PROPOSED PLAN

RESIDENTIAL YARD SOILS
OMAHA LEAD SITE

OMAHA, NEBRASKA

Prepared by:

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FINAL REMEDIAL ACTION

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INTRODUCTION

This Proposed Plan for the Omaha Lead Site (OLS) is intended to inform and solicit the views of the affected community regarding the Environmental Protection Agency's (EPA) preferred alternative to address lead contamination in residential yards. A Proposed Plan fulfills public participation requirements under Section 117(a) of the Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA), as amended, and the Section 300.430(f)(2) of the National Contingency Plan (NCP). The purpose of this Proposed Plan is to:

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

This Proposed Plan highlights key information from the Draft Final Remedial Investigation (October 2008), Public Review Draft Baseline Human Health Risk Assessment (October 2008), and the Draft Final Feasibility Study (October 2008) also released for public review. These and other documents in the Site Administrative Record are available for additional information regarding the proposed remedial action at the Omaha Lead Site Information Repositories located at the EPA Regional Office, 901 N. 5th Street, in Kansas City, Kansas, at either of the two EPA Public Information Centers located in Omaha:

EPA Public Information Center – North
3040 Lake Street
Omaha, Nebraska
(402) 991-9583

EPA Public Information Center – South
4911 S. 25th St.
Omaha, Nebraska
(402) 731-3045

or at the document repositories located at these public libraries in the Omaha area:

Omaha Public Library
W. Dale Clark Main Library
215 South 15th Street
Omaha, Nebraska
(402) 444-4800

Washington Branch Library
2816 Ames Avenue
Omaha, Nebraska
(402) 444-4849

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

SITE BACKGROUND

The OLS includes residential properties that have been contaminated as a result of air emissions from lead smelting/refining operations with lead-contaminated surface soils in the city of Omaha, located in Douglas County, Nebraska,. The total area of the properties that comprise the OLS is approximately 27 square miles and encompasses the eastern portion of the greater metropolitan area in Omaha, Nebraska. The site is centered in downtown Omaha, Nebraska, which was the former location of at least two historic lead smelting/refining operations.

In 1998, the Omaha City Council wrote EPA requesting assistance in addressing lead contamination which was suspected of causing elevated blood lead levels in children. The EPA

began sampling residential properties and properties that were used to provide licensed child care services in March 1999 under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). To date, more than 35,000 residential properties have been tested for soil-lead contamination. Properties located within a defined area that is designated as the OLS Final Focus have been found to have lead concentrations consistently above the soil screening level of 400 parts per million (ppm). This area is generally bounded by 56th Street to the west, Harrison Street (Sarpy County line) to the south, Read Street to the North, and the Missouri River to the east. Although surrounding downtown Omaha, the OLS does not include commercial properties that comprise the Omaha central business district. Approximately 35 percent of the residential properties that EPA has tested to date have at least one mid-yard sample that exceeds 400 ppm. Soils tested in Council Bluffs, Iowa, and Carter Lake, Iowa, have not demonstrated consistently elevated soil lead levels.

The ASARCO facility conducted lead smelting and refining operations 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. During the operational period, lead and other heavy metals were emitted into the atmosphere through smoke stacks and other processes. The pollutants were transported downwind in various directions and deposited on the ground surface in residential areas.

Aaron Ferrer and Sons operated a lead battery recycling plant located at 555 Farnam Street from the early 1950s until 1963, when it was sold to a predecessor of Gould, Inc., and eventually closed in 1982. This facility also released lead-containing particulates to the atmosphere from their smokestacks.

The Douglas County Health Department (DCHD) performed monitoring of the ambient air quality around the ASARCO facility from1984 until 1996. This air monitoring routinely measured ambient lead concentrations significantly exceeding the 1.5 micrograms per cubic meter ($\mu g/m^3$) National Ambient Air Quality Standard for lead at that time. The highest recorded quarterly average for lead measured in air was 6.57 $\mu g/m^3$.

The DCHD has compiled statistics on the results of blood lead screening of children under six years of age for more than 25 years. Blood lead screening of children living in zip codes located east of 45th Street have always exceeded the 10 microgram per deciliter ($\mu g/dl$) health-based threshold more frequently than children living elsewhere in the county. There is a decreasing trend in the frequency of elevated blood lead levels in children with time as well as with distance from the former locations of the lead processing industries. The DCHD partially attributes this to the increased number of blood lead screenings that have been performed in the county. In addition, releases of lead-contaminated particulate matter from the ASARCO refinery ceased in 1997. Elimination of this source of exposure is likely to have had an affect on the rate of elevated blood lead levels in children.

