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August 4, 1994

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Ms. Susan Pastor, P-19J
Community Relations Coordinator
Office of Public Affairs
U.S. EPA, Region V
77 West Jackson Boulevard
Chicago, IL 60604-3590

Re: Asarco and Federated Metals' Comments on Circle Smelting Corporation Site, Beckemeyer, Illinois <u>Engineering Evaluation and Cost Analysis</u>

Dear Ms. Pastor:

In June, 1994, EPA announced that it had completed an "Engineering Evaluation/Cost Analysis--Circle Smelting Corporation Site, Beckemeyer, Illinois" and that it would receive public comment on the document. Subsequently, the public comment period was extended to August 5, 1994. The purpose of this letter and its enclosures is to provide the comments of ASARCO Incorporated and Federated Metals Corporation on the Circle Smelting Corporation site EE/CA.

By letters dated September 15 and 16, 1993, Asarco and later, Federated Metals Corporation, were notified by EPA that the agency was investigating a potential release or threatened release of hazardous substances at the Circle Smelting Corporation site in Beckemeyer, Illinois. Subsequently, on March 22, 1994, Asarco and Federated Metals received a Unilateral Administrative Order from EPA requiring the excavation and removal of certain material in connection with the installation of a water distribution system in the Village of Beckemeyer, Illinois. Asarco and Federated Metals have responded to the UAO and the excavation and removal project is nearing completion. Our understanding is that EPA has been satisfied with the work and we expect that EPA will so notify Asarco and Federated Metals shortly after the project is completed.

Since receiving the EE/CA, Asarco and Federated Metals have undertaken a number of actions in order to be able to timely comment on the document. The companies have retained the services of several highly qualified scientists and engineers to review and provide written comments on the EE/CA. Attachment 1 are the engineering related comments prepared by Hydrometrics, Inc. Attachment 2 are the risk related comments prepared by Kleinfelder, Inc. Attachment 3 are general comments on the EE/CA. Attachment 4 are relevant memoranda prepared by the Illinois Department of Public Health. Attachment 5 is the July 14, 1994 EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. Attachment 6 is EPA's July 15, 1994 Section 403 Interim Lead Hazard Guidance. Attachment 7 is an excerpt from the Centers for Disease Control Statement on Preventing Lead Poisoning in Young Children. Attachment 8 is Table I -- EPA Recommendations for Response Activities for Residential Lead-Contaminated Bare Soil. Attachment 9 are miscellaneous studies and documents submitted in support of Asarco and Federated Metals' comments and their proposed alternate plan. All of this material is submitted to EPA for its consideration and inclusion in the Administrative Record.

Despite the fact that Asarco and Federated Metals have had a relatively short period in which to review and comment on the EE/CA, the companies have been able to review the document, prepare comments, and prepare an alternative removal plan for inclusion in the EE/CA. Before presenting those comments and their proposed alternative, Asarco and Federated Metals would like to make it absolutely clear, however, that the companies do not entirely agree with EPA on the nature and extent of a threat to the environment or to public health posed by the presence of cinders in the Village of Beckemeyer area.

The companies do agree that the Circle smelter site and related drainage areas should receive further study to determine the nature and extent of any release of hazardous substances and appropriate remedial actions. With regard to the Village of Beckemeyer residential area, however, the companies believe that there is little, if any, risk to the population and that to the extent some risk may be present, it can be dealt with efficiently and effectively through community protection measures. This is particularly demonstrated by the fact that the material in question has been present in the community for many years and yet, no adverse health effects have ever been linked with this material. Moreover, blood lead testing of area children has demonstrated that elevated blood leads are not present. Finally, the Illinois Department of Public Health itself has confirmed that little, if any, work in the residential area is required. See, Attachment 4.

Asarco and Federated Metals recognize, however, EPA's broad authority under CERCLA and that in the event EPA undertakes Superfund financed remedial action, the companies might, sometime in the future, be found liable for these costs. Therefore, because Asarco and Federated Metals believe that settlement of this matter without litigation is in the best interest of both the companies and the public, and without admitting to the need for any remedial action, or to the liability of Asarco or Federated Metals for such remedial action, Asarco and Federated Metals offer the following alternative to be added to the EE/CA and offer to carry out this alternative under an appropriate consent order or consent decree:

ASARCO AND FEDERATED METALS REMEDIAL ACTION ALTERNATIVE

VILLAGE OF BECKEMEYER RESIDENTIAL AREA

On July 14, 1994, EPA issued its "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities" (OSWER Directive No. 9355.4-12). Attachment 5. This directive establishes an approach for determining protective levels for lead in soil at CERCLA sites. The guidance was issued in conjunction with EPA's section 403 guidance on residential lead-based paint, lead-contaminated dust and lead-contaminated soil. Attachment 6.

In summary, the CERCLA guidance recommends the development of site-specific lead data, utilizing that site-specific data in the IEUBK model to set remediation goals and establishing appropriate remedial measures ranging from no action and intervention to abatement. This approach is consistent with the rule 403 process established EPA under the Toxic Substances Control Act program.

Based upon EPA's new soil lead guidance, the following elements are appropriate for the Village of Beckemeyer residential area:

- A focused remedial investigation/feasibility study should be conducted to develop the site-specific data necessary to run the IEUBK model. Once the data is collected, the model would be run to select remediation goals based upon actual exposure at the site. Appropriate remedial actions would then be selected to achieve those goals.

- As part of the focused RI/FS, additional soil sampling will be undertaken to obtain representative data sufficient for running the IEUBK model.

- While the focused RI/FS is being prepared, a community protection measures program would be established working closely with EPA, Illinois Department of Public Health and local governments. This program would combine biological monitoring, a health intervention program, community education and institutional controls as follows;

- **Biological Monitoring.** Provide blood lead screening for all children less than 72 months of age at least once per year or as directed by a health care provider, with particular attention given to children between the ages of 9 months and 36 months. Blood lead screening would be provided to others upon request.

- **Health Intervention.** Blood lead monitoring results would be compared to Centers for Disease Control (CDC) criteria. <u>See</u> Attachment 7. The CDC guidelines would be used as a basis for determining what type of action should be taken based on elevated blood lead levels. Where the CDC guidelines recommend intervention, such intervention would be accomplished by working with the Illinois Department of Public Health to assess specific sources of lead that may be responsible for blood lead elevations. This assessment would include soil testing, if determined necessary. The program would work with affected families to affect behavioral changes and/or sources where such exposures are documented to have impacted blood lead levels.

- **Community Education.** Develop and implement a comprehensive lead awareness and education program directed at physicians, daycare providers, elementary school students and local residents (including building contractors and do-it-yourselfers). The general public education program would consist of four main elements: pamphlets, brochures, multi-media information and information enclosed with property tax and utility billings.

- **Institutional Controls.** In coordination with local government, design and implement appropriate community-wide institutional controls to:

    - provide proper disposal of lead contaminated materials;

  - provide training on proper soils handling for public utility and municipal workers; and

  - develop a long-term flexible approach to the abatement of lead sources and elimination of exposure pathways.

- As part of the focused RI/FS, cinder types would be characterized for physical parameters, total metals, leachate potential and bioavailability. In addition, innovative remediation techniques such as phosphate amendment to soils will be examined.

Asarco and Federated Metals believe that the above set forth program is in accordance with EPA's July 14, 1994, soil lead guidance and should be adopted by Region V. The EE/CA's selection of a cleanup level of 500 ppm and soil removal is not consistent with the guidance and as is pointed out by Dr. Joyce Tsuji (Attachment 2), is not based on the proper running of the correct IEUBK model.

In carrying out the above described alternative, Asarco and Federated Metals are willing to utilize the IEUBK model in accordance with EPA's July 14, 1994 guidance. However, by doing so, neither company in any way endorses use of the model. It is the position of Asarco and Federated Metals that the model has not been properly validated through comparison between predicted and actual blood lead levels, that actual blood lead data should be given preference over modeling in risk assessment and risk management decision making and that, to the extent the model is used, it should be used with site specific data and not default parameters.

It is the preference of Asarco and Federated Metals to proceed in the Village of Beckemeyer residential area as outlined above. The companies also recognize, however, the desire of the residents of the Village to get this matter behind them once and for all. Asarco and Federated Metals believe that this can be achieved by combining attributes of the July 14, 1994, soil lead guidance, the July 15, 1994, section 403 lead hazard guidance, and utilizing version 0.61 of the IEUBK model with site-specific parameters as currently available. In order to address the residential area now and eliminate the need for future study or remedial action, Asarco and Federated Metals would be willing to discuss immediate implementation of the following remedial action:

- The lead in soil levels triggering remedial activities would be based upon "Table 1-EPA Recommendations for

Response Activities for Residential Lead-Contaminated Bare Soil" as contained in the July 15, 1994, section 403 interim lead hazard guidance document. Attachment 7. These lead levels of 400 ppm, 2000 ppm and 5000 ppm have been validated for use in the Village of Beckemeyer by the IEUBK modeling work conducted by Dr. Tsuji, utilizing the site-specific data available and version 0.61 of the IEUBK model. See attachment 2.

- The residential area would be sampled to determine how to apply the table.

- The EPA and Asarco project coordinators would use the table to determine the appropriate remediation based on sampling data and other relevant information, including demographics.

- For areas over 5000 ppm, the preferred remedial action for driveways, alleys and walkways would be to asphalt the surface over the cinder/soil material. No removal would take place prior to placement of the asphalt cover. For other areas, soil removal and replacement would be appropriate. Removal would be to 400 ppm lead or 12", whichever comes first.

- All materials removed from the residential area would be taken to the smelter site and stored with soils from the water distribution line removal. No treatment would be required.

- Upon completion of this remedial activity, the Village of Beckemeyer would receive appropriate documentation from EPA certifying that the remedial action in the Village is complete.

Asarco and Federated Metals believe that this site-specific application of the IEUBK model, meets the recommendations set forth in the July 14, 1994, soil lead guidance.

AREAS SOUTH OF CIRCLE SMELTING SITE

This area combines former residential property currently owned by Asarco, several existing homes and trailers and an area utilized as a junk automobile storage yard. Because of the varied uses being made of the properties and lack of sufficient soil data, the following actions are proposed:

- With regard to the Asarco owned property, the existing homes and trailers would be removed. The area would be fenced and vegetated. Appropriate institutional controls would be implemented to limit site access.

- With regard to the residential area west of the Asarco property, soil sampling would take place to properly characterize the nature and extent of lead in the soil. Based upon that data, a decision would be made with regard to the appropriate remedial activity. In the meantime, blood lead screening and appropriate intervention activities would take place with regard to residents as outlined above.

- With regard to the junk automobile storage yard east of the Asarco property, EPA would work with the current owner to determine the nature and extent of any release on that property. In view of the other materials currently located on the property, including used batteries, it is unlikely that lead deposited in the soil from the Circle Smelting site itself poses an unacceptable health risk.

DRAINAGE WAY SEDIMENTS

Circle Smelter site surface soil conditions are probable sources of metals in drainage way sediments. Any interim actions involving sediment removal are likely to have to be repeated if final remediation of the smelter site is not implemented before the removal. In addition, insufficient information is available to properly determine the nature and extent of any threat to the environment of the drainage ways. Further, other remedial actions, including the possibility of natural recovery, should be studied. As a result, Asarco and Federated Metals propose to approach the drainage way sediments as follows:

- A focused RI/FS would be conducted of the drainage way area. Issues to be evaluated include long term stormwater quality monitoring to assess present and post-smelter site remediation transport potential; evaluation of the potential for natural recovery (i.e. attenuation of surface metals) in drainage way sediments and water quality; alternatives to sediment removal, including drainage way capping using gravel and use of culvert and cover techniques; establishment of specific PRGs.

- While the focused RI/FS is being carried out, the following interim actions are proposed:

- Fence areas that include the eastern drainage, western drainage and the portion of an unnamed creek between the drainages to prohibit access to the highest concentrations. This could also include the formerly ponded area north of the highway.

- Institute controls, including public education and warning/trespass signs.

CIRCLE SMELTER PLANT SITE

EPA in its proposed EE/CA recognizes that there is insufficient information to determine the final remedy for the Circle Smelting plant site. It is pointed out in the Hydrometrics' comments (Attachment 1) that no action should be taken on the smelter site itself until the site has been properly characterized, particularly with regard to groundwater. Therefore, Asarco and Federated Metals propose as follows:

- A focused RI/FS would be carried out to completely characterize the smelter site, including groundwater.

- During the focused RI/FS, the following interim actions would be implemented:

    - Drainage control implementation, including erosion controls and sediment containment/catchment basins to control future off-site transport of metal bearing sediment from the plant site.

    - Dust control program, including use of water trucks and chemical retardants, such as magnesium chloride or other fixation chemicals to reduce the potential for wind transport of dust from the site.

    - Fencing to prohibit transient trespass on the site and limit potential exposure to off plant residents.

    - Demolition of retorts or other structures. Debris would be stored on-site pending RI/FS evaluation.

    - Demolition of smoke wall and on-site storage of debris pending completion of RI/FS.

Naturally, the remediation proposals set forth above will be subject to owner consent or other site access provided by EPA.

The foregoing and the attachments to this letter constitute Asarco and Federated Metals' comments on the EE/CA. Both companies request an opportunity to meet with EPA to discuss the comments and their proposal at EPA's earliest convenience.

Very truly yours,

Donald A. Robbins

Donald A. Robbins
Director, Environmental Services

attachments
cc: Tony Holoska, HSRL-6J
Mary Fulghum, ORC
Fred Nika, IEPA
Cathy Copley, Illinois Dept. of Public Health
Tom Long, Illinois Dept. of Public Health
Michael Stock, Mayor, Village of Beckemeyer
Richard Cosby, Counsel for Circle Smelting Corp.
(w/attachments 1-8 only)

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COMMENTS ON ENGINEERING EVALUATION AND COST ANALYSIS FOR CIRCLE SMELTING CORPORATION SITE BECKEMEYER, ILLINOIS

General Comments

1. The EC/CA presents a remediation plan and cost evaluation based on the assumption that a removal action is necessary and warranted. "Interim actions" for the site as presented in the EC/CA have been proposed without sufficient consideration of potential future remedies, evaluation of potential conflicts with other actions, and without sufficient evidence that health and environmental risks warrant large scale sediment and soil removal and capping. The proposed actions are extremely costly. Other equally protective measures could be much more easily implemented at a fraction of cost and inconvenience to the community.

2. The data used to support the non-time critical removal actions presented in the EE/CA are insufficient to adequately characterize the site, lack sufficient quality control data, and are not supported by adequate quality assurance documentation. These facts on the data used in the EE/CA are presented in the EE/CA document itself, and use of such data is inconsistent with EE/CA guidance (EPA, 1993, pages 27, 28 and 29).

3. **GENERAL COMMENTS ON RESIDENTIAL AREAS**
   EPA Preferred Action - Alternative 5 - Description

- Excavate observable soil and cinders from residential area and transport to the smelter property for disposal. Soil and cinders greater than 500 ppm would be excavated from alleys, walkways and driveways. The EE/CA estimates 2,300 cy of cinders would be excavated along with soil at an assumed soil depth of 1 foot >500 ppm Pb for 3,100 cy.

- Separation of excavated cinders from excavated soil, testing for TCLP and subsequent soil stabilization for soil that exceeds TCLP criteria.

- Placement of excavated soil and cinders on the smelter site for deposition and capping.

- Backfilling excavated areas with "clean fill". Areas previously used as alleys and driveways would be paved with asphalt. Sidewalks would be paved with concrete.

Major Comments

- Various types cf cinders which have been used as fill have not been adequately characterized. Key issues are:

  - o There are several (at least 4) different types of cinders; obvious metal bearing cinders, coal cinders, retort and/or other ceramic residues, and zinc skimmings which look similar to crushed limestone or cement.

  - o Total metal content and leachate potential of various cinder types have not been assessed.

  - o Bioavailability and therefore potential risks associated with cinders have not been assessed.

- The sample technique used for data in the EE/CA is not documented and sampling representativeness for the site is suspect. Selective sampling of cinders for analysis from alleys, walkways and driveways would overestimate risks.

- Excavation of all areas that "contain cinders" is not warranted. Actual risks have not been determined and are probably low because of dilution with road gravel and crushed limestone construction materials which have low metal content.

- Much of the mapped area presented in the EC/CA for cinder and soil removal does not contain obvious cinders. In many locations crushed limestone has been mistaken for "cinders".

- Large areas and volumes of material, such as Third Street, are scheduled for removal although there is no visual evidence of "cinders" nor analytical data to support a removal. The one sample on Third Street has a concentration of 516 ppm lead, which is well within urban background limits and may be associated with autos or other common urban sources. As a result, volumes presented in the EE/CA for removal are over-estimated.

- Areas in town that do contain obvious cinders (based on visual evidence) correlate with highest soil lead data concentrations presented by EPA in the EE/CA.

- Cinder and soil removal at 500 ppm lead concentrations is contrary to EPA's recently released "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (OSWER Directive No. 9355.4-12)" which recommends the development of site-specific action levels and a range or combination of remedial actions based upon soil lead levels present, uses at a given site and blood-lead data. As discussed below, a combination of intervention and abatement actions is appropriate for this site while automatic soil removal at the 500 ppm lead level is inappropriate.

4. GENERAL COMMENTS - AREA SOUTH OF SMELTER SITE
EPA Preferred Action - Alternative 5 - Description

- The "Deposition Area" south of plant would be tilled to a depth of about 8 inches. An additional 6 inches of topsoil would be placed on top of tilled soils and revegetated. .

Major Comments

- A large portion of the area has been purchased by Asarco, and there would not be residences on these properties. As a more appropriate interim measure, Asarco would remive the residences, isolate by fencing, and revegetate the area.

- An area east of the company-owned properties contains an auto wrecking/junkyard. This site obviously is not a residential area but is used for industrial activities. EPA's proposed action by tilling and importing soil is completely inappropriate for this location. Other sources of lead and metals which obviously exist on site, including junked cars and lead batteries, would have to be cleaned up or removed before any interim or permanent action could be implemented.

- Areas west of the company-owned properties consist of residences with one or more houses and trailers, similar to much of the remainder of the Beckemeyer village area. These residences should be treated similar to the rest of the Beckemeyer area, and additional information and sampling is necessary to assess a permanent solution for these sites. As a result, as with the remaining portions of Beckemeyer, interim measures using education and institutional controls are more appropriate actions than soil tilling or removal actions.

5. GENERAL COMMENTS ON DRAINAGE WAYS
EPA Preferred Action - Alternative 5 - Description

- Excavation of drainage way sediments to Randall Street using hydraulic dredging techniques. Estimated volumes presented by EPA are 1,200 cy assuming 6 inches deep dredging or excavation. Collateral construction associated with dredging includes construction of a haul road and water treatment requirements associated with dredging operations.

