FINAL RECORD OF DECISION

DECISION SUMMARY

OMAHA LEAD SITE
OPERABLE UNIT NUMBER 2

OMAHA, NEBRASKA

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SITE NAME, LOCATION, AND DESCRIPTION

The Omaha Lead Site (OLS or Site [CERCLIS ID # NESFN0703481]) includes surface soils present at residential properties, child-care centers, and other residential-type properties in the city of Omaha, Nebraska, that have been contaminated as a result of deposition of air emissions from historic lead smelting and refining operations. The OLS encompasses the eastern portion of the greater metropolitan area in Omaha, Nebraska. The Site is centered around downtown Omaha, Nebraska, where two former lead-processing facilities operated. American Smelting and Refining Company, Inc., (ASARCO) operated a lead refinery at 500 Douglas Street in Omaha, Nebraska, for over 125 years. Aaron Ferer & Sons Company (Aaron Ferer), and later the Gould Electronics, Inc., (Gould) lead battery recycling plant were located at 555 Farnam Street. Both the ASARCO and Aaron Ferer/Gould facilities released lead-containing particulates to the atmosphere from their smokestacks which were deposited on surrounding residential properties.

The OLS includes only those residential properties where the U.S. Environmental Protection Agency (EPA) determines through soil sampling that soil lead levels represent an unacceptable risk to human health. Residential properties where soil sampling indicates that soil lead concentrations are below a level of concern are not considered part of the Site. Commercial and industrial properties are also excluded from the defined Site. The EPA has established a 27.0 square-mile Final Focus Area where soil sampling of residential properties is being conducted to measure the impact of the former smelting/refining facilities on soil lead levels at individual properties. The results of the soil sampling determine whether individual properties are included within the defined OLS. For convenience, the perimeter of the Final Focus Area will be referred to as the Site boundary. The OLS is actually comprised of the individual properties that have been determined to be eligible for remedial action on the basis of soil sampling. *Figure 1* shows the general location of the OLS.

The EPA is the lead agency for this project. The Nebraska Department of Environmental Quality (NDEQ) serves as the support agency to EPA. The cleanup of residential properties at the OLS is being funded from the Superfund Trust under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA). The EPA is involved in discussions with potentially responsible parties (PRPs) for the Site seeking their participation in funding and/or performance of the selected remedy.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Site History

The ASARCO facility conducted lead smelting and refining operations at the 500 Douglas Street facility from the early 1870s until 1997. The ASARCO facility was located on approximately 23 acres on the west bank of the Missouri River in downtown Omaha. Aaron Ferer constructed and operated a secondary lead smelter and lead battery recycling plant from the early 1950s until 1963. In 1963, the facility was purchased by Gould, who operated until it closed in 1982. During the operational period of these facilities, lead-contaminated particulates were emitted into the atmosphere through smokestacks and other processes. The pollutants were transported downwind in various directions and deposited on the ground surface.

The Douglas County Health Department (DCHD) performed monitoring of the ambient air quality around the ASARCO facility beginning in 1984. This air monitoring routinely measured ambient lead concentrations exceeding the ambient standard for lead at that time of 1.5 micrograms per cubic meter (Φg/m^3). The highest recorded quarterly average measured in air was 6.57 Φg/m^3.

The DCHD has compiled statistics on the results of blood lead screening of children less than seven years of age for more than 25 years. Blood lead screening of children living in zip codes located east of 45th Street nearest to the former lead-processing facilities have consistently exceeded the 10 micrograms per deciliter (Φg/dl) health-based threshold more frequently than children living elsewhere in the county.

In 1998, the Omaha City Council requested assistance from the EPA to address the high frequency of children found with elevated blood lead levels by the DCHD. At that time, the EPA began investigating the lead contamination in the Omaha area under the authority of CERCLA.

The EPA began sampling residential properties and properties that were used to provide licensed child-care services in March 1999. Response action was initiated under CERCLA removal authority in August 1999 through an InterAgency Agreement with the U.S. Army Corps of Engineers. From 1999 through 2002, excavation and soil replacement was completed at 257 properties by the Corps of Engineers. EPA began directly implementing the removal action in 2002, and completed excavation and soil replacement at a total of 144 properties through 2003. EPA and the Corps of Engineers completed a combined total of 310 properties in 2004. Removal action was completed by EPA and the Corps of Engineers at 773 properties in 2005 as work was transitioning to CERCLA remedial authority.

The initial removal response actions were directed at excavation and replacement of soil exceeding 400 ppm at child-care centers and residences where children with elevated blood lead levels resided. In August 2002, a second removal action was initiated at all other residential-type properties where the maximum non-foundation soil lead concentration exceeded an action level of 2,500 ppm. At properties determined to be eligible for response under either of the removal actions where the maximum mid-yard soil lead level exceeded the action level, soils exceeding the cleanup level of 400 ppm were excavated and replaced with clean soil and disturbed areas were revegetated. Because of the potential contribution of deteriorating lead-based paint near the foundations of structures, the soil lead level in the drip zone (areas near structure foundations) alone would not trigger soil removal and replacement if all mid-yard soil lead levels at a property were less than the action level. However, if any mid-yard soil sample exceeded the action level, soil from all areas of the property exceeding the 400 ppm cleanup level would be removed and replaced, including drip zone soils if they exceeded 400 ppm. The action level which triggered response for typical residential properties under the second removal action was reduced to 1,200 ppm in November 2003, but the cleanup level remained at 400 ppm throughout all response actions at the OLS. In 2004, the two removal actions were combined into a single response, and in 2005, following issuance of the Interim Record of Decision, the action level for removal response during the transitional period was lowered to 800 ppm for consistency with the upcoming remedial response.

The OLS was proposed for the EPA's National Priorities List (NPL) on February 24, 2002. The proposed NPL listing became final on April 30, 2003. The general boundaries of the Site were estimated at the time of NPL listing by establishing a perimeter surrounding the properties that had been determined to exceed 1,200 ppm lead at that time. The area enclosed by this perimeter was approximately 8,840 acres (13.8 square miles), with a population of 65,863 (based upon 1990 U.S. Census information). Twenty public schools were located within this area. On the basis of soil sampling performed subsequent to NPL listing, a focus area was established where EPA targeted additional residential properties for soil sampling to characterize the impact from the former lead processing facilities. The original focus area boundary encompassed an area of 12,098 acres (18.9 square miles) bounded by Ames Avenue to the north, L Street to the south, 45th Street to the west, and the Missouri River to the east.

Between March 1999 and January 2004, surface soil samples were collected from 15,012 residential properties. EPA finalized an initial Remedial Investigation (RI) at the Site in 2004 which presented the results of previous site investigations. During data collection for the 2004 RI, the boundaries of the focus area were expanded to include additional areas where elevated soil lead levels were consistently found. The 2004 expanded focus area added portions of areas north to Redick Avenue, west to 52nd Street, and south to Harrison Street, encompassing a total area of 16,465 acres (25.7) square miles. The 2004 RI estimated that 16,000 residential properties could exceed 400 ppm lead; 5,600 properties could exceed 800 ppm lead; and 2,800 properties could exceed 1,200 ppm lead.

EPA issued an Interim Record of Decision (Interim ROD) for the OLS on December 15, 2004, based upon information in the Administrative Record for the Site, including the Remedial Investigation and Feasibility Study (RI/FS) released in 2004. The Interim ROD expanded the scope of the ongoing response action to include excavation and replacement of residential soils exceeding 400 ppm at typical residential and residential-type properties where the maximum non-foundation soil lead level exceeded 800 ppm, and continued removal and replacement of soils exceeding 400 ppm at child care centers and residences where children with elevated blood lead levels resided. The selected interim remedy added new elements to the response action, including stabilization of deteriorating exterior lead-based paint in cases where the continued effectiveness of the soil response was threatened, high-efficiency interior dust cleaning at eligible properties, health education, and participation in a comprehensive remedy with other agencies and organizations to address all identified lead exposure sources in the community.

In March 2005, the scope of the ongoing removal action was amended to include all elements of the Interim ROD, which continued until work commenced under CERCLA remedial authority. Removal response was discontinued when remedial response commenced. Proceeding under CERCLA remedial authority, EPA completed soil excavation and replacement (remediation) at 255 properties in 2005 for a total of 1,060 properties completed under combined removal and remedial authority. During 2006, soil remediation was completed at 1,044 properties under remedial authority. Soil remediation was completed at an additional 1,000 properties in 2007 and 800 properties in 2008. Through the close of the 2008 construction season, soil excavation and replacement under CERCLA removal and remedial authority has been completed at 4,615 residential properties.

Stabilization of deteriorating exterior lead-based paint in accordance with the interim remedy commenced in 2007 through a cooperative agreement with the city of Omaha's Lead Hazard Control Program. Stabilization was completed at 18 properties in 2007. In 2008, under both EPA and the city of Omaha contracts, stabilization of deteriorating exterior lead-based paint was completed at 1,169 properties.

During implementation of the interim remedy, EPA continued to perform soil lead characterization to support a final remedy for the OLS. In October 2008, EPA released a draft Final Remedial Investigation, which presented results of all site investigations including soil sampling performed at more than 35,000 residential properties. Based on the 2008 data set, EPA established the Final Focus Area for the Site, which defined the area of residential properties that are targeted for sampling. This area is generally bounded by Read Street to the north, 56th Street to the west, Harrison Street (Sarpy County line) to the south, and the Missouri River to the east, and encompasses 17,290 acres (27.0 square miles). The 2000 U.S. Census data for this area shows a total population of 125,650, including 14,117 children seven years of age and younger. Information from the Douglas County Assessor's Office indicates the presence of 39,783 residential properties within the Final Focus Area.

Through completion of the OLS Final Remedial Investigation, soil sampling had been completed at 37,076 residential properties, including 34,565 within the Final Focus Area's boundary. Of the residential properties sampled, the 800 ppm soil action level established by the Interim ROD[1] was exceeded at 4,144 properties. An additional 8,552 properties had soil lead levels between 400 ppm and 800 ppm. In total, 34.2 percent of properties sampled through completion of the 2008 RI had at least one mid-yard sample with a soil lead level exceeding 400 ppm. Based on the data trends, the OLS Final Feasibility Study (FS) estimates that soil lead levels will exceed 400 ppm at a total of 14,577 properties when soil sampling is completed at all properties within the Final Focus Area.

On the basis of spatial analysis of the data generated during the Final OLS Remedial Investigation (RI), EPA established a Final Focus Area for the OLS. Portions of the Final Focus Area extend to 56th Street to the west, the Missouri River to the east (excluding the Omaha

[1] Maximum mid-yard (non-foundation) soil lead concentrations are compared to established action levels to determine eligibility of a property for remedial action.

central business district), Read Street to the north, and Harrison Street to the south. *Figure 2* shows the boundary of the Final Focus Area and depicts the sequential expansion of the focus area since the Site was originally proposed for the NPL.

The Final Focus Area boundaries define a general area where the majority of the properties impacted by former lead processing emissions are located and soil sampling has been prioritized. The actual site, however, includes any property where soil lead levels exceed EPA criteria for initiating remedial action. The Site is composed of individual properties that exceed the established action levels, defined on a property-to-property basis, and is not defined by a discrete boundary.

Enforcement Activities

EPA issued a general notice letter under CERCLA authority on August 4, 1999, to ASARCO, Incorporated (ASARCO), asking ASARCO to perform a time-critical removal action to address lead-contaminated soils at child-care centers and residences at the site. In a response dated August 13, 1999, ASARCO declined to perform the removal action. On August 30, 1999, EPA issued an Administrative Order (Docket Number-CERCLA-7-99-0029), ordering ASARCO to perform the necessary removal action. ASARCO responded on September 7, 1999, stating they would not comply with the UAO. EPA proceeded with a fund-lead removal action to address the threat associated with the lead contamination in the residential soils. EPA subsequently identified three additional PRPs: Union Pacific, Gould, and Aaron Ferer.

The EPA has coordinated with these four PRPs during the implementation of all response actions at the site. General notice letters were issued on June 4, 2002, to initiate discussions on the performance of the RI/FS. The four parties declined to perform the RI/FS so EPA proceeded using Superfund Trust monies.

Following completion of the Interim ROD, special notice letters were issued to the four parties on December 16, 2004, requesting payment of past costs and performance of the work under the Interim ROD. A good faith offer for performance of the work was not received. On March 31, 2005, an Administrative Order (Docket No. CERCLA-07-2005-0207) was issued with a delayed effective date to Union Pacific requesting performance of the work required by the Interim ROD. The effective date was extended several times to allow continued discussions with Union Pacific. The Administrative Order became effective on December 16, 2005. Union Pacific responded on January 3, 2006, indicating that it would not comply with all of the provisions of the Administrative Order. EPA proceeded with a fund-lead remedial action to address the threats posed by Site contamination.

In August 2005, ASARCO filed for bankruptcy protection under Chapter 11 of the Bankruptcy Code in the Southern District of Texas, Corpus Christi Division. The United States filed a proof of claim in the bankruptcy action to cover all past and future costs associated with the OLS. Numerous other sites and facilities are included in the bankruptcy case. An estimation hearing on the claim for the OLS was held in Corpus Christi, Texas in August 2007. The claim for the Omaha Lead Site has not been determined and the bankruptcy reorganization case is still ongoing.

COMMUNITY PARTICIPATION

EPA has worked extensively with the Omaha community through a variety of communication vehicles, including but not limited to local speaking engagements, participation in citizens' groups and city council meetings, local public access television, public service announcements on local cable television, coverage on radio and television and in local and national newspapers, mass mailings of informational materials, public outreach by telephone, by conducting public meetings, and through the EPA Web site.

EPA has been performing outreach to Omaha citizens, elected officials, school officials, health officials, the media, nonprofit groups, and others since becoming involved in the project in 1998 in an effort to convey information about the hazards of lead poisoning and particularly how lead affects the health of children. The EPA has participated in numerous formal and informal meetings to explain EPA's role and commitment in Omaha, convey information about the Superfund process, and provide general information about the site and lead contamination. EPA responds to inquiries on a daily basis regarding the site and individual property owner's sampling results.

In November 2004, EPA established two Public Information Centers within the boundary of the focus area at the OLS that provide information regarding conditions at individual properties, the status of the overall EPA response, and information about other lead hazards in the community. One information center was established in the north Omaha community and a second was located in the south Omaha community. These information centers are staffed with bilingual public information specialists with direct access to the project database maintained at the EPA Regional Office.

In January 2004, a Community Advisory Group (CAG) was formed for the site. A CAG is a committee, task force, or board made up of residents affected by a Superfund site. They provide a public forum where representatives of diverse community interests can present and discuss their needs and concerns related to the site and the cleanup process. CAGs are a community initiative which functions independently of EPA, providing a constructive avenue for addressing and understanding historical information, cultural concerns, and communication approaches tailored to the site. Union Pacific Railroad Company, an Omaha-based company, supports the CAG by providing the services of a technical consultant and facilitator. EPA participates in all aspects of CAG-related activities and meetings at the OLS.

EPA routinely participates in outreach efforts at the OLS by meeting with local groups involved in lead hazard control, giving public presentations, making appearances at schools, and coordinating with local nonprofit organizations and grant recipients to support lead hazard control. EPA participates with the local work force and business community in development and procurement of remedial action contracts. EPA maintains a toll-free telephone number for citizen convenience, and has responded to many thousands of phone calls about the Site.

On July 16, 2004, EPA released for public comment a Proposed Plan describing an interim remedy for the OLS. Two public meetings were announced with the release of the Proposed Plan and conducted on August 10, 2004, in both the north Omaha and south Omaha communities within the focus area of the site. Three extensions of this comment period were granted in response to requests from community members. Additional EPA availability sessions were scheduled and conducted on October 20, 21, and 26, 2004. The comment period for the proposed interim remedy closed on November 1, 2004. EPA issued a ROD selecting an interim remedy for the OLS on December 15, 2004. Public comments received on the Proposed Plan were summarized and addressed in a Responsiveness Summary, which was attached to the Interim ROD.

On October 30, 2008, EPA placed a display advertisement in the Omaha World Herald announcing a public comment period for the Proposed Plan for the final remedy (final Proposed Plan) at the OLS through December 1, 2008. The final Proposed Plan and all supporting documents were assembled in the administrative record which was available for public review at five EPA information repositories in eastern Omaha and at the EPA Regional Office. The final Proposed Plan and supporting studies were also posted on the EPA Region 7 Web page. In response to requests from the community, the comment period was extended from December 1, 2008, to December 31, 2008 and then extended again until January 15, 2009. On November 18, 2008, two public meetings were conducted in the north Omaha community and the south Omaha community to present EPA's preferred alternative for a final remedy at the OLS and to provide an opportunity for additional public comment. All comments received by EPA during the public comment period for the OLS final Proposed Plan are summarized and addressed in the Responsiveness Summary attached to this document.

EPA will continue to work with the community in an effort to provide enhanced communication and education on lead poisoning prevention through outreach, public meetings, attendance at local gatherings, and mailings.

SCOPE AND ROLE OF RESPONSE ACTION

The final remedy for the OLS described in this ROD addresses soils that have been contaminated with lead from airborne deposition of historic industrial emissions from former lead smelting and refining operations. Releases of large amounts of lead-contaminated particulate matter to the atmosphere resulted in the contamination of surface soil at thousands of residential properties. EPA's response at the OLS has been directed at controlling potential exposure to lead originating from historic lead-processing operations at residential-type properties. These types of properties include single- and multi-family dwellings, apartment complexes, child care centers, vacant lots in residential areas, schools, churches, community centers, parks, greenways, 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, cannot be remediated under CERCLA authority pursuant to 42 U.S.C §9604 and will not be addressed by this cleanup action.

The initial EPA response conducted under CERCLA removal authority involved excavation and replacement of soil exceeding 400 ppm at child care centers and residences where children with elevated blood lead levels reside. During these initial actions, soils with lead levels exceeding 400 ppm were removed and replaced with clean soil. A second removal action was later initiated to address the most highly contaminated residential-type properties with maximum mid-yard soil lead levels exceeding 2,500 ppm. As cleanups were completed at the most highly contaminated residential properties, the soil lead action level was sequentially reduced to 1,200 ppm and eventually 800 ppm so that soil cleanups could continue under CERCLA removal authority at the properties remaining with the highest mid-yard soil lead levels. During all phases of the EPA response, soil excavation and replacement continued to be prioritized at child care centers and residences were children with elevated blood lead levels reside with mid-yard soil lead levels exceeding 400 ppm.

As the soil cleanup under CERCLA removal authority was ongoing, planning for continued response under CERCLA remedial authority was proceeding. Under remedial response, the remaining properties to be addressed were separated into two Operable Units. Operable Unit 1 addressed the most highly contaminated properties addressed by the interim remedy following completion of removal response. Operable Unit 2 includes the residential properties contaminated at more moderate levels which are to be addressed by the final remedy for the OLS. Addressing the most highly contaminated properties remaining at the OLS under Operable Unit 1 has allowed the EPA response to continue while additional studies and assessment of site risk has been performed to support the final remedy for the OLS.

EPA organized the work remaining following completion of CERCLA removal response into these two operable units:

- Operable Unit 1: Response at high child impact properties and the most highly contaminated OLS properties exceeding 800 ppm soil lead.

- Operable Unit 2: Response at remaining properties that exceed risk-based soil lead levels established during final remedy selection process.

In December, 2004, EPA issued an Interim ROD under Operable Unit 1 for properties at the OLS that had not been previously addressed under CERCLA removal authority. The Interim ROD established a soil lead action level of 800 ppm for residential-type properties and maintained response authority at high child impact properties where non-foundation soil lead levels exceeded 400 ppm. For properties that were eligible for soil remediation under the Interim ROD where the mid-yard soil lead levels triggered a response, the soil lead cleanup level remained 400 ppm.

The scope of the EPA response was expanded under the 2004 Interim ROD to include: (1) stabilization of deteriorating exterior lead-based paint at properties where the continued effectiveness of the soil remediation was threatened, (2) response to interior dust at properties where interior dust lead levels exceeded appropriate criteria, (3) public health education, and (4) participation in a comprehensive remedy with other agencies and organizations that addresses all identified lead hazards in the Omaha community. Exterior lead-based paint stabilization and interior dust response are applied retroactively to properties where soil cleanups have been performed under CERCLA removal authority, as well as to properties addressed under CERCLA remedial authority.

During implementation of the interim remedy at the OLS under Operable Unit 1, EPA proceeded with remedial planning activities for Operable Unit 2. A Final RI and Final FS were developed and released in draft form in October 2008. A draft Final Baseline Human Health Risk Assessment was also released in October 2008 as an appendix to the draft Final RI. On the basis of these studies and other supporting documents in the OLS administrative record, EPA released for public comment a final Proposed Plan on October 30, 2008. The Proposed Plan presented EPA's preferred alternative for a final remedy at the OLS and proposed lowering the soil lead action level to 400 ppm for all residential-type properties impacted by the former lead-processing facilities. On the basis of information in the Final RI, a total of 14,581 properties at the OLS were estimated to be eligible for response. Through the end of the 2008 construction season, soil cleanup had been completed at 4,615 properties at the OLS, leaving an estimated 9,966 properties which would be eligible for soil remediation under Operable Unit 2.