The EPA initiated a series of response actions under CERCLA removal authority in August 1999 to address soil exceeding 400 ppm at child care facilities and residences where children with elevated blood lead levels resided. In August 2002, a second removal action was initiated to

address other residential soil exceeding 2,500 ppm. This action level was reduced to 1,200 ppm in November 2003. In March 2004, these two removal actions were combined into a single response action.

The site was added to the EPA National Priorities List (NPL) in February 2003. On December 15, 2008, EPA issued an Interim Record of Decision for the OLS which expanded the scope of the ongoing removal action to include excavation and replacement of residential soils exceeding 800 ppm, and removal and replacement of soils exceeding 400 ppm at child care facilities and residences where children with elevated blood lead levels reside. In addition, the selected interim remedy included stabilization of deteriorating exterior lead-based paint in cases where the continued effectiveness of the soil response is threatened, high efficiency interior dust cleaning at eligible properties, health education, and participation in a comprehensive remedy with other partners that addresses 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 Record of Decision. Removal response was discontinued when remedial response commenced.

Implementation of the Interim Remedial Action is currently ongoing. As of October 2008, excavation and soil replacement has been completed at more than 4,200 residential properties. Exterior lead-based paint stabilization was initiated in 2006 and has been completed at more than 600 residential properties.

EPA is the lead agency at the OLS. EPA has entered into cooperative agreements with the state of Nebraska, Douglas County, and the city of Omaha for implementation of the Interim Remedial Action. The state of Nebraska and city of Omaha are also parties to the Superfund State Contract for the site. This level of cooperation with state and local governmental agencies is expected to continue during implementation of the final remedy for the OLS. To date, potentially responsible parties (PRPs) have not participated in planning, studies or implementation of response actions at the site.

SITE CHARACTERISTICS

Lead processing at the eastern edge of downtown Omaha was conducted for more than 125 years. During the Preliminary Assessment/Site Inspection, residential properties located along the directions of prevailing winds were tested to determine the extent of migration. As additional residential properties were sampled, the observed extent of contamination resulted in several expansions of the sampling area.

Elevated soil lead levels exceeding 400 ppm are present in residential properties over a wide area of eastern Omaha. In general, concentrations of lead in soil are greatest near downtown, which was the former location of the former lead processing industries. Concentrations and frequency of elevated lead levels decrease with increasing distance from downtown. 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 ethnic and income groups. The occurrence of elevated blood lead levels in children living within the OLS have 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 2006 indicates that 219 of the 238 children (92 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.

The OLS is defined as residential and residential-type properties where soil sampling results indicate that mid-yard lead concentrations exceed an established action level. Sampling is generally conducted within a designated focus area which has been expanded several times based on sampling results. The Interim Record of Decision established an action level for soil lead concentrations of 800 ppm at typical residential properties and 400 ppm at high-child impact properties including child-care facilities and properties where children with elevated blood lead levels reside. In all cases when an area exceeds the action level, all soil contaminated above the 400 ppm level are removed.

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 0-1 inch depth from each of the four quadrants and combined to form the four composite samples. An additional four-aliquot composite sample is generally collected from the drip zone area (6 to 30 inches from the foundation wall) by combining one aliquot collected from exposed soil on each side of the residence. When a mid-yard quadrant concentration exceeds an appropriate action level (800 ppm for typical residential properties or 400 ppm for high-child impact properties), the property is determined to be eligible for remedial response which includes removal of all quadrant and drip zone soils that exceed 400 ppm in the upper foot and those that exceed 1,200 ppm if excavation continues beyond a depth of one foot.

The preferred alternative for a final remedy presented in this Proposed Plan would lower the action level to 400 ppm for all residential properties. Cleanup goals once remedial action is initiated would remain the same, i.e. removal of soil exceeding 400 ppm in the upper foot and removal of soils exceeding 1,200 ppm at depths greater than one foot.

The original boundaries of the OLS focus Area were established at the time the Site was listed on the EPA National Priorities List (NPL). During the 2004 RI, the OLS Focus Area was expanded to include an area south of L Street to the Sarpy County Line (Harrison Street), an area north of Ames Avenue to Redick Avenue, and an area to the west of 45th Street. The focus area was

expanded in 2008 to include an area north to Read Street, and west to 56th Street. A map of the present Focus Area is presented in figure 1. The final focus area boundary was established by determining the area where less than five percent of properties within a 500 meter radius exceed 400 ppm.

The final focus area includes 39,764 residential properties located in an area of approximately 27 square miles. As of October, 2008, there were 33,331 properties within the final focus area that had been sampled, and 2,512 properties outside the final focus area that had been sampled. There are 6,433 residential properties within the focus area remaining to be sampled. Soil sampling has been discontinued outside the final focus area boundary.