- Treat excavated sediments that exceed TCLP results.

- Dispose sediments on-site using a soil/clay cap.

Major Comments

- The majority of proposed excavation on the unnamed tributary to Beaver Creek is based on little data below the input of the Eastern and Western Drainages. The only down-stream data point is 615 ppm lead which is well below any anticipated human exposure scenario and, based on studies at other sites, at a concentration too low to be considered a significant environmental threat. For example at the East Helena Superfund and Silver Bow Warm Springs Pond Superfund sites, metal concentrations in sediments with lead ranging from 1400 to 4000 ppm and higher showed no measurable effects on concentrations in fish tissues or in waterfowl. East Helena and Silverbow sediment concentrations are in the range of or higher than those observed for the Unnamed Tributary to Beaver Creek. Fish and waterfowl at these sites were considered significant based on their use as food sources by raptors and other upper food chain species, as well as because of potential consumption by humans. Based on observation of site conditions and available information, there is no reason to expect impacts associated with sediments in the unnamed tributaries would be significantly different than those associated with similar conditions at other, more studied sites. As a result, extensive sediment removal as proposed in the EE/CA is not warranted, particularly in light of:

  - o the lack of site specific evidence of environmental damage,
  - o that available information from other studied sites with similar conditions suggest dredging actions would not be beneficial, and
  - o considerable environmental disturbance would be necessary as a result of dredging and its associated activities such as haul road construction and treatment facility requirements.

- Dredging using hydraulic techniques is expensive, and may not be practical for the relatively small drainage ways. Flow in ditches is intermittent to dry through much of the year. Access roads and support equipment requirements would be excessive and potentially result in significant environmental disturbance, which would in the short term have a significant environmental effect. Dredging water treatment requirements are not known, could be costly, and are probably unnecessary since the drainages are intermittent to dry during portions of the year and any remaining water could be controlled using temporary diversion and/or pumping techniques. Simple backhoe work would be more appropriate, faster, more cost effective, and less environmentally intrusive. Other less intrusive or destructive options include gravel capping and/or natural attenuation, options which may be particularly appropriate in light of the lack of evidence of significant environmental impacts or threats.

- Groundwater impacts from lead are unlikely because of its low mobility in the subsurface aqueous environment. Human access and exposure potential to drainage ways is already limited by poor access caused by dense vegetation and a residential type exposure scenario is very limited in the interim until the site is adequately studied and long-term remedial actions are implemented.

- The highest metal concentrations in drainage ways appears to be on Smelter property, where access is or can be easily limited.

- The maximum potential for downstream transport of sediments was probably realized last year when record high rains and floods occurred. Immediate threats for downstream transport in excess of what has already occurred is minimal.

- Implementation of containment and capping on the plant site could interfere with necessary future investigation or remedial action relative to groundwater, surface water or subsurface soils. (see Plant Site below). Therefore, other than institutional type controls, drainage way sediment remediation activities such as excavation or capping should not be implemented until after plant site remediation is complete to prevent potential recontamination of remediated sediments. In addition, a proper site specific study is required to ascertain the appropriate remedial action for bottom sediments.

6. GENERAL COMMENTS - PLANT SITE
EPA Preferred Action - Alternative 5 - Description

- Consolidate surface plant site soils, cinders and debris to northern portion of plant.

- Cap surface soils and debris using a designed clay and topsoil cap.

- Demolish retorts for on-site disposal under cap.

- Decontaminate and demolish smoke wall for off-site disposal.

- Plug and abandon storm sewers and monitoring wells.

- Re-route utilities under cap.

- Treat TCLP materials before consolidation in cap.

- Cap ponded area north of highway.

Major Comments

- Implementation of site consolidation and capping operations will interfere with future investigation efforts and may interfere with future remedial actions for the plant site. Groundwater and subsurface strata have not been characterized and additional subsurface investigation in the capping areas is likely. The EE/CA cites an USGS reference relative to groundwater investigation including several wells "around the smelter", however files and data from this study were not available and were not presented in the EE/CA. EE/CA guidance (EPA, August, 1993, page 27) states, "to the extent possible, site characterization data should be gathered during the removal site evaluation to support the EE/CA, unless such data were gathered in prior investigations". Critical information relative to site subsurface stratigraphy and groundwater conditions has not been obtained to ascertain if proposed capping actions are environmentally sound, and that capping would not interfere with future actions associated with long-term solutions for the site.

- A clay cap on the plant site could alter the subsurface environment and result in increased mobility of arsenic metals in the saturated zone beneath the cap. A potential concern is reduced communication with the atmosphere resulting in reducing redox conditions that in turn result in an increased mobility in subsurface metals. Since no data is available on subsurface conditions, potential effects on subsurface metal mobility cannot be understood until more information is obtained and subsurface mechanisms governing mobility and transport are understood.

- Available site wells should be evaluated for usefulness in future remedial investigation efforts on groundwater before abandonment. Recent data are not available (EC/CA, page 2-3) and the only groundwater data for the site area is at least 18 years old. Existing site wells are potential sources of valuable information on present site conditions which should not be eliminated without further consideration.

- Alternatives to capping exist including interim measures to limit human and environmental exposures to plant site cinders, soils and debris. More appropriate interim measures include implementation of a site dust control program, drainage runoff/sediment controls and access restrictions.

- The EE/CA cites stressed or absent vegetation associated with the former ponded area. However, a site review shows dense vegetation in this area, and the comment appears inconsistent with the condition of the former pond area.

Specific Comments

1. **Figure ES-3.** Although not described in detail in the executive summary, a clean up level of 500 mg/l for an active industrial site is lower than clean up levels at many sites for lead around the country. Even before the recent changes in lead soil guidance, clean up levels for industrial sites were typically 1000 ppm or higher. Exposure scenarios in an active industrial area are less than a child's exposure in a residential yard and a clean up level of 500 ppm lead is not appropriate. This is particularly true in light of the lack of data and information for the site relative to possible interferences with a permanent remedy for the site (See General Comment 6 above).

2. **Pages iv and v, Alternatives 3 and 5.** Hydraulic dredging is not appropriate for intermittent streams that could be handled using more conventional and less costly techniques that would be more effective and less technically difficult (See General Comment 5 above).

3. **Page 2-5 Sampling events.** No details on sampling methodology are presented. It is not possible to evaluate the representativeness of samples collected. Based on how samples are collected for analysis, considerable unrepresentative-representative bias can be introduced thus overestimating actual soil concentrations and, therefore, site risks.

   Field XRF equipment can lead to misleading results. The key to reliable XRF data is sample preparation which results in a relative consistency of physical sample characteristics (sieved and ground to a consistent grain size). Point-and-shoot type equipment, which use is implied in the EC/CA, may not give reliable and consistent results, particularly when measured values are near clean up or action levels. As a result, soil removal actions based on such data will often over or under estimate desired soil volumes. For this reason, active soil removal projects in East Helena, Ruston, Bunker Hill and Globe do not use point-and-shoot XRF equipment but instead use laboratory grade XRF equipment and techniques which obtain reliable and defensible data. However, field XRF equipment can sometimes be used as a reliable screening tool, particularly for confirmational testing where anticipated results are significantly different than clean up levels.

4. **Page 2-6.** Again the quality of the data is suspect and details on sampling procedures and data validity are not presented. In spite of this, the first paragraph notes some data did not include appropriate QA/QC controls but is considered valid by EPA anyway. Use of suspect data to make decisions that are associated with large costs, potential risks from unnecessary construction and traffic activities in the community is not appropriate. Actions such as those proposed by EPA in this EC/CA should not be based on suspect or indefensible data, or on assumptions that data is valid with no evidence to support the assumption. The use of data lacking sufficient QA/QC controls and/or documentation is not consistent with EE/CA guidance (EPA, 1993, see Comment 2 above).

What are "green moss areas"? This reference is not adequately explained. Entact, Asarco's contractor for water project work, has not reported an association with "green moss" and elevated lead.

A review of the data shows that most of the TCLP failures are for lead. Considerable information and literature exists that shows TCLP over-predicts lead mobility. For this reason, the EPA method 1312 (Synthetic Precipitation Leachate Procedure) is believed to be more representative of lead mobility and is used as a more representative measurement of lead mobility at several sites including Superfund sites in Region 8 (East Helena for example). In addition, groundwater studies typically show lead is not mobile in typical subsurface groundwater systems. The implied lead mobility in the EC/CA is probably over-estimated.

5. **Page 3-1 Removal Action Objectives.** Institutional controls as interim measures would be protective of human health and would be more appropriate in light of the fact consequences of removal and capping actions as proposed in the EE/CA are not known. See General Comment 1.

6. **Page 3-1 Selection of PRGs based on UBK Model.** Several studies throughout the country show that where paired soil lead and blood lead is available, UBK significantly over-predicts the relationship between soil and blood leads. Typical UBK predictions, using default values as would be the case for the Beckemeyer community, show a modeled relationship of about 7 ug/dl blood lead, per 1000 ppm soil lead. Based on available soil and blood lead data from several studies at a variety of sites with lead impacted soils, EPA concluded actual relationships in studies with available data were considerably less than predicted, with reported slopes of about 2 ug/dl blood lead per 1000 ppm lead (Marcus and Cohen, 1988). For soil concentration ranges of 1000 ppm or less, data from the East Helena Superfund site show no statistical correlation between actual soil and blood lead data while UBK predictions are considerably higher (Kleinfelder and Hydrometrics, 1994). Similarly, UBK predictions for Sandy City, Utah, indicated 29% of children would exceed blood lead levels of 10 ug/dl while no individuals tested had blood lead levels greater than 6.2 ug/dl (Woodward Clyde, June 1994).

7. **Page 3-2.** Use of numeric criteria based on sensitive aquatic species in the Great Lakes that are probably not present in intermittent drainages at the Beckemeyer site is not appropriate (See comments on PRGs and Risk Assessment, Kleinfelder).

8. **Page 3-4, Chemical Specific ARARs.** Guidelines such as Ontario Sediment Guidelines are not chemical specific ARARs and should not be listed or used as such. In addition, these guidelines have apparently been established for ecosystems in the Great Lakes area and probably are intended to address established aquatic ecosystems. The condition of man-made drainage ditches which are often dry with only intermittent flow is very different from areas which may contain sensitive species in established natural ecologies.

9. **Page 3-6, Endangered Species.** The Lake Carlyle Wildlife refuge is not located on the site, contrary to the statement in the EE/CA. It is extremely unlikely that mussel sightings in Lake Carlyle, or Bald Eagles are relevant to this site.

10. **Page 3-6, Removal Scope and Schedule - Objectives.** There is no evidence of "significant threats to human health and welfare" from cinders at the smelter property, nor residential soil, roads, alleys and walkways. Threats have been assumed based on assumed PRGs and based on sample data of which representativeness and quality is suspect. Blood lead sampling data collected in 1993 showed no evidence of health affects associated with cinders. With the exception of one child, all of the children sampled in the 1993 study had lead concentrations less than 10 ug/dl, and the geometric mean of the sample population was 3.84 ug/dl (see comments, biomonitoring data, Kleinfelder). The child exception had elevated blood lead concentrations that were attributed to lead paint in its living area.

    "Significant threats to the environment" are presumed because of application of inappropriate guidelines (see comment 8 above) and there is no evidence of actual environmental threats from sediments based on the data available nor based on visual observation.

11. **Figure 3-1.** The areas scheduled for removal are apparently over-estimated and are based on insufficient data, as well as confusion of cinders with some of the standard crushed limestone building materials. See General Comment 3 above. In addition, some of the available data was not included on the Figure based on a comparison with Appendix A.

12. **Figure 3-3.** See Specific Comment 1 above.

13. **Page 3-7, Vegetation.** A field review of the area shows lush vegetation growth in the pond area and little or none of the stress stated in the EE/CA. In addition, stress can be caused by a variety of factors that have nothing to do with metals from the Circle Site. The statements are inaccurate and misleading, and are an apparent attempt to justify a removal action where no data are available to support one.

14. **Pages 4-1 through 4-5, Removal Action Alternatives.** As stated in General Comment 1, the alternatives only consider removal with no consideration for appropriately more cautious and less extreme options that would be protective, less intrusive to the community and more cost effective as an interim measure until the site can be properly studied. (General Comments).

15. **Page 4-3, Removal Technologies.** Dredging is neither the most feasible nor cost effective option for sediment removal and more conventional excavation techniques (truck and backhoe) are more appropriate for dry to intermittent

drainages. In addition, other remedial options than excavation may be more appropriate. See General Comment 5 above.

16. **Pages 4-3 and 4-4, Treatment Technologies and Tilling.** TCLP overestimates lead mobility and treatment probably would not be required to protect groundwater from lead contamination. TCLP should not be used as an evaluation tool for in-situ soils. A more appropriate technique is SPLP Method 1312. (see Comment 5 above.

17. **Page 4-7.** For use of concrete in replacement walks, typical practice in most soil remediation projects is to replace like with like. If cinders are used as a walk or alley, typically a gravel aggregate would be used instead of concrete because of cost differences. Although additional effort may be extended for the purpose of good will or political reasons, typical remediation requirements are limited to like-replace-like efforts.

    A typographical error in the fourth complete paragraph: Alternative 5 should be Alternative 2.

18. **Page 4-7, Tilling.** Tilling to a depth of 8 inches is difficult and cannot be accomplished using conventional tilling equipment. Typical landscaping or agricultural tilling equipment are not effective below 4 to 6 inches. Deep tilling in areas south of the plant will require equipment that is not conventional, and equipment availability is in question. Other items to consider, particularly for the portion of this area that is residential:

    1. Many cable, telephone and buried irrigation installations are covered with less than 8 inches of topsoil.

    2. If the area, historically, has not been zoned, it is likely subsurface power, water or even sewer utilities could be breached by deep tilling operations.

    As discussed in General Comment 4 above, other actions than tilling, including fencing of company purchased properties, and institutional controls are more appropriate interim actions for the area south of the smelter.

19. **Pages 5-1, 5-2 and 5-3, Evaluation Criteria.** In spite of the evaluation criteria reference on Page 5-1, the detailed evaluation criteria presented is not consistent with that of the referenced EPA document, *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA,* (EPA 1993). Many sub-criteria for Effectiveness, Implementability and Costs are not included in the EE/CA document.

    An additional sub-criteria not considered in either the 1993 guidance nor properly considered in the EE/CA is the potential to interfere or affect the ability to implement future remedial actions if necessary. This criteria is a key component of an FS evaluation, and is also key for alternatives for the Circle Site. Of particular concern are potential impacts on metal mobility in groundwater associated with site capping actions. Existing groundwater conditions are not understood and proposed actions could affect groundwater contaminant mobility, a possibility which should be properly evaluated before implementation of any large scale site remedy that would include capping. (see General Comment 6). While some minor discussion on potential interferences is presented in Table 5-2 under Contributions to Remedial Performance, the discussion is not complete, presents insufficient detail, and improperly concludes no potential for conflicts with future remedial actions exist.

20. **Table 5-2.**

Unidentified short term risks include traffic and construction hazards to community residents, which are real and are particularly notable in a hastily planned excavation effort.

Protective of Health and Environment Risks are not documented and several actions other than removal would be protective as an interim measure until a proper assessment is made and a cost-effective action that would not have adverse environmental or economic consequences could be implemented.

Editorial Comments

1. **Table 3-1 Footnote 1.** There is no Technical Memorandum in Appendix A. Apparently PRGs are discussed in Appendix B. A PRG for lead should be listed or explained why it is missing from the table.

2. **Page 4-5, Alternative 2.** The language is unclear. How will sediment be used to evaluate attenuation. Does "use of sediments" mean use of sediment data?

3. **Page 4-6, Residential Area in Figure 4-1.** Figure 4-1 does not show the residential areas but instead shows plant areas. The figure number is not correct.

PROPOSED ALTERNATE PLAN FOR STUDY AND REMEDIATION OF CIRCLE SMELTING CORPORATION SITE BECKEMEYER, ILLINOIS

RESIDENTIAL AREAS - proposed alternate Interim Actions

- **Implementation of community protection measures** consisting of biological monitoring, a health intervention program, community education, and institutional controls. The program would be established in coordination with EPA, the Illinois Department of Public Health and the Village of Beckemeyer. This program would provide community protection while a necessary focused RI/FS is conducted to obtain site specific data and develop coordinated long-term solutions for the community. The community protection measures program would include:

  o **Biological Monitoring.** Blood lead screening would be provided for all children less than 72 months of age at least once per year or as directed by a project designated health care professional. Particular attention would be given to children between ages of 9 months to 36 months. Blood Screening would be provided to others upon request and review.

  o **Health Intervention**. Where children are found to have confirmed elevated blood lead levels above CDC guidelines (10ug/dl), sources of lead in homes will be assessed. The assessment may include soil, house dust, paint or water testing as appropriate. The program would work with affected families to provide guidance for behavioral changes and/or identify sources where exposures have been documented to have impacted blood lead levels. The program would be implemented working with the Illinois Department of Public Health.

  o **Community Education.** A comprehensive lead awareness and education program directed at physicians, daycare providers, elementary schools, and local contractors (building contractors and do-it-yourselfers) would be developed and implemented. Elements of the public education program include:

    - pamphlets,
    - brochures,
    - multimedia information, and
    - information enclosed with property tax and utility buildings.

  o **Institutional Controls** would be implemented in coordination with local governments and would:

- provide for proper disposal of lead contaminated materials,

- provide training on proper soil handling for public utility and municipal workers, and

- develop a long-term flexible approach to the abatement of lead sources and elimination of exposure pathways.

- **Preparation of a Focused RI/FS to obtain site specific data**. In accordance with *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (EPA, July 14, 1994), site specific information would be obtained to evaluate and help select appropriate remedies for the Beckemeyer site. Tools used to select a site remedy include site specific soil, blood and other media data, and EPA's IEUBK model. Although the model has been shown to be very conservative and overpredicts soil and blood lead relationships, EPA recommends its use as a tool to help evaluate action levels and remedial measures for lead impacted sites. One objective of the focused RI/FS would be to provide real world information which can be evaluated against the model, as well as provide realistic input data for the model.

  The RI/FS effort would include representative soil sampling that obtains data representative of alleys, roadways and walkways. Actual realistic exposure potential could then be estimated. Cinder types would be characterized for physical parameters, total metals, leachate potential, and bioavailability. This information would be used to explore all potentially successful remediation options including techniques such as amendments (phosphate addition or pH controls for example) as appropriate.

AREA SOUTH OF CIRCLE SMELTER SITE - Proposed Interim Actions

- Some properties in this area are owned by Asarco. Buildings in areas owned by Asarco would be removed, and the property would be fenced. Most of the area is densely vegetated and no further action would be required. Where grass cover is not present, revegetation would be implemented to minimize the potential for air or surface water transport.

