EPA RESPONSIVENESS SUMMARY FOR
COMMENTS RECEIVED ON THE PROPOSED PLAN FOR THE OLS

INTRODUCTION

This Responsiveness Summary has been prepared to present a summary of comments received on EPA's Proposed Plan for a final remedy (Final Proposed Plan) for the Omaha Lead Site (OLS) and EPA's responses to those comments. EPA's Proposed Plan for the final remedy was released for public comment from October 30, 2008, through January 15, 2009.

The initial public comment period for the Final Proposed Plan was originally scheduled to end on December 1, 2008. Prior to the originally scheduled closing date, EPA received a number of requests to extend the public comment period. In response to these requests, the public comment period was extended for an additional 30 days to December 31, 2008. During this first extension of the comment period, additional requests for a further extension were received. EPA provided a final extension of the public comment period through January 15, 2009. Throughout the extended public comment period, EPA received written comments and supporting documents on the OLS Proposed Plan from 37 sources, including 24 private citizens and the following groups or individuals:

- Union Pacific Railroad Company (UP)
- ASARCO, Inc.
- Gould Electronics, Inc.
- OLS Citizen's Advisory Group (CAG)
- Omaha Healthy Kids Alliance (OHKA)
- Lead Safe Omaha Coalition
- State Senator H. Mello
- State Senator J. Nordquist
- Mayor Mike Fahey
- Nebraska Department of Environmental Quality (NDEQ)
- Nebraska Department of Health and Senior Services
- Douglas County Health Department
- Agency for Toxic Substances and Disease Registry (ATSDR)

Two public meetings were conducted on November 18, 2008, in north Omaha and south Omaha to present EPA's preferred alternative for a final remedy at the OLS and respond to questions about the Proposed Plan. A transcript of both meetings was prepared, and this Responsiveness Summary includes a summary of the verbal comments received at the public meetings and corresponding EPA responses. In some instances, the original responses EPA made during the public meetings have been supplemented with additional information for a more complete response

One party, Union Pacific Railroad Company (UP), submitted an extensive set of written comments that were not limited to the Final Proposed Plan, but included individual sets of comments on a number of supporting studies and investigations performed by EPA. In this extensive set, the comments on the supporting documents were submitted as appendices to the primary comments on the Final Proposed Plan. The organization of this Responsiveness Summary reflects the organization of the comments received from UP. The various comments received on the Final Proposed Plan from all parties are initially presented in this Responsiveness Summary with corresponding EPA responses. The comments received regarding the Final Proposed Plan include both written comments and verbal comments received during the public meetings. The initial section of the Responsiveness Summary is divided into two parts. Written comments received on the Final Proposed Plan and corresponding EPA responses are presented in Part A. Verbal comments received during the public meetings and corresponding EPA responses are presented in Part B. Comments and responses presented in the initial section of the Responsiveness Summary are numbered sequentially with no other designation. The order in which the comments appear has no particular relevance.

The initial section of the Responsiveness Summary which includes comments and responses on the Final Proposed Plan is followed by subsequent sections that address comments received from UP on various supporting studies and investigations. These additional comments were submitted as ten separate appendices to the main set of UP comments on the Final Proposed Plan, designated Appendices A through J. This organization will be retained in this Responsiveness Summary. A separate section of the Responsiveness Summary has been prepared to present comments and corresponding EPA responses for each of the ten appendices. These Responsiveness Summary sections are designated A through J to correspond to the appendix designation in the original comments submitted by UP. Comments with each appendix have been numbered sequentially with a letter prefix corresponding to the appendix designation. For example, the third comment submitted in Appendix A would be designated comment A-3. UP also provided nearly 50 pages of comments on the issue of its liability for cleanup costs at the OLS. Since these comments do not impact the EPA remedy selection process, EPA does not provide response to those comments.

A number of the comments received on the Final Proposed Plan were expressed by more than one party, and many of the comments offered by UP in their extensive set of comments were repetitive. Similar elements were repeated throughout the numerous individual comments submitted by UP. These elements were used in various combinations in an attempt to construct arguments supporting their overall position. It was not possible in all cases to extract the individual elements for consolidation each time they appeared in a comment. In some instances, a recurring element would be retained in the comment for completeness, and briefly addressed in the EPA response to that particular comment with a more detailed response presented elsewhere in the Responsiveness Summary. In these instances, EPA attempted to direct the reader to the location within the Responsiveness Summary where the particular element was addressed in greater detail. Therefore, the responses presented in this Responsiveness Summary should be considered collectively. EPA attempted to strike a balance between repeating responses to recurring elements that appeared in many individual comments and providing a detailed response to each element in a single location. The goal in preparing this responsiveness summary was to ensure that the public clearly understands EPA's position on issues raised in the comments received and the rationale which supports EPA's decision for the final remedy at the Omaha Lead Site.

All documents referenced in this Responsiveness Summary are included in the Administrative Record for the Omaha Lead Site.

PART A: WRITTEN COMMENTS

Comment 1:

EPA's approach to the OLS site is based on a preconception that smelter releases are the only source of lead in soil. This is evidenced by the Site Conceptual Model.

EPA Response: EPA has never maintained that smelter releases are the only source of lead in soil at the OLS. To the contrary, EPA has always understood that there are other potential lead-exposure sources besides smelter releases and that not all lead in soil is derived from smelter releases. The purpose of the conceptual site models presented in the 2004 and 2008 baseline human health risk assessments is to describe how *smelter-related emissions* at the OLS might result in exposure of residents. The OLS Final Remedial Investigation (RI) and the Final Baseline Human Health Risk Assessment (BHHRA) both provided text discussing other sources of lead that are present in the OLS. In particular, EPA understands the potential for deteriorating lead-based paint to contribute to soil lead levels in yard soils and to indoor dusts. To help clarify this issue, the site conceptual model for lead in the final risk assessment has been revised to show alternative sources of lead, and the text has been revised to be clear on which sources of lead are evaluated in the risk assessment for lead. Note that EPA has performed speciation studies at the OLS to identify sources of lead detected in soil samples collected from mid-yard and drip zone areas. These speciation studies do indicate that, in many samples, some of the lead that is present is in a form associated with lead-based paint. However, the speciation studies also demonstrate that pyrometallurgical forms of lead associated with the former industrial facilities are present in most of the samples, indicating that smelter releases have significantly impacted soil lead levels throughout the OLS.

Comment 2:

EPA is ignoring a very large body of data that demonstrate that lead-based paint, not smelter emissions, is the predominant source of lead in yard soil at the OLS. This includes:

2a. The spatial pattern of lead in soil at the OLS does not match the pattern that would be expected from wind-born deposition of smelter emissions. Rather, the pattern of lead in soil closely matches the housing age pattern, with highest soil lead levels occurring in the areas with the oldest housing. This is also seen in soil sampling results for the Council Bluffs area, where *the housing is much newer and the concentrations of lead in soil are low despite being closer to the Asarco and Gould facilities. Because the occurrence of lead-based paint is strongly correlated with housing age, this indicates that lead-based paint is the main source of lead in soil.*

EPA Response: EPA believes that the pattern of soil lead contamination encompassed by the Final Focus Area is consistent with modeled airborne lead deposition patterns from the former ASARCO facility. Although air models are generally not highly accurate in predicting the magnitude of airborne lead deposition from industrial sources, the predicted spatial pattern of deposition from the former Asarco facility, which in large part is controlled by prevailing wind direction, is consistent with measured soil lead levels within the Final Focus Area at the OLS.

The area impacted by historic industrial lead emissions is also very similar to the area of older housing stock in eastern Omaha where the presence of lead-based paint is prevalent. Because both patterns are so similar (highest near the former smelters and decreasing as a function of distance away from the smelters), it is very difficult to separate the two phenomena based on spatial pattern analysis alone. Soil lead speciation studies performed by EPA in 2002 and 2007 confirm that OLS properties are impacted by historic industrial lead emissions as well as lead-based paint.

Soil sampling performed by EPA has demonstrated that soil lead levels measured in Council Bluffs are significantly lower than soil lead levels measured in eastern Omaha. EPA believes that this 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 1940s, 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. Severe flooding of Mosquito Creek also significantly impacted Council Bluffs. 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 flood effects would significantly reduce lead concentrations in surface soils. Since most of the historic industrial lead emissions originated from the former ASARCO facility prior to implementation of flood control measures, these flood plain impacts would have significantly reduced lead levels remaining in surface soils in present-day Council Bluffs.

Newer housing age is an additional factor which is likely to have impacted current soil lead levels in much of Council Bluffs. During housing construction surface soils are disturbed through mixing with underlying soils or removal during earthwork that is performed to prepare the building site during construction, and following construction when property is graded to create a yard. These soil-disturbing activities would significantly reduce lead levels in surface soils that would have accumulated through airborne deposition of industrial lead emissions prior to the time that construction occurs. Housing construction in western portions of Council Bluffs, which is nearest to the former lead processing facilities, occurred following implementation of flood control measures in the 1940s. Soil disturbing activities during home construction would significantly reduce the historic deposition levels in these areas of relatively new construction. Following the relatively recent home construction in Council Bluffs, deposition rates from the former lead-processing facilities were greatly reduced and further soil contamination from industrial emissions would have been minimal. By contrast, much of the historic lead deposition occurred in eastern Omaha after homes were constructed (in the late 1800s and early 1900s), and would not have been impacted by earth-disturbing activities during home construction. EPA believes that flood plain impacts along with further mixing of surface soils during housing construction account for the relatively low lead levels found in surface soils in Council Bluffs, Iowa, compared to eastern Omaha.

2b. The RI data show that paint is the primary source of lead in soil. Samples from drip zones are substantially higher than mid-yard samples. Neighborhoods with elevated drip zone samples also have elevated yard samples, regardless of distance or direction from the smelters. This is consistent with weathering of lead-based paint, not aerial deposition.

EPA Response: Figure 1 **(page __?)** shows the relationship between the concentration of lead in the drip zone sample and in the yard samples at 24,575 properties in the Final Focus Area of the OLS. As shown, the relationship between the concentration of lead in drip zone samples and yard soils is not strong. To the contrary, elevated drip zone concentrations are a very poor predictor of elevated yard lead concentrations. This demonstrates that migration of lead from the drip zone into the yard area is not as substantial as claimed and is unlikely to contribute more than a small fraction to the yard soil average in most cases.

Speciation studies have identified a significant pyrometallurgical contribution to soil lead levels in OLS drip zone samples. Former lead smelting/refining operations could contribute to total soil lead levels in drip zone areas through direct deposition or wash-off of smelter emissions deposited on rooftops or impinged on structure siding. Depending on structure size and drainage characteristics, wash-off of former lead smelter/refinery emissions could concentrate pyrometallurgical lead in drip zone areas.

2c. The Small and Large Park Studies performed by EPA establishes that lead-based paint is the primary source of soil lead contamination. Many parks were developed in conjunction with adjacent neighborhoods and provide a good way to distinguish airborne deposition from lead-based paint deterioration. All of the parks have low average soil lead values (14 to 153 ppm). UPRR performed additional sampling at older parks, and ASARCO performed testing at a cemetery and obtained similar results. These data show that when no structures are present at a location, lead levels in soil are not appreciably higher than urban background and that airborne deposition from the smelters is insignificant.

EPA Response: Historic information regarding the development of public parks in eastern Omaha indicates that significant soil disturbance has occurred during initial construction, subsequent modifications, and regular maintenance. Considerable earthwork was required at many parks to create the terrain that exists today. The soil-disturbing activities include grading, filling, and mixing of surface soils with underlying soils during landscaping operations. Deposition of airborne lead from historic industrial emissions resulted in elevated soil lead levels in a relatively thin layer of surface soil. Soil-disturbing activities would result in mixing of surface soils containing relatively high lead levels from airborne deposition with underlying soils that are much lower in lead content. The result of soil mixing is to lower surface soil lead concentrations through dilution with the underlying soils. Most of the airborne deposition from the lead-processing facilities occurred prior to the 1930s, and any subsequent soil disturbance that occurred during the construction and maintenance of public parks would have significantly reduced lead levels in surface soils detected today. It is noteworthy that soil lead levels exceeding 400 ppm were detected at five public parks during recent EPA investigations of small public parks and large public parks in Omaha. The absence of lead-based paint as a potential source at these public parks leaves historic industrial lead emissions as the only remaining source significant enough to cause soil lead levels exceeding 400 ppm.

2d. The Drip Zone Width Study shows an impact of lead-based paint not only in the drip zone but also in samples at an average distance of up to 6 feet from the foundation. Soil in areas previously considered to be outside the drip zone are shown to be within the area that can be contaminated at levels exceeding 400 ppm by deterioration of lead-based paint. EPA must consider lead-based paint as a possible source of lead to both drip-zone and yard soil.

EPA Response: EPA recognizes that the drip zone around homes in the OLS may in some cases extend to distances greater than 30 inches from the foundation. The EPA Superfund Lead-Contaminated Residential Sites Handbook indirectly defines a presumptive drip zone width by specifying that drip zone soil samples should be collected from a distance of 6–30 inches from the structure foundation. One purpose of the OLS Drip Zone Width Study was to generate site-specific data to characterize the typical drip zone width at OLS properties. The OLS Drip Zone Width Study concluded that soil lead concentrations at the OLS properties sampled for this study declined with increasing distance from the foundation to levels below 400 ppm at an average distance of six feet from the foundation wall. This site-specific determination of the typical drip zone width is more representative of OLS properties than the presumptive drip zone width indirectly defined by the Handbook.

In interpreting the results of the Drip Zone Width Study, it is important to understand that all properties included in this investigation were sampled prior to soil remediation, and other factors besides lead-based paint could contribute to elevated soil lead levels in drip zones. For example, drip-zone samples could be elevated by direct deposition of historic industrial emissions onto roof tops or siding of housing, followed by wash-off during rain events. In this regard, the Drip Zone Study characterized soil lead concentrations in the area near home foundations at the OLS but did not characterize the relative contribution of lead-based paint or other potential sources to soil lead levels measured in drip zone areas. Thus, the spatial pattern of soil lead in drip zone areas is not indicative of a particular source, and the existence of elevated soil lead levels in drip zone areas does not demonstrate the contribution of lead-based paint to soil lead levels. The Drip Zone Width Study was not intended to determine if elevated soil lead levels at the OLS properties investigated resulted from lead-based paint or any other potential source or combination of sources, and no such conclusions can be drawn from this study alone.

In order to characterize the source of OLS drip zone soil lead, EPA performed lead speciation on a number of soil samples collected from drip zone areas. Lead speciation of these drip zone soil samples shows a significant, and in some cases, a predominant contribution of pyrometallurgical sources to total soil lead levels in drip zone areas.

2e. The Recontamination Study showed that significant recontamination of soil was observed within 3 feet of the house within a few years. EPA should recognize that if only a few years of paint deterioration can cause elevated soil lead levels, then over 50 years of such deterioration is the cause of existing soil contamination in the OLS.

EPA Response: EPA recognizes that deteriorating lead-based paint has the potential to produce small particles which can become incorporated into the surface soil and contribute to elevated soil lead levels. At some properties, the contribution of deteriorating lead-based paint could potentially increase soil lead concentrations to levels exceeding risk-based cleanup goals in some areas. Speciation of soil samples collected within the Final Focus Area demonstrates that OLS properties are significantly impacted by historic emissions from the former lead-processing facilities. Any contribution to soil lead levels from deteriorating lead-based paint would be in addition to the contribution from the former lead-processing facilities. EPA's response to elevated soil lead levels at OLS properties is based on the demonstrated contribution of historic industrial lead emissions to total soil lead levels.

2f. New scanning electron microscopy data collected by UPRR establishes that lead-based paint is a significant source of soil lead contamination. Within residential properties where lead concentrations are elevated, lead-based paint particles are observed in 7 of 8 cases. Particles of lead-based paint are also observed in 3 of 4 samples of remediated soil. In parks, where lead levels in soil are low, particles of lead-based paint are not observed. EPA's own speciation results support the view that non-refinery (non-pyrometallurgical) sources are the primary contributors of lead in residential yards.

EPA Response: The new scanning electron microscopy results (presented in Attachment 5 to comments from UP) are limited by a number of technical shortcomings. First, data are reported for only three non-remediated properties, two remediated properties, and six parks (one sample each). This is too small a data set to allow any reliable conclusions to be drawn. Second, the report does not include any attempt to quantify the relative amounts of lead from paint and smelter sources in any sample. Simply noting that a sample contains particles derived from paint does not demonstrate that paint is the predominant source. Third, the method used to identify lead-containing particles omits all particles with lead concentrations less than about 3–10 percent. While most chips of lead-based paint are likely to be detected by this approach, many other lead-containing particles will be ignored. This makes it impossible to make statements about the relative contribution of various sources.

Despite these short comings, the results of this analysis support the view that paint particles in soil from non-remediated properties occur primarily in the drip-zone samples, with an average of 12.7 paint particles per sample in drip-zone samples and only 1.2 paint particles per sample in yard samples. Further, of all the lead-bearing particles observed in yard soils from non-remediated properties, 97 percent are not identified as paint, and a number do contain copper, antimony, and arsenic, which is consistent with a smelter-related source. Consequently, it is not appropriate to conclude from these data that paint is the predominant source of lead in either type of soil sample. To the contrary, these limited data are fully consistent with the larger and more thoroughly analyzed speciation data set developed by EPA which indicates that, although some lead-bearing particles in yard soils may be derived from paint, a substantial fraction of the lead-bearing particles are either smelter-related or are of a form that may be derived either from the smelter or from paint. These results are also similar to a previous analysis of 10 yard soils from the OLS (GEOMEGA 1998) that identified pyrometallurgical lead in all soil samples examined, with lead-based paint being dominant in only two of the samples.

With regard to the finding that paint particles are not observed in soil samples from parks, this is not unexpected. The claim that the levels in parks are “low” and indicate that smelter releases are not significant is not correct. The average concentration of lead in native soils in Nebraska is only 10-20 ppm (Shaklette and Boerngen 1984). The concentrations of lead observed in parks in this study range from 56-234 ppm. If most of this is derived from smelter deposition, the contribution can hardly be claimed to be insignificant. Moreover, when parks were developed, it is likely that considerable disturbance of surface soils occurred which would tend to decrease the apparent contribution of smelter lead that had occurred before development.

2g. The levels and pattern of lead in soil at the OLS are similar to other cities with no smelter. Lead soil concentrations for urban areas such as Boston, Minneapolis, and New Orleans are often above 400 ppm, even when there are no impacts from lead smelting or refining. In these older neighborhoods, lead-based paint and historic releases from leaded gasoline are commonly identified as the sources of lead. A common theme is “the older the home, the greater the soil lead concentrations.” At Omaha, the pattern of soil lead levels closely matches the age of housing pattern, indicating that leaded paint, not smelter releases, is the source.

EPA Response: EPA is aware that elevated lead levels occur in soil in a number of older urban areas, including areas where releases from smelters are likely to be absent or minimal. However, simply because this is true does not mean that smelter-related releases are insignificant at the

OLS site. Air modeling calculations by UP suggest that smelter-related releases may have contributed levels of 800 ppm or more in areas near the smelter. Even at the outer margins of the focus area, UP air modeling predictions suggest that smelter releases may still be in the 100-200 ppm range. Similar calculations by EPA suggest even higher levels. These modeling predictions are supported by speciation studies in which pyrometallurgical forms of lead are observed in soil samples both near and far from the smelters. This indicates that smelter-related releases have contributed to soil lead levels throughout the focus area whether or not additional contributions are provided by lead-based paint.

2h. An April 2, 2004, e-mail contains a statement by a Public Health Advisor employed by ATSDR [Agency for Toxic Substances and Disease Registry] that states: "In Omaha, the main available sources are lead-based paint and lead-contaminated soil. The excellent work…clearly indicates that lead-based paint contributes the most to the ongoing problem."

EPA Response: EPA believes that the statement offered by a representative of ATSDR reflected the personal opinion of a single individual made without a full awareness of available exposure information pertinent to the OLS. ATSDR has provided EPA with an official position statement regarding potential lead exposure sources at the OLS recognizing both lead-based paint and contaminated soil as important exposure sources. EPA does not consider the off-hand statement offered by a single ATSDR representative to constitute a defining consideration for decision-making purposes.

2i. Blood lead studies by Douglas County show that lead-based paint is the chief cause of elevated blood lead values in children at the OLS.

EPA Response: The EPA is aware that the presence of lead-based paint has been frequently observed by the Douglas County Health Department (DCHD) at residences where children with elevated blood lead levels have been identified. However, simply because lead-based paint is observed at a home where a child has an elevated blood lead level does not mean that the paint is the only, or even the largest, contributor to the elevated blood lead. Most of the older homes where lead-based paint is common are located in areas that were also likely impacted by smelter releases. Thus, childhood exposure to lead in soil originating from the former lead-processing facilities would be highest in the older homes near central Omaha where the presence of lead-based paint is prevalent.

DCHD has not made a determination that the primary source of lead exposure at households investigated is lead-based paint. Although lead-based paint hazards have been observed during investigations of many households, DCHD has not performed studies capable of determining the relative contribution of different lead-exposure sources. The total lead exposure of a child can result from multiple exposure sources both within the child's current household and elsewhere. DCHD has not identified lead-based paint as the primary exposure source in their investigations of childhood lead poisoning at the OLS.

2j. *Indoor dust contaminated with lead-based paint is a more significant source of exposure that lead in soil. The 2004 HHRA states that "soil concentration explains only 18.57% of the variance in the indoor concentration". In other words, over 80% of the lead in indoor dust is not attributable to soil lead.*

EPA response: This interpretation of the coefficient of variation (R^2) from the 2004 HHRA soil-dust study is not correct. While it is correct that soil concentration accounts for only 18% of the variability, this does not mean that 82% of the lead in indoor dust is not derived from soil. The basic model is:

$$C(dust) = \sum C(i) \cdot mf(i)$$

where:

C(i) = concentration of dust in medium "i" that contributes to indoor dust
mf(i) = mass fraction of medium "i" in indoor dust

Much of the variance in the C(dust) term is attributable to random variation in the mass fraction terms (i.e., random variations in the amount of outdoor soil that is carried into each house, as well as the amount of non-soil material that contributes to indoor dust in each house). Variations in these mass fraction terms will result in a low value of R^2 even if soil lead is the only source of indoor lead in dust (i.e., all C(i) terms are zero except for C(soil)). Moreover, the occurrence of measurement error (sampling variability) in the C(soil) term tends to diminish the strength of the apparent relationship between C(dust) and C(soil). New data collected in 2008 on the relation between lead in soil and dust yielded a somewhat higher R^2 value (0.48), and indicated that, on average, only 42 ppm of the lead in indoor dust that was attributable to non-soil sources. This observation is not consistent with the theory that most lead in indoor dust is derived from indoor lead-based paint.

Comment 3

The final Risk Assessment did not provide any information on the relative contributions of lead from the smelter and lead from other sources (especially lead-based paint) as a source of exposure to children. In February 2008 EPA stated that the final Risk Assessment would include consideration of lead-based paint, and a statement in the RI indicated that lead-based paint was included as an exposure pathway in the final Risk Assessment.

EPA Response: In accordance with EPA policy for risk assessments performed at residential sites, risk associated with lead exposure at the OLS was characterized using the Integrated Exposure Uptake Biokinetic Model (IEUBK). As discussed in Section 4.7.1 of the Guidance Manual for the IEUBK Model for Lead in Children (USEPA 1994), risks from lead-based paint may occur from two pathways: 1) a contribution from lead-based paint to lead in outdoor soil and/or indoor dust, and 2) direct ingestion of leaded paint chips. The guidance indicates that exposures due to ingestion of lead from paint that has entered soil or dust should be evaluated because this represents a chronic on-going source of exposure. The guidance also indicates that quantification of risks from direct ingestion of paint chips should generally not be attempted because data are not available to estimate the frequency or magnitude of lead intake from paint chips or the degree of absorption from paint chip ingestion, even if data were available on the concentration of lead in paint. Consistent with this guidance, the OLS risk assessment for lead does include the contribution of lead-based paint to outdoor soil and indoor dust. Although no calculations were performed to evaluate ingestion of lead-based paint chips, this is widely recognized as being an exposure pathway of substantial public health concern.

Also note that the 1998 Clarification to the OSWER Soil Directive states, “Any activities to clean up interior lead-based paint by PRPs or other parties should not result in an increase of the risk-based soil cleanup levels.” This emphasizes that risks from lead in soil (all sources) must be addressed independently of the degree to which the levels in soil are attributable to lead-based paint and whether or not any actions are being taken to address exposures from lead-based paint.

A common misperception of the EPA risk assessment approach at lead-contaminated residential sites is that consideration of alternate exposure sources, such as lead-based paint, would reduce soil cleanup requirements. The opposite is actually true. Since the IEUBK model identifies a soil cleanup level that is required to lower the cumulative exposure from all sources to an acceptable level, the presence of additional sources of lead exposure causes the IEUBK model to predict more stringent soil cleanup levels than are required to achieve the Remedial Action Objective. The required soil cleanup level predicted by the IEUBK model is lower (more stringent) if alternate lead exposure sources are included in the risk assessment.

Comment 4

The final Human Health Risk Assessment did not utilize available blood lead data from the site as part of the risk characterization process.

4a. Blood lead data should have been considered so that the cleanup value accurately reflects soil exposure risk. The Douglas County Health Department measures exposure sources such as paint and soil during their investigation of childhood lead-poisoning cases. The data showed lead-based paint hazards in 94 percent of 2007 case management occurrences. This data clearly identifies lead-based paint as a major source of childhood lead exposure rather than soil alone, as stated in EPA’s Proposed Plan.

EPA Response: In accordance with EPA policy, blood lead data collected at a site do not provide an adequate basis for evaluating risks or for setting or revising the cleanup level. There are many reasons for this. One of the most important reasons is that EPA seeks to make cleanup decisions on a property-by-property basis, and blood lead data from any one property, taken alone, are never adequate to evaluate the authentic risk from soil at that property. In addition, even at the community level, blood lead data are subject to a number of potential limitations that generally preclude their use in risk management decision-making at a site.

4b. Children's blood lead levels are declining in and around the OLS, and the percentage of children with elevated blood lead levels within the 7 zip code area approximating the site has decreased to 3.7%, which is below the Remedial Action Objective. The decreasing percentage is consistent with national trends which the Centers of Disease Control and Prevention (CDC) attributes to efforts to remove lead from gasoline, food cans, and residential paint, as well as the ongoing decline in the number of homes with lead-based paint.

EPA Response: EPA agrees that some of the downward trend in blood lead levels in children in the seven zip codes is likely attributable to the beneficial effects of national programs that have reduced lead exposures from gasoline, food, water, and air. However, it is not correct to assume that no further action is needed at the OLS simply because the community-wide average frequency of elevated blood lead values is below the RAO. Rather, the RAO is applicable to every individual property, and EPA seeks to identify and take remedial action at every property where soil levels of lead exceed a level of heath concern.

The commenter demonstrates a lack of understanding of the RAO. The RAO is to have no more than a 5 percent probability that any child or similarly exposed children would have a blood lead level of 10 ug/dl or higher. Having less than 5 percent of the children in the community with blood lead levels less than 10 ug/dl is a significant accomplishment but does not meet the RAO.

4c. Available blood lead data, paired with soil and dust data, should have been used to calculate a site-specific GSD value. When this is done at other sites, the GSD is usually lower than the default, and this can have a large effect on the soil cleanup level.

EPA Response: Use of site data to estimate a site-specific GSD is very difficult and is strongly discouraged. As stated in USEPA 1994 (Guidance Manual for the IEUBK Model for Lead in Children):

> We must discourage the user from changing the GSD value by use of empirical site-specific data from a blood lead study. As discussed in Section 4.5 below, blood lead studies may be subject to subtle sampling biases and changes in child behavior in response to the study. The GSD value reflects child behavior and biokinetic variability. Unless there are great differences in child behavior and lead biokinetics among different sites, the GSD values should be similar at all sites, and site-specific GSD values should not be needed.

4d. Available blood lead data should be used to evaluate the short-term and long term effectiveness of the soil cleanup strategy before committing to spending a lot more money.

EPA Response: While blood lead data can be used to measure the effectiveness of a remedial action such as soil removal, this is difficult to do when the blood lead data are obtained as part of a volunteer program rather than a specific scientific investigation. Studies at other sites demonstrate that soil removal is effective in reducing lead levels not only in outdoor soil but also in indoor dust and that soil remediation leads to decreased blood lead levels in children (Mielke and Reagan 1998, Lanphear et al. 2003, von Lindern et al. 2003, Sheldrake and Stifelman 2003).

Comment 5

The boundary of the Final Focus Area is too large. The area should only include areas linked to releases of hazardous substances from the former ASARCO and/or Gould operations. Air modeling shows that the area of impact is much smaller. Expanding the boundary only adds properties where impacts to soil are from lead-based paint.

EPA Response: The Final Focus Area boundary established by EPA is based upon soil sampling data, lead speciation of soil samples, and other studies directed at characterizing the impact of historic industrial emissions on soil lead levels at the OLS. The Final Focus Area is intended to encompass the area that may be significantly and unacceptably impacted by emissions from the former lead-processing facilities. This is accomplished by finding the boundary where there is no more than a 5 percent frequency of average mid-yard soil lead levels exceeding the 400 parts per million (ppm) action level. It is expected that nearly all properties that have been unacceptably impacted by smelter releases will be included inside this boundary.

However, there is no expectation that every property within the focus area has been unacceptably impacted by smelter releases. This can only be determined by soil sampling. This is the purpose of the focus area boundary - to identify where soil measurements are needed to identify impacted properties.

Soil sampling data available to date demonstrate that the frequency and magnitude of elevated soil lead levels decreases with increasing distance from the former facilities. This pattern of decreasing soil lead levels with increasing distance from the former lead-processing facilities is consistent with a deposition pattern expected from fugitive and stack emissions from these sources. The pattern is also consistent with a role of housing age (and occurrence of lead-based paint) so expansion of the boundaries has indeed resulted in inclusion of older housing at greater distance from the former ASARCO and Gould facilities. However, soil lead speciation studies have identified lead from pyrometallurgical sources throughout the Final Focus Area, including those properties at a greater distance from the former facilities. Speciation studies have concluded that pyrometallurgical operations, which are associated with the former lead processing industries, represent the largest identified source of lead in residential yards.

Speciation studies at the OLS have also identified lead originating from pyrometallurgical sources in soil samples collected from more than 90 percent of the properties speciated throughout the Final Focus Area. The presence of lead forms associated with lead-based paint have also been identified in soil samples collected from some OLS properties, but these lead forms associated with paint are less prevalent than pyrometallurgical forms found throughout the Final Focus Area. The data indicate that the properties within the Final Focus Area are significantly impacted by historic emissions from the former lead-processing facilities in downtown Omaha.

Comment 6

EPA has failed to collect data that were promised to support an exposure study to determine the most significant exposure sources at the OLS. The NDEQ requested that EPA collect additional data in order to evaluate the relative contribution of interior lead-based paint and soil to lead in interior dust. The State of Nebraska Risk Assessor stated that the 2004 risk assessment was not defensible and would require additional data collection from all sources of lead. In the 2004 Interim ROD, EPA committed to addressing all sources of lead exposure and implementing a comprehensive program which would "seek to partner with other public and private entities to characterize and address all identified sources of lead exposure to the site community" and to "work with other interested parties and authorities to identify potential funding sources and mechanisms to address these other sources of lead exposure" in cases where CERCLA authority is limited. However, EPA did not collect data on lead levels in interior or exterior paint data, and collected interior dust data from only 98 residences. Final risk calculations were based on an unsubstantiated estimate that approximately 74 percent of lead in interior dust comes from soil. Collection of paired data on blood lead and environmental lead at multiple locations should have been performed to allow identification of the relative sources of lead exposure.

EPA Response: In making decisions about what additional data would be collected to support the final risk assessment and the final ROD, EPA considered two main factors: a) whether or not the data were needed to support decision making within the scope of EPA response authority under CERCLA, and b) whether or not the data would likely be definitive.

EPA began by considering the merits of performing a multi-media study to quantify the relative contributions of various sources of lead (especially lead-based paint) to lead exposures in children. After consultation with ATSDR, EPA determined that a study of this type would be of very limited utility because:

a) There are already a number of multi-media studies in the literature that have been performed at other lead smelter and refinery sites that establish that
    - ▪ The most important exposure media for children are dust and soil (e.g., Lanphear et al. 1998, Lanphear et al. 2003, von Lindern et al. 2003)
    - ▪ The most important sources of lead in dust and soil are smelter releases, even when lead-based paint is present (e.g., Spalinger et al. 2007)

b) Studies already available at the OLS are consistent with this model. Speciation data (Drexler 2007), mass balance calculations (Drexler and Medine 2007), and isotopic ratio analysis (Manton et al. 2000, Rabinowitz 2005) all indicate that the contributions of lead from smelter releases to soil and dust are generally of similar magnitude or even larger than the contribution from lead-based paint.

c) To the extent that interior and exterior lead-based paint are contributing lead to dust or soil, the risks from that contribution are included in the risk calculations based on direct measures of total lead levels in soil and dust.

d) Even if data were collected on the concentration and extent of interior and exterior lead-based paint at OLS homes, this would not be useful for risk management decision-making because the contribution of lead-based paint to soil or dust at a property is not a constant, but varies over time as a function of the condition of the paint. For example, just because lead-based paint is in good condition at present does not mean that it was not a source in the past. Conversely, just because paint is in poor condition at the present does not mean it was an important contributor in the past. Consequently, attempts to derive quantitative models that can predict the relative contribution of lead-based paint and smelter releases to soil and dust at a property are very difficult and are unlikely to be definitive.

e) Most important, EPA risk management decision-making regarding the need for soil response actions at a property that has been impacted by smelter releases does not depend on having a precise quantitative breakdown of the sources of lead in the soil. All that is required is knowledge that the level of lead in soil is above a level of potential health concern and that smelter releases have contributed to the total level in soil. As noted above, data are already sufficient to demonstrate that smelter releases are a substantial contributor to soil lead at locations within the OLS.

Based on these considerations, EPA determined that an additional multi-media study of relative source contributions at the OLS was not necessary to support risk management decisions under CERCLA.

Next, EPA considered the merits of collecting additional data on the relationship between soil lead levels and interior dust levels at individual properties. Although there were substantial data of this type already in existence, EPA determined that collection of new data were needed because the existing data were subject to several limitations including the following:

- Soil sampling locations were selected at random, and this resulted in the majority of sampling locations having soil lead levels of less than 1000 ppm. While this data set is considered to be representative of the site, the uneven distribution of values along the x-axis (soil lead level) reduces confidence in the slope of the line (Msd) since the slope is strongly influenced by a few data points at high soil lead levels.
- Yard-wide average values for soil lead are based on data from two different analytical methods - Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) and

X-Ray Fluorescence Spectroscopy (XRF) - whereas average indoor dust levels are based on ICP-AES analyses only.

- The particle size used for analysis of dust and soil was different (2 mm for soil, 150 um for dust), and neither of these is equal to the size fraction (< 250 um) that EPA usually associates with soil and dust ingestion by hand to mouth contact.

Because of these limitations, a new set of 98 paired soil and dust samples were collected to support the 2008 final human health risk assessment. The sampling and analysis strategy was revised to minimize the limitations associated with the previous data set. With regard to sample number, it is important to emphasize that the number of samples needed is NOT dependent on the number of properties in the site. Rather, the number of samples needed is a function mainly of the degree of between-sample variability. The sampling and analysis plan for the collection of the paired soil-dust samples reviewed the available data and determined that it was likely that an adequate soil-dust relationship could be established if it were possible to collect 20 samples from each of six soil strata. In actuality, target numbers were not achieved for all strata because a sufficient number of properties could not be located for each of the six strata. Nevertheless, a set of 98 samples does form a good basis for characterizing the relationship.

The data were used to establish a mathematical relationship between the concentration of lead in dust and lead in soil. The statistical method used was ordinary linear regression[1], and the resulting equation is:

$$\text{Cdust} = 42 \text{ ppm} + 0.74 \cdot \text{Csoil}$$

This data set and the data set upon which it is based yield several important conclusions. First, the intercept term (42 ppm) reflects the average contribution of non-soil sources (including indoor lead-based paint) to lead in indoor dust. This is a relatively small value, indicating that even though there were a few homes where indoor paint was likely a dominant source, indoor lead-based paint was a relatively minor contributor in most homes. Second, the slope term (0.74) is relatively large, indicating that on average, about three-fourths of indoor dust is derived from soil. Consequently, when lead is present in outdoor soil, this is an important (and usually dominant) contributor to lead levels in indoor dust. This conclusion is supported by the previous soil-dust investigation at the OLS (NHHSS 2004), as well as a number of studies at other sites in the region (e.g., the Oronogo-Duenweg site in Jasper County, Missouri, the Big River Mine Tailings site in St. Francois County, Missouri, and the Cherokee County site in Kansas) and by a number of studies published in the peer-reviewed literature that emphasize the importance of soil and dust as the main sources of lead exposure in children (e.g., Lanphear et al. 1998, von Lindern et al. 2003, Lanphear et al. 2003, Spalinger et al. 2007).

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[1] Note: The draft risk assessment inadvertently indicated this relationship was based on the 95% upper confidence limit of the slope estimated by ordinary linear regression. The final risk assessment has been revised to correct this error.

Finally, EPA considered the need for measuring lead levels in other environmental media to which children may be exposed. For air, it was determined that existing data were of adequate quality and that additional air monitoring was not needed. For water, EPA performed a study to measure lead levels in both first flush and post flush waters at 98 homes. These data were considered to be especially important because lead in drinking water can be a substantial source of exposure in homes where older pipes or older plumbing fixtures are present. The data indicated that lead levels were low in almost all cases and that drinking water was not a substantial lead exposure source at the OLS.

Comment 7

EPA's Proposed Plan focuses only on soil removal, and ignores repeated requests from the community and the State for a comprehensive plan that will address risks from all sources of lead exposure including lead-based paint. The option exists to fund a comprehensive remedy that will achieve EPA and community goals. One of the most important components is an ongoing education program along with removal of exterior lead-based paint where necessary. EPA should fulfill its commitment to engage other entities such as OHKA as major partners and key components of such a remedy.

EPA Response: The 2008 OLS Feasibility Study does consider a comprehensive plan intended to incorporate EPA activities into a broader community program addressing all sources of lead exposure. The Feasibility Study states:

> "The EPA is aware that lead in the environment at the OLS originates from many sources. In addition to the identified soil exposure pathway, which the above listed technologies will address, other important sources of lead exposure are interior and exterior LBP, lead-contaminated interior dust that originates from LBP and contaminated soil, and to a much lesser extent, tap water…. 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, and government agencies, private organizations, PRPs, and individual residents and to participating in a comprehensive lead risk reduction strategy that addresses lead risks comprehensively."

The Feasibility Study describes the limitation on EPA's authority to address lead-exposure sources other than lead-contaminated soil and cites EPA policy that recommends seeking partners to address these other lead-exposure risks. The Feasibility Study further states:

> "While acknowledging the importance of addressing lead exposures from all sources and developing a comprehensive approach, the EPA can only recommend, as part of a preferred or selected remedy, those actions that the EPA has the authority and policy direction to address….In the absence of resources from other parties to address such lead hazards, at residences where remediation of soils is performed, the EPA remedy could also address:
>
> - Controlling interior lead-contaminated dust through professional cleaning or providing high efficiency particulate air (HEPA) vacuum cleaners to home owners when exterior soil contributes to interior dust contamination.
> - Assessing the condition of, and stabilizing or otherwise controlling, hazards at properties where flaking lead-based paint may threaten the future protectiveness of a soil cleanup by recontaminating the clean soil placed in the excavated areas.
> - Providing support to a health education program during cleanup actions."

In the development of alternatives in the Feasibility Study, Alternative 2 (EPA's preferred alternative) includes the following:

- "a HEPAVAC will be provided to home owners whose homes exceed standards for interior dust;"
- "In order to prevent the recontamination of the clean soil placed in properties after excavation, deteriorating LBP may be stabilized on homes prior to or after the soil excavation…those homes that are determined to have the potential for elevated soil lead levels to develop due to deteriorating LBP will be addressed;"
- "Informational devices that will be implemented at the OLS site include operation of a local registry containing lead hazard information on properties in the OLS;" and
- "The current lead hazard education program would be continued through completion of the remedial action in cooperation with the ATSDR, NDEQ, and the DCHD. The existing 2 public information centers…would continue to operate until the remedial action is completed….The public health education program would be continued that includes providing community education through meetings and literature and distributing fact sheets containing information on controlling lead exposure. The EPA would continue providing lead hazard information to the public through public media (television, radio, newspapers, internet)."

As indicated above, the 2008 OLS Feasibility Study develops and evaluates alternatives that include incorporation of EPA activities into a comprehensive remedy that addresses all potential sources of lead exposure. However, certain potential lead exposure sources, such as interior lead-based paint, are outside EPA's statutory authority for direct response. The elements of a comprehensive remedy that are outside EPA's authority cannot be included as a preferred or selected remedy since EPA cannot ensure that these activities will be performed and cannot provide funding or compel others to perform these actions outside its authority. The EPA is utilizing the full extent of the lead hazard response authority under the Superfund statute to address non-soil sources of lead exposure at the OLS, including exterior LBP and interior dust. The final remedy also includes public health education activities that are directed at controlling risks associated with soil as well as non-soil sources. Consistent with the December 2004 Interim Record of Decision and the 2008 Proposed Plan, EPA remains committed to participate in a comprehensive remedy that addresses all potential sources of lead exposure in the Omaha community.

Comment 8

One commenter provided a set of comments describing how EPA's remedy selection process at the OLS is arbitrary and capricious and violates CERCLA, the NCP, and relevant EPA guidance. Several of these comments were also submitted in reference to another specific aspect of OLS activities that they pertain to. In these instances, the more complete response is provided elsewhere in this Responsiveness Summary, and the response will not be repeated under this comment. A remaining set of comments pertaining to compliance with CERCLA, the NCP, and EPA guidance that are not addressed in detail elsewhere in this Responsiveness Summary are as follows:

Comment 8a

The Proposed Plan is failing and will continue to fail. The OLS Recontamination Study demonstrates that soil will become recontaminated from on-going deterioration of lead-based paint in a relatively short period of time following soil remediation. Exterior lead-based paint must be cleaned up or stabilized <u>before</u> any soil remediation occurs.

EPA Response: EPA does not agree that the Proposed Plan is failing or that the Recontamination Study demonstrates that remediated soils will become recontaminated in a short period of time. Average soil lead levels that developed in drip zone areas following soil remediation were generally below the 400 action level for the OLS. Average soil lead concentrations exceeding 400 ppm beyond a distance of six feet from the foundation did not develop following soil remediation at any of the properties investigated in the Recontamination Study. The study concluded that the length of time passed since soil remediation occurred had no apparent effect on the soil lead levels observed at pre- or post-stabilization properties. The Recontamination Study demonstrates that elevated soil lead levels can potentially develop in areas near the foundations of homes following soil remediation if deteriorating exterior lead-based paint is not stabilized. The Recontamination Study supports the need for stabilization of exterior lead-based paint to control the potential for soil lead levels to increase following soil remediation. The final remedy includes stabilization of deteriorating exterior lead-based paint to assure that the final remedy continues to protect human health.

EPA intends to accelerate the pace of performing exterior lead-based paint stabilization at eligible properties. For properties which are determined to be eligible for lead-based paint stabilization, EPA's goal is to perform lead-based paint stabilization prior to soil remediation. This can be accomplished by assigning properties for soil remediation which are not eligible for lead-based paint stabilization while lead-based paint stabilization is accelerated at eligible properties prior to soil remediation. For those properties where soil remediation is performed prior to lead-based paint stabilization, data from the OLS Recontamination Study suggests that HEPA-vacuuming of exposed soil surfaces following paint stabilization results in soil lead levels that are protective of human health at the completion of the remedial action.

Comment 8b

The proposed remedy violates CERCLA § 121 because no other treatment technologies besides phosphate treatment were considered and the preferred remedy doesn't include treatment. The commenter contends that EPA did not consider the nine remedy selection criteria in the NCP and that short-term risks associated with implementation of the proposed remedy were not considered. The commenter stated that the alternatives evaluated for the final remedy were not sufficiently different from the alternatives evaluated for the interim remedy.

EPA Response: EPA acknowledges that phosphate treatment was the only treatment technology that was developed as a component of a remedial alternative. In fact, EPA did not identify any other treatment technologies that were potentially applicable to the final remedy at the OLS; therefore, no other treatment technologies were included in the development of alternatives. CERCLA establishes a preference for remedies that utilize treatment but does not require that selected remedial actions include treatment as a component of the remedy. EPA did consider the nine remedy selection criteria included in the NCP during the remedy selection process for the OLS. This analysis is presented in the Final OLS FS, OLS Proposed Plan and Final Record of Decision. Short-term risks associated with implementation of remedial alternatives were evaluated in the OLS Final FS and Proposed Plan and were further developed in the analysis presented in the OLS Final Record of Decision. There is no requirement under CERCLA or the NCP for development of remedial alternatives that differ from remedial alternatives developed and considered in a previous interim remedy selection process.

Comment 8c

The EPA is insensitive to community concerns and did not provide the requisite opportunity for public involvement in the final remedy selection at the OLS. The commenter asserted that adequate opportunity for public review and comment on the supporting documents for the OLS Proposed Plan was not provided.

EPA Response: EPA is certainly sensitive to community concerns and has carefully considered all comments received from the public in development of the final remedy for the OLS. The minimum 30-day comment period for the OLS Proposed Plan was exceeded by releasing the OLS Proposed Plan on October 30, 2008, and not closing the public comment period until January 15, 2009, after granting two extensions in response to requests from interested parties. The supporting documents for the OLS Proposed Plan, which include the RI, FS, BHHRA, and others, were available for review in the OLS Administrative Record both prior to and during the public comment period for the OLS Proposed Plan. There is no requirement for sequential release of these supporting documents prior to the public comment period on the Proposed Plan, nor is there a requirement for an opportunity for public comment on these documents separate from the opportunity for comment provided on the Proposed Plan. EPA exceeded the CERCLA minimum public participation requirements by making these supporting documents available to the public for review prior to release of the OLS Proposed Plan for public comment.

Comment 8d

The commenter stated that EPA should follow HUD standards in the selection and implementation of the OLS final remedy and that costs associated with control of lead-based paint should be charged to HUD.

EPA Response: Lead Hazard cleanup standards and procedures developed by HUD are in the To Be Considered category of requirements in the CERCLA remedy selection process and were so identified in the OLS Final FS, Proposed Plan, and Final Record of Decision. The OLS response is being performed by EPA under CERCLA authority, and there is no provision in the statute that would hold HUD responsible for any of the response costs. Stabilization of lead-based paint at OLS properties is being performed to protect the effectiveness of the CERCLA soil remedy.

Comment 8e

The commenter cites EPA guidance that states that significant health benefit is gained by removal of contaminated interior dust as early in the cleanup as possible, and removal of dust should be periodic throughout the project and should culminate in a final cleaning of all residences exceeding an action level after the exterior sources have been remediated.

EPA Response: Although the final remedy selected for the OLS does not include removal of interior dust as a component of the remedy, the interior dust response component of the selected final remedy does include providing household vacuum equipment fitted with HEPA filtration to residents at properties where dust lead criteria are exceeded in floor wipe samples. The interior dust response also includes health education and instruction on the importance, use, and maintenance of the HEPA vacuuming equipment. The interior dust response component of the selected final remedy for the OLS will be performed at eligible houses throughout the course of the final remedial action.

Comment 9a

UPRR is not liable for costs. UPRR does not meet any of the definitions of a PRP and is not a PRP.

Comment 9b

Emissions from Gould are less than 0.3 percent of those from ASARCO and should be considered de minimus.

EPA Response to Comments 9a and 9b: The purpose of the responsiveness summary is to respond to comments received on EPA's preferred remedy. The selection of a remedy is not affected by a party's CERCLA liability. It is not appropriate for EPA to respond to any comments discussing liability under CERCLA.

Comment 10

Excluding lead-based paint as a source has likely overestimated the impact of soil on children's blood lead levels which provides a false sense of security, overestimates the number of yards requiring replacement, and needlessly directs millions of dollars towards an ineffective strategy to reduce lead poisoning. EPA's assumption that historic air emissions are the primary source of exposure is likely to have overestimated the impact of soil on children's blood lead levels, which will prevent EPA from meeting the Remedial Action Objective.

EPA Response: EPA has not excluded lead-based paint from the risk assessment. To the extent that lead-based paint has contributed to elevated levels of lead in soil or indoor dust, these contributions are included in measurements of lead in these media, and these contributions are included in the risk calculations. The calculations indicate that soil lead (including lead from both smelter deposition and lead-based paint) is a very significant source of lead exposure to children at the OLS; hence, removal of contaminated soil as an exposure source is expected to significantly reduce lead exposure in area children. Studies at other sites demonstrate that soil removal is effective in reducing lead levels not only in outdoor soil but also in indoor dust and that soil remediation leads to decreased blood lead levels in children (Mielke and Reagan 1998, Lanphear et al. 2003, von Lindern et al. 2003, Sheldrake and Stifelman 2003).

