

Health Consultation

Evaluation of the U.S. Environmental Protection Agency
Proposed Soil Excavation Plans for the Omaha Lead Refinery Site

OMAHA LEAD REFINERY

OMAHA, DOUGLAS COUNTY, NEBRASKA

EPA FACILITY ID: NESFN0703481

JUNE 2, 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members.

This document has previously been released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The health consultation has now been reissued. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared by:

Superfund Site Assessment Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

Statement of Issues and Finding

Region 7 of the U.S. Environmental Protection Agency (EPA) has requested the written concurrence of the Agency for Toxic Substances and Disease Registry (ATSDR) on their proposed soil excavation plan for the Omaha Lead Refinery National Priorities List (NPL) site in Omaha, Nebraska. ATSDR does not approve remediation actions for a contaminated site; however, given site-specific information, we will indicate whether we conclude that a proposed site-specific remedial action would be protective of public health. This decision is specific for the Omaha Lead site and is not applicable to other sites. EPA's proposed excavation actions include the following:

1. Establish a surface soil action and cleanup level of 400 parts per million (ppm) lead. All portions of a yard exceeding 400 ppm would be excavated to a maximum depth of 12 inches.
2. If the lead concentrations at 12 inches below the surface are less than 1,200 ppm the excavated will be covered with 12 inches of clean soil.
3. If the soil lead level at 12 inches below the surface is 1,200 ppm and **or** greater, heavy plastic construction fencing would be placed in the bottom of the excavation then covered with 12 inches of fill.
4. Contaminated vacant lots, parks, school yards, green spaces, etc. would follow the same rules as above, except each property where a barrier is placed would be reported to the City of Omaha for inclusion in an institutional controls program.
5. Areas of existing vegetable gardens with surface soil greater than 400 ppm would be excavated until soil lead levels are below 400 ppm or to a maximum depth of 24 inches. An alternative to this, would involve excavating the garden area to 12 inches, then constructing a 12 inch raised bed in the garden, for a total of 24 inches of clean soil.

Except for the installation of new gardens or lawns, ATSDR agrees that EPA's proposed soil excavation plan for the Omaha Lead Refinery site would be protective of public health. ATSDR suggests that an easily accessible informational database and an educational program be developed a way to deal with this exception.

Background

The Omaha Lead site includes residential properties, childcare facilities, schools, and other properties in the city of Omaha, Douglas County, Nebraska [1]. Those properties have been contaminated with lead from air emissions from lead refining operations and other sources. The site area covers about 8,840 acres. It roughly extends south from Ames Avenue to L Street and eastward from 45th Street to the Missouri River, excluding the central business district. ATSDR's evaluation of the 2000 Census data indicates that about 86,000 residents live within the identified site area. Nine thousand seven hundred of these are children 6 and younger.

The American Smelting and Refining Company (ASARCO) operated a lead refinery on the west bank of the Missouri River in downtown Omaha from the early 1870s [1,2]. The company closed the 23-acre refinery site in 1997. ASARCO is considered to have been the primary source for the soil contamination in the Omaha Lead initial site investigation area. Other sources of lead contamination may include lead-based paint and lead deposited from automobiles that used leaded gasoline in the past.

EPA started sampling the area potentially affected by the Omaha Lead site in 1999 and through 2003 has sampled 15,191 properties in Omaha and Council Bluffs [3]. At most of these properties, a minimum of five samples were collected [2]. Four of those soil samples were collected far enough from the house to avoid likely contamination by lead-based paint from the house [4]. The fifth soil sample was collected at the drip line, which is soil within 3 feet of the house to evaluate whether there is the lead in soil from peeling lead-based paint on the house. All these samples were analyzed for lead using x-ray fluorescence (XRF). XRF allows samples to be analyzed in the field. Portions of about 10% of the samples underwent laboratory analysis to validate the XRF results. The laboratory analysis used EPA methods 3010 and 6010 [5]. Over 6,800 (42%) of the properties sampled had at least one yard sample with a soil lead level of 400 ppm or greater.

Overview of the Proposed Plan

EPA is finalizing the Feasibility Study for the Omaha Lead Site and preparing the Proposed Plan to document the preferred cleanup action for lead contaminated soils at residential type properties.¹ In sampling over 15,000 properties in or near the site area, EPA has found that lead is located in the top 2 - 12 inches of soil at most properties. However, some properties contain lead at greater depths. The following is a proposal that EPA would like to include in the Proposed Plan for the excavation of soil at the Site. EPA requests written concurrence from ATSDR on this method before finalizing the plan. The excavation actions would include the following:

- Establish a surface soil action and cleanup level of 400 ppm lead. All portions of a yard exceeding 400 ppm would be excavated to a maximum depth of 12 inches. If soil concentrations below 400 ppm are achieved at a depth of less than 400 ppm, the excavation would stop in that area.

¹ This description of EPA's excavation plan was adapted from a email dated 5/18/2004 to Sue Casteel, ATSDR Region 7, from D. Mark Doolan, EPA Region 7 requesting ATSDR's assistance and summarizing the plan.