- The auto wrecking/junkyard east of the Asarco owned properties would be considered an industrial area and obvious sources of lead and metals associated with activities at that site would have to be cleaned up or removed by the property owner before any remediation activities for this site are considered. The site is presently fenced and access is limited by the property owner.

- Residential properties west of the company-owned properties would be treated similar to the rest of the Beckemeyer area, and additional information and sampling conducted as part of a Focused RI/FS would be obtained to determine a permanent solution for these sites. In the interim, a community protection measures program would be implemented as outlined for residential areas in Beckemeyer (see Residential Areas, Proposed Interim Actions above) including the use of biological monitoring, health intervention, community education, and institutional controls.

DRAINAGE WAY SEDIMENTS - Proposed Alternative Interim Actions

Plant site surface soil conditions are probable sources of metals in drainage way sediments. Any interim actions involving sediment removal are likely to be repeated if final remediation of the plant site is not implemented concurrently or before removal. As described in comments above, remedial alternatives for the plant site should not be implemented until the groundwater system on and downgradient of the plant site is understood to avoid conflicts with potential groundwater remediation efforts, and to avoid a potential increase in metal mobility from site remediation actions such as capping (see General Comment 6 above). Proposed interim actions are:

- **Fence areas** that include Eastern Drainage, Western Drainage and the Portion of Unnamed creek between the drainages to prohibit access to highest concentrations. This could also include the formerly ponded area north of the highway.

- **Institute controls** including public education and warning/trespass signs.

- **On-going surface water and sediment sampling** over time to monitor long-term conditions.

A focused RI and FS should be completed to adequately evaluate remediation alternatives. RI/FS issues that must be evaluated are:

- Long-term storm water quality monitoring to assess present and post-plant site remediation sediment transport potential in drainage ways.

- Evaluate the potential for natural recovery (i.e. attenuation of surface metals) in drainage way sediments and water quality.

- Alternatives to sediment removal which could provide long-term protectiveness for human health and environment including:

    - Drainage way capping using gravel
    - Use of culvert and cover techniques

PRGs that are reflective of realistic drainageway human and environmental issues need to be developed. Actual human exposure is very limited and an assumption of residential type exposures is very unrealistic. Sediment PRGs based on sensitive species in aquatic environments in the Great Lakes are also unrealistic for intermittent drainages in heavily cultivated agricultural areas.

PLANT SITE - Proposed Alternative Interim Actions

- **Drainage Control Implementation** including erosion controls and sediment containment/catchment basins to contain future off-site transport of metal bearing sediment from the plant site.

- **Dust Control Program** including use of water trucks, and chemical retardants such as magnesium chloride, or other fixation chemicals to reduce the potential for wind transport of dust from the site. These control measures are common at active industrial, smelting, mining or reclamation sites where fugitive dust requires control.

- **Air monitoring program** including use of monitors to establish site baseline and background during interim actions and during final site cleanup.

- **Fencing** to prohibit transient trespass on the site and limit potential exposure to off-plant residents.

- **Demolition of retorts or other structures** that are mostly beyond repair, have little or no use value, and could impede future remedial investigation or remedial action efforts. Demolition should be contingent on RI/FS information. Debris would be stored on-site pending RI/FS evaluation.

- **Demolition of smoke wall and on-site storage of debris pending completion of RI/FS.**

The above actions are appropriate interim measures that address potential immediate exposure routes to human health and the environment, yet allow for necessary study to develop a remedial program that addresses long-term permanent solutions to human health and environmental risks. The proposed actions allow necessary freedom to properly evaluate site conditions with minimal potential for future interferences with necessary remedial investigations or long-term site actions.

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August 4, 1994

File #: 60-1361-01 A01

Mr. Donald A. Robbins
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3422 South 700 West
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Subject: Review of the Engineering Evaluation and Cost Analysis for the Circle Smelting Site, Beckemeyer, Illinois

Dear Don:

This letter presents our comments and recommendations concerning the report entitled *Engineering Evaluation and Cost Analysis, Circle Smelting Corporation Site, Beckemeyer, Illinois* (EE/CA). The review primarily focuses on aspects that affect the conclusions on health or environmental risk. Subsequent to our review, we provide recommendations on PRGs for remedial measures at this site.

Our evaluation indicates that a more site-specific approach would likely find lower risks which could be managed more effectively using an integrated approach that focuses on individuals based on the degree of hazard. Lead is the primary chemical of concern for which concentrations are highest in the cinder and clinker fill on the property and in residential areas. The hazard associated with this material is likely reduced by its large particle size and areal limitation to walkways and alleys. As for the plant site and adjacent wetland areas, a more detailed assessment is necessary in order to estimate impacts and appropriate remedial actions.

1.0 REVIEW OF THE EE/CA

1.1 General Comments

The EE/CA develops Preliminary Remediation Goals (PRGs) for rather extensive measures (e.g., soil excavation) based on a generic assessment of site risks. The evaluation of PRGs for various remedial measures would benefit greatly from a more detailed assessment of site risks, particularly for the drainage ditches, the smelter property, and the residential area affected by cinder and clinker fill. The methods used to develop the generic PRGs also differ from standard EPA guidelines, particularly for assessing noncarcinogenic effects of metals. Moreover, the list of final PRGs for soil and sediment appears to be applied to all areas of the site despite the differences in exposure and potential populations at risk.

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1.2 Specific Comments

Page ii, Preliminary Risk Evaluation, this paragraph in the executive summary states that cadmium was identified as an ecological concern because sediment samples exceeded sediment toxicity values. However, no sediment criteria values were ever presented for cadmium (see Table 3-1), and the report does not identify cadmium as an ecological concern based on the preliminary risk evaluation.

Page 2-7, first paragraph, the last sentence lists metals of primary ecological concern, but provides no justification or reference. At this point in the document, the selection of chemicals of concern has not yet occurred. Mercury is one of the chemicals listed in this sentence; however, it was not selected as a chemical of concern in the subsequent chapter.

Page 3-2, first paragraph, the calculation of risk-based PRGs based on early childhood exposure is inconsistent with U.S. EPA risk assessment guidance. Detailed comments on this issue are provided below for sections (Appendix B) discussing the calculations.

Page 3-2, Environmental Threat, the statement that the drainage ways have been affected by the site chemicals based on the observed biological indicators needs more explanation. A description of the type of ecological communities and potential receptors would be helpful for assessing the appropriateness of the PRGs and remedial actions selected. The Ontario guidelines which were used as PRGs for lead and zinc are reportedly based on "a severe effect on sensitive habitat." If such habitats or receptors are not present, these guidelines would specify unnecessary remediation. For example, many sensitive benthic organisms used in toxicity tests such as the amphipod, *Hyalella azteca* inhabit permanent water bodies (Burton et al., 1992). The drainage ditches, on the other hand, appear to contain water intermittently with a few standing pools on the west side. Observations by the 1993 EPA field investigation on habitat conditions could be misleading if the investigation was conducted during the period of record flooding. In addition, the toxicity of metals in sediment is largely determined by their bioavailability and ability to migrate to pore water in the sediments or to the water column. If the metals are from ore or mineralized forms, their solubility and toxicity would be greatly reduced. Clearly, an accurate assessment of the ecological impacts should be conducted before drastic measures such as removal of sediments should be considered.

Page 3-2, Environmental Threat, this paragraph indicates that the remediation goals for the drainage ways and associated wetlands will be developed based on biological information from a subsequent RI/FS. In the interim, Ontario Sediment Guidelines are proposed as numerical criteria. The next paragraph and Table 3-1, however, indicates that many of the recommended PRGs for sediment are based on the residential scenario or background levels. The Exposure Assessment (page 7, Appendix B) does not describe if incidental ingestion from sediment is a complete pathway for children or adults. If this pathway is incomplete, remediation of sediment and wetland soil to PRGs derived from residential exposure calculations would be inappropriate.

Table 3-1, the occupational PRG for arsenic is lower (more conservative) than the residential PRG in this table. Appendix B calculations indicate that the occupational PRG should be 3.27 ppm not 0.27 as shown in Table 3-1.

Table 3-1, this table and reference to this table in the text are unclear on whether the recommended PRGs for the smelter site are those calculated for industrial exposure or those listed in the "Final Recommended PRG Soil/Sediment" column, which were mostly calculated using residential exposure. The most appropriate PRGs for the smelter site would be those PRGs calculated based on exposure to an industrial worker.

Figure 3-1, some of the samples seem to be missing from this figure. For example, Appendix A reports samples S-9a and S-10a with lead concentrations of 31,000 and 29,000 ppm, respectively, which are not shown in Figure 3-1. In addition, the amount of area in which "cinders exceeding PRGs are present" is inaccurate. Based on the figure of sampling locations, much of the affected area has not been sampled and probably was identified in Figure 3-1 by visual inspection. Nevertheless, alleys and sidewalks may have been filled with gravel or limestone which might resemble the cinders. Several samples of the sidewalks and alleys do not show lead levels in excess of the 500 ppm PRG, indicating that the affected area and potential for exposure has been overestimated.

Appendix B, page 1, the second paragraph states that reasonable maximum exposure (RME) is evaluated using extremely conservative exposure scenarios which incorporate conservative and sometimes extreme exposure assumptions. Accordingly, an extremely conservative assumption has been made in assessing PRGs for noncarcinogenic effects of chemicals: lifetime reference doses are used to evaluate short-term exposure for a young child (see below for comment on page 9). Such extreme assumptions are inconsistent with the definition of reasonable maximum exposure as noted on the bottom of page 8 and top of page 9. The intent of RME, as discussed by the EPA Deputy Administrator and the Risk Assessment council (Habicht, 1992), is that risks should be presented as a range from central tendency to high-end risk (above about the 90th percentile of the population distribution). Bounding estimates or worst-case scenarios are not intended to be high-end risk estimates because "although it is possible that such an exposure, dose, or sensitivity combination might occur in a given population of interest, the probability of an individual receiving this combination of events and conditions is usually small, and often so small that such a combination will not occur in a particular, actual population." "This descriptor is intended to estimate the risks that are expected to occur in small but definable 'high-end' segments of the population" (Habicht, 1992). EPA guidance distinguishes between extreme scenarios that might be possible but are highly improbable, and those that are conservative but are more likely to occur within a population, with the latter being favored in risk assessment.

Appendix B, page 3, third paragraph, a reference and justification should be provided for the selection criterion of 10 percent of samples exceeding Illinois EPA background. Background concentrations of metals likely differ across the state. Consequently, Illinois EPA background concentrations may not be accurate for this site. Some consideration should also be given to the amount by which samples exceeded "background." For example, most of the six out of 25 samples of silver in excess of background barely exceed the background concentration. The highest of these samples at 13 and 14 ppm (S-9 and S-10) may be duplicates, in which case only five samples exceed background. According to the data in Appendix A, concentrations of all chemical in these two samples are relatively similar and S-10 is noted as "DUP." Figure 2-2 notes these samples at virtually the same location.

Appendix B, Page 3, third and fourth paragraph, the reason that chromium was selected as a chemical of concern is unclear. None of the chromium samples exceeded the Illinois EPA background concentrations for soil. Therefore, chromium does not require a PRG. Justification is also lacking for the form of chromium as trivalent.

Because the plant site and residential area differ in exposure pathways, potential receptors, and chemical concentrations, an identical list of chemicals should not have been developed for these two areas. Following the EE/CA's selection process, arsenic, cadmium, copper, cobalt, nickel, lead, and zinc would be selected for the plant site; and arsenic, antimony, copper, cobalt, nickel, lead, silver, and zinc would be selected for the residential area.

Appendix B, page 3, last paragraph, the statement that cobalt cannot be evaluated by "traditional or nontraditional" risk assessment methodology is inaccurate. The toxicity and potential for health effects associated with cobalt could be assessed by review and analysis of the toxicity literature. A more accurate statement would be that such an in-depth analysis is beyond the scope of the preliminary assessment.

Appendix B, Page 4, second paragraph, this paragraph implies that the hazard quotients of individual chemicals were added so that the hazard index equalled one. Examination of the values presented indicates that hazard quotients were not added. In addition, adding hazard quotients of chemicals is only appropriate if the chemicals affect similar target organs by similar mechanisms. Few if any of these chemicals would be additive below their reference doses. Consequently, this statement on additivity should be corrected.

Appendix B, page 4, fifth paragraph, the upper end of EPA's 10^{-4} to 10^{-6} "target risk" range is actually 5×10^{-4}, as noted in recent EPA Records of Decisions (U.S. EPA, 1993a) The statement that 1×10^{-6} is preferred misrepresents the national policy. A 10^{-6} risk is described by U.S. EPA (1990) as the point of departure, not the preferred end goal. Thus, use of a stringent risk level of 10^{-6} to set levels for permanent soil remediation seems like over-kill before the full remedial investigation/feasibility study is completed.

Appendix B, page 5, the last paragraph describes carcinogens as "chemicals that cause or induce cancer" and that "carcinogenic effects demonstrate a nonthreshold response mechanism." More precise wording would be that carcinogenic chemicals as a class are considered those that potentially cause cancer in humans and that for conservative regulatory purposes, the U.S. EPA assumes that carcinogens have no threshold below which the risk of cancer is zero.

Appendix B, Page 6, first paragraph, first sentence, not all chemicals which cause non-carcinogenic effects have a threshold level for toxic effects. For example, a threshold has not been established for the adverse effects of lead, as was mentioned on page 5.

Appendix B, Page 8, Step 2. Identification of Exposure Pathways, although this section presents the necessary steps in assessing whether a pathway is complete, the completeness of exposure pathways for the site are not evaluated. For example, page 9 identifies intermittent streams and associated wetlands as an exposure source, but does not identify whether this source is associated with potentially complete pathways for human or ecological receptors.

Appendix B, page 9, second and third full paragraphs, a small child is evaluated as the most sensitive receptor for the residential scenario; however, a long-term resident who was born at the site would receive more exposure including during the sensitive period of childhood. EPA (1991b) risk assessment guidelines specify an RME exposure duration of birth to age 30. The chronic reference doses also assume long-term exposure based on lifetime average body weight and intake rates. The EPA guidelines for soil exposure specify evaluation of two time periods within the 30-year exposure period. First, young children are evaluated over 6 years assuming a soil ingestion of 200 mg/day and an average body weight of 15 kg. Second, a 24-year exposure is evaluated for older children and adults assuming a 100 mg/day ingestion rate and an average adult body weight of 70 kg. Evaluating only for children results in a cleanup level 3.5 times more stringent than by using the standard EPA method (U.S. EPA, 1991b, Table 1).

Appendix B, page 9, fifth full paragraph, averaging exposure for noncarcinogenic effects only during ages birth to age six results in a high short-term estimate of a daily dose per body weight which should not be assessed using the chronic reference dose based on an average daily dose per body weight over a lifetime of exposure.

Appendix B, page 10, top of the page, a bioavailability of 100 percent is very conservative, especially for arsenic in soil for which EPA's policy has dictated 80 percent (Glass and SAIC, 1992; U.S. EPA, 1994b). The actual absorption from soil may be considerably less compared to drinking water which is the basis of the arsenic oral slope factor. Freeman et al. (1993) found that oral absorption of arsenic in smelter soils was only 24 percent of the dose resulting from intravenous injection, and 48 percent of oral gavage with arsenic in solution. A more recent study in monkeys (Freeman, 1994), has noted that absorption of arsenic in Anaconda smelter site soil and dust was 22 percent and 35 percent of oral gavage with soluble arsenic.

The effect of an 80 percent absorption factor, 30 year exposure period (age 0 to 30), and 5×10^{-4} risk level is an arsenic PRG of 230 ppm for residential. Similar assumptions for a 25 year working career result in an industrial PRG of 2,040 ppm.

Appendix B, page 10, noncarcinogenic PRG calculation, as noted above, because a short-term daily dose is used in this equation with the chronic reference dose, the equation effectively assumes that one could ingest a high amount of soil and weight 15 kg for most of a lifetime. This equation is inconsistent with EPA risk assessment guidelines.

Appendix B, Page 11, calculations, the averaging time should be listed in years not days. If the averaging time was actually in days, there would be no need to multiply it by 365 days per year.

Appendix B, Page 12, second paragraph, the first sentence, states that the lead model was run in reverse to calculate soil levels for lead. The model actually cannot be run in reverse. PRGs for soil are usually calculated by entering different soil concentrations into the model until the desired risk of exceeding the level of concern is reached. This method is described in Attachment B. Nevertheless, in actuality, 500 ppm appears to have been initially selected. This concentration was then run in the model with the result that the predicted percentage of the population was far below 5 percent exceeding 10 ug/dl. No further calculations appear to have been performed. If the model was run as described using the parameters presented in

TABLE 1
COMPARISON OF PRG CALCULATIONS

Chemical	EE/CA Calculations Residential (ppm)	EE/CA Calculations Industrial* (ppm)	Revised Calculations Residential (ppm)	Revised Calculations Industrial (ppm)
Antimony	31	818	110	--
Arsenic	0.52	3.27	230	2,040
Cadmium	78	2,044	--	2,040
Chromium	78,214	2,044,000	--	--
Cobalt	32	--	--	--
Copper	2,894	75,628	10,100	75,600
Nickel	1,564	40,880	5,480	40,900
Silver	391	10,220	1,400	--
Zinc	23,464	613,200	82,100	613,000

NOTES:

-- The chemical was not selected as a chemical of potential concern or lacked EPA toxicity criteria.

* The industrial PRGs presented here are the numbers calculated in the EE/CA. The EE/CA text is unclear on whether these were the final recommended PRGs for industrial soil.

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Attachment B, the model predicts that a soil concentration of 840-857 ppm results in the goal of 5 percent of the population predicted to exceed 10 ug/dl.

Appendix B, Page 12, third paragraph, the last sentence notes that the residential PRG for lead based on child exposure is also used as the PRG for industrial exposure. Although the residential PRG is certainly protective for adults in an occupational setting, it is likely to be overly conservative. Young children tend to have greater exposures to soil because of their hand-to-mouth behavior and greater inherent susceptibility to toxic effects of chemicals. Factors contributing to this susceptibility are: (1) more efficient absorption of many substances from the gastrointestinal tract than adults; (2) increased prevalence of dietary deficiencies such as calcium, an element that decreases lead and cadmium absorption; (3) higher metabolic rate relative to body mass; (4) lower doses resulting in adverse effects; (5) higher intake levels of soil; and a smaller body weight. The use of the model with child parameters thus overestimates exposure for adult workers. If just one of these factors, for example soil ingestion, was changed in the UBK model to a more reasonable exposure rate for workers (50 mg/day; U.S. EPA, 1991b), the soil lead concentration meeting the EPA goal would become 1,950 ppm.