EPA does not agree that this approach results in a false sense of security. To the contrary, if contributions of lead-based paint were excluded from soil and dust, risks from lead (all sources) would be underestimated and this could result in an underestimation of the true degree of lead hazard at the OLS.

Note that the risk from direct ingestion of lead-based paint chips is not included in the risk calculations. If this pathway were included, the IEUBK model would, in fact, predict an even greater need for soil remediation to compensate for this additional exposure. However, EPA does recognize the potential for lead-based paint ingestion and other lead sources to significantly contribute to overall exposure at individual households, and EPA's health education programs have emphasized that lead-contaminated soil is one of a number of potential lead exposure sources that children must be protected from in the Omaha community.

Comment 11

An EPA risk assessor indicated in a February 12, 2004, e-mail that there did not appear to be a significant relationship between soil and levels of lead in dust.

EPA Response: The relationship between lead levels in soil and dust is variable between different properties due to a number of factors, including the extent to which outdoor soil is transported into a home and the level of lead contribution from non-soil sources. Nevertheless, based on 98 paired soil-dust measurements collected to support the final human health risk assessment, after exclusion of three outliers, a statistically significant relationship does exist between lead levels in soil and dust. When a linear model is fit to the data using ordinary linear regression, the R^2 value is 0.48 and the slope is statistically different from zero ($p < 0.001$). As discussed in Appendix F of the risk assessment, the true relationship between lead in soil and dust is likely somewhat stronger but is partially obscured due to random measurement error in the soil concentration values.

Comment 12

The trend in blood lead levels in Omaha reflects the national trend, declining at approximately 1 percent per year, and Omaha blood lead data shows that the Remedial Action Objective has already been met since only 3.7 percent of children residing within the zip codes of the OLS have elevated blood lead levels.

EPA Response: The Remedial Action Objective for the OLS, as presented in the OLS Final Record of Decision, is "*to reduce the risk of exposure of young children to lead in 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 Φg/d.”* This objective is based upon the predicted blood level that would develop according to the IEUBK model in response to lead exposure for an individual child or group of similarly exposed children.

It is very important to emphasize that the Remedial Action Objective (RAO) applies to each individual property at the OLS, and whether or not the RAO has been achieved cannot be evaluated based on community-level statistics. For example, consider the hypothetical case where there are 1000 properties at a site. Of these, the risk of having an elevated blood lead is 2 percent at 950 properties, and is 20 percent at 50 properties. At the community level, the expected incidence of children with elevated blood lead will be about 2.9 percent, suggesting that the RAO has been met. However, it is obvious that the RAO has not been met at the 50 properties with high risk, and that these properties must be identified and remediated. In addition, community-level statistics are limited by the fact that all children at the OLS do not undergo blood lead screening; therefore, it is not possible to account for children or groups of children that may have elevated blood lead levels resulting from higher levels of lead exposure that are not represented in the subset of children that receive blood lead screening.

To measure achievement of the Remedial Action Objective, EPA considers data from the Baseline Human Health Risk Assessment to determine the soil cleanup level corresponding to less than a 5 percent probability that a child or group of similarly exposed children will develop a blood lead concentration exceeding 10 ug/dL. The Remedial Action Objective is achieved at individual properties when soil remediation reduces soil lead levels below the established cleanup level.

Comment 13

The sampling procedure for the Recontamination Study should have included collection of a single multi-point composite from the drip zone along each of two sides of the building to characterize average lead concentrations across the entire drip zone rather than the lead concentration gradient through the drip zone.

EPA Response: The purpose of sampling drip zone areas for the Recontamination Study was to characterize the distribution of soil lead levels at incremental distances from the foundation walls, not to get average lead concentrations across each home’s drip zone. Collection of a single composite sample by combining aliquots collected at incremental distances from the foundation would provide a measure of the average soil lead level across the drip zone. The incremental data can be mathematically averaged to determine average soil lead levels across the drip zone in addition to providing soil lead data at incremental distances from the foundation. The incremental sampling approach was applied during the OLS Recontamination Study as presented in the Recontamination Study Work Plan.

Comment 14

Visible paint chips should not have been removed from soil samples during Recontamination Study sampling, just as they are not removed from soil samples under other sampling protocols for the OLS. Young children may ingest paint chips. Paint chips are an integral part of the soil recontamination process and may become incorporated into the soil in the future by breaking down into smaller particles or weathering. Removal of paint chips is unnecessary because large paint chips will be removed by sieving and fine particles broken from the larger chips during sample handling and preparation should remain in the sample to reflect the future potential contribution of paint chips to soil lead levels. The consequence of this error is a gross underestimation of the recontamination due to lead-based paint.

EPA Response: Removal of large paint chips from soil samples prior to sample preparation and analysis during the Recontamination Study is consistent with sample collection protocols for all other soil investigations at the OLS, during which large paint chips have also been removed from soil samples. This sample collection procedure is consistent with EPA guidance. Large paint chips do not constitute a component of soil, and are appropriately separated from soil samples prior to sample preparation and analysis. If large paint chips were included in the soil sample, the measured lead concentration would be expected to vary considerably depending on the quantity of paint chips mixed with the soil sample. Soil sampling protocols do not include criteria for determining which paint chips or how many paint chips on the ground surface in the vicinity of the sampled area should be collected and mixed with the soil sample. Since paint chips can have a high lead content, measurement of a soil sample containing large paint chips would be more likely to reflect the amount of paint chips in the soil sample rather than provide data on actual soil lead levels. Note that paint chips that have already decomposed and become mixed into the soil are included in this protocol.

Because only homes with exterior lead-based paint were selected for the Recontamination Study, it is likely that visible paint chips on the ground surface contain high concentrations of lead. The purpose of the Recontamination Study was to determine if elevated lead levels developed in the soil subsequent to soil remediation. Including lead-based paint chips located on the surface in soil samples would mask the lead concentration in the actual soil since the sample measurement would reflect the lead content of lead-containing paint chips that may be present in the soil sample.

EPA recognizes that paint chips have the potential to break down into smaller particles which can become incorporated into the surface soil. EPA's response is conducted based upon the total soil lead concentration in soil samples, which includes any contributions from small particles originating from paint chips. If soil lead levels exceed the established action level for soil response, soil remediation is performed which removes lead originating from all sources, including historic industrial emissions and lead particles from paint chips.

Lead-based paint stabilization performed as part of the remedy is intended to prevent paint chips from falling to the ground and becoming a source of soil lead contamination. In cases where soil remediation is performed prior to stabilization of lead-based paint, HEPA vacuuming of exposed soil surfaces is performed following paint stabilization to remove paint chips that may have fallen to the ground after soil remediation was performed. EPA believes the EPA response to deteriorating lead-based paint provides an effective strategy for addressing potential risks associated with lead-based paint chips within the scope of CERCLA authority.

Comment 15

Changing the final cleanup level for lead in soil to 400 ppm is appropriate.

EPA Response: EPA agrees.

Comment 16

What resources are available to test for lead and other heavy metals in household tap water?

EPA Response: EPA tested tap water (including both first flush and post-flush) at 98 homes within the OLS study boundary and determined that lead concentrations in water were not of concern at any of these locations. However, the presence of lead in water may vary from house to house depending on the age and type of the pipes and fixtures. Testing of domestic water is offered by a number of private laboratories. EPA cannot recommend or endorse a particular private entity to perform testing of potable water. EPA is not aware of any publicly-funded programs that offer this type of testing to the public without charge.

Comment 17

When lead-based paint is being removed by contractors wearing protective equipment, citizens are left without protection. It is important to protect the health of the homeowners, not just the removal contractors.

EPA Response: Contractors who remove lead-based paint wear protective equipment because they are in intimate and prolonged contact with the lead-based paint. If the paint removal is performed in accordance with industry standards, there is no substantial risk to homeowners.

Comment 18

When soil remediation is occurring, an effort should be made to regrade properties install rain gardens to help minimize problems with storm-water runoff.

EPA Response: EPA has no authority under Superfund to expend resources to address issues related to the control of storm-water runoff unless this control is an element of the selected remedy. At the OLS the EPA has not included management of storm water runoff as an element of the selected remedy.

Comment 19

Several locations above 400 ppm exist in Council Bluffs outside the OLS Focus Area. These locations should be cleaned up, and further studies to identify properties above 400 ppm should be performed in Council Bluffs.

EPA Response: Soil lead levels measured by EPA in Council Bluffs, Iowa, have consistently been below a level of concern. Comment 2 above provides additional discussion about soil lead levels in Council Bluffs. EPA believes it is appropriate to address potential soil lead concerns in Council Bluffs as a separate matter for both technical and administrative reasons. Work is currently progressing as a fund-lead remedial action with the State of Nebraska contributing 10 percent toward remedial action costs. From an administrative standpoint, it would be difficult to separate costs incurred in another state from OLS costs for purposes of determining the required state cost share from Nebraska. From a technical standpoint, soil lead levels in Council Bluffs are considerably lower than in Omaha, and the frequency of exceeding 400 ppm at Council Bluffs residential properties is less than the frequency of 5 percent used to define the Final Focus Area for the OLS.

Comment 20

The City and County should identity funding sources other than the State to bear the cost of operation of a local hazard registry to provide information on actions related to lead hazards at residential properties.

EPA Response: The selected remedy includes the establishment and operation of the lead hazard registry through completion of the final remedial action. EPA agrees that the city should work with other governmental and nongovernmental organizations to identify resources for long-term operation of the lead hazard registry. Under the final remedy, a policy review will be conducted at least once every five years to ensure that the lead hazard registry is being maintained with property-specific information on all properties at the OLS. The actual operation of the lead hazard registry is not included as an operation and maintenance element of the selected remedy, and the state has no obligation to provide continued funding for its operation.

Comment 21

Soils at the Gould facility were treated with lime before soil samples were removed for speciation. This treatment altered the forms that would be present. Therefore, any similarity between mineral species at the Gould facility and residential properties is not indicative of a contribution from Gould.

EPA Response: EPA is aware that the soils at the Gould facility were treated with lime and that this treatment may have altered the chemical forms of lead observed in these samples during speciation studies. This is discussed in a 2002 apportionment study report authored by Dr. John Drexler.

Comment 22

The lead registry should include a list of properties where soil remediation has been performed and soil lead levels exceeding 400 ppm were left in place and a diagram of the affected area showing concentrations.

EPA Response: EPA agrees the purpose of the lead hazard registry is to make available property-specific information about conditions at individual properties. Included in the property-specific information is a diagram and data which identify residual soil lead levels identified at the property during initial characterization and following completion of soil remediation, if required. This information would include any areas with levels exceeding 400 ppm that remain following cleanup when that information is available.

Comment 23

EPA should send letters to property owners where soil exceeding 400 ppm is left in place following soil remediation describing affected areas. The letter should replace any previous EPA letter sent to the property owner stating that the property had been remediated.

EPA Response: Confirmation sampling data showing residual soil lead levels at the exposed surface of the excavation is provided to property owners following completion of soil remediation. This would include any areas where soil lead levels exceeding 400 ppm remain. This could occur in a limited number of properties and in some areas at depths greater than one foot. EPA has determined that the residual soil lead levels and other elements of the selected remedy are protective of human health.

Comment 24

EPA should continue to provide educational outreach and information about the lead registry to OLS residents, realtors, and other interested parties.

EPA Response: EPA agrees that alerting OLS residents, realtors, and other interested parties to the availability of the local lead hazard registry is an important component of the registry program. Health education and public outreach programs implemented as components of the final remedy will emphasize the availability of this resource. EPA funding for health education programs will continue through completion of the remedial action. EPA is hopeful that other resources can be identified to provide resources to support awareness and operation of the lead hazard registry following the remedial action.

Comment 25

The Nebraska Voluntary Cleanup Program Goals, including a cleanup level of 400 ppm lead for residential exposure scenarios should be added to the table of To Be Considered criteria in the 2008 OLS Final Feasibility Study.

EPA Response: This value has been added.

Comment 26

Excavated soil may be managed in accordance with NDEQ policy in a municipal solid waste disposal area, but several other options exist. This includes construction of a soil repository (this would be considered an industrial waste disposal area), and use of the soil as fill in a land improvement project

EPA Response: These other final management alternatives for excavated soil were identified and developed in the OLS Final Feasibility Study and are discussed in the OLS Final Record of Decision. EPA will work with the State programs to explore alternate final management alternatives that may become available in the future.

Comment 27

The plan should discuss whether any long-term operation and maintenance or institutional controls would be necessary if soil capping is performed as an alternative or in combination with excavation in large parks or schoolyards.

EPA Response: Soil capping is not included as a potential element of the final remedy; therefore, no operation and maintenance requirements related to a soil cap would apply to properties remediated in accordance with the OLS Final Record of Decision.

PART B: VERBAL COMMENTS RECEIVED AT THE PUBLIC MEETING

Comment 1

A commenter asked if it would be best to leave the contaminated soil in place, noting problems with uncovered trucks and creation of dust. The Commenter noted that he had observed soil remediation workers not wearing breathing protection. The commenter expressed concern about dust migrating to home interiors or tracked in by his large dog. The commenter stated he had rare flowers on his property and no children. The commenter asked if he could simply refuse to have the work performed.

EPA Response: EPA does not believe it is protective to leave contaminated surface soil in place, even if there are no children or other sensitive individuals who reside there at present. This is because EPA's objective is to make each property safe for use by any residential family, now and in the future. Air monitoring performed by EPA around cleanup sites indicates that soil remediation activities do not release significant amounts of lead dust into air and do not pose a risk to current residents. EPA recognizes the potential for exterior soil to contribute to interior dust through tracking or airborne migration. Once the soil is cleaned up, the remedy includes testing lead levels in interior dust and providing high-efficiency household vacuuming equipment and health education to residents where interior dust lead levels on floors exceeds HUD/EPA standards. Following completion of the remedial action, soils with lead levels exceeding soil cleanup criteria have been removed and replaced and will no longer represent a significant source of lead in interior dust.

All response work performed at the OLS, including soil remediation, is in accordance with a Health and Safety Plan developed by the contractor to comply with OSHA and other applicable requirements for worker protection. In some cases, requirements for breathing protection involving the use of air-purifying respirators can be downgraded if personal monitoring demonstrates that this level of protection is not required. Therefore, workers may not in all cases be required to use breathing protection during different phases of the cleanup.

Prior to commencing soil remediation, the response contractor contacts the property owner to arrange for a meeting, during which the property owner can express specific concerns. Particular areas of the property including flower gardens can be resampled separately to determine if they can be excluded from the soil cleanup. In most cases, garden areas where significant soil disturbance has occurred will not have soil lead levels remaining at the surface that will warrant remediation, and these areas can usually be excluded from the cleanup. However, testing of soils in these areas of concern is required in order to make that determination. In the event that cleanup of flower gardens is required, plants will be removed and set aside during the cleanup, then replanted, or alternatively plants will be replaced. EPA contractors will work with property owners to accommodate their concerns about how the work is performed to the extent possible, while still ensuring that the cleanup is protective of human health.

An owner can refuse access to perform the cleanup work, but EPA does have the authority to perform the work without the owner's permission in order to protect human health. EPA is confident that owners will grant voluntary access for cleanup work when advised of the potential benefits of having a property that is free from soil contamination. EPA strongly urges all owners and residents to cooperate with the soil cleanup program and will work with them to try to address any concerns they may have about the work to be done at their property.

Comment 2

One commenter asked if there is a possibility that the cleanup level will be lowered below 400 ppm.

EPA Response: EPA is setting 400 ppm as the final action level and does not anticipate that a soil action level lower that 400 ppm will be needed to protect human health. If new toxicity data or new exposure data were to emerge in the future that clearly indicated 400 ppm was not safe, EPA would consider the new data at that time.

Comment 3

A commenter asked how winter affects response actions such as sodding performed by EPA. In one case, a backfilled property had not been sodded for three weeks.

EPA Response: All yard work, including resodding, must be performed subject to constraints imposed by weather conditions. Soil remediation activities are halted during winter months due to freezing conditions and during the regular construction season when the ground is too wet to work. Sodding work is conducted by different subcontractors than those who perform the excavation, and so the timing of the sodding work compared to the excavation work may vary from property to property. In some cases, installation of sod may be limited by the availability of sod due to wet weather or supply limitations. If an excavation remains open for an extended period of time, a health concern is not created because the contaminated soils have been removed.

Comment 4

One commenter asked about the availability of data on lead levels in surrounding properties.

EPA Response: At the time of the public meetings, EPA could only release data for properties where decision-making had been completed which were those properties previously remediated or eligible under the Interim Record of Decision. A map was available at the meeting showing the locations of parcels where soil lead levels exceeded past or current action levels. Once a final remedy is selected in the Final Record of Decision that addresses all properties at the OLS, all soil sampling data will be publicly available for all properties.

Comment 5

One commenter asked if soil lead testing results would have to be disclosed to buyer upon sale of the property.

EPA Response: Under federal disclosure requirements, records of lead hazards, which include results of EPA soil lead investigations received by owners, must be disclosed to potential buyers of property. Under state disclosure requirements, potential environmental hazards must be disclosed to potential buyers, which the State has interpreted to include results of soil lead testing.

Comment 6

One commenter asked how many lead-poisoned children are in the Omaha area today. The commenter stated that spending $77 million to remediate 5,600 lots is $13,750 per lot and that $127 million spent on remediating 4,300 lots is $29,069 per property is beyond any conscience. The commenter asked who would fund the cleanup.

EPA Response: Statistics on the occurrence of children with elevated blood lead (> 10 ug/dL) are collected and maintained by Douglas County. Although precise numbers fluctuate over time, the most recent available data collected in 2007 indicates the frequency of children with elevated blood leads is about three times higher in the 7 zip code area approximating the OLS than would be expected based on national statistics. The screening of 42 percent of children in this area identified 209 children with blood lead levels exceeding 10 ug/dL. EPA believes that the cost of remediation is justified based on the severe and irreversible adverse health impacts to children with elevated blood lead levels. EPA considers it to be a necessary and appropriate investment to ensure the health of children who live at the site, now and in the future.

A portion of the funding for the OLS cleanup originates from a trust fund established as a result of a 2003 settlement between an ASARCO entity and the federal government to resolve an action concerning the conveyance of company assets. To date, this trust has funded $14.5

million in cleanup costs at the OLS. The remaining remedial response costs are currently shared between the State of Nebraska and the EPA Superfund Trust Fund, with the state providing a 10 percent cost share of Superfund Trust Fund expenditures. The EPA Superfund Trust Fund is currently funded from the general revenue received by the federal government. However, EPA seeks to recover funds expended for Superfund cleanups from responsible parties. Approximately 70 percent of cleanup costs in the Superfund program have been directly funded by, or recovered from, responsible parties.

Comment 7

A commenter stated that it would be a long time before funds were available through the government's claim in the ASARCO bankruptcy – at least 25 years – and the government's legal fees will exceed the amount of the claim.

EPA Response: The government has filed a claim in the ASARCO bankruptcy proceeding for OLS response costs, which includes government costs associated with the OLS and other EPA overhead and indirect costs. Any recovery of funds through the ASARCO bankruptcy as a result of that claim will be utilized for future OLS cleanup costs, or to reimburse the Superfund Trust for previously expended costs. Any recovery in the ASARCO bankruptcy proceeding will be used to offset OLS response costs, regardless of the timing of the recovery.

Comment 8

A commenter believes that Union Pacific is one of the best industries in Omaha and that EPA is "barking up the wrong tree," since they are good people and just leased the property to Asarco.

EPA Response: For Superfund sites including the OLS, EPA's enforcement policy is to seek to recover response costs from parties that are liable under the Superfund statute. The EPA has an obligation to recover any response costs, appropriately spent, from all parties who may be liable under the Superfund law.

Comment 9

A commenter questioned if EPA was getting the "best bang for the buck" by excavating soil and transferring the problem to a landfill.

EPA Response: The Feasibility Study carefully evaluated the cost effectiveness of a range of alternative strategies for addressing lead-contaminated soil at the site. The selected final remedy achieves the highest level of public health protection at the lowest cost of the alternatives developed in the OLS Feasibility Study. Use of excavated soil as landfill daily cover is a safe and effective final management strategy for contaminated soils. Once entombed in a landfill, a final cover of clean soil will ensure that future exposure is controlled. Engineering features of the landfill will prevent future migration of contained soil.

Comment 10

A commenter asked how much soil containing 400 ppm lead a child would have to ingest to result in an elevated blood lead level exceeding 10 µg/dl.

EPA Response: At present, there is no method approved by EPA for computing the amount of 400 ppm soil which, if ingested as a single dose, would result in a blood lead level of 10 ug/dL. Of greater concern to EPA are exposures that occur on a repeated basis. Based on the IEUBK model, and assuming typical lead exposures from all other sources (water, food, air) at OLS, an average intake of about 220 mg of soil per day would result in an average blood lead level of about 10 ug/dL. This mass of soil is about 1/30th the volume of a teaspoon.

Comment 11

A commenter asked how many other cities have 400 ppm lead in their soil. The earlier lead abatement projects removed soil above 2,500 ppm. Why is this level of cleanup (400 ppm) being performed in Omaha.

EPA Response: It is not possible to identify the number of cities that have widespread soil lead levels exceeding 400 ppm, but it is likely that soil in some areas of individual properties may exceed this level in many cities. EPA investigations have identified the former lead smelting/refining operations as a significant contributor to elevated soil lead levels over a widespread area at the OLS. Risks associated with soil lead for Superfund cleanups are determined on a site-specific basis taking into account the characteristics of lead present in the soil and other factors. The 400 ppm cleanup level determined to be necessary for protection of human health at the OLS would not necessarily apply to soils in other cities. Cleanup levels determined to be required for protection of human health at Superfund sites typically vary from 400 to 1,200 ppm, depending on site-specific factors.

The initial cleanup level of 2,500 ppm at the OLS was an interim value, designed to ensure that early actions were directed toward the properties with the highest levels of contamination ("worst first"). The cleanup value of 400 ppm at the OLS determined to be necessary for protection of human health was derived using the standard methods recommended by EPA that are presented in the BHHRA and discussed in the Final Record of Decision.

Comment 12

One commenter asked why lead hasn't been found in Council Bluffs or Carter Lake, Iowa, with prevailing southwesterly winds. The commenter stated that he had spoken to the Corps of Engineers and that the Council Bluffs was not affected by the1952 flood, and that Council Bluffs has not flooded for a hundred years.

EPA Response: Prevailing winds in the Omaha area are not from a southwesterly direction. As shown in Figure 2-4 of the Final OLS BHHRA, the prevailing winds at the OLS, as measured from years of wind data collected at Eppley field, are predominantly north-northwesterly and south-southeasterly. Deposition of airborne emissions is not simply controlled by prevailing winds, but is affected by a complex set of factors that cannot be accurately predicted using wind direction or air dispersion modeling.

Areas of Council Bluffs and Carter Lake, Iowa that are located within the area potentially impacted by former lead smelter /refining releases are also located within the historic flood plain of the Missouri River. Although early local levee systems offered some degree of limited protection against flooding, effective protection from major Missouri River flood events was nonexistent at Carter Lake and Council Bluffs until flood control projects were initiated by the Corps of Engineers in the 1940's. Records document significant impacts in these areas during major floods of the Missouri River that occurred in 1881, 1943, 1947, 1952, 1967, 1978, and 1993. Records indicate that 30,000 people were evacuated from Council Bluffs during the 1952 flood event. These flood events would have significantly altered surface soils through scour and deposition and would have significantly reduced lead levels present today in Carter Lake and Council Bluffs, Iowa. See also the Response to Comment 2 in Part A above.

Comment 13

A commenter asked about whether EPA will clean up dust in air duct works.

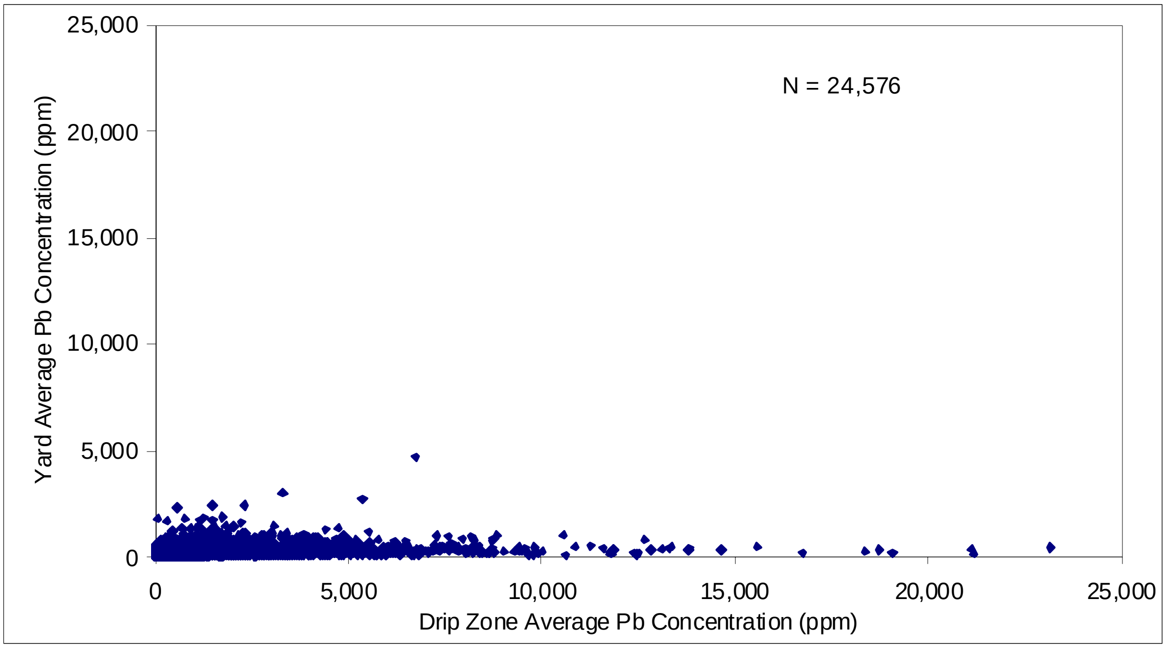
EPA Response: EPA has modified the response to interior dust in the final remedy from the one-time high-efficiency cleaning which was included in the interim remedy. EPA has determined that a one-time high-efficiency cleaning, which could include duct cleaning, does not remain effective over a prolonged period due to the presence of "reservoirs" of contaminated dust that cannot be effectively removed in carpets, furniture, and other porous items during a single cleaning event. EPA has elected to provide high-efficiency household vacuum cleaning equipment to residents in homes where interior lead levels in floor dust exceed EPA/HUD standards. This approach, along with health education, will more effectively control the potential for elevated lead levels to develop in interior dust following soil remediation. Once outdoor soils are remediated, the concentrations of lead in indoor dust will tend to decrease through routine indoor cleaning activities. Studies at other sites have shown this decrease in interior dust lead levels following soil cleanup (Mielke and Reagan 1998, Lanphear et al. 2003, von Lindern et al. 2003, Sheldrake and Stifelman 2003).

Comment 14

A commenter asked about the merits of installing a HEPA filter in their furnace

EPA Response: Installing a HEPA filter on a furnace can reduce the amount of dust present in the home. In most cases, if there is an indoor and/or outdoor source of lead at the home, this would be expected to decrease the amount of lead that is present in indoor dust, and would be expected to decrease exposure of both children and adults in the home. Installation of HEPA filters on household furnaces is not included as an element of the final remedy selected by EPA, but this action could be undertaken by homeowners and could potentially reduce lead exposure levels in home interiors.

FIGURE 1.
RELATION BETWEEN DRIP ZONE AND YARD WIDE AVEAGE SOIL LEAD LEVELS



EPA Responses to UP Comments – Appendix A
Final Drip Zone Width Study (March 2006)

Comment A-1

It is significant that the DZWS concluded that its residential yard sampling results (i.e., EPA's results from areas outside of its assumed drip zone width of 30 inches) are representative of the entire OLS, as evidenced by the following DZWS table (DZWS Table 3 at 4-3).

EPA Response: The text in Section 4.2.2 does not state that the residential yard sampling results are representative of the entire OLS (as evidenced by DZWS Table 3 on page 4-3). The report indicates that the DZWS results indicate that the residences included in the study appear to be representative of previously sampled residences within the OLS Focus Area.

Comment A-2

The DZWS provides unequivocal evidence that EPA's decision-making process regarding the sources of lead in soil at the OLS, and the appropriate method for remediating those sources, is defective at the most fundamental level, calling into question the entirety of EPA's OLS analysis, as outlined below.

a. *EPA characterized lead concentrations in several tens of thousands of Omaha-area residential yards by collecting composite soil samples that purposely excluded soil from the drip zone, taken to be up to 30 inches from the structure foundation. Samples from this assumed drip zone area were excluded from the composite samples in an effort eliminate the effects of LBP such that the samples might be indicative of the effects of smelter emissions.*

b. *Through the implementation of the Interim ROD, EPA has already addressed, through soil excavation and replacement, thousands of residential properties characterized as exceeding action levels based on these sampling results.*

c. *Now, with the Interim ROD remedy well underway, EPA conducted the DZWS, which clearly shows that the effects of LBP extend to six feet (72 inches) or more beyond the structure foundation, more than twice the distance assumed under EPA's original sampling effort.*

d. *The DZWS, therefore, indicates that the yard composite samples could very well include aliquots from 30 to 72 inches from structures within a given property. Elevated lead concentrations in such aliquots are very likely caused by drip-zone releases of LBP. Inclusion of these drip-zone aliquots contaminates the composite result and yields elevated concentrations that are unrelated to the deposition of industrial emissions.*

e. *Therefore, the very data that EPA relied upon to assess the effects of industrial emissions on soil lead levels are in fact heavily skewed by the presence of LBP.*

EPA Response: EPA recognizes that drip zone areas at the OLS can have elevated soil lead levels at distances greater than 30 inches from the foundation. The EPA Superfund Lead-Contaminated Residential Sites Handbook indirectly defines a presumptive drip zone width by specifying that drip zone soil samples should be collected from a distance of 6–30 inches from the structure's foundation. One purpose of the OLS Drip Zone Width Study was to generate site-specific data to characterize the typical drip zone width at OLS properties. The OLS DZWS concluded that soil lead concentrations at the OLS properties sampled for this study declined with increasing distance from the foundation to levels below 400 ppm at an average distance of six feet from the foundation wall. This site-specific determination of the typical drip zone width is more representative of OLS properties than the presumptive drip zone width indirectly defined by the Handbook.

EPA disagrees that deteriorating lead-based paint generally represents the primary source of lead contamination in mid-yard soils. EPA recognizes that deteriorating lead-based paint can contribute to total soil lead levels in mid-yard areas at some OLS properties. This is not unexpected since homes and other buildings within the OLS are among the oldest residential structures in eastern Omaha, and the presence of deteriorating lead-based paint has been identified at many of these properties. However, speciation studies performed by EPA have consistently demonstrated that pyrometalurgical sources, such as the former lead smelting/refining operations in eastern Omaha, represent the largest identified source of lead contamination in mid-yard soils at the OLS. EPA recognizes that deteriorating lead-based paint is more likely to have a greater impact on soil lead levels in drip zone areas, but EPA does not agree that elevated soil lead levels near the foundations of structures can be generally attributed to the presence of lead-based paint on structures. Soil lead levels in drip zone areas can also be the result of direct deposition or wash-off of lead-containing particulate matter emitted from pyrometallurgical sources deposited on rooftops and impinged on structure siding. Speciation studies performed by EPA demonstrate a significant contribution of lead from pyprometallurgical sources in drip zone areas.

Recognizing the potential contribution of deteriorating lead-based paint to soil lead levels in drip zone areas at some properties, EPA's approach to determining eligibility for soil remediation involves considering the results of mid-yard sampling as a clearer indication of the presence of elevated soil levels associated with pyrometallurgical sources. The eligibility determination for soil remediation at individual properties is based on the maximum mid-yard soil lead level detected. Soil samples collected in mid-yard areas are generally comprised of five separate aliquots that are combined to form a single composite sample for analysis. The five aliquots are collected in areas away from foundations to the extent possible at individual properties to avoid the potential impact of higher soil lead levels that may exist in drip zone areas due to a potential contribution from lead-based paint. However, depending upon the location of property boundaries in relation to the structures on an individual property, there is a possibility that an aliquot of a mid-yard sample could have been collected within six feet of foundation walls. It is not possible to define the frequency that this may have occurred, or if in fact it has occurred at all, since the precise locations of individual aliquots collected at a property are not recorded. Individual aliquots that are combined to form mid-yard samples are typically collected at distances greater than six feet from the foundation. However, including an aliquot collected within six feet of foundations cannot be assumed to result in a soil lead level in that composite sample that is dominated by lead from lead-based paint. First, soil lead level in drip zone areas can not be assumed to be dominated by the contribution of lead-based paint, as demonstrated by EPA speciation studies. Secondly, the effect of an individual aliquot collected within six feet of a foundation would be reduced because five aliquots are composited to form a single soil sample for processing and analysis. At the large majority of OLS properties, all aliquots that are combined to form the mid-yard composite sample are collected at significantly greater distances than six feet from the foundation. If an aliquot were to be collected within six feet of the foundation, EPA believes that the soil lead level measured in the five-aliquot mid-yard soil sample would still be largely indicative of the impact of pyrometallurgical sources on soil lead levels.

It is not inappropriate from a risk perspective to include aliquots collected near foundations in small yards, since these areas would more likely be included in the play area of a child in such circumstances. Including an aliquot collected near a foundation at very small yards would result in a soil lead measurement more representative of a child's play area, and does not diminish the significant contribution of pyrometallurgical sources to properties throughout the OLS. EPA recognizes that lead-based paint can contribute to total soil lead levels measured in both drip zone and mid-yard areas of some OLS properties. EPA's response is based on total soil lead levels measured in mid-yard samples at individual properties which would include any contribution from lead-based paint. EPA's response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

Comment A-3

Union Pacific evaluated the data from the 30 residences EPA sampled as part of the DZWS in light of whether the residential structures were determined to have LBP and the effect the LBP has on the corresponding yard soil, both in EPA's assumed drip zone and outside of the assumed drip zone. The following tables summarize Union Pacific's evaluation.

DZWS Residences – Average Concentrations in Drip Zone and Yards

LBP Assessment	*# of Homes*	*Average Construction Year of*	*Drip Zone Lead Conc. (ppm)*			*Residential Yard Lead Conc. (ppm)*		
			Min.	*Max.*	*Avg.*	*Min.*	*Max.*	*Avg.*
Positive	*26*	*1915*	*69*	*5,474*	*763*	*77*	*506*	*253*
Negative	*4*	*1938*	*32*	*298*	*140*	*42*	*100*	*73*

DZWS Residences – Soil Lead Concentrations in Residential Yard Quadrants

LBP Assess-ment	*# of Homes*	*Quadrant 1 (ppm)*			*Quadrant 2*			*Quadrant 3*			*Quadrant 4 (ppm)*		
		Min.	*Max.*	*Avg.*	*Min.*	*Max.*	*Avg.*	*Min.*	*Max.*	*Avg.*	*Min.*	*Max.*	*Avg.*
Positive	*26*	*62*	*914*	*250*	*43*	*909*	*281*	*55*	*901*	*262*	*64*	*396*	*203*
Negative	*4*	*36*	*91*	*60*	*56*	*72*	*62*	*42*	*111*	*74*	*32*	*173*	*94*

The upper table shows minimum, maximum, and average soil lead concentrations from the drip zone investigation and in the residential yard, as determined through sampling of yard quadrants. The lower table provides minimum, maximum, and average soil lead concentrations for the individual yard quadrants.

As shown, EPA designated 26 of the 30 residential structures as positive for LBP and 4 of the residential structures as negative for LBP. The average soil lead concentration in the drip zones of residences that are positive for LBP (763 ppm) is over five times greater than the average soil lead concentration in the drip zones of residences that are negative for LBP (140 ppm). Correspondingly, the average soil lead concentration in the residential yards of residences that are positive for LBP (253 ppm) is over three times greater than the average soil lead concentration in the residential yards of residences that are negative for LBP (73 ppm).

The implications of this are two-fold. First, the uniformly greater lead concentrations in drip zone and residential yard soil for residences that are positive for LBP further demonstrates the importance of LBP as a source of lead to Omaha's yards. Second, the uniformly low lead concentrations in drip zone and residential yard soil for residences that are negative for LBP are all well below EPA's action level of 400 ppm and confirm that deposition of smelter emissions is not a significant contributor to soil lead concentrations. This is particularly important given EPA's demonstration that the 30 residences and yards evaluated in the DZWS are representative of the entire OLS.

The average construction year of the four non-LBP residences evaluated during the DZWS is 1938, a time frame in which LBP was in widespread use. Two of the non-LBP homes have painted wood or stucco exteriors and the other two non-LBP homes have aluminum or vinyl siding. Given the age of these homes, it is almost certain that LBP was used at some point on their exteriors and that the LBP has since been covered by non-LBP or siding. Thus, though EPA's current determination is that these are non-LBP residences, there may have been past contributions of lead to yard soil from deteriorating LBP, albeit small, prior to covering with non-LBP or siding.

The soil lead concentrations in the non-LBP residential yards reflect all historic anthropogenic lead sources that have increased the soil lead concentrations beyond background levels. Background soil lead concentrations were determined by EPA to be 26 ppm (Draft Final RI Report at 1-7 and 1-8) and the average soil yard concentration for the non-LBP yards is 73 ppm. Therefore, the anthropogenic sources account for an incremental increase of only 47 ppm lead, on average. Those anthropogenic sources are numerous and include past use of leaded gasoline, broad industrial emissions from several dozen sources (Dynamac Corporation 1999), any domestic use of pesticides containing lead (Stefferud 1932), and emissions from lead refineries (including the ASARCO refinery). Thus, deposition of lead refinery emissions is only one small contributor to the incrementally small amount of lead beyond background concentrations present in the yards of the non-LBP residences.

EPA Response: The DZWS was performed to determine the area next to the foundation that could be impacted in the future by deteriorating lead-based paint using site-specific data collected at the OLS. This determination is based on characterizing the extent of past drip zone impacts which could originate from lead-based paint and other significant sources including wash-off and direct deposit of former lead smelter/refinery emissions. The drip zone area determined in the DZWS was used with an assumed mixing depth of one inch in a calculation to determine eligibility for lead-based paint stabilization.

EPA disagrees that soil lead levels at OLS properties can be primarily attributed to the presence of lead-based paint. Lead-based paint was manufactured and used at residential properties from the 1800s until the sale for residential use was banned in 1978. Since almost all housing within the OLS was constructed prior to 1978, and most prior to 1950, lead-based paint is present on most structures within the OLS. This is confirmed by the lead-based paint assessments that have been performed on more than 3,100 properties within the OLS. If elevated soil lead levels were primarily due to the presence of lead-based paint on structures, the spatial distribution of properties with elevated soil lead levels would be expected to be relatively uniform across the OLS. However, this pattern is not observed. Residential properties nearest the former lead smelting/refining facilities generally have the highest occurrence of elevated soil lead levels and the highest maximum mid-yard concentrations. The frequency of elevated soil lead levels and magnitude of the maximum mid-yard soil lead concentrations decrease with increasing distance from the former lead smelting/refining facilities. Even at properties within the OLS at greatest distance from these former facilities where impacts of these former operations are reduced, soil speciation studies performed by EPA confirm a significant pyrometallurgical contribution to total soil lead levels measured in mid-yard areas.

EPA performs lead-based paint assessments on structures within the OLS to determine the present potential for deteriorating lead-based paint to fall to the ground, mix with soil, and result in elevated soil lead levels near foundations. The assessments are performed to determine if deteriorating lead-based paint in its current condition threatens the continued effectiveness of soil remediation performed at individual properties. Based on the results of the lead-based paint assessment, if the continued effectiveness of the remedy is threatened by the presence of deteriorating lead based paint, stabilization of painted surfaces on structures is offered to property owners to help ensure the continued protectiveness of the remedy.

Lead-based paint assessments are not performed for the purpose of determining if lead-based paint is present on a structure, and it is not appropriate to categorize property as positive or negative for lead-based paint on the basis of the lead-based paint assessments. The mere presence of lead-based paint on a structure cannot be used as an indicator of the potential contribution of lead-based paint to present-day soil lead levels. Due to the age of housing in eastern Omaha, lead-based paint is present on almost all residential structures within the OLS, as confirmed by the lead-based paint assessments performed on OLS properties. In most cases, lead-based paint has been present on OLS homes since their initial construction which began in the 1800s. It is not possible for the lead-based paint assessments performed now by EPA to determine the degree of soil contamination that has been caused due to past problems with deteriorating lead-based paint. The positive or negative determination for lead-based paint referred to by the commenter is an indication of current conditions and cannot be used as an indicator of the past contribution of lead-based paint to elevated soil levels, since problems with deteriorating lead-based paint which may have existed in the past may or may not exist on the present-day structures. The best indicator of the source of lead in OLS soils is through speciation of the lead forms present in the soil, which has shown that pyrometallurgical operations are the most significant identified source in OLS soils.

EPA recognizes that other anthropogenic sources, such as the historic use of leaded gasoline for fuel, could contribute to some extent to overall soil lead levels at the OLS. EPA has evaluated the potential contribution of the use of leaded fuel relative to the contribution from former lead smelting/refining operations. The amount (mass) of lead potentially emitted into the Omaha environment through the use of leaded fuel is many times less than the amount of lead released from the historic lead smelting/refining operations, and does not represent a source that contributes significantly to elevated soil lead levels found at OLS properties. Speciation studies performed by EPA have confirmed that forms of lead associated with the use of leaded fuel do not significantly contribute to total soil lead levels at the OLS relative to the contribution from pyrometallurgical sources. Speciation studies performed by EPA have also concluded that forms of lead associated with pesticide usage are not present at significant levels in OLS soils. EPA does not believe that the historic use of leaded gasoline or pesticides are significant contributors to elevated soil lead levels at the OLS.

EPA has evaluated other historic industrial operations in eastern Omaha as potential sources of lead in Omaha soils. The Dynamac study cited by the commenter is one of two such EPA studies directed at identifying and gathering information about other industrial operations that could have potentially contributed to elevated soil lead levels at the OLS. Evaluation of these other potential industrial sources has not identified the existence of facilities or processes that could have released a sufficient amount of lead to significantly impact soil lead levels in an area as widespread as the OLS. In comparison, emissions from the former ASARCO facility and to a lesser extent the former Aaron Ferer/Gould facility produced lead emissions on a scale many times greater than the potential emissions from these other facilities. Furthermore, evaluation of soil sampling data from properties in proximity to these other industrial facilities has not identified the presence of properties with elevated soil lead levels clustered around these potential sources. Information concerning the historic processes at these facilities and soil lead data collected in proximity do not indicate that these other eastern Omaha industrial facilities significantly contributed to elevated soil lead levels at the OLS.

EPA acknowledges that non-pyrometallurgical sources of lead, including lead-based paint and pesticides containing lead, may have resulted in increased soil lead levels at certain properties where these sources exist, but EPA speciation studies demonstrate that pyrometallurgical lead is present at more than 90 percent of the properties studied and represents the largest identified source of lead in OLS soils. The soil samples collected during the DZWS were not speciated: consequently, it is not possible to determine the specific source of the lead in the soil at these particular properties.

Comment A-4

Union Pacific also evaluated soil lead data for the residences EPA designated as negative for LBP during the DZWS relative to soil lead data from the over 2,400 soil samples EPA collected from Omaha's parks. A figure provided summarizes this evaluation, including average soil lead concentrations in the parks as well as average soil lead concentrations in the 4 residences designated as negative for LBP. These residences are indicated with either a circle or triangle, depending on the exterior finish of the home (see the legend on Figure 1). One of the residences is located in the northeast portion of the OLS, to the east of Fontanelle Park; two of the residences are located just north of I-80 and west of the I-80/I-480 interchange; and the final residence is located just north of I-80 and east of the I-80/I-480 interchange. Figure 1 also shows the location of the former ASARCO smelter with a superimposed wind rose showing the predominant north-northwest / south-southeast wind direction.

The soil lead concentration data for both the parks and the non-LBP residences are indicated by color on Figure 1. As shown (and detailed in Appendix G to this comment package), the soil lead concentrations in Omaha's parks are universally low and are similar to the average soil lead concentrations in non-LBP residences sampled during the DZWS. The average soil lead concentrations in individual parks ranged from 14 ppm to 153 ppm while the average soil lead concentrations in the non-LBP residences is 73 ppm. These low concentrations are shown by the preponderance of light-blue shading on Figure 1.

As detailed in Appendix G of this comment package, Omaha's parks are broad, open areas that are not subject to the effects of LBP, which explains their uniformly low soil lead concentrations and similarity in terms of soil lead concentrations with the non-LBP residences from the DZWS. This further supports that LBP is a significant source of lead to the soils of properties where structures with LBP are present. Additionally, the low soil lead concentrations in the parks and non-LBP residences confirm that emissions from the ASARCO smelter are not a significant contributor to soil lead concentrations in Omaha. For example, inspection of the distribution of soil lead concentrations relative to the prevailing wind directions reveals no preferentially high soil lead concentrations to the north-northwest or south-southeast of the former ASARCO smelter (Figure 1).

EPA Response: It is not valid to compare data from the four properties identified by the commenter as negative for lead-based paint to data from the public parks. As explained previously, the fact that a lead-based paint assessment performed by EPA identifies a significant amount of deteriorating lead-based paint at this time is not an indication of the potential for lead-based paint on a structure to have contributed to the total soil lead levels at individual properties. Lead-based paint assessments are performed by EPA to determine the current potential for deteriorating lead-based paint to fall to the ground, mix with soil, and increase soil lead levels in the future. Properties that are described by the commenter as negative for lead-based paint may still have a significant amount of lead-based paint present on the structure. The lack of a current problem with deteriorating lead-based paint, as measured by the EPA assessment, is not an indicator of the past contribution of lead-based paint on the structure to total soil lead levels. It is not valid to use the lead paint assessment as an indicator of the contribution of lead-based paint to total soil lead levels. Furthermore, EPA does not agree that comparison of the sampling results from four residences sampled during the DZWS to sampling results from the parks could be considered statistically significant under any circumstances.

EPA does not agree present-day soil lead levels measured in surface soils at public parks are indicative of the original impact from former lead smelting/refining operations. Historic information regarding the development of public parks in eastern Omaha indicates that significant soil disturbance has occurred at Omaha parks during initial construction, subsequent modifications, and during regular maintenance. Considerable earthwork was required at many parks to create the terrain that exists today. The soil-disturbing activities include grading and filling and mixing of surface soils with underlying soils during initial earthwork, park improvement, and landscaping operations. Deposition of airborne lead from historic industrial emissions resulted in elevated soil lead levels in a relatively thin layer of surface soil. Soil-disturbing activities would result in mixing of surface soils containing relatively high lead levels from airborne deposition with underlying soils that are much lower in lead content. Soil mixing lowers surface soil lead concentrations through dilution with the underlying soils.

EPA does not agree that low lead concentrations detected in the public parks supports that LBP is a significant source of lead to the soils of properties where structures with LBP are present. Soil lead levels exceeding 400 ppm were detected in at least one soil sample from five of the parks sampled by EPA. In the absence of lead-based paint as a potential source of soil lead at these public parks, the elevated soil lead levels detected must be the result of another source at these five parks. The elevated soil lead levels remaining today at these five parks could be the result of less soil mixing occurring in these particular areas. In the absence of lead-based paint, there are no other sources of lead that could result in soil lead concentrations elevated to these levels at these five parks. Since it is not feasible that the impact from the former industrial emissions could have been limited to these five discrete areas, the presence of elevated soil lead levels at these five parks indicates that the impact to other areas of the park has been altered through soil disturbance and possibly other factors.

Wind rose information can be useful in predicting general directions in which airborne contaminants could be transported, particularly in the initial design of a site investigation when other data characterizing the distribution of contamination is not available. EPA utilized wind rose information and air dispersion modeling in the design of the initial soil lead investigation performed at the OLS to identify areas potentially impacted by the former lead smelting/refining operations. The actual deposition of airborne contaminants is the result of a complex set of factors, involving considerations beyond mere wind direction. EPA has relied not on predictive tools, such as wind rose information and air dispersion modeling, to characterize the impact of the former lead smelting/refining operations, but rather has collected soil data from actual impacted areas to characterize the OLS. Soil lead analysis combined with speciation of soil samples collected from impacted areas is a far more definitive approach to characterizing the impact from the former smelting/refining operations. As indicated on Figure 4-3 of the Draft

Final Remedial Investigation Report, there are many residential properties located to the north-northwest and south-southeast of the former ASARCO smelter that have elevated soil lead concentrations. Speciation studies conducted by EPA in 2002 and 2007 confirm that OLS properties are significantly impacted by historic industrial lead emissions.