Operable Unit 2 includes all remaining remedial response work at the OLS. Work remaining under Operable Unit 1 that has not yet been completed will be accomplished under Operable Unit 2. Properties identified with time-critical conditions, including residences with elevated blood-lead levels in children and high child-impact areas, will continue to receive prioritized response during the final remedy implemented under Operable Unit 2. The precise scope of work remaining to be completed under Operable Unit 2 is not known with certainty since sampling has not been completed to determine eligibility for soil remediation, exterior lead-based paint stabilization, and interior dust response. The projections of work remaining presented in the Final RI and Final FS are based upon trends in data collected through the completion of the 2008 construction season.

Comprehensive Plan

EPA is aware that lead in the environment at the Site originates from many sources. In addition to the identified soil exposure pathway, other important sources of lead exposure at some properties at the OLS include, but is not be limited to, interior and exterior lead-based paint, lead-contaminated interior dust, children's toys, certain imported candy, jewelry, and cookware. Generally, sources other than contaminated soil cannot be remediated by EPA in the course of residential lead cleanups. CERCLA and the NCP limit Superfund authority to address interior lead-based paint. For example, CERCLA Section 104(a)(3)(B) limits EPA's authority to respond to releases within residential structures as follows:

> Limitations on Response: The President [EPA] shall not provide for removal or remedial action under this section in response to a release or threat of release…from products which are part of the structure of, and result in exposure within, residential buildings or business or community structures…

In addition, Section 101(9) of CERCLA specifically provides that the definition of "facility" does not include "any consumer product in consumer use."

The above-cited sections of CERCLA generally limit the EPA's authority to respond to lead-based paint inside a structure or house. However, EPA does have authority to address deteriorating exterior lead-based paint as a component of a response action to prevent recontamination of soils that have been remediated.

OSWER policy presented in the August 2003 Superfund Lead-Contaminated Residential Sites Handbook (OSWER Directive 9285.7-50) recommends against using money from the Superfund Trust Fund to address interior lead-based paint exposures, and recommends that actions to address or abate interior lead-based paint risks be addressed by others such as the U.S. Department of Housing and Urban Development (HUD), local governments, health authorities, PRPs, private organizations, or individual homeowners. The OSWER policy also recommends against using Superfund Trust money to remove interior dust solely from lead-based paint or to replace lead plumbing within residential dwellings, and recommends that the regions seek partners to address these other lead exposure risks.

EPA acknowledges the importance of addressing these other exposures in controlling overall exposure to lead hazards at residential Superfund sites. EPA will participate with other organizations such as HUD, the Agency for Toxic Substances and Disease Registry (ATSDR), state environmental departments, state and local health departments, private organizations, PRPs, and individual residents to develop and implement a comprehensive lead risk reduction strategy for the Site.

EPA clearly understands that the community desires a comprehensive remedy to address all potential sources of lead. The EPA supports a comprehensive remedy. Although EPA Superfund authority does not allow EPA to perform all of the actions necessary to address every potential source of lead exposure, the EPA remedy can provide for many elements of a comprehensive lead-reduction program. EPA can provide funds to support health education efforts to reduce the risk of lead exposure in general. Consistent with OSWER policy, EPA will not increase the risk-based soil cleanup levels as a result of any actions taken to address these other sources of exposure.

SITE CHARACTERISTICS

Properties that comprise the OLS are generally located within a 27.0-square-mile area of eastern Omaha that has been impacted by more than 125 years of emissions from historic lead smelting and refining operations. During the course of operations, lead-contaminated particulate matter was released through stack and fugitive emissions and dispersed in a wide area surrounding the facilities. Airborne emissions were deposited on surface soils at thousands of residential properties in the impacted area. The 27.0-square-mile Final Focus Area at the OLS includes close to 40,000 residential-type properties. According to 2000 Census figures, the Final Focus Area includes 53,511 housing units with a total population of 125,650, including 14,117 children 7 years of age and younger.

The Site is located entirely within an urban area in eastern Omaha and includes only residential properties[2]. The NPL listing establishes that commercial and industrial properties, including the Omaha central business district, are excluded from the defined site. The Site is composed of individual residential properties in the area impacted by historic lead processing emissions where soil testing detects soil lead concentrations at levels that trigger EPA response action. Residential properties in eastern Omaha where testing does not detect soil lead concentrations above EPA action levels are not considered part of the Site.

Properties where the former ASARCO and Aaron Ferer/Gould facilities were located have been remediated during prior response actions, and are not a part of the OLS. Following remediation, the properties where both of the former lead processing facilities were located were redeveloped for beneficial use.

EPA began collecting samples from surface soils (0-1 inch below ground surface) at residential properties in eastern Omaha in 1999. This surface soil sampling has continued throughout the course of EPA response actions. In 2001, a Site Inspection report was prepared which reported the results of surface and subsurface soil sampling performed at approximately eight residential properties every tenth of a mile in sampling corridors leading from downtown Omaha in north, south, east, and west directions. Subsurface samples, collected at approximately 550 of these residences, consistently indicated a decrease in lead levels with increasing depth, consistent with airborne deposition of lead contamination. Subsurface soil sampling was discontinued on the basis of this sampling effort, and surface soil sampling has been relied upon to characterize potential exposure point concentrations at OLS residential properties.

Currently there are 34,598 properties within the Final Focus Area where soil sampling has been performed, and 2,511 properties outside the Final Focus Area that have been sampled. There are 4,360 residential properties within the Final Focus Area remaining to be sampled, and an additional 825 properties that can not be sampled, usually because of no exposed soil present on the property.

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[2] The term "residential properties" used in this document includes residential-type properties such as schools, churches, parks, vacant lots in residential neighborhoods, and other non-commercial/industrial properties where residential exposure levels could occur.

Elevated soil lead levels are present in residential properties over a wide area of eastern Omaha. In general, concentrations of lead in soil are greatest at residential properties near downtown, where the former lead processing facilities were located. Concentration and frequency of elevated lead levels tend to decrease with increasing distance from the former lead smelting and refining operations. The OLS includes some of the oldest neighborhoods in the Omaha area. This area is primarily used for residential purposes and is populated with a variety of racial, ethnic, and income groups.

Soil sampling performed by EPA has demonstrated that soil lead levels measured in Council Bluffs, Iowa, are significantly lower than soil lead levels measured in eastern Omaha. The significantly lower soil lead levels in Council Bluffs can be attributed to the development of Council Bluffs in the historic flood plain of the Missouri River. The historic flood plain of the Missouri River extends more than three miles east of the former ASARCO and Gould facilities, and includes most of present-day Council Bluffs. Prior to construction of flood control improvements by the U.S. Army Corps of Engineers, which began in the late1940s, severe flooding of the Missouri River would inundate portions of Council Bluffs located in the flood plain east of Omaha for extended periods of time. During flood events, sediment deposition and scour would either cover or remove lead contamination deposited in surface soils from the former lead-processing facilities. These impacts would significantly reduce lead concentrations in surface soils. The historic industrial lead emissions originated from the former ASARCO facility prior to implementation of flood control measures would have been altered by sediment deposition and scour during major flood events. These flood plain effects would have significantly reduced lead levels remaining in surface soils in the historic Missouri River flood plain immediately east of Omaha. Much of the housing in Council Bluffs located in the historic floodplain of the Missouri River was constructed following implementation of flood control measures, and the soil disturbance caused by housing construction would further reduce soil lead levels in surface soils. *Figure 3* depicts the flood plain of the Missouri River located between the east and west bluffs in the vicinity of Council Bluffs.

EPA has established a Final Focus Area shown in *Figure 4*. This Final Focus Area is based on a geospatial analysis of existing soil lead data, and includes the area where the frequency of residential properties with soil lead above 400 ppm exceeds 5 percent (i.e., at least 1 in 20 homes has a soil lead level of potential concern). Lead speciation studies have determined that the historic lead smelting and refining operations in eastern Omaha are a significant source of lead contamination at residential properties throughout the Final Focus Area. In some instances, residential properties that are outside the Final Focus Area boundary have been sampled in efforts to identify the extent of contamination. Properties located outside the Final Focus Area boundary are considered a part of the OLS if soil sampling has detected soil lead levels exceeding the final EPA soil lead action level.

Figure 5 presents a general conceptual model of how smelter-related contaminants that have been released to the environment at the OLS might result in exposure of humans. The environmental medium of chief concern is surface soil that has been impacted by wet or dry deposition of metal-containing airborne particulates released from the smelters. The human population of chief concern is residents in the area of the OLS, now or in the future, including both children and adults. Residents might be exposed to smelter-related contaminants in Site soils by a number of different pathways including ingestion, inhalation, and dermal contact with contaminated soil or dust, and ingestion of home-grown produce that may have taken up contaminants from the soil.

At smelter sites, contaminants of concern (COCs) typically include a range of different metals and metalloids. At the OLS, Baseline Human Health Risk Assessments performed in 2004 and 2008 have identified lead as the primary COC at the Site. The primary route of exposure to lead at the OLS is ingestion of surface soil and dust contaminated with lead. Exposure to lead-contaminated soils has contributed to an increased incidence of childhood blood lead poisoning in areas near the former lead processing facilities. The frequency of elevated blood lead levels in children living within the OLS has consistently exceeded the frequency of elevated blood lead levels in children living in other parts of Douglas County. The latest available data from the Douglas County Health Department for 2007 indicates that 209 of the 259 children (81 percent) in Douglas County with measured elevated blood lead levels exceeding 10 μg/dL reside within the seven zip-code area approximating the OLS site.

Soil lead investigations at the OLS have determined that lead contamination in undisturbed areas generally remains limited to the upper few inches of soil. In impacted areas that have been disturbed, soil mixing that has occurred with underlying soils has, in some cases, resulted in a significant reduction in lead concentrations detected in surface soils. The inconsistent pattern of soil disturbance since airborne deposition of industrial emissions from the former lead processing facilities began more than 125 years ago is a significant factor in the variation in lead levels observed at the OLS. The variation in soil lead levels at the OLS can be significant both between nearby or adjacent properties, and within individual properties.

Soil sampling at residential properties at the OLS has been performed in accordance with the Superfund Lead-Contaminated Residential Sites Handbook. This sampling approach involves collection of multiple samples at individual residential properties which helps assure that contaminated areas are identified if varying soil lead conditions are present. 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 0 to1 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. Additional samples are collected from garden areas and play zones if present on a property.

The volume of contaminated soil that must be removed to attain cleanup goals also varies significantly from property to property. The size of the yard at individual properties is highly variable. Due to the variation in surface soil lead concentrations, the number of quadrants that require excavation to achieve cleanup goals can vary from a single quadrant to the entire yard. In addition, the depth of excavation can vary from quadrant to quadrant. Although elevated soil lead concentrations are generally limited to the upper few inches of soil, excavation of 6 to 12 inches of soil in remediated quadrants is typically performed to assure that cleanup goals are met. The variation in areal extent and depth of excavation results in a range of soil volume that must be removed from individual properties. On average, approximately 50 tons of soil is removed from each residential property to achieve cleanup goals.

CURRENT AND POTENTIAL FUTURE LAND USE AND RESOURCE USES

Land use at the properties which comprise the OLS is residential and residential-type parcels. Since the Site is defined to include only residential and residential-type properties, commercial and industrial properties within the Final Focus Area are not considered part of the Site. The OLS is located entirely within the city limits of Omaha, Nebraska, where local zoning ordinances control land use. The site is bordered by adjacent Omaha neighborhoods and commercial areas to the north and west, and developed areas within the city of Bellevue, Nebraska, in Sarpy County to the south, and the Missouri River to the east. The continued residential use of property can be reasonably assumed for the majority of the thousands of properties that comprise the Site through local zoning control. It is possible that, at some point in the future, interest will arise in converting some of the current residential properties to nonresidential use.

Also located within the general area of affected residential properties are numerous nonresidential properties, including the Omaha central business district. As noted above, certain nonresidential properties such as parks and schools are included in the remedy as residential-type properties. Commercial properties including the Omaha central business district and industrial properties are not included in the site definition and soil sampling is not performed at properties with this type of land use.

Groundwater is not affected by lead-contaminated soils at the impacted residential properties that comprise the Site. Potential groundwater impacts related to the ASARCO and Aaron Ferer/Gould facilities were mitigated through placement of a cap over remediated areas. Soil lead contamination at the OLS has remained very stable, exhibiting little or no vertical migration or leaching after more than 125 years since former lead smelting/refining operations began. Since lead in surface soils at the OLS is not considered readily leachable under normal circumstances, local groundwater quality is not threatened by lead-contaminated surface soils. Shallow groundwater beneath the OLS discharges directly to the Missouri River and is not useable as a potable water source due to poor quality and low productivity. The municipal water supply is readily available and used by Omaha residents, and domestic use of local groundwater is controlled by City Ordinance. Groundwater is not addressed by this ROD due to the lack of potential impact on groundwater quality and the absence of potential receptors.

Surface water is also not affected by lead-contaminated soils at the OLS. The most prominent surface water feature potentially affected by site contaminants is the Missouri River immediately east of the Site. Available data indicate that public health is not threatened by potential Site impacts on surface water quality in the Missouri River. Sampling results of water and sediment in the Missouri River immediately adjacent to the ASARCO and Aaron Ferer/Gould facilities has not detected elevated levels of lead or other smelter-related contamination. Public drinking water intakes which supply the cities of Omaha and Council Bluffs are located upstream of the OLS.

Future use of surface water and groundwater resources should not be affected by lead-contaminated soils at the Site or the remedial action described in this ROD.

SUMMARY OF SITE RISKS

Human Health Risks from Lead

The primary chemical of concern (COC) for human health at the OLS is lead. *Figure 7, Table 1* summarizes the range of maximum non-foundation soil lead levels detected during OLS investigations at 34,217 sampled properties in the Final Focus Area. *Figure 7, Table 2* summarizes the number and percentage of sampled OLS properties within the Final Focus Area with maximum non-foundation soil lead levels falling within specified ranges.

The human health risk assessment for lead focused on young children seven years of age and younger (0 to 84 months) who are OLS residents. Young children are most susceptible to lead exposure because they have higher contact rates with soil or dust, absorb lead more readily than adults, and are more sensitive to the adverse effects of lead than are older children and adults. The effect of greatest concern in children is impairment of the nervous system, including learning deficits, lowered intelligence, and adverse effects on behavior.

In accordance with EPA's recommended risk assessment approach for lead, potential health risks to children from lead were evaluated using EPA's Integrated Exposure Uptake Biokinetic (IEUBK) model. The IEUBK model uses measures or estimates of lead concentrations in environmental media (soil, dust, water, air and food) to estimate the probability that a child's blood lead level might exceed a health-based standard of 10 micrograms per deciliter (μg/dL). For convenience, the probability that a child will have a blood lead level above 10 μg/dL is referred to as "P10." The EPA's health protection goal is that there should be no more than a 5 percent chance of exceeding a blood lead level of 10 μg/dL in a given child or group of similarly exposed children (i.e., P10 ≤ 5 percent). The basis for this goal is that health effects associated with childhood lead exposure have been determined to occur at or below a blood lead level of 10 μg/dL.

The IEUBK model was used to evaluate risks to children from lead at 28,478 residential properties within the Final Focus Area. Residential properties where soil has already been remediated by EPA were not included in the risk assessment. Inputs to the IEUBK model are summarized below.

- At each property evaluated, the concentration of lead in soil was based on the average of all surface soil samples collected from the main part of the yard. Samples of soil from the drip zone were not included because it is not considered likely that children will routinely be exposed in the drip zone. The measured mean concentration value was adjusted to account for the fact that children are mainly exposed to finer (smaller) particles of soil, in which lead is somewhat more concentrated than in the bulk soil sample.

- The concentration of lead in indoor dust was estimated from the concentration of lead in outdoor soil. During the Final Baseline Human Health Risk Assessment, the relationship between soil and dust was based on data from 98 properties at the OLS where paired soil and dust samples were collected. The average concentration of lead in indoor dust was estimated by the following equation: $C(dust) = 42\ ppm + 0.74 \cdot C(soil)$. This equation indicates that, on average, 74 percent of the mass of indoor dust is derived from soil. The amount of lead in indoor dust is the sum of the lead from soil and other (nonsoil) sources. The average contribution from nonsoil sources is estimated to be 42 mg/kg, suggesting that releases from indoor lead-based paint are, on average, not excessive. Based on these findings, the percent of lead from soil is not a constant, but may range from less than 50 percent when soil levels are low to over 90 percent when soil levels are high.

- The extent of lead absorption from soil was based on measurements performed in animals (2 samples) and in an *in vitro* system that is known to yield reliable estimates of absorption in animals (47 samples). Taken together, the data indicated that absorption of lead from Site soils is about 80 percent of that from readily absorbable forms of lead. *In vitro* data for 94 indoor dust samples indicated the same value (80 percent) was appropriate for estimating absorption of lead from indoor dust.

- The concentration of lead in water was based on data collected at 98 properties at the OLS. This included measures of both "first-flush" water (water drawn in the morning before water use begins), and "post flush water" (water drawn after the pipes have been flushed). Concentration values were typically low, and the average for the Site was 1.36 μg/L.

- The concentration of lead in air was based on measurements performed at 5 air monitoring stations in the OLS. Because the concentration of lead in air decreased after the smelters ceased operation, only data from 2000-2003 were used. The average value was 0.036 $\mu g/m^3$.

- All other model inputs were default values recommended for use by EPA.

Lead in soil and dust may arise from a number of different sources, including not only deposition from historic smelter emissions but also releases from indoor and outdoor lead-based paint, historic releases from vehicles using leaded gasoline, and others. The risk assessment is based on the total level of lead in soil and dust. Direct ingestion of lead-based paint chips does not serve as an input to the IEUBK model at the OLS. Indirect exposure to lead from lead-based paint and other potential sources of lead is accounted for in the IEUBK model through the use of total lead levels measured in soil and dust to derive model inputs. The IEUBK model does not separate the risk estimated from various sources, but rather determines impacts on blood lead levels resulting from exposure to all lead sources that contribute to the total lead levels measured in soil, dust, food, water, and air.

The results of the IEUBK model calculations are summarized in *Figure 8*. As seen, of the 28,478 properties evaluated, a total of 19,445 homes (68 percent) are predicted to have P10 values at or below the health-based goal of 5 percent, and 9,033 properties (32 percent) have values that exceed the goal. Of these 9,033 properties, 3,177 have P10 values between 5 percent and 10 percent; 3,051 properties have P10 values between 10 percent and 20 percent; and 2,805 properties have P10 values greater than 20 percent. The location of properties with P10 values greater than the health-based goal of 5 percent were widespread across the OLS Final Focus Area and were found within all zip codes with the exception of 68117 (which only had 2 properties). *Figure 6* shows zip code boundaries in eastern Omaha.

These results indicate that a number of homes or parcels within the Final Focus Area have soil lead levels that are of potential health concern to children who may reside there now or in the future.

Risks to Residents from Other (Non-Lead) Contaminants of Potential Concern (COPCs)

Risks to area residents (children and adults) from exposure to other (non-lead) smelter-related contaminants in soil were evaluated in accordance with standard risk assessment methods recommended by EPA for use at Superfund sites. Chemicals that were evaluated included aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, manganese, mercury, thallium, vanadium, and zinc. Risks were evaluated for both children and adults who have central tendency exposure (CTE) and reasonable maximum exposure (RME). Non-cancer risks are expressed in terms of a Hazard Quotient (HQ). HQ values less than or equal to one are not of concern, while values above one are of potential concern. The results are shown in *Figure 9.* As indicated, estimated non-cancer risks from most COPCs in surface soils for residential scenarios, including both children (age 0-7 years) and adults (age 8-30 years), are below a level of potential concern ($HQ \leq 1$). An exception is arsenic, which results in non-cancer risks for an RME child at about 10 percent of the properties. Estimated cancer risks from arsenic are shown in *Figure 10*. Cancer risks are within EPA's risk range of 1E-04 to 1E-06 for the CTE resident, but about 5% of properties exceed the risk range (> 1E-04) for an RME resident. These properties are a subset of the properties that are of concern for non-cancer effects in children.

The distribution and sources of arsenic was the focus of separate independent studies that are included as Appendix D in the Remedial Investigation. Two studies by the National Exposure Research Laboratory (NERL) concluded that the high levels of arsenic found with limited frequency at OLS properties are not related to the widespread lead contamination from former lead smelting/refining operations. Arsenic data were also evaluated by the Laboratory for

Environmental and Geological Studies (LEGS). LEGS also concluded that the arsenic contamination did not correlate with elevated soil lead levels at the OLS and the predominant source of arsenic in the high concentration samples was arsenic trioxide, a form commonly used as a rodenticide. Based on these results, arsenic is not considered a contaminant of concern for the Record of Decision.