At the very least, the upper end of the 500 - 1,000 ppm range for residential soil (mentioned in the second paragraph) could have been suggested. Recent developments in EPA guidance indicates that upper limits of this range for residential soil could be as high as 5,000 ppm (U.S. EPA, 1994a).

Appendix B, Attachment B, page B-1, first paragraph given the April 29, 1994 date of the EE/CA document, the version of the EPA UBK lead model used (0.5) is outdated. By late 1993, the EPA was providing the use of version 0.61 to parties conducting risk assessments at sites involving the EPA. Because the EE/CA was conducted for the EPA, the use of the outdated model seems odd. Version 0.99d is now available along with a new guidance manual (U.S. EPA, 1994d). The EPA, however, is using version 0.61 with the new default parameters from U.S. EPA (1994d) (e.g., U.S. EPA, 1994c), because version 0.99d has not been validated.

Appendix B, Attachment B, page B-1, fourth full paragraph, little effort was devoted to considering site-specific conditions which would affect certain exposure parameters. For example, exposure at the site would be reduced by the larger particle size and therefore lower bioavailability of the material in the alleys and sidewalks and the relatively small area affected within the neighborhood. Lead in interior dust would also be expected to be lower than in the walkways because migration of lead from the alleys and sidewalks seems to be minimal based on the sampling results.

2.0 SITE-SPECIFIC RECOMMENDATIONS

This section recommends site-specific concentrations for lead in soil which might be considered for various health-protective actions. These concentrations were developed using current U.S. EPA guidelines, the available scientific literature, and site data. Lead is the primary chemical of concern identified by the EE/CA, with the exception of a few copper samples in the drainage ways. Recalculation of the PRGs according to current U.S. EPA guidelines in the previous section (see review comments) likewise found that levels of the other metals were not a concern or would be addressed by actions to address lead levels.

The following evaluation presents the nature of exposure at the site, the available blood lead monitoring information, and calculations of soil concentrations for consideration of remedial actions.

2.1 Exposure Setting

The site includes four areas which differ in exposure and potential receptors. The areas include the residential area of the Village of Beckemeyer, the Circle Smelter property, the area to the south of the smelter, and the drainage ways and associated wetlands to the north of Beckemeyer.

2.2.1 Smelter Property

Sources of inorganic chemicals on the smelter property are coal cinders and clinker (termed cinder waste) and past smelter emissions. Cinder waste was stockpiled up to 15 feet deep on the smelter property. Some of this waste has lead concentrations up to on the order of 10,000 ppm. Stack and fugitive emissions from operations appear to be associated with lower soil concentrations of inorganic chemicals. The likely exposed population on the property would be workers. Exposure may occur from incidental soil ingestion or air exposure from dust onsite.

2.2.2 Residential Area in the Village of Beckemeyer

The main source of metals in this area is cinder waste located in walkways and alleys not widespread elevation of metals throughout the residential area including play areas and yards. Samples in excess of 500 ppm ranged from 509 to 50,000 ppm. Local residents including young children are considered the receptors of concern. The spatial location of the cinder material would tend to limit exposure to the youngest age groups (e.g., less than age six) who are considered the most sensitive subgroup for lead exposure. The coarse particle size of the material would also decrease transport into houses by air or by tracking and would decrease gastrointestinal absorption. Long (1993) notes that vegetative cover is present in many areas, including walkways, thereby reducing exposure. The area containing cinder waste with elevated lead levels may also have been overestimated by the visual inspection as indicated by the number of samples in Figure 2-2 of the EE/CA which showed relatively low levels in alleys and walkways. Limestone and gravel which may resemble cinder waste were likely also used as fill material.

In addition, the available sampling data suggest that concentrations of metals in the cinders do not appear to be migrating to other areas of the yard. The EE/CA data show that soil samples not associated with cinders were usually within background ranges for lead and that metals were limited to the upper few feet of soil where cinders were present. A study of a smelter slag used as gravel in driveways in Tacoma, Washington, corroborates the EE/CA findings that metals in cinder fill do not appreciably migrate to surrounding soil. The investigation found that metals concentrations dramatically decreased adjacent to the driveway resulting in little effect to yard soil concentrations (Keystone/NEA, 1991). The Tacoma study also found that the amount of driveway slag tracked into houses was greatly reduced by the large particle size of this material.

2.1.3 Adjacent Area South of the Smelter

The small area directly south of the smelter has received airborne emissions from the smelter property. This area includes industrial (e.g., salvage yard) and a few residential properties. Lead levels in the impacted area identified by the EE/CA are generally lower (less than 2,000 ppm) than the residential area where cinder waste was deposited. The type of exposure for this area differs from the rest of Beckemeyer in that the deposition of chemicals from the plant into soil would provide a larger affected area than for areas with only cinder waste in alleys and walkways. The particle size of lead in this deposition area may also be smaller than in cinder waste. By contrast with the smelter property and the residential area with cinder fill, the type of exposure in this area would be more similar to the default assumptions of the lead model which was run by the EE/CA. Nevertheless, the type of exposure and the exposed population should be considered before applying remedies based on default assumptions of child exposure.

2.1.4 Drainage Ditches

The drainage ditches, intermittent stream, and associated wetlands northwest of the smelter receive surface water runoff from the smelter property. The flow in the ditches is intermittent with some ponding in places in the west drainage ditch. Species that would likely inhabit these intermittent drainage ditches would be life stages of some insects and amphibians. Most of these organisms would not be sediment-dwelling and would be less sensitive than those that live in the sediments of permanent water bodies. According to the EE/CA, a study of environmental impacts "showed that the site contaminants had toxicological effects on root growth and invertebrates between the site and Beaver Creek." Information in the EE/CA is lacking to evaluate this result. If these tests were not performed on relevant species for the site, the results may not be representative of actual site effects. In addition, information on associated concentrations of copper and lead are not reported. Recommendations for this area of the site are that a more detailed evaluation be conducted of site-specific conditions before PRGs can be set and remedial measures decided.

2.2 Biomonitoring Data

A recent blood lead survey was conducted of residents of Beckemeyer as well as a few residents of other local areas by the Illinois Department of Public Health. Evaluation of these data and appropriate follow up actions are based on the Centers for Disease Control (CDC) guidelines. The CDC considers that a child with a blood lead level below 10 ug/dl is considered not to have a lead exposure problem (CDC, 1991). For children with blood lead levels above 10 ug/dl, the CDC recommends various degrees of screening, monitoring, education, intervention, and treatment depending on the amount of lead exposure (Table 2). The general level of concern for adults is 25 ug/dl, although a goal of below 10 ug/dl is also recommended for pregnant and nursing mothers.

The available blood lead results do not indicate a lead problem for children or adults in Beckemeyer (IDPH, 1994b; Long, 1993; Table 3; Figure 1). Blood lead samples were

TABLE 2
CDC SLIDING SCALE OF RECOMMENDED ACTIONS FOR CHILDREN AT VARIOUS BLOOD LEAD LEVELS

Class	Blood Lead Concentration (ug/dl)	Comment
All children ages		Pediatric health-care providers should assess children's risk for high-dose exposure at every office visit. Children considered at low risk should have blood lead testing at ages 12 and 24 months. Children at high risk should have tests every six months.
I	≤ 9	No special follow-up required.
IIA	10-14	Community education and community-wide lead poisoning prevention activities should occur if many children in the community have these blood levels. Blood lead should be screened more frequently.
IIB	15-19	Nutritional and educational interventions and more frequent blood lead screening should occur. If blood level persists, environmental investigation and intervention should be performed.
III	20-44	Environmental evaluation, remediation, medical evaluation, and medical treatment if needed.
IV	45-69	Medical intervention and environmental investigation and remediation.
V	≥ 70	Child has a medical emergency, hospitalize immediately. Medical and environmental investigation and intervention must begin immediately.

Source: Centers for Disease Control (CDC). 1991. Preventing lead poisoning in young children. U.S. Department of Health and Human Services.

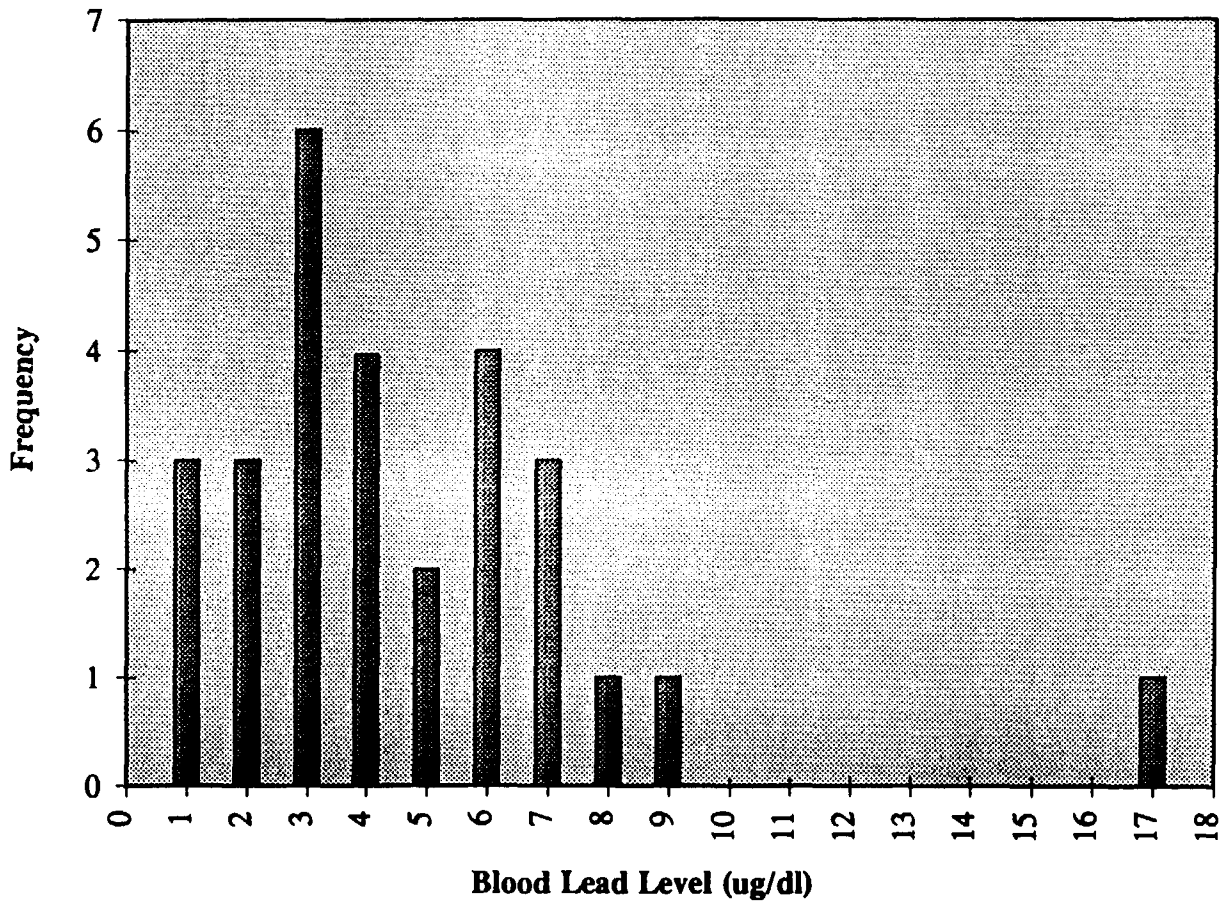
Table 3: Blood Lead Survey of Beckemeyer Children Birth to Age Six

	Blood Lead Level (ug/dl)
Number	27
Arithmetic Mean	4.21
Standard Deviation	2.11
Geometric Mean	3.63
Median	4.0
Range	<2 - 8.6

NOTES:
Excludes child with high blood lead level (17.4 ug/dl) due to house paint.
Half the detection limit was used for samples below the detection limit (2 ug/dl).

BECBLOOD.XLS (7/27/94)

Figure 1: Blood Lead Levels in Children in Beckemeyer



Note: The highest blood lead level (17 ug/dl) was caused by leaded paint and not smelter related activities.

collected on September 28 and 30, 1993 from 28 children age 6 or less living in the study area near the Circle Smelter site (Copley, 1994). All lead levels in young children were below 10 ug/dl, except for a child who was exposed to lead paint in the home (IDPH, 1994a). If the child with lead paint exposure is removed from the data set, the geometric mean blood lead for the children is 3.84 ug/dl (see Table 3 for other statistics). Blood lead levels are unlikely to be underestimated by these data because the survey was conducted in fall when blood lead levels are usually at their peak (late summer and fall). On the other hand, according to 1990 census data, the survey may have only measured about a quarter of the population of young children.

Blood lead levels of children age 7 to 18 were less than 10 ug/dl, and all adults had blood lead levels considerably below 25 ug/dl. All women had blood lead levels below 10 ug/dl, and the highest blood lead level in the study was measured in an elderly male at 12.9 ug/dl.

2.3 Calculation of Potential PRGs for Soil

Areas of the site which would benefit from a more site-specific evaluation of lead health risks and appropriate PRGs are the smelter property and the residential area affected by deposition of cinder waste (Village of Beckemeyer). Calculation of soil PRGs focuses on these areas of the site because exposures in these locations would differ greatly from the default assumptions of the UBK lead model.

2.3.1 Smelter Property PRGs

The likely population of concern at the smelter property would be industrial workers. The EPA has not developed a blood lead model or soil screening levels for adults, although the need for such guidance is mentioned in the recent EPA OSWER Directive for soil lead guidance (Laws, 1994). The EPA UBK model based on child biokinetic factors and intake rates is not appropriate for estimating blood lead levels in adults. The California Department of Toxic Substances Control (DTSC, 1992), however, has developed a spreadsheet model for both adults and children (California Lead Model). This model was used to evaluate adult workers at the plant site, where children would not be present. Default parameters were used in the California Lead Model with the exception of the air concentration which was changed from 0.01 ug/m^3 to the more conservative value of 0.1 ug/m^3 to agree with the UBK model and the assumption was made that no lead exposure would occur through eating vegetables grown at the site. The California Lead model assumes that an adult would be exposed to lead through soil contact, soil ingestion, inhalation, water ingestion, and food ingestion (See Table 4).

Soil PRGs were calculated by entering soil lead concentrations in the model to achieve a 95th percentile of the population at 25 ug/dl or a risk of 5 percent of exceeding 25 ug/dl. This blood lead level is recommended by the CDC as the level of concern in adults. A similar calculation was performed for 10 ug/dl for women who potentially may be pregnant or nursing. Resulting soil PRGs were 17,000 ppm at the 25 ug/dl blood lead level and 5,200 ppm for the 10 ug/dl goal. Remediation actions could be considered at these levels depending on the type of population present at the site. These calculations conservatively assume that the lead in soil from cinder and clinker is as bioavailable as lead in soil from combustion emissions or eroding paint. The target blood lead goal of 25 ug/dl is also more conservative

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TABLE 4
ADULT LEAD ASSESSMENT

Adults Males and Women Beyond Child Bearing Years

INPUT		OUTPUT					
MEDIUM	LEVEL		PERCENTILES				
LEAD IN AIR (ug/m³)	0.1	UNITS	50th	90th	95th	98th	99th
LEAD IN SOIL (ug/g)	17,000	BLOOD Pb, ADULT (ug/dl)	14.1	22.1	25.0	28.9	31.9
LEAD IN WATER (ug/l)	15						
PLANT UPTAKE? 1=YES 0=NO	0						
AIRBORNE DUST (ug/m³)	50						

Pathway	Blood Pb (ug/dl)	Route-specific constant		Concentration in medium		Contact rate	Percent of total
SOIL CONTACT:	3.32 =	1E-04 (ug/dl)/(ug/day)	*	17000 ug/g	*	1.85 g soil/day (5 g/m² * 0.37 m²)	24%
SOIL INGESTION:	7.48 =	0.018 (ug/dl)/(ug/day)	*	17000 ug/g	*	0.025 g soil/day	53%
INHALATION:	1.56 =	1.64 (ug/dl)/(ug/m³)	*	0.95 ug/m³	*		11%
WATER INGESTION:	0.84 =	0.04 (ug/dl)/(ug/day)	*	15 ug/l	*	1.4 l water/day	6%
FOOD INGESTION:	0.88 =	0.04 (ug/dl)/(ug/day)	*	10.0 ug Pb / kg diet	*	2.2 kg diet/day	6%

Women of Child-Bearing Age

INPUT		OUTPUT					
MEDIUM	LEVEL		PERCENTILES				
LEAD IN AIR (ug/m³)	0.1	UNITS	50th	90th	95th	98th	99th
LEAD IN SOIL (ug/g)	5,200	BLOOD Pb, ADULT (ug/dl)	5.6	8.8	10.0	11.5	12.7
LEAD IN WATER (ug/l)	15						
PLANT UPTAKE? 1=YES 0=NO	0						
AIRBORNE DUST (ug/m³)	50						

Pathway	Blood Pb (ug/dl)	Route-specific constant		Concentration in medium		Contact rate	Percent of total
SOIL CONTACT:	1.02 =	1E-04 (ug/dl)/(ug/day)	*	5200 ug/g	*	1.85 g soil/day (5 g/m² * 0.37 m²)	18%
SOIL INGESTION:	2.29 =	0.018 (ug/dl)/(ug/day)	*	5200 ug/g	*	0.025 g soil/day	41%
INHALATION:	0.59 =	1.64 (ug/dl)/(ug/m³)	*	0.36 ug/m³	*		11%
WATER INGESTION:	0.84 =	0.04 (ug/dl)/(ug/day)	*	15 ug/l	*	1.4 l water/day	15%
FOOD INGESTION:	0.88 =	0.04 (ug/dl)/(ug/day)	*	10.0 ug Pb / kg diet	*	2.2 kg diet/day	16%

* Multiply by

than the 40 ug/dl level specified under OSHA regulations which apply to workers exposed to lead in the work place.

2.3.2 *Beckemeyer Village PRGs*

The current EPA guidelines for lead in residential soil include the OSWER directive for revised interim soil lead guidance for CERCLA sites and RCRA corrective action facilities (Laws, 1994) and the Toxic Substances Control Act Section 403 rule (U.S. EPA, 1994a). Both guidelines specify a screening level of 400 ppm below which no further action is required other than possibly education. Both guidance documents clearly state that the screening level is not a cleanup goal. The screening level is intended as a trigger for deciding whether further study is warranted. Above this level, increasingly aggressive measures are taken to reduce exposure depending on the degree of risk. The OSWER directive specifies that risks are to be assessed based on the site information and the UBK lead model. Depending on the risks, both OSWER and the Section 403 rule allow a range of possible actions to be considered. Such actions do not necessarily require soil excavation and may include both intervention and abatement. Intervention may include institutional controls, education/public outreach, gardening restrictions, indoor cleaning and dust removal, or additional cover. Abatement may include soil removal, capping, isolation of lead paint, or other more permanent measures.