Comment A-5

Remarkably, EPA's RI Report describes the DZWS and its findings, yet still fully relies upon the soil lead characterizations that are based on the earlier, assumed drip zone width of 30 inches (now demonstrated as unreliable). EPA makes no effort to explain its apparent rejection of its own DZWS results and does not appear to understand that those results undermine the basic (but incorrect) premise of the OLS RI and FS: that elevated soil lead concentrations in Omaha result from deposition of industrial emissions. The reality is that LBP is the primary source of elevated soil lead concentrations in Omaha.

EPA Response: An important purpose of the DZWS was to generate site-specific data to characterize the typical drip zone width at OLS properties. The width of the drip zone was of interest to help assess the potential for deteriorating lead-based paint on structures in their current condition to fall to the ground, mix with soil, and increase soil lead levels near foundations. In order to develop quantitative criteria to determine if the current level of deteriorating lead-based paint on a structure threatened the continued effectiveness of the remedy, it was necessary to characterize the distance from the foundation that could potentially be impacted by lead-based paint and other drip zone effects. The drip zone effects include historic direct deposition and wash-off of pyrometallurgical lead from rooftops and structure siding and any past contribution from deteriorating lead-based paint. By knowing the width of the potentially impacted area, along with other factors, it is possible to calculate the increase in soil lead concentration that could occur if deteriorating lead-based paint identified on a structure during the EPA assessment were to fall to the ground and mix with soil. This calculated increase in soil lead level is used to determine eligibility for stabilization of lead-based paint at individual properties by EPA where the continued effectiveness of soil remediation is threatened.

The DZWS was performed to determine the width of the area near foundations that has been impacted by drip zone effects which includes both direct deposition and wash-off of pyrometallurgical lead from structures and lead-based paint, if present. Speciation studies have demonstrated that drip zone soils are impacted from both of these sources. Presence of lead in drip zone soils can not be assumed to originate solely from lead-based paint. Extrapolating beyond this false premise to suggest that soil lead levels measured in mid-yard areas are the result of the lead-based paint contribution to drip zone soils is not valid and certainly cannot be based on the results of the DZWS which was performed for another purpose altogether. The only valid approach for characterizing the relative contribution of lead in soil samples is through speciation studies, which were not performed on samples collected for the DZWS.

EPA does not agree that the results of the DZWS undermine the premise that elevated soil lead concentrations in the OLS result from deposition of industrial emissions. EPA recognizes that drip zone areas at the OLS can have elevated soil lead levels at distances greater than 30 inches from the foundation. The OLS Drip Zone Study concluded that soil lead concentrations at the OLS properties sampled for this study declined with increasing distance from the foundation to levels below 400 ppm at an average distance of six feet from the foundation wall. The fact that a single aliquot of a multi-aliquot composite sample may have been collected within 6 feet of the foundation at a very limited number of OLS properties, if at all, does not mean that the elevated soil lead concentrations detected in residential properties within the OLS are the result of lead-based paint. Soil lead speciation studies performed by EPA in 2002 and 2007 confirm that OLS properties are significantly impacted by historic industrial lead emissions.

Comment A-6

Given this, EPA must now consider LBP as a significant source of lead to both drip zone soil and yard soil and that its previously generated soil lead data are demonstrative of the presence of LBP. EPA can no longer assert that historical deposition of historical emissions must have been the cause of yard soil lead concentrations above 400 ppm at all of the locations identified for remediation under CERCLA. EPA's own data now show that LBP is the cause at many, if not most, of those properties.

EPA Response: EPA recognizes that lead-based paint can contribute to total soil lead levels measured in both drip zone and mid-yard areas of some OLS properties. The EPA response is based on total soil lead levels measured at individual properties which would include any contribution from lead-based paint. EPA has never asserted that deposition of historical pyrometallurgical emissions must have been the cause of all yard-soil lead concentrations above 400 ppm at the locations identified for remediation. EPA's response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities. However, the inference on the part of the commenter that lead-based paint is the cause of most of the elevated soil lead levels at remediated properties has no scientific basis. Soil lead speciation studies performed at OLS properties which are capable of identifying the origin of lead in soil have concluded that pyrometallurgical emissions represent the largest identified source of lead in OLS soils.

Comment A-7

EPA should have conducted a DZWS <u>prior to</u> sampling thousands of residential yards in Omaha. This would have allowed exclusion of soil truly affected by LBP from the composite samples used to characterize the residential yards, with the likely outcome that the number of yards requiring remediation due to industrial emissions would be many thousands less than now contemplated by EPA. Unfortunately, the aliquots comprising the residential yard samples have already been mixed, and holding times for metals analyses have been exceeded. Therefore, EPA has no viable method for correcting its blunder, other than to reimplement the residential yard sampling program while taking into account the findings of the DZWS such that soil aliquots most likely to contain LBP are excluded from the composite yard samples.

EPA Response: Soil sampling at the OLS has consistently been conducted in accordance with the Superfund Lead-Contaminated Residential Sites Handbook. EPA disagrees that the soil data collected to date is not valid. Soil sample aliquots are collected away from the foundation of the home to the extent possible to avoid possible drip zone effects. As explained previously, the presence of lead in drip zone soils can not be assumed to originate from lead-based paint. Also see response to Comment A-2..

Comment A-8

The DZWS sampling design and data interpretation are based on the premise that deteriorating LBP can act as a source of lead to nearby yard soil such that EPA's interim clean up level for yard soil (400 ppm) is exceeded, even in the absence of other sources of lead such as historical emissions. This is the same premise that EPA chose to ignore in its interpretation of the Remedial Investigation (RI) data and when using residential yard soil data to make decisions regarding cleanup actions taken under CERCLA. The DZWS confirms that the presence of deteriorating LBP alone can result in yard soil lead concentrations above the interim clean up level. In accordance with the Interim ROD, EPA is removing any yard soil with lead above 400 ppm. However, yards contaminated by LBP, or other consumer products containing lead, are not eligible for clean up under CERCLA.

EPA Response: EPA disagrees that the DZWS data interpretation is based on the premise that deteriorating LBP can act as a source of lead to nearby yard soil such that EPA's interim clean up level for yard soil is exceeded even in the absence of other sources of lead. EPA recognizes that lead-based paint can contribute to total soil lead levels measured in both drip zone and mid-yard areas of some OLS properties. Soil samples collected during the DZWS were not speciated to determine the source of the lead in each sample. Other factors that could increase soil lead levels in drip zone areas include direct deposition of historic industrial emissions and wash-off of industrial airborne lead emissions that are deposited on roof tops or impinge on the siding of housing. In fact, EPA has demonstrated that these historic pyrometallurgical releases are predominant over lead-based paint and leaded gasoline as sources of lead to the Omaha community. The DZWS characterized soil lead concentrations in the area near home foundations at the OLS, but this study did not characterize the contribution of lead-based paint or other potential sources to soil lead levels measured in drip zone areas. The DZWS was not intended to determine if elevated soil lead levels at the OLS properties investigated resulted from lead-based paint or any other potential source or combination of sources, and no such conclusions can be drawn from this study. Soil lead speciation studies performed at properties in the OLS confirm that the properties are impacted by historic industrial lead emissions and EPA's response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

Comment A-9

The Addendum to the DZWS, dated April 6, 2006, provides detailed test results from individual properties. Those results indicate spatial patterns of lead distribution in soil that are consistent with soil contamination by LBP on the exterior of the house; lead concentrations decrease with increasing distance from the home. At some of those properties, lead *concentrations greater than 400 ppm occur at distances greater than 8 feet from the exterior walls of the house (e.g., see data for BVID 15951 in the DZWS Addendum). These drip zone results can be compared with the residential yard (quadrant) sampling results for BVID 15951, as shown on Table 1 of the DZWS. Those results indicate soil lead concentrations that are consistently below the interim action level of 400 ppm. Thus, the available analytical data from this residence strongly support that the lead impacts are primarily due to the presence of LBP. This home would not be eligible for CERCLA cleanup.*

EPA Response: The presence of elevated soil lead levels in the drip zone area of a property with maximum mid-yard soil lead levels less than 400 ppm cannot be interpreted as an indication that soil lead originates from lead-based paint. Factors that control the deposition of airborne particulates are complex, and airborne deposition would not necessarily be expected to occur to the same degree in open mid-yard areas as would occur near the walls of structures where wind currents are blocked and stagnation of air can occur. Lead levels can also increase in drip zone areas preferentially over mid-yard areas due to wash-off of lead-containing particulates deposited on rooftops or impinged on structure siding. Another important factor that can cause soil lead levels to vary at different locations on a property involves the mixing of surface soils with underlying soils that may occur in certain areas of a residential yard resulting from soil disturbance. Airborne deposition of historic lead smelting/refining emissions resulted in a relatively thin layer of contamination located near the surface. Soil disturbance that results in mixing of surfaces soils with lesser contaminated subsurface soils would reduce the soil lead level measured at the surface through dilution. Placement of soil, soil amendments, or sod on top of the contaminated surface soils would also dramatically reduce the soil lead level measured at the surface. Disturbance of surface soils and placement of additional material on ground surfaces are typical activities involved in gardening, lawn maintenance and landscaping, and can readily account for reduced mid-yard soil lead levels relative to drip zone soil lead concentrations found at some OLS properties. Lower mid-yard soil lead levels relative to drip zone concentrations at a particular property cannot be interpreted only as an indication of the contribution of lead-based paint.

EPA acknowledges that the soil lead concentrations in the mid-yard quadrants are below 400 ppm at the property with BVID 15951 and that the property is not eligible for soil remediation. However, EPA disagrees that the data indicate soil lead concentrations are primarily due to the presence of LBP. The DZWS was not intended to determine whether elevated soil lead levels at the OLS properties investigated resulted from lead-based paint or any other potential source or combination of sources; and because speciation was not performed on the soil samples collected from the property, no such conclusions can be drawn from the soil data from this property..

Comment A-10

For the purposes of residential-property characterization used during and since the RI, EPA defines the drip zone as the area within 30 inches of exterior foundation walls; soil located more than 30 inches from exterior walls is considered "mid-yard" soil. EPA's DZWS indicates that LBP actually has an effect on soil lead concentrations at an average distance of up to 6 feet from the exterior walls. Therefore, soil located in an area of the yard previously considered by EPA to be outside of the drip zone (i.e., 30 inches to 6 feet from exterior walls) is now *considered to be within an area that can be contaminated by deterioration of LBP to lead levels that exceed the interim clean up level. Clearly, EPA should have conducted a drip zone study prior to implementing the residential soil sampling effort under the RI.*

EPA Response: Soil sampling at the OLS has consistently been conducted in accordance with the Superfund Lead-Contaminated Residential Sites Handbook which defines the drip zone as 6–30 inches from the foundation for the purpose of collecting the drip zone sample. It is not EPA's practice to collect aliquots of mid-yard samples in areas immediately adjacent to drip zone areas. Soil sample aliquots are collected away from the foundation of the home to the extent possible. The possibility that a single aliquot of a multi-aliquot composite mid-yard sample may have been collected from 30 inches to 72 inches from the foundation at a limited number of properties, if at all, does not invalidate the soil data collected at the OLS.

Comment A-11

The Addendum to the DZWS, dated April 6, 2006, is supposed to begin on page 73 of the RI Appendix I (Final Drip Zone Width Study.pdf) file. The addendum portion of the PDF is incomplete and the pages are not in the correct order. Specifically:

- *PDF page 73 should be deleted;*
- *PDF pages 118-120 need to be moved up to pages 73-75;*
  1 property is missing the field sheet for paint (BVID: 14410);
  8 properties are missing field sheets for both paint and soil (BVIDs: 14414, 14532, 15951, 16201, 18203, 25551, 30262 and 30444).

Most significantly, while all paint assessment data for the properties evaluated for the DZWS appear to be presented in the Appendix C table (Lead-Based Paint Assessment data), none of that data is included in EPA's database. The paint assessments for the properties evaluated for the DZWS were completed at the end of 2005. EPA's database reports paint assessment data from 2006 through 2008.

EPA Response: The PDF files will be corrected as indicated in the comment. All of the field data sheets were included in the hard copies of the Remedial Investigation Report; however, some of the field sheets did not copy into the PDF files.

The LBP assessments that were performed in 2005 for the Drip Zone Width Study were performed prior to the development of the Draft Residential Paint Assessment Pilot Work Plan. The procedures used to perform the 2005 paint assessments are described in Appendix A of the Drip Zone Width Study, and they are very similar, but not identical, to the paint assessment procedures described in the 2006 Draft Residential Paint Assessment Pilot Work Plan. Because the procedures used during the 2005 paint assessments were not identical to the paint assessment procedures finalized in 2006, the data from the 2005 assessments has not been included with the data from the paint assessments performed in accordance with the 2006 protocol that is presented in Appendix H of the Draft Final RI Report. In addition, the purpose of the 2005 paint assessments was not to determine if the properties were eligible for paint stabilization, which is the purpose of the 2006 paint assessment. In fact, the 2005 paint assessments were performed on many properties that were not eligible for soil remediation, so eligibility for lead-based paint stabilization would not have been an issue and a lead paint assessment would not have been warranted. Consequently, EPA believes the data from the 2005 paint assessments should be maintained separately from the paint assessment data obtained in 2006 through 2008.

Paint assessment data was provided in Appendix A of the Draft Final RI Report for all properties except the data from the paint assessments performed in 2005 as part of the Drip Zone Width Study. The data from the 2005 paint assessments was included with the Drip Zone Width Study in Appendix I of the Draft Final RI Report.

Comment B-1

EPA Has Not Identified the Only Significant Lead Source at the OLS.
Rather than comply with the NCP or its own guidance, EPA has applied a preconceived approach that lead contamination in Omaha's residential yards results from only two sources (the former ASARCO and Gould facilities) and that only soil remediation can address the lead that purportedly originated from those sources. EPA maintains this position even though RI residential soil sampling now conducted at over 35,000 properties clearly identifies that deteriorating LBP, as measured by drip zone sampling, is the largest contributor of lead to soil at the OLS. This conclusion is supported by the RI data that plainly show that the pattern of elevated lead soil concentrations in the drip zone and mid-yard area matches the age distribution of housing and not the expected pattern of airborne deposition. This comment was also made on the 2004 RI Report.

EPA Response: The data do not support the conclusion that the pattern of elevated lead soil concentrations in the drip zone and mid-yard area matches the age distribution of housing and not the expected pattern of airborne deposition. To the extent that older homes are located nearer to the former ASARCO facility, it is expected that they would be more likely to have elevated soil lead concentrations due to industrial emissions. EPA recognizes the potential for deteriorating lead-based paint to contribute to soil lead levels in yard soils. EPA performed speciation studies at the OLS in 2002 and 2007 to identify sources of lead detected in soil samples collected from mid-yard and drip zone areas. Speciation of OLS soil samples has identified the presence of lead forms associated with lead-based paint in many of the samples analyzed, but these speciation studies demonstrate that pyrometallurgical lead associated with the former industrial facilities has significantly impacted soil lead levels throughout the OLS.

Comment B-2

EPA's Drip Zone Width Study Indicates that All of the Soil Lead Data Collected to Date Are Representative of Lead-Based Paint Impacts.

UPRR's detailed comments on EPA's DZWS are provided in Appendix A of this comment package; key points from those detailed comments are summarized here.

EPA's sample methodology for residential yards has been to exclude areas of each yard between 6 and 30 inches from the residential structure foundations (EPA's assumed drip zone) because of the potential effects of LBP. Samples collected from areas beyond 30 inches from the structures are used to develop "mid-yard" composite soil samples for the purpose of characterizing lead concentrations in the yard soil. This approach was used for over 35,000 residential yards in Omaha. EPA recently conducted the DZWS (as described in RI Appendix I) that demonstrates that in the OLS the effects of LBP extend to six feet (72 inches) or more into the residential yards. Thus, EPA's own site-specific study indicates that the data EPA has relied upon to make decisions about *remediating residential yards due to the purported effects of refinery emissions are in fact predominated by the presence of LBP. The 2008 RI offers no explanation or correction for this glaringly obvious error that renders the RI data useless for making decisions regarding remediation of lead that originated from refinery emissions.*

The DZWS provides unequivocal evidence that EPA's decision-making process regarding the sources of lead in soil at the OLS, and the appropriate method for remediating those sources, is defective at the most fundamental level. Through the implementation of the 2004 Interim Record of Decision (IROD), EPA has already addressed, through soil excavation and replacement, thousands of residential properties characterized as exceeding action levels based on these "mid-yard" sampling results. Now, with the IROD remedy well underway, EPA conducted the DZWS, which demonstrates that the effects of LBP extend to six feet (72 inches) or more beyond the structure foundation, more than twice the distance assumed under EPA's original sampling effort. The DZWS, therefore, indicates that the yard composite samples almost certainly include aliquots from 30 to 72 inches from structures within a given property. Elevated lead concentrations in such aliquots are very likely caused by drip-zone releases of LBP. Inclusion of these drip-zone aliquots contaminates the "mid-yard" composite results and yields elevated concentrations that are unrelated to the deposition of industrial emissions. Therefore, the very data that EPA relied upon to assess the effects of industrial emissions on soil lead levels are in fact heavily skewed by the presence of LBP.

Remarkably, EPA's RI Report describes the DZWS and its findings, yet still fully relies upon the soil lead characterizations that are based on the earlier, assumed drip zone width of only 6–30 inches from the residential structures (now demonstrated as unreliable). EPA makes no effort to explain its apparent rejection of its own DZWS results and does not appear to understand that those results undermine the basic (but incorrect) premise of the OLS RI and FS that elevated soil lead concentrations in Omaha result from deposition of industrial emissions. The reality is that LBP is the primary source of elevated soil lead concentrations in Omaha.

As detailed in UPRR's comments on the DZWS (Appendix A), EPA designated 26 of the 30 residential structures evaluated as part of the DZWS as positive for LBP and 4 of the residential structures as negative for LBP. The average soil lead concentration in the drip zones of residences that are positive for LBP (763 ppm) is over five times greater than the average soil lead concentration in the drip zones of residences that are negative for LBP (140 ppm). Correspondingly, the average soil lead concentration in the non-drip zone residential yards of residences that are positive for LBP (253 ppm) is over three times greater than the average soil lead concentration in the residential yards of residences that are negative for LBP (73 ppm). The implications of this are two-fold. First, the uniformly greater lead concentrations in drip zone and residential yard soil for residences that are positive for LBP further demonstrates the importance of LBP as a source of lead to Omaha's yards. Second, the uniformly low lead concentrations in drip zone and residential yard soil for residences that are negative for LBP are all well below EPA's action level of 400 ppm and confirm that deposition of smelter emissions is not a significant contributor to soil lead concentrations. This is particularly important given EPA's assertion that the 30 residences and yards evaluated in the DZWS are representative of the entire OLS.

EPA should have conducted a DZWS prior to sampling thousands of residential yards in Omaha. This would have allowed exclusion of soil truly affected by LBP from the composite samples used to characterize the residential yards, with the likely outcome that the number of yards requiring remediation due to industrial emissions would be many thousands less than now contemplated by EPA. Unfortunately, the aliquots comprising the residential "mid-yard" samples have already been mixed, and holding times for metals analyses have been exceeded. Moreover, based on the Site data provided by EPA in support of the 2008 RI and Proposed Plan (which does not include field notebooks or similar yard-specific details), it does not appear that the precise sampling locations in each yard were recorded. Therefore, EPA has no viable method for correcting its mistake other than to reimplement the residential yard sampling program while taking into account the findings of the DZWS to ensure that for all future sampling soil aliquots most likely to contain LBP are excluded from the composite yard samples. Amazingly, EPA is basing the need for remedial action at a given property on the RI data set that is demonstrably tainted by the presence of LBP.

EPA Response: Comments submitted on the Drip Zone Width Study (OLS DZWS) were previously addressed. Portions of these responses are provided below to address the comments submitted on the Final RI that pertain to the OLS DZWS.

The primary purpose of the Drip Zone Width Study was to characterize the width of the area impacted by drip zone effects at typical OLS properties in order to determine the area that could potentially be impacted by future deteriorating lead-based paint falling to the ground and mixing with soils near foundations. Existing soil lead levels in drip zones at the properties evaluated in the Drip Zone Width Study are the result of factors in addition to deteriorating lead-based paint which include direct deposition of lead from pyrometallurgical sources and wash-off of pyrometallurgical lead deposited on rooftops and impinged on structure siding. Data collected during the Drip Zone Width Study cannot be used to determine the source of lead that presently exists in drip zone soils since speciation of lead forms to determine their origin was not performed on soil samples collected during this study.

EPA recognizes that drip zone areas at the OLS can have elevated soil lead levels at distances greater than 30 inches from the foundation. The EPA Superfund Lead-Contaminated Residential Sites Handbook indirectly defines a presumptive drip zone width by specifying that drip zone soil samples should be collected from a distance of 6 to 30 inches from the structure foundation. The OLS DZWS concluded that soil lead concentrations at the OLS properties sampled for this study declined with increasing distance from the foundation to levels below 400 ppm at an average distance of six feet from the foundation wall. This site-specific determination of the typical drip zone width is more representative of OLS properties for purposes of a soil mixing calculation for future deposition of deteriorating lead-based paint than the presumptive drip zone width indirectly defined by the Handbook.

EPA disagrees that deteriorating lead-based paint generally represents the primary source of lead contamination in mid-yard soils. EPA recognizes that deteriorating lead-based paint can contribute to total soil lead levels in mid-yard areas at some OLS properties. This is not unexpected since homes and other buildings within the OLS are among the oldest residential structures in eastern Omaha, and the presence of deteriorating lead-based paint has been identified at many of these properties. However, speciation studies performed by EPA have consistently demonstrated that pyrometallurgical sources, such as the former lead smelting/refining operations in eastern Omaha, represent the largest identified source of lead contamination in mid-yard soils at the OLS. EPA recognizes that deteriorating lead-based paint is more likely to have a greater impact on soil lead levels in drip zone areas, but EPA does not agree that elevated soil lead levels near the foundations of structures can be generally attributed to the presence of lead-based paint on structures. Soil lead levels in drip zone areas can also be the result of direct deposition or wash-off of lead-containing particulate matter emitted from pyrometallurgical sources deposited on rooftops and impinged on structure siding. Speciation studies performed by EPA demonstrate a significant contribution of lead from pyprometallurgical sources in drip zone areas. Speciation is the only definitive method which is capable of attributing lead in OLS soils to the source of origin.

Recognizing the potential contribution of deteriorating lead-based paint to soil lead levels in drip zone areas at some properties, EPA's approach to determining eligibility for soil remediation involves considering the results of mid-yard sampling as a clearer indication of the presence of elevated soil levels associated with pyrometallurgical sources. The eligibility determination for soil remediation at individual properties is based on the maximum mid-yard soil lead level detected. Soil samples collected in mid-yard areas are generally comprised of five separate aliquots that are combined to form a single composite sample for analysis. The five aliquots are collected to the extent possible in areas away from foundations at individual properties to avoid the potential impact of higher soil lead levels that may exist in drip zone areas due to a potential contribution from lead-based paint. However, depending upon the location of property boundaries in relation to the structures on an individual property, there is a possibility that an aliquot of a mid-yard sample could have been collected within six feet of foundation walls. It is not possible to define the frequency that this may have occurred, or if in fact it has occurred at all, since the precise locations of individual aliquots collected at a property are not recorded. Individual aliquots that are combined to form mid-yard samples are typically collected at distances greater than six feet from the foundation. However, including an aliquot collected within six feet of foundations cannot be assumed to result in a soil lead level in that composite sample that is dominated by lead from lead-based paint. First, soil lead level in drip zone areas can not be assumed to be dominated by the contribution of lead-based paint, as demonstrated by EPA speciation studies. Secondly, the effect of an individual aliquot collected within six feet of a foundation would be reduced because five aliquots are composited to form a single soil sample for processing and analysis. At the majority of OLS properties, all aliquots that are combined to form the mid-yard composite sample are collected at significantly greater distances than six feet from the foundation. If an aliquot were to be collected within six feet of the foundation, EPA believes that the soil lead level measured in the five-aliquot mid-yard soil sample would still be largely indicative of the impact of pyrometallurgical sources on soil lead levels.

It is not valid to use data from the four properties identified by the commenter as negative for lead-based paint as an indication that lead-based paint has not impacted soils at these properties or that properties identified by the commenter as positive for lead-based paint indicates a significant impact from lead-based paint on soil lead levels. The fact that a lead-based paint assessment performed by EPA identifies a significant amount of deteriorating lead based paint at this time is not an indication of the potential for lead-based paint on a structure to have contributed to the total soil lead levels at individual properties. Lead-based paint assessments are performed by EPA to determine the current potential for deteriorating lead-based paint to fall to the ground, mix with soil, and increase soil lead levels in the future. Properties that are described by the commenter as negative for lead-based paint may still have a significant amount of lead-based paint present on the structure. The lack of a current problem with deteriorating lead-based paint, as measured by the EPA assessment, is not an indicator of the past contribution of lead based paint on the structure to total soil lead levels. It is not valid to use the lead paint assessment as an indicator of the contribution of lead-based paint to total soil lead levels. Furthermore, EPA does not agree that comparison of the sampling results from four residences sampled during the DZWS to the sampling results from the parks could be considered statistically significant under any circumstances.

The DZWS was performed to determine the width of the area near foundations that has been impacted by drip zone effects which includes both direct deposition and wash-off of pyrometallurgical lead from structures and lead-based paint, if present. Speciation studies have demonstrated that drip zone soils are impacted from both of these sources. Presence of lead in drip zone soils cannot be assumed to originate solely from lead-based paint. Extrapolating beyond this false premise to suggest that soil lead levels measured in mid-yard areas are the result of the lead-based paint contribution to drip zone soils is not valid and certainly cannot be based on the results of the DZWS which was performed for another purpose altogether. The only valid approach for characterizing the relative contribution of lead in soil samples is through speciation studies, which were not performed on samples collected for the DZWS.

EPA recognizes that lead-based paint can contribute to total soil lead levels measured in both drip zone and mid-yard areas of some OLS properties. EPA's response is based on total soil lead levels measured at individual properties which would include any contribution from lead-based paint. Speciation studies confirm that deposition of emissions from former pyrometallurgical operations have significantly impacted soil lead levels present in OLS soils, and EPA's response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

Comment B-3

EPA's Small and Large Park Studies Prove That Soil Lead Concentrations in Most of Omaha Are Unaffected by Refinery Emissions.

EPA's sampling data for Omaha's parks are presented in Appendix J and Appendix K to the RI without interpretation. UPRR's detailed comments on these appendices are provided in Appendix G of this comment package; key points from those detailed comments are provided here.

EPA collected <u>over 2,400</u> soil samples from 43 small parks (less than 10 acres) and 15 large parks (more than 10 acres) within the OLS. These parks include locations proximate to the ASARCO and Gould refineries and along the predominant wind direction (to the north-northwest or south-southeast). Soil in the park areas are isolated from the local effects of deteriorating LBP as well as heavy automobile traffic and related historical leaded-gasoline emissions. However, soil in the *park areas would not be protected from airborne deposition of lead that originates from long-term industrial sources such as the former ASARCO and Gould refineries. Thus, if elevated soil lead concentrations in the OLS are due to deposition of refinery emissions, the park areas should exhibit lead concentrations that are similar to residential yards.*

The robust data set collected by EPA indicates that the parks have very low soil lead concentrations when compared to residential soils.

- *None of the park samples had a lead concentration greater than 800 ppm.*
- *Two of the more than 500 small park samples had a lead concentration greater than 400 ppm, but neither of those concentration measurements was confirmed by later laboratory analysis of the samples.*
- *Three of the more than 1,800 large park samples had a lead concentration greater than 400 ppm.*
- *None of the parks had an average soil lead concentration close to EPA's 400 ppm "screening level." The average lead concentration in park surface soils ranged from 14 to 153 ppm.*

Thus, only five of the approximately 2,400 samples (0.2 percent) collected from Omaha's parks exceeded the screening level of 400 ppm lead. These results are consistent with a similar study conducted by UPRR (see Section III, Attachment 4 of these Comments). This is yet another line in the overwhelming body of evidence that sources other than emissions from the ASARCO and Gould facilities are responsible for the presence of lead in soils at the OLS.

Although EPA presented the parks data in the 2008 RI, EPA made no effort to use those data to better characterize the nature and extent of soil contamination originating specifically from the former ASARCO and Gould facilities. EPA does not explain that the parks provide an ideal set of test plots for evaluating the contribution of airborne lead deposition to soil in the absence of contributions from other common sources such as deteriorating LBP. Many of the parks sampled by EPA have been in existence since the founding of the City and throughout the history of lead emissions from the ASARCO refinery. See Figures 5 through 8 of these Comments and Attachment 1, DVD 4 of these Comments. As such, the mass of lead deposited from ASARCO refinery emissions to the oldest Omaha parks would represent the total location-specific deposition for the entire history of the lead processing operations at that facility.

Aerial deposition of lead particulates is broad and consistent and would have impacted all areas of the parks (particularly along the prevailing wind directions). Instead of acknowledging that the parks data are useful for characterizing the lead distribution in OLS soils, EPA has previously argued that soils in the small parks were too disturbed in the past to be representative of historical surface soil conditions. The likelihood that soils have been extensively disturbed at all 2,474 EPA sample locations in both small and large parks distributed across the OLS, particularly given the grid pattern method EPA used to select sample locations, is not credible. It is unrealistic for EPA to take the position that all of the park sample locations have been disturbed, while nearby residential samples would not have been subject to similar, or more, disturbance activities. Therefore, some portion of the total number of parks samples collected by EPA represent areas of limited or no historic disturbance of soils.

Neither discussion nor interpretation of the parks investigation data are provided in the individual appendices or in the later 2008 RI. To address the RI requirement to fully characterize the nature and extent of contamination, the parks data should be compared to, and contrasted with, the surrounding residential soil data. Even a cursory analysis identifies that the distinction between park soil lead concentrations and those concentrations found in adjacent neighborhoods is due to the presence of LBP on homes. Absent the lead contribution from paint, the adjacent yards would be consistent with the parks data and well below EPA's 400 ppm screening level. EPA's omission of these analyses in the 2008 RI is inconsistent with the requirements of the NCP. Clearly, the parks data provide an obvious and important line of evidence regarding the nature and extent of lead contamination at the OLS. The lack of consideration given these data has directly contributed to EPA's arbitrary decision to address the impacts of lead, based on residential soil, through CERCLA.

EPA Response: Responses to all comments received on the Small Park and Large Park investigations are presented in a subsequent section of this responsiveness summary. The comment above is similar to the subsequent comment submitted on these two studies, and EPA's response to this comment is provided below.

EPA does not agree that the public parks provide an ideal set of test plots for evaluating the contribution of airborne lead deposition to soil in the absence of contributions from other lead sources such as deteriorating lead based paint. Present-day soil lead levels measured in surface soils at public parks cannot be assumed to be indicative of the original impact from former lead smelting/refining operations. Historic information regarding the development of public parks in eastern Omaha indicates that significant soil disturbance has occurred at Omaha parks during initial construction, subsequent modifications, and during regular maintenance. Considerable earthwork was required at many parks to create the terrain that exists today. The soil-disturbing activities include grading and filling and mixing of surface soils with underlying soils during initial earthwork, park improvement, and landscaping operations. Deposition of airborne lead from historic industrial emissions resulted in elevated soil lead levels in a relatively thin layer of surface soil. Soil-disturbing activities would result in the mixing of surface soils containing relatively high lead levels from airborne deposition with underlying soils that are much lower in lead content. Soil mixing lowers surface soil lead concentrations through dilution with the underlying soils. Most of the airborne deposition from the lead-processing facilities occurred prior to the 1930s, and any subsequent soil disturbance that occurred during the construction and maintenance of public parks would have significantly reduced lead levels in surface soils detected today. Consequently, EPA believes that a comparison of the soil data from the public parks with the soil data from residential properties is not meaningful.

EPA does not agree that low lead concentrations detected in the public parks supports the claim that LBP is a significant source of lead to the soils of properties where structures with LBP are present. Soil lead levels exceeding 400 ppm were detected in at least one soil sample from five of the parks sampled by EPA. In the absence of lead-based paint as a potential source of soil lead at these public parks, the elevated soil lead levels detected must be the result of another source at these five parks. The elevated soil lead levels remaining today at these five parks is the apparent result of less soil mixing in these particular areas. In the absence of lead-based paint, there are no other sources of lead that could result in soil lead concentrations elevated to these levels at these five parks. Since it is not feasible that the impact from the former industrial emissions could have been limited to these five discrete areas, the presence of elevated soil lead levels at these five parks indicates that the impact to other areas of the park has been altered through soil disturbance and possibly other factors.

The absence of lead-based paint as a potential source at these public parks leaves historic industrial lead emissions as the only remaining source significant enough to cause soil lead levels exceeding 400 ppm.

EPA has performed speciation studies at residential properties to identify sources of lead detected in soil samples collected from mid-yard and drip zone areas. Speciation of the soil samples has identified the presence of lead forms associated with lead-based paint in many of the samples analyzed, but these speciation studies demonstrate that pyrometallurgical lead associated with the former industrial facilities has significantly impacted soil lead levels throughout the OLS. Speciation is the only definitive method which is capable of attributing lead in OLS soils to the source of origin. EPA recognizes the potential for deteriorating lead-based paint to contribute to soil lead levels in yard soils. EPA's response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

Figures 5 through 8 that were provided with the comments do not indicate that the parks were in existence at the date shown on the figure. The park names and locations appear to have been superimposed on the figures. The original figure does not appear to include the name of any of the parks.

Comment B-4

Air Deposition Modeling Does Not Support EPA's Conclusions.

An air dispersion model of the OLS was developed by the Idaho National Engineering Laboratory in 1999, as described in Section 1.1.3.2 of the Draft Final RI. The results of the model indicated that most particulate fallout from the former ASARCO and Gould refinery stacks would have occurred in line with the prevailing wind directions (i.e., along a north-northwest to south-southeast line) and that the maximum fallout would occur about 600 meters from the former smelter stacks along this prevailing wind direction line, with fall out rates rapidly declining beyond 600 meters. The extensive data collected by EPA bear no resemblance whatsoever to the predictions of the air- dispersion model (see UPRR's Specific Comment 2 on EPA's Draft Final Feasibility Study Report). Elevated lead concentrations in residential yards are documented to occur throughout Omaha and in no way reflect any pattern oriented along a north-northwest to south-southeast path. Instead, the lead-in-soil patterns match the presence of LBP in older neighborhoods, as corroborated by the general lack of lead in Omaha's parks, where structures with LBP are generally not present.

EPA Response: EPA believes that the pattern of soil lead contamination encompassed by the Final Focus Area is consistent with modeled airborne lead deposition patterns from the former ASARCO facility. Although models are generally not highly accurate in predicting the magnitude of lead deposition from airborne industrial sources, the predicted spatial pattern of deposition from the former ASARCO facility predicted by modeling, which is in large part controlled by prevailing wind direction, is consistent with measured soil lead levels within the Final Focus Area at the OLS.

The use of air dispersion modeling to predict deposition rates of emissions from the former lead smelting/refining operations is highly uncertain. Deposition rates predicted by air dispersion models have undergone very few evaluations and are less reliable than air concentrations predicted by air dispersion models. Air dispersion models are more reliable in providing information regarding the general shape of deposition patterns and direction of deposition and are far less reliable in estimating the actual magnitude of deposition.

Wind rose information and air dispersion modeling can be useful in predicting general directions in which airborne contaminants could be transported, particularly in the initial design of a site investigation when other data characterizing the distribution of contamination is not available. The air dispersion model of the OLS developed by the Idaho National Engineering Laboratory in 1999 was used by EPA in the design of the initial soil lead investigation performed at the OLS to identify areas potentially impacted by the former lead smelting/refining operations.

The actual deposition of airborne contaminants is the result of a complex set of factors involving considerations beyond mere wind direction. EPA has relied not on predictive tools, such as air dispersion modeling, to characterize the impact of the former lead smelting/refining operations, but rather has collected soil data from actual impacted areas to characterize the OLS. Soil lead analysis combined with speciation of soil samples collected from impacted areas is a far more definitive approach to characterizing the impact from the former smelting/refining operations. As indicated on Figure 4-3 of the Draft Final Remedial Investigation Report, there are many residential properties located to the north-northwest and south-southeast of the former ASARCO smelter that have elevated soil lead concentrations. Speciation studies conducted by EPA in 2002 and 2007 confirm that OLS properties are significantly impacted by historic industrial lead emissions.

The Final Focus Area encompasses the area significantly impacted by emissions from the former lead-processing facilities. Soil lead speciation studies have identified lead from pyrometallurgical sources throughout the Final Focus Area. Speciation studies have concluded that pyrometallurgical operations, which are associated with the former lead-processing industries, represent the largest identified source of lead in residential yards. Speciation studies at the OLS have also identified lead originating from pyrometallurgical sources in soil samples collected from more than 90 percent of the properties speciated throughout the Final Focus Area. The presence of lead forms associated with lead-based paint have also been identified in soil samples collected from some OLS properties, but these lead forms associated with paint are less prevalent than the pyrometallurgical forms found throughout the Final Focus Area. The data indicate that the properties within the Final Focus Area are significantly impacted by historic emissions from the former lead-processing facilities in downtown Omaha.

Comment B-5

EPA Has Not Effectively Characterized the Sources of Lead in Site Soil.

Two separate reports were prepared for EPA by Dr. John Drexler of the University of Colorado (Boulder) to present data collected to identify sources of lead to residential soils within the Omaha Lead Site (OLS). Collectively, these two studies comprise EPA's "Apportionment Study" as described in Section 1.1.8 of the 2008 RI.

The first report was prepared in 2002, the 2002 Apportionment Study, and the report findings were summarized in the 2004 RI. EPA relied solely on the findings of the 2002 Apportionment Study to support its erroneous conclusion that emissions from the former ASARCO lead refinery and the Gould secondary lead smelter are the dominant source of lead to residential soils in the OLS and to justify continued expansion of the area included within the OLS boundary. UPRR provided specific comments on the 2002 Apportionment Study with their comments on the 2004 RI, but EPA never specifically addressed UPRR's comments. EPA's Responsiveness Summary, issued with the IROD, provides no additional support for Drexler's conclusions and no substantive responses to UPRR's technical concerns. Instead, the IROD makes the conclusory, non-substantive statement:

> *The assumption that lead found in soils at the OLS originated from airborne deposition of historic emissions from the ASARCO refinery and Gould Battery facility is supported by the Apportionment Study performed by EPA. The Apportionment Study is a technically sound document which identifies the ASARCO and Gould facilities as significant contributors to the lead contamination detected in Site soils based on proven scientific methodologies.*

EPA correctly identified its position regarding the source of lead in the OLS as only an assumption. UPRR's position remains that the 2002 Apportionment Study does not support an assumption that lead found in soils at the OLS originated from historic emissions. Instead, the 2002 Apportionment Study results indicate that a small portion of the lead found in soil may have originated from such emissions, but a much larger portion is not attributable to any specific source. None of the lead in soil has been directly traced to either the ASARCO or Gould facilities, and given the history of industrial and consumer uses of lead within the site, the "proven scientific methodologies" used for the study do not provide the level of certainty that EPA represents in their responses to UPRR's previous comments, all of which are incorporated herein by this reference and attached in Attachment 1, DVD 2.

Drexler prepared a second report in 2007 to present additional data collected to supplement the data reported in 2002. EPA did not solicit public comment on this second report because it did not include the second report with the 2008 RI for public review and comment.

EPA continues to rely heavily on the findings reported by Drexler in the 2002 and 2007 reports (the Apportionment Study) both in EPA's characterization of lead sources and in its explanation of the nature and extent of lead contamination at the OLS. UPRR prepared detailed comments on the Apportionment Study (see Appendix H of this comment package). A summary of those comments follows.

Drexler presents two main findings at the end of his report, both of which are unsubstantiated by Drexler's data. The first finding, that "both smelter emissions and lead-bearing paint" are primary contributors of lead to soil within the OLS, is supported in part by the lead speciation data presented in his report, but it is not consistent with other lines of evidence. Neither Drexler nor EPA have considered the lead speciation data in conjunction with other site-specific information such as the widespread distribution of elevated soil lead concentrations across the OLS and the distances from the ASARCO/Gould refineries yards with elevated soil lead concentrations are located. Other site-specific information that should have been considered includes

- *the spatial distribution of lead in soil across the OLS relative to potential lead sources;*
- *the spatial distribution of lead in soil within individual residential lots;*
- *a comparison of drip zone soil lead concentrations to yard soil lead concentrations (drip zone soil is more likely to contain paint from the exterior of the home than soil in the middle of yards);*
- *the locations of the residential soil samples studied by Drexler relative to the ASARCO/Gould refineries and other potential industrial lead sources; and*
- *The strong positive correlation between elevated soil lead concentrations and areas of older (pre-1950s) housing stock with prevalent exterior LBP.*

When Drexler's lead speciation data are reviewed along with these other lines of evidence, the only explanation that remains consistent with those data is that numerous sources have contributed lead to residential soil within the OLS. This is particularly evident at locations distant from the ASARCO/Gould refineries where refinery emissions cannot explain the lead concentrations and lead speciation that is reported by Drexler. The other potential lead sources to OLS yard soils include LBP, leaded gasoline emissions, and industrial facilities with shorter term and more local lead emissions. Drexler's lead speciation data do not distinguish one potential source from others or assist in identifying the predominant sources of lead in OLS yard soil.

Drexler's second finding, that "pyrometallurgical forms of lead were the largest identifiable lead source in residential yards; more than 90 percent of the yard samples speciated had pyrometallurgically apportioned lead; at least 32 percent of the bulk lead found in community soils is from a pyrometallurgical source; there is a strong lead isotopic correlation between community soils and the ASARCO plant with apparent limited input from the Gould facility or leaded gasoline; and that lead paint cannot be isotopically ruled out as a source of lead, but isotopes suggest its significance is also limited" (Draft Final RI Report at page ES-4) is flawed for many reasons. First and foremost, these hypotheses are not consistent with Site data. The data in the report actually indicate that 90 percent of the soil samples contain lead species that might be pyrometallurgical in origin, but a smaller percentage of the soil samples contain lead predominantly associated with those species. Second, approximately 68 percent of the lead present in Omaha's residential soils is not traceable to any identifiable lead source based on lead speciation and isotopic data. Finally, the apparent isotopic correlation between community soils and ASARCO plant soils is not supported by other lines of evidence. The isotopic data presented by Drexler do not provide a basis for the statement that input from Gould or leaded *gasoline is limited, and there is no technical basis for the statement that paint is a limited source of lead to community soils. In order for Drexler to draw these conclusions from lead isotopic data, the sources he considers must be isotopically distinguishable from one another. Drexler has neither provided any data, nor otherwise demonstrated that ASARCO and Gould lead emissions, LBP, and leaded gasoline emissions, have distinctive (i.e., non-overlapping) isotopic signatures that can be identified in Omaha yard soils.*

Finally, although the new data presented in Drexler's 2007 report more than double the previous sample set, the Apportionment Study still only includes samples from 72 different residential lots and 2 parks. As such, the study data are not representative of conditions throughout the OLS.

EPA Response: Soil lead speciation studies have identified lead from pyrometallurgical sources throughout the Final Focus Area. Speciation studies have concluded that pyrometallurgical operations, which are associated with the former lead-processing industries, represent the largest identified source of lead in residential yards. Speciation studies at the OLS have also identified lead originating from pyrometallurgical sources in soil samples collected from more than 90 percent of the properties speciated throughout the Final Focus Area.

EPA acknowledges that the area impacted by historic industrial lead emissions includes the area of older housing stock in eastern Omaha where the presence of lead-based paint is prevalent. The presence of lead forms associated with lead-based paint have been identified in soil samples collected from some OLS properties, but these lead forms associated with paint are less prevalent than pyrometallurgical forms found throughout the Final Focus Area. The data indicate that the properties within the Final Focus Area are significantly impacted by historic emissions from the former lead-processing facilities in downtown Omaha.

EPA believes that the residential properties used for the apportionment study are representative of the residential properties within the OLS.

Additional EPA responses have been provided to UP's comments contained in Appendix H.

Comment B-6

EPA's Bioavailability Samples Were Strongly Influenced by Lead-Based Paint.

EPA conducted an in-vivo (swine) bioavailability study on two composited samples from four yards within the OLS (Casteel, 2004) and two in-vitro bioavailability studies. A key premise of the study was that the samples were representative of residential soils unaffected by the drip zone, which was presumed to contain LBP. The 35,000-plus residential yards sampled by EPA to characterize soil lead concentrations in the OLS are predicated on the assumption that the drip zone extends 30 inches beyond the foundation of the dwelling. However, EPA's recent DZWS demonstrates that the drip zone is typically six feet (72 inches) or more. Thus, it is highly likely that the samples collected by EPA to characterize the residential yards that were used in the bioavailability studies, include LBP and are not representative of industrial air emissions. This is apparent with regard *to the two samples that were used for the in-vivo test, which had lead concentration of 1,613 ppm and 2,003 ppm (2008 RI at p. 1-16); only a very small fraction of samples collected in the OLS exhibited concentrations this high, suggesting the presence of LBP chips.*

EPA Response: EPA believes the soil samples collected for the bioavailability studies were representative of the residential soils in the OLS. As described previously, EPA does not believe that the results of the OLS DZWS indicate a significant influence of lead-based paint in mid-yard soil samples. The purpose of the bioavailability studies was to determine the relative bioavailability of lead in representative soil samples from the OLS. The information obtained from the studies was used in EPA's Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) to determine the human health risk from lead at the site. Since the purpose of the study was to obtain data to determine the human health risks from all lead sources at the site, including risks from industrial emissions and lead-based paint, mid-yard soil samples that may have been influenced by both industrial emissions and lead-based paint should have been used in the study.

Comment B-7

EPA's Demographic Study Overlooked a Number of Material Issues.

Demographic data are critical to developing a complete understanding of site conditions and exposures. However, the demographic survey conducted by EPA, Demographic and Land Use Survey, Omaha Superfund Site, Omaha, Nebraska (EPA, 2003) does not provide either the quality or quantity of information needed to make fundamental evaluations regarding the OLS. As a result of EPA's study approach and inadequate input to the questionnaire, the survey failed to obtain basic information needed to identify all lead sources—or the most significant lead sources—in children's environments. Specific concerns with the survey include (a) the survey format was not conducive to collecting data regarding multiple children below the age of six in the same household;(b) the survey did not stress the importance of providing accurate answers to sensitive questions;(c) the survey did not seek adequate information regarding the frequency of house cleaning, time spent by young children outside, and whether those children spend significant amounts of time at residences outside the OLS; (d) the survey method included no quality control system to verify responses; and (e) the survey was not provided in all prevalent languages in the community.

EPA Response: The *Assessment of Exposure to Lead Poisoning Demographic and Land Use and Activity Patterns* report was finalized in January, 2004. EPA believes that the Demographic Study provides sufficient critical demographic data to determine the site conditions and receptors at the site. The survey form did identify residences where there were multiple children below the age of six in the same household as well as the time spent outside by young children. The survey was provided in English and Spanish.

Comment B-8

ATSDR's Public Health Assessment Was Based Upon Incomplete Data and EPA's Inaccurate Site Conceptual Model; Its Conclusions Do Not Support the RI.

EPA relied on ATSDR's Public Health Assessment for the Omaha Lead Refinery, Omaha, Douglas, County, Nebraska (PHA), to support the RI. UPRR commented extensively on the PHA on August 5, 2004, and by Addendum on September 4, 2004. Those comments are fully incorporated by this reference and attached in Attachment 1, DVD 2 of these Comments. In summary, the PHA was based on EPA's inaccurate Site Conceptual Model and resultant incomplete data set. In particular, though ATSDR correctly concluded that LBP is a primary source of child lead exposure within the Site, the magnitude and impact of that exposure was not evaluated. ATSDR relied on the bioavailability analyses performed for EPA though, as discussed above, a host of problems raise fundamental concerns about those analyses. UPRR identified additional data gaps and data quality concerns specifically germane to the PHA. Consequently, the risk determinations made in the PHA are unreliable and should not be used to establish or support any soil cleanup level at the Site. Despite EPA's commitment in the Responsiveness Summary to refine the HHRA during IROD implementation, EPA did not do so. Any further investigation conducted at the OLS should be developed in consideration of the data gaps identified in the PHA. Specifically, EPA has failed to conduct a meaningful evaluation of the exposures from interior and exterior paint, though demanded by the community. If that risk information is ever developed for the OLS, it should be used, rather than the PHA, as a basis for future Site risk management decisions.

EPA Response: EPA did not rely on the ATSDR Public Health Assessment to support the RI. However, the conclusions in the Public Health Assessment are consistent with the OLS remedial investigation and baseline human health risk assessment.

EPA believes the conceptual site model developed for the OLS is accurate and appropriate for decision-making for the final remedy. The conceptual site model describes how smelter-related emissions that have been released to the environment at the OLS might result in exposure of residents. EPA recognizes that there are other potential lead exposure sources that can contribute in varying amounts to the total or cumulative exposure of residential children. However, it is not the goal of the conceptual site model to identify each of these alternative (non-smelter) sources. Nevertheless, to help clarify this issue, EPA has modified the Site Conceptual Model to include lead-based paint as a potential source of exposure. However, including lead-based paint in the Site Conceptual Model does not alter the approach to the investigation of the OLS or the response action determined to be necessary in accordance with CERCLA, the NCP, and EPA policy.