- Areas of existing vegetable gardens with surface soil greater than 400 ppm would be excavated until soil lead levels are below 400 ppm or to a maximum depth of 24 inches. An alternative option, and one that may be preferred would involve excavating the garden area to 12 inches, then constructing a 12 inch raised bed in the garden, for a total of 24 inches of clean soil.
- Once the yard soil has been excavated to a depth of 12 inches, soil in the bottom of the excavation will be sampled. EPA would consider that any soil containing lead concentrations less than 1,200 ppm (3 times the action level) will not present a significant risk once covered with 12 inches of clean soil, and the yard would simply be backfilled. For reference, EPA Headquarters allow Regions the flexibility to select cleanup levels for lead from 400 ppm to 1,200 ppm without HQ consultation. The IEUBK will predict a 1,200 ppm cleanup level for lead using the least conservative, yet defensible values for each model parameter. Additionally EPA has excepted 1,200 ppm lead in surface soil as a standard trigger level for conducting time-critical removal actions (in other words, lead levels below 1,200 ppm do not warrant a time-critical removal action).
- For areas of the yard exceeding 1,200 ppm lead, heavy plastic construction fencing would be placed in the bottom of the excavation as a visible/physical barrier prior to placing the 12 inches of clean backfill. Drip zones (within 3 feet of a structure) of the yard would be treated the same as the general yard areas. All yards where barriers are placed will be reported to the City of Omaha, where they would be tracked under the building/construction permit system. Residents planning home expansion, or other major yard disturbances/excavation, would be required to safely address contaminated soil.
- Excavated vacant lots, parks, school yards, green spaces, etc. would follow the same rules as above, where heavy plastic construction fence would be placed in the bottom of the excavation if the soil exceeds 1,200 ppm lead. However, each property where barrier is placed would be reported to the City of Omaha for inclusion in the institutional controls program. EPA, through discussion with the City, anticipates that Omaha will track these properties through their building permit system to insure proper development in the future to address the remaining contaminated soil if excavated during construction/development of the property.

Analysis

Here is our analysis of the components of EPA's proposed soil excavation plan for residential area soil in the Omaha Lead site area.

1. *Establish a surface soil action and cleanup level of 400 ppm lead then excavate all portions of a yard where the soil lead exceeds 400 ppm down to a maximum depth of 12 inches.*

EPA seeks to limit the risk that children will have blood lead concentrations above 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) [6]. They recommend "that a soil lead concentration be

determined so that a typical child or group of children exposed to lead at this level would have an estimated risk of no more than 5% of exceeding a blood lead level of 10 µg/dL” [7]. Using default inputs, the IEUBK model identifies 400 ppm as the soil lead concentration where 5% of the children would have blood lead levels about 10 µg/dL.

Although, the IEUBK model tends to overestimate the association of blood lead levels with respect to soil levels (alone), ATSDR utilizes its results to ensure the protection of children who may have other lead exposures. Therefore, ATSDR considers it prudent to prevent exposures to soil with lead concentrations above 400 ppm

- 2. If the lead concentrations at 12 inches below the surface are less than 1,200 ppm the excavated will be covered with 12 inches of clean soil.*

The underlying premise of this component of EPA’s plan is that 12 inches of clean soil on top of soil concentrations of no more than 1,200 ppm would insure that soil lead levels at the surface would never exceed 400 ppm. EPA is, therefore, assuming that any disturbance of the soil would result in no more than 1 part of contaminated soil being mixed with at least 2 parts of clean soil. Disturbances could include installing or repairing water, sewer, or natural gas lines; underground electrical, T.V., or phone cables; fence and mail box posts; basketball poles; and similar activities. It also could include planting trees or shrubs. For these sorts of disturbances, EPA’s underlying premise seems reasonable and would be protective of public health.

However, this premise might not be reasonable if a resident decided to install a new garden or lawn and turned the soil using a power tiller. A possible way to deal with this situation would be to create a database which could be accessed at Omaha city offices or online that would permit residents to discover whether their lot had been tested or cleaned up. This database could be designed so that a resident could be made aware whether there were still elevated soil lead levels below grade. In conjunction with this, an education program should be developed to inform residents about the clean up.

- 3. If the soil lead level at 12 inches below the surface is 1,200 ppm and greater, heavy plastic construction fencing would be placed in the bottom of the excavation then covered with 12 inches of fill.*

This approach would be protective of public health as long as residents had a reasonable way to find out the significance of the barrier. The database suggested in number 2 could be one way to accomplish this.

- 4. Contaminated vacant lots, parks, school yards, green spaces, etc. would follow the same rules as above, except each property where a barrier is placed would be reported to the City of Omaha for inclusion in an institutional controls program.*

This approach would also be protective of public health. It is suggested that information on these properties on the informational database described previously.

5. *Areas of existing vegetable gardens with surface soil greater than 400 ppm would be excavated until soil lead levels are below 400 ppm or to a maximum depth of 24 inches. An alternative to this, would involve excavating the garden area to 12 inches, then constructing a 12 inch raised bed in the garden, for a total of 24 inches of clean soil.*

Covering an existing garden area with 24 inches of clean fill should be protective of public health.

Assumptions and Limitations

The assumptions and limitations of this health consultation include

- That the soil used as clean fill would have lead levels at or near the background soil lead concentration of 26 ppm [8];
- That determination of the soil lead level at the bottom of an excavated area follow EPA protocol and procedures for determining contaminant levels for a specific area.
- That the 400 and 1,200 ppm concentrations are the 95% confidence levels for those levels not the actual levels.
- That the site area will not undergo any development or building activity in which the soil is graded off in distinct layers without being aware of the presence of lead-contaminated soil below grade.

Conclusion

Except for the installation of new gardens or lawns, ATSDR agrees that EPA's proposed soil excavation plan for the Omaha Lead Refinery site would be protective of public health.

Recommendation

ATSDR recommends that an easily accessible information database and an education program be developed as a way to deal with installation of new gardens or lawns by residents and also as a way to provide information on the excavation and other remediation activities.

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