The available evidence (see also Long, 1993) for the residential area affected by cinder waste indicates that greatly elevated concentrations of lead are restricted to a large particle size material in limited exposure areas (e.g., areas were young children would be less likely to play frequently). Accordingly, the UBK model was modified to assess this type of exposure.

2.3.2.1 Model Assumptions for Lead in Soil

The EPA UBK model was used to calculate PRGs for soil by running the model for children from birth to age seven (0-84 months), following U.S. EPA's general procedures for other smelting and mining sites such as Butte, Montana, and Sandy, Utah (U.S. EPA, 1993b; U.S. EPA, 1994c). EPA version 0.61 of the model was used to be consistent with recent uses of the model at these other lead sites.

According to the operating assumptions of the EPA model, exposure inputs should be averages or other measures of central tendency (e.g., medians; U.S. EPA, 1994d). For this reason, use of reasonable maximum exposure values is not recommended because it violates the assumptions of the model and would cause scientifically invalid and overly conservative results. Site-specific data on blood lead levels, when available, should also be considered in assessing the possibility of health effects in the community.

EPA default exposure values were used unless more appropriate values could be determined using updated scientific or site-specific information (Table 5). Indoor dust concentrations and the bioavailability of soil and dust were revised according to site-specific evidence, while outdoor air concentrations, dietary intake levels, and soil and dust ingestion rates were updated to the recently recommended default values (EPA, 1994d). In addition, a range of geometric standard deviations were used in the UBK model and soil parameters were adjusted to account for the relatively small percentage of a child's exposure area which contains cinder waste.

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TABLE 5
EPA LEAD MODEL: EXPOSURE PARAMETERS AND INPUT VALUES

	PARAMETER	DEFAULT VALUE(S) FROM VERSION 0.61	VALUES USED FOR RESIDENTIAL BECKEMEYER
1.	Variation in air concentration by year (e.g., from age 0–7).	All yearly conc. are equal.	All yearly conc. are equal.
2.	Outdoor lead concentration (ug/m^3)	0.200	0.100
3.	Indoor air lead concentration (Percentage of outdoor air)	30%	30%
4.	Time spent outdoors (hrs/day)	1, 2, 3, 4, 4, 4, 4 *	1, 2, 3, 4, 4, 4, 4 *
5.	Ventilation rates (m^3/day)	2, 3, 5, 5, 5, 7, 7 *	2, 3, 5, 5, 5, 7, 7 *
6.	Lung absorption (percentage)	32%	32%
7.	Diet intake (ug/day)	5.88, 5.92, 6.79, 6.57, 6.36, 6.75, 7.48 *	5.53, 5.78, 6.49, 6.24, 6.01, 6.34, 7.00 *
8.	Alternative diet values	Not used.	Not used.
9.	Gastrointestinal absorption from diet (%)	50	50
10.	Lead concentration in drinking water (ug/L)	4.00	4.00
11.	Drinking water intake (L/day)	0.20, 0.50, 0.52, 0.53, 0.55, 0.56, 0.59 *	0.20, 0.50, 0.52, 0.53, 0.55, 0.56, 0.59 *
12.	Alternative water values	Not used.	Not used.
13.	GI absorption from drinking water (%)	50	50
14.	Soil lead levels (ppm; ug/g)	200.0	To be determined
15.	Indoor dust lead levels	Same as soil lead levels.	10% of outdoor soil + 100 ug/g per ug/m^3 from air
16.	Ingestion weighting factor (percent soil/percent dust)	45/55	45/55
17.	Amount of soil ingested daily (g/day)	0.10	0.021, 0.034, 0.034, 0.034, 0.025, 0.023, 0.021 *
	Amount of soil ingested daily (g/day)	0.10	0.085, 0.135, 0.135, 0.135, 0.100, 0.090, 0.085 *
18.	GI absorption from soil and dust (%)	30	20
19.	Paint lead intake (ug/day)	0.0	0.0
20.	Alternative paint values	Not used.	Not used.
21.	GI absorption from leaded paint (%)	30	30
22.	Maternal contribution method	Infant Model	Infant Model
23.	Mother's blood lead concentration at birth of child (ug/dl)	7.5	2.5
24.	Geometric Standard Deviation	1.42	1.35 – 1.6

* Value varies by age group. Values listed are for the following ages, respectively:
0–1, 1–2, 2–3, 3–4, 4–5, 5–6, 6–7

Indoor dust concentrations: The UBK model default indoor lead dust concentration recommended by the EPA for a multivariate source pathway is 70 percent of outdoor soil lead plus an additional 100 micrograms of lead per gram of dust for every microgram of lead in a cubic meter of air (ug/g per ug/m^3; U.S. EPA, 1994d). This relationship can vary considerably and may depend on the presence of other sources of lead dust in the home such as leaded paint, hobbies using lead, and airborne lead. The default percentage of indoor dust lead relative to soil lead was based on estimations at several lead sites: East Helena, 85 percent; Midvale, 70 percent; Butte, 26 percent; and Kellogg, 9 percent (EPA, 1994d). The 9 percent for Kellogg seems in error given the actual site document which reports a house dust percentage of about 100 percent of soil (Terra Graphics, 1990). Many of these sites are unrepresentative of the residential area of Beckemeyer, where the source of lead is cinders used as fill material. Because of the larger particle size of the cinders and the location of the cinders in the driveways and alleys, lead from the cinders is less likely to enter houses than would air emissions.

Factors which lower the ratio of indoor dust concentration of lead relative to outdoor soil or fill are whether an active or recently active air emissions source is present and whether the outdoor source is of large particle size such as slag or cinder waste. The indoor dust concentration of lead at Sandy, Utah, the site of three historical smelters, was estimated by the EPA to be 15 percent of outdoor soil based on the sampling data (U.S. EPA, 1994c). Indoor dust concentrations of arsenic in Tacoma, Washington, were at least 10 to 20 times higher in driveway slag than in household carpet dust (Keystone/NEA, 1991). The EPA risk assessment for this site assumed that the indoor arsenic concentration was 1 percent of the arsenic concentration in slag driveways (Glass and SAIC, 1992). For the residential areas of Beckemeyer, the indoor dust concentration was conservatively assumed to be 10 percent of the outdoor concentration in alleys and walkways with the additional default contribution from air lead of 10 ppm.

Gastrointestinal Absorption of Soil and Dust: Gastrointestinal absorption is expressed as the fraction or percentage of ingested lead that enters the blood stream. Oral absorption of lead in soil at Beckemeyer would depend on the form of lead, soil mineralogy, and particle sizes present. These factors affect biological availability (bioavailability) of the lead present for absorption into the blood. The EPA default absorption value for lead in soil is 30 percent. By comparison, animal studies of lead in soil have observed bioavailabilities of below ten percent in rabbits and rats (Johnson et al., 1991; Davis et al., 1992, Dieter et al., 1993; Freeman et al., 1992a,b) to as high as 44.7 percent in swine (Poppenga et al., 1991). The wide range in bioavailability may be due to interspecies differences among test animals and differences in the particle size, lead concentration solubility, lead concentration, and chemical form of lead at various sites. Factors which tend to increase lead absorption include dietary deficiency of calcium and iron, younger age, high stomach pH, longer stomach residence time in animals such as pigs, or fasting between meals versus feeding continuously (e.g., rats; Dressman and Yamada, 1991; Mielke and Heneghan, 1991; Mushak, 1991; Weis and LaVelle, 1991).

Adjustment of the default absorption factor has been performed by the EPA at the Bunker Hill Smelter site in Idaho, based on calibration of the lead model with blood lead data on local children. The default absorption rate (30 percent) and soil ingestion rate (100 mg/day) were reduced to 20 percent and 70 mg/day based on comparison of the UBK model results to the available blood lead data (U.S. EPA, 1990c).

Because of the larger particle size of cinder waste compared to lead found at most sites, lead from cinders are expected to be less bioavailable than lead at other sites (Long, 1993). For the residential areas of Beckemeyer, a value of 20 percent was conservatively used to account for the lower bioavailability of cinders. This absorption value is considerably higher than values determined for lead in soil at several other sites (Johnson et al., 1991; Davis et al., 1992, Dieter et al., 1993; Freeman et al., 1992a,b).

Geometric Standard Deviation (GSD): The PRG for soil determined using the UBK model represents an average soil concentration for a community or for an individual which results either in no more than 5 percent of the community exceeding 10 ug/dl or no more than a 5 percent chance of exceeding 10 ug/dl). Whether the model predicts an individual's risk or the community risk depends on the geometric standard deviation used in the model. Since a PRG usually defines the upper limit concentration before a specific remedial action, the soil PRG should be calculated on an individual basis rather than to be applied as an average for the community.

Sources of variability that the individual GSD should incorporate are differences in children's mouthing behavior, soil ingestion rates, or physiological processes, but not variation in environmental lead levels or other sources of variation throughout the community. Unfortunately, reliable measurements of individual GSD are for the most part unavailable and few indirect estimates have been published. One source of information is the GSDs that result after adjustment for variation in lead in air, soil, dust, water, and other environmental factors using multiple regression techniques. Such an analysis of six sites resulted in estimated GSDs of 1.24 to 1.37 (Marcus, 1988), and a recommended individual GSD of 1.35 (U.S. EPA, 1991a). The current default individual GSD is 1.6 based on the upper end of six analyses at five western mining and smelting sites reported adjusted GSDs of 1.30 to 1.63 (Marcus, 1992). This new default GSD is similar to recent community-wide variation in blood lead levels which indicates that either the individual GSD is overestimated or that variation in soil lead and other environmental lead sources has little effect on blood lead levels of children. Given the amount of uncertainty in an appropriate individual GSD, a range of GSDs was used from 1.35 to 1.6.

Yard Area: The UBK model default assumptions are likely to greatly overestimate exposure to lead in soil because elevated concentrations of lead are not located throughout the yard but are confined primarily to walkways and alleys. A similar situation occurred in Tacoma Washington where lead and arsenic containing slag was used in driveways, parking areas, and as ornamental rock. In the EPA risk assessment for Tacoma (Glass and SAIC, 1992), the assumption was made that the slag covered only 25 percent of the yard and that outdoor daily contact rates for slag are proportional to the area of slag within the exposure area. Following the methodology from Tacoma, 25 percent of EPA's current soil and dust ingestion rate default was used for the soil ingestion rate (see Table 5). The indoor dust ingestion rate remained the same as the default(1).

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(1) In reality, only a single ingestion rate may be entered for dust and soil. To acheive the desired results, the soil ingestion rate was decreased by 4 times and the concentration of dust (10% of soil) was increased by 4 times (40% of soil), which effectively results in

2.3.2.2 Results of UBK Model and Recommended PRGs

Results of the UBK model should be interpreted with caution because of the many uncertainties in its use, particularly in the case of exposure to cinder waste in walkways and alleys. For example, contrary to the high dependence of blood lead on soil lead predicted by the model, an EPA study of three cities found that remediation of outdoor soil had little or no impact on lowering lead levels of children (U.S. EPA, 1993d; Weitzman et al., 1993). The UBK model, however, is the preferred regulatory tool for assessing PRGs for lead in soil.

Based on the GSD range of 1.35 to 1.6, the UBK model predicts PRGs of 3,260 to 4,685 ppm as resulting in the specified risk goal of no more than a 5 percent risk of exceeding 10 ug/dl. These lead levels are approaching the 5,000 ppm trigger level under the TSCA Section 403 rule for soil abatement. Consequently, the UBK model results along with the blood lead monitoring data indicate that the degree of risk associated with lead in cinders is relatively low for the residential area compared to other sources of urban lead. Appropriate actions according to the OSWER directive for soil and Section 403 rule may include a program for public education and outreach, more detailed sampling of walkways and alleyways to assess lead levels, evaluation of the lead concentrations and amount of exposure area for homes where young children are present. A local child lead program could also include referral of all blood lead testing information to the local health department and follow up counseling and environmental investigation if warranted. For areas where young children are potentially exposed to cinder waste in excess of the calculated PRG (e.g., 3,260 ppm), potential actions may include covering of alleyways or walkways with additional gravel or other measures to limit exposure that fall short of complete abatement. At levels in excess of 5,000 ppm, more permanent physical actions should be considered such as paving the alleyways or walkways with asphalt.

3.0 SUMMARY AND CONCLUSIONS

The primary chemical of concern associated with the smelter site is lead, for which the levels are highest in cinder waste. The EE/CA document could be greatly improved with a more site-specific evaluation of the nature of exposure to this material. In addition, a more detailed assessment of the drainage ditches and wetlands area is necessary in order to assess ecological risks and appropriate remedial actions. Separate remediation goals for the smelter property versus the residential area should be considered. Specifically, such goals for lead should consider the reduced amount of exposure and risk for adult workers as compared to children which form the basis of the residential PRG. According to a lead model for adults, lead PRGs in soil for worker protection may range from 5,200 ppm to 17,000 ppm depending on whether women of child-bearing age are present. PRGs for lead in cinder waste in the residential area are on the order of 3,000 to 4,700 ppm, based on the reduced amount of exposure to this material as compared to lead in soil and dust throughout the yard and house. The available blood lead survey also indicates that exposure to lead in this material has not elevated children's blood lead levels above the CDC level of concern. Types of remedial actions to be

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allowing the ingestion rate for soil to be decreased to 25 percent of the original whereas the ingestion rate of dust remains the same.

taken may include education, intervention, or abatement measures depending on the degree of risk present.

Please do not hesitate to call me should you have any questions.

Yours very truly,

KLEINFELDER, INC.

Joyce S. Tsuji, PhD, DABT
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cc: Mike Thorp, Heller, Ehrman, White, and McAuliffe
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JOYCE S. TSUJI, PhD, DABT
Associate Toxicologist

Summary of Experience
Dr. Tsuji is Kleinfelder's Program Manager of risk assessment and toxicology. She is a board-certified toxicologist with over six years experience as a senior scientist and technical director in environmental consulting with responsibilities including direction of toxicological evaluations and risk assessments of chemical contamination, risk communication to regulators and the public, corporate quality assurance, and program development. She also has ten years experience in independent and collaborative research, and has instructed courses in environmental physiology, toxicology, and risk assessment at the university level. Dr. Tsuji is recognized as a technical expert throughout in the U.S. and in Australia.

Education
PhD University of Washington (Environmental Physiology), Seattle, Washington, 1986

BS Stanford University (Graduated first in Biological Sciences with honors and distinction; Phi Beta Kappa), Stanford, California, 1980

<u>Postgraduate Studies</u>
Mid-America Toxicology Course, Missouri (General Toxicology)
University of Washington (Pesticide Medicine)
Hatfield Marine Sciences Center, Oregon (Aquatic Toxicology)
Organization for Tropical Studies, Costa Rica (Tropical Ecology)

Professional Affiliations
Pacific Northwest Association of Toxicologists
Society of Environmental Toxicology and Chemistry
Society of Risk Analysis, Columbia-Cascades Chapter

Registration
Diplomate of the American Board of Toxicology, 1992

Grants and Awards
National Science Foundation Dissertation Improvement Grant
National Science Foundation Graduate Fellowship
Theodore Roosevelt Memorial Fund, The American Museum of Natural History
Gaige Fund Award, American Society of Ichthyologists and Herpetologists
Grant in Aid of Herpetology, Society for the Study of Amphibians and Reptiles
Graduate School Fellowship, University of Washington
Sigma Xi Award

Grants and Awards (continued)

Scholarships from the State of California and Stanford University
Phi Beta Kappa, Stanford University (awarded junior year)
Fox Fund Award for the Outstanding Graduate in Biology at Stanford University
Best Presentation Award in Comparative Physiology and Biochemistry, American Society of Zoologists
Best Presentation Award in Ecology, American Society of Zoologists

Select Project Experience

A selection of some of Dr. Tsuji's projects is included below.

Court-Appointed Expert on Health Risk Issues. Appointed as an expert to advise a U.S. district court on health risk issues related to lead, arsenic, and other potential inorganic and organic chemicals for an 11-square mile area of the city of Dallas, Texas. The study area included a former secondary lead smelter, several battery and metals reclamation facilities, numerous other industries, a large public housing project, single and multi-family private residents, and schools. The fate of present and future renovation and development of the area greatly depended on the outcome of this expert opinion on health risks.

Toxicological Evaluation of Cleaning Agents. Evaluated the toxicology of cleaning agents for a Fortune 500 company negotiating backflow device requirements with health authorities. Communicated the nature of the toxicity of the ingredients and compared exposure during a backflow event to other dietary or cosmetic exposures to these chemicals.

Technical Expert for Review of State Hazardous Air Pollutant Rules. Reviewed and provided comments related to toxicology and risk assessment for the proposed hazardous air pollutant rules in the State of Arizona. Participated in public hearings and communicated the latest scientific information to the Arizona Association of Industries (AAI), public interest groups, and the Arizona Department of Environmental Quality (ADEQ). Commended by both ADEQ and AAI for scientific contributions to the process and facilitation of consensus.

Senior Oversight, Sacramento Army Depot Risk Assessments. Provided senior review and direction on multiple risk assessments for operable units of the Sacramento Army Depot Superfund site. Risk assessments involved various sources of contamination and close coordination with the U.S. EPA and State of California toxicologists. The base-wide risk assessment is the first completed in U.S. EPA Region IX.

RCRA Risk Assessment for a Wood Treatment Facility. Conducted an evaluation of human health and ecological risks for a wood-treating facility bordering wetlands, a wildlife refuge, and a major tributary of the Columbia River. Primary issues of concern were transport of copper, chromium, arsenic, and polycyclic aromatic hydrocarbons, to the wetlands via contaminated groundwater. Soil sampling revealed these chemicals as well as petroleum hydrocarbons and dioxins. The potential toxicity of sediment samples was also assessed.

Select Project Experience (continued)

Risk Assessment, Former Boat Repair and Cannery Site. Conducted a preliminary evaluation of health and environmental effects of a former Pacific Northwest shipbuilding and cannery site that is being redeveloped into a resort. Issues of primary concern include petroleum hydrocarbon contamination in soil and the aquatic toxicity of tributyltin in marine sediments and in groundwater that discharges to the surface water in the harbor. Toxicity of tributyltin in sediments was evaluated using mussels and oysters as sensitive indicator species. Polycyclic aromatic hydrocarbons and lead were also elevated in subsurface soils and in groundwater. Potential human exposures include children playing on the beach and people eating seafood collected at the site.