EPA did collect additional soil, dust and drinking water data from OLS residences to enhance the Final Baseline Human Health Evaluation. Additional speciation studies were also performed to further evaluate potential sources of lead in OLS soils. More than 3,100 lead-based paint assessments have been performed at OLS properties to better characterize the potential for deteriorating lead-based paint to increase soil lead levels near foundations. EPA has collected a substantial amount of data to refine the assessment of risks and support a final remedy for the OLS. In accordance with EPA risk assessment policy, exposure to interior and exterior lead-based paint does not factor directly into the assessment of risks at the OLS. Contributions of deteriorating lead-based paint are indirectly accounted for in the BHHRA by considering total lead concentrations in interior dust and exterior yard soil samples which includes any contribution from lead-based paint. Data characterizing interior and exterior lead-based paint would therefore not be useful in assessing risks at the OLS in accordance with policy which defines EPA's risk assessment procedures.

Comment B-9

As a preliminary matter, it is a gross oversimplification to state that Superfund is the program EPA has to address "risks posed by uncontrolled hazardous waste sites." (ES-1, ¶ 1). This characterization is not appropriate for the OLS and could be viewed as offensive to residents within the Site boundaries. This language should be revised.

EPA Response: The statement does not indicate that the OLS is an uncontrolled hazardous waste site. The statement indicates that the RI is the methodology that the Superfund program has established for investigating the risks posed by uncontrolled hazardous waste sites. However, EPA has determined during the final remedy selection process that additional controls are necessary to provide protection of human health at the OLS. EPA believes the statement is correct as written.

Comment B-10

Page ES-1, Paragraphs 2 and 3: UPRR Ownership of the ASARCO Refinery Property

Several comments about UPRR ownership of property are incorrect. The Union Pacific Railroad Company did not exist until 1897. The prior railroad company went into receivership (bankruptcy), and the newly formed Utah entity, UPRR, acquired the Omaha land on January 22, 1898. At the time it was acquired by UPRR, it was already burdened by the smelter lease. Moreover, at no time did UPRR own the entirety of the property on which the ASARCO refinery was located. Rather, UPRR only owned a portion of that property, the remainder of which was owned by the City of Omaha. UPRR leased that portion of the ASARCO refinery property that it owned to ASARCO from 1898 until 1946, at which time UPRR sold the leased portion of the ASARCO site to ASARCO. However, during the period from 1898 to 1946, the United States government (Government) took over and owned and/or operated UPRR's assets, including the Omaha property for a total of approximately six years. From January 1, 1918, to March 1, 1920, the United States government owned all of UPRR's railroad assets under the Federal Control Act of 1918. See Section VI. D. 1. of UPRR's General Comments. In WWII, the United States once again operated and controlled the United States railroad companies, including UPRR, from December 27, 1943 through December 28, 1945. Id. After WWII, the federal government took possession and control of UPRR's system in 1948 and from July 8, 1950, to May 23, 1952, including its Omaha assets, to prevent labor unrest from growing into strikes that would have crippled the entire United States transportation system. That total additional period of federal control was more than another two years. Id. Accordingly, the United States owned the parcel leased to ASARCO during those time periods, for a total of slightly more than six years.

Throughout the period of ASARCO's operations, the City of Omaha also owned property that was occupied by ASARCO, including public streets and rights-of-way. By ordinance, the City also claimed ownership of property created by depositing slag along the western boundary of the Missouri River. To the extent not owned by the City, any extensions of property into the Missouri River by deposition of slag were owned by the State of Nebraska. Of course, as noted in the RI, the former ASARCO refinery site is now owned entirely by the City and is a park.

To the extent that UPRR is noted at all in this section, the statements should have been corrected to note that UPRR owned only a small amount of property at the ASARCO refinery for a portion of its operation. Other owners of the ASARCO property should also be identified, including both the United States and the City of Omaha.

The description of emissions from both the ASARCO and Aaron Ferer/Gould operations is incomplete and misleading. See Comments B-3 and B-4, above. For example, there is ample evidence in the administrative record (AR) and from the ASARCO OLS Estimation that demonstrates ASARCO's innovation in installing bag houses and other emission control equipment at the turn of the century, as well as the effectiveness of that equipment. Moreover, Site soil data simply do not support EPA's contention that the primary sources for lead in soil are the ASARCO and Gould facilities.

EPA Response: The language in the Draft Final Remedial Investigation Report depicts the general ownership of the ASARCO facilities. Two Union Pacific Companies owned the land where the ASARCO facility operated from the 1860s until it was sold to ASARCO in 1946.

EPA believes that the description of the emissions from the ASARCO and Gould facilities is correct. Lead and other heavy metals were emitted into the atmosphere through smokestacks and through fugitive emissions from plant operations and transported to properties which comprise the OLS. EPA acknowledges that air emission control equipment was eventually installed at the ASARCO facility, initially for the purpose of limiting the loss of product through stack emissions.

Comment B-11

Pages ES-2 (and ES-5): Summary of properties addressed in the Interim ROD

UPRR recognizes that EPA used the words "non-foundation" soil in the IROD. However, "non-foundation" is not a defined term in CERCLA, the NCP, or any EPA guidance. Given that "drip line" is defined at 40 CFR. 745.63, "drip zone" is defined in the Lead Handbook, and the OLS site-specific drip zone is defined by the DZWS, EPA creates unnecessary confusion by using yet another term referring to an area within a residential yard. It is especially troubling that EPA would use the most imprecise term of all the options available. UPRR recommends that EPA use defined terms wherever possible to describe remedy components in the Final ROD.

On page ES-5, EPA again uses the term "non-foundation," but here it is not quoting a provision from the IROD, but describing surface soil sampling results. EPA should stop using this undefined term; its use is confusing and sloppy. "Drip line," "drip zone," or "mid-yard" are all defined terms that should be used, instead.

EPA Response: EPA used the term "non-foundation" in the 2004 remedy selection process for the Interim ROD and believes that this term is useful for describing general areas of a property which could be characterized by multiple types of soil samples. Generally, EPA collects separate soil samples from mid-yard areas, garden areas, play zones, and drip zones to characterized soil lead levels at a property. The term non-foundation is a term used to collectively refer portions of a property that are located away from structure foundations. The use of terms "drip zone" and "non-drip zone" could create confusion, since garden areas, for example, could be located either near or away from the structure foundation. Therefore "drip zone" samples would not necessarily define all of the types of samples that could be collected near foundations; likewise, "non-drip zone" samples would not necessarily mean all samples that are collected away from foundations if a garden area were located near the structure.

Comment B-12

Page ES-3 and 4: Previous Investigations

As UPRR noted in its 2004 comments (incorporated herein and attached in Attachment 1, DVD 2), by the time that EPA obtained samples from the former ASARCO refinery property, that site had been remediated. Accordingly, there is no basis in the record to support that conclusion that the 32 soil samples EPA collected were representative of ASARCO soils during its operation. It is also unlikely that the 32 soil samples collected were representative of air emissions from the ASARCO operation. Accordingly, these soil samples do not provide a meaningful basis for comparison in the Apportionment Study. See UPRR's detailed comments to RI, Appendix D in Appendix H of these Comments.

EPA Response: During the remediation performed at the former ASARCO facility, EPA collected 20 surface soil samples in accordance with an approach designed to obtain material that was representative of surface soils prior to placement of a soil cover over certain areas of the former facility. Samples were collected through borings or trenching. In addition, soil samples from the most heavily impacted surface soils at the former facility were collected by ASARCO and archived prior to remediation. EPA obtained 21 samples from the archived soil samples collected by ASARCO prior to the cleanup of the facility. Twenty-four of the samples collected by EPA or obtained from ASARCO were selected for speciation analysis using electron microprobe techniques. Speciation of these soil samples show forms of pyrometallurgical lead that are consistent with processes known to have occurred at the former ASARCO facility. The summary of lead speciation for the 24 samples collected from the ASARCO property is presented in Table 4 of the 2002 speciation report prepared by Dr. John Drexler. EPA believes that lead forms found in the soil samples collected from the former location of the ASARCO facility are representative of former process and emissions from this facility and can appropriately be used as a basis of comparison to community soils in the speciation study.

Comment B-13

Page ES-6: Indoor Dust

For purposes of the 2004 RI, EPA sought to sample 500 homes for indoor dust, but only obtained samples from 159 homes. For the 2008 RI, EPA sought to sample 120 homes (2008 RI at 2-6), but only sampled an additional 98 homes for indoor dust. The RI does not include any discussion as to whether these data, cumulatively, are sufficient or representative. Moreover, since EPA did not provide its actual inputs to the IEUBK modeling for public review, it is not clear that any of the site-specific indoor dust data was used for modeling; it was not used in 2004.

EPA Response: As discussed in Section 2.12 of the baseline human health risk assessment, the indoor dust data collected in 2008 do satisfy EPA's data usability criteria, and these data were used in the risk assessment, as clearly discussed in Section 4.4.1. All of the inputs to the IEUBK model are presented in Table 4-1 of the 2008 Risk Assessment

Comment B-14

Page ES-6: Lead Based Paint Assessments

EPA states that it has performed exterior LBP assessments at 2,667 properties. Of these, EPA found that 1,042 had deteriorating LBP. Given that EPA has conducted soil sampling at 35,843 properties and remediated soils at over 4,000 of those properties, two issues should be at least identified in this section. First, EPA has not complied with the NCP, the Lead Handbook or other relevant residential lead site guidance by waiting to even sample the exterior paint on approximately 4,000 properties until after soil remediation was completed. Secondly, the dataset of sampled properties is likely not large enough to serve as a basis for projecting how many properties will have deteriorating LBP. The Douglas County Assessor's Office maintains data on the age of housing in Omaha. That data would also be relevant, if not more relevant, in projecting the number of properties that will likely require LBP stabilization to avoid further yard soil contamination (or recontamination).

EPA Response: EPA began the response actions in Omaha in 1998, several years prior to the release of the Superfund Lead-Contaminated Residential Sites Handbook. Sampling for the presence of lead-based paint on homes in Omaha occurred during the early investigations of the OLS. EPA also performed speciation studies (September 2002) early on in the process to determine the relative contribution of different potential sources to soil lead levels and collected and analyzed separate drip zone samples which were the areas of properties most likely to be impacted, at least partially, by lead-based paint. These early efforts demonstrate an awareness of the presence of lead-based paint as a potential source of contamination in Omaha.

EPA believes that the remedial investigation was performed in accordance with the NCP, the 2003 EPA Superfund Lead-Contaminated Residential Sites Handbook, and appropriate agency policies regarding lead-contamination site assessments. Lead-based paint assessments were not performed, as the commenter suggests, for assessment of risks associated with this potential lead source, but rather to characterize the potential for deteriorating lead-based paint on a structure in its present condition to fall to the ground and increase lead levels in remediated soils and thereby threaten the continued effectiveness of the remedy. Structures on properties where EPA determines that the remedy is threatened are eligible for stabilization of exterior lead-based paint. The assessments did not show, as described by the commenter, that deteriorating lead based paint was found on 1,042 of the 2,667 properties assessed, but rather indicated that the severity of deteriorating lead-based paint in its current condition threatened the continued effectiveness of soil remediation at this number of properties. The number of lead-based paint assessments performed to date has formed a very robust data set which is representative of properties across the OLS. EPA believes that this number of assessments is sufficient to project the number of properties where the continued effectiveness of soil remediation will be threatened by deteriorated lead-based paint.

Data on housing age from the County Assessor's Office would not be useful in determining the degree of deterioration of surfaces coated with lead-based paint. Since most housing within the OLS was constructed prior to the discontinuation in residential use of lead-based paint, some amount of lead-based paint would be expected to be present on structures at most OLS properties. However, the present degree of deterioration of painted surfaces can not be inferred from housing age. The age of the house is not relevant as to whether the property is eligible for paint stabilization.

Comment B-15

Page ES-7: Drip Zone Width Study

See CommentB-2 and Appendix A of this comment package. EPA sampled over 35,000 residential yards in Omaha using the assumption that the drip zone (i.e., the area that would be affected by LBP) extended from 6 inches to 30 inches from the residential structures. However, the DZWS confirms that the drip zone actually extends to 72 inches or more into the residential yards. Thus, EPA's own DZWS indicates that all of the soil lead data collected to date, and that are being used to make decisions regarding remediation, are indicative of LBP and not smelter emissions.

UPRR also notes that on the same page, ES-7, in the brief discussion about EPA's LBP Recontamination Study, EPA cited as a Study finding that "[s]amples collected from all properties at distances greater than 6 feet from the foundation averaged less than 400 ppm." However, EPA failed to note that that result was completely consistent with the DZWS results in that distances greater than 6 feet from the foundation are beyond the site-specific drip zone and, therefore, beyond the area likely to be impacted by deteriorating LBP from the home. See Comment B-2 and Appendix F of these Comments.

EPA Response: See Response to Comment B-2

Comment B-16

Pages ES-7 and ES-8: Public Parks

See Comment B-3 and Appendix G of this comment package. Lead concentrations in Omaha's parks are very low (i.e., only 5 of over 2,400 samples exceeded 400 ppm) when compared to lead concentrations in Omaha's residential yards. Structures with LBP are generally not present in the parks, but are present in the residential areas. Thus, the data that EPA collected from Omaha's parks confirm that the lead present in the residential area soil is primarily derived from LBP.

EPA Response: See response to Comment B-3.

Comment B-17

Page ES-8: Baseline Human Health Risk Assessment

See CommentB-4 and Appendix J of these Comments. Carrying forward EPA's preconceived idea of the Site and its sources, EPA states that the "environmental medium of chief concern is surface soil that has been impacted by the wet or dry deposition of metal-containing airborne particulates released from the smelters." However, even EPA's toxicologist, Dr. Weis, when testifying for EPA in the ASARCO OLS Estimation acknowledged two sources of exposure of concern—soil lead and paint lead—stating that house dust is the exposure pathway of greatest concern "[s]oil lead in the environment, as well as paint lead, makes its way through a variety of very complex pathways into house dust…" Hr'g Tr. (Weis) at 5-6, Aug. 7, 2007. EPA's artificial constraint to surface soil results in a failure to consider lead sources at the Site and all pathways of exposure. These failures violate CERCLA, the NCP, the Lead Handbook, and the 1998 Clarification. As a consequence of these failures, EPA's 2008 HHRA is incomplete and does not assess the most significant OLS risks.

EPA Response: In accordance with EPA policy for risk assessments performed at residential sites with lead-contaminated soils, risk associated with lead exposure at the OLS was characterized using the Integrated Exposure Uptake Biokinetic Model (IEUBK). The IEUBK model is specifically designed to evaluate the risks to children under conditions of long-term (chronic) exposure to lead in environmental media in a residential setting. The exposure pathways that are evaluated include exposure to lead in soil, dust, water, food, and air. Dust is viewed as being a secondary medium that is impacted by soil, air, and lead-based paint (if present). Thus, EPA has not focused solely on soil. The topic of using the IEUBK model to evaluate risks from exposure to lead-based paint is discussed in detail in Section 4.7.1 of the Guidance Manual for the IEUBK Model for Lead in Children (USEPA 1994). As discussed in this guidance, exposure to lead from lead-based paint can occur through two main pathways: (1) a contribution from lead paint to lead in outdoor soil and/or indoor dust and (2) direct ingestion of lead-based paint chips. The guidance indicates that exposures due to ingestion of lead from paint that has entered soil or dust should be evaluated because this represents a chronic ongoing source of exposure. The guidance indicates that quantification of risks from paint chip ingestion should not be attempted because data are not available to estimate the frequency or magnitude of the lead intake or the degree of absorption from paint chip ingestion. Also note that the 1998

Clarification to the OSWER Soil Directive states, “Any activities to clean up interior lead-based paint by PRPs or other parties should not result in an increase of the risk-based soil cleanup levels.” This emphasizes that risks from lead in soil must be addressed independently of whether or not there are substantial risks from lead-based paint and whether or not any actions are being taken to address exposures from lead-based paint

Consistent with EPA policies and guidance described above, the OLS risk assessment accounts for the contribution of lead-based paint to overall risk levels by using measurements of the concentration of total lead in outdoor soil and indoor dust that may or may not be impacted by lead-based paint.

Comment B-18

Section 1.0 (Page 101): Introduction

Again, as noted in the beginning of the specific comments, to identify the OLS as an “uncontrolled hazardous waste site” is not an appropriate characterization. This language should be revised. It is also telling to note that EPA’s two stated objectives for the 2008 RI do not include identifying the “nature” of the contamination as required by CERCLA, the NCP, and EPA’s relevant guidance. Since EPA has already predetermined that the nature of contamination is air emissions of industrial lead to OLS residential soils, here it is only interested in defining the extent of that contamination.

EPA Response: Determining the nature of the contamination is addressed by the first objective: collection of data to develop a risk assessment. The nature of contamination at the OLS has been determined by collection of these data as well as the speciation studies that confirm the pyrometallurgical lead as a significant source of the lead at OLS properties.

Also see response to comment B-9 above.

Comment B-19

Section 1.1.1 (Page 1-2): Site Description

In the first paragraph, EPA should note that the former ASARCO property is now a City of Omaha park.

The comment concerning LBP and leaded fuel emissions should have been expanded. Numerous studies, including Leinenkugel, 2002, document the presence of LBP throughout the Site. Readily available historic records document other sources, including pesticides and historic use of slag in city sidewalks (see Attachments B, F, G and H of UPRR’s October 14, 2004, comments on the Draft RI Report), should have been included in the “Site Description.”

EPA Response: The first paragraph of Section 1.1.2 indicates that the former ASARCO property is now used by the City for commercial and public purposes. EPA recognizes the historic activities cited in the comment, including the past use of pesticides and the use of lead-contaminated slag from smelting and refining operations for construction of sidewalks in Omaha.

The EPA does not have information that use of slag for sidewalk construction contributed significantly to the widespread lead contamination detected at the site. Historic use of pesticides has a greater potential to result in more widespread contamination, but the 2002 and 2007 apportionment studies did not find lead forms associated with pesticide usage in significant amounts. In contrast, these speciation studies concluded that on average at least 32 percent of the lead found in samples collected from mid-yard areas originated from pyrometallurgical sources, which is the largest identified source of lead in OLS soils.

Comment B-20

Section 1.1.2, Site History (Page 1-3 to 1-4)

Please see Specific Comment 1. Statements in the Site History section concerning UPRR's ownership of the ASARCO property are incorrect. Furthermore, during both World Wars and after WWII, the United States government owned all of UPRR's Omaha railroad assets, including the parcel leased to ASARCO at various times, cumulatively exceeding six years. The City of Omaha and the State of Nebraska also owned portions of the ASARCO site. As set forth in UPRR's General Comments, Section VI, D. 2. and amply documented by the historic records enclosed in Attachment 1, DVD 4, the United States government also operated the ASARCO facility during both World Wars. These facts should be added to the Site History statement in the RI for accuracy. The Site History also should have noted that the refined lead produced from the ASARCO refinery and, to a lesser extent, from the Aaron Ferer/Gould smelter, was used by numerous industries and manufacturing companies throughout Omaha. Thus, the chemical composition of the lead (including its lead isotopes) from each of the facilities would be the same or serve as the base for the lead that was used and potentially emitted by other Omaha companies.

The Site History omits a number of key historical points that are important in understanding significant potential sources of lead in the Omaha area, including the following:

- *Historical industrial sources of lead other than the ASARCO refinery and Gould smelter are not considered. See Attachments K and L of UPRR's October 14, 2004, comment package for a comprehensive list of historic sources and their known locations (attached hereto and incorporated by reference in Attachment 1, DVD 2).*
- *This section should include a discussion of the development of the residential areas included in the Site. Dates and phases of development are critical to understanding the potential for LBP impact and its potential for recontamination of soils and contribution to elevated blood-lead levels . Specifically, the RI should note that 96 percent of the housing in the Site is older than 1980 and 63 percent is older than 1950, meaning that a significant percentage of the housing in the Site is highly likely to contain LBP and, for the 63 percent of the housing that is older than 1950, that LBP is likely to contain 50 percent lead.*
- *Developmental stages also include the demolition of structures containing LBP, including the State's (Nebraska Department of Roads (NDOR)) demolition of over 600 homes in Omaha for the continuation and completion of the North Freeway (see articles provided in Attachment F of UPRR's October 14, 2004 comment package).*

- *The Drexler Report notes the presence of arsenic from rodenticides, including lead arsenate. The "Site History" should also mention the widespread past use of pesticides in Omaha. Historic operations of the City of Omaha should also be considered . Specifically, historic accounts of City development document the use of slag in "slagolithic" pavement material used in city sidewalks (see Attachments G and H of UPRR's October 14, 2004 comment package).*

As noted in Specific Comment 2, EPA's use of the words "non-foundation" is inappropriate, confusing, and sloppy. EPA should stop using these words and use the proper terms defined in the Lead Handbook.

EPA Response: Ownership information regarding the ASARCO facility is presented in the RI for background purposes only. Ownership of the facility does not directly relate to the impact of facility emissions, which is characterized by the RI.

EPA identified other potential industrial sources of lead contamination in eastern Omaha in two reports prepared in 1999. EPA has evaluated these potential industrial sources including the soil lead data collected in close proximity and has not found evidence that releases from these facilities represent a significant source of soil lead present in OLS soils.

EPA agrees that historical information about development of the City, including demolition, may be of interest in terms of housing age and potential impacts at individual properties. EPA recognizes that use of lead-based paint with varying lead content is common to many structures throughout the OLS. The presence of lead-based paint represents a potential source of lead contamination at many individual properties that is in addition to the significant impact of former lead smelting/refining operations on soil lead levels at the OLS. EPA is authorized to respond to OLS properties that are impacted by the former lead smelting/refining operations and is limited in authority to respond to properties solely impacted by the presence of lead originating from lead-based paint.

As indicated previously, EPA does not have information that would indicate that the historic use of pesticides and slag represent significant sources of lead in OLS soils.

Also see Responses to Comments B-10 and B-11 above.

Comment B-21

Section 1.1.3.2 (Page 1-7): Previous Investigations in the OLS

Please see Comment B-4. The September 1999 INEEL Air Modeling and Dispersion report concludes that the highest concentrations of lead in soil from the ASARCO refinery are likely to be found along the direction of the prevailing winds. The fact that increased soil lead concentrations at the Site do not occur predominantly in directions of prevailing winds indicates that other sources are contributing to the soil lead concentrations measured at the Site. A wind rose diagram created using wind data from Eppley Airfield in Omaha for the years 1984 thru 1992 indicates predominant wind directions blowing toward the north-northwest, south-

southeast, and north (41.7 percent) with significant components to the south, southeast, and northeast (26.3 percent). Superimposing the wind rose data over the Site diagram shows that most of the sampling locations and reported lead in soil readings occur in a crosswind direction from the ASARCO site, evidencing other lead sources. Thus, the INEEL Study supports, in a number of other ways, the conclusion that numerous sources contributed to the soil lead concentrations measured at the Site.

EPA Response: See Response to Comment B-4.

Comment B-22

Section 1.1.5 (pages 1-9 and 1-10): Preliminary Assessment/Site Inspection (PA/SI)

This section describes the yard sampling protocols used to collect data for the 2001 PA/SI. The data were collected based on the assumption that LBP effects may extend up to 3 feet from the residence foundation. Data from these areas were excluded from samples used to characterize the yards. As noted in Comment B-2 and Appendix A of this comment package, EPA has now confirmed that the drip zone extends up to 6 feet (72 inches) from the foundation. Thus, the data used in the PA/SI almost certainly reflect LBP.

The finding that if surface soil concentrations are low there is no reason to believe that concentrations would increase with depth is stated to be "consistent with airborne deposition of lead..." but would also be true for many other modes of surface deposit of lead, including peeling LBP dropping off a house into the yard.

EPA Response: See response to Comment B-2 above.

EPA recognizes that if surface lead concentrations are low, other modes of surface deposit of lead, including peeling LBP falling from a house, would generally not cause increasing lead concentrations with increasing depth, unless soil disturbance occurred which repositioned surface soils to greater depths, or some other factor occurred which increased the downward mobility of lead in the surface soils. Some forms of lead could be more leachable and subject to downward migration relative to the lead from pyrometallurgical sources. Subsurface sampling data at the OLS has generally not identified elevated soil lead levels at depths greater than one foot, indicating that downward migration of pyrometallurgical lead that was deposited during a period of more than a century has been limited.

Comment B-23

Section 1.1.7 (pages 1-11 to 1-12); Douglas County Health Department

The numeric information presented in this section shows that the blood lead issues in Omaha are improving, regardless of the EPA action. Based on the information provided in this section, children with elevated blood lead levels occurred in Douglas County (including the OLS) at the following frequencies:

2000: 1 in 18
2002: 1 in 22
2003: 1 in 28
2004: 1 in 35
2005: 1 in 38
2006: 1 in 45

These incremental improvements should have been noted in the 2008 RI. In addition, this section is incomplete in several other respects. It does not present any information regarding exposure information from the DCHD case management program for children with blood lead levels greater than 10 µg/dL. DCHD has also compiled extensive information about the age of housing in Omaha, the likely prevalence of LBP, and the strong correlation between older housing and children with elevated blood lead levels. The 2008 RI should have provided information regarding sources affecting elevated blood lead levels identified by DCHD such as soil, paint, home remedies, and occupational exposures. The 2008 RI should also include a section on the age of housing, the correlation between housing age and likely presence of LBP, and the correlation documented by Leinenkugel (see Attachment B of UPRR's October 14, 2004, comment package) between age of housing and children with elevated blood lead levels.

EPA Response: The blood level data are presented in the RI Report and it is apparent that the ratio of children with high blood levels to the total number of children tested is decreasing. There is no information to indicate that the improvement would have occurred regardless of the EPA response at the OLS. EPA believes that multiple factors can be responsible for this decline, including closing of the ASARCO facility which eliminated an ongoing source of lead to the community. EPA's response actions and public health education and outreach have increased public awareness of lead hazards in the community. This decline has occurred largely in the absence of extensive programs directed at controlling or abating lead-based paint hazards, except for the exterior lead-based paint stabilization component of the EPA remedy. EPA does recognize that other programs, some of which have received funding from the U.S. Department of Housing and Urban Development (HUD), have addressed lead-based paint hazards at the OLS.

EPA's response is primarily directed at soil lead contamination resulting from the former lead smelting/refining emissions. EPA recognizes that other sources of lead exposure exist at many properties throughout the OLS and that lead-based paint is prevalent in much of the older housing stock. Information developed by the DCHD regarding lead exposure sources at individual households is not directly useful in developing a remedy to address soil contamination. From the standpoint of a comprehensive remedy, however, this type of data collected by the DCHD is useful in identifying alternate sources of lead exposure that exist at some households in the community that can be included in the development of health education and public outreach programs.

EPA is aware that the presence of lead-based paint has been frequently observed by the DCHD at residences where children with elevated blood lead levels have been identified. Most of these older homes were constructed prior to 1978 when the sale or use of lead-based paint at residential properties was banned. The presence of lead-based paint is not unexpected at the older homes which are also most impacted by airborne emissions from the former lead-processing facilities. Childhood exposure to lead in soil originating from the former lead-processing facilities would be highest in the older homes near central Omaha where the presence of lead-based paint is prevalent.

DCHD has not made a determination that the primary source of lead exposure at households investigated is lead-based paint. Although lead-based paint hazards have been observed during investigations of many households, the commenter acknowledges that DCHD has identified other potential sources affecting elevated blood lead levels including soil, paint, home remedies, and occupational exposures. DCHD has not performed studies capable of determining the relative contribution of different lead exposure sources. In addition, children who reside at the OLS are exposed to multiple sources of lead both within the child's current household and elsewhere. DCHD has not identified lead-based paint as the primary exposure source in their investigations of childhood lead poisoning at the OLS.

The study by Leinenkugel found that over 90 percent of the children with identified elevated blood lead levels lived in homes in the eastern part of Omaha which were built prior to 1950. While blood lead levels were actually measured, the remainder of the analysis (with the exception of the soil data provided by EPA) is primarily demographic in nature. The area considered by the Leinenkugel study is also the area where properties were most impacted by atmospheric deposition of pyrometallurgical lead. The findings of the Leinenkugel study indicate that lead-based paint is a potential source of exposure, but do not lessen the need to address lead contamination in soils to protect children's health.

Comment B-24

Section 1.1.8 (Pages 1-12 to 1-14): Apportionment Study

EPA continues to rely heavily on the findings reported by Drexler in the 2002 and 2007 reports (collectively referred to as the Apportionment Study) both in their characterization of lead sources and in their understanding of the nature and extent of lead contamination for the OLS. UPRR notes several deficiencies in these reports that render EPA's findings questionable at best. See UPRR's Comment B-5 and Appendix H and its prior comments on the 2002 Apportionment Study, Attachment 1, DVD 2.

EPA Response: See response to UP's Comment B-5 and Appendix H.

Comment B-25

Sections 1.1.9 and 1.1.10 (Pages 1-14 to 1-17): Bio-Availability Studies

EPA's bioavailability studies were strongly affected by the presence of LBP in the soil samples used to conduct the studies, primarily due to EPA's incorrectly assumed drip zone width, as confirmed by EPA's own DZWS. See UPRR's Comments B-2 and B-6 and its 2004 comments in Attachment 1, DVD 2.

EPA Response: See response to Comment B-6.

Comment B-26

Section 2.0 (Beginning on Page 2-1): Remedial Investigation Activities

EPA did not develop data quality objectives (DQOs) as required by EPA Order 5360.1 and described in the RI/FS Guidance (EPA, 1998). DQOs are necessary to determine whether data collected at a site are valid and of sufficient quality for making site decisions. Without complete and adequate data, it is impossible for EPA to select an appropriate remedy for the Site. EPA's data collection efforts to-date have been inadequate due to EPA's failure to follow standardized procedures. Before initiating any future work at the Site, EPA should re-evaluate its data collection approach and develop DQOs and proper data validation procedures as required by EPA Order 5360.1 and described in the RI/FS Guidance (EPA, 1998).

> *EPA. 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive No. 9355.3-01. October.*

EPA Response: EPA disagrees that DQOs were not developed as required by EPA Order 5360.1 and RI/FS guidance. Quality Assurance Project Plans were prepared by Sverdrup Environmental, Inc. in 1999 and Black & Veatch in 2007 that address data quality objectives for the collection of environmental samples at the OLS. These documents are referenced in Section 8.0, Bibliography, of the RI Report. Soil and other samples collected during the remedial investigation were collected in accordance with these documents. Data validation procedures are discussed in Section 4.1 of the RI Report and indicate that the soil data meets quality assurance goals.

Comment B-27

Section 2.1, (Pages 2-1 and 2-2): Residential Soil Sampling

With regard to sampling residential properties in the OLS, the 2008 RI states:

> *"…the property was divided into front and back yard halves. Then the front and back yard halves were each divided into two equal quadrants. At the discretion of the field team, smaller yards were divided into fewer sampling areas. One composite sample composed of five aliquots of equal mass was collected from each quadrant. Each aliquot was collected from a randomly selected location in the quadrant and from the top 1 inch of soil away from influences of the drip zone. The drip zone included the area within 6 inches to 30 inches of the foundation of all buildings on the property" (emphasis added).*

As discussed in UPRR's Comment B-2, and detailed in Appendix A of this comment package, EPA's own DZWS confirms that the drip zone throughout Omaha is at least 72 inches from the residential structures, more than twice the distance assumed by EPA during sampling of over 35,000 residential properties. As such, the soil lead database that EPA is using to assess residential yards *for possible remediation due to the alleged effects of emissions from the ASARCO and Gould refineries is in fact largely affected by LBP. The last two sentences in the above quoted passage are untrue.*

EPA Response: See response to Comment B-2.

Comment B-28

Section 2.2.2 (Pages 2-5 and 2-6): 2007 Home Interior Investigation

In view of the very limited number of indoor dust samples EPA collected for the 2004 RI, EPA committed in the Responsiveness Summary to conduct additional site characterization, in part, to obtain additional indoor dust samples. However, once again EPA fell short of its indoor dust sampling goal of 120 homes, sampling only 98. Moreover, since EPA did not provide the IEUBK inputs for public review, it is unclear whether these indoor dust data and/or the 2004 data were used in the model.

EPA Response: See response to Comment B-13.

Comment B-29

Section 2.2.2.1 (Page 2-6): Soil Sampling Protocols

This section describes residential yard sampling protocols that were used to collect soil samples at houses where interior dust samples were collected. In general, these samples were collected in a similar manner as those for other residential yards, with the exception that the drip zone was assumed to be 3 feet (36 inches) and not 6 inches to 30 inches from the residential structure foundation. No explanation is given as to why a different drip zone width was used for these samples. In any event, the assumed drip zone width is obviated by EPA's own DZWS, which indicates that the drip zone throughout the OLS is 6 feet (72 inches) or more. Again, the incorrect drip zone width assumption used by EPA for collection of its "mid-yard" samples results in a massive soil database that is heavily influenced by LBP. As an additional variance from sampling for other residential yards, EPA did not collect a drip zone sample. No explanation is provided for this inconsistency.

EPA Response: During the 2007 indoor dust sampling investigation, soil samples were also collected in accordance with the Field Sampling Plan (Ref 48 in RI Report) prepared for the investigation. The purpose of the soil sampling was to obtain paired dust and soil samples that could be used in the human health risk assessment; not to collect soil samples to determine whether the property was eligible for soil remediation. Consequently, the soil sampling protocols used in the indoor dust sampling investigation were not identical to the soil sampling protocols used to determine if the property was eligible for remediation. As discussed in the Field Sampling Plan and the RI Report, 5 soil aliquots were collected from each of the four quadrants of the property that were previously sampled, and the 20 resulting aliquots were subsequently composited to form one soil sample for each property. The soil was sieved with a 60 mesh sieve prior to analysis by the laboratory.

EPA believes that maintaining a maximum distance of 36 inches from the foundation for collection of aliquots instead of the 30 inches identified as the presumptive drip zone in the EPA Superfund Lead-Contaminated Residential Sites Handbook did not affect the soil data collected during the indoor dust sampling investigation.

Composite sampling of mid-yard areas at OLS properties involves collection of multiple soil aliquots in areas away from foundation walls to avoid the influence of factors which can result in elevated soil lead levels in drip zones. To the extent possible, each of the aliquots was collected in areas away from the foundation wall. Depending upon the location of the property boundaries in relation to the home, it is possible, although unlikely, that some soil aliquots could have been collected from 36 to 72 inches from the structure. However, the effects of any individual aliquots collected in this interval are significantly reduced because 20 aliquots were composited to form a single soil sample for processing and analysis.

Because the purpose of the soil sampling was to obtain paired dust and mid-yard soil samples for use in the human health risk assessment, drip zone soil samples were not required and were not collected.

Comment B-30

Section 2.4 (Pages 2-13 and 2-14): Drip Zone Width Study

Please see Comment B-2 and Appendix A of this comment package. The DZWS confirms that LBP has affected the majority of the soil samples collected by EPA in the OLS, even though it was EPA's intent to characterize the lead in yard soil that it believes originated from the ASARCO and Gould refineries.

EPA Response: See response to Comment B-2.

Comment B-31

*Section 2.5 (Pages 2-15 to 2-18): Lead-Based Paint Recontamination St**udy***

UPRR's detailed comments on the Recontamination Study are provided in Appendix F of this comment package. In summary, it is both interesting and important to note that in interpreting the soil sampling data collected for the LBP Recontamination Study, EPA did not utilize the same 2.5-foot (30 inch) drip zone definition it applied for cleanup decisions on the 35,000 plus properties sampled for the RI, or the 36-inch drip zone width it used when collecting yard soil samples to pair with interior dust samples. Rather, EPA utilized a 6-foot (72 inch) drip zone for this study.[1] *Further, EPA provides no plausible explanation for its decision to remove visible paint chips from the soil samples for the Recontamination Study, in the face of the Lead Handbook and its contractor's recommendation to the contrary. This practice for the Recontamination Study is particularly difficult to understand since visible paint chips are left in for all other OLS soil sampling programs.*

The results of the Recontamination Study demonstrate that the presence of deteriorating LBP on the exterior of a home can result in re-contamination of yard soil (i.e., soil located more than 3 feet from the home's foundation (and outside the operationally defined drip-zone area) within a couple of years after yard-soil removal and replacement. These results are consistent with other studies cited by UPRR in their comments on EPA's 2004 Proposed Plan for the IROD. As cited by UPRR's comments on the 2004 Proposed Plan, Menrath (2004) also concluded that failure to abate exterior LBP prior to removing soils, as recommended by the Lead Handbook and the 1998 Clarification, can result in recontamination of yards as though the yard replacement remedy had never been implemented; recontamination can occur in as little as two (2) years; and within ten (10) years yards can become recontaminated to levels exceeding those observed prior to the soil removal. With completion of EPA's own Recontamination Study, it is clear that deteriorating LBP is an obvious ongoing and historic source of lead to yard soils within the OLS.

EPA now proposes to include limited LBP abatement as part of its remedy for the OLS. Unfortunately, well over 4,000 yards have already been remediated in the OLS but LBP stabilization has been implemented at only approximately 500 properties as of late September, 2008. Thus, the vast majority of residential properties where EPA has performed remediation are already in the process of being recontaminated. EPA should have recognized the potential for recontamination by LBP at the outset of its yard remediation program. Even more important, however, is that LBP abatement will not be effective over the long term, rendering EPA's remedy for the OLS neither long-term effective nor cost effective. First, EPA intends only to abate LBP "…only those surfaces which have loose and flaking lead-based paint."[2] *Thus, LBP that is not deemed by EPA to be "loose or flaking" at the time of remediation will continue to deteriorate. Those areas of a structure that receive LBP abatement will simply be repainted with non-lead paint after removal of visibly flaking paint. The current deteriorated condition of the paint on the vast majority of the residences in the OLS is evidence that many home owners generally do not maintain the painted surfaces of their residences. Consequently, those areas of the home where LBP abatement is not implemented by EPA will eventually flake, as will those areas that are covered with non-lead paint, releasing the previously encapsulated LBP and recontaminating adjacent remediated yards. Stabilization is only temporary.*

> *Menrath, William, HUD Healthy Homes Grant Number OHLHR 0063-99 "Evaluation of Exterior Lead Reduction and Control Methods FINAL REPORT" March, 2004.*

[1] *Table 5-2 of the Recontamination Study Report "presents the lead concentrations measured at 6-inch intervals from the foundation. The table also presents the average lead concentrations within 6 feet of the foundation (considered the drip zone width at the OLS) and the average soil lead concentration at a distance of 6 feet to 10 feet from the foundation." (EPA 2008, emphasis added).*

[2] *http://www.epa.gov/region7/cleanup/npl_files/omaha_paint_factsheet3_sept07.pdf*

EPA Response: Soil samples were collected for the OLS Recontamination Study for a different purpose than soil samples collected to determine eligibility of drip zone areas for soil remediation, and very different sampling protocols were used for this study. The purpose of the sampling performed during the OLS Recontamination Study was to determine if soil lead levels in areas near foundations would potentially increase following soil remediation due to the presence of deteriorating lead-based paint. Samples collected within six feet of structure foundations were considered drip zone samples, since the previous 2006 OLS DZWS had identified average impacts of drip zone effects to this distance from the foundation. These drip-zone effects were not limited to those from deteriorating lead-based paint, but also included impacts due to direct deposition of former lead smelting/refining emissions and wash-off of former industrial emissions deposited on rooftops and impinged on structure siding. Because these drip zone effects were found to impact soil lead levels within six feet of structure foundations in the DZWS, areas within 6 feet of foundations were considered drip zone areas for the purpose of the OLS Recontamination Study sampling. The area considered the drip zone during the OLS Recontamination Study does not suggest that data from the DZWS can be used to determine the extent of the impact from lead-based paint on drip zone soils.

The OLS Recontamination Study clearly explains that the samples collected during the study could not be used for comparison to risk-based criteria. Results of the OLS Recontamination Study cannot be used to determine whether recontamination will occur at a rate that will exceed risk-based levels in a particular time frame. In accordance with OLS sampling procedures and EPA policy, risk-based determinations for drip zone areas are based on collection of a multi-aliquot sample combining soil from drip zones on all sides of the structure where exposed soil is present. These samples are more representative of average exposure conditions, and are collected within a distance of 6–30 inches from the foundation. By contrast, samples collected during the OLS Recontamination Study were collected along transects located at only two sides of the structure and individual samples were not combined to form a composite to better reflect average soil lead levels. Results of the OLS Recontamination Study indicate that soil lead levels can increase due to deteriorating lead-based paint following soil remediation, but the rate of recontamination or time required for health-based criteria to be exceeded cannot be extrapolated from the findings of the study.

EPA does not agree that the Recontamination Study demonstrates that remediated soils will become recontaminated in a short period of time. Although not intended for comparison to risk-based criteria, average soil lead levels that developed in drip zone areas following soil remediation were generally below the 400 ppm action level for the OLS. Average soil lead concentrations exceeding 400 ppm did not develop following soil remediation beyond a distance of six feet from the foundation at any of the properties investigated in the Recontamination Study. The study concluded that the length of elapsed time since soil remediation occurred had no apparent effect on the soil lead levels observed at pre- or post-stabilization properties. The Recontamination Study demonstrates that elevated soil lead levels can potentially develop in areas near foundations of homes following soil remediation if deteriorating exterior lead-based paint is not stabilized to prevent an increase in soil lead levels. The Recontamination Study supports the need for stabilization of exterior lead-based paint to control the potential for elevated soil lead levels to develop following soil remediation. The final remedy includes stabilization of deteriorating exterior lead-based paint to ensure continued protectiveness of the final remedy.

Removal of large paint chips from soil samples prior to sample preparation and analysis during the Recontamination Study is consistent with sample collection protocols for all other soil investigations at the OLS, during which large surficial paint chips were not included in soil samples. These sample collection procedures are consistent with EPA sample collection protocols which involve removal of debris or foreign matter from the surface prior to soil sample collection. Large paint chips do not constitute a component of soil, and are appropriately separated from soil samples prior to sample preparation and analysis. If paint chips were included in the soil sample, the measured lead concentration would be expected to vary considerably depending on the quantity of paint chips mixed with the soil sample and the lead content of the paint. Soil sampling protocols do not include criteria for determining which paint chips or how many paint chips on the ground surface in the vicinity of the sampled area should be collected and mixed with the soil sample. Because paint chips can have a high lead content, measurement of a soil sample containing surficial paint chips would provide more of an indication of the amount of paint chips in the soil sample, rather than data on actual soil lead levels.

Because only homes with exterior lead-based paint were selected for the Recontamination Study, it is likely that visible paint chips on the ground surface contain high concentrations of lead. The purpose of the Recontamination Study was to determine if elevated lead levels developed in the soil subsequent to soil remediation. Including lead-based paint chips in soil samples would mask the lead concentration in the actual soil since the sample measurement would reflect the lead content of lead-containing paint chips that may be present in the soil sample. See also response to comments submitted on OLS Recontamination Study, Appendix F, for further discussion of paint chip considerations.

EPA acknowledges that in order to protect public health, it was necessary to conduct soil remediation at some properties prior to paint assessments and subsequent paint stabilizations. The OLS Recontamination Study evaluated soil lead levels at remediated properties both before and after lead-based paint stabilization. The study concluded that both the magnitude and frequency of elevated soil lead concentrations detected were generally lower at properties following lead-based paint stabilization and HEPA vacuuming of surface soils and that although the soil sampling protocol was not designed for the purpose of characterizing risk, conditions at post-stabilization properties did not suggest a need for additional response action to address elevated soil lead levels. Therefore, the level of recontamination that does occur at properties prior to performing lead-based paint stabilization would appear to be remedied through lead-based paint stabilization and HEPA vacuuming of soil surfaces subsequently performed by EPA, resulting in a protective remedy at completion.

During implementation of the final remedy, EPA will attempt to complete lead-based paint stabilization at all previously remediated properties and perform stabilization at a sufficient number of new properties to enable soil remediation to be performed only at properties where stabilization has been previously completed. Lead-paint assessments performed by EPA to date have identified 1,482 properties that are eligible for lead-based paint stabilization. Stabilization has been completed at 1,187 of these eligible properties, which is more than 80%. EPA will continue to prioritize accelerating the pace of lead-based paint assessments to enable performance of stabilization prior to soil remediation.

Stabilization of lead-based paint performed by EPA as a component of the final remedy involves preparation, priming, and painting of all previously painted surfaces on eligible structures. EPA recognizes that continued maintenance will be necessary to assure that painted surfaces remain intact so that underlying lead-based paint that is not removed from structures remains encapsulated which will protect human health and assure the continued effectiveness of the remedy. EPA recognizes that past maintenance of many OLS structures has been inadequate to prevent deteriorating lead-based paint problems from developing. EPA cannot assume the role of maintaining OLS properties in perpetuity. An important component of an ongoing comprehensive remedy involves making materials and resources available to homeowners to assist with maintenance of surfaces painted with lead-based paint. EPA supports these and other elements of a comprehensive remedy, including health education and public outreach, to address lead exposure sources that are outside CERCLA authority. EPA also recognizes that the city of Omaha recently enacted an ordinance which provides for lead-based paint hazards to be addressed under a city nuisance ordinance so that problems with deteriorating lead-based paint can more easily be addressed through municipal code enforcement. EPA believes that these programs and authorities will help assure continued maintenance of stabilized surfaces on OLS structures addressed under the final remedy.

Comment B-32

Section 2.10.2 (Page 2-27): Field Book Documentation for Sampling Activities

EPA's practice of using bound field logbooks for sampling activities is described in this section, but the logbooks have not been made available for public review. As described, these logbooks have information regarding the Site upon which EPA has relied for RI, FS, 2008 HHRA and Proposed Plan purposes and should be made available to the public in the AR.

EPA Response: All relevant information from field log books was presented in reports of investigations and studies prepared by EPA. EPA did not rely upon information recorded in field log books that does not appear also in the reports which they support. Therefore, field log books are not required to be included in the OLS Administrative Record since all relevant information contained in those log books is presented elsewhere. The field log books are available for review upon request, in accordance with Freedom of Information Act provisions.

Comment B-33

Section 4.0 (Pages 4-1 through 4-9): Nature and Extent of Contamination

Please see Comments B-1 through B-8. Several lines of evidence overwhelmingly confirm that EPA has not properly identified the source(s) of soil lead contamination in the OLS. Rather than comply with the NCP or its own guidance, EPA has applied a preconceived approach that lead contamination in Omaha's residential yards results from only two sources (the former ASARCO and Gould facilities) and that only soil remediation can address the lead that purportedly originated from those sources. EPA maintains this position even though RI residential soil sampling now conducted at over 35,000 properties clearly identifies that deteriorating LBP, as measured by drip zone sampling, is the largest contributor of lead to soil at the OLS. The lines of evidence that confirm EPA's mischaracterization of the sources of lead at the OLS include:

- *The widespread distribution of lead in soil occurrences in Omaha at distances of several thousands of meters from the former refinery locations, in contravention to atmospheric deposition modeling that indicates that the areas of elevated soil lead concentrations should be located along the prevailing north-northwest/south-southeast wind directions and in close proximity (i.e. 600 meters) from the former ASARCO and Gould refineries.*
  The essential lack of any elevated soil lead concentrations in Omaha's parks (based on over 2,400 samples collected by EPA), where structures with LBP are not present, versus the greatly increased incidence of elevated soil lead concentrations in residential areas, where structures with LBP are present.

- *The significant width of actual drip zones in Omaha (72 inches or more) relative to EPA's assumed drip zone width of 6 to 30 inches from structures.*

- *The tendency for recontamination of remediated properties by deteriorating LBP, which was documented in the last year, long after the two purported sources of lead contamination, the former ASARCO/Gould refineries have been closed.*

All of these lines of evidence confirm that LBP is the primary source of elevated soil lead in the OLS.

The purpose of an RI is to determine the nature and extent of contamination of the site being investigated. The starting point of that effort is a Site Conceptual Model to assist, inter alia, in developing a sampling program and to identify possible pathways of exposure to investigate. 40 C.F.R. § 300.430(b) and (d). EPA took none of these required steps at the OLS. Rather it conducted an investigation designed to prove the extent of the industrial contamination to soils, only.

EPA Response: EPA disagrees that the source of soil lead contamination at the OLS has been mischaracterized. The OLS is defined as properties where soil lead levels have been impacted by former lead smelting/refining operations. EPA recognizes that lead-based paint potentially contributes to soil lead levels at certain OLS properties, but this contribution from lead-based paint is in addition to soil lead levels originating from former lead-processing industries. EPA has investigated the release of lead from the former lead smelting/refining operations in accordance with the NCP and EPA guidance, and these investigations have concluded that lead-based paint, although potentially significant at certain properties, is not the origin of the widespread soil lead contamination identified at the OLS. The comment that drip zone sampling has confirmed that deteriorating lead-based paint is the largest contributor to lead in soil is not valid. Total lead analysis of soil samples collected in drip zone areas is not capable of identifying the contribution of lead-based paint to soil lead levels since lead in drip zone areas could originate from a number of sources. Speciation studies performed by EPA which are capable of identifying the source of lead found in soil samples have identified lead originating from both lead-based paint and former industrial emissions present in drip zone soils, and lead from former industrial operations is generally more predominant in the samples evaluated.

