximately one-and-a-half years will be needed to complete excavation work. The time to implement this alternative could be shortened or lengthened by reducing or increasing the pace of soil remediation.

Health Education

Health education is required under this alternative to reduce potential adverse health effects from lead contamination remaining after the cleanup is completed. Health Education measures considered for this Site include but are not limited to:

- Extensive community-wide blood-lead monitoring
- In-home assessments for children identified with elevated blood lead levels
- Distribution of prevention information and literature
- Outreach activities directed to area physicians
- Community education meetings and distribution of literature at such presentations at civic clubs, schools, nurseries, pre-schools, churches, fairs
- Family assistance
- Special projects to increase awareness of heavy metal health risks

Institutional Controls (ICs)

In addition to excavation, Alternative 2 includes institutional controls because contamination will remain below the ground surface at some properties. The EPA has historically required ICs to ensure a remedy's long-term protectiveness. At present, there are no applicable zoning ordinances in Allen

County for residential properties. However, there are potential ICs that could be utilized. These include but are not limited to the following:

- Establishment of a registry of residential properties that have greater than 1,200 ppm at 12-inches below ground surface (bgs) with the City of Iola or Southeast Kansas Multi-County Health Departments.
- Yards subject to the ICs will also be extensively evaluated during each 5-year review to ensure the remedy has remained protective.
- Possible building permit requirements that would involve pre-screening properties for lead.
- Builder and developer education programs for dealing with heavy metal soil contamination and best management practices for construction workers.
- Deed restrictions or environmental covenants.

Alternative 3: Phosphate Stabilization; Excavation and Disposal

Time to Construct: 1.5 years
Capitol Cost: $35,062,578
Operation and Maintenance Cost: $958,543
Total Present Worth Cost: $36,021,121

This alternative involves a combination of excavation and phosphate stabilization of residential soils and high child impact areas found to contain lead concentrations above 400 ppm. An estimated 902 properties have lead concentrations greater than 400 ppm. Because the previous pilot studies at other sites estimated that the bioavailability of lead can be reduced by 30 to 50 percent, it is conservatively assumed that a phosphate amendment could only be effective at reducing risks associated with lead concentrations in the soils by 30 percent. Consequently, phosphate stabilization would only be conducted on soils with lead concentrations above 400 ppm but less than 572 ppm. Residential properties with lead concentrations above 572 ppm lead or 35 ppm arsenic would be excavated as described in Alternative 2.

The total number of residential properties with lead concentrations above 400 ppm and below the effective stabilization level of 572 ppm is estimated to be approximately 452 properties. The remaining 450 properties would be remediated as described in Alternative 2.

In addition, this alternative includes all other activities described in Alternative 2, including public health education and institutional controls.

EVALUATION OF ALTERNATIVES

A comparative analysis of alternatives using the nine NCP evaluation criteria is presented in this section. The purpose of this analysis is to identify the advantages and disadvantages of each alternative relative to the other alternatives. A separate comparison of the alternatives is presented under the heading of each criterion.

Protection of Human Health and the Environment

This criterion is used to determine if each alternative is protective of human health and the environment, and is assessed based on a composite of factors, especially long-term effectiveness and permanence,

short-term effectiveness, and compliance with applicable or relevant and appropriate requirements (ARARs). Protection of human health and the environment is addressed to varying degrees by the two action alternatives, Alternatives 2 and 3. The No Action Alternative would have no effect on risks currently present at the FUZ Site and would not be protective of human health or the environment.

Alternatives 2 and 3 both provide protection of human health through reduced exposure to lead in contaminated soils. Alternative 3 provides protection through *in situ* treatment for soil lead levels between 400 ppm and 572 ppm by immobilizing lead and effectively reducing its bioavailability. Alternatives 2 and 3 provide protection by removal of contaminated soils from the exposure pathway and replacement with clean soil. The excavation activities address the risk of exposure through direct contact with lead-contaminated soil. ICs would provide further levels of risk reduction for Alternatives 2 and 3.