Soil sampling results as of October 2008 indicate that there are 4,011 properties within the final focus area and 41 properties outside the final focus area with high mid-yard soil concentrations that exceed 800 ppm. Results show that there are 8,135 properties within the final focus area and 174 properties outside the final focus area that have high mid-yard lead concentrations between 400 and 800 ppm. Based on the observed pattern and frequency of detected soil lead levels, the Final Remedial Investigation estimated that a total of 14,705 sampled and unsampled properties will have a high mid-yard soil lead level exceeding 400 ppm and be eligible for soil remediation under the preferred alternative presented in this Proposed Plan. Of the total number of properties projected to eligible for the final remedial action, soil remediation had been completed at 4,239 properties under the interim remedy as of October 2008. Using this projection of eligible properties, an additional 10,466 properties would require soil remediation after October 2008, if an action level of 400 ppm is established for the final remedy.

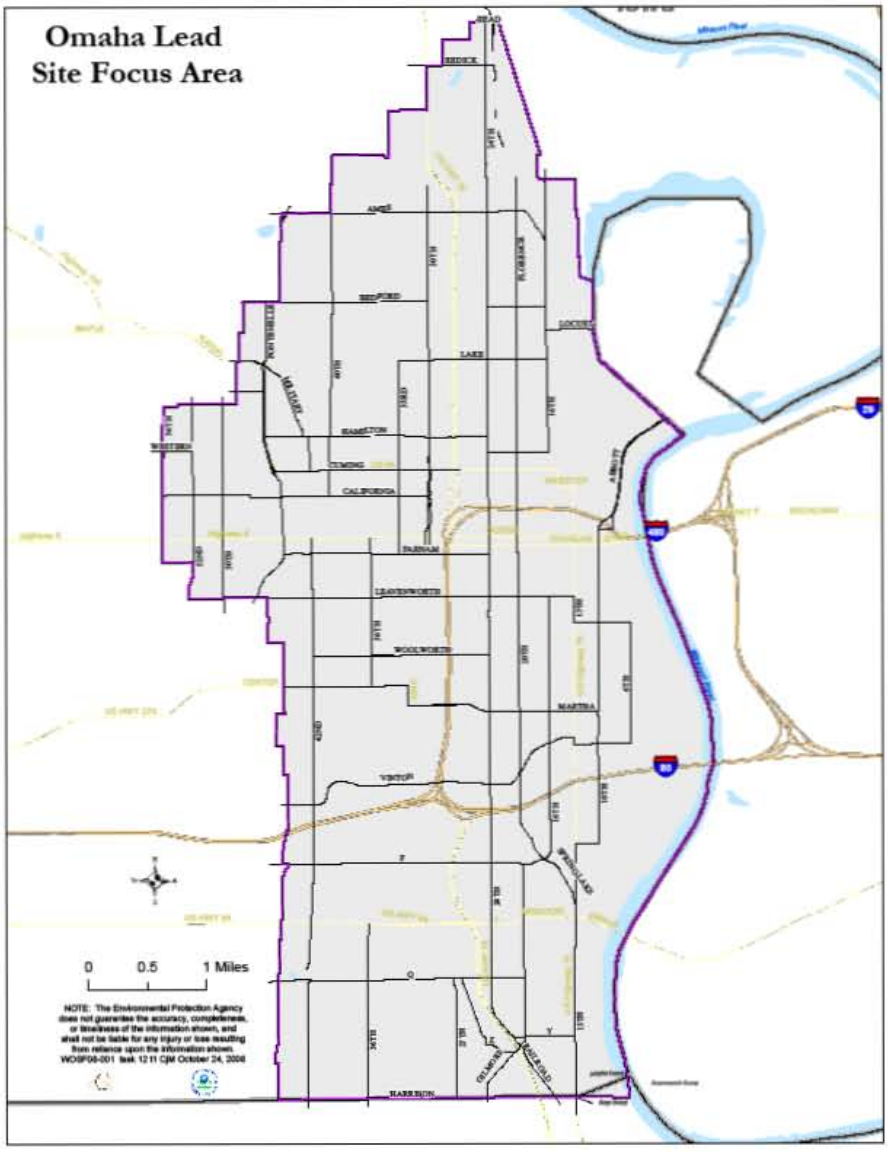

Figure 1.

SCOPE AND ROLE OF RESPONSE ACTION

This Proposed Plan describes the final remedy preferred by EPA to address residential properties that have been contaminated with lead by industries located in downtown Omaha, Nebraska. These industries no longer exist, however, they processed lead on a large scale, and released large amounts of lead-contaminated particulate matter to the atmosphere. The subsequent contamination of surface soils in surrounding residential yards was an environmental consequence of these activities. Residential-type properties that are contaminated with lead resulting from historic industrial emissions are the only type of properties that will be addressed

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

The lead contamination is located in surface soils at the residential properties that comprise the OLS. There is considerable variability in lead concentrations found in surface soils from property to property and within individual properties. Fewer than half of the residential properties that EPA has tested to date have soil concentrations that exceed the 400 ppm screening level. Modification of residential yards over the past century resulting from filling, grading, or other earth-disturbing activities has had the potential to either cover or dilute surface lead contamination. These earth-disturbing activities would be expected to be highly variable from property to property and within individual properties. Due to the high degree of variability in surface lead concentrations, EPA has defined the site to include only those properties that have soil lead concentrations that meet or exceed a soil lead action level.