EPA believes that the distribution of lead in soil is consistent with results of air dispersion modeling. In contrast, atmospheric deposition modeling is far less certain and does not produce reliable results. Of particular note, however, is Figure 18, provided by this commenter, which presents the commenter's predicted soil lead levels based on atmospheric deposition modeling and predicts average soil lead levels resulting from lead refining operations of 200 – 400 ppm at distances of several miles from the former facility (even using grossly underestimated emission levels). Noting that these are predicted average soil lead concentrations, the maximum soil lead levels at these properties, which form the basis for soil remediation, could be considerably higher.

Historic information assembled on the initial construction, development, and maintenance of public parks in Omaha indicates that significant soil disturbance occurred at all of these parks resulting from earthwork, improvements, and landscaping performed since their inception. This soil disturbance would have significantly reduced present-day soil lead levels in surface soils through mixing with underlying soils or placement of fill or soil amendments in impacted areas. As explained further in EPA's responses to comments provided on the EPA park investigations, EPA believes that the park data support a significant impact of former lead smelting/refining operations on soil lead levels at city parks. As explained previously, EPA does not believe that the results of the OLS DZWS which indicate that drip zone effects can impact soils up to six feet from foundations indicates that soil sample results are influenced by lead-based paint. See response to Comment B-2 above.

EPA does not agree that data from the OLS Recontamination Study can be used to compare soil lead levels to risk-based criteria. The OLS Recontamination Study concludes that soil lead levels can increase due to deteriorating lead-based paint subsequent to soil remediation but that this increase in soil lead levels is mitigated during lead-based paint stabilization performed by EPA where necessary so that soil lead levels at completion of the remedial action are protective of human health.

EPA has modified the Site Conceptual Model to include lead-based paint as a potential source of exposure. However, including lead-based paint in the Site Conceptual Model does not alter the approach to the investigation of the OLS or the response action determined to be necessary, in accordance with CERCLA, the NCP, and EPA policy.

Also see responses to Comments B-1 through B-8.

Comment B-34

Section 5.0 (Page 5-1): Contaminant Fate and Transport

The first paragraph of this section states:

> *"Early investigations at the Omaha Lead Site found evidence of high lead concentrations in surface soils along the corridors of the prevailing wind currents which pass through downtown Omaha. At the same time, two industrial properties on the east side of downtown Omaha were being investigated as the sources of the contamination. The conclusions of these investigations demonstrated that*

> *contamination was deposited from air currents originating at the east edge of downtown, along the Missouri River, and traveling outward, primarily to the north, south, and west. These potential sources are no longer operating and no other potential sources of lead contamination that could have widespread influence have been identified" (emphasis added).*

It is remarkable that the 2008 RI would include this obviously incorrect language in view of the substantial amount of data that has been collected in the OLS. First, this text perpetuates EPA's false preconception that the lead contamination in the OLS originated from the "two industrial properties" (the ASARCO and Gould refineries). Second, and as detailed in previous comments, the distribution of elevated soil lead concentrations in the OLS are in no way correlative with the prevailing wind directions from these former industrial facilities; instead, the elevated soil lead concentrations are essentially ubiquitous in all areas with older (i.e., pre-1950) housing stock. Such elevated lead concentrations do not occur in Omaha's parks. Based on the information collected by EPA, the obvious source of the lead in Omaha's residential area is deteriorating LBP. Through its refusal to acknowledge this simple fact, EPA has not met the most basic requirements of an RI: to characterize the nature, extent, fate, and transport of contaminants at the Site. EPA uses the words "non-foundation" again in the fourth paragraph of Section 5.0. EPA should stop using these words and use defined terminology.

EPA Response: See response to Comments B-1, B-3, and B-4.

Comment B-35

Section 6.0 (Pages 6-1 to 6-8): Baseline Human Health Risk Assessment

UPRR's detailed comments on the 2008 HHRA are provided in Appendix J.

Comment B-36

Section 7.0 (Pages 7-1 to 7-4): Summary and Conclusions

UPRR disagrees with the fundamental presumptions of EPA's RI and has identified the major flaws in its work plans, work implementation, data analysis, remedial alternatives development, and recommended remedy. The best solution for the OLS is a Comprehensive Program, as the community has been recommending and requesting for years. EPA's current effort of yard removal has already been demonstrated to be unsuccessful in maintaining lead soil concentrations below 400 ppm. Moreover, lead in soil in not the primary source of exposure for the majority of Omaha's children. Rather paint both in indoor dust and to a lesser extent from soil, is the demonstrated primary exposure source. UPRR is asking EPA to re-evaluate its remedy selection and work with the community and HUD to implement a Comprehensive Program for the future of Omaha's children.

EPA Response: The final remedy for the OLS does include participation in a comprehensive remedy intended to incorporate EPA-authorized activities into a broader community program addressing all sources of lead exposure. Language from the OLS Final Record of Decision states:

> 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 interior and exterior lead-based paint, lead-contaminated interior dust, children's toys, certain imported candy, jewelry, cookware, and others. Generally, sources other than contaminated soil can not be remediated by EPA in the course of residential lead cleanups. CERCLA and the National Contingency Plan (NCP) limit Superfund authority to address interior lead-based paint. For example, CERCLA Section 104(a) (3) (B) limits the 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, the 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, the 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 originating 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 OLS.

EPA clearly understands that the community desires a comprehensive remedy to address all potential sources of lead. EPA supports a comprehensive remedy. Although the EPA Superfund authority does not allow the EPA to perform all of the actions necessary to address every 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.

EPA is utilizing the full extent of the lead hazard response authority under the Superfund statute to address non-soil sources of lead exposure at the OLS, including exterior lead-based paint and interior dust (originating from soil). The final remedy also includes public health education activities that are directed at controlling risks associated with soil as well as non-soil sources. EPA remains committed to participating in a comprehensive remedy that addresses all potential sources of lead exposure in the Omaha community.

EPA Responses to UP Comments – Appendix C
Draft Residential Paint Assessment Pilot Work Plan (November 6, 2006)

Comment C-1

EPA states that "Deteriorating lead-containing paint can potentially fall to the ground, mix with soil, and result in soil-lead concentrations that exceed health-based limits in residential settings" (Residential Paint Assessment Pilot Study Work Plan, p. 2-1). Both common sense and the EPA study allow for the same conclusion. This is an accurate description of the potential recontamination process that exists at any property where lead-based paint is present on exterior surfaces. EPA recognizes and accepts that this recontamination process will take place in the future, but incomprehensibly, EPA does not acknowledge that the same process has already taken place for decades at the vast majority of properties located within the OLS.

The Residential Paint Assessment Pilot Work Plan describes the methods and criteria that EPA will use to identify properties where exterior lead-based paint has the potential to recontaminate remediated yard soil and thereby limit the effectiveness of soil removal and replacement. Properties where EPA finds recontamination potential, per the methods described by this plan, will be eligible for exterior paint stabilization.

The work plan presents two approaches for determining whether there is recontamination potential. First, the plan describes procedures for quantitative measurements of deteriorated lead-based paint mass and for calculating the potential effect of that lead mass on yard soil lead concentrations as paint deteriorates over time. Second, the plan presents several considerations for qualitative evaluation of lead recontamination potential. Both of these approaches will be used at all properties where any deteriorated lead-based paint is identified. Therefore, every decision regarding eligibility will ultimately involve a quantitative decision based on specific measurement criteria as well as a qualitative decision made by "EPA and its partnering agencies."

EPA has presented paint assessment field sheets for less than 30 properties where paint assessments have been performed. Those assessments were performed to support the Drip Zone Width Study, and results are included within an appendix to the Drip Zone Width Study Report. These 30 assessments were all performed in 2005, prior to completion of the Residential Paint Assessment Pilot Work Plan and the 2005 data are not included in the database. It is not clear whether the procedures used for the 2005 paint assessments were consistent with those described in the November 2006 Residential Paint Assessment Pilot Work Plan.

Section 7.1.4 of the RI Report indicates that the procedures presented in this plan have been followed to perform lead-based paint assessments at more than 2,667 properties since early 2006. None of the paint assessment documentation has been provided by EPA for review, so it is impossible to comment on whether the "pilot" methods provide accurate and appropriate information for future decision making regarding paint stabilization. EPA also reports that the quantitative paint assessments performed at 1,042 of these 2,667 properties (39 percent) indicated deteriorated lead-based paint has the potential to cause recontamination of the top 1 inch of soil within 6 feet of the foundation at a lead concentration greater than 400 ppm. These 1,042 properties are all now considered eligible for paint stabilization.

Others of the 2,667 properties may also be considered eligible based on the findings of qualitative assessments completed by EPA or its partnering agencies. Qualitative assessment results have not been reported for any of the properties where deteriorated paint has been observed, but the findings of the qualitative assessments could push the percentage of properties requiring paint stabilization much higher than 39 percent.

The Residential Paint Assessment Pilot Work Plan indicates that EPA plans to return to properties already remediated to complete paint assessments:

> *"EPA recognizes that soil cleanups have been completed at many properties to date at the Site [4,239 as of October 2008]. If a structure is found to be eligible for paint stabilization at a property where a soil cleanup has been completed, EPA will evaluate any recontamination that may have occurred since completion of the soil cleanup, and take appropriate measures to assure that the cleanup remains protective of human health and the environment. These actions may include, but are not limited to, vacuuming of fallen paint chips or replacement of sod or ground cover. In some instances, removal of soil may be required to restore protectiveness of the original soil cleanup. EPA will work with homeowners to determine the most appropriate measures to assure continued effectiveness of the remedy." (p. 2-6)*

The Interim ROD, issued in 2004, indicated that paint stabilization would be needed at some properties to prevent recontamination. However, during implementation of the interim remedy EPA did not assess paint condition and lead content to evaluate the potential for recontamination because they had not yet developed any procedures or criteria for identifying properties where deteriorating paint has the potential to recontaminate yard soil. Why didn't EPA develop and implement their procedures for paint assessment before proceeding with remediation under the Interim ROD? This oversight has led to conditions whereby remediated soil has been subject to an ongoing source of lead contamination for years, and as a result, yard-soil removal and replacement may have to be repeated at some percentage of the 4,239 remediated properties.

Depending on the percentage of remediated properties ultimately found eligible for paint stabilization and the recent rates of paint deterioration at those properties, there may be hundreds, or ultimately thousands, of remediated properties that now require a second round of soil removal and replacement due to the effects of lead-based paint deterioration. These additional soil clean-up actions will add considerable costs to the remedy that EPA alone should incur because these clean ups will be performed solely to address effects of lead-based paint deterioration that took place due to EPA's negligence in implementing the remedy and in the absence of any industrial emissions from the historic ASARCO and Gould smelters.

EPA's selected remedy includes paint assessment and stabilization at properties eligible for soil clean up, and as such, it addresses lead paint as a significant ongoing source of lead to yard soil. This is the appropriate approach for reduction in lead exposure and protection of residents' health. However, this approach is completely at odds with EPA's insistence that the elevated lead concentrations in OLS yard soils necessitating remediation in the first place have in all cases originated from industrial emissions rather than common domestic sources of lead such as lead paint.

EPA Response: EPA recognizes that lead-based paint can contribute to total soil lead levels measured in both drip zone and mid-yard areas of some OLS properties. EPA's response at the OLS is based on total soil lead levels measured at individual properties which would include any contribution from lead-based paint. EPA response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

EPA acknowledges that the LBP assessments that were performed in 2005 for the Drip Zone Width Study were performed prior the development of the Draft Residential Paint Assessment Pilot Work Plan. The procedures used to perform the 2005 paint assessments are described in Appendix A of the Drip Zone Width Study. The procedures used to perform the 2005 paint assessments are very similar, but not identical, to the paint assessment procedures described in the 2006 Draft Residential Paint Assessment Pilot Work Plan. Because the paint assessment procedures used during the 2005 paint assessments were not identical to the 2006 paint assessment procedures, the data from the 2005 assessments has not been included with the data from the 2006 assessments. In addition, the purpose of the 2005 paint assessments was not to determine if the properties were eligible for paint stabilization. In fact, the 2005 paint assessments were performed on many properties that were not eligible for soil remediation. Consequently, EPA believes the data from the2005 paint assessments should be presented separately from the paint assessment data obtained in 2006 through 2008.

With the exception of data from the paint assessments performed in 2005 as part of the Drip Zone Width Study, paint assessment data for all properties were provided in Appendix A of the Draft Final Remedial Investigation Report. The data from the 2005 paint assessments were included with the Drip Zone Width Study in Appendix I of the Draft Final Remedial Investigation Report.

EPA acknowledges that some properties may become eligible for paint stabilization based on the qualitative assessment as described in the Draft Residential Paint Assessment Pilot Work Plan. However, the number of properties that will become eligible using these criteria cannot be predicted at this time, but is expected to be limited.

At the time that the 2004 Interim Record of Decision was issued, EPA had not yet developed protocols for assessment of lead-based paint or criteria for determining if conditions threatened the continued protectiveness of the remedy. Upon issuing the Interim Record of Decision, EPA determined that proceeding with the interim remedy was necessary for protection of human health and that the implementation of the interim remedy could not be delayed while protocols were developed for assessment of lead-based paint. Upon issuance of the Interim Record of Decision on December 15, 2004, EPA immediately began developing protocols that could be used to assess the severity of deteriorating lead-based paint conditions at OLS properties and an approach to determine whether the level of deteriorating lead-based paint at a remediated property threatened the continued effectiveness of the remedy. Assessment of deteriorating lead-based paint on structures began in 2005 for properties included in the Drip Zone Width Study and continued in 2006 and subsequent years under a draft protocol that was released as an appendix to the March 17, 2006, Drip Zone Width Study. To date, more than 3,000 lead-based paint assessments have been performed in accordance with the 2006 protocol. EPA has made considerable progress in the assessment of lead-based paint at OLS properties since issuing the Interim Record of Decision.

As demonstrated by the OLS Recontamination Study, EPA recognizes the potential for soil lead levels to increase in areas near foundations at some properties where soil remediation is performed prior to lead-based paint stabilization. EPA has considered the potential for recontamination to occur at certain properties and determined that the final remedy will result in soil lead levels that are protective of human health upon completion of the remedial action. Residents are made aware of EPA's findings regarding the condition of lead-based paint on their homes and given health education materials on how to protect their families from existing paint hazards. Health education will also be provided under the final remedy through other outlets including announcements on English- and Spanish-speaking cable television.

The 2008 OLS Recontamination Study evaluated the potential for soil lead levels to increase following soil remediation due to deteriorating lead-based paint. The OLS Recontamination Study concluded that soil lead levels did increase in some cases near foundations following soil remediation, but the increase in soil lead levels was in most instances moderate, with average soil lead levels that developed in drip zone areas of individual properties generally remaining below the 400 action level for the OLS. Although the soil samples collected during the OLS Recontamination Study were not collected for the purpose of characterizing risk levels, comparison to the 400 ppm cleanup level for the OLS provides a point of reference to assist in assessing the study results. Average soil lead concentrations exceeding 400 ppm did not develop following soil remediation beyond a distance of 6 feet from the foundation at any of the properties investigated in the LBP Recontamination Study.

At the 25 properties sampled in the OLS Recontamination Study prior to lead-based paint stabilization, the average soil lead level measured in drip zone samples was 148 ppm. The average lead concentration in drip zone areas of properties sampled prior to lead-based paint stabilization exceeded 400 ppm at 4 properties in this group. For comparison, 21 properties were sampled following exterior lead-based paint stabilization which includes HEPA vacuuming of exposed soil surfaces. This sampling was performed to determine the impact that HEPA vacuuming of surface soils would have on soil lead levels that could develop following soil remediation. The average soil lead level measured in drip zones at the 21 properties sampled following exterior lead-based paint stabilization and HEPA vacuuming of soil surfaces was 95 ppm, compared to 148 ppm at properties sampled prior to stabilization. The average soil lead levels were less than 400 ppm along all transects sampled at properties following lead-based paint stabilization and HEPA vacuuming of soils. The study concluded that conditions at post-stabilization properties do not suggest a need for additional response to address elevated soil lead levels.

On the basis of results from the OLS Recontamination Study, EPA believes that the level of recontamination that may occur at some properties following soil remediation, but prior to lead-based paint stabilization, will remain moderate and that HEPA vacuuming of soil surfaces will address any recontamination that does occur due to deteriorating lead-based paint and ensure that the remedy is protective of human health upon completion. HEPA vacuuming of surface soils following lead-based paint stabilization can be performed at minimal expense, and avoids the second round of soil removal and replacement suggested by the commenter. EPA disagrees that the additional soil cleanup actions will add considerable costs to the remedy.

As noted in the Final Record of Decision, EPA's preference is to perform stabilization of deteriorating lead-based paint at eligible properties prior to soil remediation. In cases where soil remediation was performed prior to lead-based paint stabilization, the moderate level of recontamination that may occur can be addressed at minimal expense through HEPA vacuuming of soil surfaces. The OLS Recontamination Study concluded that the length of elapsed time since soil remediation occurred had no apparent effect on the soil lead levels observed at pre- or post-stabilization properties. During implementation of the final remedy, EPA will attempt to complete lead-based paint stabilization at all previously remediated properties and perform stabilization at a sufficient number of new properties to enable soil remediation to be performed following lead-based paint stabilization at new properties.

Also see response to Comment A-11.

Comment C-2

p. 2-2, "TSCA Title X regulations are not considered to be applicable or relevant and appropriate to the circumstances at the Site."

> *No rationale is provided for the statement above that TSCA Title X regulations are not considered ARARs for actions taken to address lead-based paint and reduce lead-exposure risks in residential settings.*

EPA Response: The Residential Paint Assessment Pilot Work Plan indicates that the regulations are not applicable or relevant and appropriate for establishing a lead level at which deteriorating paint conditions could result in soil concentrations that are not protective of human health and the environment under CERCLA. Regulations at 40 CFR 745 do not address measures necessary to ensure the continued protectiveness of soil remediation under a CERCLA remedy. Regulations under TSCA Title X do not constitute potential ARARs, but rather are "To Be Considered" criteria for purposes of CERCLA remedy selection as directed in the Superfund Lead-Contaminated Residential Sites Handbook and indicated in the Feasibility Study Report.

Comment C-3

p. 2-5, "For the purposes of this pilot study, deteriorating lead-based paint on a structure is assumed to fall onto the ground surface within the six feet of the foundation and be uniformly mixed with the top one inch of soil."

> *EPA does not adopt the 2.5-foot drip zone area (six inches to thirty inches from the structure foundation) as the zone of mixing for deteriorating lead-based paint and soil. Though not mentioned here, one of the findings of the EPA's Drip Zone Width Study is that the mixing zone for deteriorating paint and soil extends 6 feet from building foundations. The 6-foot mixing zone includes both the drip zone, as defined by HUD and adopted by EPA for routine residential property sampling protocols, and 3 feet of additional "yard soil." Therefore, EPA's own work indicates that lead-based paint contaminates both drip-zone soil and yard soil at residential properties within the OLS.*

EPA Response: The average width of a drip zone at a typical OLS property was determined to be six feet from the foundation on the basis of site-specific data generated during the OLS Drip Zone Width Study. The six foot drip zone includes the area from 6–30 inches of the foundation defined in the Superfund Lead-Contaminated Residential Sites Handbook, as well as the area 3.5 feet beyond the 30 inch drip zone. The width of the drip zone at a typical OLS property was of interest as an input to calculate the increase in soil lead concentration that would result from deteriorating lead-based paint falling to the ground and mixing with soil. The determination of a six foot drip zone supports the assumption in the soil mixing calculation that deteriorating lead-based paint falls to the ground and mixes with soils within six feet of the foundation. The six foot drip zone width is not intended to establish distinct boundaries separating different portions of OLS yards.

EPA disagrees that the six-foot drip zone determination indicates that lead-based paint contaminates both drip zone and yard soil. The drip zone from 6–30 inches from the foundation is specified in the Superfund Lead-Contaminated Residential Sites Handbook for the purpose of defining the area where soil samples should be collected to characterize drip zone areas. Mid-yard areas of OLS properties are characterized by collection of a multi-aliquot sample in areas away from foundations. Generally, aliquots that are combined to form a mid-yard composite sample are collected at distances greater than six feet from the foundation. In the rare case that a mid-yard aliquot may have been collected within six feet of the foundation, if this has occurred at all, the resulting composite sample would remain largely representative of mid-yard conditions. EPA does not see a need to modify sampling protocol at the OLS on the basis of results of the Drip Zone Width Study. Samples collected from drip zone and mid-yard areas under the existing protocols remain representative of those respective areas.

EPA recognizes that LBP can contribute to total soil lead levels measured in samples collected from both the drip zone and mid-yard areas of some OLS properties. Speciation of OLS samples demonstrates that former lead smelting/refining operations have significantly impacted soil lead levels throughout the OLS, including drip zone areas. EPA response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

Comment C-4

p. 6-2, first full paragraph

> *The instructions for calculating the Mass of Impacted Soil needs to be corrected to include conversion volume of soil in cubic feet to volume of soil in cubic centimeters before multiplying the bulk density by the volume of soil.*

EPA Response: The first sentence on page 6-2 and the Example LBP Assessment Calculation Sheet in Figure 6-1 indicate that the impacted soil volume is converted from cubic feet to cubic centimeters. Figure 6-1 also indicates that the conversion factor is 28,316.8 cubic centimeters per cubic foot.

Comment C-5

p. 6-4, Step 4 – Calculation of Allowable Lead in Impacted Soil

> *The mass of allowable lead calculation assumes that all of the lead from deteriorating paint is mixed uniformly within the 6-foot mixing zone around the foundation. However, when the total mass of lead associated with deteriorating paint is present in only a portion of the painted components on a home (e.g. front porch) the lead originating from paint deterioration will not mix into the total volume of soil present in a mixing zone that extends around the entire perimeter of the home. In such cases, the mixing calculation would underestimate the lead concentration in soil that is actually recontaminated by deteriorated paint (e.g., soil in immediate vicinity of front porch). Such scenarios should be considered as part of the "qualitative approach" described in Section 7.*

EPA Response: The mixing calculation is intended to determine an average concentration that would develop in the entire drip zone area if deteriorating lead-based paint were to fall to the ground and mix uniformly with soils within six feet of the foundation to a depth of one inch. EPA recognizes that if mixing of deteriorating lead-based paint were not uniform, then portions of the drip zone would have higher or lower soil lead levels, depending on the amount of lead-based paint incorporated into the soil at a particular point. Since risks associated with exposure to lead-contaminated soil is assessed on the basis of an average exposure level over a period of time, EPA believes that it is appropriate to calculate an average concentration for the entire drip zone area, knowing that the level of exposure that actually occurs could be higher or lower on individual occasions.

The "qualitative approach" for determining eligibility for lead-based paint stabilization is not intended to apply to the type of scenario described by the commenter. Instead, the quantitative approach has been developed to apply to structures in cases where deteriorating lead-based paint is accessible and XRF instrumentation can readily be used to characterize lead content of painted surfaces. The quantitative approach estimates the average soil lead level that would develop in the entire drip zone resulting from all deteriorating lead-based paint on a structure falling to the ground and mixing with soil under the stated assumptions. It is not feasible to make a reliable determination about which portions of the drip zone would be affected by specific areas of deteriorated lead-based paint on a structure. As mentioned previously, calculation of an average soil lead level that would develop in the drip zone due to deteriorating lead-based paint is more appropriate for comparison to risk-based criteria.

The qualitative criteria is generally applied to situations where a significant amount of deteriorating lead-based paint is observed by an experienced EPA representative in an area that is inaccessible for characterization of lead content using hand-held XRF instrumentation. A common example could involve severely deteriorated lead-based paint observed under a soffit on an upper floor of a multi-story house. In this scenario, EPA or an EPA representative could determine that the property is eligible for lead-based paint stabilization on the basis of the observed lead hazard without quantitative data characterizing the severity of the deteriorating lead-based paint problem.

Comment C-6

Section 7 Paint Stabilization Actions

> *Procedures for paint stabilization are not described here and there is no reference to other documents for review of those procedures. Procedures for paint stabilization should be consistent with those recommended by HUD.*

EPA Response: The *Residential Paint Assessment Pilot Work Plan* describes activities related to the assessment of lead-based paint on structures and presents a protocol for determining the severity of deteriorating lead-based paint that is identified. The purpose of the work plan is not to describe procedures that will be followed in the actual stabilization of lead-based paint. Paint stabilization activities will be performed in accordance with lead-safe work practices for remodeling, repair, and painting. Workers are required to participate in an eight-hour training course which includes a curriculum developed jointly by HUD and EPA. These procedures are consistent with *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* developed by HUD.

EPA Responses to UP Comments – Appendix D
Draft Final Feasibility Study, Residential Yard Soil (October 2008)

Comment D-1

Lead Sources Have Not Been Identified or Sufficiently Evaluated to Develop Alternatives or Perform an Alternatives Analysis Consistent with NCP Section 300.430(e)

Consistent with the RI, the Draft Final FS for the Site overemphasizes the role of the former ASARCO and Gould refineries as the principal lead sources of concern. Despite evidence indicating that LBP plays a significant role at the OLS, the Draft Final FS addresses only remediation of lead concentrations in soils allegedly from refinery emissions. The Draft Final FS, like the RI, ignores fundamental meteorological and wind rose data, soil speciation, arsenic-to-lead ratio analysis, and historical information about the businesses and development of the City of Omaha, all of which document significant sources of lead in Site yard soil other than the former refineries and other pathways for lead exposure (primarily LBP). Other sources of lead include numerous industrial sources, emissions from large scale demolition of over 600 homes in Omaha containing LBP, past use of lead arsenate pesticides, past use of leaded gasoline, the historic use of smelter slag in construction projects, and other miscellaneous sources of lead such as home, hobby, and occupational sources.

EPA Response: See response to Comments B-4 and B-5, and Comments B-19 and B-33 to Appendix B, RI Report.

Comment D-2

The Feasibility Study Does Not Meet Minimum Regulatory Requirements

The Draft Final FS does not meet minimum regulatory requirements for many of the same reasons detailed in UPRR's 2004 comments on the previous FS. It does not meet requirements of C.F.R. § 300. 430(e)(1) because it provides remedial alternatives that focus only on excavation and/or treatment of soil, thus discounting a priori other sources of lead exposure. Other deficiencies are as follows:

- *EPA's cost analysis does not meet the basic requirements of NCP section 300.430(e)(9)(G). The summary costs do not include assumptions, time components, or any of the basic underlying information that would enable the public to critically evaluate the summary information that is presented. For example, some of the problems include: capital costs are to include direct and indirect costs. EPA's indirect costs can exceed 35 percent, yet are not quantified in the Draft Final FS. There are also numerous errors in the summary cost information presented.*

- *EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (1988) (RI/FS Guidance) states that a summary table "highlighting the assessment of each alternative with respect to each of the nine criteria" should accompany the narrative discussion of alternatives. The Draft Final FS does not include such a summary table.*

EPA Response: EPA believes that the OLS FS is consistent with regulatory requirements under CERCLA. The FS was developed in consideration of appropriate EPA guidance documents and is generally consistent with EPA policies regarding lead contamination site assessment.

A narrative discussion assessing each alternative with respect to each of the nine evaluation criteria is included in the FS. Presentation of a summary table is not mandatory.

Also see response to Comment D-4 below.

Comment D-3

The ARARs Analysis Is Arbitrary

EPA has focused exclusively on historic industrial air emissions of lead, missing the real problem in Omaha. Accordingly, EPA has failed to identify appropriate ARARs. The OLS ARARs analysis is deficient: there are no applicable chemical-specific requirements, but EPA identifies a number of chemical-specific requirements from adopted guidance as "To Be Considered" (TBCs), but does not apply most of these in its alternatives analysis and those it does use are applied inconsistently. Draft Final FS at 2-2, and Tables 2-1 and 2-2. Specifically, EPA identifies a number of important and directly relevant Superfund guidance documents that apply to multi-source, residential lead sites. Of these, only the Superfund Lead-Contaminated Residential Sites Handbook, OSWER Directive 9285.7-30, August 2003 (Handbook) is mentioned again. EPA also identifies the Toxic Substances Control Act, the Lead-Based Paint Poisoning Prevention Act, the Residential Lead-Based Paint Hazard Reduction Act and respective implementing regulations, but then arbitrarily only selects the interior dust chemical-specific standards, rejecting all outdoor chemical-specific standards under these laws. Draft Final FS at 2-2, and Tables 2-1 and 2-2. The vast majority of ARARS identified have little to do with the primary issues at the Site. EPA's ARARs selection and analysis is incomplete and arbitrary. Specific Comment 6 identifies several other aspects of the ARARs analysis that renders it deficient.

EPA Response: EPA believes that it has identified the appropriate ARARs. The commenter does not suggest that any specific ARARs are missing, only that EPA has not discussed appropriate chemical-specific requirements identified in TSCA and EPA guidance documents. The Superfund Lead-Contaminated Residential Sites Handbook is very clear that the chemical specific requirements of TSCA, Section 403 are not ARARs. The guidance documents cited by the commenter, including the Handbook, suggest that EPA should use the IEUBK model as part of an assessment of Human Health risks to identify the appropriate site specific soil cleanup levels for lead contamination. This is what was done for the Omaha Lead site.

Comment D-4

Financial/Cost Information Does Not Meet Statutory and Regulatory Requirements

CERCLA (including EPA's "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (July 2000) (OSWER Directive 9355.0-75)) and the NCP present detailed requirements for the development of cost information for the analysis of FS alternatives. Despite these requirements, the Draft Final FS does not present detailed cost information. Rather, the Draft Final FS presents summary cost information on remedial alternatives, but does not provide an explanation of how the estimates and, in particular, the unit rates, were generated. Moreover, there appear to be numerous errors and omissions in the summary cost information provided (compare Tables 6-3 and 6-4). EPA's guidance indicates that the cost estimates should provide an accuracy of "+50 percent to -30 percent." The FS does not indicate whether or not estimated costs meet the recommended level of accuracy. Overall, two page summary cost tables are wholly insufficient to meaningfully support cost estimates on the order of $200 million to $300 million (see Tables 6-3 and 6-4 of the Draft Final FS). It is noted that the Draft Final FS includes, as its Appendix A, a detailed cost evaluation for phosphoric acid treatment and sodding of yards as part of Alternative 3. This detail, some 15 pages in length, is used to support a single line item on Table 6-4, and is disparately lengthy compared to the complete lack of detail for the numerous other line items on the table. Other cost information concerns include, but are not limited to:

- *Both Alternatives 2 and 3 include "participation in a comprehensive remedy with public and private partners involved in health education, outreach, lead abatement and other lead hazard control activities" (Proposed Plan at 14), yet there is no cost associated with that component so its inclusion in the Proposed Plan is misleading.*
- *The State of Nebraska is statutorily responsible for operation and maintenance of the remedy, yet it appears to have no cost for Alternative 2 (Table 6-3) and present worth annual costs of $2,245,000 for Alternative 3 (Table 6-4).*
- *Unit costs for the HEPA vacuum component of Alternatives 2 and 3 are different and appear to be double counted for Alternative 3.*
- *No basis is provided for the assumptions, stated in the Draft Final FS at pages 5-4 and 5-5 for the very low estimate of only 1,445 properties that would be eligible for and agree to participate in the interior dust response component. Since EPA has only sampled interior dust at 257 locations out of the 35,843 properties where yards have been sampled (approximately 0.7% of properties at the OLS), its assumed numbers, upon which cost analysis is done, are arbitrary.*
- *Remedy implementation will require an estimated 10 years, yet EPA does not appear to have made any adjustment to unit pricing for capital costs over the life of the remedy.*

EPA Response: EPA believes there is sufficient detail in the cost estimates in Tables 6-3 and 6-4 to evaluate the costs presented. The unit costs for excavation and disposal of soils are determined by historical costs for similar activities at the OLS. Additional detailed information used to determine the costs for phosphate stabilization was presented because this technology has not been implemented at the OLS or other sites, and there was no historical information to use as the basis of the unit pricing.

EPA believes the cost estimates provide an accuracy of +50 percent to -30 percent. A statement to this effect will be included in the FS.

Costs associated with participation in a comprehensive remedy with public and private partners are included in the cost estimate. The annual costs provided for implementing Alternatives 2 and 3 include information dissemination via mass media, including television, establishing a lead hazard registry, funding for general public health education, costs for maintaining two EPA public information centers, and additional health education associated with the interior dust response. EPA can not provide funding for elements of a comprehensive remedy that are not authorized under CERCLA response authority.

Both alternatives include annual costs for institutional controls. The term “O&M” in Table 6-4 will be replaced with the term “IC” to be consistent with Table 6-3. Unit costs for the HEPA vacuums in Table 6-4 will be changed to be consistent with Table 6-3 and the duplication of costs for the HEPA vacuums in Table 6-4 will be eliminated.

The basis for the assumption that 1,445 properties will be provided HEPA vacuums is presented at pages 5-4 and 5-5 of the FS. The property must be eligible for soil remediation to become eligible for dust sampling. Historical information from the OLS indicates that 14,581 properties may be eligible for soil remediation. Of these properties it is assumed that 50 percent of the property owners will grant access to perform dust sampling; and of the properties sampled, approximately 20 percent of the properties will be eligible for interior dust response. EPA acknowledges that the number of property owners that may grant access is not known with certainty, and the number may increase or decrease. The number of properties that may be eligible for dust response is also estimated based on the number of properties that would be eligible for response using historical dust sampling information.

In accordance with EPA guidance, the costs of the alternatives are compared using present worth values. The present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year. As a result, no adjustment to the unit pricing for capital costs is required.

Comment D-5

The Draft Final FS Relies On the Fundamentally Flawed Inconsistent Meaning of “Mid-Yard”

As stated in the introduction of this Draft Final FS comment, the DZWS developed an OLS site-specific drip zone (the area influenced by LBP) of six feet or more beyond the foundation of homes in Omaha. Yet all of EPA’s RI yard sampling efforts, used for over 35,000 residential properties, limited the drip zone to the relatively narrow region 6 inches to 30 inches from the residence foundation. Therefore, samples collected during the RI with the intent of measuring soil lead concentrations away from the influence of the drip zone predominantly measured the impacts of LBP. EPA relies on these allegedly “mid-yard’ paint-biased sample results that are necessarily higher in lead concentration than if they were true “mid-yard” away from the influence of LBP, to determine the need for CERCLA remedial action. This inconsistency adversely affects all aspects *of the Draft Final FS. For example, Section 3.2 addresses the Preliminary Remediation Goals (PRGs) and Action Level. PRGs are based on "average mid-yard lead concentrations." Draft Final FS at 3-2. The PRGs are therefore biased high and the entire analysis is flawed. The action level is then selected based upon a calculation of "the average mid-yard concentration that will result at each property following soil remediation." Id. Again, this "average mid-yard concentration" factors in the biased high concentrations for quadrants that are not remediated, resulting in selection of a higher action level than if true mid-yard data were used. These flaws are so fundamental to the entire OLS dataset that one cannot "back calculate" what true mid-yard values would be. This flaw is so pervasive as to undermine the validity of the entire Draft Final FS and alternatives analysis.*

EPA Response: See response to Comment B-2 to Appendix B, the RI Report.

Comment D-6

The Draft Final FS Glosses Over the Risks Presented by Increased Truck Traffic

EPA's RI/FS Guidance recommends that risks to workers and the general public associated with remedial alternatives be considered under the heading "short-term effectiveness." The remedial alternatives at the OLS, particularly Alternative 2, rely on soil removal and replacement that will necessarily entail increased truck traffic in congested urban and residential areas. However, risks posed by such traffic are only touched on in the Draft Final FS. These risks include both risks from windblown contaminated dust and risks from increased heavy truck traffic through the community. For Alternative 2, in particular, significant volumes of lead-contaminated soil will be transported through the community, resulting in significant increases in heavy truck traffic on public roads as well as windblown transport of excavated, lead-bearing soil. The Draft Final FS does not appear to contain any estimates whatsoever of the volume of soil that would be removed, transported to a repository, and replaced under Alternatives 2 or 3, eliminating any possibility of meaningful implementability and short-term effectiveness evaluations. As stated in UPRR's comments on the earlier FS, hundreds of thousands of cubic yards of material would need to be hauled under any soil replacement alternative, necessitating tens of truck trips per day on public roads, with concomitant risks to the public.

In contrast, as a detracting factor, the Draft Final FS seems to emphasize the risks associated with Alternative 3. The identified risks include: "short-term risks to the public from transporting large volumes of phosphoric acid through residential neighborhoods" (Draft Final FS at 6-18) and "[a]dditional risks to the public would include accidents involving the transport vehicles and chemical spills" (Draft Final FS at 6-19). EPA's inconsistent evaluation of risks associated with increase truck traffic is completely arbitrary.

EPA Response: EPA acknowledges that there will be increased traffic in residential neighborhoods during the soil excavation and removal. The increased traffic would occur during implementation of either Alternatives 2 or 3. During soil excavation and removal, risks to the community and workers are mitigated by implementing dust suppression measures, including covering the trucks and watering yards to control wind blown dust. These measures are common for Alternatives 2 and 3. EPA believes that the risk to the community and workers from transporting truckloads of acid in residential neighbors is higher than the risk from transporting truckloads of soil. Spills of acids would be more difficult to contain and could cause substantial harm to residents or the environment before emergency responders could arrive to contain or neutralize the acid.

Comment D-7

The Draft Final FS Should Have Recognized the Work Being Done in the Community and Proposed a Comprehensive Program Alternative to Effectively Coordinate These Efforts

The Draft Final FS should acknowledge the existing lead health programs in Omaha and discussed how these programs could work more effectively if coordinated. At least eight organizations are assisting or have assisted the Omaha community through lead exposure reduction programs, including:

- *Lead Safe Omaha Coalition;*
- *The Omaha Lead Site Community Advisory Group;*
- *Nebraska Health & Human Services;*
- *Douglas County Childhood Lead Poisoning Prevention;*
- *The City of Omaha;*
- *Omaha Healthy Kids Alliance;*
- *Hope Medical Outreach Coalition; and*
- *Douglas County/Sarpy County Extension Office.*

The work of these organizations would be more successful if coordinated and fully integrated. Appropriate collaboration could be provided through a Comprehensive Program that recognizes and incorporates the work of each organization. A coordinated, comprehensive, community-based approach is supported by UPRR and other members of the community.

EPA Response: The 2008 OLS Feasibility Study does consider a comprehensive plan intended to incorporate EPA activities into a broader community program addressing all sources of lead exposure. The Feasibility Study states:

> The EPA is aware that lead in the environment at the OLS originates from many sources. In addition to the identified soil exposure pathway, which the above listed technologies will address, other important sources of lead exposure are interior and exterior LBP, lead-contaminated interior dust that originates from LBP and contaminated soil, and to a much lesser extent, tap water…. 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, and government agencies, private organizations, PRPs, and individual residents to participate in a comprehensive lead risk reduction strategy that addresses lead risks comprehensively.

EPA participation in a comprehensive remedy is also included as an element of the selected final remedy for the OLS. The OLS Final Record of Decision states:

> 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. 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 (originating from soil and other sources), children's toys, cookware, jewelry, imported candies, and others.

EPA is committed to participating in a comprehensive remedy with other interested parties in the community to address all identified lead exposure hazards. EPA funding will be used to provide elements of a comprehensive remedy that are consistent with CERCLA response authority.

Comment D-8

Section 1.0, Introduction

As noted in General Comment 1, with the singular focus on collection of soil data, the FS cannot be used effectively to assist in the selection of a remedial action for the OLS. Significant lead exposure pathways, particularly LBP, were ignored during EPA's FS sampling activities. Accordingly, EPA did not develop the information required to properly run the IEUBK model or undertake the evaluations recommended in relevant EPA guidance.[2]

[2] Relevant EPA guidance includes the *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA* (EPA, 1988) ("RI/FS Guidance"), the *Superfund Lead-Contaminated Residential Sites Handbook* (EPA, 2003) ("Handbook"), the *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children* ("IEUBK Guidance"); OSWER Directive 9200.1-17: *Focus Areas for Headquarters Support for Regional Decision Making*, May 22, 1996 (OSWER Directive 9200.1-17); OSWER Directive: *Clarification to the1994 Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, OSWER Directive #9200.4-27P ("OSWER Directive 9200.4-27P"), especially Appendix *Factsheet: Determining Appropriate Response Actions at Residential Lead Sites*; and OSWER Directive: *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*, OSWER Directive 9355.4-12 ("OSWER Directive 9355.4-12"), including Appendices A-1 and A-2. HUD and TSCA should also be considered. Though some of these guidances were identified, most were neither discussed nor even mentioned outside of Tables 2-1 and 2-2.

EPA Response: See responses to Comments B-1, B-2, B-3, B-4, B-5 to Appendix B, the RI Report and responses to Appendices J and H.

Comment D-9

Section 1.2.1, Site Location and Description and Section 1.2.2 Operational History and Waste Characteristics

See General Comment 1. These sections present the assumption that all Site contamination originated from industrial activities, with emphasis on historic activities at the ASARCO refinery and the secondary lead smelter operated by Aaron Ferer & Sons, Co. (Aaron Ferer) and later by Gould National Batteries (Gould). It has been well documented that multiple sources of lead contamination exist at the Site, including LBP.[3] *This section also ignores many other industrial sources of lead that may exist within the OLS. The existence of additional lead sources, beyond the ASARCO refinery, has also been well documented in reports by Dynamac (1999), Leinenkugel (2002), and others. In order to provide an accurate view of Site conditions, and comply with the NCP section 300.430(e) and (f), and relevant EPA guidance (listed in footnote 2), EPA must consider impacts from all lead sources. If the Draft Final FS is not amended, at a minimum, the additional source and exposure pathway information should be addressed in the Responsiveness Summary, final remedy selection, and during the risk management process.*

The second paragraph on Page 1-4 states, "pollutants were transported downwind in various directions." This statement is incorrect and inconsistent with statements in section 1.2.3 of the RI and the findings of the Idaho National Environmental and Engineering Laboratory (INEEL), indicating that from the ASARCO facility, "the highest concentrations of lead were likely to be found along the direction of prevailing winds."[4] *As discussed in detail in UPRR's RI comments, particulate deposition would follow predominant wind directions. A wind rose for Omaha demonstrates that the prevailing winds in Omaha are focused in a NNW-SSE orientation and that any potential emissions from the ASARCO facility would not be dispersed in "various directions," but would instead be distributed in a focused manner (see Figure 1, attached). Air dispersion modeling by the EPA (INEEL, 1999) confirms this analysis. The INEEL, 1999 report supports the conclusion that there are many lead sources in Omaha because the widely distributed and variable concentrations of lead found in Omaha soils could not have originated from a single or even two sources, as relied on by EPA throughout its analysis of the Site.*

EPA should develop an appropriate conceptual model for the Site that accounts for its own data and the findings of its contractors INEEL (INEEL, 1999) and Drexler (Drexler, 2002) that do not support EPA's theory that the only sources of lead in Omaha soils are the ASARCO and Aaron Ferer/Gould facilities. A multi-source/multi-media model should be applied for all future sampling and other Site work. EPA should fully discuss these issues in the Responsiveness Summary following public comment on the Proposed Plan, correct the discussion of the data by providing a clear description of Site conditions that pertain to wind directions and potential contaminant deposition, and take the corrected information into account for final remedy selection.

[3] *According to EPA's The Source of Anomalous Lead Concentrations in Soils from the Omaha Community-Omaha, Nebraska (Drexler, 2002), at least 30% of lead in Omaha Lead Site soils originates from LBP.*

[4] *RI, page 1-5, referencing INEEL's report titled Dispersion Modeling of Atmospheric Deposition Patterns around the ASARCO Omaha Lead Refinery, September, 1999 (INEEL, 1999).*

EPA Response: EPA developed a conceptual site exposure model which is presented in both the 2004 and 2008 baseline human health risk assessments. The conceptual site model describes how smelter-related emissions that have been released to the environment at the OLS might result in exposure of residents. EPA recognizes that there are other potential lead-exposure sources that can contribute in varying amounts to the total or cumulative exposure of residential children. However, it is not the goal of the conceptual site model to identify each of these alternative (non-smelter) sources. Nevertheless, to help clarify this issue, EPA has modified the Site Conceptual Model to include lead-based paint as a potential source of exposure. However, including lead-based paint in the Site Conceptual Model does not alter the approach to the investigation of the OLS or the response action determined to be necessary, in accordance with CERCLA, the NCP, and EPA policy.

The 2002 Apportionment Study by Dr. John Drexler did not state that at least 30% of lead in Omaha Lead Site soils originates from LBP. Figure 6 in the 2002 study indicates that the frequency of occurrence for paint in soil samples is approximately 30 percent. In comparison, lead from pyrometallurgical sources was identified in more than 90 percent of the properties sampled in the 2002 and 2007 apportionment studies.

Also see responses to Comments B-1-B-8 to Appendix B, the RI Report.

Comment D-10)

Section 1.2.3, Nature and Extent of Contamination

Paragraph 3 of this section discusses distribution of contaminants in the "prevailing wind directions," indicating elevated readings are "clustered" along those directions. Directional distribution of contamination by wind action can only be discussed in relation to a specific source of that contamination.

This paragraph does not state the assumed source of contamination nor does it provide an azimuthal direction for prevailing wind direction. The statement is inconsistent with that made in Section 1.2.2 on (page 1-4, paragraph 2) of the Draft Final FS and is unsupported by any data or facts obtained by EPA during the RI or the FS. See the wind rose figure and related discussion in the preceding comment.

EPA pre-supposed the ASARCO site as the primary lead source, yet failed to collect data necessary to characterize ASARCO (or any other source) as the source of lead in the OLS. In fact, none of the Site data including EPA's wind data, soil data, speciation data, and paint data, and the data collected by UPRR's contractor supports EPA's sole or dual air emission source theory. Available data also refute the FS comment concerning "clustering" of soil concentrations over 400 ppm. The wind rose diagram, above, shows predominant wind directions toward the north-northwest, south-southeast, and north (41.7 percent) with significant components to the south, southeast, and northeast (26.3 percent). As such, most of the sampling locations and reported lead in soil readings occur in a crosswind direction from the former ASARCO site. In addition, lead measurements in

Council Bluffs, Iowa, to the east of the former refinery, do not display elevated lead concentrations. This fact is significant in that westerly and easterly wind components in Omaha are essentially the same. The lack of symmetry for lead distribution between Omaha and Council Bluffs indicates significant source(s) of lead in Omaha other than the former refinery. The Draft Final FS contentions regarding air dispersion of lead contamination from the ASARCO facility are inaccurate and should be corrected in the Responsiveness Summary and the correct information taken into account for final remedy selection.

EPA Response: 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. EPA believes that this 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 the1940s, 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 remove or cover lead contamination deposited in surface soils from the former lead-processing facilities. These impacts would significantly reduce lead concentrations in surface soils. Since most of the historic industrial lead emissions originated from the former ASARCO facility prior to implementation of flood control measures, these flood plain impacts would have significantly reduced lead levels remaining in surface soils in present-day Council Bluffs.

Newer housing age is an additional factor which is likely to have impacted current soil lead levels in much of Council Bluffs. During housing construction, surface soils are disturbed through mixing with underlying soils or removal during earthwork performed to prepare the building site and construct housing. These soil-disturbing activities would significantly reduce lead levels in surface soils that would have accumulated through airborne deposition of industrial lead emissions prior to the time that construction occurs. EPA believes that flood plain impacts and soil mixing during housing construction account for the relatively low lead levels found in surface soils in Council Bluffs, Iowa, compared to eastern Omaha.

Also see responses to Comment 2a and B-4.

Comment D-11

Section 1.2.4, Contaminant Fate and Transport

Consistent with the preceding comments, the statements about previous studies and prevailing wind direction are vague and inaccurate and should be corrected in the Responsiveness Summary. Conclusions regarding contaminant source and transport presented in this section are unsupported by data. The statement that "no other potential industrial sources of lead contamination… .have been identified" is simply false. EPA's contractor Dynamac identified numerous potential industrial sources in Omaha and Council Bluffs. Information is readily available and is presented in Attachments K and L of UPRR's October 14, 2004 comment package, concerning over 200 industrial sources, more than 40 of which are sources of lead air emissions, in addition to leaded gasoline automobile emissions.

Numerous studies have also been conducted showing impacts from other sources in Omaha.[5] *This fundamental, erroneous Site information must be corrected in the Responsiveness Summary and the correct information taken into account for final remedy selection. Any further Site work relying upon these Draft Final FS statements would be arbitrary and without scientific basis.*

[5] *See, e.g.,* Angle, Carol R., Md., McIntire, Matilde S., Md., Vest, Gary: Blood Lead of Omaha Children – Topographic Correlation with Industry, Traffic and Housing, published by Nebraska Medical Journal, April 1975, p. 97.