RI/FS Risk Assessment, Copper Smelter, Tacoma, Washington. Directed RI/FS risk assessment projects for a copper smelter in Tacoma, Washington, including offsite residential areas and consideration of effects to off-shore aquatic life due to over eight metals in groundwater, surface water, and sediments in the adjacent bay. Activities also included negotiation of health issues with the EPA and risk communication to the public. Participated in a technical work group with EPA, the state, and NOAA to design and implement toxicity testing and assessment of sediment contamination. A few organic chemicals such as PAHs, PCB, and anilines were also a concern at the site.

Expert for U.S. EPA on a Wood Treatment Site. Served as an expert for the U.S. EPA in evaluating effects to human health and aquatic organisms due to organic chemicals (creosote, PAHs) and metals (e.g., copper, chromium, arsenic) in soil, groundwater, marine sediments, and surface water from a Pacific Northwest wood-treating facility. Dioxins and furans were also present in soil as a result of a retort fire.

Evaluation of Waste Disposal and Storage in a Watershed. Retained as an environmental toxicology expert by Whatcom County in a legal action filed by the county to cease storage of hazardous and solid waste on a property located within a primary watershed. Evaluated the potential chemical hazards at the property that might threaten the watershed.

Project Manager, Risk Assessment of a Reservoir in Montana. Served as project manager under a contract with the U.S. EPA for conducting a risk assessment of a reservoir in Montana contaminated by upstream mining and smelting activities. The site covers hundreds of acres involving potential impacts to aquatic life, the wetlands, bird life, and local drinking water wells. The risk assessment involved coordination among various agencies (U.S. EPA, the state, U.S. Fish and Wildlife, state Fish and Game), the public, and the Principal Responsible Party (PRP).

Senior Toxicologist, Risk Evaluation, Coeur d'Alene, Idaho. Retained as the senior toxicologist for a risk evaluation of mine tailings in Coeur d'Alene River and Lake. Provided technical input and risk communication regarding the likelihood of adverse effects associated with exposure to metals in surface water, fish, beach sediments resulting from over a century of tailings buildup from upstream mining. Communicated possible health concerns at a press conference.

Select Project Experience (continued)

Health Risk Assessments of Incineration. Directed multipathway risk assessments of hazardous and municipal waste incinerators. Researched the health effects of incineration ash. Incineration sites included New Jersey, Kentucky, Midwestern states, and Seattle. Chemicals of primary concern for potential risks were metals and dioxins and furans.

Review of the Scoring of Arsenic. Reviewed the scoring of arsenic by the Canadian Government's Substance Selection Committee which implemented the Ontario Ministry of the Environment Scoring System for Assessing Environmental Contaminants. Provided technical comments on the environmental fate and persistence, aquatic toxicity, and carcinogenicity of different arsenic forms.

Health Risk Assessment, Pesticide Warehouse Fire. Evaluated health risks associated with residential exposure to pesticides and herbicide releases as a result of a fire at a nearby grain silo and a warehouse containing over 100 agricultural chemicals. Emergency response action levels were developed to guide remediation of residential soil contaminated by surface runoff of water used in fighting the fire.

Assessment of Inhalation Risks at a Geothermal Plant. Provided senior review of a health evaluation of workers exposed to air levels of hydrogen sulfide, mercaptans, and other sulfur compounds at a geothermal energy plant. Issues of concern also included potential toxic interactions among these compounds.

Expert Witness for a Lumber Yard and Wood Treatment Site. Retained as an expert witness in support of litigation regarding the potential health effects and cleanup levels at an industrial site in Northern California involving various activities including lumber storage, wood treatment, wood products manufacturing, and railroad engine construction.

Toxicological Assessment of Carpet Glue. Researched the toxicology of the more than 22 ingredients in carpet glue for a glue manufacturer who was sued along with the carpet manufacturer, carpet installers, and landlord of a retail space in which tenants claimed multiple chemical sensitivity and other long-term health effects from short-term exposure to a newly installed carpet. Few of the alleged health effects were supported by the available toxicological literature.

Health Effects of Odors from a Wastewater Treatment Plant. As an expert for a city, evaluated the potential health effects associated with odorous chemicals (primarily hydrogen sulfide and mercaptans) associated with emissions from a wastewater treatment plant. A critical issue was the distinction between odor levels that are a public nuisance, possibly resulting in subjective effects in some individuals, but not the cause of clinically-defined adverse health effects.

Risk Communication on Lead in Drinking Water of Public Schools. Provided toxicological expertise and risk communication for a school district dealing with the issue of lead in drinking water of schools. Assessed the sampling data, recommended further testing and controls, and discussed the nature of the risks and solutions with school officials. Contributed to press releases and communication to parents.

Select Project Experience (continued)

Impact Analysis of Landfills. Provided senior direction of health and aquatic issues of groundwater impact analyses in support of a landfill closure and corrective action at landfills in California. Issues investigated included migration of volatile organic chemicals in groundwater to an adjacent bay where they might impact marine organisms and fishermen, and potential impacts to drinking water wells and irrigation water. Peer reviewed multipathway risks for two other landfills.

Toxicology Evaluation of PCBs and PAHs. Assessed the relative hazards posed by PCBs compared to PAHs at a coal gasification and metal recycling site. The study supported a de minimis settlement by the utility companies that had contributed transformers with residual PCB oil to the site.

Risk Assessment, Mine Tailings. Assessed the toxicity of mine tailings to cattle, and food chain transfer of metals in tailings to humans consuming beef or beef liver. Work was conducted in support of a project to use cattle to disperse grass seeds and fertilize tailings slopes for revegetation.

Assessed Effects of PCBs on Upland Soil and River Sediment. Assessed the adverse effects of PCBs and priority pollutants in uplands soils and river sediments on the environment (including aquatic organisms and associated terrestrial wildlife) and to public health at an industrial site that was to be redeveloped into a museum. Designed a tissue residue study of local fish and used the results to derive more realistic bioaccumulation rates for PCBs in sediment.

Risk Assessment, Petroleum Contamination from Fuel Storage. Directed a risk assessment of petroleum-related contamination of soil and groundwater at a state Superfund site in Washington. Risks were considered for commercial use of the site as well as for potential exposure to nearby users of private wells. The assessment included a detailed toxicity evaluation of volatile and semivolatile chemicals in gasoline and diesel fuel mixtures. Site-specific cleanup action levels were recommended depending on various engineering controls.

Health Risk Assessment, Queensland, Australia. Directed a health risk assessment in Queensland, Australia involving contamination of a residential area by previous industrial and disposal activities. This high-profile site was known as Australia's Love Canal. Chemicals of concern included lead, PAHs, PCBs, cyanide, chlorinated benzenes in groundwater, surface water, soil, and air.

Expert Witness for Lead Contamination, Victoria, Australia. As an expert witness for the Environmental Protection Authority of Victoria, conducted a focused risk assessment of lead contamination from a past battery recycling plant in Melbourne, Australia. Residential development had already commenced at the site without prior remediation. Played an instrumental role in justifying that health protective actions were necessary.

Select Project Experience (continued)

Assessed Bioavailability, Adverse Health Effect, Goldmine Site, Alaska. Assessed the bioavailability and adverse health effects of arsenic-containing ore and mercury contamination of an old goldmining site in Alaska that was turned into a children's playground. Negotiated site-specific approach for setting cleanup levels with the Alaska Department of Environmental Conservation. This study set a precedent for allowing higher cleanup levels because of low bioavailability.

Senior Oversight, Pesticide and Herbicide Contamination. Provided senior oversight of projects related to pesticide and herbicide contamination, including evaluation of health and environmental effects of pesticides and herbicides used by Northwest utilities on vegetation and on utility poles. Supervised expert witness work regarding a potential poisoning caused by an organophosphate pesticide, and the use of pesticides on school buses and likely effects on children.

Health Evaluations, Zinc Smelters. Conducted focused health evaluations of zinc smelters/refineries in Texas and Tasmania, including presentations of the results to regulatory officials and the news media.

Assessed Inhalation Toxicology For An Air Permit. Evaluated the inhalation toxicology of criteria pollutants and metals in support of an air permit hearing before the Texas Air Board for the modernized equipment proposed by a copper smelter.

Toxicology Expert on Acid Mine Drainage. Retained as an expert on the toxicology and health risk of metals associated with contamination of private wells by acid mine drainage in Arizona. Worked with county and state health officials to assess and communicate potential health effects indicated by well water sampling.

Risk Assessment of Petroleum Contamination. Assessed risks associated with PAH and petroleum hydrocarbon contamination from underground storage tanks at an industrial site in Massachusetts. This risk assessment provided the state regulatory agency with sufficient scientific justification to approve a limited cleanup for the protection of workers.

Health Evaluation of Indoor Air. Evaluated the levels of volatile organic chemicals in air within a commercial building in Southern California to assess whether volatile chemicals in groundwater were migrating into the building at levels of health concern for workers. Exposures were found to be below California worker health criteria.

Health Risk Assessments of Lead Smelters. Conducted health risk assessments of lead smelter sites in Montana, Utah, and Washington. Reviewed the health risks of smelters in Kansas City and Texas. The Montana site is an active facility, whereas the other sites are the former locations of smelters or milling activities. Evaluated biomonitoring data on residents and environmental sampling. Assessed impacts due to air, water, soil, and dust using the U.S. EPA uptake/biokinetic lead model. Chemicals of concern included lead, arsenic, and cadmium.

Select Project Experience (continued)

Health Issues Related to a Cadmium Refinery. Provided health risk and toxicology expertise for an active cadmium refinery in Denver, including review of risk assessments, evaluation of air emissions, interpretation of health data of residents, discussion of technical issues with the state agencies, and risk communication to the public. This site required environmental cleanup for cadmium, lead, and arsenic.

Risk Assessment of a Naval Shipyard. Examined the nature and extent of underground contamination at an abandoned naval shipyard in Northern California converted for residential use. Evaluated the potential for adverse health effects to future residents from long-term exposure to petroleum hydrocarbons, lead and other metals. Developed cost-effective, risk-based cleanup levels which were approved by the California Department of Health Services.

Risk Assessment of a Industrial Munitions Site. Directed human health and ecological risk assessment of lead, PAHs and explosive chemicals at a former industrial munitions facility. The site encompassed a large woodland area including small lakes and a salmon stream, and bordered a wildlife refuge and river delta. Ecological concerns included both potential aquatic impacts and risks to burrowing animals in the upland areas.

Evaluated Risks of Urban Storm Water. Directed a review and assessment of risks to public health and aquatic life due to urban storm water discharges in the Seattle area.

Risk Communication. Participated in public meetings and news conferences as a health risk expert; explained health issues to concerned parents at a day-care facility near a Superfund site.

Contingency Plan for Incineration of Oily Waste. Provided senior direction and review on a contingency plan for incineration of oil-soaked waste and debris associated with oil spill cleanup in Alaska. This work was performed for a major petroleum consortium in response to regulatory requirements.

Expert Evaluation of Groundwater Contamination. Evaluated the potential health risks of groundwater contaminated with volatile organic chemicals in support of a legal settlement for a property owner adjacent to a major Superfund site in Washington.

Review of the NPL Listing of a Mine Waste Site. Reviewed the National Priorities List ranking of a mine waste site in Idaho. Comments primarily focused on the lack of consideration of the bioavailability of arsenic and lead in the mine waste.

Various Projects, U.S. EPA. Directed projects for the U.S. EPA Technical Enforcement Support (TES) program. Responsibilities included direction of risk assessments for the EPA and oversight of potentially responsible parties (PRPs) conducting risk assessments.

Publications and Presentations

Recent Presentations

"Current Uses of the EPA Lead Model to Assess Health Risks and Action Levels for Soil." Rocky Mountain Lead, Arsenic Conference. Society for Environmental Geochemistry and Health. Salt Lake City, Utah. July 1994.

"Scientific Considerations in Using Aquatic and Sediment Criterion." The Second Annual Clean Water Act Conference. Puget Sound Water Quality Authority. Seattle, Washington. June 1994.

"From Mice to Men: How Risk-Based Cleanup Levels are Developed." The Science Behind Environmental Law. Washington State Bar Association Continuing Legal Education Committee and the Environmental Land Use Section. Seattle, Washington. February 1994.

"Toxic Exposure and Risk Factors." The Science in the Courtroom. Washington State Bar Association Continuing Legal Education Committee. Seattle, Washington. February 1994.

"Risk Assessments in Washington State." Invited Speaker for the monthly program of the Association of Women in Environmental Professions. Seattle, Washington. November 1993.

"Air Toxics and Risk Management Analysis in Arizona." Air Quality Technical Workshop. Arizona Association of Industries and Kleinfelder, Inc. Prescott, Arizona. August 1993.

"Effects of Chemical and Physical Form on the Bioavailability of Arsenic in the Environment." Poster presentation at the International Conference on Arsenic Exposure and Effects. Society of Environmental Geochemistry and Health. New Orleans, Louisiana. July 1993.

"Risk Assessment in Independent Cleanup Actions." Lecture for the Continuing Legal Education (CLE) International Conference on the Washington Model Toxics Control Act. Seattle, Washington. October 1992.

"Toxicological Basis of Absorption Factors." Presentation at the Annual Meeting of the Society of Toxicology, Seattle, Washington, February 1992.

"Risk Assessment of Residue Disposal and Utilization. Presentation at the Meeting of the International Ash Working Group." Rutgers University, February 1992.

"Advanced Issues: Risk Assessment Methodologies." Eighth Annual Hazardous Waste Law and Management Conference. Sponsors, U.S. Environmental Protection Agency, Region 10, University of Washington School of Law, 1991.

Presentations (continued)

"Evaluation of Impacts to Terrestrial Ecosystems: Opportunity for Ecotoxicologists." Coauthored poster at the Annual Meeting of the Society of Environmental Chemistry and Toxicology, Seattle, Washington, November 1991.

"Risk Assessment of Hazardous Wastes and Hazardous Materials." Invited speaker for the quarterly meeting of the Academy of Hazardous Materials Management, Pacific Northwest Chapter, Seattle, Washington, December 1990.

"Health Effects of Solid Waste Incinerator Ash." Symposium on Solid Waste Management, National Environmental Health Association, Seattle, Washington, June 1989.

"Essential Components of a Human Health Risk Assessment." Invited speaker for the Puget Sound Section of the American Chemical Society, Everett, Washington, April 1989.

"Application of Toxicology." Participant in a panel discussion. Pacific Northwest Association of Toxicologists, Annual Meeting, Moscow, Idaho, September 1988.

"Principles of Toxicology." Invited lecturer for the Hazardous Waste Managers Course. University of California Los Angeles. November 1987.

Recent Publications

Pascoe, G.A. and J.S. Tsuji, "Review of U.S. EPA's Assessment of Arsenic Skin Cancer Potency: The Issue of Threshold Carcinogenicity." 1994, in preparation.

Tsuji, J.S. and G.A. Pascoe, "The Toxicological Basis of Absorption Factors in Risk Assessment." Regulatory Toxicology and Pharmacology, 1994, in preparation.

"Are Hazardous Waste Site Edicts Over-Protective?" Puget Sound Business Journal 12(20):9A, 13A, 1991

Kalvig, B.A., L. Maggio-Price, J. Tsuji, and W.E. Giddens, Salmonellosis in Laboratory-Housed Iguanid Lizards (*Sceloporus* spp.)." Journal of Wildlife Diseases 27(4):551-556, 1991

Tsuji, J.S., R.B. Huey, F.H. van Berkum, T. Garland, Jr., and R.G. Shaw, "Locomotor Performance of Hatchling Fence Lizards (*Sceloporus occidentalis*): Quantitative Genetics and Morphological Correlates." Evolutionary Ecology 3:240-252, 1989

Publications (continued)

van Berkum, F.H., R.B. Huey, J.S. Tsuji, and T. Garland, Jr., "Repeatability of Individual Differences in Locomotor Performance and Body Size During Early Ontogeny of the lizard *Sceloporus occidentalis* (Baird & Girard)." Functional Ecology 3:97-105, 1989

"Seasonal Profiles of Standard Metabolic Rate of Lizards (*Sceloporus occidentalis*) in Relation to Latitude." Physiological Zoology 61:230-240, 1988

"Thermal Acclimation of Metabolism in Sceloporus Lizards from Different Latitudes." Physiological Zoology 61:241-253, 1988.

van Berkum, F.H. and J.S. Tsuji. "Interfamilial Differences in Sprint Speeds of Hatchling *Sceloporus occidentalis* (Reptilia: Iguanidae)." Journal of Zoology, London 212:511-519. 1987

Tsuji, J.S., J.G. Kingsolver, and W.B. Watt, "The in-Flight Thermal Physiological Ecology of a Butterfly (*Colias*), Oecologia 69:161-170, 1986.

Stevenson, R.D., C.R. Peterson, and J.S. Tsuji, "The Thermal Dependence of Locomotion, Tongue Flicking, Digestion and Oxygen Consumption in the Wandering garter snake." Physiological Zoology 58:46-57, 1985.

"Seasonal Changes in Standard Metabolism and Habitat Temperatures of *Sceloporus occidentalis* Lizards." Abstract, American Zoologist 26:136A, 1985.

Tracy, C.R., F.H. van Berkum, J.S. Tsuji, R.D. Stevenson, J. Nelson, B. Barnes, and R.B. Huey. "Errors Resulting from Linear Approximations of Heat Balance Equations in Biophysical Ecology." Journal of Thermal Biology 9:261-264, 1984.

Feder, M.E., A.G. Gibbs, G.A. Griffith, and J.S. Tsuji. "Thermal Acclimation in Salamanders: Fact or Artifact." Journal of Thermal Biology 9:255-260, 1984.

ASARCO

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M.G. King
Research Manager

August 4, 1994

Ms. Susan Pastor, P-19J
Community Relations Coordinator
Office of Public Affairs
U.S. EPA, Region V
77 West Jackson Boulevard
Chicago, IL 60604-3590

Re: Comments Relating to the Engineering Evaluation and Cost Analysis for the Circle Smelting Site, Beckemeyer, Illinois

Dear Ms. Pastor:

This letter discusses issues pertaining to the Engineering Evaluation and Cost Analysis (EE\CA) published by EPA for the Circle Smelting Site located in Beckemeyer, Illinois. This letter is divided into two sections. The first section sets forth comments applicable to the EE\CA generally. The second section discusses specific comments regarding the EE\CA.

GENERAL COMMENTS

Failure To Consider Site-Specific Information:

Available site-specific information such as blood lead data, special characteristics of smelter waste, and community acceptance information is not considered in the EE/CA. This information is crucial to proper characterization of the site and should be considered. Moreover, the two guidance documents most relevant to this site direct EPA to consider such information when determining appropriate remedial measures. See Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (USEPA 1994); Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (USEPA 1993).