SUMMARY OF SITE RISKS

An updated Baseline Human Health Risk Assessment (BHHRA) was developed in 2008 for the OLS using site-specific information. Lead was identified in the BHHRA as the primary contaminant of concern. Other metals, such as arsenic, were also identified as contaminants of concern, but were eliminated from further consideration due to their relatively low risk and/or lack of connection to releases from the industrial sources being addressed by this Superfund action.

The EPA uses the Integrated Exposure Uptake Biokinetic (IEUBK) model to evaluate the risk that lead contamination of soil poses to children under seven years of age. The IEUBK model uses either site-specific inputs (if available) or default inputs to estimate the probability that a child's blood lead level might exceed a health-based standard of 10 micrograms per deciliter (ug/dl). If only default values are used as inputs to the model, a child or group of similarly exposed children would have less than a 5 percent probability of having a blood lead level at or above 10 µg/dl if the soil in that child's environment had no more than 400 ppm of lead in the soil.

REMEDIAL ACTION OBJECTIVES

Consistent with EPA policy, one Remedial Action Objective has been developed for residential soils in Omaha:

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

DETERMINATION OF PRELIMINARY SOIL CLEAN UP GOALS

Final cleanup levels for lead in residential soil at Superfund sites generally are based on the IEUBK model results and the nine criteria analysis in accordance with the CERCLA regulations contained in the National Contingency Plan (NCP). Under most circumstances, the EPA selects a residential soil lead cleanup level which is within the range of 400 ppm to 1,200 ppm. A preliminary remediation goal (PRG) has been developed for the OLS using site-specific input parameters for the IEUBK model. The IEUBK model input parameter that significantly influenced the recommended cleanup level is the relatively high bioavailability of the lead in OLS soils.

The PRG for lead in soil at the OLS is based on the average mid-yard concentration of lead in a residential property that is associated with no more than a 5 percent chance that a child (age 0-84 months of age) living at the property will have a blood lead level that exceeds 10 μg/dL. The probability of having a blood lead level above 10 μg/dL is referred to as P10. The PRG for the OLS corresponds to the Remedial Action Objective for the Site following completion of the remedial action.

The IEUBK model was used to determine the concentration of lead in soil that yields a P10 value which meets EPA's Remedial Action Objective for the OLS (P10 < 5 percent). PRGs were determined based on analysis of the fine-grained soil (< 250 μm) using a laboratory analytical method such as Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) as well as analysis of the bulk soil fraction (< 2 mm) using an X-Ray fluorescence (XRF) instrument for soil lead analysis. Each soil fraction in combination with a particular analytical method will yield a different PRG.

The PRG values which are derived from the IEUBK model are somewhat uncertain, due to uncertainty in the model and in the true values of the input parameters used in the IEUBK model calculation. Two important sources of uncertainty in the development of the PRG values relate to the true relative bioavailability of soil lead and the relationship between lead in indoor dust and outdoor soil. Both of these factors serve as inputs to the IEUBK model. For the purpose of the PRG evaluation, a series of alternate PRG calculations was performed to evaluate the uncertainty that arises from variation in the relative bioavailability and the relationship between lead in interior dust and outdoor soil. These two factors were varied within a range of possible values based on the varying results of site-specific investigations previously performed in order to determine a plausible range of PRGs that would correspond to a P10 of less than 5 percent.

This plausible range of PRGs was calculated separately for analysis of the bulk fraction versus fine fraction of soil, and separately assuming the use of XRF versus ICP-AES analysis. Because the routine decision-making protocol that guides the response action at individual OLS properties involves analysis of bulk soil samples using an XRF instrument, the PRG range calculated using this combination is of primary interest. Using XRF analysis of bulk soil, the plausible PRGs meeting the Remedial Action Objective for soil at the OLS range from 208 ppm to 366 ppm with a best estimate of 247 ppm. These PRGs are based on average mid-yard lead concentrations, not the maximum mid-yard lead concentration that serves as the basis for taking action at individual properties.