EPA Response: The entire statement cited in the comment reads, "no other potential industrial sources of lead contamination that could have widespread influence have been identified." EPA is aware of the numerous companies identified in the Omaha area that handled lead as part of their operation. EPA also recognizes the historic activities, including the demolition of homes for freeway construction, the past use of pesticides, and the use of lead-contaminated slag from smelting and refining operations for construction of sidewalks in Omaha. EPA does not have information that use of slag for sidewalk construction contributed significantly to the widespread lead contamination detected at the OLS. Historic use of pesticides has a greater potential to result in more widespread contamination, but the 2002 and 2007 apportionment studies did not find lead forms associated with pesticide usage in significant amounts. In contrast, these speciation studies concluded that on average at least 32 percent of the lead found in samples collected from mid-yard areas originated from pyrometallurgical sources, which is the largest identified source of lead in OLS soils.

EPA believes that the other identified sources discussed did not have widespread influence on soil lead levels at the OLS.

Comment D-12

Section 1.2.5, Baseline Risk Assessment

Please see UPRR's detailed comments on the draft Baseline Human Health Risk Assessment (BHHRA), which are provided in Appendices F and G of this comment package. Those comments are not repeated here, but are incorporated by reference. The draft BHHRA is an extension and update of a previous interim BHHRA prepared by the Nebraska Health and Human Services Risk Assessment Program, for which UPRR provided detailed comments on October 14, 2004 comment package.

It is surprising that major comments made by UPRR on the interim BHHRA remain applicable to the draft BHHRA. Like its predecessor, the draft BHHRA is premised on the incorrect assumption that historic air emissions from the former ASARCO and Gould facilities in east Omaha are the dominant sources of lead in yard soil and house dust in the Omaha Lead Site. Even if extensive study by the Douglas County Health Department (DCHD) did not clearly document a direct correlation between age and condition of housing and children with elevated blood lead levels, which it does, a credible and useful BHHRA would require EPA to justify its exclusive focus on historic emissions from these two facilities. EPA's Site Conceptual Model (shown in Figures 3.1 and 4.1 of the BHHRA) is fundamentally flawed, thereby compromising all Site sampling, data analysis, risk analysis, and remedial alternative development and selection.

The question of the source(s) of lead in Omaha is not merely academic; its misjudgment results in misdirection of remedial efforts and failure to achieve the goal of protecting children from excessive exposure to lead, a known neurotoxicant. The shameful thing about these multiple failures is not that they result in overly health-protective actions; to the contrary, they ensure that massive sums of money will be expended without addressing potentially significant lead sources other than soil. Unfortunately, the draft BHHRA remains an exercise in IEUBK modeling to develop hypothetical estimates of blood lead levels in children, without reference to the extensive body of actual blood lead data from OLS children. Though EPA purports to have include sufficient site-specific data in the IEUBK modeling this time (unlike in 2004), the indoor data are not presented, nor are the model inputs discussed in any meaningful detail. Like its predecessor, the draft BHHRA fails to comprehensively evaluate the relative risk presented by exposure to lead in soils versus other lead exposures in the OLS. Therefore, it is not informative with respect to either determining the source and magnitude of existing risks, or developing rational strategies to reduce the incidence of elevated blood lead levels in the OLS.

EPA includes a discussion of other chemicals of potential concern. One of these, arsenic, is carcinogenic and above Hazard Quotient levels of concern, but is not carried forward as a contaminant of concern. Yet, EPA provides no explanation for this decision. Data developed both prior to and since the 2004 BHHRA document that much of the site arsenic is present from the use of lead arsenate pesticides and, therefore, cannot be addressed under CERCLA. Yet, EPA does not acknowledge this fact.

EPA Response: Comments concerning the BHHRA were found in Appendices I and J of the materials submitted by the commenter. See EPA responses to Appendix I and Appendix J comments. Also see EPA response to Comment D-9 above.

Indoor dust data and potable drinking water data used in the IEUBK model are presented in Table 4-3 of the RI Report. Inputs to the IEUBK model are presented in Table 4-1 of the BHHRA.

Section 5.4.2 of the BHHRA discusses both cancer risks and non-cancer risks from arsenic. The total cancer risks and total non-cancer risks to residents from ingestion and dermal exposure from soil are presented in Tables 5-3 and 5-4 of the BHHRA. Section 4.10 of the RI Report discusses the presence of arsenic at the OLS. The presence of arsenic at some OLS properties is discussed in the Final Record of Decision:

> 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 was 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

singularly, 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.

Comment D-13

Section 2.0, Potential Applicable and/or Relevant and Appropriate Requirements (ARARs)

As noted in General Comment 3, EPA's identification, discussion, and selection of ARARs and TBCs is incomplete and arbitrary. In addition to being arbitrary, the ARARs analysis is deficient in at least the following additional respects:

- *EPA identifies several highly relevant chemical-specific requirements from the Toxic Substances and Control Act (TSCA) and its implementing regulations at 40 C.F.R. Part 745, including the chemical-specific requirement that defines a soil lead hazard at a residential property for a play area as "when the soil-lead concentration from a composite play area sample of bare soil is equal to or greater than 400 ppm or in the rest of the yard when the arithmetic mean lead concentration from a composite sample is equal to or greater than 1,200 ppm." Draft Final FS at 2-3. EPA also identifies the TSCA interior dust sample chemical-specific requirement that "a dust-lead hazard is present in a residential dwelling when the weighted arithmetic mean lead loadings for all single surface or composite samples of floors and interior window sills are equal to or greater than 40 fig/ft^2 for floors and 250 fig/ft^2 for interior window sills. Id. Yet, EPA only applies the interior dust requirements (for Alternatives 2 and 3), rejecting the TSCA outdoor standards without explanation.*
- *EPA also properly identifies that Lead-Based Paint Poisoning Prevention Act; Residential Lead-Based Paint Hazard Reduction Act and it implementing regulations at 24 C.F.R. Part 35 as potential chemical-specific ARARs, but then only applies the interior dust requirement noted in the preceding bullet. Draft Final FS, Table 2-1.*

  EPA identifies (actually misidentifies due to typographical errors and missing information) several of its own guidance documents as potential federal chemical-specific ARARs, but then never discusses them and does not apply them. Specifically, Table 2-1 includes the following guidance as TBCs: 1) EPA Revised Interim Soil-lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive 9355 4-12, July 14, 1994 [sic] (the correct date of the directive is August 1994); 2) Clarification to the 1994 Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive 9200 4-27P, August 1998; 3) EPA Strategy for Reducing Lead Exposures, February 21, 1991; and 4) Superfund Lead-Contaminated Residential Sites Handbook, OSWER 9285.7-30, August 2003 (the "Handbook"). At least the first two and the Handbook are directly applicable to the OLS and contain much highly relevant information about addressing multi-source lead sites. It is noteworthy that EPA has consistently ignored and/or violated each of the above guidances in its implementation of the Interim ROD. The tabular reference *without further discussion is a strong indication that EPA intends to continue to violate these guidances for final remedy selection and implementation.*

- *Importantly, the Recontamination Study clearly demonstrates that ARARs are only fleetingly met by implementation of EPA's extremely costly remedy. As EPA makes no mention of the likely cost in excess of $100 million that the State of Nebraska will incur to maintain this improvident remedy.*

EPA Response: The Commenter suggests that EPA has been incomplete and arbitrary in identifying, discussing, and selecting ARARS and TBCs, yet the commenter does not suggest any ARARs or TBCs that have not been included. The first two bullets suggest that EPA has not incorporated, as ARARS, the appropriate chemical specific requirements for lead contamination in soils, including those of TSCA and several EPA guidance documents. The Superfund Lead-Contaminated Residential Sites Handbook is very clear that the chemical specific requirements of TSCA, Section 403 are not ARARs. The guidance documents cited by the commenter, including the Handbook, suggest that the EPA should use the IEUBK model as part of an assessment of Human Health risks to identify the appropriate site specific soil cleanup level for lead contamination. This is what was done for the Omaha Lead site.

EPA OSWER Directive 9355 4-12 was issued on July 14, 1994, as stated in OSWER Directive 9200.4-27P, *Clarification to the 1994 Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities*. However, to avoid confusion, the date will be changed to August 1994. EPA believes that guidance documents have been followed to the extent practicable. EPA also believes that the selected remedy will comply with all ARARs and is not aware that compliance will cost the state of Nebraska in excess of $100 million.

Comment D-14

Section 3.0, Remedial Action Objectives and Action Levels

As noted in General Comment 5, EPA's development of Preliminary Remediation Goals and Action Levels is premised on the flawed use of "mid-yard" data that has been demonstrated by the DZWS to be significantly impacted by LBP. Accordingly, this entire RAO and Action Level analysis is fundamentally wrong and unusable for identifying or estimating the number of (or specific) properties requiring remediation, any alternatives analysis, or any other FS or remedy selection purpose. A corrected analysis that compensates for and removes the data points impacted by LBP should be conducted and presented in the Responsiveness Summary and the correct information taken into account for final remedy selection.

EPA Response: See response to Comment B-2 to Appendix B, the RI Report.

Comment D-15

Section 4.0, Identification and Screening of Technologies

Because of the persistent, incorrect focus on "residential soil contamination from lead refining/processing" (Draft Final FS, p. 3-1), LBP and other sources of lead and their impacts on health in the study area were not considered. The RAO will not be met by any of the identified alternatives, at a *minimum due to the high probability of yard recontamination.*[6] *Due to strong influence by paint on the bioavailability test samples and other noted deficiencies in running the IEUBK model, the conclusions drawn in regard to health risk are, at best, incomplete. As noted in UPRR's RI comments, there are numerous serious concerns with the bioavailability analyses conducted by EPA. Most notably, the bioavailability results are not borne out by actual blood lead measurements. If the bioavailability results were accurate, far more children would have significantly higher blood lead levels than actually measured. Therefore, the bioavailability results are incorrect and are too high. See Attachment O to UPRR's October 14, 2004 comment package.*

EPA must consider the effects of LBP, and other sources of lead exposure that are not associated with the ASARCO/Gould refineries, in selection of the remedy, in the Responsiveness Summary, and during the risk management process. Given the recognized uncertainties in some parameters used in the IEUBK model, the referenced blood lead analyses, and the corresponding uncertainties in the BHHRA, it is premature to select a preliminary remediation goal or a risk management cleanup level. This is particularly true since EPA guidance OSWER Directive 9355.4-12 recognizes that the RAO can be achieved through a number of different lead exposure reduction options at a multi-source/multi-media site such as the OLS, not necessarily including soil excavation, but certainly not only soil excavation.

[6] *Nationally recognized research by the University of Cincinnati demonstrates a high potential for recontamination of yards by peeling exterior lead-based paint within two (2) years and that within ten (10) years, yards can become recontaminated to levels exceeding those observed prior to the soil removal (Menrath presentation, August 3, 2004). Menrath, William, HUD Healthy Homes Grant Number OHLHR 0063-99 "Evaluation of Exterior Lead Reduction and Control Methods FINAL REPORT" March, 2004 (Menrath, 2004).*

EPA Response: EPA believes that the selected remedy will achieve the remedial action objective by removing a significant source of lead contamination from residences in the OLS. Studies at other sites demonstrate that soil removal is effective in reducing lead levels not only in outdoor soil but also in indoor dust and that soil remediation leads to decreased blood lead levels in children (Mielke and Reagan 1998, Lanphear et al. 2003, von Lindern et al. 2003, Sheldrake and Stifelman 2003). See response to RI Comment B-31 (Appendix B) for a discussion of the issue of potential recontamination of soil by exterior lead-based paint.

EPA understands there is a large population of children at the OLS where blood lead measurements have been taken and agrees this information is informative. However, in accordance with EPA policy (OSWER Directive 9200.4-27), blood lead data collected at a site do not provide an adequate basis for evaluating risks or for setting or revising the cleanup level. There are many reasons for this. One of the most important is that EPA seeks to make cleanup decisions on a property-by-property basis, and blood lead data from any one property, taken alone, are never adequate to evaluate the actual risk from soil at that property. In addition, even at the community level, blood lead data are subject to a number of potential limitations that generally preclude their use in risk management decision-making at a site. To the extent that observed blood lead levels do not agree with IEUBK model predictions, there are a number of reasons why this may be so, including shortcomings in the blood lead data and the possible effect of awareness in the study population. Even if the observations and the predictions do not agree, this does not provide a basis to claim that any specific input to the IEUBK model is incorrect, especially the relative bioavailability term, which is based on substantial site-specific data. Experience at other sites has shown the IEUBK model is a good predictor of long-term blood lead levels in children, while blood lead studies are considered a snapshot of ongoing exposure under a specific set of circumstances at a specific time.

Comment D-16

Section 4.1, Institutional Controls

There are currently no institutional controls being imposed in residential areas of the Site. This component is likely not well understood by the affected public. Moreover, the FS does not include any discussion of the cost of implementing the registry EPA proposes that the state or local government could establish.

One additional minor issue is noted, there is a typographical error in line two of Section 4.1.1. "[C]omprise" should be "compromise."

EPA Response: EPA disagrees that there are currently no institutional controls at the site. Institutional controls include informational devices such as the ongoing education programs that EPA supports in conjunction with the Douglas County Health Department and others. EPA also maintains two public information centers that distribute information on controlling lead hazards and respond to questions from the public. The cost of implementing a local lead hazard registry is included in Tables 6-3 and 6-4. The term "repository" will be replaced by the term "registry" to avoid confusion in these tables.

"Comprise" will be changed to "compromise" in line two of Section 4.1.1.

Comment D-17

Section 4.2, Excavation

In Section 4.2.2, of the previous Draft FS Report, EPA stated that lead is "typically more evenly distributed in yards that have been impacted by airborne sources." That sentence has been omitted from Section 4.2.2 of the Draft Final RI Report. Both the previous Draft FS Report, and the Draft Final FS Report include this passage: "the EPA has information for this site indicating that many of the residential properties with soil concentrations above the action level also have areas of their properties below the action level…"

It is curious that EPA chose to omit the first sentence from the Draft Final RI Report. The presence of lead in Omaha's residential areas is unevenly distributed, even within small, individual residential yards. If emissions from the ASARCO and Gould refineries were truly the sources of the lead (which they are not), the lead concentrations would be much more uniform across a given yard (which they are not). EPA apparently understood that the combination of these two statements in the previous Draft FS Report undermined its basic but flawed premise for yard remediation in Omaha: that the lead originated from the ASARCO and Gould refineries. A much more plausible *explanation for the spotty nature of elevated lead concentrations in the OLS is the presence of LBP originating from adjacent structures. This is wholly supported by the findings of EPA's own sampling efforts in Omaha's parks, where very low lead concentrations were observed in thousands of soil samples, primarily because the parks do not contain structures with LBP, as well as the DZWS, which demonstrates that the effects of LBP extend several feet into residential yards from adjacent structures (see UPRR's general comments on the RI Report).*

EPA cannot continue to ignore the substantial presence of LBP and other non-refinery sources, throughout the Site, including in yard soils. EPA must consider the presence of LBP and other sources of lead exposure that are not associated with the ASARCO refinery in the Responsiveness Summary and during interim remedy selection and implementation.
Significant additional risks associated with excavation of lead contaminated soils are not discussed in the FS. Excavation activities have inherent potential risks to health of workers and residents, including increased dust levels and physical risks associated with heavy equipment, the use of hand tools, potential interference with power or other utility lines, and physical activity.

EPA Response: The referenced sentence from the 2004 FS is included in a section of the report that addresses complete excavation of a yard rather than partial excavation of the yard. The sentence indicates that excavation of entire yards may be necessary for yards contaminated from airborne sources, as lead is typically more evenly distributed in these yards. EPA acknowledges that the lead concentrations may not be evenly distributed within any particular property at the OLS and that excavation of complete yards is not always required. The next to last sentence of Section 4.2.2 of both the 2004 FS and the 2008 Draft FS reads, "The EPA has information for this site indicating that many of the residential properties with soil concentrations above the action level also have areas of their properties below the action level, and a complete removal of soils from properties may not be necessary." Since excavation of complete yards is frequently not necessary, the referenced sentence was deleted. EPA believes that lead from airborne industrial sources may have been more evenly distributed within individual OLS properties at one time but that a number of factors could account for the present soil lead distribution, including soil disturbance and yard augmentation.

Comment D-18

Section 4.3, Disposal

In Section 4.2, EPA notes that excavation can be difficult and costly. However, transportation risks and costs associated with soil disposal are hardly even mentioned in Section 4.3. The full implications of soil transportation should have been discussed either in the introductory section or in Section 4.3. Absent full disclosure, the alternatives analysis is misleading to the public regarding the impacts that the remedy will have on Omaha neighborhoods in the Site.

The discussion of disposal options in Section 4.3 remains incomplete. The Draft Final FS presents three disposal options, but does not provide sufficient detail about any of them to fully identify ARARs, assess associated risks, or cost the three options. Again, this approach precludes meaningful evaluation and participation by the public contrary to CERCLA section 113(k)(2)(B) and NCP section 300.430(c). Since the first option, a soil repository, includes long-term O&M that would be *the responsibility of the State of Nebraska and a cost to its citizens, pursuant to CERCLA section 104(c)(3)(A) which provides "the State will assure all future maintenance of the removal and remedial actions provided for the expected life of such actions…" the costs of this alternative may be of particular interest to the public and certainly to the State. The selection of, and costs associated with, the second option, off-site disposal, may also be of particular interest to the State and its citizens. To the extent that the disposed material is determined to be hazardous, CERCLA section 104(c)(3)(B) requires that the State "assure the availability of a hazardous waste disposal facility acceptable to the [EPA]…"*

Additionally, transport of materials increases the potential for injury from accidents as well as the potential for increased distribution of dust from lead contaminated soils. Further, use of lead contaminated soils as beneficial fill has implications regarding risk to those receptors living and working near the fill area. As noted in General Comment 6, the FS does not adequately discuss the risks associated with large truck traffic used in excavation and disposal. The current landfill used for disposal of excavated soil in the OLS is located in Malvern, Iowa, over 25 miles from Omaha. Each truck trip is thus over 50 miles, all of which occurs on public thoroughfares. As noted in UPRR's comments on the previous Draft FS, this could result in up to 32 truck trips a day for a period of several years, just to move contaminated soils.

The discussion in Draft Final FS Section 4.3 has no basis in the record and does not meet regulatory or guidance risk evaluation requirements. EPA should consider all risks associated with excavation, transportation, and disposal/land use of excavated soils. EPA should develop quantitative risk assessments focused on each of these activities and potential receptors. The cost of these risk assessments should be included as part of the cost/benefit analysis in the Draft Final FS. No decision about disposal should be made without an FS addendum or similar report to the public with all appropriate detail to enable the State and other interested persons to be fully informed and to comment on the disposal alternatives.

EPA Response: The detailed evaluation of the alternatives, including a discussion of appropriate ARARs, short term risks, and the cost of the alternatives is presented in Section 6.0, Detailed Evaluation of Selected Alternatives. EPA guidance does not require a detailed evaluation of all process options considered for inclusion in an alternative. EPA is anticipating continued use of excavated material as daily cover but would explore other options that may become available in the future with the state. State programs regulate the construction of a soil repository or beneficial use of excavated material, which ensures state coordination for any final management option that may arise.

Comment D-19

Section 4.4, Capping Technologies

In Section 4.4.3, EPA identifies the benefits of vegetative covers, stating that such covers may be appropriate alone for soils with low concentrations of metals, but does not define "low." Vegetative barriers are part of the selected remedy for a major mining and smelting related Superfund site in north Idaho. Table 12.1-2 of the September 2002 Record of Decision for the Bunker Hill Mining *and Metallurgical Complex Operable Unit 3 includes the following as part of the residential area remedy:*

> *"…vegetative barriers to control or limit migration of soils between 700 and 1000 mg/kg." The Responsiveness Summary included in the Bunker Hill ROD states:*
>
> *"The cleanup plan includes more flexibility in reaching cleanup standards in residential areas, i.e., 'community greening,' by using barriers such as vegetation on contaminated yards between 700 and 1,000 parts per million (ppm) lead instead of excavating and replacing soil between 700 and 1,000 ppm lead. This will result in less disruption and fewer yards having soil removed and replaced."*

Based on EPA's own remedy selection at the Bunker Hill site, vegetative covers alone should be given greater consideration in the FS, Proposed Plan, and remedy selection at the OLS. As EPA notes, grass grows well in Omaha. Since soil is a relatively low pathway of exposure at the OLS, in many areas a vegetative cover may provide sufficient protection. Moreover, though EPA noted the HUD standard for remediation of bare ground versus vegetated areas in the narrative on page 2-3 and in Table 2-1, EPA arbitrarily only focused on the TSCA/HUD indoor dust chemical-specific standard. The HUD approach should be identified, discussed in detail, and taken into account in the Responsiveness Summary and remedy selection.

EPA Response: Alternatives presented in the FS were prepared in accordance with the identified ARARs and To Be Considered Criteria, including the Superfund Lead-Contaminated Residential Sites Handbook, the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, and the 1998 Clarification to the 1994 Revised Interim Soil Lead (Pb) Guidance for CERCLA Sites and RCRA Corrective Action Facilities. Section 6.2 of the Handbook indicates that there are currently only two remedial actions that generally are considered to be protective, long-term remedial actions at residential properties: (1) excavation of contaminated soil followed by the placement of a soil cover barrier and (2) placement of a soil cover barrier without any excavation of contaminated soil. The Handbook indicates that a minimum of 12 inches of soil should be used to establish an adequate barrier. The Handbook also states that excavation followed by placement of a soil cover is the preferred method. Placement of a vegetative cover or placement of a 12-inch soil cover, without excavation and removal of contaminated soil or placement of a 12-inch soil cover is not identified as an acceptable alternative in the Handbook. All of these process options were discussed, and the use of only a vegetative cover was eliminated from consideration because it may not provide adequate protectiveness and does not comply with EPA guidance.

The soil lead concentrations discussed in the HUD regulations are not intended to be cleanup levels at CERCLA sites, but only serve as an indicator that further study is appropriate (See 1994 OSWER Directive). The August 1994 OSWER Directive and the August 1998 OSWER Directive indicate that the IEUBK model is a good predictor of potential long-term blood-lead levels for children in residential settings. The OSWER Directives recommend that the IEUBK model be used as the primary tool to generate risk-based soil cleanup levels at lead sites for current or future residential land use. The 1998 OSWER Directive also indicates that response actions can be taken, and remedial goals developed, using IEUBK predictions alone.

Comment D-20

Section 4.5.2, Phosphate Stabilization

Phosphate stabilization is a chemical stabilization procedure in which phosphate salts are added to soils in either solid or liquid form and mixed with the soil in an effort to reduce the bioavailability of any lead present in the soil. EPA prepared a "Draft Final Bench-Scale Treatability Study" to assess the effectiveness of this technology in the OLS. UPRR's detailed comments on this treatability study are provided in Appendix E of this comment package. UPRR's most significant comment on the treatability study is that it does not recognize that the lead present in the soil samples used to conduct the test is primarily attributable to LBP, even though the presence of paint chips is documented in at least one of the soil samples. For example, the first page of the treatability study document includes this sentence:

> *"The OLS includes contaminated surface soils (generally between 0 to 6 inches below ground surface (bgs)) present at residential properties, child-care facilities, and other residential-type properties in the city of Omaha, Nebraska, which were contaminated as a result of historic air emissions from lead smelting and refining operations."*

An extensive amount of data collected to date indicates that deteriorating LBP is likely the source of elevated soil-lead concentrations observed in Omaha.

EPA Response: EPA recognizes that deteriorating lead-based paint can affect soil lead levels at individual properties. Soils from the drip zone and the mid-yard area of residential properties were tested during the bench scale treatability study. Since one of the three soils tested during the bench scale treatability study was comprised of soils from the drip zone, lead-based paint may have influenced the total lead level measured in the sample, in addition to other potential sources that affect drip zone soil lead levels. The OLS Treatability Study did not demonstrate that phosphate treatment significantly reduced bioavailability in soil collected from either the drip zone or mid-yard areas.

Comment D-21

Section 4.6, Actions to Address Other Non-Soil Sources of Lead
EPA presents an incomplete discussion of the statute, the regulations and its guidance on page 4-8. By quoting only part of CERCLA section 104(a)(3), EPA misleads the public. The true picture of EPA's authority is very different. First, EPA has authority under 104(a)(4) to address lead exposures, without regard for the limitations in 104(a)(3), if the exposure is deemed a public health emergency. As a separate mechanism, NCP section 300.515(f) also allows EPA to address lead-paint issues comprehensively at the State's request. Third, OSWER Directive 9355.4-12 clearly recognizes that in

cases such as the OLS, where soil exposure to lead is only one of the pathways and is likely a limited pathway of exposure, it may be more protective and more appropriate to remediate the other sources of lead exposure instead of just soils. This multi-exposure pathway approach can be included in the remedy, as well. Specifically, OSWER Directive 9344.4-12, Appendix A-1, Step 5, presents the following decision logic:

- *"If lead-based exterior or interior paint is the only major contributor to exposure, no Superfund action is warranted.*
- *If soil is the only major contributor to elevated blood lead, a response to soil contamination is warranted, but paint abatement is not.*
- *If both exterior LBP and soil are major contributors to exposure, consider remediating both sources, using alternative options…*
- *If indoor dust levels are greater than soil levels, consider evaluating the contribution of interior LBP to the dust levels. If interior LBP is a major contributor, consider remediating indoor paint to achieve a greater overall risk reduction at a lower cost."*

OSWER Directive 9344.4-12, Appendix A-2 also recommends that exterior paint be examined to determine its lead content. Where exterior paint contains lead, EPA advises that recontamination potential should be evaluated and exterior paint remediated in conjunction with soils. In addition, indoor paint should be examined for lead content as Appendix A-2 states:

> *"If indoor dust lead concentration is greater than outdoor soil lead concentration (because of contamination from both interior paint and outdoor soil), remediate indoor dust (e.g., through a removal action, or making HEPA-VACs available to community). Once the risk from indoor paint has been assessed, examine options to abate indoor paint (e.g., PRP, State, local, HUD) and consult TSCA Section 403 program for additional information and/or guidance."*
>
> *"While RCRA and CERCLA have very limited authority regarding the cleanup of interior paint, the remedy may take into account the reduction of total risk that may occur if interior paint is addressed by other means. Thus, for example, a Record of Decision (ROD) or Statement of Basis (SB) may recognize that interior LBP is being addressed by other means, and narrow the response accordingly (possibly making this contingent on completion of the interior LBP abatement effort)."*

Contrary to the statements in Section 4.6, EPA can include exterior paint abatement, indoor dust evaluation, and indoor dust removal actions all in the remedy. Moreover, though EPA may not perform the interior LBP abatement, the ROD can recognize that interior LBP is being addressed, which should be done through incorporation in the remedy via the Comprehensive Program. EPA should have evaluated the Comprehensive Program alternative, including all components identified in Attachment C of UPRR's October 14, 2004 comment package, all of which can be included in the ROD and all of which (with the exception of interior LBP abatement) can be implemented by EPA using Superfund Trust Fund money. Moreover, to the extent that the State has not requested implementation of NCP section 300.515(f), for those remedy components that address LBP that EPA cannot *legally address under CERCLA Sections 101(9) and 104(a)(3), 42 U.S.C. § 9601(9) and 9604(a)(3) and the NCP 40 C.F.R. § 300.400(b)(2), the FS should include a detailed discussion, why EPA cannot implement those components and how they could be addressed.*

Inclusion of all of the above elements in the Comprehensive Program and further sampling and evaluation of exterior paint, interior paint, interior dust, and speciation of interior dust, per Directive 9355.4-12 was previously identified as critical for the interim remedy because EPA did not do this necessary work during the initial RI. UPRR and others identified this concern and noted that the investigations conducted by EPA and its subcontractors were incomplete and insufficient to adequately characterize the source of elevated blood lead levels in residents of Omaha. Regrettably, despite those prior comments, these deficiencies remain; EPA did not sufficiently evaluate exterior paint, interior paint, interior dust, or speciate interior dust and still has not adequately characterized the source of elevated blood lead levels in residents of Omaha. It is apparent that the investigations' biases toward industrial sources of lead contamination continue to result in remedial decisions that will not meet the Site RAO and will not meet the requirement of CERCLA section 121 or the NCP section 300.430(a)(1)(i) because the remedy will not be protective of human health at the OLS. EPA has not provided sufficient data to indicate that soil removal or cleanup will result in any significant reduction of blood lead levels in residents. In fact, with known high instances of LBP in residences in the OLS, there is a high potential for the incidence of elevated blood lead levels to remain the same – or reduce consistent with national trends for urban areas - after soil removal. To achieve CERCLA's requirements, EPA must conduct further investigation into the source(s) of elevated blood lead levels of children within the OLS and the source of lead contamination in soils at the OLS. These investigations should have been conducted during the interim remedial period, prior to final remedy selection, as noted by UPRR in its 2004 comments.

EPA Response: See response to Comment B-36 to Appendix B, the RI Report.

The percentage of children screened at the OLS with elevated blood lead levels has been declining since initial EPA involvement. Initial EPA efforts were directed at properties where children were identified with elevated blood lead levels or where soil lead levels were highest. EPA believes that the decline in the incidence of elevated blood lead levels at the OLS is evidence that there is not a high potential for the incidence of elevated blood lead levels to remain the same, as stated by the commenter.

The commenter is correct that EPA can take action under CERCLA 104(a)(4) if the exposure caused by site contaminants is deemed a public health emergency. While the exposure at the Omaha Lead site is very serious and requires the immediate attention that EPA has been providing since initiating response, EPA is not aware that the exposure at this site has been deemed a public health emergency. In addition, NCP Section 515(f) does allow the state to request changes or enhancements to the remedy at a site. EPA is not aware that the state has asked for enhancements to the remedy. EPA coordinates closely with the state on all response actions conducted at the site.

The remainder of this comment discusses the need for EPA to assess all exposure pathways and participate in a Comprehensive Program to address all lead-exposure sources. Since the 2004 Interim Record of Decision, EPA has performed additional characterization of lead levels in soil, exterior lead based paint, interior dust, and tap water. This data has been used in accordance with our current guidance, the Handbook, as inputs to the IEUBK model in assessing risks posed by site contamination. In the final remedy, EPA commits to participate in a Comprehensive Program to address all lead-exposure sources and to provide funding to support elements of a comprehensive remedy to the limit of its authority under CERCLA.

Comment D-22

Section 5.0, Development of Alternatives

As noted throughout UPRR's comments on the Draft Final FS, the alternatives do not present a full range of possible remedies due to EPA's disregard of LBP exposures at the Site. Consistent with Directive 9355.4-12, EPA should simply recognize that the Site is a multisource/ multi-media site and evaluate and address the prevalent pathways of lead exposure as recommended by the decision logic presented in Appendices A-1 and A-2 of that Directive.

See response to Comment D-21 to the FS Report.

Comment D-23

Section 5.1.2, Alternative 2: Excavation and Disposal with Institutional Controls

This section describes how residential properties with at least one non-drip zone sample greater than 400 ppm lead will be excavated and disposed. As UPRR has previously noted, EPA's own DZWS confirms the effects of exterior LBP in yard soils to distances of up to 72 inches or more from the residential structures whereas EPA's massive data set (over 35,000 residential yards) is based on a drip zone width of only 6 to 30 inches from the home. Therefore, a significant portion of the samples EPA deems "non-drip zone samples" actually reflect drip zone (i.e., paint impacted) conditions.

The alternative description makes mention of stabilizing exterior LBP in an effort to reduce recontamination of the remediated yards. EPA's own recontamination study proves that, where residential structures have LBP (and virtually all such structures within the OLS do have LBP), recontamination of soil over time is a certainty due to the eventual failure of any stabilizing paint that is placed over the LBP. Peeling paint is widespread on the exteriors of homes in the OLS. Also, according to EPA, only those surfaces which have loose and flaking lead-based paint will be repaired.[7] *Stabilized LBP will eventually peel and recontaminate the yards, as will LBP that EPA did not identify as loose and flaking at time of stabilization. Therefore, soil removal and excavation in the OLS is neither long-term effective nor cost effective.*

The description of this alternative is devoid of the specific types of information that are needed to fully evaluate its effectiveness (both long and short term) and cost. There are no estimates of the volume of soil that may need to be excavated and disposed. There also are no estimates of the distance over which excavated soil would need to be hauled on public roads. Therefore, based on the meager information EPA has assembled, this alternative cannot be meaningfully evaluated.

[7] http://www.epa.gov/region7/cleanup/npl_files/omaha_paint_factsheet3_sept07.pdf

EPA Response: See response to Comment B-2 and Comment B-31 on the Appendix B comments on the RI.

The volume of soil that is excavated from any particular property will vary depending upon the depth of contamination and the total area of the yard that contains soil lead concentrations exceeding 400 ppm. The distance from the remediated property to the disposal site in Malvern, Iowa, also varies depending upon the location of the remediated property within the OLS. Because these factors vary, average costs per property were developed for excavation, transportation, and disposal of the contaminated soil. The estimated costs to excavate, transport, and dispose of the contaminated soil on a per property basis were developed using historical costs for performance of soil remediation at the OLS. These costs are within an accuracy of +50 percent to – 30 percent required by EPA guidance for preparing FS Reports.

Comment D-24

Section 5.1.3, Alternative 3 Phosphate Stabilization: Excavation and Disposal with Institutional Controls

Alternative 3 is essentially the same as Alternative 2 with the exception that residential yard quadrants that fall in the range of 400 ppm to 500 ppm lead would be stabilized in place with phosphate reagent. Quadrants exceeding 500 ppm would be excavated and disposed, as for Alternative 2. All of UPRR's comments on Alternative 2 (above) are applicable to Alternative 3 as well.

EPA Response: See response to Comment D-23.

Comment D-25

Section 6.0, Detailed Evaluation of Remedial Alternatives

Any alternative that focuses on soil excavation will not meet the first threshold criterion of protecting human health, because soil is likely not the primary pathway of lead exposure at the Site. Thus, the FS does not and cannot demonstrate that any of the alternatives meet either of the two threshold criteria. As noted in General Comment 3, EPA effectively applied a new criterion that does not exist in the NCP for purposes of this FS. Specifically, as noted on page 6-1 of the Draft Final FS, the second balancing criterion is reduction in toxicity, mobility, or volume achieved *through treatment. Contrary to this description and the requirement of the NCP section 300.430(e)(9)(iii)(D), the Draft Final FS just evaluates reduction of toxicity, mobility, or volume – an entirely different analysis that misses the whole point of Congress' emphasis on treatment. See CERCLA section 121(a).*

EPA's cost estimates for the various remedial alternatives are unsupported. As a result, the reader cannot evaluate the accuracy and relevance of the costs associated with each remedial alternative. Additionally, EPA guidance, OSWER 9355.0-75, states that estimates should provide an accuracy of "+50 percent to –30 percent." The Draft Final FS does not indicate whether or not estimated costs meet this level of accuracy.

As discussed in General Comment 6, EPA's RI/FS Guidance defines the short-term effectiveness evaluation criterion to include risk from excavation and transportation activities. EPA has not quantified the risk associated with the excavation and transportation activities included in several of the remedial alternatives. In its final remedy selection, EPA should consider the risks to workers and residents (both in Omaha and along the transport route(s)) associated with excavation and transportation of lead impacted soils in congested urban areas and address these issues in detail in the Responsiveness Summary and take them into account in final remedy selection. These risks should be characterized by considering actual traffic injuries and fatalities based on published information, extrapolated to account for the may thousands of truck miles that will be needed to transport contaminated and clean soil under the soil removal alternatives proposed by EPA.

EPA Response: The third balancing criterion discussed on page 6-7 addresses reduction of toxicity, mobility, or volume through treatment. As stated in the first sentence, "This criterion addresses the statutory preference for selecting remedial action that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants." Alternative 2 does not employ treatment and the discussion under this criterion covers the reduction of mobility of the contaminants through excavation and placement in a landfill. Alternative 3 does employ phosphate treatment of soil with lead concentrations between 400 ppm and 500 ppm. As discussed on page 6-19, the treatment portion of this alternative would reduce the toxicity and mobility of the contamination for those properties with lead concentrations between 400 ppm and 500 ppm.

EPA believes that factors affecting short-term effectiveness were adequately developed in the OLS Final Feasibility Study and support the final remedy selection for the OLS.

Comment D-26

Section 6.2.2, Alternative 2: Excavation and Disposal with Institutional Controls

Alternative 2 Does Not Meet the Overall Protection Criterion. The first two sentences in the "Overall Protection" section have not been demonstrated to be true. The documentation of elevated lead concentrations in soil and elevated blood lead levels does not prove that the blood leads result from soil pathway exposures. EPA did not conduct any paired blood sampling or indoor dust, paint, soil, and blood sampling to document that predominant Site lead exposures are from soil. The second paragraph discusses stabilization of exterior LBP to avoid recontamination of remediated *yards. However, even stabilized paint will eventually peel and recontaminate the yard. The third paragraph develops a flawed and unproven argument that soils are a major contributor of lead contamination to interior dust in homes. UPRR supports cleaning or abatement of indoor dust and would include it as a component of the Comprehensive Program. However, this argument is unsubstantiated by existing Site data. In order to reliably determine that exterior soils are a significant contributor to lead in interior dust, a speciation study is required. Without such determination, the statement that "remediating residential soils would reduce a contamination pathway to the home interiors" is unsupported and completely without basis in the Site Administrative Record. Indeed, to the contrary, the available information strongly suggests that soil is a minor contributor and that LBP is a major contributor to lead concentrations in interior dust of many homes in the OLS. Consistent with Directive 9355.4-12, during the interim remedial period, EPA should have conducted the paired blood, indoor dust, paint, and soil sampling, and dust and soil speciation to document the predominant source(s) of lead exposure at the Site, but it did not, despite Congressional funding of $500,000 allocated expressly for that purpose. Alternative 2 cannot be demonstrated to meet the criterion for overall protection of human health based upon available Site data. First, as noted above, existing data do not demonstrate that remediation of soil will eliminate a significant enough lead exposure pathway to protect human health or enable the Site RAO to be met. Second, one component of the overall protection criterion is permanence (see NCP section 300.430(e)(9)(iii)(A) and FS, p. 6-1).*

The FS Does Not Document that Alternative 2 Will Have Long-Term Effectiveness. As noted, without demonstrating that soil is a significant pathway of lead exposure, the initial conclusion that residual risks would be significantly reduced by Alternative 2 is not substantiated. Even with the inclusion of exterior LBP stabilization, permanence will not be achieved because the stabilized paint will eventually peel and recontaminate the yard.

The "Short-Term Effectiveness" Discussion for Alternative 2 Is Incomplete. See General Comment 6. EPA makes no effort in the Draft Final FS to estimate the number of truck miles or trips that will be necessary to transport excavated yard soil to its final disposal site. In the previous Draft FS, EPA stated that Alternative 2 assumes that 16,000 yards will be excavated within the Site and that 960,000 cubic yards of contaminated soil will be transported through Omaha's neighborhoods. This could equate to 32 trips by large dump trucks carrying contaminated soil, per day, for a several year period. Members of the public almost certainly will be injured or killed due to this high volume of truck traffic. These figures would be doubled to transport in the clean fill. Both the windblown dust exposure associated with transport and the increase in heavy truck traffic present short-term risks that are not identified at all. Worker exposure to windblown contamination during remediation activities should also be at least mentioned. Discussion about a disposal repository is purely speculative at this point since no viable disposal option has really been identified.

Alternative 2 Does Not Reduce Toxicity, Mobility, or Volume by Treatment. The discussion about Alternative 2 under this heading does not meet regulatory requirements. The NCP identifies this criterion as a treatment criterion. Alternative 2 is a dig and haul option and does not include any treatment. The FS should fairly evaluate Alternative 2 for what it does – no treatment – it simply does not meet this criterion.

Alternative 2 Is Implementable, But the Costs for Alternative 2 Are Unacceptable. General Comment 4 points out that none of the cost information provided in the Draft Final FS is sufficiently detailed to enable effective evaluation and comparison of each alternative. However, from the summarized cost information presented for Alternative 2, one can readily conclude that this alternative is far too expensive for the speculative and temporary benefit that would be derived from its implementation. Disposal costs (i.e., tipping fees) do not appear to have been considered in the cost estimate.

The State and the community have repeatedly requested a Comprehensive Program. For example, during the public hearing on August 10, 2004 and by letter of August 9, 2004 from Mr. Mike Linder, Director of NDEQ, the State has voiced its support for a comprehensive approach to address all sources of lead exposure. As Mr. Linder stated:

> *"…we believe that activities associated with all of the sources of lead exposure should be included in the Preferred Alternative. It appears that this kind of comprehensive approach is being allowed in other EPA Regions and should be allowed for at this site."*

*By letter of September 9, 2004, the OLS Community Advisory Group also stated its support for a comprehensive program**,** including components to address indoor and exterior lead-based paint. Other letters and written requests for a Comprehensive Program are included in Attachment 1 of this comment package and incorporated by this reference. For this deficiency, among others, UPRR does not support Alternative 2.*

EPA Response: See responses to Comment B-5 and Comment B-36 to Appendix B, the RI Report and responses to Comments D-4, D-5, and D-6 and Comment D-13 to the FS.

Alternative 2 does not include treatment as an element of the remedy, so there is no reduction of toxicity, mobility, or volume achieved through treatment. Alternative 2 does result in a reduction in toxicity, mobility or volume, but not through a treatment component.

EPA notes that the commenter acknowledges the reliability of determining the origin of lead in interior dust through a speciation study.

EPA did not receive $500,000 from Congress to conduct paired blood, indoor dust, paint, and soil sampling, and dust and soil speciation to document the predominant source(s) of lead exposure at the Site, as the commenter suggests. The 2006 approved Congressional budget included a $500,000 special appropriation to the "Lead-based paint hazard control program" in Omaha, Nebraska. The intended use of the funding was not otherwise specified in the bill. The funds were provided to the City of Omaha Lead Hazard Control Program through a cooperative agreement with EPA. EPA did not receive any of these funds for any type of study.

Comment D-27

Section 6.2.3, Alternative 3: Phosphate Stabilization and Excavation with Health Education and Institutional Controls

See Specific Comment 13. Alternative 3 incorporates treatment of soil between 400 and 500 ppm lead and excavation for all soils above 500 ppm using the same approach as Alternative 2.

Alternative 3 continues to rely predominantly on soil remediation and, for the reasons stated in Specific Comment 19, it cannot be demonstrated to meet the criterion for overall protection of human health based upon available Site data. Long-term effectiveness of a soil excavation focused remedy cannot be documented on the current record, without significantly more detail about exterior LBP abatement. UPRR's comments on Alternative 2 (above) apply equally to the excavation and disposal aspects of Alternative 3 and are incorporated here by reference.

EPA Response: See response to Comment D-26 above.

Comment D-28

Section 7.0, Comparative Analysis of Alternatives

Section 7 is replete with the same incorrect and biased analysis as identified in Specific Comments 19 and 20. UPRR incorporates those comments and does not reiterate those issues here. In short, neither of the two action alternatives meets all nine criteria. The record is incomplete and insufficient to effectively evaluate compliance with a number of the nine criteria, such as compliance with ARARs, short-term effectiveness, and cost. Long term effectiveness will not be accomplished even if exterior paint abatement is incorporated because the stabilized paint will eventually peel and recontaminate the yard. Only Alternative 3, which incorporates phosphate treatment, will accomplish any reduction of toxicity, mobility or volume through treatment. Alternative 2 simply moves contamination from one location to another at great expense and should be rejected immediately for that reason. All alternatives are implementable to some degree, so this is not a distinguishing criterion. With regard to cost, CERCLA does not require review strictly of cost, but of the cost-effectiveness of each alternative. Any remedy that fails is not cost effective and due to EPA's predominant focus on soil excavation in each of the alternatives presented, all will fail. None of the alternatives will interrupt one of the recognized primary (if not the most significant) pathways of lead exposure at the Site – exposure to LBP. Until that is recognized and addressed, the remedy will be inadequate and will not meet CERCLA remediation requirements.

EPA should reject all of the Alternatives evaluated in the FS in favor of a Comprehensive Program as the only remedy approach that will effectively meet the nine criteria.

EPA Response: See responses to Comments D-26 above.

EPA Responses to UP Comments – Appendix E
Draft Final Bench-Scale Treatability Study

Comment E-1

Page 1-1, second paragraph

> *"The OLS includes contaminated surface soils (generally between 0 to 6 inches below ground surface (bgs)) present at residential properties, child-care facilities, and other residential-type properties in the city of Omaha, Nebraska, which were contaminated as a result of historic air emissions from lead smelting and refining operations."*

An extensive amount of data collected to date demonstrates that deteriorating lead-based paint (LBP) is the primary source of elevated soil-lead concentrations observed in Omaha. The text should be modified to reflect the findings of EPA's Drip-Zone Width Study, Lead-Based Paint Recontamination Study, and other data collected during the Remedial Investigation, which demonstrate this point.

Furthermore, understanding of the relative contribution of LBP to lead in Omaha yard soils is critical to a successful remediation program. For example, since LBP on building exteriors is a significant but unrecognized source of lead to yard soil, yards that are remediated through either removal/replacement or amendment will become recontaminated over time as the LBP deteriorates.

EPA Response: See responses to Comments B-1, B-2, and B-5, and Comment B-31 to the RI Report submitted as Appendix B.

Comment E-2

Page 1-1, fifth paragraph

> *"Studies conducted at other Superfund sites contaminated with similar forms of lead…"*

Although not explicitly stated here, the most well-known Superfund site where similar studies were conducted is the Tri-States Mining District site. Soils from the Tri-States Mining District are known to have been contaminated by smelter emissions and mine waste. Concentrations of lead in soil from the Tri-States Mining District were much higher than those found in mid-yard soils at the OLS. Lead concentrations between 400 and 6,000 mg/kg were documented in smelter-impacted soil from Joplin, MO (Hettiarachchi et al. 2001; Tang 2007).

The soils used for the Tri-States treatability studies are not comparable to the soils used for the OLS study. Based on the lead speciation data presented in this report for tested soils from the OLS, there is no evidence that the soils used for the OLS treatability study are "…contaminated with similar forms of lead" (i.e., lead from smelter emissions and mine waste). The largest proportion of lead present in *least two of the three OLS soil samples tested most likely originated from lead-based paint. The only soils with comparably high lead concentrations are soils that contain a large component of lead from lead-based paint.*

EPA Response: "With similar forms of lead" will be removed from the text and will be replaced with "by lead smelting operations."

Comment E-3

Page 1-5

Three study limitations are noted on pages 1-5. Based on these limitations, it appears that the original objective for the treatability study has not been met. The 2004 Interim Record of Decision (IROD) specified "…an initial bench scale test to determine the effect that the treatment technology has on the bioavailability of lead in site soils under laboratory conditions."

The first limitation is that in vivo testing cannot be used to evaluate lead bioavailability in soil when the soil lead concentration is between 400 and 800 mg/Kg. This is the explanation provided for not conducting in vivo tests as part of this study. However, only one of the soils tested had a lead concentration within this range. The other two soils had lead concentrations of 1,100 and 2,230 mg/Kg, and in vivo bioavailability tests could have been completed for both of these samples.

The second limitation indicates that in vitro tests have not been calibrated to in vivo test results for phosphate-amended soils. As a result, bioaccessibility estimates from in vitro tests on the treated soils cannot be used to obtain reliable estimates of the reductions in lead bioavailablity due to soil treatment. This limitation could have been addressed by performing in vivo tests on treated soils with lead concentrations greater than 1,000 mg/Kg. Furthermore, RI data clearly show that the total soil-lead contribution from non-paint sources is well below 200 ppm at any property and only paint-impacted properties exceed 400 ppm. Therefore, the whole study is an exercise in evaluating potential to address paint-impacted soils.

The third limitation is that there is no conclusive data provided by the study to evaluate the long-term effectiveness of the treatments in reducing the relative bioavailability of lead in treated soil. This is the primary study objective noted in the 2004 IROD (see quote above). If the study does not meet this objective, then it was poorly designed and/or poorly implemented. Additional explanation should be provided regarding failure to address the IROD's stated objective for the treatability study. If the objective established in the IROD is not attainable, then that error in the IROD should be recognized.

The need for in vivo testing of the test soils should be reconsidered. In vivo testing of the test soils in their pre-treatment condition could be used to evaluate the extent to which distinct lead speciation (e.g., soils with LBP vs. soils without LBP) controls lead bioavailability. This type of data is not available from the existing in vivo bioavailability testing performed to support the OLS RI. In addition, a final test to measure in vivo lead bioavailability in a soil that has been treated to reduce lead bioaccessibility may be warranted to demonstrate the effectiveness of the preferred treatment approach using more certain in vivo methods.

EPA Response: EPA believes that it was not necessary to perform *in vivo* testing of the soils during the bench scale test. A mathematical correlation has been established between the data from *in vitro* testing and *in vivo* testing that enables the *in vitro* test results to accurately estimate the bioavailability of lead in soil. The *in vitro* testing is significantly less resource intensive, can be performed more rapidly (weeks instead of months required for the *in vivo* testing), and does not require the sacrifice of animals. Because of the large number of samples that were analyzed (148 samples) in the bench scale treatability study using *in vitro* testing, these issues were significant.