Risks to Ecological Receptors

EPA has determined that a formal ecological risk assessment is not necessary at the OLS. With respect to terrestrial receptors (birds, mammals, plants), the Site is urban and is not considered to be suitable habitat for most species of native plants and animals. With respect to aquatic receptors, available data suggest that there are no detectable releases from the Site to the Missouri River, so an evaluation of risks to aquatic receptors is not needed.

Determination of Preliminary Remediation Goal for Lead

In accordance with EPA policy, the Preliminary Remedial Goal (PRG) for lead in soil at residential properties is derived using the IEUBK model. The PRG is the soil concentration of lead that yields a P10 value of 5 percent. If only default values are used as inputs to the IEUBK model, the model yields a PRG value of approximately 400 ppm.

When reliable site-specific data are available, the IEUBK model may incorporate those inputs to derive a site-specific PRG that may be different from the value based on default input parameters. As described previously, several types of site-specific data are available for evaluating lead risks at the OLS, including the soil-dust relationship, the bioavailability of lead in soil and dust, and the levels of lead in air and water. When best estimates of the site-specific inputs are used, the resulting PRG for lead in soil at the OLS is 298 ppm measured by ICP analysis in the fine fraction of soil or 247 ppm measured by XRF in bulk soils.

In considering these values based on site-specific inputs, it is important to understand that IEUBK model predictions are subject to some uncertainty since site-specific model inputs can vary over a range of values. To investigate the potential impact of these uncertainties, EPA performed a number of alternative PRG calculations using different combinations of IEUBK model inputs for the bioavailability term and the soil-dust relationship. The resulting PRG values ranged from 251 ppm to 442 ppm, measured in fine fraction by ICP analysis or ranged from 208 ppm to 366 ppm measured in bulk soil by XRF.

Determination of the Final Remediation Goal for Lead

Final cleanup levels for lead in residential soil at Superfund sites generally are based on a consideration of the PRG derived by the IEUBK model results, taking the uncertainty in the value into account, and also considering the nine criteria in accordance with the CERCLA regulations contained in the National Contingency Plan (NCP). Under most circumstances, EPA selects a residential soil lead cleanup level which is within the range of 400 ppm to 1,200 ppm.

EPA is selecting a soil action level for lead in residential soils at the site of 400 ppm as measured in bulk samples using XRF instrumentation. This soil action level is near the lower end of the typical 400 ppm to 1,200 ppm residential risk range, is near the upper end of the site-specific PRG range (measured in bulk soil by XRF), and is consistent with the Interim Record of Decision. The cleanup of surface soils at or above 400 ppm is anticipated to reduce child blood lead levels to meet the Remedial Action Objective and provide a protective remedy for the community. Additional activities include health education, operation of a local lead hazard registry, providing equipment and training to OLS residents for high-efficiency cleaning of home interiors contaminated through tracking of soils, and addressing loose and flaking exterior lead-based paint to protect the remedy effectiveness to provide further protection of human health at the OLS. The final response action selected in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

The application of the action level also requires consideration of the depths of excavation and other risk management elements. Under the Interim Record of Decision, EPA applied the 400 ppm action level to the first one foot and also established a not-to-exceed cleanup level of 1,200 ppm at depths below one foot. Due to the distribution of lead contamination in the soil profile at the OLS, Region 7 has determined that backfilling of excavated areas to original grade with clean material after reaching a residual soil lead level less than 400 ppm in the upper foot, or a residual concentration of less than 1,200 ppm at a depth greater than one foot, combined with other elements of the selected remedy, is protective of human health. These OLS cleanup criteria are based upon a risk-management determination made by Region 7 in consideration of site-specific conditions at the OLS and the experience gained in remediating over 4,600 properties using this strategy. Under the Interim Record of Decision, EPA applied the 400 ppm action level to the first one foot and also established a not-to-exceed cleanup level of 1,200 ppm at depths below one foot. More than 98 percent of the post-remediation quadrants met the 400 ppm action level at all depths. The 1,200 ppm is also protective for occupational exposure of utility workers or other construction workers that could potentially contact subsurface soils following soil remediation. Five-year review procedures will apply to any eligible properties where soil remediation does not achieve the action or cleanup levels specified in this Final Record of Decision.

REMEDIAL ACTION OBJECTIVE

Consistent with Agency policy established in the EPA Residential Sites Handbook, a single Remedial Action Objective (RAO) has been established for Operable Unit 2 at the site, as follows:

> The Remedial Action Objective is to reduce the risk of exposure of young children to lead in (or derived from) outdoor yard soil such that, given typical exposures to lead in air, water and food, the IEUBK model predicts there is no greater than a 5 percent chance an individual child, or group of similarly exposed children, will develop a blood-lead concentration exceeding 10 µg/dL.

This RAO is based on the understanding that current and reasonably anticipated future land use at the site is residential. Under residential land use conditions, the most susceptible receptor is a young child (age 7 and younger). As described in the final human health risk assessment, the IEUBK model was used to evaluate risks to children from lead in soil, dust (which is linked to soil), water, air, and diet. Of these exposure media, the largest exposure comes from soil and dust. The final remedy for the OLS will effectively control the contribution of the soil/dust exposure pathway, and enable achievement of the RAO.

<u>DESCRIPTION OF ALTERNATIVES</u>

Three alternatives were developed in the Final OLS FS to meet the identified Remedial Action Objective. The alternatives were developed to specifically address residential soil contamination resulting from industrial lead processing operations and include:

- Alternative 1: No Action

- Alternative 2: Excavation and Soil Replacement with Health Education and Institutional Controls

- Alternative 3: Excavation and Soil Replacement with Phosphate Stabilization, Health Education and Institutional Controls

Description of Remedy Components

Alternative 1: No Action

The EPA is required by the NCP, 40 CFR § 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 that reduced risks to human health and the environment. Although a response action to address lead-contaminated soils is ongoing at the OLS, excessive residual risks to human health remain, as documented in the BHHRA. Under the No-Action Alternative, the ongoing remedial action would cease. The concentrations of metals in residential yard soils would remain at levels that present an unacceptable risk to human health, particularly for young children residing at the OLS. The No-Action Alternative is therefore not protective of human health.

Alternative 2: Excavation and Soil Replacement with Health Education and Institutional Controls

- Excavation and Replacement of Soils Exceeding 400 ppm Lead
- Stabilization of Deteriorating Exterior Lead-Based Paint
- Response to Lead-Contaminated Interior Dust
- Health Education

- Operation of a Local Lead Hazard Registry as a type of Institutional Control and Development of an Institutional Control and Assurance Plan
- Participation in a Comprehensive Remedy Addressing Identified Lead Exposure Sources

Under this alternative, residential properties with at least one non-foundation sample greater than 400 ppm lead would be eligible for remedial action. The remedial action would include excavation and disposal of contaminated soil in all quadrants, drip zones, play zones, and other areas that exceed 400 ppm lead in surface soils. Excavation would continue until the lead concentration at the exposed surface of the excavation is less than 400 in the initial one foot below the surface, or less than 1,200 ppm at depths greater than one foot. A visual barrier would be placed when the 1,200 ppm not-to-exceed cleanup level at depth is exceeded below one-foot. Excavated soil would be disposed of either in a soil repository constructed for this purpose, used as beneficial fill in an industrial land use project, if appropriate, or transported to a solid waste landfill and used as daily cover or disposed of. Yards where only the drip zone soil exceeds 400 ppm lead would not be addressed under this action.

To date, soil remediation had been completed at 4,615 properties during previous response under CERCLA removal and remedial authority. Based on soil sampling completed and relying on trends for unsampled properties, the OLS Final Feasibility Study estimates that 9,966 additional properties with maximum non-foundation soil lead levels exceeding 400 ppm would become eligible for soil remediation under the final remedy.

This alternative includes stabilization of deteriorating exterior lead-based paint in cases where EPA determines that the continued effectiveness of the soil remediation is threatened. Lead-based paint stabilization would only be performed at properties which are also eligible for soil remediation under this alternative. EPA has developed a protocol to determine eligibility for exterior lead-based paint that is described in the OLS Recontamination Study. This protocol would be applied under this alternative to determine if structures at individual properties are eligible for exterior lead-based paint stabilization due to a threat to the continued effectiveness of soil remediation. Stabilization of structures involves preparation of surfaces to remove loose and flaking lead-based paint using lead-safe procedures, followed by priming and painting of all previously painted surfaces. Lead-based paint stabilization performed under this alternative would be voluntary to homeowners.

Alternative 2 provides for response to interior lead-contaminated dust at properties where soil remediation is performed. Interior dust wipe samples would be collected from floors in accordance with HUD interior wipe sampling protocol, and compared to EPA/HUD wipe sample criteria for floors to determine if the property is eligible for interior dust response. At eligible properties, residents would be provided a HEPA-equipped household vacuum cleaner and given training on its importance and operation and maintenance. In addition, residents would be provided health education pertaining to household lead exposure hazards, and actions that are necessary to lower potential lead exposure inside the home. Interior lead-contaminated dust response would be voluntary to homeowners.

A public health education program would be implemented to provide additional protection of human health. Elements of the public health education program include continued operation of the OLS Public Information Centers, providing public service announcements on local cable television, and funding to local agencies and organizations for outreach and education directed at lead hazards in the Omaha community.

This alternative includes a lead hazard registry which is a type of institutional control that provides additional protection of human health by making information available to the public about conditions at individual OLS properties. The lead hazard registry will provide interested parties with on-line access to lead hazard information at individual properties which includes the status of EPA investigations and response actions and other lead hazard information including HUD-funded lead hazard control and abatement activities.

This alternative includes participation in a comprehensive remedy with public and private partners involved in health education, outreach, lead abatement, and other lead hazard control activities.

Alternative 3: Excavation and Soil Replacement, Phosphate Stabilization with Health Education and Institutional Controls

- Phosphate Stabilization of Soils at Levels 400 ppm to 500 ppm
- Excavation of Soils Exceeding 500 ppm
- Stabilization of Deteriorating Exterior Lead-Based Paint
- Response to Lead-Contaminated Interior Dust
- Health Education
- Operation of a Local Lead Hazard Registry as a type of Institutional Control and Development of an Institutional Control and Assurance Plan
- Participation in a Comprehensive Remedy Addressing Identified Lead Exposure Sources

This alternative involves a combination of excavation and phosphate treatment of lead-contaminated soils at residential-type properties that have maximum mid-yard soil lead levels above 400 ppm. A Bench Scale Treatability Study was performed during implementation of the interim remedy at the OLS to evaluate the potential effectiveness of phosphate treatment on lead in OLS soils. The Treatability Study concluded that the most successful soil amendment reduced the in vitro bioaccessability of lead in the three tested OLS soil types from 15 to 26 percent. For the purpose of this alternative, it is assumed that a 20 percent reduction in lead bioavailability can be achieved using phosphate stabilization on OLS soils, and that application of phosphate treatment to soil lead concentrations ranging from 400 to 500 ppm would successfully achieve the Remedial Action Objective for soil lead. This alternative assumes that phosphate treatment is applied to residential properties with a high mid-yard soil lead concentration in the range of 400 to 500 ppm.

Under Alternative 3, residential properties with a high mid-yard soil lead level exceeding 500 ppm would be remediated by conventional excavation and soil replacement similar to Alternative 2. This alternative includes all other activities described in Alternative 2, including exterior lead-based paint stabilization, interior dust response, health education, operation of a local lead registry, and participation in a comprehensive remedy with public and private partners to address all identified lead exposure sources in the community.

Common Elements and Distinguishing Features of Each Alternative

With the exception of the No-Action Alternative, each alternative includes the common elements of deteriorated exterior lead-based paint stabilization, interior dust response, health education, operation of a local lead hazard registry, and participation in a comprehensive remedy that addresses all identified sources of lead exposure in the Omaha community. These elements will be unchanged regardless of the approach that is selected in the final remedy for soil remediation.

Both action alternatives are similar in their attainment of key applicable or relevant and appropriate requirements (ARARs). The key distinguishing features of the action alternatives relate to the number of yards to be excavated and the use of phosphate stabilization to treat contaminated soils instead of excavation and soil replacement.

Under both action alternatives, excavation and soil replacement will be performed at properties where the maximum non-foundation soil lead level exceeds 500 ppm. Under Alternative 2, excavation and soil replacement will be applied at all properties eligible for remedial action, including those properties with maximum non-foundation soil lead levels between 400 and 500 ppm. Under Alternative 3 however, phosphate treatment would be applied to properties with a maximum non-foundation soil lead level between 400 and 500 ppm, and excavation and replacement would be applied to properties with maximum non-foundation lead concentrations exceeding 500 ppm.

Stabilization of deteriorating lead-based paint and interior dust response, common to both Alternatives 2 and 3, are not considered stand-alone actions, but rather are ancillary components of the principal elements of each alternative involving excavation and soil replacement and soil treatment. Stabilization of deteriorating lead-based paint is performed at eligible properties to help assure the long-term effectiveness of soil remediation under both action alternatives. Lead-based paint stabilization is performed to prevent remediated soils near structure foundations from becoming recontaminated by loose and flaking paint falling to the ground and mixing with soils. This action is not taken to control the potential for direct exposure to peeling lead-based paint or lead-based paint chips that fall to the ground, but these lead hazards are also mitigated by stabilizing deteriorating lead-based paint to protect the continued effectiveness of the soil remedy.

Likewise, interior dust response is related to soil remediation and is included in each action alternative to address this potential exposure source which partially originates from tracking of outdoor contaminated soils and migration of fine particulates in outdoor soils to indoor areas through blowing and other transport mechanisms. Interior dust response would be performed during implementation of soil remediation to address indoor impacts from yard soils. Actions would not be taken to address deteriorating lead-based paint or interior dust if not for the presence of outdoor soils exceeding health-based levels.

Human health protection under all alternatives is increased through state and federal lead hazard disclosure requirements. In accordance with CERCLA requirements, property owners are provided results of soil sampling performed both during initial characterization of soil lead levels at individual properties and following excavation to confirm that cleanup goals have been met. Sampling data transmittals constitute a lead hazard record under Federal HUD and TSCA regulations, which must be disclosed by property owners to buyers prior to purchase, and must be disclosed by landlords to tenants upon lease signing and renewal. State real estate rules require that property owners must disclose sampling results to buyers as information pertaining to potential environmental hazards prior to purchase. State and federal lead hazard disclosure requirements represent an informational tool which assures that buyers and tenants of OLS properties are provided with records of soil lead levels at individual properties. When transmitting sampling results and other information concerning potential lead hazards at individual properties, property owners are advised by EPA that the provided information constitutes records that must be retained to comply with state and Federal disclosure requirements.

Alternative 2 involves the excavation of all properties exceeding 400 ppm. This alternative represents a final remedy for the estimated 14,577 properties (including previous response) that would be excavated and restored. This alternative does not rely upon treatment in any way to potentially address any of the contaminated site properties. Under Alternative 2, approximately 50 tons of contaminated soil would be removed from each of the remaining 9,966 properties for a total of approximately 500,000 tons, and transported off-site for final management or use as beneficial fill.

Alternative 3 includes a combination of excavation and treatment to achieve remedial action objectives. This alternative also constitutes a final remedy for the 4,615 remediated and estimated 9,966 remaining properties at the Site contaminated at levels above 400 ppm. Phosphate treatment would be applied to an estimated 3,234 properties with maximum non-foundation soil lead levels between 400 and 500 ppm. Under Alternative 3, excavation and replacement of contaminated soils would be performed for an estimated 6,732 residential properties where maximum non-foundation soil lead levels exceed 500 ppm, which is the highest lead concentration in OLS soils that can be effectively treated as demonstrated by the OLS Phosphate Treatability Study. Off-site management or beneficial use of approximately 50 tons of soil per excavated property, or approximately 337,000 tons total, would be required. Treated soils would remain on-site at individual properties where phosphate treatment is applied.

The primary distinction between alternatives involves the reliance upon a proven, conventional approach to remediation involving the excavation and replacement of contaminated soils versus consideration of a promising, yet unproven technology to reduce risks in existing soils to acceptable levels. Phosphate stabilization has been demonstrated in some studies to reduce bioavailability by as much as 50 percent, thereby reducing risks associated with contaminated soils, but the effectiveness of this technology under conditions at the OLS remains uncertain. Soil type and chemistry can be expected to impact the effectiveness of this type of technology. For this reason, a treatability study was conducted to evaluate the short-term effectiveness of this technology applied to OLS. The long-term effectiveness and reliability of phosphate treatment is much less assured than the conventional approach of excavation and soil replacement.

Significant differences also exist between excavation and treatment with regard to management of untreated waste and treatment residuals. Excavation and replacement of contaminated soil requires final management of untreated waste in a disposal cell or possible use as beneficial fill. If treatment is applied to contaminated properties, treated materials would remain at the surface in treated areas. Residual risks associated with direct contact with the treated soil would be reduced through the treatment process to acceptable levels. If the effectiveness of treatment decreased over time, residual risks of treated soil could increase to unacceptable levels. Long-term monitoring of treatment levels would be required to assure the continued effectiveness of the remedy.

The residual health hazard associated with excavated soil would be controlled through engineering controls by any of the final management options. Excavated soils placed in a solid waste landfill or a soil repository constructed for this purpose would be isolated from potential exposure as a result of placement inside a contained facility.

Efforts to date have been unsuccessful in identifying a beneficial use for the excavated materials that has the support of government jurisdictions at the local, state, and federal levels. If a beneficial use of the material cannot be arranged, the excavated soils must be disposed of in an engineered repository or in an existing solid waste landfill.

The construction of a repository or disposal in an existing solid waste landfill has a significant monetary cost. The 2004 OLS FS estimated the cost of final management in a soil repository at approximately $1 per ton, excluding transport and land acquisition. Excavated materials are currently being hauled to a solid waste landfill for use as daily cover at a cost of approximately $15 per ton. Use of the material as beneficial fill avoids costs associated with repository construction or disposal fees, but still involves transportation costs that could potentially be offset by the value of the material as fill.

If proven successful, soil treatment would potentially eliminate future operation and maintenance costs since there would be no future action required to provide long-term protection of the remedy. Although excavation and soil replacement would also avoid operation and maintenance costs for remediated properties, some long-term costs may be associated with operation and maintenance of the soil repository or landfill. Operation and maintenance costs could continue to be incurred in perpetuity. These long-term costs could potentially be avoided if beneficial use of excavated soils could be identified and implemented.

During the 2004 evaluation of alternatives which supported the interim Remedial Action, the cost analysis indicated that the use of soil treatment could result in significant capital cost savings compared to soil excavation and replacement. The 2004 OLS FS estimated the net cost of yard excavation and replacement at $11,000 per property, compared to $3,000 per property for phosphate treatment. However, an updated cost analysis was performed during the 2008 OLS Final FS which indicated that costs had significantly increased for phosphate treatment. While the estimated cost of excavation and soil replacement was increased to $13,000, the estimated cost of phosphate treatment increased to more than $35,000 per property, due in large part to a nearly 500 percent increase in the cost of phosphoric acid. This increased treatment cost results in total capital costs for the Alternative 3 of $356.9 million which significantly exceeds the total capital cost of $235.3 million for Alternative 2. Projected over a ten-year implementation period with a 7 percent discount rate for both action alternatives, the total present worth for Alternative 3 of $250.6 million significantly exceeds the present worth for Alternative 2 of $165.3 million.

Excavation and replacement of contaminated soils is the conventional approach to lead-contaminated soil remediation and uses readily available equipment and standardized procedures. Removal and replacement of lead-contaminated soils is easily implementable and provides immediate protection and permanence by removing hazardous soils to prevent potential human exposure. By comparison, treatment of lead-contaminated residential soils uses an innovative technology for remediating a portion of the contaminated soils, and partially satisfies the CERCLA preference for treatment remedies. However, phosphate treatment has not been applied on a full-scale basis at sites similar to the OLS. Long-term effectiveness and reliability are uncertain with phosphate treatment, and significant short-term risks and implementation challenges may exist for this alternative.

Expected Outcomes of Each Alternative

Both excavation of contaminated soils and successful implementation of phosphate treatment would allow for unrestricted future use of remediated properties. Residential use of these properties could continue under either approach. Both excavation and replacement of contaminated soils and soil treatment are readily implementable.

The time frame to achieve cleanup goals would be similar for both approaches. Excavation, soil replacement, and resodding of a single property can be performed in a period of several days, but one to two weeks of implementation time is typical due to scheduling of contractors. By comparison, soil treatment could take from several days to a week for the soil additions to have their intended effects, after which soil neutralization and resodding would be performed resulting in a typical implementation time of two to three weeks per property. Both approaches to site remediation will take a number of years to implement due to the large number of properties involved. Funding levels would control the number of properties that could be completed each year, which would control the project period. This analysis assumes that funding levels are sufficient to complete either Alternative 2 or Alternative 3 in a period of ten years.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP requires EPA to evaluate selected remedial alternatives considering nine criteria. The nine criteria are grouped into two threshold criteria, five balancing criteria, and two modifying criteria. The two threshold criteria are overall protection of human health and the environment and compliance with ARARs. Generally, alternatives must satisfy the two threshold criteria or they are rejected without further considering the remaining criteria. The five balancing criteria include long-term effectiveness and permanence, reduction in toxicity, mobility, and volume achieved through treatment, implementability, short-term effectiveness, and cost. The two modifying criteria consist of state and community acceptance.