Since the maximum lead concentration in a single quadrant (not the average mid-yard concentration) is compared to an action level to determine if soil remediation will be conducted at a property, an additional calculation must be performed to determine the average mid-yard concentration that will result at each property following soil remediation. Under the current remedial action at the OLS[1], soil remediation involves removal of soil exceeding 400 ppm from all quadrants and the drip zone at individual properties. Since soils exceeding 400 ppm are removed during remediation, the average mid-yard concentration is greatly reduced at remediated properties. For the purpose of determining the resulting average mid-yard soil lead concentration, it can be assumed that some amount of background soil lead is present in the backfill soil that is used to replace excavated soils exceeding 400 ppm. For this calculation, the background concentration in clean soils used for backfill is assumed to be 20 ppm lead. To calculate the average mid-yard concentrations at remediated properties, it is assumed that all quadrants exceeding 400 ppm are excavated and replaced with soil having a lead concentration of 20 ppm.

The average mid-yard concentration that would remain following removal of soil in quadrants exceeding 400 ppm was calculated for the 33,331 individual properties that have been sampled at the OLS. The calculated average mid-yard concentration following remediation is then compared to the plausible range of PRGs that have been determined to meet Remedial Action Objectives. Of the properties sampled to date at the OLS, soil lead levels exceed 400 ppm in at least one mid-yard quadrant at 12,361 properties. Removal of quadrants exceeding 400 ppm at these properties would effectively reduce average mid-yard concentrations to much less than 366 ppm which is the upper end of the range of plausible PRG values, since the presence of at least one quadrant that has been reduced to 20 ppm would significantly reduce the yard-wide average soil lead concentration. Of the remaining properties which are not eligible for soil remediation (i.e. individual mid-yard concentrations are all less than 400 ppm) average mid-yard lead concentrations are already less than 366 ppm at all but 21 properties. These 21 properties represent less than 0.07 percent of the 33,332 properties sampled to date at the OLS. Based on these occurrences, it can be estimated that 4 additional properties of the 6,433 properties yet to be sampled at the OLS would have average mid-yard lead concentrations exceeding 366 ppm

[1] Remedial action under the current Interim Record of Decision is initiated at properties that are determined to be eligible if one or more mid-yard soil lead concentration exceeds the appropriate action level -- 800 ppm for typical properties and 400 ppm for EBL, child-care, and high-child impact properties.

following remediation of eligible properties. This would increase the total number of properties with average mid-yard lead concentrations that do not fall within the plausible PRG range to only 25. Therefore, removing soils that exceed a 400 ppm action level based lead concentrations measured in individual mid-yard quadrants would reduce average soil lead levels at virtually all OLS properties to meet the soil lead Remedial Action Objective.

In almost all cases, selection of a 400 ppm action level, as applied at the OLS, would reduce the residual risk following soil remediation to meet the soil lead Remedial Action Objective. For the few properties that would remain slightly above the plausible PRG range, EPA would evaluate each individual property and perform additional response actions as required to lower risk to within the acceptable range meeting the soil lead Remedial Action Objective. EPA is also proposing measures, that when applied site-wide will provide additional protection of human health through health education and institutional controls, as components of the preferred alternative. These additional actions would reduce risks further within the plausible PRG range meeting the soil lead Remedial Action Objective.

The 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. Typically, sources other than exterior soil lead contamination resulting from historic industrial operations at the OLS would not be remediated by the EPA in the course of residential soil lead cleanups. CERCLA and the NCP limit Superfund authority to address interior sources of exposure. For example, CERCLA Section 104(a)(3)(B) limits the EPA's liability 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…"

The above-cited section of CERCLA generally limits the EPA's authority to respond to lead-based paint inside a structure or house. However, the 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 address or abate interior lead-based paint risks be addressed by others such as U.S. Department of Housing and Urban Development (HUD), local governments, health authorities, PRPs, private organizations, or individual homeowners. 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.

The 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 the Agency for Toxic Substances and Disease Registry (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 comprehensively. The 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. It should be noted that OSWER policy directs that the EPA should not increase the risk-based soil cleanup levels as a result of the action taken to address these other sources of exposure.

SUMMARY OF ALTERNATIVE CLEAN UP PLANS CONSIDERED

Three alternatives were developed in the OLS Final Feasibility Study 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 with Health Education and Institutional Controls
- Alternative 3: Excavation and Phosphate Stabilization with Health Education and Institutional Controls

Alternative 1: No Action

The EPA is required by the NCP, 40 C.F.R. § 300.430(e)(6) to evaluate the No Action Alternative. The No Action Alternative may be appropriate at some sites where a removal action has already occurred that reduce 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 with Health Education and Institutional Controls

Under this alternative, residential properties with at least one mid-yard quadrant sample greater than 400 ppm lead will be eligible for remedial action. The remedial action will include excavated and disposal of contaminated soil in all quadrants, drip zones, play zones, and other areas that exceed 400 ppm lead in surface soils (0-1 inch depth) 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. Yards where only the drip zone soil exceeds 400 ppm lead would not be addressed under this action. A public

health education program would be implemented to provide additional protection of human health. This alternative includes an institutional control that would provide for operation of a local lead hazard registry to provide information regarding actions taken to characterize or respond to identified lead hazards at individual residential properties.