As indicated in Section 2.2 of the Treatability Study Work Plan, *in vivo* testing was not anticipated to be used during the bench scale treatability study and would only be considered if the results of the *in vitro* testing indicated that the phosphate treatment might be effective in reducing the bioavailability of lead to acceptable levels.

Although the *in vitro* testing procedure has not been validated for use on phosphate amended soils, EPA believes the *in vitro* testing procedure provided data that could be used to determine whether the phosphate treatment would be effective in reducing the bioavailability of lead to acceptable levels. There are no scientific data to indicate that the Relative Bioassessibility Leaching Procedure (RBALP) *in vitro* method does not estimate the correct *in vitro* bioassessibility (IVBA) for a phosphate treated soil. In fact, a number of the test soils used in the calibration of the RBALP contain significant quantities of lead phosphate.

The treatability study was designed to implement a bench-scale treatability study to determine the short term reduction in the relative bioavailability of lead in soils. Following the bench-scale study, field testing would be implemented to evaluate the long term effectiveness of the phosphate amendments to reduce the bioavailability of lead in soils. However, the bench-scale treatability study indicated that the phosphate amendments would not provide sufficient short term reduction in the bioavailability of lead to make phosphate stabilization an effective alternative. Consequently, EPA concluded that additional field testing over a three year period to evaluate the long-term effectiveness of the phosphate amendments was not necessary.

Measured lead relative bioavailability values from *in vivo* analyses do not provide “distinct lead speciation.” Lead bioavailability is a function of lead form, particle size, and the association (liberated/encapsulated) of each lead particle. Although it is correct that lead paints generally have very high (85-100 percent) RBA values, so do soils containing lead carbonate, lead oxide, or lead chloride from pyrometallurgical sources.

Comment E-4

Page 1-5, Section 1.2

Only one of the soils tested, Soil A, had a lead concentration within the range being considered for treatment (i.e., 400-800 mg/Kg lead). Further discussion of results specific to this concentration range is warranted.

EPA Response: The test results for Soil A (average lead concentration between 400-800 ppm) are presented in Tables 2-1, 2-2, 2-3, 2-6, 2-7, 3-1, 4-1, and Figures 2-1, 2-2, 2-5, 2-8, 3-1, 3-4, 3-7, and 3-10. The discussions in Section 3.4 and 4.0 of the Bench Scale Treatability Study Report indicate that none of the phosphate amendment scenarios consistently lowered the relative bioavailability of lead in OLS soils to a degree that would warrant further evaluation of phosphate treatment through field testing. The treatment effectiveness demonstrated in the bench-scale study indicates that phosphate treatment would not effectively reduce bioavailability of lead in soils with soil lead levels in the 400–800 ppm range. EPA believes that the discussion in the report is sufficient to present the data and support EPA decision-making.

Comment E-5

Section 2.1.4, page 2-7

The dominant lead forms identified in the three test soils, each a composite of soil collected from multiple residential properties within the OLS, are cerrusite (lead carbonate), anglesite (lead sulfate), and lead phosphate. Cerrusite, as "white lead" pigment, and anglesite, as "blue lead" pigment, can both originate from LBP; anglesite can also originate from spent car batteries. Lead titanium oxide, another paint pigment, was also identified as a significant percentage of the lead mass present in the drip zone soil sample (Soil C). These lead species were not identified as dominant forms of lead present in the residential soil samples analyzed for lead species to support the EPA's "Apportionment Study." Inconsistencies between previous lead-species characterization of residential soil and the lead species present in samples used for the treatability study should be addressed and discussed in this report. To the extent that the three test soil samples are representative of residential soils that would be targeted for treatment, the treatability study, as implemented, predominantly evaluated treatment of soils contaminated by LBP.

EPA Response: EPA does not believe that the speciation results for the three test soils are in "conflict" with results presented in the Apportionment Study. These data resulted from the use of two different sample collection protocols during separate episodes. Lead forms identified in the OLS Treatability Study soil samples are consistent with those found in the Apportionment Study, i.e., soils containing large relative masses of cerussite, anglesite, or lead phosphate were found in the Apportionment Study. The purpose of the OLS Treatability Study was to measure the reduction in the bioavailability of lead in soils following application of phosphate amendment to the soil. Soil samples were not collected for the purpose of identifying lead forms that may exist at individual OLS properties. The speciation data from the three test soil samples used in the bench scale treatability study does affect the study's conclusions that treatment of any of the test soils with phosphate amendments does not reduce the bioavailability of lead in the test soils by more than 20 percent, on average.

The data from the OLS Treatability Study do not indicate that these soils are dominated by LBP. The lead forms cerussite and anglesite are not only common pigments in lead paint, but they are extensively found in the waste product and soils from the ASARCO facility. In addition, lead titanium oxide (lead titanate) was not a common pigment used in house paint. Its use was far more commonly associated with piezoelectric materials. It was also found in large proportions in a few soils from the Apportionment Study, but over the entire OLS it only represented approximately 1 percent of the relative lead mass and is not recognized as a dominant lead form in OLS soils.

Comment E-6

Table 2-3

No discussion is included regarding the utility of the “bioaccessible lead mass (Biorm Pb)” estimate as a potential indicator for bioaccessibility test results, and there is no comparison of the estimated “Biorm Pb” in soil to in vitro bioaccessibility test results for either pre- or post-treatment soils. If the “bioaccessible lead mass” estimate is a hypothetical measure of bioaccessibility that does not correspond to the bioaccessibility measured by in vitro testing, those values are not reliable and should be eliminated from the results reported here.

EPA Response: The bioaccessable lead mass is provided to the reader as an alternative method for evaluating the speciation data. Its basis for calculation is provided in the “Metal Speciation SOP,” Appendix B of the report. In the case of this study it simply reflects the potentially bioavailable portion of the relative lead mass (based only on physical characteristics—i.e., particle-size and association) that may be of interest to some readers or be useful in further remediation planning.

Comment E-7

Table 2-4 and Figure 2-9

One paint chip was identified in Soil B, the mid-yard soil with lead concentration greater than 1,000 mg/Kg, but more than sixty-five percent of the relative Pb mass in this sample was attributed to cerussite, or lead carbonate, a form of lead that is also present in lead-based paint. Soil B is a composite sample of soils collected from mid-yard locations at various properties, yet the study report contains no discussion of the presence of “paint” in this sample. Again, with regard to Soil B, the treatability study, as implemented, evaluated treatment of soils contaminated by LBP, without any mention of that effect of the study.

A discussion of the different lead species identified in samples A, B, and C and their potential origin (i.e., smelter emissions or LBP) should be included in Section 2.

EPA Response: The objective of the Treatability Study was to evaluate the effectiveness of various phosphate amendments on the reduction of lead bioavailability in soils from the OLS. The task of identifying potential sources of lead to the OLS was presented in the Apportionment Study and the reader should refer to that document for such data.

Comment E-8

Figures 2-8, 2-9, 2-10, 3-2, 3-3, 3-4, 3-5, 3-6, 3-10, 3-11, 3-12

The bar charts are missing the fill colors indicated on the legends to these figures. Without the color coding on the bar charts, accurate review and interpretation of these charts is impossible. Please add.

EPA Response: All of the identified figures were complete in the Draft FS Report as it appears in the OLS Administrative Record. The pdf file of the Draft FS Report appearing on the EPA, Region 7, website was found to be missing color fill on figures noted in the comment. The Draft OLS Treatability Study that appears on the EPA website will be replaced with a final version of the report that includes complete figures.

Comment E-9

Section 3.0 Laboratory Bench Testing

According to the work plan for this study, laboratory bench tests were to be used to identify the specific types of amendments and their application rates for extended testing in the field-scale test plots. The bench-test procedures described for the study included sequential applications of distinct reagents to soil separated by equilibration periods of 2, 7, and 14 days. Although the longer equilibration time of 14 days may be warranted for the bench tests to evaluate the effectiveness of longer-term soil treatments, it most likely is not practical for use in a large-scale residential-yard remediation program.

UPRR previously recommended (January 10, 2007, UPRR comments on the Treatability Study Work Plan, draft dated December 2006) that focus be maintained on treatment approaches that have both a high likelihood of providing acceptable reductions in lead bioavailability as well as a high degree of field practicality. It may not be practical, from the residents' perspective especially, to roto-till successive amendments into yard soils on separate occasions that are several weeks apart. Very little information was provided by the bench-scale test designs to assess optimum equilibration times for the different treatments that were tested.

Recommendations for further field tests of treatments and discussions of practical field applications are missing from this document. These omissions support the conclusion that either the treatability study was cut short before it was completed, or that EPA never had any real intention of implementing phosphate treatment.

EPA Response: The bench scale treatability used 2, 7, and 14 day reaction times between the application of the phosphate amendment and the addition of lime to the soil to determine if the phosphate amendments would reduce the bioavailability of lead in soil under a range of reaction times. If the phosphate amendments were successful in reducing the bioavailability of lead in soil under one or more of the reaction times, further field testing would have been performed with the testing focused on the more successful treatment scenarios. However, none of the treatment scenarios in the bench scale treatability study consistently lowered the relative bioavailability of lead in OLS to a degree that would warrant further evaluation of phosphate treatment through field testing. The treatment effectiveness demonstrated in the bench-scale study indicates that phosphate treatment would not effectively reduce bioavailability of lead in OLS soils to a level that would support further consideration as a component of the final remedy

Comment E-10

Section 3.5 - Post Treatment Speciation

Changes in lead speciation after soil treatment with phosphate amendments was not discussed in sufficient detail. For example, no explanation or interpretation is provided for the following changes in lead speciation between the pre- and post-treatment soils.

- *Soil A - pre-treatment soil contained anglesite and galena and neither of these forms appears in the post treatment sample.*
- *Soil B - nearly all of the lead carbonate (identified as cerrusite) and lead sulfate (anglesite) present before treatment were transformed by the treatment process to lead in other forms, primarily phosphate. Paint present in the pre-treatment sample was not observed in the post-treatment sample.*
- *Soil C - lead sulfate was transformed to other lead forms, but lead carbonate (identified as cerrusite) was not as significantly reduced by treatment as the lead carbonate in Soil B.*

These results indicate that significant transformation of certain lead forms was achieved by the soil treatment. More complete discussion of the pre- and post-treatment lead speciation results is needed to evaluate the utility of various treatment approaches for soils containing lead from the various potential sources (i.e., industrial emissions, lead-based paint, leaded gasoline emissions, etc.) within the OLS.

EPA Response: An expanded discussion of the points identified by the commenter will be provided in the final OLS Treatability Study.

Comment E-11

Section 4.0 – Conclusions

Study results indicated a limited reduction (15%-26%) in IVBA upon addition of 1.5% phosphoric acid with amorphous iron at pH 1.5, and that soluble primary and secondary orthophosphates were formed rather than insoluble products. Studies conducted within the Tri-State Mining District on smelter-impacted soils saw greater success in reduction of bioavailability due to formation of insoluble lead products such as chloropyromorphite. Potassium chloride (KCl) was added along with amendments in these studies, yet KCl was not added along with the phosphate amendments in this study. No chlorophyrmorphite was confirmed present in the treated soils from OLS. No explanation was provided for the omission of KCl.

The analysis and discussion of pre- and post-treatment lead speciation results and the long-term effectiveness of the treatments in reducing the relative bioavailability of lead in treated soil were all inadequate, suggesting that the treatability study was poorly designed and/or implemented or was terminated before completion.

EPA Response: KCl was added to the soil samples at the rates presented in the table on page A-2 of Appendix A of the Bench Scale Treatability Study.

Additional discussion of pre- and post-treatment speciation results will be added to the final OLS Treatability Study. The long-term treatment considerations were not further developed in the bench-scale study report since further field testing will not be conducted due to limited effectiveness, and this alternative will not be further considered for implementation at the OLS.

EPA Responses to UP Comments – Appendix F
Draft Final Lead-Based Paint Recontamination Study Report (October 2008)

Comment F-1

When identifying the individual properties eligible for soil remediation under the OLS interim and final remedies, EPA makes no effort to identify the source of lead to soil. Instead, it relies on an assumption that the dominant source of lead to yard soil is industrial emissions from the former ASARCO refinery and Gould secondary lead smelter in downtown Omaha (without ever testing or proving the merit of that assumption). EPA applies this assumption to all properties regardless of distance from these two industrial facilities and regardless of conditions observed at any individual property, including those where deteriorated lead-based paint (LBP) is abundant on the exterior of the home or on outbuildings, fences, and other structures present in the yard. As a result of this omission, EPA is proposing to remediate properties in neighborhoods many miles cross-wind from the former refineries.

Given the results reported in the Drip Zone Width Study (DZWS) Report, the Draft Final Lead-Based Paint Recontamination Study Report (RI, Appendix L) (Recontamination Study), along with parks data and other RI information, EPA must now consider LBP as a source of lead to both drip-zone soil (i.e., soil located less than 2.5 feet from a structure's foundation) and yard soil (i.e., residential soil located more than 2.5 feet from a structure's foundation wall). EPA can no longer assert that historical deposition of industrial emissions was the primary cause of yard-soil lead concentrations above 400 ppm at all of the locations identified for remediation under CERCLA. The RI data clearly show that LBP is the cause at those properties.

In previous comments submitted on EPA's 2004 Proposed Plan for the Interim Record of Decision (IROD), UPRR recommended that EPA re-define "outside the roof drip line" and "non-drip zone" for all future work at the Site. UPRR pointed out that the housing in the Site is known to be predominantly pre-1950's housing and almost entirely pre-1970's housing, and most of these older homes have large eaves. At comparable sites, Union Pacific was aware that a "drip line" of 5 feet or more is customary. The DZWS and the Recontamination Study confirmed that impacts of LBP above 400 ppm can extend more than 6 feet into the yards. However, data for the over 35,000 residential properties sampled by EPA for the RI are based on limiting the drip zone to 2.5 feet (30 inches). The result is that EPA has been measuring the impacts of LBP rather than refinery deposition. EPA has been making decisions on the need for remedial action at a given property based on a paint-biased dataset.

Though EPA chose not to use the Recontamination Study to characterize risk levels or to determine whether additional response action is warranted at the properties sampled (see Recontamination Study at 6-1), the data could be used for those purposes. Moreover, the LBP Soil Mixing Calculations (Recontamination Study, Appendix A) or similar evaluation, in combination with the DZWS data, could be used to determine the predominant source of lead in soils (LBP or industrial sources) at a given property. It appears that EPA has purposefully chosen NOT to conduct that evaluation because it would lead to the conclusion that at the OLS EPA is conducting a remediation outside the scope of its authority.

Based on the 2008 Proposed Plan, it appears that EPA has not and does not intend to modify its sampling protocols based on the new definition of drip-zone and yard soils, nor does EPA intend to collect data that can be used to evaluate whether LBP is the dominant source of lead to yard soil at individual properties within the OLS. EPA will continue to remediate yard soil at any OLS property where lead concentrations exceed 400 ppm regardless of whether or not the dominant origin of lead is LBP on the home.

The Recontamination Study supports inclusion of actions to address LBP as part of the OLS remedy. The final remedy described in the 2008 Proposed Plan includes actions to address exterior LBP at properties where lead in yard soil exceeds the final action level (400 ppm is the action level included in the Proposed Plan), as follows:

> *"…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."*

As EPA acknowledges in the 2004 Proposed Plan that it also "…has authority to conduct response actions addressing soils contaminated by a release of lead-contaminated paint chips from the exterior of homes to prevent recontamination of soils that have been remediated." EPA's authority to clean up LBP ends however at properties where lead-contaminated paint chips are the predominant source of lead and thereby cause the original, elevated lead concentrations in yard soil.

The results of the Recontamination Study demonstrate that the presence of deteriorating LBP on the exterior of a home can result in re-contamination of yard soil (i.e., soil located more than 2.5 feet from the home's foundation (and outside the operationally defined drip-zone area) within a couple of years after yard-soil removal and replacement. These results are consistent with other studies cited by UPRR in their comments on EPA's 2004 Proposed Plan for the IROD. As cited by UPRR's comments on the 2004 Proposed Plan, Menrath (2004) also concluded that failure to abate exterior LBP prior to removing soils can result in recontamination of yards as though the yard replacement remedy had never been implemented; recontamination can occur in as little as two (2) years; and within ten (10) years yards can become recontaminated to levels exceeding those observed prior to the soil removal. With completion of EPA's own Recontamination Study, it is clear that deteriorating LBP is an obvious ongoing and historic source of lead to yard soils within the OLS.

It is both interesting and important to note that in interpreting the soil sampling data collected for the LBP Recontamination Study, EPA did not utilize the same 2.5-foot (30 inch) drip zone definition they applied for cleanup decisions on the 35,000 plus properties sampled for the RI. Rather, EPA utilized a 6-foot (72 inch) drip zone for this study.

Results reported by EPA are consistent with results from UPRR's study of recontamination at remediated properties (Attachment 1) and confirm that deteriorating LBP is resulting in the recontamination of remediated yards to levels exceeding EPA's 400 ppm cleanup criteria. In both studies (EPA and UPRR) the highest levels of lead in soils were measured in the drip zones.

EPA Response: EPA disagrees with the comment that EPA has made no effort to identify the source of lead in the soil at the OLS. As discussed in Section 1.1.8 of the Draft Final Remedial Investigation Report, EPA conducted lead speciation studies in 2002 and 2007 to determine the sources of lead contamination found in the soil of residential properties at the OLS. Seventy-seven soil samples from residential properties located throughout the OLS were analyzed. The results of the studies confirmed that OLS properties are significantly impacted by historic industrial lead emissions.

EPA disagrees with the comment that the RI data clearly show that lead-based paint is the cause of soil lead contamination at those properties. The EPA speciation studies concluded that lead originating from pyrometallurgical sources is the largest identified source of lead in OLS soils. Pyrometallurgical lead has been identified in EPA speciation studies at properties throughout the OLS, including properties described by the commenter located at a distance of miles cross-wind from the former lead smelting/refining facilities. EPA recognizes that most structures within the OLS have some amount of lead-based paint present on certain exterior surfaces. This is not unexpected since almost all housing within the OLS was constructed prior to the ban on the sale and use of lead-based paint on residential structures in 1978. The presence of lead based paint on a structure, however, is not an indicator of the contribution of lead-based paint to soil lead levels measured in drip zones or mid-yard areas.

EPA does recognize the potential contribution of lead-based paint to soil lead levels at some OLS properties. EPA also recognizes an increased potential at some OLS properties for lead-based paint to contribute to soil lead levels in drip zone soils. However, soil lead measured in drip zone soils cannot be assumed to be dominated by lead-based paint. A significant amount of lead found in drip zone soils could originate from pyrometallurgical sources and could result from direct deposition of airborne emissions or wash-off of lead-containing particulates deposited on rooftops or impinged on structure siding. EPA speciation studies have confirmed the presence of a significant pyrometallurgical contribution to total soil lead levels found in samples collected from OLS drip zones.

Recognizing the potential contribution of lead-based paint to soil lead levels in drip zones at some OLS properties, EPA determines eligibility for soil remediation based on the results of samples collected from non-foundation areas. Properties at the OLS are determined to be eligible for soil remediation if elevated soil lead levels are measured in any sample collected from mid-yard areas, gardens, or play zones. If soil lead levels are elevated in the sample collected from a drip zone, but not in any other sample collected in an area away from the foundation, the property is not eligible for remedial action. This approach is intended to avoid performing remedial action on properties where elevated soil lead levels are largely due to lead-based paint.

Speciation of soil samples from each of the thousands of OLS properties to determine the relative contribution of various lead sources to total soil lead levels is not feasible, nor is this analysis necessary. Soil lead speciation studies performed by EPA have confirmed that pyrometallurgical sources have significantly impacted properties throughout the OLS and represent the largest identifiable source of lead in OLS soils. It is not necessary to show that lead from pyrometallurgical sources is predominant in soil samples for a property to be eligible for remedial action. EPA's response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

The final remedy for the OLS includes stabilization of deteriorating lead-based paint at properties where EPA determines that the continued effectiveness of the remedy is threatened. EPA disagrees with the comment that EPA lacks the authority to clean up (stabilize) lead-based paint at properties where lead-contaminated paint chips are the predominant source of lead in soil. Speciation studies have confirmed that pyrometallurgical sources have significantly impacted properties across the OLS. There may be properties where lead-contaminated paint chips represent a significant source of soil lead, but this contribution is in addition to soil lead originating from the former lead smelting/refining facilities. Soil remediation is authorized when a portion of the total lead present in the soil originates from the former lead-processing facilities. Stabilization of deteriorating lead-based paint where necessary to ensure continued effectiveness of the remedy is authorized at those properties determined to be eligible for soil remediation.

EPA disagrees with the comment that decisions on the need for remedial action at a given property have been based on a paint-biased dataset. EPA recognizes the potential contribution of deteriorating lead-based paint to soil lead levels in drip zone areas at some properties. For this reason, EPA's approach for determining eligibility for soil remediation involves considering the results of non-foundation sampling as a clearer indication of the presence of elevated soil levels associated with pyrometallurgical sources. The eligibility determination for soil remediation at individual properties is based on the maximum non-foundation soil lead level detected.

Soil samples collected in mid-yard areas are generally comprised of five separate aliquots that are combined to form a single composite sample for analysis. The five aliquots are collected in areas away from foundations to the extent possible at individual properties to avoid the potential impact of higher soil lead levels that may exist in drip zone areas due to a potential contribution from lead-based paint. However, depending upon the location of property boundaries in relation to the structures on an individual property, there is a possibility that an aliquot of a mid-yard sample could have been collected within six feet of foundation walls. It is not possible to define the frequency that this may have occurred, or if in fact it has occurred at all, since the precise locations of individual aliquots collected at a property are not recorded. Individual aliquots that are combined to form mid-yard samples are typically collected at distances greater than six feet from the foundation. Including an aliquot collected within six feet of foundations cannot be assumed to result in a soil lead level in that composite sample that is dominated by lead-based paint. First, EPA speciation studies have demonstrated a significant amount of pyrometallurgical lead in soil samples collected from drip zone areas. Secondly, the effect of an individual aliquot collected within six feet of a foundation would be reduced because five aliquots are composited to form a single soil sample for processing and analysis. At the majority of OLS properties, all aliquots that are combined to form the mid-yard composite sample are collected at significantly greater distances than six feet from the foundation. If an aliquot were to be collected within six feet of the foundation, EPA believes that the soil lead level measured in the five-aliquot mid-yard soil sample would still be largely indicative of the impact of pyrometallurgical sources on soil lead levels. EPA does not believe it is necessary to modify soil sampling procedures at the OLS due to results of samples collected during the Recontamination Study and Drip Zone Width Study.

EPA disagrees that the data from the Drip Zone Width Study and the Recontamination Study should have been used to characterize the risk levels or to determine whether additional response action is warranted at the properties sampled. As indicated in Section 2.0 of the Recontamination Study, the soil samples collected during the recontamination study were not collected for comparison to risk-based or health-based soil lead criteria. Individual soil sample results were averaged in the report for the purpose of comparison to risk-based screening criteria, but the data are not intended or well suited for this purpose.

EPA has developed sample collection procedures for determining soil lead levels for comparison to health-based criteria, and this sampling protocol is described in the Superfund Lead-Contaminated residential Sites Handbook. Soil samples collected during the Recontamination Study were not collected in accordance with this protocol, and comparison to health-based criteria is not appropriate. As an example of the limited nature of the Recontamination Study data, soil samples from drip zone areas were only collected from two sides of a structure, while samples collected for risk-based purposes are collected from all sides of the structure where exposed soil exists. It is interesting, however, that at every structure sampled during the Recontamination Study where the average soil lead level exceeded 400 ppm within six feet of the foundation along one transect, the average soil lead level within 6 feet of the foundation along the second transect at the same property was less than 400 ppm in all instances. Elevated soil lead levels in one area of a drip zone do not necessarily indicate that the entire drip zone has elevated soil lead levels.

One of the primary conclusions of the OLS Recontamination Study was that elevated soil lead levels were measured in soils near foundations of structures following soil remediation at properties with deteriorating lead-based paint present on exterior surfaces. In this sense, recontamination did occur at some properties where elevated soil levels were measured, but this data cannot be used to determine that risk-based criteria were exceeded by the observed recontamination. As explained previously, the data collected during the OLS Recontamination Study are not intended or well suited for comparison to risk-based or health-based soil lead criteria, and the data generated during this study cannot be interpreted to characterize exposure areas of the property for risk-assessment purposes. It is not possible to assess whether recontamination occurred at any of the properties evaluated to levels that are not considered protective of human health. However, the level of recontamination was sharply reduced at properties following lead-based paint stabilization which included HEPA vacuuming of exposed soil surfaces. The OLS Recontamination Study concluded that both the magnitude and frequency of elevated soil lead concentrations detected were generally lower at properties following lead-based paint stabilization and HEPA vacuuming of surface soils and that although the soil sampling protocol was not designed for the purpose of characterizing risk, conditions at post-stabilization properties did not suggest a need for additional response action to address elevated soil lead levels. Therefore, the limited level and area of recontamination that does occur at properties prior to performing lead-based paint stabilization would appear to be remedied through lead-based paint stabilization and HEPA vacuuming of soil surfaces subsequently performed by EPA, resulting in a protective remedy at completion.

The soil mixing calculations used for the paint assessment cannot be used to determine the predominant source of lead in soils as indicated in the comment. The soil mixing calculations are only used to determine the potential lead concentration in the soil (at properties where the soil has been remediated) that could occur if all of the deteriorated paint were to fall to the ground and uniformly mix with the soil under the stated assumptions. The soil mixing calculation cannot be used to determine the source of the lead at residential properties. EPA conducted lead speciation studies in 2002 and 2007 to determine the sources of lead contamination found in the soil of residential properties at the OLS. The results of the studies confirmed that OLS properties are significantly impacted by historic industrial lead emissions.

For purposes of analyzing the data from the OLS Recontamination Study, the width of the drip zone assumed was six feet from the foundation of the structure in accordance with the information obtained during the Drip Zone Width Study. The six foot drip zone includes the 6–30 inch drip zone indirectly defined in the Superfund Lead-Contaminated Residential Sites Handbook as well as the area 3.5 feet beyond the 30-inch drip zone. Soil samples at the OLS have consistently been collected in accordance with the procedures specified in the Superfund Lead-Contaminated Residential Sites Handbook.

The wider drip zone determined on the basis of site-specific data at the OLS does not invalidate past or future cleanup decisions made by EPA. Samples collected for characterization of soil lead levels within the 6–30 inch drip zone area described in the Superfund Lead-Contaminated Residential Sites Handbook are also within the six-foot drip zone width determined using site-specific data; therefore, drip zone characterization data remain valid. It is not EPA’s practice to collect aliquots of mid-yard samples in areas immediately adjacent to drip zone areas. Soil sample aliquots are collected away from the foundation of the home to the extent possible to avoid possible drip zone effects. As explained previously, the presence of lead in drip zone soils cannot be assumed to originate from lead-based paint. The possibility that one aliquot of a multi-aliquot mid-yard composite sample may have been collected within a distance of six feet from the foundation at a limited number of properties, if at all, does not mean that the elevated mid-yard soil lead concentrations detected at residential properties within the OLS are significantly influenced by lead-based paint or are otherwise not reliable.

It is not inappropriate from a risk perspective to include aliquots collected near foundations in small yards, since these areas would more likely be included in the play area of a child in such circumstances. Including an aliquot collected near a foundation at very small yards would result in a soil lead measurement more representative of a child’s play area, and does not diminish the significant contribution of pyrometallurgical sources to properties throughout the OLS. EPA's response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

Comment F-2

Refer to Section 1.1 (p. 1-2)

> *"…and <u>exterior LBP assessments which commenced on structures at the OLS in 2006."</u>*

LBP assessments commenced on structures in 2005 according to the paint assessment field sheets included in the DZWS Addendum for the 30 properties that were included in the DZWS. The above statement in the LBP Recontamination Study Report should be revised to reflect the correct year the assessments were commenced.

EPA Response: Paint assessments were performed on structures in late 2005 during the DZWS. However, the protocols used during these paint assessments were slightly different from the paint assessments that commenced in 2006 to determine whether the property was eligible for paint stabilization. Consequently, the data from the paint assessments performed for the DZWS have not been combined with the data from the later paint assessments. EPA believes the text accurately reflects the activities at the site.

Comment F-3

Refer to Section 1.1 (p. 1-2 and 1-3)

"*In order to prevent the re-contamination of the clean soil placed in yards after excavation, loose and flaking exterior lead-based paint…will be stabilized on affected structures* ***prior*** *to soil excavation."*

This is the protocol and sequence recommended by the Superfund Lead-Contaminated Residential Sites Handbook (Handbook), as well. Yet, it has not been followed at the OLS.

EPA Response: EPA acknowledges that in order to protect public health, it was necessary to conduct soil remediation at some properties prior to the time paint assessments and subsequent paint stabilizations could be performed. The OLS Recontamination Study evaluated soil lead levels at remediated properties both before and after lead-based paint stabilization. The study concluded that both the magnitude and frequency of elevated soil lead concentrations detected were generally lower at properties following lead-based paint stabilization and HEPA vacuuming of surface soils and that although the soil sampling protocol was not designed for the purpose of characterizing risk, conditions at post-stabilization properties do not suggest a need for additional response action to address elevated soil lead levels. Therefore, the level of recontamination that does occur at properties prior to lead-based paint stabilization would appear to be remedied through the lead-based paint stabilization and HEPA vacuuming of soil surfaces subsequently performed by EPA, resulting in a protective remedy at completion.

As stated previously, EPA intends to accelerate the pace of performing exterior lead-based paint stabilization at eligible properties. For properties which are determined to be eligible for lead-based paint stabilization, EPA's goal is to perform lead-based paint stabilization prior to soil remediation. This can be accomplished by performing soil remediation at properties which are not eligible for lead-based paint stabilization while lead-based paint stabilization is accelerated at eligible properties prior to soil remediation

Comment F-4

Refer to Sections 1.1 and 1.2 (p. 1-3)

Discussing the drip zone, EPA states: "[i]n addition to LBP, other factors could impact the distribution of lead in areas near foundations at the OLS including airborne deposition of historic industrial emissions and wash-off of lead particulates impinged on roofs, siding, or other structure surfaces."

There is ***no basis in the record*** *for this statement. To the contrary, the DZWS specifically identifies and defines the drip zone (determined at the OLS to be 6 feet) as the area impacted by LBP. EPA's parks data demonstrate that airborne deposition of historic industrial emissions would not result in soil lead concentrations – even in the drip zone – even approaching 400 ppm.*

EPA Response: Because the DZWS indicated that average lead concentrations were below 400 ppm six feet from the foundation of the property does not mean that historic industrial emissions were not deposited within six feet of the foundation. As discussed in Section 1.1.8 of the Draft Final Remedial Investigation Report, EPA conducted lead speciation studies in 2002 and 2007 to determine the sources of lead contamination found in the soil of residential properties at the OLS. A portion of the samples were collected from the drip zones as well as the mid-yards of residential properties. The results of the studies confirmed that OLS properties, including drip zone areas, are significantly impacted by historic industrial lead emissions.

The DZWS does not define the drip zone to be solely impacted by lead-based paint. Rather, the drip zone is the area near the foundation of a structure where soil lead levels could most readily increase due to deteriorating lead-based paint falling to the ground and mixing with soil in the future. The drip zone area is also impacted by direct deposition of airborne pyrometallurgical emissions or wash-off of lead-containing particulates originating from pyrometallurgical sources that are deposited on rooftops or impinged on structure siding. EPA speciation studies have confirmed the presence of a significant pyrometallurgical contribution to total soil lead levels found in samples collected from OLS drip zones.

EPA does not agree that present-day soil lead levels measured in surface soils at public parks are indicative of the original impact from former lead smelting/refining operations. Historic information regarding the development of public parks in eastern Omaha indicates that significant soil disturbance has occurred at Omaha parks during initial construction, subsequent modifications, and regular maintenance. Considerable earthwork was required at many parks to create the terrain that exists today. The soil-disturbing activities include grading and filling, mixing of surface soils with underlying soils during initial earthwork, park improvement, sodding, and other landscaping operations. Deposition of airborne lead from historic industrial emissions resulted in elevated soil lead levels in a relatively thin layer of surface soil. Soil-disturbing activities would result in the mixing of surface soils containing relatively high lead levels from airborne deposition with underlying soils that are much lower in lead content. The result of soil mixing is to lower surface soil lead concentrations through dilution with the underlying soils.

Comment F-5

Refer to Sections 5.1 and 5.2 (pp. 5-6 and 5-10)

"The presence of paint chips did not appear to be a reliable indicator of elevated soil lead levels."

EPA has no basis for this comment since the study sampling protocol included the removal of all visible paint chips (Recontamination Study, Appendix B, "Field Sampling Protocols for LBP Recontamination Study" at B-1).Union Pacific previously commented on the work plan for this study and commented that "Paint chips are an integral part of the soil recontamination process, and their presence and impact on soil lead concentration should be documented." It appears that EPA's response to this comment was to note the presence or absence of paint chips in soil during sampling, which is helpful. However, EPA removed visible paint chips from the soil samples before they were analyzed for lead. In so doing EPA virtually guaranteed that there would be no relationship between the presence of paint chips on surface soils in the yard and the lead concentration of the same soil without the paint chips included. At newly remediated properties, any paint chips observed would have been present in soil for a relatively short time (i.e., 4 years or less). Paint chips recently fallen from deteriorated paint on the exterior of the home will break down eventually into smaller particles and experience weathering in soil over time and they will contribute lead to the fine-grained component of soil. Therefore, exclusion of large paint chips from samples taken today will underestimate the amount of lead re-contaminating "components of soil" in the future.

EPA Response: During soil sampling performed as part of the OLS Recontamination Study, an inspection of the ground surface at each property sampled was performed and, the presence or absence of paint chips was noted on the field sheets. As described in the OLS Recontamination Study, paint chips were generally observed in the drip zones at properties where elevated soil lead concentrations were detected in individual samples and at all of the properties where the average lead concentration in the soil exceeded 400 ppm. However, there were also paint chips observed in the drip zones at several properties that did not have elevated lead concentrations in individual soil samples. In addition, there were no paint chips observed at several properties that contained elevated lead concentrations in individual samples. For this reason, the OLS Recontamination Study concluded that the presence of paint chips was not a reliable indicator of elevated soil-lead concentrations. EPA disagrees that there is not a basis for this comment.

Because only homes with exterior lead-based paint were selected for the Recontamination Study, it is likely that visible paint chips on the ground surface contain high concentrations of lead. The purpose of the Recontamination Study was to determine if elevated lead levels developed in the soil subsequent to soil remediation. Sieving of soil samples was performed, consistent with OLS sample collection procedures, to remove large paint chips and other debris and provide a clearer measurement of the lead concentration in the soil itself.

Lead-based paint stabilization performed as part of the remedy is intended to prevent paint chips from falling to the ground and becoming a source of soil lead contamination. In cases where soil remediation is performed prior to stabilization of lead-based paint, HEPA vacuuming of exposed soil surfaces is performed following paint stabilization to remove paint chips that may have fallen to the ground after soil remediation was performed. EPA believes its response to deteriorating lead-based paint provides an effective strategy for addressing potential risks associated with lead-based paint chips within the scope of CERCLA authority.

Comment F-6

Appendix B – Sampling Protocols, 4th bullet

The EPA's Superfund Lead-Contaminated Residential Sites Handbook references HUD guidance (1995) that specifically states:

> *"If paint chips are present in the soil, they should be included as part of the sample. However, there should be no special attempt to over-sample paint chips. The laboratory should be instructed to disaggregate ('break up') paint chips by forcing them through a sieve in the laboratory. Although paint chips should not be oversampled, they should not be excluded from the soil sample, since they are part of the soil matrix." (HUD, 1995)*

No other EPA sampling protocols prepared for this Site, such as the sampling protocol used to characterize residential yard soil and the DZWS protocol, instruct samplers to exclude visible paint chips, and the reason given here for doing so, "…visible paint chips are not a component of soil" makes no sense in terms of estimating the potential for recontamination and evaluating residents' future exposure to lead due to recontamination. Young children may ingest paint chips just as they may ingest any other soil component. Further, it is indisputable that large paint chips originating from nearby exterior walls will break down into smaller particles and experience weathering in soil over time. Therefore, exclusion of large paint chips from samples taken today will underestimate the amount of lead re-contaminating "components of soil" in the future. Paint chips are an integral part of the soil recontamination process, and their presence and impact on soil lead concentration should be documented. EPA's OLS contractor, HydroGeologic, Inc., recommended inclusion of paint chips and described the protocol for doing so. Yet, EPA rejected the Handbook and its contractor's advice.

UPRR comments on the Recontamination Study Work Plan (dated June 20, 2008) (Attached and incorporated by reference herein) questioned the rationale used for excluding visible paint chips from soil samples collected for this study. EPA did not change the sampling protocol in response to this comment or provide additional explanation in the final study report.

EPA Response: Removal of large paint chips from soil samples prior to sample preparation and analysis during the Recontamination Study is consistent with sample collection protocols for all other soil investigations at the OLS, during which large paint chips and other debris are removed from soil samples. This sample collection procedure is consistent with EPA guidance which recommends removal of debris and foreign matter from the ground surface prior to sample collection. Large paint chips do not constitute a component of soil and are appropriately separated from soil samples prior to sample preparation and analysis. If paint chips were included in the soil sample, the measured lead concentration would be expected to vary considerably depending on the quantity of paint chips mixed with the soil sample and the lead content of the paint chips. Soil sampling protocols do not include criteria for determining which paint chips or how many paint chips on the ground surface in the vicinity of the sampled area should be collected and mixed with the soil sample.

EPA recognizes that paint chips have the potential to break down into smaller particles which can become incorporated into the surface soil. EPA's response is conducted based upon the total soil lead concentration in soil samples, which includes any contribution from small particles originating from paint chips. If soil lead levels exceed the established action level for soil response, soil remediation is performed which removes lead originating from all sources, including historic industrial emissions and lead particles from paint chips

The HUD guidance referenced in the comment recommends forcing large paint chips through a number 60 sieve. This approach is not readily implementable, since large paint chips found at some OLS properties cannot be readily forced through the number 60 sieve recommended by the HUD method. Not only is this approach impracticable, this sample preparation would not result in a sample that is useful for the intended purpose of the Recontamination Study. Including large paint chips that exist on the surface of the soil with the soil in a sample would not provide an accurate measure of the soil lead level that had developed in the soil itself, which was the intent of sampling conducted during the Recontamination Study.

Soil samples collected during the Recontamination Study were processed in the Omaha field office using the same protocols that are used for all of the residential soil samples. These protocols include sieving with a 10 mesh sieve and analyzing the sample with a XRF instrument. The 10 mesh sieve will not necessarily remove small visible paint chips from the soil sample prior to analysis. When confirmation samples are sent to the laboratory for analysis, no special instructions are given to eliminate paint chips as part of sample preparation. Any paint chips that pass through the sieving process are included in the samples analyzed.

EPA disagrees that HydroGeologic, Inc., recommended inclusion of paint chips in the sample. HydroGeologic indicated that the HUD guidance states that paint chips should not be removed from the sample and should be broken-up using a sieve. HydroGeologic also indicated that the sample should be sieved with at least a 60-mesh sieve. As indicated previously, sieving with a 60 mesh sieve would remove all visible paint chips from the soil sample.

EPA Responses to UP Comments – Appendix G
Small Park Surface Soil Investigation Report (August 2006)
Large Park Surface Soil Investigation Report (December 2007)

Comment G-1

The overall objective of EPA's public parks surface soil sampling within the Omaha Lead Site (OLS) Focus Area was to determine whether any of the parks were eligible for clean up under the Interim Record of Decision (IROD). EPA should have also considered the many data points collected from these parks as a conservative measure of total aerial deposition of lead from industrial sources. A comparison of EPA parks data with adjacent residential data provides a straight forward method for isolating airborne deposition from the impacts of LBP and other residence-specific impacts (see UPRR's Specific Comments on EPA's DZWS and Recontamination Study). When this analysis is considered, the many data points collected from parks clearly show that the potential contribution of lead from the ASARCO/Gould facilities to residential soil-lead concentrations is minimal.

EPA collected over 2,400 soil samples from 44 small parks (less than 10 acres) and 15 large parks (more than 10 acres) within the OLS. These parks include locations proximate to the ASARCO/Gould refineries and along the predominant wind direction (to the north-northwest or south-southeast). Figure 9 of UPRR's General Comments shows the locations of the parks sampled by EPA, as well as the minimum, maximum and average lead concentrations measured in the soil samples from each park.

The following findings are made based on review of the data obtained during this study:
- *At all of the parks sampled by EPA, the parks soils have low lead concentrations compared to residential soils.*
- *None of the parks had an average soil-lead concentration close to EPA's 400 ppm "screening level." The average lead concentration in park surface soils ranged from 14 to 153 ppm.*
- *None of the over 2,400 park samples had a soil-lead concentration greater than 800 ppm.*
- *Only two of the more than 500 small park samples had a soil-lead concentration greater than 400 ppm, but neither of those concentration measurements was confirmed by later laboratory analysis of the samples.*
- *Only three of the more than 1,800 large park samples had a soil-lead concentration greater than 400 ppm.*

These results are consistent with data reported by UPRR for the parks soil samples they collected in 2007 (Attachment 4). UPRR collected a total 80 soil samples from 8 different parks. The average soil-lead concentrations in each park ranged from 40 ppm to 128.5 ppm. There was no correlation of average soil-lead concentration with distance from the former ASARCO/Gould *refineries. The UPRR sample set included samples from the top 2 inches of soil as well as samples collected at depths of 6 to 8 inches below the surface. On a location-specific basis, the surface soil sample typically had a higher lead concentration than the sample collected at greater depth.*

The EPA parks results and the UPRR data are also consistent with data collected by ASARCO, Inc. at the Prospect Hill Cemetery. ASARCO, Inc. collected 11 soil samples and reported lead concentrations ranging from 69.5 ppm to 123 ppm. The average lead concentration of the cemetery soil samples was 92 ppm.

The ranges of lead concentrations measured in Omaha parks are actually lower than typical "urban background" lead concentrations reported from other cities in the United States (Mielke et al. 1983, 1984 and Tulane/Xavier Center for Bioenvironmental Research. 2008). Soils in many of the park areas are isolated from the local effects of heavy automobile traffic and related historical leaded-gasoline emissions, and they are also broadly isolated from effects of deteriorating lead-based paint (LBP). Soils in the park areas are not protected however from airborne deposition of lead that originates from long-term industrial sources such as the former ASARCO refinery.

Although EPA presented their parks data in the RI Report, there was no effort made to use those data to better characterize the nature and extent of soil contamination originating specifically from the former ASARCO and Gould facilities. EPA does not explain that the parks provide an ideal set of test plots for evaluating the contribution of airborne lead deposition to soil in the absence of contributions from other common sources such as deteriorating LBP. Many of the parks sampled by EPA have been in existence since the founding of the City (Figure 5-Figure 8) and throughout the history of automobile and industrial lead emissions including the ASARCO refinery. As such, the lead deposited from ASARCO refinery emissions to the oldest Omaha parks would represent a portion of the total location-specific deposition for the entire history of the lead emissions within the City of Omaha.

Aerial deposition of lead particulates from a central source is broad and consistent and would have impacted all areas of the parks. Instead of acknowledging that the parks data are useful for characterizing the lead distribution in OLS soils, EPA has previously argued that soils in the small parks were too disturbed in the past to be representative of historical surface soil conditions. It is improbable that soils have been extensively disturbed at all 2,474 EPA sample locations in both small and large parks distributed across the OLS. Moreover, EPA collected an initial phase of large park samples on a random basis (RI Appendix K at 3-1) and the remainder were composites taken on a 100 ft by 100 ft grid basis (Id., at 4-1), with the high child-impact area sampling taken as "additional samples." Id. Only 72 high child-impact area samples were taken out of 1,802 reported in RI Appendix K, leaving 1,730 taken on a grid basis. It is highly improbable that all of these grid-based park sample locations have been disturbed, while nearby residential samples have not been subject to similar activities.

Figure 11 contrasts the average park concentrations, from all data sources, with the average lead concentrations in residential drip zone soils and yard soils. As can be seen from the figure, there is no relationship between the soil-lead concentrations measured at paint-impacted residential properties and the far lower soil-lead concentrations measured at neighboring parks/cemetery. The parks and cemetery data clearly show that airborne lead deposition from the ASARCO/Gould refineries is insignificant across the entire residential portion of the OLS. This finding is confirmed by the similarly low soil-lead concentrations in residential samples collected at properties without LBP (see UPRR General Comments Appendix A). The soil-lead concentrations measured at the parks/cemetery are consistent with general urban background concentrations expected for areas away from the effects of residential structures and major historic traffic routes.

EPA included neither discussion nor interpretation of the parks investigation data in the individual reports or in the later RI Report. To address the RI requirement to fully characterize the nature and extent of contamination, the parks data should be compared to, and contrasted with, the surrounding residential soil data. Even a cursory analysis identifies that the distinction between park soil-lead concentrations and those concentrations found in adjacent neighborhoods is due to the presence of LBP on homes. Absent the lead contribution from paint, the adjacent yards would be consistent with the parks data and well below EPA's 400 ppm screening level. EPA's omission of these analyses in the RI Report is inconsistent with the requirements of the NCP. Clearly, the parks data provide an obvious and important line of evidence regarding the nature and extent of lead contamination at the OLS. The lack of consideration given these data has directly contributed to EPA's arbitrary decision to address the impacts of lead, based on residential soil, through CERCLA.

EPA Response: EPA does not agree that the public parks provide an ideal set of test plots for evaluating the contribution of airborne lead deposition to soil in the absence of contributions from other lead sources such as deteriorating lead based paint. Present-day soil lead levels measured in surface soils at public parks cannot be assumed to be indicative of the original impact from former lead smelting/refining operations. Historic information regarding the development of public parks in eastern Omaha indicates that significant soil disturbance has occurred at Omaha parks during initial construction, subsequent modifications, and regular maintenance. Considerable earthwork was required at many parks to create the terrain that exists today. The soil-disturbing activities include grading and filling, the mixing of surface soils with underlying soils during initial earthwork, park improvement, and landscaping operations. Deposition of airborne lead from historic industrial emissions resulted in elevated soil lead levels in a relatively thin layer of surface soil. Soil-disturbing activities would result in the mixing of surface soils containing relatively high lead levels from airborne deposition with underlying soils that are much lower in lead content. The result of soil mixing is to lower surface soil lead concentrations through dilution with the underlying soils. Most of the airborne deposition from the lead processing-facilities occurred prior to the 1930s, and any subsequent soil disturbance that occurred during the construction and maintenance of public parks would have significantly reduced lead levels in surface soils detected today. Consequently, EPA believes that a comparison of the soil data from the public parks with the soil data from residential properties is not meaningful.

EPA does not agree that low lead concentrations detected in the public parks supports the claim that LBP is a significant source of lead to the soils of properties where structures with LBP are present. Soil lead levels exceeding 400 ppm were detected in at least one soil sample from five of the parks sampled by EPA. In the absence of lead-based paint as a potential source of soil lead at these public parks, the elevated soil lead levels detected must be the result of another source at these five parks. The elevated soil lead levels remaining today at these five parks is the apparent result of less soil mixing in these particular areas. In the absence of lead-based paint, there are no other sources of lead that could result in soil lead concentrations elevated to these levels at these five parks. Since it is not feasible that the impact from the former industrial emissions could have been limited to these five discrete areas, the presence of elevated soil lead levels at these five parks indicates that the impact to other areas of the parks has been altered through soil disturbance and possibly other factors.

It is noteworthy that soil lead levels exceeding 400 ppm were detected at five public parks during recent EPA investigations. The absence of lead-based paint as a potential source at these public parks leaves historic industrial lead emissions as the only remaining source significant enough to cause soil lead levels exceeding 400 ppm.

EPA has performed speciation studies at residential properties to identify sources of lead detected in soil samples collected from mid-yard and drip zone areas. Speciation of the soil samples has identified the presence of lead forms associated with lead-based paint in many of the samples analyzed, but these speciation studies demonstrate that pyrometallurgical lead associated with the former industrial facilities has significantly impacted soil lead levels throughout the OLS. EPA recognizes the potential for deteriorating lead-based paint to contribute to soil lead levels in yard soils. EPA response is authorized under CERCLA when a portion of the total lead present in the soil originates from the former lead-processing facilities.

Figures 5 through 8 that were provided with the comments do not indicate that the parks were in existence at the date shown on the figure. The park names and locations appear to have been superimposed on the figures. The original figure does not appear to include the name of any of the parks.

Comment G-2

Consistent with the OLS Quality Assurance Project Plan, one out of every 20 soil samples (5 percent) collected during the large parks sampling were sent to the EPA Region 7 Laboratory for Quality Assurance (QA) metals analysis (SW846 Method 6010). The QA results are not summarized in the report; and the accuracy of the XRF data was not assessed; the QA results are only presented on the field sheets.