Threshold Criteria

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment is evaluated through a composite of factors and addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, and/or institutional controls.

The No-Action Alternative would not affect existing conditions at the site. The No-Action Alternative does not address any of the identified risks for human health and is not considered protective of human health and the environment.

Protection of human health and the environment is addressed to varying degrees by Alternatives 2 and 3. In excavated areas, Alternatives 2 and 3 both provide a level of protectiveness by removal of contaminated soils from the exposure pathway and replacement with clean soil. Excavation and soil replacement eliminates the risk of exposure through direct contact with lead-contaminated surface soil in remediated areas. Additional protection of human health is provided under Alternatives 2 and 3 through public health education and the lead registry institutional control.

Alternative 3 provides protection through *in situ* treatment for soil lead levels between 400 and 500 ppm by immobilizing lead and reducing its bioavailability. However, the safety and long-term effectiveness of the treatment technology must be demonstrated for lead-contaminated soils at the OLS. The protectiveness of soil treatment is less assured compared to conventional soil excavation and replacement.

The common components of Alternatives 2 and 3 including health education, operation of a local hazardous waste registry, and participation in a comprehensive remedy that addresses all identified lead exposure sources enhance the level of human health protection provided by excavation/replacement and soil treatment. The nine-criteria analysis of Alternatives 2 and 3 will focus on the principal elements of these alternatives. Deteriorating lead-based paint stabilization and interior dust response may affect attainment of the nine criteria, but these actions are considered ancillary to the principal components of excavation/replacement and soil treatment.

Exposure to lead in house dust would potentially be reduced at remediated properties under Alternatives 2 and 3 by providing high-efficiency household vacuum equipment and training and education to participating residents. Primary health education programs under Alternatives 2 and 3 would provide further, ongoing risk reduction for Alternatives 2 and 3.

Change in future land use could present additional risks and threaten protectiveness if adequate controls are not in place to assure that appropriate actions are taken prior to a land use change. Both Alternatives 2 and 3 are protective for residential land use, and soil remediation would be performed under both alternatives for all OLS properties where residential use is presently occurring. If future land use were to change from residential to commercial or industrial, the soil remediation would remain effective since the exposure level would be less under both of these alternate land uses.

Conversely, a change in land use from commercial or industrial to residential could result in unacceptable levels of exposure without effective controls since the EPA remedy addresses only properties that are currently in residential use. Certain commercial or industrial properties which are not a part of the OLS could include exposed soil with elevated lead levels which would be unsuitable for residential use. Local zoning ordinances are in place to prevent future residential use of commercial or industrial properties without appropriate investigation and response to potentially contaminated soils. Change in land use from commercial or industrial to residential would require a zoning change recommended after review by the Omaha Planning Department and passed by the Omaha City Council. New partial residential use at properties currently zoned for commercial or industrial use would require a conditional use permit issued following review by the Omaha Planning Department. The review conducted in both cases by the Omaha Planning Department would include an assessment of data available in the Omaha lead hazard registry, which is operated by the Omaha Lead Hazard Control Program within the City Planning Department. This review would identify the need for soil lead investigation and potential response which would be required prior to the zoning change or issuance of a conditional use permit to allow residential use.

In general, permanence of the different alternatives is potentially similar. Alternative 2 provides permanence through removal and containment of contaminated soils that exceed 400 ppm lead. Alternative 3 provides permanence through a combination of immobilization of phosphate-treated contaminated soils and excavation and soil replacement. However, the permanence of soil treatment would have to be supported by ongoing soil testing to determine if the treatment maintains its effectiveness over time.

Compliance with ARARs

Section 121(d) of CERCLA and the NCP at § 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations which are collectively referred to as ARARs, unless such ARARs are waived under CERCLA § 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the ARARs of other federal and state environmental statutes or provides a basis for invoking a waiver.

A detailed evaluation of ARARs for each alternative is presented in the 2009 OLS Final Feasibility Study. Under certain circumstances, final management of excavated soils must comply with Subtitle D requirements for disposal of solid waste under the Resource Conservation and Recovery Act of 1976 (RCRA). Testing of excavated soil for hazardous waste characteristics has consistently demonstrated that the material can be managed as a nonhazardous solid waste; therefore, Subtitle C requirements under RCRA do not apply to final management of excavated soils. Siting requirements under Nebraska state statutes could control establishment of local soil repository, but no location has yet been identified to serve this purpose. Remediation of individual properties and operation of staging areas for excavated soil comply with stormwater discharge requirements under the National Pollution Discharge Elimination System (NPDES) and Nebraska Title 119 requirements, however these requirements are not directly applicable due in part to the relatively small size of work areas. Fugitive dust emissions from individual properties and staging areas comply with Nebraska Title 129 Air Quality Regulations. Transportation of excavated materials complies with Department of Transportation Hazardous Material Transportation Requirements. Lead hazard regulations under the Department of Housing and Urban Development do not constitute ARARs for the CERCLA response at the OLS, but are in the category of To Be Considered criteria.

Both Alternatives 2 and 3 meet the identified federal and Nebraska ARARs. The No-Action Alternative has no ARARs with which to comply.

Balancing Criteria

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup levels have been met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Alternative 3 reduces risk through a combination of treatment and soil replacement, while Alternative 2 achieves risk reduction through soil replacement only. Alternatives 2 and successful application of Alternative 3 would provide long-term effectiveness for remediated properties. Residual risk levels are greater under Alternative 3 because the phosphate treatment component of this remedy leaves moderate levels of treated lead in yards with maximum mid-yard lead concentrations between 400 and 500 ppm. Soil excavation and replacement are effective engineering controls for properties with maximum non-foundation soil lead levels exceeding 500 ppm under Alternative 3 and for all remediated soils under Alternatives 2. The No-Action Alternative provides no effectiveness for the protection of public health and the environment over the long term.

At some properties, deteriorating lead-based paint on exterior surfaces of structures can threaten the long-term effectiveness and permanence of soil excavation and replacement. If not maintained, exterior lead-based paint can deteriorate and fall to the ground and mix with soils near the foundations following the soil cleanup, thereby increasing the lead concentration in remediated areas. Alternatives 2 and 3 provide for stabilization of deteriorating lead-based paint at properties where EPA determines that the continued effectiveness of the soil remedy is threatened. EPA recognizes that exterior paint stabilization can control the potential for deteriorating lead-based paint to recontaminate remediated soils for some period of time, but that since lead-based paint is not permanently removed from structures, additional maintenance of painted surfaces will eventually be required to protect remediated soils. EPA cannot provide ongoing maintenance of OLS properties in perpetuity, and instead relies upon property owners to assume responsibility for future property maintenance. Recent action by the Omaha City Council to include deteriorating lead-based paint as a nuisance under the Omaha municipal code will help assure continuing maintenance of painted surfaces by property owners, which in turn will help provide long-term effectiveness of soil remediation.

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.

Alternatives 2 and 3 include establishment of a local lead hazard registry which is a form of institutional control. The lead registry provides easily accessible information to community members about potential lead hazards at individual properties. The local lead hazard registry will become a permanent resource for community members, raising awareness, and providing information about conditions at individual OLS properties. EPA anticipates that this institutional control will remain operational following completion of EPA response activities, which helps assure long-term effectiveness and permanence of the final remedy.

In general, permanence of the different alternatives for remediated properties is similar. Alternative 2 provides permanence through complete removal and containment of contaminated soils at or above 400 ppm lead concentrations. Alternative 3 provides permanence through a combination of soil treatment and removal and replacement of excavated soils.

Reduction of Toxicity, Mobility or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. 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 involves no treatment and would not reduce toxicity, mobility, or volume of Site contaminants. Alternative 2 and the excavation component of Alternative 3 do not involve treatment, but would significantly reduce the mobility of the contaminated surface soils during final management due to the engineering features designed to contain the contaminated soils in a soil repository or secure landfill, or use as beneficial fill in a controlled setting.

Alternative 3 is the only alternative that involves treatment, and would reduce the toxicity and mobility of contaminants through phosphate stabilization of soils with lead concentrations between 400 ppm and 500 ppm lead. Alternative 3 uses treatment as a principle element of the cleanup, which is preferable under the CERCLA statute and the NCP. Phosphate stabilization transforms the lead in contaminated soils into a form that is less leachable and less bioavailable. The reduced leachability reduces the mobility of the lead in the environment. The reduced bioavailability lowers the toxicity of site contaminants to exposed individuals.

Excavation and replacement of contaminated soils reduces the mobility of contaminants in residual soils that remain in excavated areas of individual properties by providing a clean soil barrier above the exposed surface of the excavation. This barrier provides physical protection against migration of residual contaminants through erosion or other forces. Soils treated in Alternative 3 remain at the surface and are not afforded this same protection against potential migration.

Short-Term Effectiveness

This criterion addresses the period of time needed to implement the remedy, and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until the cleanup is completed and the final level of protection has been achieved.

Excavation and soil replacement under Alternatives 2 and 3 proceed on a property-by-property basis. The amount of time required to complete excavation and soil replacement at any particular property largely depends on scheduling of contractors and weather conditions. Typically, contaminated soils can be excavated and removed in one to two days. Backfilling of excavated areas can typically be completed in one day or less. Sodding can be accomplished in several hours; however, availability of sod can be affected by wet or freezing conditions. Overall, excavation, backfilling, and sodding can generally be completed within one to two weeks at each property. With multiple crews providing various services, work can progress at a number of properties simultaneously.

The time required to achieve cleanup levels through soil treatment is dependent upon the time required to achieve effectiveness of the treatment technology on site soils. Typically, reagents are tilled into the soil and allowed to remain in place for a period of several days to a week or more until cleanup levels are achieved. Treated soils are then neutralized, if necessary, and resodded. The time required to implement a soil treatment remedy may vary from two to three weeks due to the additional time required for treatment to achieve effectiveness. Soil treatment could proceed at multiple properties simultaneously.

The overall time required to implement each alternative is dependent upon the number of work crews that are deployed to remediate properties simultaneously. With adequate resources at full deployment, it is anticipated that multiple crews could remediate from 1,000 to 2,000 properties per year, using either treatment or soil excavation and replacement. At this rate, remediation of the remaining eligible properties to be addressed under Alternatives 2 and 3 could be completed in five to ten years.

The excavation and soil replacement components of Alternatives 2 and 3 involve short-term risks to Site workers and community members related to use of earth moving equipment on small residential properties and the transport of excavated contaminated soils, clean backfill, and sod along public roadways. Since more material is excavated and transported under Alternative 2, risks to workers, residents, and community members associated with excavation and transport through residential neighborhoods would be somewhat greater than Alternative 3.

Alternative 3 would present an additional risk to site workers handling phosphoric acid and other potentially hazardous reagents during soil treatment activities. This risk would also apply to residents and community members that must avoid contact with the soil reagents. Tanker trucks of phosphoric acid would be transported through public roadways in densely populated neighborhoods. Staging and distribution facilities in these neighborhoods would be required to store and dispense reagents for treatment of individual yards. Contact with low-pH soils during treatment 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 affects 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 additional short-term safety risks to workers involved in rototilling of reagents into soils.

Short-term risks also exist for workers involved in stabilization of deteriorated exterior lead-based paint under Alternatives 2 and 3. Workers are required to adhere to lead-safe work practices to protect themselves and residents/community members from exposure to lead-based paint during stabilization. Stabilization of deteriorated paint poses additional safety risks to workers because of tools used to prepare surfaces for painting and ladders and lift equipment used to access surfaces to be stabilized.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as the availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

All evaluated alternatives are readily implementable once access is granted to enter properties to perform remediation. Excavation, backfilling, sodding, and material transportation are proven and straightforward technologies. Excavation and replacement of contaminated soils is performed using conventional earth-moving equipment and hand tools, and can be readily performed by trained operators and laborers. Similar operations have been underway at the OLS during previous CERCLA removal and remedial response actions beginning in 1999. Coordination with local and state governments has been established.

The treatment portion of Alternative 3 would require additional planning to successfully implement. The procedures for soil treatment are anticipated to be straightforward and readily implementable. 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 OLS, but these could be overcome with proper planning and equipment.

Soil treatment could offer potential implementation advantages relative to excavation and treatment at some properties. Soil excavation and replacement requires heavy equipment that must be transported in and out of residential neighborhoods. Residential properties often do not provide ready access for the types of equipment used to remove and replace soil, and much of the work must be performed by hand. Considerable damage can occur to residential properties through the use of heavy construction equipment even when care is taken to protect property features. Soil treatment typically utilizes smaller, more manageable equipment that is less likely to damage residential properties

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.

Costs associated with Alternative 3 are higher than for Alternative 2, in large part because soil treatment involves the additional cost of soil reagents. Alternative 2 utilizes a straightforward, earthwork approach to soil remediation without additional costs associated with handling and use of soil reagents such as phosphoric acid, potassium chloride, and lime. Additional costs would also be incurred under Alternative 3 for the ongoing soil analysis program that would be required to assure the continued protectiveness of the remedy. The cost of phosphate treatment for an individual property is estimated at $35,000 in the OLS Final FS, compared to a unit cost of $13,000 per property for conventional excavation and soil replacement.

A detailed cost analysis for Alternatives 2 and 3 is presented in the OLS Final FS. The total capital costs for Alternatives 2 and 3 are estimated at $235.3 million and $356.9 million, respectively. The present worth cost for Alternative 2 is estimated at $165.3 million. The present worth cost for Alternative 3 is estimated at $250.6 million. No costs are associated with the No-Action Alternative. Cost summaries for Alternatives 2 and 3 are presented in *Figure 11* and *Figure 12*.

Alternatives 2 and 3 both require final management of excavated soils. The availability of final management options will affect the capital costs of each alternative. The unit cost assumed for excavation and soil replacement in the OLS Final FS includes final management of excavated material. A constructed soil repository for final management of excavated soils would require ongoing operation and maintenance. The 2004 FS estimated the present value of operating and maintaining a soil repository using a 7 percent discount rate over a period of 20 years at approximately $71,000.

Modifying Criteria

State Acceptance

This criterion addresses the state of Nebraska's preferences or concerns about the OLS remedial action alternatives. EPA is the lead agency and has coordinated all Site activities with NDEQ throughout this project. NDEQ has expressed support for a comprehensive approach to lead exposure sources at the Site. NDEQ opposes institutional controls that would place notices or restrictions on individual residential properties. DHHSS also provided comments on the 2008 OLS Proposed Plan. These and the NDEQ comments received are presented and addressed in the attached Responsiveness Summary. A letter of concurrence supporting the selected final remedy for the OLS has been received from NDEQ.

Community Acceptance

EPA encouraged public review and comment on the preferred cleanup by publicly announcing the release and availability of the Final Proposed Plan for the OLS with supporting documents in the Administrative Record. To provide the community with an opportunity to submit written or oral comments, EPA initially released the OLS Final Proposed Plan on October 30, 2008, initiating a public-comment period originally scheduled to end December 1, 2008. Two public meetings were held on November 18, 2008, in north and south Omaha, Nebraska, to present EPA's preferred final remedy for the OLS and respond to questions and receive public comment. Upon receiving requests from members of the public and various stakeholders, EPA extended the public-comment period on two occasions: initially to December 31, 2008, and ultimately to January 15, 2009.

The community generally supports the interim remedy being selected by EPA, although some community members would prefer to see additional resources directed toward a comprehensive lead-risk-reduction program that addresses all sources of lead contamination including lead-based paint. Most community members understand that there are limits to EPA's authority under Superfund, and are supportive of EPA working in concert with other agencies and organizations to implement a comprehensive program addressing all identified sources of lead exposure. Some community members expressed reservations about the safety and long-term effectiveness of soil treatment to address lead contamination. The community strongly desires the cleanup to be completed in as brief a period of time as possible.

PRINCIPAL THREAT WASTES

Principal threat wastes are source materials that require remediation based on toxicity, mobility, and the potential to create unacceptable human health or ecological risks. The principal threat wastes are generally those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, nonprincipal threat wastes are those source materials that can be reliably contained and that would present only a low risk in the event of exposure. Surface soil containing chemicals of concern that are relatively immobile in air or groundwater are generally not considered to constitute principal threat wastes.

Residential soils at the OLS were contaminated through decades of emissions from historic lead-smelting and refining operations. Other sources of lead, including lead-based paint and leaded gasoline, also contribute to total soil lead levels at some OLS properties. Although the lead-contaminated soils can be readily and reliably contained, they do present a very significant risk in the event of exposure. Exposure of young children to a very small amount of contaminated soil can result in an elevated blood lead level exceeding 10 µg/dl. For this reason, lead-contaminated residential soils are considered principal threat wastes at the OLS.

The NCP at § 300.430(a)(1)(iii)(A) establishes a preference for treatment to be used to address principal threat wastes when practicable. Treatment will not be employed for the final remedy for the OLS due to lack of effectiveness demonstrated in the OLS Treatability Study and the uncertainty in the long-term effectiveness of phosphate treatment applied to lead-contaminated soils at the OLS. Phosphate treatment has traditionally been used in other applications to stabilize lead-containing materials prior to disposal. This technology has not been applied to residential properties intended for unrestricted future use. By comparison, excavation and soil replacement involve conventional earthwork technologies that are well-demonstrated and effective for eliminating Site risks present at the OLS.

SELECTED REMEDY

Summary of the Rationale for the Selected Remedy

EPA is selecting Alternative 2, excavation and replacement of soils exceeding 400 ppm, for the final remedy at the OLS. Excavation and soil replacement is a proven, effective approach for remediation of lead-contaminated soils. In contrast, phosphate treatment has not been successfully applied on a large scale for remediation of lead-contaminated soils. The location of the OLS in a densely populated, urban environment including many Environmental Justice communities raises additional concerns about the application of an unproven remediation approach at the OLS. By contrast, excavation and soil replacement has been successfully conducted at the OLS during previous CERCLA removal and remedial response which began in 1999. Implementation of this final remedy will essentially continue the EPA response at the remaining properties with soil lead levels exceeding the final cleanup level for the Site.

The selected remedy also represents the most cost-effective alternative for remediation of lead-contaminated soils at the OLS. The cost of conventional excavation and soil replacement is estimated at $13,000 per property in the OLS Final FS. This cost estimate is based upon contracting experience gained by EPA during site-specific procurement actions for similar work at the OLS. The cost estimated in the OLS Final FS for phosphate treatment exceeds $35,000 per property. This is an estimated cost based on projected labor, material, and equipment necessary to perform the work. Since this technology has not been applied previously to full-scale soil remediation, there is no precedential cost information available for reference. However, more than $15,000 of the cost per property is related to the cost of soil additives including, most significantly, phosphoric acid. It is clear that the cost of phosphate treatment significantly exceeds the cost of conventional excavation and soil replacement. Given the uncertainties associated with the long-term effectiveness of phosphate treatment, and the additional need for soil monitoring to assure the continued effectiveness of the technology, the selected remedy involving excavation and soil replacement represents the most cost-effective alternative for the final remedy at the OLS.

Description of the Selected Remedy

EPA's selected final remedy for the OLS includes the following elements:

- Excavation and Replacement of Soils Exceeding 400 ppm Lead
- Stabilization of Deteriorating Exterior Lead-Based Paint
- Response to Lead-Contaminated Interior Dust
- Health Education
- Operation of a Local Lead Hazard Registry as a type of Institutional Control
- Participation in a Comprehensive Remedy Addressing Identified Lead Exposure Sources

The selected final remedy continues the ongoing remedial response being implemented under the December 15, 2004, Interim ROD for the OLS with the following modifications:

- Under the previous interim remedy, properties were eligible for soil remediation if the maximum non-foundation soil lead level exceeded 800 ppm. Child care centers and properties where children with elevated blood lead levels reside (high child impact properties) were eligible for soil remediation under the interim remedy if the maximum non-foundation soil lead level exceeded 400 ppm. The final remedy for the OLS will lower the soil lead action level, which determines eligibility for soil remediation, to 400 ppm for all residential and residential-type properties. By lowering the soil lead action level to 400 ppm for all residential properties, the distinction between high child impact properties and typical residential properties is no longer necessary to determine eligibility for response. High child impact properties will continue to be prioritized for response.

- Soil sampling will continue to determine eligibility for remedial action at properties inside the Final Focus Area where sampling has not been performed. Due to the low frequency of properties exceeding the final EPA soil lead action level outside the boundary of the Final Focus Area, additional soil sampling will generally be discontinued beyond the Final Focus Area boundary following the final remedy selection and performed only if warranted based on property-specific circumstances. Lead-based paint assessments will continue to be offered at all properties which are eligible for soil remediation, and interior dust wipe sampling will be offered at all properties following soil remediation.