EPA has conducted an extensive sampling program to identify residential yards that require excavation. The EPA estimates that approximately 10,466 additional properties have a high mid-yard soil lead level exceeding 400 ppm, which would be eligible for remediation in addition to the 4,239 properties where soil remediation has been completed under previous removal actions and the current interim remedy. Excavated soil would be disposed 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 sanitary landfill and used as daily cover or disposed.

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 proposed eligibility protocol 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.

This alternative provides for response to interior lead-contaminated dust at properties where soil remediation is performed. Interior lead-contaminated dust response would be voluntary to homeowners. Interior dust wipe samples would be collected from floors in accordance with the 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 with a HEPA-equipped household vacuum cleaner and given training in the importance, operation and maintenance of the HEPA vacuum. 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.

This alternative also 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: Phosphate Stabilization and Excavation with Health Education and Institutional Controls

This alternative involves a combination of excavation and phosphate treatment of lead-contaminated soils at residential-type properties that have high 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 bioaccessibility of lead in the three OLS soil types tested 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 health education, operation of a local lead registry, exterior lead-based paint stabilization, interior dust response, and participation in a comprehensive remedy with public and private partners to address all identified lead exposure sources in the community.

EVALUATION OF ALTERNATIVES

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

<u>Protection of Human Health and the Environment</u>

This criterion is used to determine if each alternative is protective of human health and the environment and is assessed based on a composite of factors, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with applicable or relevant and appropriate requirements (ARARs). Protection of human health and the environment is addressed to varying degrees by the two action alternatives, Alternatives 2 and 3. The No Action Alternative would have no effect on risks currently present at the OLS.

Alternative 2 and Alternative 3 both provide protection of human health through reduced exposure to lead in contaminated soils. Alternative 3 provides protection through *in situ* treatment for soil lead levels between 400 ppm and 500 ppm by immobilizing lead and

effectively reducing its bioavailability. Alternatives 2 and 3 provide protection by removal of contaminated soils from the exposure pathway and replacement with clean soil. The excavation activities address the risk of exposure through direct contact with lead-contaminated soil. Exposure to lead in house dust would be reduced through interior dust response for both Alternatives 2 and 3. Health education programs would provide further levels of risk reduction for Alternatives 2 and 3.

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

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

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

Long-Term Effectiveness

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

Alternative 3 effectively reduces risks through a combination of treatment and excavation, while Alternatives 2 achieves risk reduction through excavation only. The residual risk is greater with Alternative 3 because the phosphate treatment component of this remedy leaves moderate levels of treated lead in yards with high mid-yard lead concentrations between 400 and 500 ppm. Alternatives 2 and 3 reduce risks for homes using effective engineering controls with soil concentrations of lead at or above 400 ppm. Alternatives 2 and 3 also include public health education to further control residual risks. The No Action alternative provides no effectiveness for the protection of public health and the environment over the long term.

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

Alternatives 2 and 3 include establishment of a local lead hazard registry which is a form of institutional control to further reduce residual risks following completion of soil remediation. The lead hazard registry provides information to interested parties about the presence of lead hazards at individual properties. The lead registry represents an ongoing informational devise to increase public awareness of lead hazards.

Short-Term Effectiveness

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

Significant short term risks are associated with Alternative 3. Contact with low-pH soils must be prevented for a several day period until soils are neutralized by adding lime. The low pH soils could potentially cause chemical burns or other adverse 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 short term risks to workers involved in handling and application of acid and roto-tilling of soils.

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

Reduction of Toxicity, Mobility or Volume

This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the contaminants. The No Action Alternative would not reduce toxicity, mobility, or volume of site contaminants. Alternative 2 would significantly reduce mobility of soils with concentrations exceeding 400 ppm lead through excavation and disposal in a controlled final management facility, followed by backfilling of excavated areas and restoration of yards. Alternative 3 would reduce the mobility of soil ranging in concentration from 400 to 500 ppm through chemical treatment. Excavation of soils exceeding 500 ppm would reduce the mobility of contaminated soil through removal and disposal in a controlled final management facility. Phosphate stabilization under Alternative 3 uses treatment as a principle element of the cleanup, which is preferable under the Superfund law and the NCP. Mobility of excavated materials placed in a sanitary landfill, soil repository, or commercial fill is greatly reduced due to the engineering features designed to contain the contaminated soils.