EPA Response: The soil samples collected during the large park investigation were processed and analyzed using the same procedures that were used for the residential soil samples. The data evaluation discussion presented in Section 4.1 of the Draft Final Remedial Investigation Report is applicable to all soil samples including the soil samples collected from the large parks. As indicated in the comment, the results of the quality control (QC) samples collected during the large park investigation are presented on the field sheets adjacent to the sample results from the primary sample.

Comment G-3

Laboratory analyses of the two small parks samples with XRF lead concentrations greater than 400 ppm did not confirm the greater-than-400 ppm XRF results.

EPA Response: EPA acknowledges one soil sample from 29th and Blondo Park and three soil samples from Kellom Greenbelt Park exceeded 400 ppm lead. The locations were resampled and the lead concentrations measured in the samples from these 4 locations using XRF instrumentation were below 400 ppm. This information is presented in Appendix J of the Draft Final Remedial Investigation Report.

The differing results of the two sampling efforts are indicative of uncertainty which is inherent in procedures used for both sample collection and analysis. Differing results from separate sampling efforts is to be expected and does not indicate that results of either sampling effort are not valid. EPA sampling of OLS properties, including public parks, is supported by a quality assurance program that assesses the validity of the entire OLS data set. Results of this quality assurance program have consistently demonstrated that the level of error associated with procedures used to characterize soil lead levels at the OLS is acceptable. Regardless of the results of subsequent sampling efforts at the small parks, the initial results remain valid and are an indication that elevated soil levels do exist in these areas.

Comment G-4

Confirmation samples for the quadrants at Levi Carter, Miller and Spring Lake Parks, where lead-in-soil concentrations were greater than the screening level were not collected. As a result, there is no laboratory confirmation of soil-lead concentrations greater than 400 ppm in any of the parks soils.

EPA Response: EPA acknowledges that three soil samples from Levi Carter Park had lead concentrations of 400 ppm, 401 ppm, and 542 ppm; one sample from Miller Park had a lead concentration of 416 ppm; and one sample from Spring Lake Park had a lead concentration of 539 ppm. Collection of additional samples in these areas is not necessary to confirm the validity of the original sampling results. EPA's sampling of OLS properties, including public parks, is supported by a quality assurance program that assesses the validity of the entire OLS data set. Results of this quality assurance program have consistently demonstrated that the level of error associated with procedures used to characterize soil lead levels at the OLS is acceptable. The original results of soil investigations performed at Levi Carter, Miller, and Spring Lake Parks are valid and supported by the OLS data quality assurance program, and it is not necessary to resample these parks to confirm the original sample results.

EPA Responses to UP Comments – Appendix H
Apportionment Studies

Comment H-1

EPA assumptions [conclusions] based on the Apportionment Study are inconsistent with the RI and other information about lead distribution to soil within the OLS. The study should have considered the data in terms of factors such as:

The spatial distribution of lead in soil across the OLS. The pattern of lead distribution is not consistent with lead deposition from a single, long-term emissions source like the ASARCO refinery. Rather than showing consistently decreasing concentrations with distance from the suspected emissions source, the lead concentrations in soil vary widely from property to neighboring property.

EPA Response: Small-scale variations in lead concentration between adjacent properties are expected due to random effects of human disturbance (digging, adding fill, etc.) as well as random levels of contributions from other sources (e.g., lead-based paint). When viewed on a larger scale, there is a clear pattern of decreasing soil lead concentrations as a function of distance from the smelter, and the large scale spatial pattern is fully consistent with air modeling results generated both by UP and by EPA.

Comment H-2

Comparisons of the drip-zone soil lead concentrations to yard-soil lead concentrations at residential properties across the OLS should have been reviewed to support interpretations of the lead speciation and lead isotopic data collected for the Apportionment Study. Lead concentrations are higher in the drip zones than in yards, indicating a large mass contribution from LBP to soil in the drip zones. The Drip-Zone Width Study, the Recontamination Study, and SEM studies demonstrate that lead-based paint contributes lead to yard soil outside of the drip zone. The housing stock in the OLS is almost exclusively pre-1950, and the older homes would likely have been repeatedly prepped and painted with LBP. At locations well outside the probable area of measurable effects from deposition of refinery emissions, the drip-zone soils with elevated lead concentrations coincide with the areas of older housing.

EPA Response: EPA agrees that exterior lead-based paint in poor condition may contribute to lead in drip-zone soil and that this may tend to correlate with housing age. However, wash-off of historic smelter deposition is likely to be a significant source as well. For example, wash-off of smelter deposition from the roof of a home could result in a drip zone concentration several times the level in the yard, depending on the size of the house and other conditions at a particular property. Air dispersion modeling performed by both UP and EPA predicts significant impacts of smelter releases to soil at distances at least as far as the bounds of the Final Focus Area. Thus, there are no areas investigated by EPA that are "well outside the probable area of measurable effects from deposition of refinery emissions".

Comment H-3

The locations of the residential soil samples used for the Apportionment Study relative to the former ASARCO refinery and other potential industrial lead sources. There is no spatial pattern relating the lead mass from pyrometallurgical sources to distance from the ASARCO refinery. There are examples of yards with high pyrometallurgical concentrations far from the smelter (> 5 km), and examples of properties close to the smelter (< 3 km) with low concentrations of pyrometallurgical lead. This indicates pyrometallurgical lead is derived from other sources. Also, some properties have low percentages of pyrometallurgical lead but high lead concentrations, indicating that there are other significant lead sources at or impacting these locations.

EPA Response: There is no reason to postulate that "high concentrations" of pyrometallurgical lead in soil at distances "far from the source" (>5 km) must have a different source than the smelters. Air dispersion modeling performed by both UP and EPA indicates that <u>average</u> smelter contributions at this distance may easily be several hundred ppm, and contributions at individual properties might be substantially higher. Likewise, low levels of pyrometallurgical lead at properties closer to the smelter may be explained either by random variations in small scale deposition patterns or by the consequence of human activities (soil disturbance, adding fill, etc.). It is not reasonable or realistic to expect uniformity in small scale deposition; hence, it is not correct to claim that such small scale variations disprove the smelters as the source of pyrometallurgical lead in soil. EPA agrees that the occurrence of high lead levels with low pyrometallurgical lead content at a specific property could suggest that other sources may be contributors to the soil lead at that location.

Comment H-4

Available information that should have been reviewed to support interpretations of the lead speciation and lead isotopic data collected for the Apportionment Study includes data describing the spatial distribution of lead in soil within individual residential lots, especially the residential lots that provided samples for the Apportionment Study. For example, three soil samples collected within the same residential lot have different lead concentrations and distinct lead speciation. The soil collected from the drip zone around the home has the lowest lead concentration but the highest percentage of pyrometallurgical lead. The two yard samples have higher lead concentrations but relatively lower percentages of pyrometallurgical lead. These findings do not make sense, and the lead speciation data provides no helpful information to identify the source of lead contributing additional lead to yard soil. Likewise, soils from two adjacent residential lots have similar lead concentrations but distinct lead speciation results.

Pyrometallurgical lead is present in the soil from one lot but not in the other. If "smelter emissions" are a primary source of lead to the yard soils described in these examples, then the pyrometallurgical lead deposited at these locations must have broken down in the soil to non-source-specific species at distinctly different rates. Only extreme circumstances (of which there is no evidence here), such as vastly different soil pH conditions across the lot, would cause such differential breakdown of pyrometallurgical lead within typical lots or adjacent lots. The distribution patterns are not consistent with a single industrial facility purportedly acting as the primary source of pyrometallurgical lead.

EPA Response: As noted above, small scale variability in deposition patterns within an individual property or between adjacent properties may occur for a wide range of reasons. Over-interpreting small scale variability without examining large scale trends is not the best way to interpret the data.

Comment H-5

Less than 10% of the lead mass in soils collected from two different downtown parks was classified as pyrometallurgical. Both parks are located in relatively close proximity (less than 2.5 kilometers) to the former smelters. Soil in park areas has far less potential for lead input from domestic sources, such as lead-based paint. Of the more than 2,400 additional parks-soil samples collected by EPA and, only 5 of those had lead concentrations greater than 400 mg/Kg and none had lead concentrations greater than 800 mg/Kg. If emissions from the ASARCO refinery are the primary source of lead at these locations, then one would expect a higher soil lead concentration and higher proportion of lead in pyrometallurgical forms.

EPA Response: Historic information regarding the development of public parks in eastern Omaha indicates that significant soil disturbance has occurred during initial construction, subsequent modifications, and regular maintenance. Considerable earthwork was required at many parks to create the terrain that exists today. The soil-disturbing activities include grading and filling and mixing of surface soils with underlying soils during landscaping operations. Deposition of airborne lead from historic industrial emissions resulted in elevated soil lead levels in a relatively thin layer of surface soil. Soil-disturbing activities would result in mixing of surface soils containing relatively high lead levels from airborne deposition with underlying soils that are much lower in lead content. The result of soil mixing is to lower surface soil lead concentrations through dilution with the underlying soils. Most of the airborne deposition from the lead-processing facilities occurred prior to the1930s, and any subsequent soil disturbance that occurred during the construction and maintenance of public parks would have significantly reduced lead levels in surface soils detected today. It is noteworthy that soil lead levels exceeding 400 ppm were detected at five public parks during recent EPA investigations. The absence of lead-based paint as a potential source at these public parks leaves historic industrial lead emissions as the only remaining source significant enough to contribute to soil lead levels exceeding 400 ppm.

The commenter mistakenly identified two downtown parks that were sampled and included in the Apportionment Study as Logan and Columbus Parks. The speciated park samples actually originated from Kellom Greenbelt and Columbus Park. It is accurate that less than ten percent of the total lead mass in these two soil samples was associated with pyrometallurgical sources (Kellom Greenbelt SAID 52426 – nine percent pyrometallurgical, Columbus Park SAID 20235 – six percent pyrometallurgical). However, 72 percent of the total lead mass from the Kellom Greenbelt sample and 38 percent of the total lead mass from the Columbus Park sample was non-source specific. No lead forms associated with paint were found in either sample.

Comment H-6

Lead speciation data suggest that contributions from pyrometallurgical lead do not result in extremely high soil lead concentrations, even in the areas of Omaha where deposition of lead emissions from the ASARCO refinery would have been highest. The only interpretation of the Apportionment Study data that remains consistent with the other Site characterization data is that numerous sources have contributed lead to residential soil within the OLS. The other potential lead sources to OLS yard soils include LBP, leaded gasoline emissions, and industrial facilities with shorter term and more local lead emissions. The majority of lead present in residential soil cannot be traced to any specific source. Because of this, EPA's Proposed Plan is flawed and should not be implemented.

EPA Response: There is no requirement that the contribution of pyrometallurgical lead to soil lead be “extremely high” in order to justify soil remediation. To the contrary, all that is required under CERCLA is that the lead concentration be above a level of health concern and that the source (smelter releases) contributed to the total. Speciation data indicate that identifiable pyrometallurgical lead is present in almost every property studied and that pyrometallurgical lead represents the largest identified form of lead found in OLS soils. Because it is likely that some pyrometallurgical lead has weathered to forms that are not unique to smelters, the actual pyrometallurgical contribution is likely to be higher.

Comment H-7

EPA has misrepresented the certainty with which conclusions can be made based on the types of data that were collected for the Apportionment Study. Given the overlap of lead species associated with a broad range of sources present over time within the OLS, the techniques used (lead-speciation and lead-isotopic analyses of soil samples) provide highly uncertain information about the possible sources of lead to residential soil. At best, the study gives insight to conditions at individual properties. These types of data should only be used cautiously and only in the context of other more definitive Site data and a thorough understanding of the Site history and other factors that are known to have contributed lead to residential soil.

UPRR does not agree that the 2002 Apportionment Study supports EPA's assumption that lead present in soils at the OLS originated from historic refinery emissions. Instead, the study results indicate that the largest portion of lead present in soils with more than 400 ppm lead cannot be attributed to any specific source. None of the lead in soil can be traced directly to either the ASARCO or Gould facilities using the Apportionment Study's methods. Given the history of widespread industrial and consumer uses of lead within the Site, the "proven scientific methodologies" used for the study cannot and do not provide the level of certainty regarding the origin of lead in soil that EPA asserts.

EPA Response: EPA does not agree that there is any substantial uncertainty in the origin of lead particles that are classified as pyrometallurgical. Some chemical forms including lead slag, lead chloride, lead antimony oxide, lead metal oxide, and lead metal sulfate only originate from lead smelters. Some other forms, including lead carbonate, lead sulfate and lead oxide originate from lead smelters, but also occur in other sources, including lead-based paint. Consequently, only a fraction of these forms were included in the pyrometallurgical category.

Comment H-8

UPRR provided specific comments on the 2002 Apportionment Study with the 2004 RI Report comments, but EPA's Responsiveness Summary was conclusory and dismissive, and provided no substantive responses to the comments. Because all of UPRR's 2004 comments on the 2002 Apportionment Study remain unanswered, UPRR's comments on that document still stand, and they are incorporated herein by this reference.

EPA Response: EPA does not agree that the previous responses to comments received regarding the 2002 Apportionment Study were conclusory and dismissive. Nevertheless, EPA is providing enhanced responses to the comments received regarding the 2002 and 2007 apportionment studies in this Responsiveness Summary.

Comment H-9

The 2007 Supplemental Apportionment Study (Drexler, J.W., 2007, A Supplemental Speciation Report on Soils from the Omaha Community, Omaha, Nebraska. Prepared for U.S. Environmental Protection Agency, Region VII, May 3, 2007) has never been released by EPA for public review and comment, thereby precluding meaningful public participation in this critical step of the remedy selection process. All data collected in support of characterizing the sources and nature and extent of contamination should be included in the RI Report, as is required by the NCP and relevant EPA guidance

EPA Response: The 2007 Supplemental Apportionment Study was included in the Administrative Record for the Final OLS Proposed Plan and was available for review during the public comment period, as were the other records which support the final remedy for the OLS. The NCP does not require that a separate public comment period be announced and conducted for each document in the Administrative Record, but rather requires that supporting documents be included in the Administrative Record for review during the public comment period conducted for the Proposed Plan.

Comment H-10

Although the 2007 data more than doubles the previous sample set, the study still only includes samples from 72 different residential lots and 2 parks. As such, the combined study data cannot be considered representative of conditions throughout the Site.

EPA Response: Speciation data from 72 different residential properties is more than adequate to be representative of the Final Focus Area. The sampling locations were specifically selected to provide spatial representation, including land use (residential, vacant, and park), distance from the smelter, front yard vs. back yard, as well as drip zone and garden samples. Note that UP submitted speciation data on only three unremediated residential properties and six parks (one sample each) and appeared to have no concerns about the quality of the data. In this case, EPA agrees that the UP data set is too small to be considered representative.

Comment H-11

The five conclusions of the 2007 Apportionment Study are misleading and misrepresent the data.

Conclusion No. 1 states: "Pyrometallurgical forms of lead are the largest identifiable lead source in residential yards.". The key word in this statement is "identifiable." This statement should be clarified by adding that a large percentage, at least 68 percent, of the lead present in Omaha soils <u>is not traceable to an identifiable lead source</u> based on lead speciation and lead isotopic data.

EPA Response: The text is clear that, at many locations, the majority of the lead in soil is in a mineral form that does not allow attribution to a specific source.

Comment H-12

The reported percentages of pyrometallurgical lead are higher than actually measured. This is because a fraction of the non-source-specific lead mass equal to the fraction of pyrometallurgical lead was assumed to be derived by weathering from pyrometallurgical lead. In order for this assumption to be valid, all of the source-identifiable lead species present must breakdown to non-source-specific lead at the same rate over time such that the relative *proportion of source-identifiable lead species from different sources never changes in soil. Different lead species have different weathering rates in soil, and the relative abundance of lead species will change over time due to natural weathering processes. The adjustment of the pyrometallurgical and non-source-specific lead speciation is invalid and has no technical merit, and reduces the reliability of those speciation data. If this adjusted is removed, the reported average value of 32% value is reduced to 24%.*

EPA Response: The 2007 Apportionment Study presents all of the raw data and discusses the basis for the calculations used in the apportionment. As noted in the comment, there are several forms of lead, including lead carbonate, lead sulfate, and lead oxide, that are dominant forms in soils from the ASARCO facility and are known to be released from lead smelters. Consequently, there is a high likelihood that emission/contamination of these forms occurred from the ASARCO facility. However, because these forms also occur in some lead-based paints, the fraction of these forms that arise from a pyrometallurgical source must be estimated by interpolation from other data. The 2007 Apportionment Study presents how this interpolation was performed, and why.

Comment H-13

Conclusion No. 2 states: "The ASARCO facility's historical emissions clearly dominate all other identified sources." This statement is not supportable because numerous other industrial facilities in Omaha very likely had similar pyrometallurgical lead forms associated with their air emissions. Consequently, these mineral forms can not be specifically attributed to either the ASARCO or the Gould facilities. In addition, the soil samples selected to represent the former ASARCO and Gould facilities were collected at depth from remediated areas of the ASARCO refinery and Gould facility. EPA has not demonstrated that the lead forms found in these samples are representative of air emissions from ASARCO and Gould.

EPA Response: To date, the ASARCO and Gould facilities remain the only two identified potential industrial sources that could contribute any significant quantity of pyrometallurgical lead to the OLS. The other industrial sources referred to do not use, generate, or emit the chemical forms classified as pyrometallurgical. The two other potentially significant sources of lead to the OLS (lead-based paint and leaded gasoline) were discussed in depth in the Apportionment Study. EPA agrees that speciation of lead in soil samples from the two facilities may not provide a definitive quantitative picture of the lead forms released to air from stack and fugitive emissions but does believe that the data provide useful qualitative information on the lead forms likely to have been present at the sites. One potential exception is the soil samples from the Gould facility, which were treated with lime. This may have altered the types of lead phases present.

Comment H-14

Expert reports prepared for the U.S. Government for the ASARCO bankruptcy-estimation hearing in August 2007 demonstrate that the government expert preparing a lead emissions estimate for the ASARCO refinery, Allen Medine, relied on this conclusion from Drexler (2007) to support an unrealistically high estimate of lead emissions deposited from the ASARCO refinery, and Drexler in turn relied on Medine's unrealistic emissions estimate to support his conclusion regarding the ASARCO refinery's lead contributions to soil. This circular reasoning proves nothing, and neither Drexler's nor Medine's apportionment opinions have been substantiated by the data available to describe the actual Site conditions.

EPA Response: The EPA disagrees that the conclusions presented in the Apportionment Study are the result of "circular reasoning." The work of both Medine and Drexler used independent data sets and methodologies to arrive at their conclusions. Neither study was dependent on data or findings from the other. Therefore, they do not represent circular reasoning. To the contrary, they represent an independent validation/support of the conclusions reached in each study.

Comment H-15

Conclusion No. 3 states: "More than 90% of yards speciated have pyrometallurgical apportioned lead.". This statement is misleading. The data in the report actually indicate that 90 percent of the soil samples contain lead species that might be pyrometallurgical in origin, but a smaller percentage of the soil samples contain lead predominantly associated with those species. Even if it is true that 90% of the soil samples studied contained some lead of potentially pyrometallurgical origin, that finding does not mean that 90% of the lead mass in those soils is pyrometallurgical, or that 90% of the lead mass originates from either the ASARCO or Gould facilities.

EPA Response: The statement is correct and accurate. The commenter's interpretation of the statement that 90 percent of the soil samples contain pyrometallurgical lead is also accurate. As the commenter points out, the statement does not imply that 90 percent of the lead mass in those samples is of pyrometallurgical origin or that 90 percent of the lead mass originates from either the ASARCO or Gould facilities. The commenter correctly interprets the statement, and EPA believes that the statement is not misleading. The conclusions based on the EPA apportionment studies are based on actual soil sampling results and represent the best science available to address the source of the lead in residential soils.

Comment H-16

EPA's air-dispersion model predicts that lead emissions from the ASARCO refinery would have been widely deposited. However, based on estimates of the total lead mass emitted from the refinery over time, the amount of lead deposited to soil from those emissions is predicted to *cause lead concentrations greater than EPA's interim cleanup level only within a limited portion of the OLS. The presence of "pyrometallurgical" lead in soil does not demonstrate that elevated soil-lead concentrations are due to ASARCO refinery emissions. The mere presence of pyrometallurgical lead species, even in relative abundance in soil, does not support the conclusion that ASARCO emissions were so dominant over all other sources that they are the cause of lead concentrations in excess of 400 mg/Kg or 800 mg/Kg. The mass of lead reported as pyrometallurgical in any of the samples analyzed rarely exceeds EPA's interim cleanup level of 800 mg/Kg. Only 23 of the 78 soil samples have lead concentrations greater than 800 mg/Kg and only 8 of those, or approximately 10% of all samples analyzed, reportedly had greater than 800 mg/Kg lead in identifiable pyrometallurgical forms. There are 6 additional samples that reportedly have greater than 400 mg/Kg identified lead as pyrometallurgical, for a total of 14 of 78 samples with more than 400 mg/Kg lead in forms identified as "pyrometallurgical."*

EPA Response: EPA believes the air modeling calculations performed by UP are based on a substantial underestimate of the amount of lead released; hence, it is likely that the model predictions substantially underestimate the impact of smelter releases on lead levels in soil. However, regardless of the air modeling results, the trigger for EPA action is not restricted to situation where the smelter releases have caused an increase in soil lead of 400 ppm or more. Rather, EPA has authority and responsibility to take action when the total soil lead exceeds a level of health concern and smelter releases have contributed to the exceedence. Speciation of the soil indicates that more than 90 percent of yards studied have pyrometallurgical lead, and these forms of lead are generally more abundant than lead forms associated with paint. The data indicate that the properties within the Final Focus Area are significantly impacted by historic emissions from the former lead-processing facilities.

Comment H-17

Conclusion No. 4 states: "At least 32% of the bulk lead found in community soils is from a pyrometallurgical source." This statement is misleading, if not simply wrong, because the percent of lead ultimately deposited to community soils within the OLS from pyrometallurgical sources, or from the ASARCO refinery, has not been determined with the certainty implied.

EPA Response: While there is some degree of uncertainty in any summary statistic computed from a set of environmental measurements, the report is clear that the values reported are based on the data available. Consequently, EPA does not agree that the report is misleading.

Comment H-18

Inclusion of lead in slag as a component of the pyrometallurgical lead deposited from air emissions is incorrect. Slag is not present in air emissions. Slag may have been present in soil collected at the former ASARCO and Gould facility locations, but slag would not be transported from those locations to residential yards via air dispersion and deposition.

EPA Response: This assertion is incorrect. Analysis of filters from stacks at several lead smelters shows that small particles of slag are present in stack emissions. In addition, slag may be released as a fugitive (as opposed to stack) emission and may also be used as fill or for road sanding. Any of these pathways can also lead to the presence of slag in residential yard soil. Regardless of transport pathway, slag in soil is attributable to the ASARCO smelter.

Comment H-19

The report speculates that the presence of lead carbonate in Gould "source" soil is due to high pH conditions that promote transformation of metallic lead to a carbonate form. High soil pH conditions are not likely at a battery recycling facility. Battery acid typically lowers the pH of soil at such facilities.

EPA Response: This comment is inaccurate. Prior to burial and covering, soils from the Gould facility were treated with lime, thus elevating the normal soil pH. In addition, batteries arriving at the plant are likely not to contain significant sulfuric acid. Moreover, primary crushing is conducted on concrete or asphalt surfaces with runoff collection systems, so it is unlikely any acid from the batteries would affect the soil around the plant.

Comment H-20

Conclusion No. 5 states: "A strong lead isotopic correlation between community soils and ASARCO plant with apparent limited input from Gould or leaded gasoline. Lead paint cannot be isotopically ruled out as a source of lead, but isotopes do suggest its significance is also limited." However, the isotope data do not support this conclusion. In order to draw these conclusions, the sources must be isotopically distinguishable from one another. The report does not demonstrate that ASARCO and Gould lead emissions, LBP, and leaded gasoline emissions, have distinctive (i.e., non-overlapping) isotopic signatures that can be identified in Omaha yard soils. To the contrary, isotopically similar lead was used to feed local lead industries and to produce lead paint and leaded gas products. Figure 10a from the report illustrates this point. One can conclude from these data that lead from a number of different lead-ore sources is present in paint and soil in Omaha. Figure 10a of the report also demonstrates that the paint and soil lead isotopic ratios are indistinguishable from each other on a Site-wide basis. One possible explanation—indeed the most likely explanation given all the other Site data—for this similarity is that Omaha soil contains abundant lead from paint. The best use of lead isotopic data for source identification in Omaha is on a location-specific (i.e., property-specific) basis. A deteriorated layer of LBP present on the exterior of an individual home or as paint chips in yard soil may have an isotopic signature that is distinct from the lead isotopic signature of other, long-term cumulative sources of lead to yard soil. If so, it may be possible to distinguish that lead isotopically from other sources of soil lead, including lead deposited to soil from industrial air emissions, and describe a quantity of lead deposited to soil with paint.

EPA Response: EPA agrees that, based on the isotopic data available at the time of the 2007 report, the isotopic ratios of lead in ASARCO soil and in lead-based paint are not easily distinguishable, although the limited data do allow a partial separation. Likewise, the isotope ratio for lead in soil from the Gould facility is somewhat identifiable, while lead from gasoline is readily distinguishable. Based on this, Conclusion 5 is accurate and appropriate, based on the data available.

EPA Responses to UP Comments – Appendix I
Focus Area Boundary

Comment I-1

The 5% criterion used by EPA to set the focus area boundary is incorrect. The basis for the value is not explained, but presumably it is related to the traditional choice of 5% as a significance level. The null hypothesis is that smelter releases are the principal source of lead concentration at a property. The alternative hypothesis is that lead exceedences are principally due to lead based paint. Use of a 5% criterion creates a very high probability of a Type II error (deciding that the smelter is responsible for elevated soil lead when lead-based paint is actually responsible).

EPA Response: The commenter has misinterpreted the purpose and approach used to establish the Final Focus Area boundary. As stated in Appendix A of the risk assessment, the purpose of the geospatial analysis was to determine if the Expanded Focus Area was sufficient to include all areas where homes with soil concentrations above 400 ppm occurred more frequently than 5 percent. As noted, a small areas to the west and north of the Expanded Focus Area were identified and added to the Expanded Focus Area to form the Final Focus Area. The choice of 5 percent as the frequency to use in the geospatial analysis is not based on a statistical test intended to limit Type I decision errors. If the goal of the geospatial analysis were revised to include uncertainty (e.g., the boundary includes all locations where there is a 5 percent or higher probability that the true frequency of properties above 400 ppm in a neighborhood is 5 percent or greater), then the bounds of the Final Focus Area would likely have been expanded by a much larger area.

In this strategy, there is no presumption or requirement that smelter release be the “predominant” source of lead in a yard above 400 ppm. However, studies of the form of lead in the soil at many locations across the Final Focus Area indicate that releases from the smelter are a significant fraction of the total in most locations. It is EPA’s goal that the Final Focus Area shall enclose most properties that have a soil lead level above a level of potential health concern and that have been significantly impacted by smelter releases. EPA recognizes that pyrometallurgical impacts are detectable at some properties beyond the Final Focus Area boundary, but in most cases the soil lead levels will be below a level of health concern, and the contribution of the smelter to soil lead will usually tend to be decreased outside the focus area.

Comment I-2

A review of Figure 1 in Appendix A clearly indicates the final focus area boundary is defined based on arbitrary choices. For example, a number of neighborhoods with exceedence densities below 5% are included. These neighborhoods include vast numbers of properties within the southwest and northwest corners of the focus area.

EPA Response: The Final Focus Area boundary is not arbitrary. The original boundary of the focus area was established at the time the site was added to the National Priorities List (NPL) by establishing a perimeter surrounding properties that had been determined at the time to have a soil lead concentration that exceeded 1,200 milligrams per kilogram (mg/kg) (USEPA 2005a). This area encompassed approximately 13.8 square miles. As RI sampling continued, the focus area was expanded to include a total of about 20 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 (USEPA 2005a). In 2004, the focus area was further expanded to include a portion of the area bounded by Redick Street to the north, Harrison Street to the south, and 52nd Street to the west. This is referred to as the Expanded Focus Area. These expansions were based on a consideration of the frequency that properties were being identified with soil levels above 400 ppm and on the levels of pyrometallurgical lead that were observed during speciation studies. The final addition to the focus area is based on a geospatial analysis that identified some areas outside the western and northern margins of the Expanded Focus Area where the frequency of properties with soil lead values above 400 ppm is higher than 5 percent. It is important that all such areas be included inside the Final Focus Area so that homes above the level of concern can be identified through soil sampling.

Comment I-3

No rationale is provided for selecting 500 m as the radius of a neighborhood. Property-specific exceedence density is useful if and only if neighborhood properties share the characteristics of the target property (similar age, similar distance to the smelters, similar wind direction). A review of available data indicate that for many properties the 500 meter radius is inappropriate because: (a) the wind rose is elliptical while the neighborhood is round, (b) some homes with low soil lead concentrations are surrounded by homes with high soil lead, so assigning a neighborhood exceedence value to the low lead home is incorrect, (c) no property constructed post 1960 has elevated soil lead, so mixing properties of different ages is "mathematical homogenization."

EPA Response: The choice of 500 m as the radius of a neighborhood is based upon an understanding of the typical size of a residential property in the OLS. Most properties are about 0.2 acres (8700 square feet) in size, and the size of the neighborhood was selected to ensure a sufficient number of homes (100 or more) in a neighborhood so that the estimate of exceedence frequency would be robust. In the geospatial analysis presented in Appendix A to the Final

BHHRA (Appendix M to the OLS Final RI), the actual number of properties within each neighborhood was usually about 400. Less than 2.5 percent had less than 100 neighbors. Because the assessment is empirical, there is no requirement that all homes in a neighborhood share the characteristics of the central home. In particular, long term average wind speed and direction are not likely to vary substantially over the scale of 500 m, so the choice of the neighborhood shape is completely unrelated to the shape of the wind rose.

The commenter appears to argue that it is inappropriate to include any home with a soil level below 400 ppm in the focus area. That assertion is not logical or appropriate. The purpose of the focus area is to define the spatial extent of an area where property-by-property investigations are required to identify homes with soil lead above 400 ppm. If the assertion is valid that newly constructed houses are very unlikely to have elevated soil lead levels, then the property-specific investigation will reveal that, and no remedial action will be required at such locations.

Comment I-4

The average lead concentration for each property is computed based on samples that do not include the drip zone. In other words, these samples are viewed as principal indicators of air-dispersion impacts, as reflected by the following text: "If a property has a mean concentration in yard soil above 400 mg/kg, it is considered likely that smelter releases are the principal reason, although other sources of lead (naturally occurring background levels, releases from paint, automobile exhaust, etc.) may also contribute in some cases." However, EPA's drip zone study proves that lead-based paint contributes to yard samples beyond the drip zone samples.

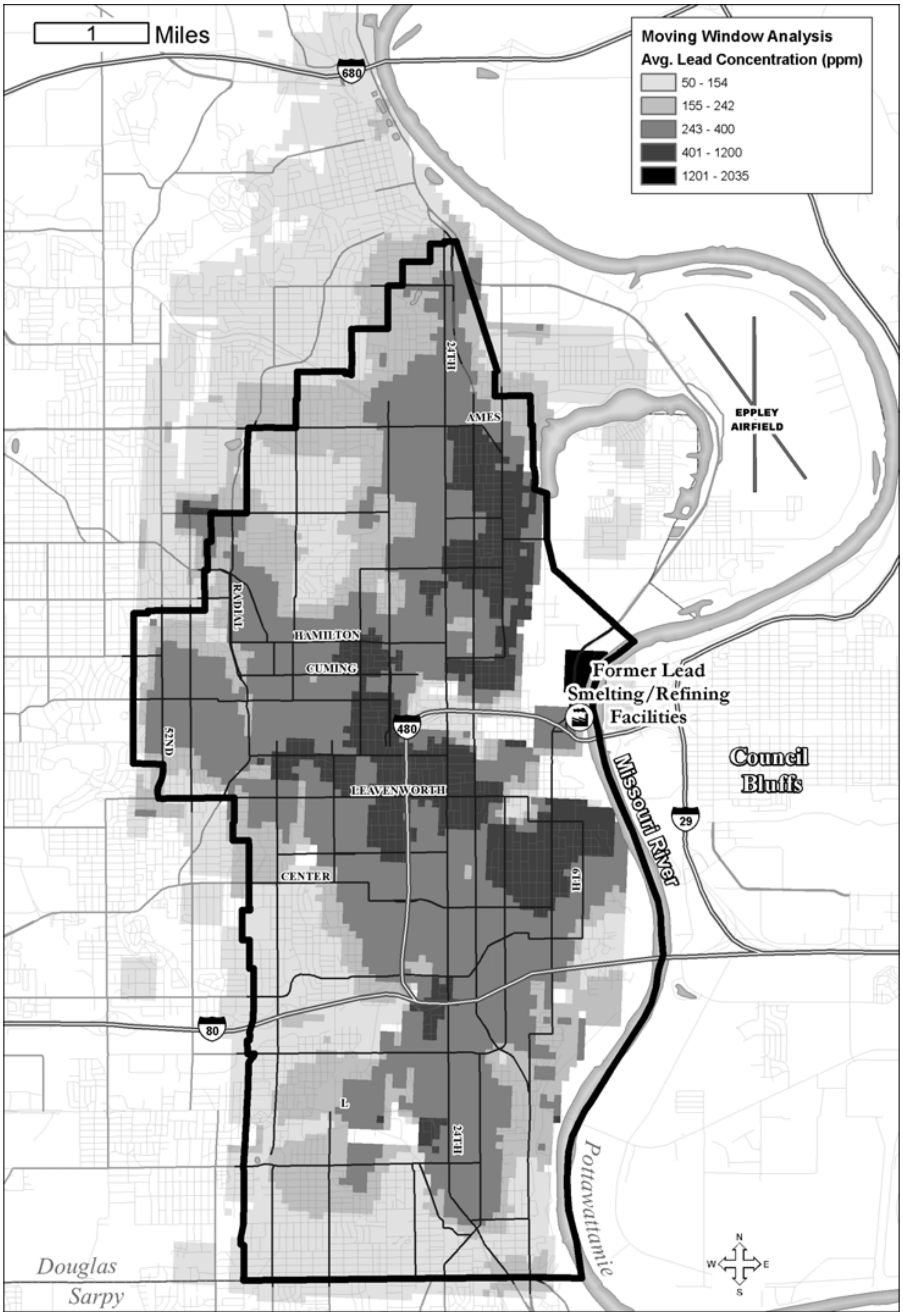
EPA Response: EPA agrees that the sentence quoted is too presumptive about source and will revise the sentence as follows: "If a property has a mean concentration in yard soil above 400 mg/kg, it is considered likely that smelter releases are a significant contributing factor, although other sources of lead (naturally-occurring background levels, releases from paint, automobile exhaust, etc.) may also contribute in some cases." As clearly stated in the risk assessment, the distinction between drip-zone samples and yard samples is not based on a distinction in presumptive source, but based on a distinction in expected behavior (children are not likely to spend a majority of their time playing outdoors within several feet of the house). Also note that there is no presumption that lead-based paint is the only source that may impact drip zone samples. Wash-off of historic smelter releases is also likely to be significant for homes constructed before about 1930. For risk assessment purposes, the fact that lead-based paint may contribute to soil levels at some distance from the house is irrelevant. Risk is based on total lead exposure from all sources, including lead-based paint that has entered soil. Thus, it is appropriate and correct to include all non-drip zone soil samples in the computation of yard-wide mean values.

Comment I-5

A previous spatial pattern analysis performed by UPRR indicated a spatial trend in soil lead concentration values in the area south of the former refineries. However, this may be an artifact due to the inclusion of drip-zone impacted data. Given a radial pattern of older homes around the refineries, the inclusion of drip zone samples can produce artificial spatial trends. An analysis that uses the lowest quadrant value at a location constructed before 1978 to represent the non-drip zone pattern reveals that the spatial pattern reported earlier is now much weaker. These results demonstrate that inclusion of drip-zone impacted samples is a significant cause of detected trends.

EPA Response: The conclusion that there is a spatial trend in the soil lead concentration data does not depend on whether or not drip zone samples are included. Figure 1 is a map that is based on a 500 meter moving window average of mid-yard soil samples (excluding drip zone samples). Visual inspection of this figure reveals a clear downward trend in average yard soil concentration as a function of distance from the smelter. There is no compelling logic that use of the lowest quadrant from each property will yield a meaningful analysis.

FIGURE 1


1 Miles
Moving Window Analysis
Avg. Lead Concentration (ppm)
50 - 154
155 - 242
243 - 400
401 - 1200
1201 - 2035
680
EPPLEY AIRFIELD
24TH
AMES
RADIAL
HAMILTON
CUMING
Former Lead Smelting/Refining Facilities
480
52ND
LEAVENWORTH
Council Bluffs
Missouri River
29
CENTER
6TH
80
L
24TH
Pottawattamie
Douglas
Sarpy
N
W
E
S

Comment J-1

The 2008 HHRA is premised on the incorrect assumption that historic air emissions from the former ASARCO and Gould facilities in east Omaha are the dominant sources of lead in yard soil and house dust.

EPA Response: EPA understands, and the risk assessment acknowledges, that lead in soil and dust in properties at the OLS may be derived from multiple sources, including not only smelter emissions but also releases from leaded paint. However, lead speciation data from the site indicate that pyrometallurgical lead (i.e., lead whose origin is from the former lead smelting/refining operations) is a significant component of total lead found in soil samples collected across the study area. It is neither the role nor the objective of the risk assessment to estimate the relative contribution of alternative sources to the total lead exposure. Rather, the human health risk assessment evaluates risks to children living in the OLS site from lead that is present in environmental media (soil, dust, water, air, and food) without regard to the source of the lead in those media.

Comment J-2

The question of sources is not merely academic. Misjudgment results in misdirection of remedial effort.

EPA Response: The EPA Final Remedial Action addresses lead exposure sources that are authorized under CERCLA. EPA recognizes the potential benefits of addressing all sources of lead exposure in achieving an overall solution to the lead problems at the OLS. Although EPA lacks authority under CERCLA to address exposures due to direct exposure to lead-based paint, EPA is committed to partnering with other organizations such as ATSDR, HUD, state environmental departments, state and local health departments, government agencies, private organizations, PRPs, and individual residents to participate in a comprehensive lead risk reduction strategy that addresses lead risks comprehensively.

Comment J-3

The 2008 HHRA does not comply with EPA guidance. EPA's Lead Handbook specifies that all significant sources of lead should be identified. Data regarding the contribution of each source is critical in evaluating the most effective remedial alternatives. The 2008 HHRA relies almost exclusively on soil data for exposure and risk assessment, premised on the unsupported assumptions that outdoor soil is the dominant source of exposure and that lead in soil was primarily derived from historical smelter emissions.

EPA Response: As noted above, risks from lead are assessed based on exposure to the total lead level in soil and other media, regardless of source. However, speciation studies performed by EPA have concluded that releases from pyrometallurgical operations represent the largest identifiable source of lead in OLS soils. EPA does not assume that all lead in OLS soils is due to lead smelter/refinery releases and agrees that a quantitative understanding of the relative magnitude of different sources of lead exposure would be useful in planning a comprehensive lead risk reduction strategy. However, as noted above, EPA has limited authority under CERCLA to address sources of lead exposure other than lead released from the former lead smelting/refining operations. Because other sources of lead exposure may remain uncontrolled, assessing and responding to the exposure from soil becomes even more important in limiting cumulative exposure to lead.

Comment J- 4

The 2008 HHRA evaluates lead risks solely via the use of the IEUBK model. Of the environmental concentration value inputs to the model, only soil was residence specific. The IEUBK model was used to set a soil remediation value, but EPA did not provide any of its inputs to the IEUBK to enable the public to evaluate the accuracy of the PRG.

EPA Response: The risk assessment evaluated risks from lead using the IEUBK model in accordance with EPA guidance (OSWER Directive 9200.4-27, dated August 27, 1998). Lead concentrations in soil were residence-specific, while inputs for lead in air, lead in water, soil transfer to dust, and lead absorption from soil and dust were all site-specific. All of these inputs are clearly provided in Table 4-1 of the risk assessment.

Comment J- 5

The 2008 HHRA (Appendix F) presents a soil-dust relationship based on 98 data pairs, but avoids giving the R^2 *value. The data could not be evaluated because they were not provided electronically. Also absent is a discussion of the validity of the assumption that soil is the major contributor to indoor dust lead, the large uncertainties in the data manipulation, or the impacts on the IEUBK model results.*

EPA Response: As discussed in the risk assessment, the relationship between lead levels in soil and dust at the OLS is expected to be variable, and this is reflected in the R^2 value (0.48). However, the relationship is highly significant ($p < 0.001$). As discussed in Appendix F of the risk assessment, the true relationship between lead in soil and dust is likely somewhat stronger, but is partially obscured due to random measurement error in the soil concentration values. The raw data were provided in the electronic database attached to the 2008 HHRA, in Table "Btbl_ICP Soil Dust Water 2007." The regression analysis makes no assumptions about the size of the contribution of soil lead to dust lead. To the contrary, this is the output of the regression analysis. As discussed in Appendix F of the OLS Final BHHRA, the best fit model suggests that the slope of the line is 0.74, indicating that, on average, about 74 percent of the mass of indoor dust is derived from outdoor soil. Appendix F of the BHHRA contains a detailed description of the data "manipulation" (adjustment for measurement error), and the uncertainties are discussed in Section 4.6.1 of the risk assessment.

Comment J-6

The strongest predictor of soil lead concentration is housing age. This is because lead-based paint is common in older housing, and lead based paint contributes to lead in soil. A plot of yard soil lead vs. distance from the smelter does not show any spatial trend, while there is a clear relationship with drip-zone lead and housing age.

EPA Response: EPA does not agree that a plot of soil lead vs. distance from the smelter does not show a spatial trend. To the contrary, there is a clear and obvious trend for soil lead concentrations to decrease as a function of increasing distance from the smelter (e.g., see Figure 2-2 of the BHHRA and Figure 1 in response to Comments on the Final Focus Area boundary submitted as Appendix I). There is also a tendency for house age to decrease as a function of distance from the smelter. If house age is thought to influence paint contributions to soil (this is an over-simplification) and if distance from the smelter influences the degree of smelter-related deposition to soil, then the influence of both housing age and distance from the smelter would have a similar affect on soil lead levels which cannot be separated using simple spatial pattern comparisons. Consequently, the fact that there is a correlation between soil lead and housing age cannot be used to attribute the soil lead to lead-based paint since the same pattern can also be attributed to smelter deposition. Recognizing these limitations of simple spatial pattern analysis, EPA has relied upon other approaches (speciation, isotope analysis) to reach conclusions about the relative contributions of lead-based paint and smelter releases to soil.

Comment J-7

EPA's Recontamination Study confirms that deteriorated lead-based paint is a significant source of soil lead.

EPA Response: EPA disagrees that the OLS Recontamination Study confirms that deteriorated lead-based paint is a significant source of soil lead. The Recontamination Study cannot be used to define the contribution from alternate sources to total soil lead levels measured at the OLS. Soil speciation studies, which would be necessary to provide this information, were not performed on samples collected from the OLS Recontamination Study.

Lead measured in drip zone soils cannot be assumed to be dominated by lead-based paint. A significant amount of lead found in drip zone soils could originate from pyrometallurgical sources and be the result of direct deposition of airborne emissions or wash-off of lead-containing particulates deposited on rooftops or impinged on structure siding. EPA speciation studies have confirmed the presence of a significant pyrometallurgical contribution to total soil lead levels found in samples collected from OLS drip zones.

Comment J-8

EPA did not consider blood lead data from the site. This information provides the best available exposure information for lead. If these data had been considered, EPA's premises would be revealed as false.

EPA Response: Blood lead data from the site (presented in Figure 2-6 of the risk assessment) provide qualitative support for the view that lead exposures and risks at the OLS are higher than other locations in Nebraska and elsewhere across the nation. However, EPA guidance (OSWER Directive 9200.4-27, dated August 27, 1998) clearly states that quantification of risks from lead in soil should be performed using the IEUBK model and that blood lead studies should not be used for establishing remedial or non-time-critical soil removal levels at lead sites:

- "OSWER recommends that the IEUBK model be used as the primary tool to generate risk-based soil cleanup levels"
- "OSWER recommends that blood lead studies not be used for establishing long-term remedial or non-time-critical removal cleanup levels at sites"

As discussed in OSWER Directives 9355.4-12 and 9200.4-27, these recommendations are based on a number of considerations, including the following:

- Blood lead studies are not definitive tools in evaluating potential risk from exposure to lead in the environment.
- The utility of blood lead testing results depends on how representative the information is of the population being evaluated, the design of the data collection, and the quality of the laboratory analysis.
- While blood lead studies may be useful in identifying children with elevated blood lead values, they may not provide an accurate representation of current community-wide exposures.
- Blood lead studies represent a snapshot in time and may not be representative of future conditions.
- Site residents may temporarily alter their behavior whenever public attention is drawn to a site. In such cases, the altered behavior could mask the true magnitude of potential risk at a site.

It is for these reasons that the blood lead data were not reviewed in detail in the risk assessment and were not used quantitatively to characterize risks or establish cleanup goals.

Comment J-9

Blood lead levels strongly correlate with housing age. A study by Leinenkugel (2002) reported that 100% of all elevated blood lead values occurred in children living in housing constructed before 1980. Inspections at home of children with elevated blood lead levels indicate that lead-based paint is present in most cases.

EPA Response: First, as discussed above, EPA believes that there are too many potential limitations to blood lead data to allow definitive identification of the sources of lead exposure in children. Secondly, simply because a correlation exists between blood lead levels and housing age does not mean that lead-based paint is the source of the elevated blood lead. This is because housing age tends to decrease as a function of distance from the smelter, which is the same pattern that is expected for smelter deposition to soil. Likewise, simply observing that lead-based paint is present in most homes where children have elevated blood lead is not sufficient to prove that the paint is the cause.

Comment J-10

The IEUBK model grossly overestimates the prevalence of elevated blood lead levels in most OLS zip codes.

EPA Response: There are several reasons why observed blood lead levels may be lower than predicted by the IEUBK model. First, as noted by the EPA's Science Advisory Board (see discussion in OSWER Directive 9355.4-12), people who live in an area where the environment is contaminated with lead often become aware of the potential hazards (especially when EPA is performing investigations and taking response actions) and may temporarily modify their behavior to reduce the exposure of their children. Hence, blood lead levels below 10 µg/dL are not necessarily evidence that a potential for significant lead exposure does not exist or that such potential could not exist in the future. In addition, the blood lead data collected by Douglas County are based on voluntary participation in the blood lead program; hence, the results may not be representative of the community as a whole. OSWER Directive 9200.4-27 emphasizes the potential limitations in relying upon blood lead data that are not representative. It is for these reasons that EPA does not use blood lead data as the basis for quantification of lead risk.

Comment J-11

Overall prevalence of elevated blood lead levels in children in the OLS are similar to the U.S. Comparing rates at the OLS site to Lancaster County, the State of Nebraska and national data is complicated by marked ethnic and socioeconomic differences between groups.

EPA Response: First, it is internally inconsistent to simultaneously assert that the prevalence of elevated blood lead is the same in the OLS as nationally (it is not) or that comparisons between the site and other data sets (including national data) are confounded by differences in demographic variables. If the latter is true, the former is irrelevant. Second, and more importantly, community statistics on the prevalence of elevated blood lead levels are not an appropriate basis for evaluating risks from lead at the property level. It is EPA's goal is to ensure there is no more than a 5 percent chance of an elevated blood lead level occurring at any individual property within the site boundary, not just to achieve a community-wide average level below 5 percent.

Comment J-12

The IEUBK model does not represent potentially significant differences in lead exposure by race, sex and ethnicity. Leinenkugel (2002) reported that a majority of elevated blood lead levels occurred in minority race or ethnic groups, and that males had more exposure than females. Data from Douglas County also indicates a higher incidence of elevated blood lead in Spanish-speaking than English speaking children within a zip code. As discussed by Levin et al (2008), what is needed is a cross-Agency effort to identify all lead sources so exposures can be addressed.

EPA Response: Differences in the frequency of elevated blood lead levels between different subgroups of a population is a well-known phenomenon, and it is not surprising that such differences are observed at the OLS. These differences may be caused by a variety of factors, potentially including: (a) differences in environmental concentration levels (e.g., population A tends to live in a more contaminated area than population B), (b) differences in exposure rates to environmental media (e.g., population A tends to ingest more soil or dust than population B), and (c) differences in exposure to non-environmental sources (e.g., population A tends to cook food in lead-glazed pots while population B tends to cook in metal pots). Regardless of the reason(s) for the differences, it is important to stress that the IEUBK model is intended to provide a generic evaluation of the risks of lead from environmental media without regard to demographic variables. This is because EPA seeks to select cleanup plans that will be safe for all populations, now and in the future, not just a particular sub-population.