In general, the permanence of alternatives 2 and 3 is similar. Alternative 2 provides permanence through complete removal and containment of contaminated soils that exceed 400 ppm lead or 35 ppm arsenic. Alternative 3 provides permanence through immobilization of phosphate-treated contaminated soils and through removal and replacement of excavated soils. However, for Alternative 3 this determination would have to be supported by ongoing soil testing to determine if the treatment maintains its effectiveness over time.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

This criterion is used to determine how each alternative meets applicable or relevant and appropriate federal and state requirements, as defined in CERCLA, Section 121. A detailed evaluation of ARARs is presented in the feasibility study. Alternatives 2 and 3 both meet the identified federal and Kansas ARARs. The No Action Alternative has no ARARs with which to comply.

Long-Term Effectiveness

Long-term effectiveness assesses a cleanup alternative in terms of the risk remaining at the FUZ Site after the goals of the cleanup have been met. The primary focus of this evaluation is to determine the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

Alternative 3 effectively reduces risks through a combination of treatment and excavation, while Alternatives 2 achieves risk reduction through excavation only. The residual risk is greater with Alternative 3 because the phosphate treatment component of this remedy leaves moderate levels of treated lead in yards with high mid-yard lead concentrations between 400 and 572 ppm. Alternatives 2 and 3 reduce risks for homes using effective engineering controls with soil concentrations of lead at or above 400 ppm. Alternatives 2 and 3 also include ICs to further control residual risks. The No Action alternative provides no effectiveness for the protection of public health and the environment over the long term.

A long-term monitoring program would be required to assess the long-term effectiveness of phosphate stabilization under Alternative 3. The program would include soil chemistry monitoring, including bioaccessability measurements to assess the effects of natural weathering and the long-term stability of the lead-phosphate minerals formed during phosphate treatment.

Short-Term Effectiveness

This criterion addresses the effects of the alternatives during implementation until the cleanup is completed and the associated level of long-term protection has been achieved. Alternative 2 involves removal and replacement of a greater quantity of soil, so risks to workers, residents, and community members associated with excavation and transport through residential neighborhoods would be somewhat greater than Alternative 3. Alternative 3 involves transporting and handling large quantities of phosphoric acid in residential areas, which poses additional risks to workers, residents, and community members.

Significant short term risks are associated with Alternative 3. Contact with low pH soils must be prevented for a several day period until soils are neutralized by adding lime. The low pH soils could potentially cause chemical burns or other adverse effects to individuals that contact treated soils. Fencing installed to prevent access to treated areas would not assure protection of pets, small animals, birds, and other wildlife. Application of phosphoric acid to yards would pose short term risks to workers involved in handling and application of acid and roto-tilling of soils.

Alternatives 2 and 3 would require a similar length of time to implement at each residence. The No Action Alternative imposes no risk on remedial action workers, but the public and the environment would continue to be exposed to current lead levels.

Reduction of Toxicity, Mobility or Volume

This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the contaminants. The No Action Alternative would not reduce toxicity, mobility, or volume of site contaminants. Alternative 2 would significantly reduce mobility of soils with concentrations exceeding 400 ppm lead through excavation and disposal in a controlled final management facility, followed by backfilling of excavated areas and restoration of yards. Alternative 3 would reduce the toxicity of soil ranging in concentration from 400 to 572 ppm through chemical treatment. Excavation of soils exceeding 572 ppm would reduce the mobility of contaminated soil through removal and disposal in a controlled final management facility. Phosphate stabilization under Alternative 3 uses treatment as a principle element of the cleanup, which is preferred under the Superfund law and the NCP. Mobility of excavated materials placed in a sanitary landfill, soil repository, or commercial fill is greatly reduced due to the engineering features designed to contain the contaminated soils.

Implementability

Implementability addresses the technical and administrative feasibility of implementing a cleanup and the availability of various services and materials required during its implementation. All alternatives are readily implementable. Excavation is a proven and easily implemented technology. Application of phosphoric acid and lime to residential properties would utilize standard and readily available lawn maintenance equipment. Logistical considerations for transporting and staging large quantities of phosphoric acid and lime may present challenges in older residential neighborhoods at the FUZ Site, but these could be overcome with proper planning and equipment. Both action alternatives are considered technically feasible from an engineering perspective.

Cost

This criterion addresses the direct and indirect capital cost of the alternatives. Operation and maintenance costs incurred over the life of the project, as well as present worth costs, are also evaluated. A detailed cost analysis for Alternatives 2 and 3 is presented in the Final Feasibility Study. The total present worth cost for Alternative 2 is estimated at $19.8 million. The present worth cost for Alternative 3 is estimated at $36.0 million. Minimal costs are associated with the No Action Alternative.