Site-specific data are especially critical to this site since such data indicate that a less conservative removal alternative is warranted in place of the overly protective and inefficient alternative recommended by EPA. For example, blood lead results indicate that a lead problem does not exist in the Village of Beckemeyer. Additionally, exposure to smelter waste is limited and the waste is present in large particle sizes thereby reducing levels of lead in indoor dust and lead bioavailability. Furthermore, EPA has documented in the site Community Relations Plan (USEPA 1994) that the residents of Beckemeyer resent the presence of EPA and do not think a lead problem exists in their community as evidenced by the blood lead results. EPA's willful failure to consider these factors in the EE/CA is unreasonable and results in a recommended removal action that is arbitrary and capricious.

Recommendations Are Made Based On Insufficient Data:

EPA recommends that an extensive removal action take place in the residential area, the plant site, former pond area, and drainage ways, even though EPA recognizes that available information is insufficient to properly characterize these areas. For example, the EE/CA states that EPA does not have enough information to characterize the waste material, that an RI/FS is required to properly characterize the site, and that the subsurface conditions of the site and the potential for groundwater contamination is unknown. Furthermore, the EE/CA incorrectly characterizes some areas of the site such as the former pond area and drainage ways, and utilizes data that is not validated. If EPA conducts an extensive removal action as recommended in the EE/CA based on insufficient and inaccurate data, EPA will be acting arbitrarily and capriciously.

SPECIFIC COMMENTS

Executive Summary:

Page i: Introduction - The EE/CA states that EPA will provide a description of its rational behind selection of the recommended alternative in the Proposed Action Memorandum, EPA's final decision document. Refusing to disclose the rationale behind recommending an alternative until after the final decision document is published is manifestly unreasonable. Furthermore, not disclosing decisionmaking rationale in the EE/CA is contrary to EPA guidance. See Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA 1993) ("EE/CA Guidance"). This guidance directs EPA to clearly explain in the EE/CA its reasoning behind recommending an alternative. Moreover, it is unclear why EPA would chose not to explain its rationale when publishing its recommended alternative unless EPA does not yet have sufficient justification or rationale defined.

Page ii: Preliminary Risk Evaluation - EPA asserts that the Preliminary Remediation Goal (PRG) at this site for lead, 500 mg/kg, is based on applicable guidance documents. However, EPA does not reference these guidance documents. Furthermore, EPA should now utilize the EPA guidance recently published regarding lead in soil. This guidance is supposed to replace all soil lead guidance previously published. See Revised Interim Soil Lead Guidance for CERCLA Sites in RCRA Corrective Action Facilities (EPA 1994).

Site Characterization:

Page 2-6: Analytical Data Summary - Although many data sets did not include QA\QC samples, the data are assumed to be valid in the EE/CA. Such assumptions are contrary to EPA directives in the EE/CA Guidance which states that all data considered by EPA should be supported by QA\QC data. See EE/CA Guidance p. 28.

Page 2-6: Analytical Data Summary - EPA contends that areas around the Village of Beckemeyer that exhibit green moss are associated with elevated levels of lead and zinc. This conclusion is erroneous and unjustified. Entact, Asarco's contractor for the water main project, has determined that no connection appears to exist between the presence of green moss and elevated levels of lead and zinc.

Removal Action Objectives:

Page 3-2: Preliminary Risk Evaluation - EPA developed soil and sediment PRGs for both residential and occupational scenarios. However, EPA fails to utilize the occupational PRGs when determining the recommended alternative for the plant site. EPA does not explain its rationale for this omission, however, applying residential PRGs to an industrial site without a factual basis to do so is arbitrary and capricious.

Page 3-2: Human Health Assessment - The EE/CA states that the UBK "model predicts that a concentration of lead in soil of approximately 500 mg/kg would result in 0.85 percent of an exposed population having a level over the level of concern." This sentence is obviously incorrectly presented and it erroneously describes the risk posed by lead in the residential soil. It is disconcerting that EPA fails to correctly present and consider the human health risks associated with this site before recommending an extensive removal action.

Page 3-2: Environmental Threat - Although the EE/CA states that the site-specific remediation goals for cleanup of the drainage ways would be developed during a subsequent RI\FS, the recommended alternative proposes extensive sediment removal. EPA is recommending removal of the sediments without proper characterization of the drainage ways. Such a recommendation is unreasonable and unjustified.

Page 3-3: Statutory Limits on Removal Actions - EPA admits that, at this point, any removal action at this site will be fund-financed. Therefore, the twelve month\$2 million statutory limit is applicable to the recommended alternative set forth in the EE\CA. In order for EPA to undertake this removal action, estimated to cost $10.4 million, EPA must seek an exemption from the statutory limitation. EE/CA Guidance requires that EPA explain in detail how the recommended removal action will be exempted from statutory limits if such an exemption is required. EPA fails to include any explanation of the requisite exemption in the EE\CA. Furthermore, Superfund Accelerated Cleanup Model (SACM) guidance directs Regions to consult with EPA Headquarters regarding non-time-critical removals that cost over $5 million. See Enforcement Under SACM - Interim Guidance (USEPA 1992).

Page 3-4: Chemical-Specific ARARs - EPA explains that cleanup levels have been established at 500 mg/kg within EPA Region V. However, Region V should now consider the recent Interim Soil Lead Guidance published by EPA. Furthermore, EPA utilizes the Ontario Sediment Guidelines to identify levels of metals in drainage way sediments that will result in severe ecological damage. However, EPA does not state why these guidelines are applicable to the drainage areas surrounding the Circle Smelter site. The conditions between the two areas are drastically different. The drainage ways near the smelter site are ditches with intermittent stream flow that support limited habitat. In contrast, the Ontario guidelines are based on sensitive habitat related to permanent water bodies. To apply overly conservative guidelines without justification to so and in disregard of existing information is arbitrary and capricious.

ARAR Table 3-2: Page 2 - EPA incorrectly identifies the Corrective Action Management Unit (CAMU) policy as a relevant and appropriate classification. The CAMU rule is more appropriately classified as an applicable requirement. Furthermore, the land disposal restrictions and capping requirements are not applicable requirements as presented but rather are relevant and appropriate. If such requirements were considered applicable, the CAMU policy would be rendered ineffective since the land disposal restrictions and capping requirements would have to be met. Under the CAMU rule, land disposal restrictions and minimum technology requirements under RCRA are not triggered when placing RCRA waste within a CAMU.

Table 3-2: Page 3 - Occupational Exposure Standards are incorrectly characterized as ARARs. According to the EPA Compliance With Other Laws Manual, OSHA regulations are not ARARs. These regulations are addressed separately within the CERCLA statute.

Page 3-6: Location-Specific ARARs - EPA is implying that because there are reports of threatened or endangered species at the Lake Carlyle Wildlife Refuge, located five miles away from the smelter site, that these species are also present at the Circle Smelter site. EPA has absolutely no data to support such a conclusion and, therefore, making such an assumption is arbitrary and capricious.

Page 3-7: Areas and Volumes for Removal Actions - EPA declares that vegetation is stressed or not present in most of the ten acre area of the former pond. Based on Asarco's observations, this area is thick with vegetation and EPA is incorrectly assessing the condition of this area.

Evaluation of Alternatives:

Page 4-2: Institutional Controls - Consideration of institutional controls in the EE/CA is limited to air monitoring, dust suppression, and fencing. Not only are numerous additional institutional controls available, but other type of intervention actions also should be utilized. According to the recent Interim Soil Lead Guidance, intervention also includes education and public outreach, gardening restrictions, indoor cleaning and dust removal, or other type of cover. Further, this guidance states that intervention measures may be more appropriate than abatement at many sites. EPA should consider the wide range of intervention measures as described in the Interim Soil Lead Guidance when determining the appropriate alternative for this site.

Page 4-3: Disposal Technologies - The EE\CA incorrectly declares that treatment will be necessary to meet land disposal restrictions. However, under the current CAMU rule, land disposal restrictions would be inapplicable to remediation waste disposed of on-site. Furthermore, untreated waste may be placed on the smelter site without having to comply with the RCRA minimum technology requirements as long as the disposal techniques used are protective of human health and the environment.

Page 4-13 - Recommended Alternative 5: Residential Area - EPA fails to acknowledge that the UBK model is overly conservative. In fact, studies have documented that the UBK model significantly over-predicts the relationship between lead in soil and blood lead levels. Additionally, EPA fails to consider site-specific data when using the UBK model to determine the lead PRG for the residential area. When site-specific data are properly utilized in the model, a much higher PRG results. Some of the site-specific data that should be incorporated into the UBK model include information regarding bioavailability, cinder particle size, and indoor dust levels. Further, the EE/CA incorrectly states that the cleanup level is the same as the PRG, i.e., 500 mg/kg, without considering intervention actions such as institutional controls, education and other measures, and available blood-lead data. According to the Interim Soil Lead Guidance, lead cleanup levels should ordinarily be higher than the lead PRG after proper consideration of intervention measures and blood lead data.

If the UBK model is properly applied at this site, the cleanup levels for the residential area would be very similar to the cleanup levels developed under the Agency Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil (EPA 1994), i.e., the "Title X Guidance". According to the Title X Guidance, abatement of soil contaminated with lead is not necessary unless lead levels are above 5000 mg/kg. Intervention measures should be applied where children are present and soil lead levels are between 400 and 5000 mg/kg. If the presence of children is unlikely, intervention measures should be implemented where soil lead levels are between 2,000 and 5,000 mg/kg.

Although EPA states that the Title X Guidance should not be utilized at CERCLA sites, this mandate is not legally defensible. Lead levels below 5000 mg/kg do not suddenly pose a significant enough health threat to warrant removal just because a CERCLA site is involved where PRPs are available to pay for cleanups. Site-specific information should not change nationwide lead levels that are deemed hazardous. Contrary to what EPA claims, both the CERCLA Interim Soil Lead Guidance and the Title X Guidance were developed for the same purpose, to address hazardous levels of lead in soil. Therefore, the Title X Guidance should be applied at this site.

Drainage Ways - EPA does not justify its recommendation that sediments be dredged from the drainage ways. EPA assumes that the drainage ways contain sensitive ecosystems, however, such an assumption is not justified. Again EPA is making many conclusions based on insufficient data. Additionally, EPA dismisses natural recovery without any explanation or justification.

Plant site - Although EPA admittedly has very little information regarding the waste materials on the plant site, EPA is recommending an extensive removal action for the site. Additionally, even though EPA has recognized that it knows very little about the subsurface conditions of the site, EPA is recommending that a large portion of the smelter site be capped. Such a recommendation based on insufficient data is not only arbitrary and capricious but also ill-advised. To place a clay cap on the plant site without knowledge of the subsurface environment could result in increased mobility of metals in the saturated zone beneath the cap.

A focused RI/FS is necessary to determine the best remedial alternative for the plant site. Because the site poses little or no short-term health risk, utilizing institutional controls to limit access until further study of the site can take place is by far the best interim action available.

The EE/CA also recommends that the former pond be capped in the same manner as the plant site. Such a recommendation is unjustified. EPA claims that because the lead concentrations in the pond area are greater that 500 mg/kg, a direct contact protection measure such as a clay cap is warranted. However, under the Interim Soil Lead Guidance, many other types of intervention measures are available to limit contact to the pond area. Furthermore, EPA has not yet sufficiently studied the vegetation and condition of the former pond area to recommend any remedial alternative, let alone a clay cap that would destroy all existing vegetation. To cap this area prior to conducting a focused RI/FS would be arbitrary and capricious.

Without explanation, the EE/CA states that the CAMU policy will not be used at this site. However, according to the preamble to the CAMU rule, CERCLA sites such as this site are ideal for application of the CAMU rule. See 58 Fed. Reg. 8658, 8659 (1993). EPA should reconsider using the CAMU rule for any remedial action taken at this site since it allows more flexibility in selecting a remedy while still providing adequate protection to human health and the environment.

<u>Detailed Evaluation And Comparative Analysis Of Alternatives:</u>

Table 5-2: Page 5 - The EE/CA claims that the clay cap over the plant site and the former pond area would be designed to be compatible with a RCRA cap and, therefore, such a cap would

properly contribute to remedial performance. However, this conclusion is incorrect. Not only could the clay cap be more harmful than beneficial, the cap could conceivably require replacement during the final remediation phase. Such an impractical approach to remediation of the plant site does not contribute to remedial performance, cost effectiveness, or overall efficiency which is one of the primary goals of the Superfund Accelerated Cleanup Model (SACM). See Early Action and Long-Term Action Under SACM - Interim Guidance (USEPA 1992).

If you have any questions regarding the comments presented above, please contact me.

Very truly yours,

Donald A. Robbins by KAS

Donald A. Robbins
Director, Environmental Services

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ILLINOIS DEPARTMENT OF
PUBLIC HEALTH
A Healthier Today For A Better Tomorrow

John R. Lumpkin, M.D., Director

MEMORANDUM

TO: Manna Muroya, ATSDR
Region 5, Chicago

FROM: Tom Long, Toxicology Section TL

DATE: May 12, 1993

RE: Circle Smelting, Beckemeyer, Clinton County
Case #408268601H

==

In response to your memo of April 30, 1993, regarding the need for an immediate removal action at the above referenced site, Toxicology staff have reviewed the USEPA data provided as well as data available from IEPA and IDPH files. The latter information addresses past action at this site together with ongoing efforts or planned action. Based on the available data and in view of the exposure potential, we do not view this as a time critical situation and do not believe an immediate removal action is necessary or warranted. For any intended cleanup, whatever its extent, to be successful, it needs to be carefully planned and executed to avoid serious potential problems in terms of exposure and community relations.

The problem in Beckemeyer is viewed as non-time critical for several reasons:

1) In regards to the yard sampling within the village limits, aside from two "hot spots" (110 and 113), soil lead levels largely conform to expected air deposition and surface run-off patterns. This results in the highest concentrations being found north-northeast of the site, but generally away from populated areas.

2) While the two "hot spots" have had contour lines imposed around them indicating substantial contamination, it is our feeling that this misrepresents the situation. There is no evidence suggesting these dispersion patterns are accurate or even likely. The situation appears more characteristic of a localized use of waste material (slag?) as fill material rather than the result of a point source dispersion. This representation is confusing and ought not to be used. More information is needed to better characterize the extent and magnitude of the soil lead levels within the village limits. Some additional information will be available as the result of IDPH/IEPA efforts in the area to support the development of the health assessment.

3) Again, aside from the two "hot spots," the soil lead levels in the yards are generally below 500 ppm. This level is certainly above background soil lead levels based on local, state, national, and global data, but they are below levels of health concern (short- or long-term). Predictions of the Biokinetic Uptake Model aside, soil lead does not markedly contribute to body burdens of lead in adults or children. There is no benefit in removal of soil contaminated with lead in terms of reducing body burdens and may be some risk involved in terms of increased exposure to lead as well as other hazards. An indiscriminate removal action based on soil lead levels is inappropriate in the absence of more thorough site characterization.

4) There is vegetative cover in many areas, including the walkways which limit soil contact and hence exposure. Additionally, much of the highest contamination results from use of waste materials in walkways, alleys, and possibly roads. This material is often of a size and form which reduces the likelihood of lead exposure and/or absorption. Consideration should be given to better characterizing lead levels in relation to particle size, dislodgeability, and lead species involved. First attention should be given to alleyways which are unvegetated, in which the waste material may have been crushed by vehicular traffic, and which may be attractive play areas for children.

5) Limited biomonitoring of children and adults in close proximity to the site has been conducted in the past. Even considering the most current CDC guidance on blood lead levels, there was no indication of unusual exposure or body burdens.

6) Little or no groundwork for a removal action has been laid with local residents or officials. Experience dictates that prior community relation work is essential to achieving cooperation and a successful conclusion to any effort undertaken. IEPA has begun this process and we are planning to coordinate our efforts accordingly.

7) The largest exposure potential results from fugitive dust emissions at off-site tracking from the facility and associated waste areas. The surface run-off may pose an ecologic risk as well. Fortunately, as previously stated, deposition is largely away from populated areas. Control of these releases, however, would prevent further contamination of surface waters and sediments, farmland, roadways, and adjacent residential yards.

In light of the above, a time critical situation does not appear to exist at this site. Any remediation which is determined to be necessary in residential areas (i.e., removal of yard "hot spots," replacement of walkways, etc.) should only be done after careful consideration of the extent and magnitude of the lead contamination as well as the possible impacts of remedial action. Since there is multiple agency involvement at this site, it is further important to coordinate efforts and identify appropriate goals to make efficient use of resources and avoid misunderstandings and/or public confusion or fear. The following recommendations are made for this site:

1) Early and proactive community involvement and education should be undertaken. Since IEPA has a history with this site, has conducted prior outreach in the community, has a proven track record of success, and is interested in this site, they should take the lead and plan for a meeting or meetings in the near future. IDPH has not pursued its plans for sampling in order to coordinate with IEPA and utilize their resources. IDPH, however, plans to conduct physician and health professional education in the area regarding lead and associated contaminants in the very near future.

2) Additional sampling (a statistically valid sample) of the area to verify the extent and magnitude of the lead contamination is necessary. Special attention ought to be given to unvegetated and/or high traffic areas, especially alleys which may have incorporated slag material in their construction or maintenance. Information on contaminant characteristics (particle size distribution, solubility, dislodgeability, and lead species) would help determine exposure potential and bioavailability. IDPH has planned to collect additional soil samples in the area to address some of these issues, but may defer to IEPA if additional sampling is planned which will be useful in the health assessment process. IDPH does plan to take interior dust samples, paint samples, and water samples to account for potential confounders in citizen exposure.

3) Efforts should be made to control air and water releases from the site as well as to control the on-site waste in order to prevent untoward exposure or further environmental degradation. In this same light, IEPA ought to work closely with the city to ensure that planned public works renovation this summer does not disperse contamination or result in otherwise avoidable exposure to leaded dust.

4) Biomonitoring of the population, specifically children, ought to be carried out in the area to supplement earlier findings. IDPH plans to carry out a lead screen in conjunction with ATSDR as soon as possible. IDPH would like to coordinate with IEPA's community relation effort to maximize results and avoid confusion.