Implementability

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

Cost

This criterion addresses the direct and indirect capital cost of the alternatives. Operation and maintenance costs incurred over the life of the project, as well as present worth costs, are also evaluated. A detailed cost analysis for alternatives 2 and 3 is presented in the Final Feasibility Study. The present worth cost for Alternative 2 is estimated at $254 million. The present worth cost for Alternative 3 is estimated at $365 million. No costs are associated with the No Action Alternative.

Alternative 3 is more costly than Alternative 2 due in large part to the cost of the soil amendments required for phosphate treatment. A large increase in the cost of phosphoric acid has occurred since the initial investigation of this technology for potential application to the OLS in 2004. The cost of phosphate treatment for an individual property is estimated at $35,000 in the Final Feasibility Study, compared to a unit cost of $13,000 per property for conventional excavation and soil replacement.

State Acceptance

This criterion addresses the Nebraska Department of Environmental Quality's (NDEQ) preferences or concerns about the OLS remedial action alternatives. The EPA is the lead agency and has coordinated all OLS activities with NDEQ throughout this project. The NDEQ, as the EPA's support agency, has supported the implementation of the interim remedy, and has entered into a Superfund State Contract to assure matching funds for the interim remedy. The NDEQ will provide comments during the comment period.

Community Acceptance

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

provided directly to interested parties, and made available at four public information repositories located within the final focus area of the OLS. In order to provide the community with an opportunity to submit written or oral comments, EPA is providing a public comment period through December 1, 2008. Two public meetings in Omaha, Nebraska will also be scheduled during the public comment period to present the Proposed Plan, accept written and oral comments, and to answer questions concerning the EPA's preferred alternative.

PREFERRED ALTERNATIVE

The EPA's preferred alternative for the final remedy at the OLS is Alternative 2, excavation and removal of soils exceeding 400 ppm with health education, institutional controls, interior dust response and participation in a comprehensive remedy in the community. The EPA's preferred alternative is similar to the ongoing interim remedy at the OLS with the following modifications:

- The soil lead action level would be reduced to 400 ppm from 800 ppm at typical residential properties that have not been designated as high-child impact areas. There would be no change in the action level for high-child impact properties including child care facilities and residences where children with elevated blood lead levels reside. The soil lead action level for these high-child impact areas under the ongoing interim Record of Decision is already established at 400 ppm.

- The preferred alternative includes operation of a lead hazard registry as an informational device to inform interested parties about the status of lead remediation efforts and identified lead hazards at individual properties. The lead hazard registry would be operated by the local municipal government in Omaha.

- The interim remedy included high efficiency interior cleaning at residences where elevated levels of lead were identified in interior dust. Due to the limited effectiveness of a one-time interior dust cleaning to provide long-term protection from interior dust hazards, the final remedy will eliminate high efficiency cleaning and substitute health education, training, and provision of HEPA household vacuums to residents of houses where soil remediation is performed and interior dust wipe samples exceed appropriate EPA/HUD criteria.

Elements of EPA's preferred alternative are described below:

<u>Excavation</u>

The preferred alternative involves the excavation and removal of soil, backfilling the excavation with clean soil, and restoring the grass lawn. Excavation would be performed at an estimated 10,466 properties where soil remediation has not been performed to date during previous EPA response actions. The residential-type properties that will be eligible for remedial action under the final remedy include: 1) residences with a mid-yard soil lead level exceeding 400 ppm where

children with an elevated blood lead level resides; 2) child care facilities with a mid-yard soil lead level exceeding 400 ppm; 3) high child impact areas such as a park or school where soils exceed 400 ppm; or 4) any other residential-type property where at least one non-foundation sample exceeds 400 ppm lead.

Soil would be excavated using lightweight excavation equipment and hand tools in the portions of the yard where the surface soil exceeds 400 ppm lead. Excavation would continue in all quadrants and drip zone areas exceeding 400 ppm lead until the 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. The ATSDR has provided the EPA with a health consultation which states that soil lead levels less than 1,200 ppm will not cause significant human health risk if covered with a minimum of 12 inches of clean soil.

This Proposed Plan assumes that approximately 10,466 residential properties have at least one mid-yard quadrant exceeding 400 ppm soil lead. These properties are in addition to the 4,239 residential-type properties where soil remediation has been completed under previous EPA response actions. On average, approximately 50 tons of soil has 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 523,300 tons of lead contaminated soil would require excavation, replacement, 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 OLS.

Clean fill and topsoil would be used to replace the soil removed after excavation, returning the yard to its original elevation and grade. The EPA will not utilize soil from any protected loess hills area as fill for the OLS. After the topsoil has been replaced, a grass lawn will be established through sodding. Hydro-seeding or conventional seeding may be considered for very large properties such as parks, or for unoccupied properties, in lieu of sodding. Hydro-seeding or conventional seeding would only be applied, however, with the agreement of the homeowner and when circumstances assure that a quality grass cover can be effectively established from seed. Sod must be used in sloped areas of properties that would be subject to erosion before grass from seed could become established.