- The preferred alternative includes an institutional control involving the operation of a local lead hazard registry which will contain information about the status of EPA investigation and response and other lead hazards identified at individual Omaha properties. The lead hazard registry will provide access to property-specific lead hazard information both on-line and through the Omaha Lead Hazard Control Program and other agencies and organizations involved in lead hazard control efforts in Omaha. The final remedy includes establishing the lead hazard registry with necessary hardware, software, technical assistance, and personnel to provide for operation through completion of the final remedial action. EPA anticipates that the lead hazard registry will continue to operate following completion of EPA response activities through an alternate funding mechanism.

- The interim remedy included high efficiency interior cleaning at residences where elevated levels of lead were identified in interior dust. Under the final remedy, participating residents at eligible properties will be offered high-efficiency household vacuum equipment, training on maintenance and the importance of proper usage, and education on mitigation of household lead hazards. Interior dust response will be offered on a voluntary basis to residents at properties where soil remediation is performed and interior floor wipe sampling indicates that HUD criteria are exceeded.

Elements of EPA's selected final remedy are described below:

Excavation

The final remedy involves the excavation and removal of soil, backfilling excavated areas with clean soil, and restoring the grass lawn. Excavation will be performed at an estimated 9,966 properties where soil remediation has not been performed under previous response actions. All residential and residential-type properties with a maximum non-foundation soil lead level exceeding 400 ppm will be eligible for soil remediation. High child impact areas, which include child care centers and properties where a child with an elevated blood lead level resides, will be prioritized for remedial action under the final remedy.

Soil will be excavated using lightweight excavation equipment and hand tools in the portions of the yard where the surface soil exceeds 400 ppm lead. Excavation will continue in all quadrants, play zones, and drip zone areas exceeding 400 ppm lead until the residual lead concentration measured at the exposed surface of the excavation is less than 400 ppm in the initial foot, or less than 1,200 ppm at depths greater than one foot. Soils in garden areas will be excavated until reaching a residual concentration of less than 400 ppm in the initial two feet from the original surface, or less than 1,200 ppm at depths greater than two feet. Creation of raised-bed gardens may be considered as an option for remediation of garden areas where removal of contaminated soil to achieve cleanup criteria is not practicable.

EPA estimates that 9,966 residential properties where soil remediation has not been performed will have at least one mid-yard quadrant exceeding 400 ppm soil lead and will become eligible for remedial action under the final remedy. These properties are in addition to the 4,615 properties where soil remediation has been completed under previous EPA response actions. On average, approximately 50 tons of soil have been removed from individual properties to achieve the cleanup goal of 400 ppm. If the tonnage removed per property under the final remedy remains the same, a total of approximately 500,000 tons of lead-contaminated soil would require excavation and disposal. The quantity of soil requiring removal at each individual property under the final remedy may be somewhat reduced since more moderately contaminated soils will be remediated by this action relative to previous response actions which addressed the most highly contaminated properties at the OLS.

After confirmation sampling has verified that cleanup goals have been achieved, excavated areas will be backfilled with clean soil to original grade and a grass lawn will be restored. Clean fill and topsoil will be used to replace the excavated soils, returning the yard to its original elevation and grade. EPA will not utilize soil from any protected Loess Hills area as backfill for the OLS. After the topsoil has been replaced, a grass lawn will be established through sodding. Hydroseeding or conventional seeding may be considered for very large properties such as parks, or for unoccupied properties, in lieu of sodding. Conventional seeding or hydroseeding will be applied at residential properties only at the request of the homeowner and when circumstances assure that a quality grass cover can be effectively established from seed. For example, sod must be used in sloped areas of properties where grass seed would be subject to erosion.

High child impact properties will continue to be prioritized for remedial action under the final remedy. When a child residing within the Site is identified with an elevated blood lead level through the ongoing blood screening program for children, the status of sampling and response at the child's residence will be checked. If sampling results indicate any non-foundation sample exceeding 400 ppm, the property will be prioritized for remedial action.

Soil sampling performed to guide response decisions will be conducted in accordance with procedures described in the Superfund Lead-Contaminated Residential Sites Handbook. Residential yards will be divided into a number of sections and one multi-aliquot composite sample will be collected from each section. The number of sections in each yard will depend upon the size of the yard. For properties less than 5,000 square feet, separate sections will generally be designated for each half of the front yard, each half of the back yard, and the drip zone area surrounding the residence. For properties greater than 5,000 square feet, the lot will generally be divided into sections no larger than approximately 1/4 acre.

At typical residences, a five-aliquot composite sample will be collected from each mid-yard section. A four-aliquot composite sample will typically be collected from the drip zone of the house within 6 to 30 inches from the exterior walls. A separate composite sample will be collected from any play areas or vegetable gardens present on individual properties.

With the exception of certain samples collected for quality control purposes, soil samples will be analyzed for lead content using X-Ray fluorescence spectrography (XRF) instruments. Sampling results will be compared to a 400-ppm-soil-lead action level. If one or more mid-yard sections exceed the appropriate action level, the property will be eligible for EPA response.

In the process of identifying appropriate options for soil remediation at individual properties, the conditions of existing vegetation, the use patterns of the property, and current drainage patterns within and adjacent to a property will be evaluated. Following soil remediation, properties will be restored to preremediation conditions. Installation of landscaping features including mulch, crushed stone, landscaping cloth, sand, wood chips or other forms of vegetation may be considered in remediated areas where grass cover cannot be established.

During remediation activities, clean access to the residence will be provided for residents and visitors at all times. Clean access will provide access to entryways of the home that avoids contact with potentially contaminated soil. Sidewalks will be thoroughly cleaned at the conclusion of each workday to provide as clean an entry as possible to the residence. In the absence of a sidewalk, placement of plywood, pallets, plastic, or other temporary measures may be used to control exposure and prevent tracking of soil into the residence. All residents will be required to stay away from active construction areas during remediation activities. Exposed excavation areas or stockpiled soils will be protected to prevent accidents and exposure.

Water application will be used, as necessary, to minimize the potential for fugitive dust emissions. Application rates will be regulated to control dust during excavation, yet prevent the development of muddy conditions. The objective will be to minimize airborne dust and avoid the production of mud that could be transported off-site on vehicle tires and other mobile equipment. Tank trucks will be used for dust suppression if outdoor faucets and hydrants from private residences and public areas are not available for water supply sources.

Final Management of Excavated Materials

Three options are available under the final remedy for final management of excavated soils. The first option is to transport the contaminated soil to an off-site Subtitle D solid waste landfill for use as daily cover and/or disposal. This option is currently being used for the ongoing interim remedy at the Site.

A second option is to use the soil excavated from the residential yards as beneficial fill in a commercial, industrial, or public works construction project. Lead-contaminated soils at the Site are considered a risk to human health only in residential settings. In certain instances, excavated soils could be safely used as beneficial fill in a controlled setting without creating an unacceptable risk to human health. Constructed engineering features may be necessary to protect filled areas. Coordination with other agencies, particularly at the state and local level, are required for an acceptable beneficial use to be identified and implemented. The value associated with the beneficial use of excavated materials could potentially offset the costs to transport and place the materials, resulting in a cost-effective solution to final management of contaminated soils.

A third option involves constructing an off-site repository on publicly or privately owned land. Significant design and site preparation may be required for construction of the facility. This option is limited by the availability of land and willingness of landowners to maintain such a facility.

Stabilization of Loose and Flaking Exterior Lead-Based Paint

The final remedy continues the exterior lead-based paint stabilization program that was developed and implemented under the interim remedy to protect remediated soils from recontamination that could result from deteriorating exterior lead-based paint. Under the final remedy, the lead-based paint assessment protocol which was presented in the October 2008 Draft Final Lead-Based Paint Recontamination Study Report prepared for the OLS, will be finalized as presented and utilized to determine eligibility for exterior lead-based paint stabilization at properties where soil remediation is performed. If the exterior lead-based paint assessment determines that the continued protectiveness of the soil remediation is threatened by deteriorating exterior lead-based paint, the owner of the property will be offered stabilization of painted surfaces on structures located on the property. Exterior lead-based paint stabilization will be provided on a voluntary basis to homeowners.

Not all homes will be determined to be eligible for stabilization. Only those homes where the lead-based paint assessment determines that the continued effectiveness of soil remediation is threatened will be eligible for paint stabilization. Loose and flaking lead-based paint will be removed from painted surfaces using lead-safe practices, which include wet scraping and collection of paint chips using plastic sheeting. All previously painted surfaces will be primed and repainted. Reasonable efforts will be made to match existing house color, unless the homeowner expresses an alternate preference that does not increase cost.

EPA's preference is to perform lead-based paint stabilization at eligible properties prior to soil remediation. However, soil remediation has been completed at a large number of properties where structures will be eligible for lead-based paint stabilization. Soil remediation was performed at many of these properties before stabilization of lead-based paint was included in the scope of the remedy. Lead-based paint stabilization was added to the EPA response in the December 2004 Interim ROD, and stabilization of properties could not commence until eligibility protocols and criteria were developed. These factors resulted in a significant number of properties where soil remediation was performed prior to lead-based paint stabilization. During the final remedy, EPA will attempt to complete stabilization at remediated properties and to proceed with stabilization at properties prior to soil remediation.

Interior Dust Response

At homes where soil remediation is performed, wipe samples will be collected from floors in accordance with HUD protocol for assessing interior lead hazards. Residences where floor wipe samples exceed appropriate EPA/HUD standards will be eligible for interior dust response. At eligible properties, residents will be provided HEPA-equipped household vacuums and provided training on the importance, use, and maintenance of the HEPA vacuum for interior dust cleaning. Health education will also be provided to residents to inform them of the presence of household lead hazards and measures that can be taken to reduce or control exposure. The interior dust response will be provided on a voluntary basis to residents following soil remediation at properties where wipe sampling has determined eligibility.

Health Education

Due to the presence of a number of identified lead hazards at the OLS, a health education program will be performed to raise awareness and mitigate exposure. An active educational program is ongoing and would be continued under the final remedy in cooperation with agencies and organizations that could include ATSDR, NDHHS, DCHD, local nongovernmental organizations, and other interested parties throughout the duration of the EPA remedial action. The following, although not an exhaustive list, indicate the types of educational activities that may be conducted at the Site:

- Support for in-home assessments for children identified with elevated blood lead levels.
- Development and implementation of prevention curriculum in schools.
- Support for efforts to increase community-wide blood lead monitoring.
- Physicians' education for diagnosis, treatment, and surveillance of lead exposure.
- Operation of EPA Public Information Centers to distribute information and respond to questions about the EPA response activities and lead hazards in the community.
- Use of mass media (television, radio, internet, print media, etc.) to distribute health education messages.
- Development and distribution of informational tools such as fact sheets, brochures, refrigerator magnets, etc., to inform the public about lead hazards and measures that can be taken to avoid or eliminate exposure.

Participation in Comprehensive Program Addressing All Potential Lead Sources

The final remedy at the OLS includes participation with other agencies and organizations in a comprehensive approach directed at addressing all potential lead exposure sources at the Site. EPA is aware that lead in the environment at the OLS originates from many sources. In addition to the soil exposure pathway, other important sources of lead exposure are interior and exterior lead-based paint and lead-contaminated interior dust (originating from soil and other sources), children's toys, cookware, jewelry, imported candies, and others. Typically, sources other than exterior soil lead contamination resulting from historic industrial operations at the OLS would not be addressed by EPA in the course of residential soil lead cleanups. CERCLA and the NCP limit Superfund authority to address interior sources of exposure. CERCLA generally limits EPA's authority to respond to lead-based paint inside a structure or house. However, EPA has authority to conduct response actions addressing deteriorating lead-based paint that threatens the continued effectiveness of soil remediation, and also to address lead-contaminated interior dust which results at least in part from migration of exterior soils to the interior of a structure.

The Office of Solid Waste and Emergency Response (OSWER) policy recommends against using money from the Superfund Trust Fund to address interior lead-based paint exposures, and recommends that actions to control or abate interior lead-based paint risks be addressed by others such as HUD, local governments, health authorities, PRPs, private organizations, or individual homeowners. OSWER policy also recommends against using money from the Superfund Trust Fund to remove interior dust solely from lead-based paint or to replace lead plumbing within residential dwellings, and recommends that the EPA Regions seek partners to address these other lead exposure risks.

Controlling alternate lead exposure sources will not affect the remedial action determined to be necessary to control risk associated with contaminated residential soils at the OLS. EPA policy specifically directs that soil cleanup levels should not increase as a result of any action taken to address other sources of lead exposure.

EPA acknowledges the importance of addressing these other exposures in realizing an overall solution to the lead problems at residential Superfund sites. The EPA is committed to partnering with other organizations such as ATSDR, HUD, state environmental departments, state and local health departments, private organizations, PRPs, and individual residents, and to participate in a comprehensive lead-risk reduction strategy that addresses lead risks from all potential lead-exposure sources. EPA can perform assessments of these other lead hazards as part of the investigative activities and can provide funds to support health education efforts to reduce the risk of lead exposure in general.

Institutional Controls

An institutional control in the form of a local lead hazard registry is included in the final remedy to help assure the continued protectiveness of properties remediated in accordance with this ROD. The lead hazard registry will provide interested parties with on-line access to lead hazard information at individual properties which includes the status of EPA investigations and response actions and other lead hazard information including HUD-funded lead hazard control and abatement activities. Information available through the lead hazard registry will include initial soil lead sampling results from individual quadrants and residual soil lead levels remaining at properties following soil remediation. EPA will notify residents and property owners about the information that is available through the lead hazard registry as part of the transmittal sent at the completion of soil remediation at individual properties. Residents and property owners will receive a second notification when the lead hazard registry is complete and fully operational at the conclusion of the OLS remedial action. The final notification will describe information available through the lead hazard registry and again advise property owners that records of potential lead hazards received from EPA should be retained for compliance with state and Federal disclosure requirements.

EPA intends to sample all residential properties in the Final Focus Area and to perform soil remediation at those properties that are determined to be eligible on the basis of this soil sampling. EPA will make best efforts to obtain voluntary access to perform soil sampling and soil remediation at eligible properties from property owners. In the event EPA is unable to secure voluntary access to perform soil sampling or soil remediation, EPA intends to advise property owners of CERCLA authority which allows EPA to take these actions without owner consent, and of EPA's strong preference to perform work under voluntary access. In some instances when voluntary access cannot be obtained, EPA may elect to use CERCLA enforcement authority to obtain access for EPA to take necessary actions to protect human health and the environment. At the conclusion of the remedial action at the OLS, EPA anticipates that soil sampling and remediation will be completed at all eligible properties which would eliminate the need for permanent restrictions on use of properties or other forms of institutional controls beyond the lead hazard registry to assure protection of human health. If EPA is unable to perform soil sampling and/or any necessary remedial action at certain properties, the need for additional institutional controls to restrict use or control potential exposure may be reassessed. The potential need for additional institutional controls will be evaluated during implementation of the final remedy in an Institutional Control and Assurance Plan (ICIP).

Excavated soils are currently transported to a RCRA Subtitle D land disposal facility where they are disposed of or used for daily cover. The operating permit and closure plan for the landfill will assure that the excavated materials continue to be managed properly. If an alternate final management strategy becomes available for excavated material involving construction and operation of a soil repository or use of excavated materials for beneficial fill, institutional controls may be required to control future land use at the site of the final management facility.

At this time, it is not possible to anticipate the precise need for institutional controls, or the type of institutional controls that may be deemed appropriate under these circumstances. These potential institutional control requirements, and other presently unforeseen needs for institutional controls, will be assessed in the event that they arise during implementation of the final remedy.

Stabilization of deteriorating exterior lead-based paint and interior dust response will be offered to owners of eligible properties on a voluntary basis. EPA does not intend to consider the use of CERCLA enforcement authority to perform these actions in the event that property owners elect not to participate in these programs. Institutional controls will not be imposed on remediated properties where assessment and/or implementation of lead-based paint stabilization or interior dust response is not performed.

Summary of the Estimated Remedy Costs

Capital costs associated with implementation of the final remedial action are presented in *Figure 13*.

The information in this cost summary table is based on the best available information regarding the anticipated scope of the selected remedial action. Changes in the cost elements are likely to occur as a result of new information and data collected during the design and implementation of the remedial alternative. Major changes, if they arise, may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences (ESD), or an amendment to this ROD. This is an order-of-magnitude engineering cost estimate that is expected to be accurate within +50 to -30 percent of the actual project cost.

A present worth analysis was performed to evaluate a project duration of ten years. *Figure 14* projects the present value costs associated with implementation of the selected remedial action over a ten-year period. Capital costs are divided evenly between years for this analysis. Actual distribution of funding requirements may vary due to fiscal scheduling, contracting strategies, or other considerations.

Expected Outcomes of the Selected Remedy

The selected remedy will provide human health protection at individual remediated properties and within the overall Omaha community. EPA has demonstrated an achievable pace of performing soil remediation at 1,000 properties per year. With adequate funding, EPA believes lead-based paint stabilization and interior dust response can also be completed at this pace. At this pace, approximately ten years will be required to complete remedial action at the estimated 10,000 properties eligible for future response under the OLS final remedy. Human health protection from lead-contaminated soils would be provided under the final remedy for 1,000 individual properties per year for ten years. Increased funding levels could increase the number of properties completed per year and reduce the total project period.

The purpose of the remedial action is to control risks posed by direct contact with lead-contaminated soil and dust. The results of the Final Baseline Human Health Risk Assessment indicate that individual children or groups of similarly exposed children at the OLS are at risk of developing elevated blood lead levels exceeding 10 µg/dL if exposure to soil lead levels exceeding 400 ppm is not controlled or eliminated. This remedy will remove and replace soils exceeding 400 ppm in the upper 12 inches at residential OLS properties, which will reduce the risk of exposure of young children to lead in outdoor yard surface soil such that the IEUBK model predicts there is no greater than a 5 percent chance an individual child, or group of similarly exposed children, will develop a blood lead concentration exceeding 10 Φg/dL. Excavation will continue until reaching a residual soil lead level of less than 400 ppm in the upper 12 inches of soil, or less than 1,200 ppm at depth greater than 12 inches. Soil remediation performed under the selected remedy, in combination with a local lead hazard registry and health education, will assure protection of human health at remediated properties, and at all properties within the OLS upon completion of remedial action.

Implementation of the final remedy will result in a positive socioeconomic impact within the OLS. Negative effects on quality of life and property values resulting from the impact of former lead-smelting and refining operations will be relieved by the selected remedy. The implementation of remedial action will benefit the impacted community, creating hundreds of jobs and service-related income for many residents over a period of years in economically disadvantaged areas within the OLS.

Concurrent with the selected remedy, the EPA will work with other parties to implement a comprehensive program to address lead exposure hazards in media that are beyond CERCLA authority. EPA will participate in a comprehensive program to the limit of CERCLA authority to address all potential lead exposure sources in the community and will work with other agencies, organizations, and interested parties to identify resources and mechanisms to address identified exposure sources.

STATUTORY DETERMINATIONS

EPA's primary legal authority and responsibility at Superfund sites is to conduct response actions that achieve protection of human health and the environment. Section 121 of CERCLA also establishes other statutory requirements and preferences that include compliance with federal and state applicable or relevant and appropriate requirements (ARARs), cost effectiveness, and the use of permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable. Additionally, the statute includes a preference for remedies that utilize treatment to reduce the mobility, toxicity, and volume of contaminants. The following sections discuss how the selected alternative meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy will protect human health and the environment at remediated properties by achieving the Remedial Action Objectives through conventional engineering controls, institutional controls, and health education. Risks associated with lead-contaminated soils at the Site are caused by the potential for direct contact with contaminated soils. The selected remedy controls this direct exposure pathway through excavation and replacement of lead-contaminated soils at the residential properties. Protectiveness of soil excavation and replacement is enhanced through a public health education program and an institutional control in the form of a local lead hazard registry. The implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts.

Compliance with ARARs

In general, selected remedies should comply with ARARs unless waivers are granted. The selected remedy is expected to meet all chemical-, action-, and location-specific ARARs and does not involve any waivers. A comprehensive list of chemical-specific ARARs identified in the OLS Final FS is presented in *Figure 15.* Location-specific ARARs for the OLS are presented in *Figure 16*, and action-specific ARARs for the OLS are presented in *Figure 17.* Key ARARs are discussed below.

<u>Chemical Specific ARARs – To Be Considered Criteria</u>

- Lead-Based Paint Hazard Regulations: Residential Lead-Based Hazard Reduction Act, 42 U.S.C. Section 4851 <u>et</u> <u>seq</u>.; Toxic Substances Control Act, 15 U.S.C. Section 2601 <u>et</u> <u>seq</u>.; Lead-Based Paint Hazard Regulations, 40 CFR Part 745.

These statutes and regulations identify lead-based paint hazards in various media. Pursuant to the Superfund Lead-Contaminated Residential Sites Handbook, the regulations defining lead-based paint hazards do not constitute ARARs for CERCLA remedy selection, but are used as "To Be Considered" criteria. For interior dust response under the final remedy, floor dust wipe sample levels will be compared to lead levels found in 40 CFR Part 745.65. These regulations identify a level of concern of 40 micrograms/square foot (ug/ft^2) for lead in wipe samples collected from floor surfaces inside homes. Although the regulations also identify soil lead levels that represent a lead-based paint hazard, site-specific soil cleanup levels are developed and utilized at CERCLA sites using the IEUBK model in accordance with EPA policy.