Alternative 3 is more costly than Alternative 2 due in large part to the cost of the soil amendments required for phosphate treatment. A large increase in the cost of phosphoric acid has occurred since the initial investigation of this technology for potential application. The cost of phosphate treatment for an individual property is estimated at $41,567 in the Final Feasibility Study, compared to a unit cost of $15,181 per property for conventional excavation and soil replacement.

State Acceptance

This criterion addresses the KDHE preferences regarding the FUZ Site remedial action alternatives. The EPA is the lead agency and has coordinated all FUZ Site activities with KDHE throughout this project. KDHE, as the EPA's support agency, has supported the implementation of the removal action. KDHE will provide comments during the comment period.

Community Acceptance

The EPA encourages public review and comment on the preferred remedial alternative through release of this Proposed Plan and supporting documents included in the Administrative Record. The opportunity for public comment on the EPA's preferred alternative and the underlying documents supporting this preference will be publicly announced. Technical documents will be made available in the electronic repository for this site:

https://semspub.epa.gov/src/collection/07/AR63756

In order to provide the community with an opportunity to submit written or oral comments, the EPA is providing a public comment period through September 7, 2016. A public meeting in Iola, Kansas, is scheduled for August 25, 2016, at 6:30 PM to present the Proposed Plan, accept written and oral comments, and to answer questions concerning the EPA's preferred alternative.

PREFERRED ALTERNATIVE

The EPA's preferred alternative for the final remedy at the FUZ Site is Alternative 2, excavation and removal of soils exceeding 400 ppm with institutional controls. The EPA's preferred alternative is similar to the ongoing removal action with the following modifications:

- The action level for lead would be reduced from 800 ppm to 400 ppm.
- An action level for arsenic would be established at 35 ppm.

The EPA expects the Preferred Alternative to satisfy the following statutory requirement of Section 121(b) of CERCLA: (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery

technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element or explain why the preference for treatment will not be met. The following sections discuss how the Preferred Alternative meets these statutory requirements.

Protection of Human Health and the Environment

The Preferred Alternative will protect human health and the environment at remediated residential properties by achieving the RAOs through conventional engineering measures. Risks associated with lead-contaminated residential soils at the Site are caused by the potential for direct contact with contaminated soils. The Preferred Alternative eliminates this direct exposure pathway through excavation and replacement of lead-contaminated soils with clean fill at the residential properties. Contaminated soils will be removed from residential properties, permanently eliminating this identified source of exposure. The implementation of the Preferred Alternative will not pose unacceptable short-term risks or cross-media impacts.

Compliance with ARARs

In general, preferred alternatives should comply with ARARs unless waivers are granted. The Preferred Alternative is expected to meet all chemical-specific, action-specific, and location-specific ARARs and does not involve any waivers. The ARARs for this Proposed Plan are included in the Feasibility Study.

Cost Effectiveness

The Preferred Alternative is a cost-effective solution to lead-contaminated residential soils at the Site. The Preferred Alternative relies on conventional engineering methods that are easily implemented. Contaminated soils are removed and replaced with clean fill, thereby providing a permanent remedy for remediated residential soils which will not be subject to future costs.

Utilization of Permanent Solutions and Alternate Treatment Technologies

The Preferred Alternative utilizes a well-demonstrated remediation approach to lead-contaminated soils that will provide a permanent remedy for residential properties. Removal and replacement of contaminated residential soils permanently removes lead and arsenic contaminants as a potential source of exposure. The Preferred Alternative best satisfies the statutory mandates for permanence.

Preference for Treatment

The Preferred Alternative does not utilize treatment to address the threats posed by the residential property soils. The residual waste found in the residential soils is considered a low-level threat waste, which is defined as surface soil containing COCs that generally are relatively immobile in air or ground water in the specific environmental setting (OSWER, Publication 9380.3-06FS, 1991).

COMMUNITY PARTICIPATION

The EPA relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, an Administrative Record containing the HHRA, the RI Report, the FS Report, and all other documents supporting this decision have been made available

to the public for a 30-day public comment period which begins on August 8, 2016, and concludes on September 7, 2016.

A public meeting will be held on August 25 2016, at 6:30 p.m. at Iola Public Library. The EPA will present the Proposed Plan, the Preferred Alternative, and receive public comments, both verbal and written.