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 the 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. A five-aliquot

composite sample will typically 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 is collected from distinct play areas and gardens, if present.

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 would be compared to a 400 ppm soil lead action level. If one or more mid-yard sections exceed the appropriate action level, the property becomes eligible for Superfund response.

Soil capping may be considered as an acceptable alternative to, or in combination with, excavation to reduce cost in special cases such as large parks or school yards where placement of a cap would not create drainage problems. Capping in areas where soil-lead concentrations are greater than 400 ppm, but less than 1,200 ppm, would require a minimum of 12 inches of clean soil for the cap. Capping would not occur in areas where surface soils exceed 1,200 ppm lead.

Disposal

Three options are available to accommodate disposal of the excavated yard soils. The first option would be to simply haul the contaminated soil to an offsite sanitary 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 would be to use the soil excavated from the residential yards as beneficial fill in the construction of an industrial facility. 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 in an industrial setting without creating a risk to human health. Constructed engineering features may also be necessary to protect filled areas.

A third option would consist of constructing an offsite 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.

Exterior Lead-Based Paint Stabilization

In order to prevent the re-contamination of the clean soil placed in yards after excavation, exterior lead-based paint stabilization may be performed at properties where deteriorating lead-based paint threatens the continued effectiveness of the soil remediation. Lead-based paint stabilization will only be performed at properties which are eligible for soil remediation and not all properties where soil remediation is performed will be eligible. Lead-based paint stabilization will be provided on a voluntary basis to residents at eligible properties.

The EPA has developed a protocol for assessing the degree of deteriorated lead-based paint on structure surfaces and has proposed criteria to determine eligibility for lead-based paint stabilization which is presented in the OLS Recontamination Study Work Plan. Not all homes will be determined to be eligible for stabilization. Only those homes where lead-based paint is determined to threaten the continued effectiveness of soil remediation will be eligible for paint stabilization. Loose and flaking lead-based paint would 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 would be primed and repainted.

EPA's preference is to perform lead-based paint stabilization at eligible properties prior to soil remediation. By necessity, lead-based paint stabilization will follow soil remediation at a significant number of eligible properties at the OLS due to the large number of properties where a soil cleanup has been performed before stabilization of lead-based paint was included in the scope of the remedy. Lead-based paint stabilization was not included as an element of the removal actions conducted from 1999 through 2004. In addition, after lead-based paint stabilization was added to the response action in December 2004 with the Interim Record of Decision, a significant period of time was required to develop the protocol for conducting exterior lead-based paint assessments, and to develop the proposed criteria for determining the severity of deteriorated lead based paint that would warrant stabilization to protect the soil remedy. Lead-based paint stabilization at OLS properties began in 2006, but there remains a large backlog of structures that will require stabilization following soil remediation.

Interior Lead 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. This interior dust response will involve providing eligible residents with a HEPA-equipped household vacuum and providing training to the residents 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 and measures that can be taken to reduce or control exposure. The interior dust response will be provided on a voluntary basis to residents at eligible properties. The soil dust response will be conducted following soil remediation.

Health Education

Due to the presence of various lead hazards at the OLS Superfund Site, health education for the community and medical professionals in the area 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 the ATSDR, NDHHS, DCHD, and local non-governmental organizations 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 Approach

The EPA recognizes that there are numerous lead exposure sources that potentially contribute to the overall level of lead exposure at the OLS. In addition to soil, other potential sources include interior and exterior lead-based paint, lead-contaminated interior dust, hobbies or activities involving materials containing lead, occupational exposure resulting in subsequent contamination of homes, certain types of cookware, some imported candies, and certain types of jewelry. The EPA will seek to partner with other public and private entities to characterize and address all identified sources of lead exposure within the OLS community, and will participate in the development of risk reduction strategies that address all significant sources of lead exposure.

Generally, CERCLA response actions are undertaken to address a release or threat of a release of a hazardous substance, such as lead, into the environment. There are potential limitations to CERCLA authority. For example, CERCLA Section 104(a)(3) states that "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....". This section generally limits EPA's authority to respond to interior lead-based paint or plumbing inside a house. In these cases where CERCLA authority is limited, EPA will identify and coordinate with other interested parties and programs to address lead exposure sources that are not included in EPA authority.

Additional Information

The Proposed Plan and the Administrative Record are available for review during normal business hours at the EPA Region 7 Records Center, the north and south EPA Public Information Centers in Omaha, and the W. Dale Clark main library and the Washington branch library in Omaha. The Administrative Record contains all documents which support EPA's preferred alternative for a final remedy at the OLS.

The public can submit written comments (received by EPA no later than December 1, 2008) to:

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If you have any questions or need additional information about the OLS, please contact:

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