- Superfund Lead-Contaminated Residential Sites Handbook (OSWER Directive 9285.7-50), August 2003.

- EPA Revised Interim Soil Lead Guidance For CERCLA Sites And RCRA Corrective Action Facilities, August 1994, and 1998 Clarification, OSWER Directive 9355.4-12, August 1994, and OSWER Directive 9200,2-27P, August 1998.

These guidance documents recommend using the Integrated Exposure Uptake Biokinetic Model (IEUBK) on a site-specific basis to assist in developing cleanup goals.

Location-specific ARARs

- The Endangered Species Act (16 U.S.C., section 1531, 50 CFR part 200, 30 CRF Part 402).

No federal or threatened and endangered species have been identified at the Site to date.

- The National Historic Preservation Act (16 U.S.C.), and the regulation at 33 CFR part 800.

No affected properties have been identified to date that are eligible for or included on the National Register of Historic Places.

- The National Archeological and Historic Preservation Act (16 U.S.C., and 36 CFR part 65).

These requirements provide for recovery and preservation of artifacts which may be discovered during implementation of response actions. No such items have been identified to date.

- Protection of Wetlands, Executive Order 11990; 40 CFR, part 6, appendix A.

The remedial action will be designed to avoid adversely impacting wetlands wherever possible including minimizing wetlands destruction and preserving wetland values.

- Protection of Floodplains, Executive Order 11988: 40 CFR part 6, appendix A.

If a repository is constructed, it will be designed to avoid adversely impacting any floodplain areas and consider flood hazards and floodplain management.

Action-Specific ARARs

- Subtitle D of the Resource Conservation and Recovery Act (RCRA), Section 1008, section 4001, et seq., 42 U.S.C. 6941, et seq., State or Regional Solid Waste Plans and implementing federal and state regulations.

All excavated soil disposed of in a sanitary landfill will comply with Subtitle D requirements. If other disposal alternatives are used, Subtitle D of RCRA may be applicable.

- Occupational Safety and Health Act, 29 CFR part 1910 will be applicable to all actions.

- Subtitle C of RCRA, 42 U.S.C. section 6901, et seq., 40 CFR part 260, et seq. and implementing federal and state regulations for contaminated soils that exhibit the characteristic of toxicity and are considered RCRA hazardous waste.

Subtitle C of RCRA is potentially applicable for the removal of soils contaminated with heavy metals, particularly if these soils exceed the TCLP regulatory threshold. Any wastes exceeding the TCLP regulatory threshold will undergo treatment on-site in accordance with the substantive requirements of RCRA before being transported to a sanitary landfill or a repository. Wastes will not be stored on site for longer than 90 days after excavation. To date, no excavated soils have failed TCLP analysis.

- Department of Transportation (DOT) regulations, 49 CFR parts 107, 171-177.

DOT hazardous material transportation regulations are applicable for transportation of the contaminated soils to the current disposal facility.

- Clean Water Act, Stormwater Runoff Requirements, 40 C.F,R. part 122.26.

If the construction work at a property requires excavation resulting in a land disturbance of greater than 1 acre and less than 5 acres, then the stormwater runoff requirements may be applicable and the substantive stormwater requirements must be met to prevent erosion, including best management practices. EPA anticipates this situation to arise infrequently, if at all, because most of the properties affected by this action will require work on less than an acre of land.

In addition, if a repository is constructed for final management of excavated soil, compliance with these regulations will be required during construction and management of the repository.

- The Lead Safe Housing Rule, 24 CFR part 35.

While these regulations only apply to federally owned property or housing receiving federal assistance, it may be relevant and appropriate to apply these regulations when addressing exterior lead-based paint on a property to prevent the recontamination of the soil when a soil cleanup is being performed.

`The state of Nebraska identified the following ARARs:

- Title 129 - Nebraska Air Quality Regulations

- Title 128 - Rules and Regulations Governing Hazardous Waste Management in Nebraska

- Title 132 - Integrated Solid Waste Management Regulations

- Title 119 - Rules and regulations Pertaining to the National Pollutant Discharge Elimination System

- Title 178 - Chapter 23, Nebraska Rules on Lead-Based Paint Activities.

Action-Specific ARARs - To Be Considered Criteria

EPA Guidance, Renovate Right. Important Lead Hazard Information for Families, Child Care Providers, and Schools, EPA-740-F-08-002, March, 2008.

It may be appropriate to consider this guidance when addressing exterior lead-based paint on a property to prevent the recontamination of the soil when a soil cleanup is being performed

- Nebraska Voluntary Cleanup Program (VCP) Remediation Goals.

The Nebraska VCP remediation goals include a cleanup level of 400 ppm for lead in soil for residential exposures based on EPA's IEUBK model.

Cost Effectiveness

The selected remedy is a cost-effective, permanent solution to lead-contaminated residential soils at the Site. Excavation and replacement of contaminated soils has the highest level of short- and long-term effectiveness and permanence of the alternatives evaluated. Treatment technologies evaluated for this remedy have significantly higher costs and have not been demonstrated to assure long-term effectiveness and permanence for remediation of residential soils at this time. Although not achieved through treatment, the selected remedy does result in reduced mobility of site contaminants through engineering controls. The selected remedy relies on conventional engineering methods that are easily implemented. Contaminated soils are removed and replaced, thereby providing a permanent remedy for remediated soils that will not be subject to future costs associated with residual risks.

Utilization of Permanent Solutions and Alternate Treatment Technologies

The selected remedy utilizes a well-demonstrated approach to remediation of contaminated soils that will provide a permanent remedy for remediated soils. Removal and replacement of contaminated soils permanently removes Site contaminants as a potential source of exposure. No alternate treatment technologies were identified that have been demonstrated to provide long-term effectiveness at this time. The selected remedy best satisfies the statutory mandates for permanence and treatment.

The selected remedy ensures long-term effectiveness and permanence through removal and replacement of contaminated soils. Treatment technologies evaluated for the OLS final remedy have not demonstrated long-term effectiveness and permanence, and have not been applied full scale at any CERCLA site. Although toxicity and volume of contaminated soils is unchanged by the final remedy, the mobility of contamination is reduced by the final remedy through final management of excavated soils. The treatment alternative evaluated in the final remedy selection is intended to reduce the mobility and toxicity of lead contamination through phosphate stabilization, although the long-term effectiveness of the evaluated treatment technology has not been demonstrated. Both action alternatives evaluated can be implemented in similar time periods, and both have short-term risks associated with use of heavy earth-moving equipment on small residential properties and transportation of materials and equipment through densely populated neighborhoods.

EPA has concluded that the selected remedy is protective, compliant with ARARs, cost-effective, and provides the best balance of trade-offs for utilizing permanent solutions and alternative treatment technologies to the extent practicable for the Site.

Preference for Treatment as a Principal Element

The selected remedy does not utilize treatment as a principal element. A treatability study was performed to evaluate the potential short-term effectiveness of various treatment approaches for reducing the toxicity of lead-contaminated soils at the OLS. The Treatability Study demonstrated that even the most effective treatment method resulted in limited reduction in lead bioavailability in OLS soils. The long-term effectiveness and permanence of the treatment results have not been demonstrated. The selected remedy does not satisfy the statutory preference for treatment as a principal element due the lack of proven effectiveness and permanence of the treatment alternatives evaluated. The selected remedy will reduce the mobility of contaminants of concern at the Site and control the potential for future exposure through removal and final management in a facility providing containment through engineering controls.

Five-Year Review Requirements

After remedial action, the vast majority of properties will allow for unlimited use and unrestricted exposures and will not be subject to a five-year review requirements. Properties will be subject to the statutory five-year review requirement where the action or cleanup levels are exceeded. In addition, a policy review will be conducted at least once every five years to ensure that the local lead hazard registry is being maintained on all properties at the OLS with property-specific information. An Institutional Control and Assurance Plan (ICIP) will be developed during implementation of the final remedy to assess the need for additional institutional controls that may arise at certain OLS properties. The ICIP will specifically include a provision that requires periodic review of the operational status and effectiveness of the lead hazard registry and land use changes. Prior to completion of the remedial action, non-remediated OLS properties where soil remediation has not yet been performed with soil lead levels that do not provide for unlimited use and unrestricted exposure will be subject to periodic five-year reviews in accordance with section 121 (c) of CERCLA and the NCP § 300.430(f)(5)(iii)(C).

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the final remedy at the OLS was released for public comment in October 2008. The Proposed Plan identified Alternative 2 as the preferred alternative for soil remediation. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as identified in the Proposed Plan, were necessary or appropriate.