Comments received at the public meeting, as well as written comments submitted during the comment period, will be addressed in the Responsiveness Summary section of the ROD, the document which formalizes the selection of the remedy.

All written or verbal comments should be addressed to:

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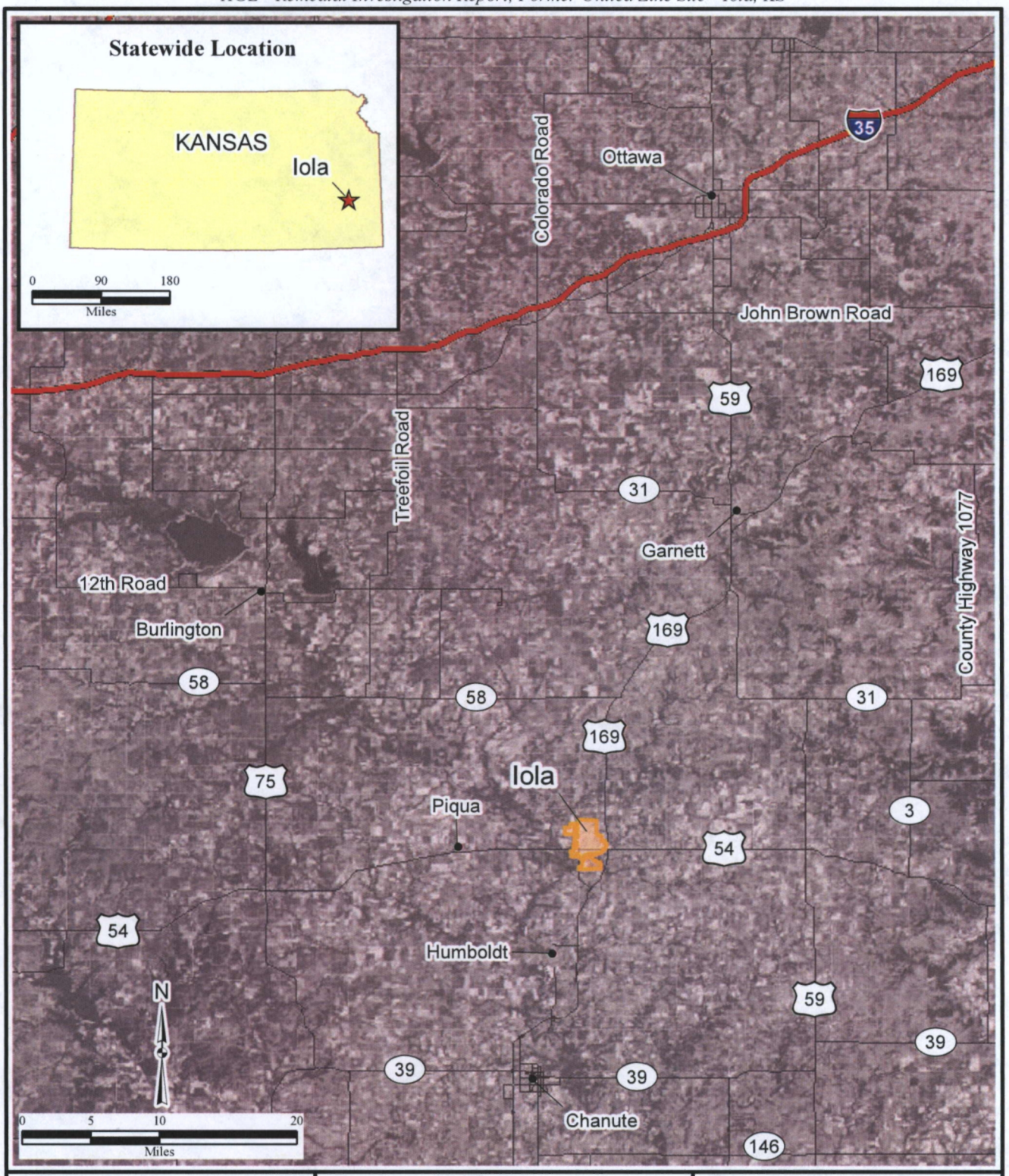
Lenexa, KS 66219
Telephone: 1-913-551-7429 or 1-800-223-0425
E-mail: corazzin.brendan@epa.gov