FIGURES

Figure 1
OLS Locator Map

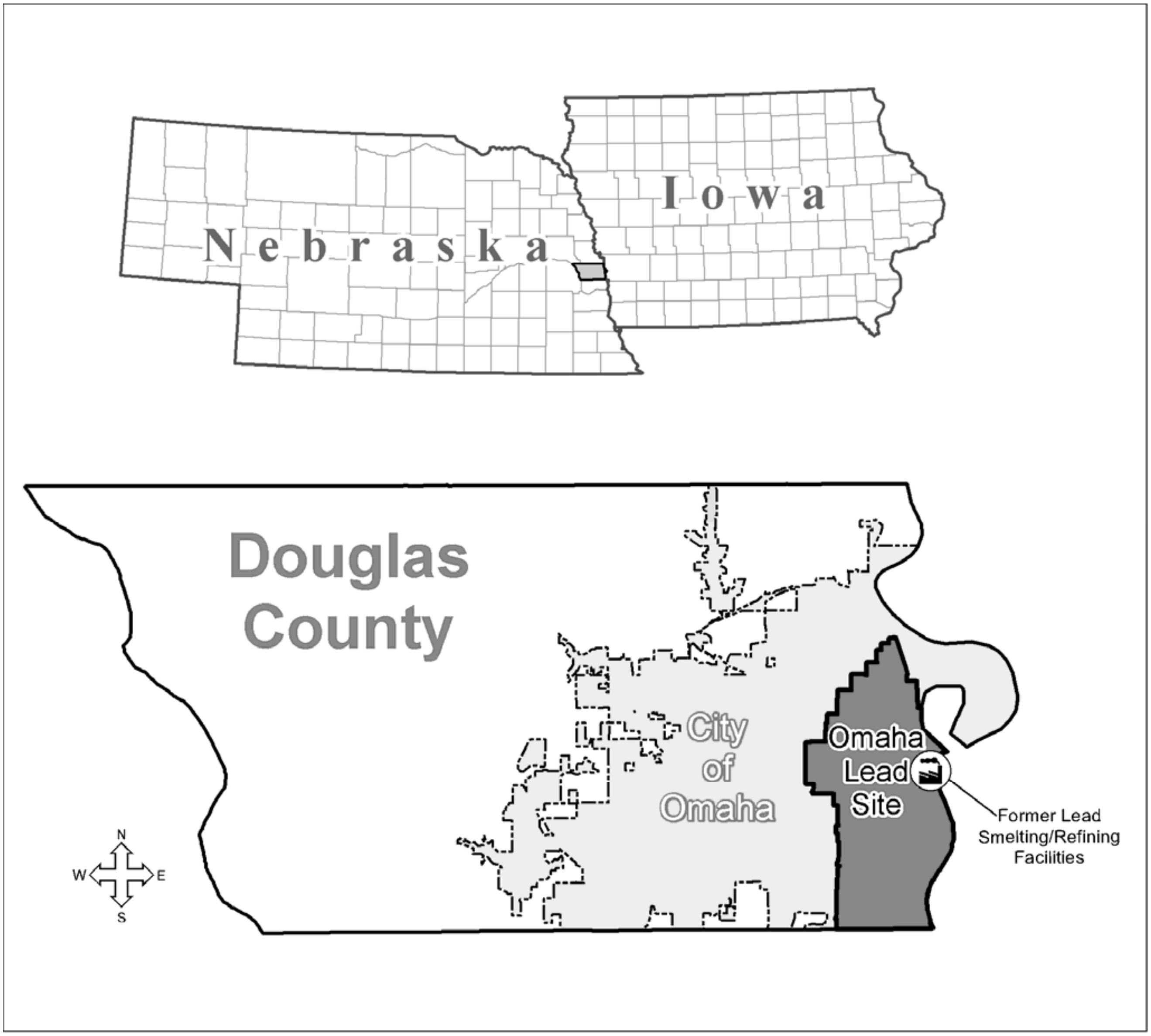


Figure 2
Boundary of Final Focus Area

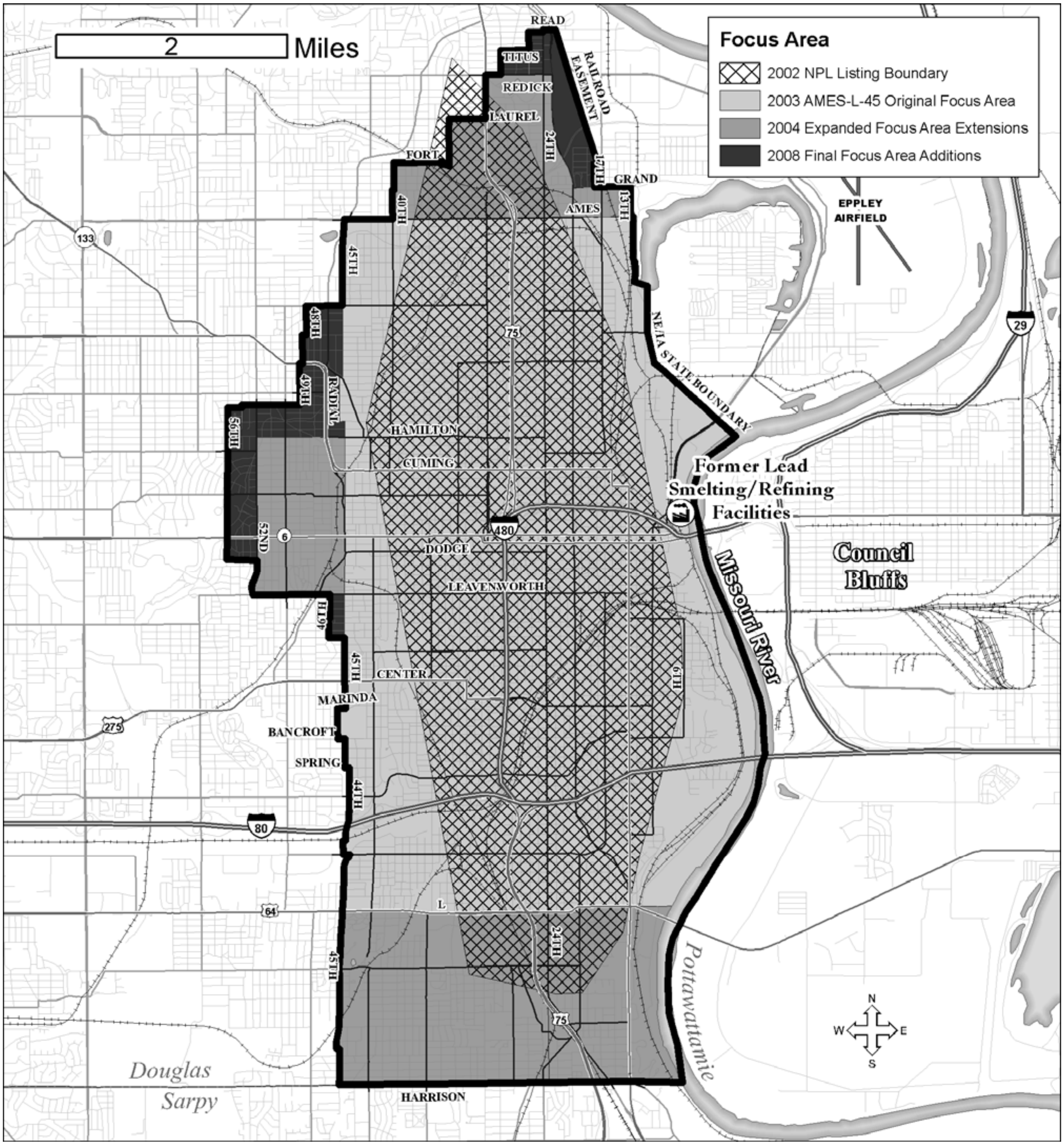


Figure 3
Missouri River Flood Plain

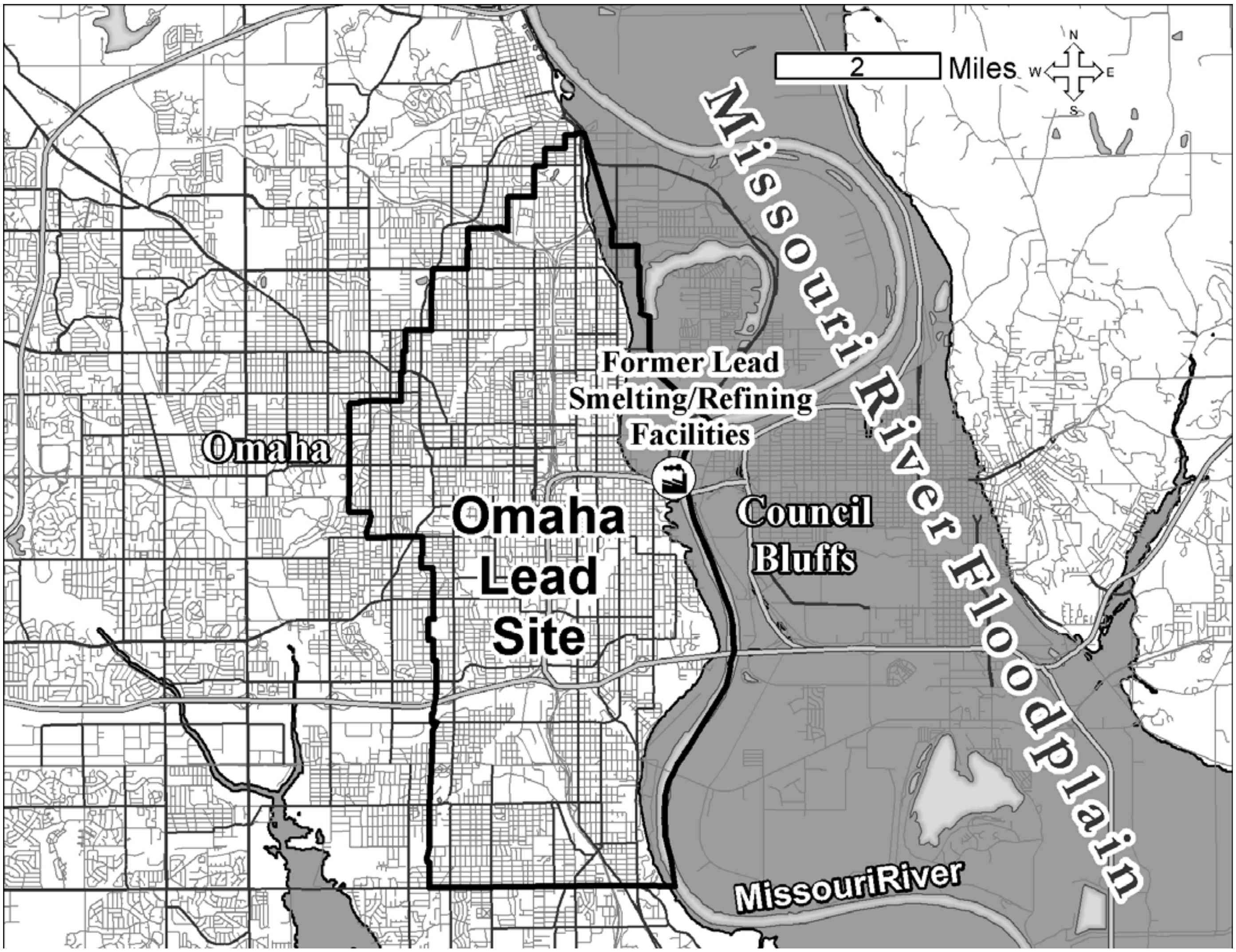


Figure 4
OLS Final Focus Area

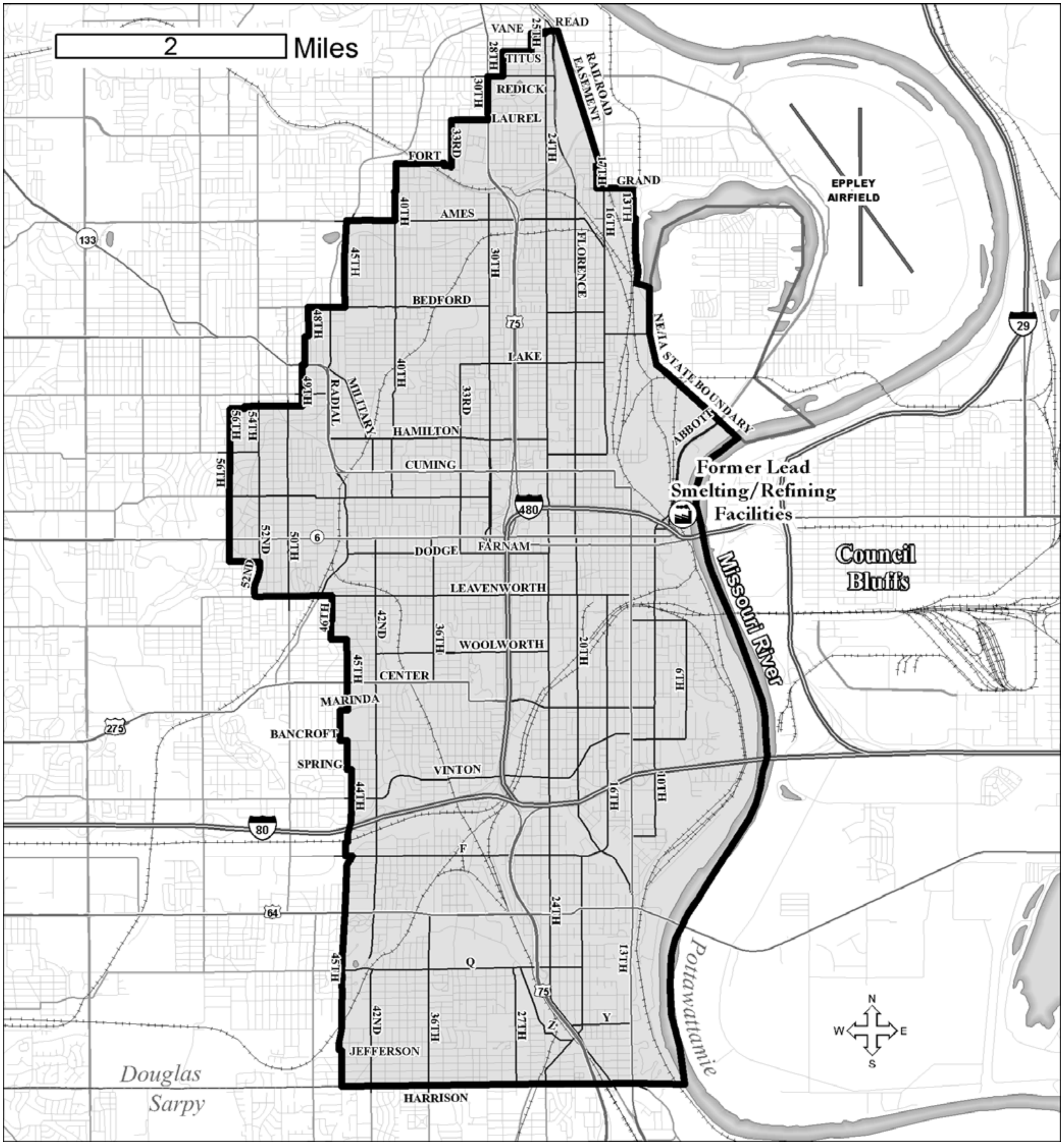
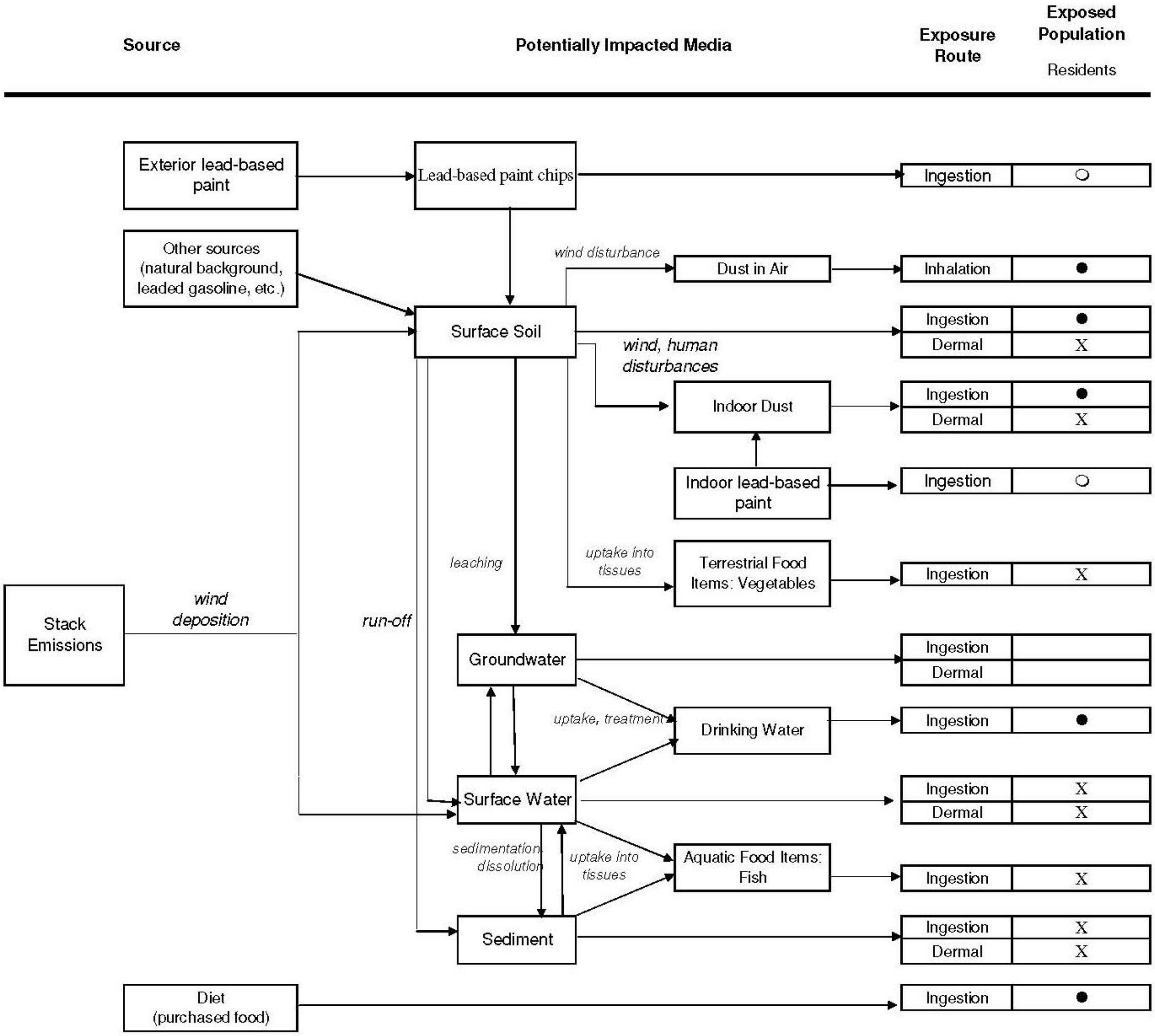


Figure 5
Conceptual Site Model



LEGEND

●	Pathway is complete and might be significant; sufficient data are available for quantitative evaluation
○	Pathway is complete and might be significant; insufficient data are available for quantitative evaluation
X	Pathway is or may be complete, however, risk is low or data are lacking. Qualitative evaluation only.
	Pathway is not complete; no evaluation required

Figure 6
Eastern Omaha Zip Code Boundaries

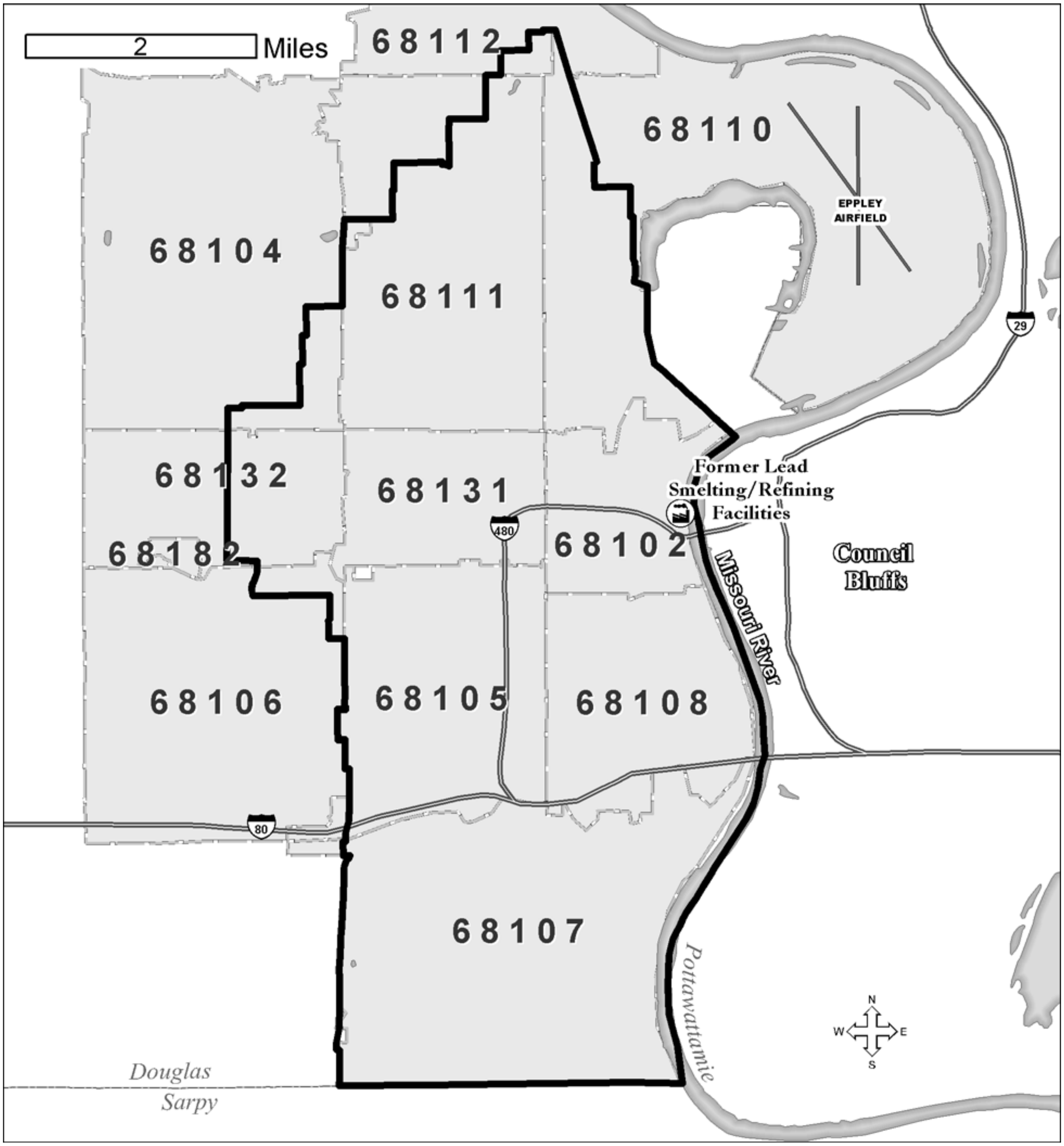


Figure 7

Table 1. OLS Non-Foundation Soil Lead Concentrations, parts per million (ppm)		
Concentration Range	Number of Properties	Percentage of total properties
> 5,000	77	0.23 percent
2,000 - 5,000	532	1.6 percent
1,200 – 2,000	1,197	3.5 percent
800 – 12,000	2,296	6.7 percent
400 – 800	8,369	24.5 percent
< 400	21,746	63.6 percent

Table 2. OLS Non-Foundation Soil Lead Level Exceedences, parts per million (ppm)		
Concentration Range	Number of Properties	Percentage of total properties
> 5,000	77	0.23 percent
>2,000	609	1.8 percent
>1,200	1,806	5.3 percent
>800	4,102	12.0 percent
>400	12,471	36.4 percent

Figure 8
Summary of Risks to Child Residents (0-84 months)
From Lead Exposure to Lead in Surface Soil

ZIP CODE	NUMBER OF PROPERTIES EVALUATED	ESTIMATED NUMBER AND PERCENT OF PROPERTIES WITHIN THE SPECIFIED P10 RANGE					TOTAL NUMBER AND PERCENT OF PROPERTIES WHERE P10 EXCEEDS 5%
		≤ 5%	>5% to ≤10%	>10% to ≤20%	>20% to ≤50%	>50%	
68102	71	45	6	9	11	0	26
		63%	8%	13%	15%	0%	37%
68104	27	21	3	3	0	0	6
		78%	11%	11%	0%	0%	22%
68105	4,953	3,585	518	463	343	44	1,368
		72%	10%	9%	7%	1%	28%
68106	165	147	7	7	3	1	18
		89%	4%	4%	2%	1%	11%
68107	7,069	5,762	587	424	258	38	1,307
		82%	8%	6%	4%	1%	18%
68108	3,324	1,468	499	653	625	79	1,856
		44%	15%	20%	19%	2%	56%
68110	2,170	1,011	332	384	381	62	1,159
		47%	15%	18%	18%	3%	53%
68111	7,295	5,422	766	634	421	52	1,873
		74%	11%	9%	6%	1%	26%
68112	162	115	17	20	8	2	47
		71%	10%	12%	5%	1%	29%
68117	2	2	0	0	0	0	0
		100%	0%	0%	0%	0%	0%
68131	1,955	1,019	286	312	269	69	936
		52%	15%	16%	14%	4%	48%
68132	1,285	848	156	142	110	29	437
		66%	12%	11%	9%	2%	34%
ALL	28,478	19,445	3,177	3,051	2,429	376	9,033
		68%	11%	11%	9%	1%	32%

P10 = Probability of exceeding a blood lead value of 10 µg/dL (%).

Figure 9
Summary of Non-Cancer Hazard Quotients

Panel A. CTE Receptor

ANALYTE	TOTAL NUMBER OF PROPERTIES	NUMBER OF PROPERTIES WITHIN THE SPECIFIED RISK RANGE — Non-Cancer Hazard Quotient (HQ) for Ingestion and Dermal Exposure — Child				Adult			
		≤1	2 - 5	>5	Max	≤1	2 - 5	>5	Max
Aluminum	219	214	0	0	0.08	214	0	0	0.01
Antimony	2,843	2,843	0	0	0.9	2,843	0	0	0.09
Arsenic	3,046	2,970	71	5	8	3,046	0	0	0.8
Cadmium	3,046	3,046	0	0	0.06	3,046	0	0	0.01
Cobalt	214	214	0	0	0.2	214	0	0	0.02
Chromium III	3,046	3,046	0	0	0.001	3,046	0	0	0.0001
Chromium VI	3,046	3,046	0	0	0.08	3,046	0	0	0.01
Copper	214	214	0	0	0.1	214	0	0	0.02
Iron	214	214	0	0	0.3	214	0	0	0.03
Manganese	219	214	0	0	0.1	214	0	0	0.01
Mercury	2,832	2,830	1	1	6	2,832	0	0	0.6
Thallium	3,046	3,040	6	0	4	3,046	0	0	0.4
Vanadium	214	214	0	0	0.04	214	0	0	0.00
Zinc	27,737	27,737	0	0	0.1	27,737	0	0	0.01

Panel B. RME Receptor

ANALYTE	TOTAL NUMBER OF PROPERTIES	NUMBER OF PROPERTIES WITHIN THE SPECIFIED RISK RANGE — Non-Cancer Hazard Quotient (HQ) for Ingestion and Dermal Exposure — Child				Adult			
		≤1	2 - 5	>5	Max	≤1	2 - 5	>5	Max
Aluminum	219	214	0	0	0.2	214	0	0	0.03
Antimony	2,843	2,841	2	0	2.5	2,843	0	0	0.3
Arsenic	3,046	2,736	253	57	24	3,038	8	0	3
Cadmium	3,046	3,046	0	0	0.2	3,046	0	0	0.02
Cobalt	214	214	0	0	0.5	214	0	0	0.1
Chromium III	3,046	3,046	0	0	0.003	3,046	0	0	0.0003
Chromium VI	3,046	3,046	0	0	0.2	3,046	0	0	0.03
Copper	214	214	0	0	0.4	214	0	0	0.04
Iron	214	214	0	0	0.8	214	0	0	0.1
Manganese	219	214	0	0	0.3	214	0	0	0.04
Mercury	2,832	2,829	1	2	17	2,831	1	0	1.8
Thallium	3,046	3,029	16	1	11	3,046	0	0	1.1
Vanadium	214	214	0	0	0.1	214	0	0	0.01
Zinc	27,737	27,737	0	0	0.4	27,737	0	0	0.04

Figure 10
Summary of Estimated Excess Cancer Risk from Arsenic

ZIP CODE	NUMBER OF PROPERTIES EVALUATED	ESTIMATED NUMBER AND PERCENT OF PROPERTIES WITHIN THE SPECIFIED RISK RANGE							
		Estimated Excess Cancer Risk from Ingestion and Dermal Exposure							
		CTE				RME			
		≤1E-06	>1E-06 to ≤1E-05	>1E-05 to ≤1E-04	>1E-04	≤1E-06	>1E-06 to ≤1E-05	>1E-05 to ≤1E-04	>1E-04
68102	6	1	5	0	0	0	1	5	0
		17%	83%	0%	0%	0%	17%	83%	0%
68104	7	1	5	1	0	0	1	5	1
		14%	71%	14%	0%	0%	14%	71%	14%
68105	466	49	373	44	0	1	51	372	42
		11%	80%	9%	0%	0%	11%	80%	9%
68106	33	6	22	5	0	0	6	23	4
		18%	67%	15%	0%	0%	18%	70%	12%
68107	800	94	674	32	0	0	105	664	31
		12%	84%	4%	0%	0%	13%	83%	4%
68108	276	15	257	4	0	0	15	257	4
		5%	93%	1%	0%	0%	5%	93%	1%
68110	259	15	241	3	0	0	16	240	3
		6%	93%	1%	0%	0%	6%	93%	1%
68111	800	69	697	34	0	0	79	690	31
		9%	87%	4%	0%	0%	10%	86%	4%
68112	6	0	5	1	0	0	0	5	1
		0%	83%	17%	0%	0%	0%	83%	17%
68131	172	19	145	8	0	0	24	140	8
		11%	84%	5%	0%	0%	14%	81%	5%
68132	221	15	188	18	0	1	20	184	16
		7%	85%	8%	0%	0%	9%	83%	7%
ALL	3046	284	2612	150	0	2	318	2585	141
		9%	86%	5%	0%	0%	10%	85%	5%

Figure 11
Cost Summary for Alternative 2-Evacuation and Disposal
Omaha Lead Site

Cost Estimate Component	Quantity	Unit Cost	Total Price
Mobilization	1	$50,000	$50,000
Obtain Soil and LBP Access/Soil Sampling	5,210	$400	$2,084,000
Property Access/Indoor Dust Wipe Sampling	7,160	$100	$716,000
Material Movement (excavation, transport, backfill, dust suppression, and sodding)	9,966	$13,000	$129,558,000
Post Cleanup Reports	9,966	$100	$996,600
Paint Assessment	11,683	$210	$2,453,430
Exterior Lead-based Paint Stabilization	5,522	$4,000	$22,088,000
Purchase/Instructions - HEPAVAC	1,432	$440	$630,080
Preparation of Health and Safety Plan	40	$100	$4,000
Preparation of QA/Sampling Plan	60	$100	$6,000
Contingencies/Design/Permitting/Construction Services			$71,463,000
Subtotal			$230,049,110
Establish/Maintain Information Registry for 10 years	10	$100,000	$1,000,000
Public Health Education for 10 years	10	$250,000	$2,500,000
Maintain 2 Public Information Centers for 10 years	10	$156,000	$1,560,000
Information dissemination via Mass Media for 10 years	10	$150,000	$1,500,000
Subtotal			$6,560,000
Total			$236,609,110
TOTAL PRESENT WORTH COST			$165,213,000

Figure 12
Cost Summary for Alternative 3-Evacuation and Disposal
Omaha Lead Site

Cost Estimate Component	Quantity	Unit Cost	Total Price
Mobilization	1	$50,000	$50,000
Obtain Soil and LBP Access/Soil Sampling	5,210	$400	$2,084,000
Property Access/Indoor Dust Wipe Sampling	7,160	$100	$716,000
Material Movement (excavation, transport, backfill, dust suppression, and sodding)	6,245	$13,000	$81,185,000
Post Cleanup Reports	6,245	$100	$624,500
Phosphoric Acid Treatment	3,721	$35,596	$132,452,716
Paint Assessment	11,683	$210	$2,453,430
Exterior Lead-based Paint Stabilization	5,522	$4,000	$22,088,000
Purchase/Instructions - HEPA VAC	1,432	$440	$630,080
Long Term Monitoring Program for 372 Phosphate Treated Properties; 6 mo and Yrs 2, 5, 10, 15 and 20	2,232	$344	$767,808
Long Term Monitoring Reports	6	$9,600	$57,600
Preparation of Health and Safety Plan	40	$100	$4,000
Preparation of QA/Sampling Plan	60	$100	$6,000
Contingencies/Design/Permitting/Construction Services			$108,522,600
Subtotal			$351,641,734
Establish/Maintain Information Registry for 10 years	10	$100,000	$1,000,000
Public Health Education for 10 years	10	$250,000	$2,500,000
Maintain 2 Public Information Centers for 10 years	10	$156,000	$1,560,000
years	10	$150,000	$1,500,000
Subtotal			$6,560,000
Total			$358,201,734
TOTAL PRESENT WORTH COST			$250,506,000

Figure 13
Alternative 2 – Cost Analysis for Excavation and Disposal
Omaha Lead Site Final FS Report

Cost Estimate Component	Quantity	Units	Unit Cost	Capital Cost	Annual Cost
CAPITAL COSTS					
Mobilization (1)	1	Mob	$50,000	$50,000	
Obtain Soil and LBP Access/Soil Sampling (1)	5,210	Properties	$400	$2,084,000	
Property Access/Indoor Dust Wipe Sampling	7,160	Properties	$100	$716,000	
Material Movement (excavation, transport, backfill, dust suppression, and sodding) (2)	9,966	Properties	$13,000	$129,558,000	
Post Cleanup Reports (1)	9,966	Properties	$100	$996,600	
Paint Assessment	11,987	Properties	$210	$2,517,270	
Exterior Lead-based Paint Stabilization (2)	6,312	Properties	$4,000	$25,248,000	
Purchase/Instructions - HEPAVAC	1,432	Properties	$350	$501,200	
Preparation of Health and Safety Plan	40	HR	$100	$4,000	
Preparation of QA/Sampling Plan	60	HR	$100	$6,000	
DIRECT CAPITAL COST SUBTOTAL				$161,681,070	
Bid Contingency (15%)				$24,252,200	
Scope Contingency (10%)				$16,168,100	
TOTAL DIRECT CAPITAL COST				$202,101,370	
Permitting and Legal (2%)				$4,042,000	
Construction Services (10%)				$20,210,100	
CONSTRUCTION COSTS TOTAL				$226,353,470	
Engineering Design (3%)				$6,790,600	
TOTAL CAPITAL COST				$233,144,000	
TOTAL ANNUAL CAPITAL COSTS[3]				$23,314,400	
ANNUAL COSTS					
Year 1					
Information Dissemination via Mass Media, Including Television	1	LS	$150,000		$150,000
Establish Information Registry	1	LS	$100,000		$100,000
Public Health Education	1	LS	$250,000		$250,000
Maintain 2 Public Information Centers	1	LS	$156,000		$156,000
HEPAVAC instructions	1,432	HR	$90		$128,880
Year 2-10					
Information Dissemination via Mass Media, Including Television	1	LS	$150,000		$150,000
Maintain Information Registry	1	LS	$100,000		$100,000
Public Health Education	1	LS	$250,000		$250,000
Maintain 2 Public Information Centers	1	LS	$156,000		$156,000
TOTAL PRESENT WORTH COST				$168,479,000	

7 percent discount rate used to calculate present worth.

HR - Hours

LS - Lump Sum

FT - Feet

EA - Each

1 - BVSPC 2004 (Ref. 25)
2 - Costs Provided by EPA based on historical costs at the OLS
3 - Total Annual Capital Costs each year for 10 years

Figure 14
Alternative 2 – Cost Analysis for Excavation and Disposal
Present Worth Cost Analysis
Omaha Lead Site Final FS Report

Year	Annual Capital Costs	Annual Costs	Total Annual Costs	Intermittent Costs Include:
1	$22,849,500	$784,880	$23,634,400	
2	$22,849,500	$656,000	$23,505,500	
3	$22,849,500	$656,000	$23,505,500	
4	$22,849,500	$656,000	$23,505,500	
5	$22,849,500	$656,000	$23,505,500	
6	$22,849,500	$656,000	$23,505,500	
7	$22,849,500	$656,000	$23,505,500	
8	$22,849,500	$656,000	$23,505,500	
9	$22,849,500	$656,000	$23,505,500	
10	$22,849,500	$656,000	$23,505,500	
11		$0	$0	
12		$0	$0	
13		$0	$0	
14		$0	$0	
15		$0	$0	
16		$0	$0	
17		$0	$0	
18		$0	$0	
19		$0	$0	
20		$0	$0	
21		$0	$0	
22		$0	$0	
23		$0	$0	
24		$0	$0	
25		$0	$0	
26		$0	$0	
27		$0	$0	
28		$0	$0	
29		$0	$0	
30		$0	$0	
Total Annual Costs			$235,184,000	
Present Worth of Annual Costs			$165,213,000	

Figure 15
Potential Chemical-Specific Federal and State ARARs

Potential Federal Chemical-Specific ARARs			
Authority	Citations	Synopsis	Requirement
A. Applicable Requirements	None		
B. Relevant and Appropriate	None		
1. Safe Drinking Water Act	National Primary Drinking Water Standards 40 CFR Part 141 Subpart B and G	Establish maximum contaminant levels (MCLs), which are health based standards for public waters systems.	Required to meet MCLs.
2. Safe Drinking Water Act	National Secondary Drinking Water Standards 40 CFR Part 143	Establish secondary maximum contaminant levels (SMCLs) which are non-enforceable guidelines for public water systems to protect the aesthetic quality of the water.	SMCLs may be relevant and appropriate if groundwater is used as a source of drinking water.
3. Safe Drinking Water Act	Maximum Contaminant Level Goals (MCLGs) 40 CFR Part 141, Subpart F	Establishes non-enforceable drinking water quality goals.	The goals are set to levels that produce no known are anticipated adverse health effects. The MCLGs include an adequate margin of safety.
4. Clean Water Act	Water Quality Criteria 40 CFR Part 131 Water Quality Standards	Establishes non-enforceable standards to protect aquatic life.	May be relevant and appropriate to surface water discharges, or may be a TBC.
5. Clean Air Act	National Primary and Secondary Ambient Air Quality Standards 40 CFR Part 50	Establishes standards for ambient air quality to protect public health and welfare.	Requires air emissions to meet clean air standards.
6. National Pollutant Discharge Elimination System (NPDES)	40 CFR Parts 122, 125	Determines maximum concentrations for the discharge of pollutants from any point source into waters of the Untied States.	Requires non point discharge to meet NPDES permit standards.
C. To Be Considered			
1. EPA Revised Interim Soil-lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities	Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12, August 1994 OSWER Directive 9200.4-27P, August 1988	Establishes screening levels for lead in soil for residential land use, describes development of site-specific preliminary remediation goals, and describes a plan for soil-lead cleanup at CERCLA sites.	This guidance recommends using the EPA Integrated Exposure Uptake Biokinetic Model (IEUBK) on a site-specific basis to assist in developing cleanup goals.
2. EPA Strategy for Reducing Lead Exposures	EPA, February 21, 1991	Presents a strategy to reduce lead exposure, particularly to young children.	The strategy was developed to reduce lead exposure to the greatest extent possible. Goals of the strategy are to 1) significantly reduce the incidence above 10 µg Pb/dL in children; and 2) reduce the amount of lead introduced into the environment.

3. Human Health Risk Assessment		Evaluates baseline health risk due to current site exposures and establish contaminant levels in environmental media at the site for the protection of public health because ARARs are not available for contaminants in soils.	The risk assessment approach using this data should be used in determining cleanup levels because ARARs are not available for contamination in soils.
4. Superfund Lead-Contaminated Residential Sites Handbook	EPA OSWER 9285.7-30, August 2003.	Handbook developed by EPA to promote a nationally consistent decision making process for assessing and managing risks associated with lead contaminated residential sites across the country.	Use the available data to determine what has been done nationally to assess local risks.
5. Toxic Substances and Control Act (TSCA)	Lead-Based Paint Poisoning Prevention in Certain Residential Structures 40 CFR Part 745	Establishes EPA requirements for addressing lead-based paint poisoning prevention in certain residential structures.	Identifies and sets requirements for maximum amount of lead in dust samples collected from windows sills and floors. Impose requirements on the seller or lessor of target housing to disclose to the purchaser or lessee the presence of any known lead-based paint hazards, provide available records and reports, and attach specific disclosure and warning language to the sales or leasing contract.
6. Lead-Based Paint Poisoning Prevention Act; Residential Lead-Based Paint Hazard Reduction Act	Lead-Based Paint Poisoning Prevention in Certain Residential Structures 24 CFR Part 35	Establishes HUD requirements for addressing lead-based paint poisoning prevention in certain residential structures.	Identifies and sets requirements for maximum amount of lead in dust samples collected from windows sills, window troughs and floors. Establishes requirements for seller or lessor of target housing to disclose the presence of any known lead-based paint and/or lead-based paint hazards to purchaser or lessee and provide available records and reports. Sets requirements for amount of lead in paint.

Potential State Chemical-Specific ARARs

Authority	Citations	Synopsis	Requirement
A. Applicable Requirements	None		
B. Relevant and Appropriate Requirements			
1. Nebraska Surface Water Quality Standards	Nebraska Department of Environmental Quality - Title 117	Regulates the discharge of constituents from any point source, including stormwater, to surface waters of the state. Provides for maintenance and protection of public health and aquatic life uses of surface water and groundwater.	Required for protection of wetlands, streams, lakes, and impounded waters from the runoff from toxic discharges.
2. Nebraska Safe Drinking Water Act	Nebraska Rev. Stat. 71-5301 et seq. and Title 179, Chapter 2	Establishes drinking water standards (MCLs), monitoring standards, and other treatment requirements.	Required to meet MCLs.

3. Nebraska Air Pollution Control Rules and Regulations	Nebraska Department of Environmental Quality - Title 129	Establishes Ambient Air Quality Standard and regulates emissions of contaminants into the air.	Required to meet ambient air quality standards.
C. To Be Considered			
1. Human Health Risk Assessment Report (HHRA)		Evaluates baseline health risk due to current site exposures and established contaminant levels in environmental media at the site for the protection of public health.	The risk assessment approach using this data should be used in determining cleanup levels because ARARs are not available for contaminants in soils.
2. Nebraska Voluntary Cleanup Program (VCP) Remediation Goals		The VCP remediation goals include a cleanup number of 400 ppm for lead in soil for residential exposures based on EPA's IEUBK model.	Nebraska VCP goals should be considered in establishing soil lead cleanup levels.

Figure 16
Potential Location-Specific Federal and State ARARs

Potential Federal Location-Specific ARARs			
Authority	Citations	Synopsis	Requirement
A. Applicable Requirements			
1. Historic project owned or controlled by a federal agency	National Historic Preservation Act: 16 U.S.C. 470, et.seq; 40 CFR § 6.301; 36 CFR Part 1.	Property within areas of the Site is included in or eligible for the National Register of Historic Places.	The remedial alternatives will be designed to minimize the effect on historic landmarks.
2. Site within an area where action may cause irreparable harm, loss, or destruction of artifacts.	Archeological and Historic Preservation Act; 16 U.S.C. 469, 40 CFR 6.301.	Property within areas of the site contains historical and archaeological data.	The remedial alternative will be designed to minimize the effect on historical and archeological data.
3. Site located in area of critical habitat upon which endangered or threatened species depend.	Endangered Species Act of 1973, 16 U.S.C. 1531-1543; 50 CFR Parts 17; 40 CFR 6.302. Federal Migratory Bird Act; 16 U.S.C. 703-712.	Determination of the presence of endangered or threatened species.	The remedial alternatives will be designed to conserve endangered or threatened species and their habitat, including consultation with the Department of Interior if such areas are affected.
4. Site located within a floodplain soil.	Protection of Floodplains, Executive Order 11988; 40 CFR Part 6.302, Appendix A.	Remedial action will take place within a 100-year floodplain.	The remedial action will be designed to avoid adversely impacting the floodplain in and around the soil repository to ensure that the action planning and budget reflects consideration of the flood hazards and floodplain management.
5. Wetlands located in and around the soil repository.	Protection of Wetlands; Executive Order 11990; 40 CFR Part 6, Appendix A.	Remedial actions may affect wetlands.	The remedial action will be designed to avoid adversely impacting wetlands wherever possible including minimizing wetlands destruction and preserving wetland values.
6. Structures in waterways in and around the soil repository.	Rivers & Harbors Act, 33 CFR Parts 320-330.	Placement of structures in waterways is restricted to pre-approval of the U.S. Army Corps of Engineers.	The remedial action will comply with these requirements.
7. Water in and around the soil repository.	Clean Water Act, (Section 404 Permits) Dredge or Fill Substantive Requirements, 33 U.S.C. Parts 1251-1376; 40 CFR Parts 230,231.	Capping, dike stabilization construction of berms and levees, and disposal of contaminated soil, waste material or dredged material are examples of activities that may involve a discharge of dredge or fill material. Four conditions must be satisfied before dredge and fill is an allowable alternative.	1. There must not be a practical alternative. 2. Discharge of dredged or fill material must not cause a violation of State water quality standards, violate applicable toxic effluent standards, jeopardize threatened or endangered species or injure a marine sanctuary. 3. No discharge shall be permitted that will cause or contribute to significant degradation of the water. 4. Appropriate steps to minimize adverse effects must be taken. Determine long- and short-term effects on physical, chemical, and biological components of the aquatic ecosystem.

8. Area containing fish and wildlife habitat in and around the soil repository.	Fish and Wildlife Conservation Act of 1980, 16 U.S.C. Part 2901 et seq.; 50 CFR Part 83 and 16 U.S.C. Part 661, et seq. Federal Migratory Bird Act, 16 U.S.C. Part 703.	Activity affecting wildlife and non-game fish.	Remedial action will conserve and promote conservation of non-game fish and wildlife and their habitats.
B. Relevant and Appropriate Requirements			
1. 100-year floodplain	Location Standard for Hazardous Waste Facilities-RCRA; 42 U.S.C. 6901; 40 CFR 264.18(b).	RCRA hazardous waste treatment and disposal.	Facility located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout during any 100-year/24 hour flood.
C. To Be Considered	None		

Potential State Location-Specific ARARs

Authority	Citations	Synopsis	Requirement
A. Applicable Requirements			
1. Solid waste management regulations	Nebraska Department of Environmental Quality – Title 132 – Integrated Solid Waste Management Regulations	Requires permits for proper identifications and disposal of solid waste in solid waste disposal areas.	Requires specified procedures for the location, design, operation, and ground water monitoring, closure, disposal, post closure, and financial assurance for solid waste disposal facilities. Requires specific procedures for special waste management.
2. Siting Procedures and Policies	Nebraska State Statutes 13-1701 to 13-1714	Policies and procedures are required in order to get approval for a solid waste disposal.	Requires approvals by local jurisdictions prior to the development of a site as a solid waste disposal area.
3. Flood-plain Management Act	Nebraska State Statues 13-1001 to 31-1031 and Title 258	Policies and procedures for construction or disposal in flood plains.	Governs certain activities occurring in flood plains
4. Nebraska Nongame and Endangered Species Act	Nebraska State Statues 37-801 to 37-811 and Title 163 Chapter 4, 012	Policies and procedures to ensure protection of Threatened and Endangered species Requires consultation with Nebraska Game and Parks Commission.	Requires actions which may affect threatened or endangered species and their critical habitat.
B. Relevant and Appropriate Requirements	None		
C. To Be Considered.			
1. Hazardous waste handling, transport and disposal regulations	Nebraska Department of Environmental Quality – TITLE 128 Nebraska Hazardous Waste Regulations	Requires operating permits for proper identifications, handling, transport, and disposal of hazardous materials.	Supplement the federal RCRA regulations and define state permitting requirements.
2. Siting Procedures and Policies	Nebraska State Statutes 81-1521.08 to 81-1521.23	Policies and procedures are required in order to get approval for a hazardous waste management facility.	Requires approvals by local jurisdictions prior to the development of a site as a hazardous waste management facility.

Figure 17
Potential Action-Specific Federal and State ARARs

Potential Federal Action-Specific ARARs			
Authority	Citations	Synopsis	Requirement
A. Applicable Requirements			
1. Disposal of Solid Waste in a Permanent Repository and closure of the Repository.	Subtitle D of RCRA, Section 1008, Section 4001, et seq., 42 U.S.C. '6941, et seq.	State or Regional Solid Waste Plans and implementing federal and state regulations to control disposal of solid waste. The yard soils disposed in the repository may not exhibit the toxicity characteristic and therefore, are not hazardous waste. However, these soils may be solid waste.	Contaminated residential soils will be consolidated from yards throughout the site into a single location. The disposal of this waste material should be in accordance with regulated solid waste management practices.
2. Disposal of Hazardous Waste in the Permanent Repository and Designation as a Corrective Action Management Unit (CAMU).	Subtitle C of RCRA, Section 3001 et seq., 42 U.S.C. '6921, et seq. and implementing regulations at 40 CFR Subpart S, Corrective action for solid waste management units and temporary units, 40 CFR '264.522	RCRA defines CAMUs to be used in connection with implementing remedial measures for corrective action under RCRA or at Superfund sites. Generally, a CAMU is used for consolidation or placement of remediation wastes within the contaminated areas at the facility. Placement of wastes in a CAMU does not constitute land disposal of hazardous waste and does not constitute creation of a unit subject to minimum technology requirements.	The RCRA requirements of Subtitle C are not applicable to the disposal of residential yard soils in the repository. Residential yard soils contaminated from smelter fall out are not excluded from regulation under the RCRA exclusion for extraction, beneficiation and mineral processing. Therefore, yard soils exhibiting a RCRA toxicity characteristic would be regulated under Subtitle C of RCRA. However, because of the CAMU regulation, these residential soils are remediation wastes and may be disposed without triggering RCRA disposal requirements. The remedial action will comply with the requirements of the CAMU rule.
B. Relevant and Appropriate Requirements			
1. NPDES Storm Water Discharge for Permanent Repository.	40 CFR Part 122, ' 122.26	Establishes permitting process and discharge regulations for storm water	Required management of repository where waste materials come into contact with storm water. Also required during construction of the repository.
2. Transportation of excavated soils.	DOT Hazardous Material Transportation Regulations, 49 CFR Parts 107, 171-177	Regulates transportation of hazardous wastes.	Relevant and appropriate for the excavation alternative which would transport wastes on-site.
C. To Be Considered	None		

Potential State Action-Specific ARARs			
Authority	Citations	Synopsis	Requirement
A. Applicable Requirements			
1. Fugitive dust control measures to be utilized during excavation activities	Nebraska Department of Environmental Quality – TITLE 129 Air Quality Regulations, Chapter 32	Requires operating and construction permits to provide that reasonable measures be used to prevent particulate emissions from leaving the premises. Also, sets ambient air quality standards for a number of air constituents.	Recommend that excavation of yard soils be handled in such a manner as to control fugitive emissions, such as use of a water spray during excavation or transportation. May be used in monitoring ambient air quality during implementation for lead and other particulates.
2. Solid waste management regulations	Nebraska Department of Environmental Quality – TITLE 132 – Integrated Solid Waste Management Regulations	Requires permits for proper identifications and disposal of solid waste in solid waste disposal areas.	Requires specified procedures for the location, design, operation, and ground water monitoring, closure, post closure, and financial assurance for solid waste disposal facilities. Requires specific procedures for special waste management.
3. Siting Procedures and Policies	Nebraska State Statutes 13-1701 to 13-1714	Policies and procedures are required in order to get approval for a solid waste disposal area.	Requires approvals by local jurisdictions prior to the development of a site as a solid waste disposal area.
B. Relevant and Appropriate Requirements			
1. Nebraska Surface Water Quality Standards	Nebraska Department of Environmental Quality - TITLE 117	Regulates the discharge of constituents from any point source, including stormwater, to surface waters of the state. Provides for maintenance and protection of public health and aquatic life uses of surface water and groundwater.	Required for protection of wetlands, streams, lakes, and impounded waters from the runoff from toxic discharges.
2. Rules and Regulations pertaining to the issuance of permits under the National Pollutant Discharge Elimination System	Nebraska Department of Environmental Quality - TITLE 119	Defines and issues permits for the discharge of constituents from any point source, including storm water, to surface waters of the state. Establishes development of an approved action plan and discharge regulations for storm water	Required for protection of wetlands, streams, lakes, and impounded waters from the runoff from toxic discharges. Required of management of repository where waste materials come into contact with storm water. Also required during construction of the repository. Monitoring program shall be implemented to ensure compliance with discharge regulations.

C. To Be Considered			
1. Hazardous waste handling, transport and disposal regulations	Nebraska Department of Environmental Quality – TITLE 128 Nebraska Hazardous Waste Regulations	Requires operating permits for proper identifications, handling, transport, and disposal of hazardous materials.	Supplement the federal RCRA regulations and define state permitting requirements.
2. Siting Procedures and Polices	Nebraska State Statues 81-1521.08 to 81-1521.23	Policies and procedures are required in order to get approval for a hazardous waste management facility	Requires approval by local jurisdictions prior to the development of a site as a hazardous waste management facility.
3. Nebraska Voluntary Cleanup Program (VCP) Remediation Goals		The VCP remediation goals include a cleanup number of 400 ppm for lead in soil for residential exposures based on EPA's IEUBK model.	Nebraska VCP goals should be considered in establishing soil lead cleanup levels.