FIGURES



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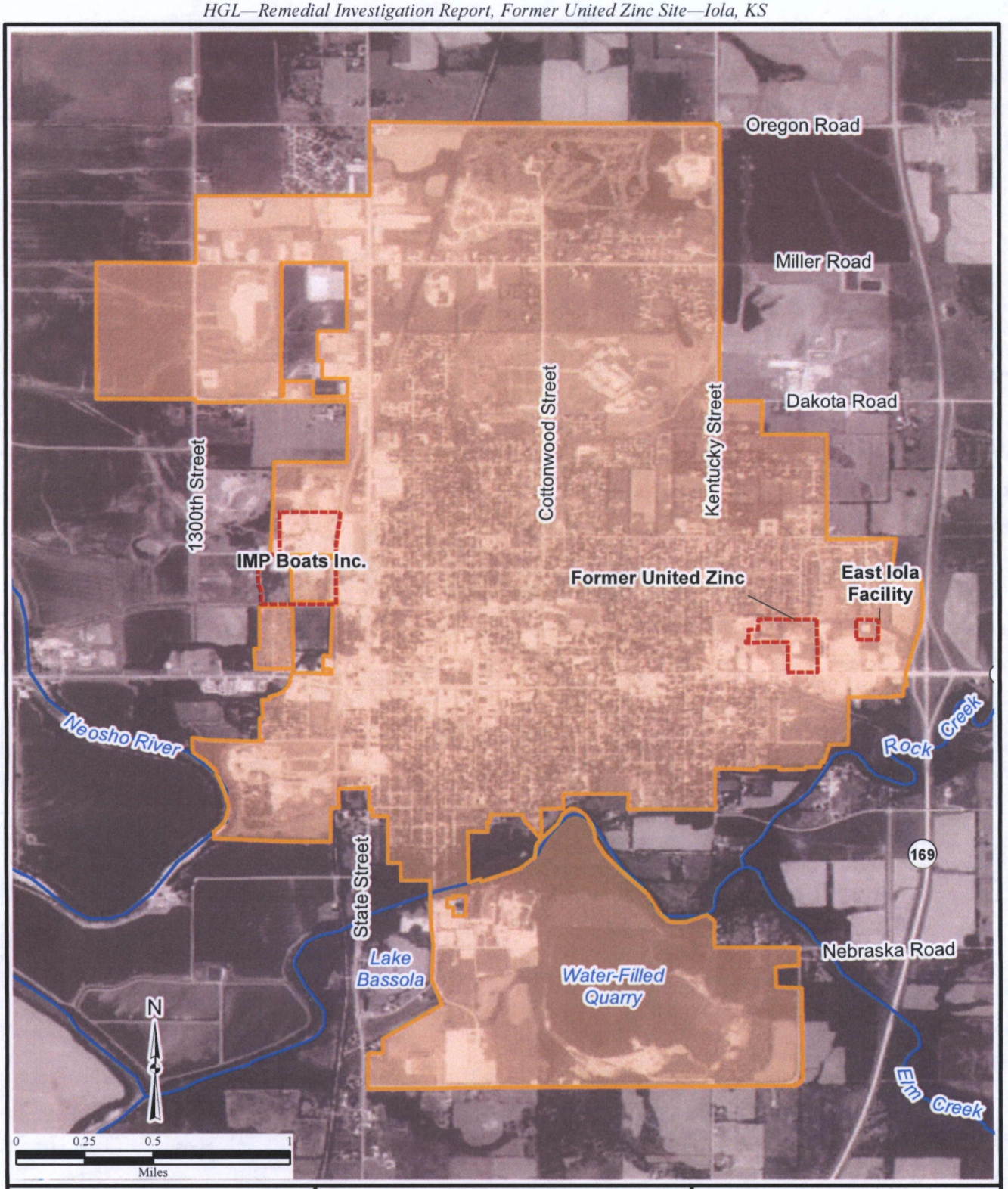
ArcGIS Online Imagery

Legend

- Town
- Interstate
- Highway
- Iola City Limits

Figure 1.1
Site Location



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5/5/2016 JG
Source: HGL, ESRI,
ArcGIS Online Imagery

Legend

- Surface Water Course
- Former Smelter
- Iola City Limits

Figure 1.2
Former Smelter Locations