I trust the above is sufficient for your needs and clarifies our opinion regarding this site as well as our plans for completion of the health assessment and any ancillary activities. Please contact me if further information is required or questions remain.

cc: IDPH Regional Office, Edwardsville
Tom Krause-IEPA, Springfield
Stan Black-IEPA, Springfield
Jim Jansen-IEPA, Springfield
Ken Mensing-IEPA, Collinsville
Bill Greim-ATSDR, Atlanta
File

Results of IDPH September 1993 Beckemeyer Area Blood Lead Screening
(Detection Limit = 2.0 micrograms/deciliter)

Age Range	# Individuals		Rate of Partici-pation	Blood Lead Levels (μg/dL)			
	Town 1990	1993 Screen		BBL Range	Mean ND=1.9*	Mode (#)	Median
0-5	96	24	25%	ND-8.6, 17.4	4.9	ND (3)	3.9
6-9	77	36	47%	ND-6.6	3.2	ND (5)	3.1
10-13	77	36	47%	ND-6.7	2.9	ND (8)	2.5
14-19	162	16	10%	ND-5.4	2.5	ND (9)	1.9
20-29	150	27	18%	ND-11.2	3.0	ND (11)	2.2
30-39	151	47	31%	ND-11.8	3.6	ND (8)	3.0
40-49	106	24	23%	ND-5.8	3.1	2**	2.9
50-59	95	19	20%	ND-10.5	5.0	4***	4.8
60-69	109	12	11%	ND-6.9	4.5	NONE	4.3
70+	124	7	6%	3.4-12.9	7.0	NONE	6.7
Total	1070	248	23%	ND-17.4	3.6	ND (49)	3.1

* = results below the detection limit were included as 1.9 mcg/dL
** = bimodal ND (2): 2.5 (2)
*** = four modes 3.9 (2): 4.8 (2): 5.2 (2): 5.3 (2)

STATE OF ILLINOIS

DEPARTMENT OF PUBLIC HEALTH
Bernard J. Turnock, M.D., M.P.H.
Director

M E M O R A N D U M

TO: Concerned Parties

FROM: Tom Long

RE: Circle Smelting, Beckmeyer, Illinois

DATE: May 6, 1987

Confidentiality requirements forbids the release of medical information that we gather or receive. I am therefore required to delete identifiers from the copies of letters sent to outside agencies or individuals. In order to facilitate your understanding of the blood level tests, I have assembled the pertinent data in terms of age, sex, and blood lead or EP level.

	SEX	AGE	BLOOD LEVEL (MCG%)	EP LEVEL (MCG%)
1.	Male	13	7	-
2.	Female	53	11	-
3.	Male	28	22	-
4.	Female	35	9	-
5.	Female	17	8	-
6.	Female	9	15	-
7.	Female	14	7	-
8.	Female	11	14	-
9.	Female	31	5	-
10.	Female	29	7	-
11.	Female	45	7	-
12.	Male	6	9	-
13.	Male	10	10	-
14.	Female	8	6	-
15.	Male	31	12	-
16.	Female	3	-	18
17.	Female	1(?)	-	26
18.	Female	22	5	-
19.	Male	22	12	-
20.	Male	1	-	24

Please contact me if questions arise.

TL/60P/9948P

535 West Jefferson Street • Room 450, Springfield, Illinois 62761 • (217) 782-4977
100 West Randolph Street • Suite 6-600, Chicago, Illinois 60601 • (312) 917-2793

April 29, 1987

Mr. & Mrs. [redacted]
[redacted]
Beckemeyer, IL 62219

Dear Mr. & Mrs. [redacted]:

We are pleased to inform you that the results of testing we performed on March 19, 1986 indicates no excess in blood lead concentration in your family. According to the National Centers for Disease Control (CDC) 1985 Standards, "an elevated blood lead level, which reflects excessive absorption of lead, is defined as a concentration of lead in whole blood of 25 mcg% or greater." Levels permissible in occupationally exposed persons are somewhat higher, and blood levels which indicate acute or symptomatic lead poisoning are generally much higher (100 mcg% or more).

The blood lead levels measured in [redacted] and [redacted] are 12 mcg% and 5 mcg%, respectively. These are well below the standard level of 25 mcg%, and are considered within normal range.

In addition, [redacted] was given a screening test (finger-stick) not given to his parents. This test is called an Erythocyte Protoporphyrin or "EP". For this test the CDC has determined that 35 mcg% is the lowest amount that may be considered "abnormal". I would like to stress that this test does not measure lead; it measures a natural substance in the red blood cell which may increase when blood lead is increased. When this test gives an abnormal result, further evaluation is necessary to determine if that abnormal result is caused by a high amount of lead in the blood (by taking a blood lead test), or if the test was abnormal for another reason such as iron deficiency anemia.

[redacted] had a blood EP of 24 mcg% which is much lower thanlthe 35 mcg% upper limit standard, and is only very slightly higher than the average result for this test of 20 mcg%. We feel at this time, further testing for Travis is unnecessary. Given his young age and the potential for lead exposure in his environment, however, we would encourage you to have him checked (periodically) by a pediatrician or family doctor in the future to make sure that his blood lead and/or EP stays within normal range. A rise in the results of these tests could warn of exposure to lead later in his childhood. At this stage of his life, the best way to treat such exposure is to prevent it; we hope that the following information will be helpful in allowing your family to minimize the risk of lead which is present in the environment.

Blood lead tests such as were done on members of your family are like a snapshot of your lead exposure. They can tell us whether the amount of lead your body is now handling is too high. They cannot tell us how much lead you have been exposed to during your lifetime, nor can they protect you from future lead exposures. The fact that no one presently is suffering from excessive lead exposure means that you are "doing something right." With continued good sense and an awareness of risks for exposure, you may avoid any problems due to the background level of lead in your environment now or anywhere you might live.

To protect individuals from lead it is important to:

(1) Watch toddlers carefully as they have a natural tendency to explore and may put dirt or other non-food items which may be contaminated in their mouths. Just crawling in dirt or handling dirt may increase their exposure since this age group has frequent hand-to-mouth behavior. Keeping a house as clean and free of dust as possible will also minimize a young child's exposure to lead contained in dust.

(2) Eliminate household sources of lead such as old paints, peeling paint or paint chips, lead pipes, or burning painted wood as fuel.

(3) If work exposure to lead is expected, be very careful not to bring lead home on clothes or shoes. It is suggested that people who work in industries, such as smelting, change clothes before coming home to their family.

(4) Provide regular balanced meals. Malnutrition, calcium deficiency, and iron deficiency can make a person more susceptible to lead poisoning. Adequate amounts of lowfat milk, protein, and vegetables will contribute to good nutrition. A diet high in fats or overuse of vitamin and mineral supplements is not recommended.

(5) If an individual is experiencing health problems, alert your doctor to the possibility of lead exposure. The symptoms of lead toxicity are sometimes vague and it helps if the doctor is made aware of specific risks you may have.

(6) If an individual becomes seriously ill with any of the following symptoms: severe weakness (particularly in the extremities), clumsiness, stomach cramping, convulsions or seizures, or difficulty staying awake or speaking, then seek immediate medical attention.

Another question that has come up pertains to the safety of feeding families with the vegetables grown in backyard gardens or meat raised in the proximity, given the elevated levels of metals found in your soils.

Plants have been shown to absorb lead and other metals from the soil as they grow. It is believed that the majority of the lead absorbed in this way ends up in the leaves or green parts of the plant, a medium amount is distributed in the roots, and the least in the fruit or seed of the plant. For this reason, it is thought that leafy vegetables, such as lettuce and spinach, may be the most lead dangerous; tubers, such as turnips or potatoes, carry a medium risk; and fruits, such as tomatoes and corn, are the safest.

Uptake by the plant in all its parts is directly related to the amount of lead in the soil, so in badly contaminated soil, none are totally "safe". Because of your close location to the smelting industry, your soil contains more metals than would be normally present in areas that grow crops used as food. However, such levels of metal are far from unusual in urban areas that are near busy streets or freeways (from the exposure to car exhaust, industrial sources, and the like).

No one can say for certain that eating plants grown in these soils is going to harm any person individually. We have reviewed your situation along with experts from the Centers for Disease Control in Atlanta, Georgia and the University of Illinois at Champaign-Urbana. It is our collective opinion that, given the soil levels of lead, cadmium, and zinc detected in IEPA testing, there is little chance of adverse effects from consuming properly cleaned and prepared fruits and vegetables (fresh or canned) from your garden. This is particularly true if your garden provides the majority of your family's vegetables and fruits. In this instance, it is more important to be provided proper nutrition than to risk malnutrition because of a relatively minor exposure.

In terms of the pork raised on contaminated soils, it is our opinion that the meat will generally contain acceptable levels of the metals of concern; however, we would recommend not consuming organ meat, particularly kidney or liver.

I hope that this information is useful in helping you understand your blood test results as well as answer some of the general questions that have been asked. If there is anything that is of further concern, or if there are any further questions, please contact me at the above address.

Sincerely,

Thomas F. Long
Senior Environmental Toxicologist
Environmental Toxicology Program

cc: Dennis Newman, IEPA-LPC
Division of Environmental Health, Region 4
Mildred Fort, Childhood Lead Screening Program
Central Office File

52P/8732Pd1b

Illinois Department of Public Health

NEWS RELEASE

FOR IMMEDIATE RELEASE

CONTACT: 217-782-5750
TDD: 800-547-0466
FAX: 217-782-3987

SPRINGFIELD, IL, March 11, 1994 -- The Illinois Department of Public Health today announced that blood tests of Beckemeyer residents found no evidence that exposure to emissions from the Circle Smelting Site in Clinton County resulted in elevated blood lead levels.

Of the 223 Beckemeyer residents who took part in the Department's blood lead screening clinic in September 1993, only one child had an elevated blood lead level and that was determined to be as a result of lead paint in the home.

No lead was detected in 45 of the blood samples tested, while 177 specimens had blood lead levels below state and federal thresholds at which people are considered to have lead poisoning.

The acceptable blood lead level for children is below 10 micrograms of lead per deciliter of blood. The level of concern for adults is 25 micrograms of lead per deciliter of blood and above.

The U.S. and Illinois Environmental Protection Agencies have found evidence of lead contamination in Beckemeyer's soil and surface water associated with industrial emissions from the Circle Smelting Site, which has been in operation since 1904. The contamination, which does not affect the community's drinking water supply, raised community concerns about whether lead in the environment presented a risk, especially for children.

-- more --

ILLINOIS DEPARTMENT OF
PUBLIC HEALTH
A Healthier Today For A Better Tomorrow

John R. Lumpkin, M.D., Director

CONFIDENTIAL

October 21, 1993

<<MARK>>
<<MARK>>
P.O. Box <<MARK>>
Beckemeyer, IL 62219

Dear <<MARK>>:

Thank you for your participation at the Illinois Department of Public Health Lead Clinic held at the Beckemeyer Grade School during the last week of September, 1993.

We are pleased to report that the blood lead levels in the participants from your family were within acceptable ranges, which included:

Name	Blood Lead Level (µ/dL)
<<MARK>>	

If you have any further questions, please call Cathy Copley at the Illinois Department of Public Health, Edwardsville Regional Office at (618) 656-6680.

Sincerely,

Michael Hungerford, P.E.
Regional Engineer

535 West Jefferson Street • Room 500 • Springfield, Illinois 62761
100 West Randolph Street • Suite 6-600 • Chicago, Illinois 60601

CLINTON COUNTY BLOOD LEAD LEVEL RESULTS (9-28-93 or 9-30-93)

Venipuncture blood lead level (mcg/dl)	Participant age on date of blood sample	Sex	Participation number
.	9	F	128
.	15	M	044
.	33	F	245
.	5	M	247
.	37	F	241
.	18	F	180
.	23	F	115
.	68	F	103
.	21	F	025
.	32	M	135
.	27	F	136
.	26	F	022
.	10	M	024
.	32	F	105
.	5	M	106
.	26	F	066
.	12	F	147
.	10	M	050
.	37	F	144
.	15	F	167
.	21	F	235
.	13	M	071
.	36	F	026
.	16	F	029
.	9	F	138
.	6	M	139
.	2	M	183
.	10	M	187
.	20	F	227
.	14	F	217
.	28	F	199
.	10	F	195
.	35	F	047
.	29	F	196
.	25	F	240
.	30	F	273
.	17	M	011
.	41	F	151
.	16	M	038
.	14	F	040
.	17	F	041
.	23	F	200
.	42	F	184
.	50	F	176
.	7	M	134
.	10	F	072
.	8	M	073
.	12	M	060
.	45	F	112
2.0	41	F	070
2.0	14	F	053
2.0	15	M	027
2.0	34	F	032
2.0	39	F	220

2.0	36	M	192
2.0	33	F	193
2.0	12	M	194
2.0	12	M	055
2.0	8	F	170
2.0	12	F	113
2.1	53	F	043
2.1	40	F	052
2.1	27	F	075
2.1	7	F	077
2.1	13	F	230
2.1	12	M	222
2.1	28	F	231
2.1	11	F	198
2.1	39	F	013
2.2	13	M	202
2.2	6	M	209
2.2	27	F	173
2.2	3	M	010
2.2	37	F	023
2.2	46	F	065
2.2	38	F	130
2.2	13	M	131
2.3	8	M	208
2.3	9	F	009
2.3	25	F	004
2.3	9	F	146
2.3	8	F	254
2.3	13	F	028
2.3	20	F	210
2.4	3	M	137
2.4	11	M	068
2.4	22	F	122
2.4	34	M	261
2.5	34	M	104
2.5	4	F	251
2.5	9	M	118
2.5	48	F	213
2.5	48	F	102
2.5	13	M	054
2.5	36	F	197
2.5	44	F	017
2.5	12	F	039
2.5	11	M	132
2.5	31	F	262
2.6	9	M	246
2.6	7	F	067
2.6	37	M	249
2.6	11	F	117
2.6	61	F	142
2.6	45	F	036
2.7	20	M	205
2.7	31	F	058
2.8	32	F	127
2.8	40	F	107
2.8	30	F	116
2.8	12	F	169
2.8	8	F	133
2.8	7	M	263
2.9	41	F	204

2.9	40	M	069
2.9	10	M	033
2.9	14	M	152
3.0	35	F	124
3.0	35	M	244
3.0	5	F	076
3.0	29	F	237
3.0	47	M	018
3.1	48	M	212
3.1	19	F	239
3.1	8	M	190
3.1	9	M	274
3.1	3	F	014
3.1	3	M	258
3.2	38	F	201
3.2	8	M	030
3.2	34	F	101
3.2	32	M	260
3.3	10	M	182
3.3	33	F	250
3.3	1	M	252
3.3	40	F	234
3.3	6	F	034
3.3	10	F	059
3.3	13	F	178
3.4	36	M	171
3.4	71	F	148
3.4	6	M	056
3.4	31	F	257
3.4	33	F	177
3.5	3	F	005
3.5	49	F	211
3.5	15	M	226
3.5	7	M	232
3.5	11	F	218
3.5	68	M	141
3.5	48	F	110
3.6	7	M	129
3.6	4	M	248
3.6	58	F	191
3.6	13	M	037
3.7	14	M	108
3.7	27	F	207
3.7	55	F	228
3.7	65	M	063
3.8	68	F	161
3.8	51	F	256
3.8	9	M	123
3.9	10	F	120
3.9	33	M	015
3.9	29	M	172
3.9	47	F	003
3.9	49	M	051
3.9	29	M	006
3.9	50	M	149
3.9	51	M	021
4.0	69	F	162
4.0	29	M	214
4.0	6	F	155
4.0	6	F	259

4.0	9	F	165
4.1	9	M	109
4.1	35	M	150
4.1	2	M	188
4.2	24	F	224
4.2	6	M	061
4.3	47	M	012
4.3	36	F	164
4.4	13	M	168
4.4	11	F	166
4.4	8	M	179
4.5	7	M	242
4.5	65	F	020
4.5	33	F	216
4.5	2	F	264
4.5	51	F	049
4.6	71	M	159
4.6	9	F	189
4.7	54	M	042
4.7	11	M	145
4.8	53	F	206
4.8	46	F	253
4.8	51	F	229
4.8	6	F	233
4.9	34	F	119
4.9	37	M	064
4.9	23	M	223
5.0	75	F	062
5.2	64	F	114
5.2	32	M	265
5.2	56	M	048
5.2	52	M	175
5.3	10	M	243
5.3	52	M	255
5.3	33	M	057
5.3	56	M	126
5.4	59	F	203
5.4	15	M	185
5.5	3	M	025
5.5	43	F	221
5.6	1	M	174
5.6	39	M	046
5.6	66	F	001
5.7	12	M	181
5.7	33	M	008
5.8	49	M	219
5.9	35	M	186
5.9	4	M	007
5.9	29	M	236
6.1	61	M	143
6.2	7	M	238
6.3	4	F	035
6.3	68	M	045
6.5	1	F	269
6.6	7	F	157
6.7	70	F	206
6.7	35	M	266
6.7	13	M	267
6.9	69	M	019
7.0	5	F	158

7.1	5	F	125
7.1	53	F	111
7.7	81	M	016
7.8	2	F	225
8.1	37	M	163
8.4	53	F	121
8.6	1	M	270
8.9	76	M	160
10.5	59	M	140
11.0	34	M	215
11.2	29	M	074
11.8	36	M	031
12.9	71	M	156
17.4	2	F	268

k0S16D

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

Date: April 30, 1993

To: Dr. Tom Long, IDPH

From: Manna M. Muroya, ATSDR

Subject: Circle Smelting, Beckemyer, IL

Attached you will find sampling information for the Circle Smelting Site. Per our conversation earilier today, I am sending you the data and maps provided to me by Tony Holosaka, EPA/RPM.

I called Tony to clarify his request. He said that the Site Assessment Team (SAT) for Cirlce Smelting will be presenting the site to the RDT on May 13, 1993. The SAT would like a public health opinion on the attached sampling data before they go to the RDT. Specifically, is there sufficient health risk to conduct an immediate removal?

It is my understanding that you are currently preparing a public health assesment for this site, but that document may not be ready before May 13, 1993. Therefore, I am requesting a brief health consultation, including an answer to the above question, by May 10, 1993. As with all consultations, I'll review the dcument with Atlanta headquarters before it is provided to EPA.

If you have any questions please do not hesitate to call me or Louise at (312) 886-0840. Thank you.

cc: Louise Fabinski, ATSDR Senior Regional Representative

4.0	9	F	165	[redacted]	Beckemeyer
4.1	9	M	109	[redacted]	Beckemeyer
4.1	35	M	150	[redacted]	Beckemeyer
4.1	2	M	188	[redacted]	Beckemeyer
4.2	24	F	224	[redacted]	Beckemeyer
4.2	6	M	061	[redacted]	Beckemeyer
4.3	47	M	012	[redacted]	Beckemeyer
4.3	36	F	164	[redacted]	Beckemeyer
4.4	13	M	168	[redacted]	Beckemeyer
4.4	11	F	166	[redacted]	Beckemeyer
4.4	8	M	179	[redacted]	Beckemeyer
4.5	7	M	242	[redacted]	Breese
4.5	65	F	020	[redacted]	Beckemeyer
4.5	33	F	216	[redacted]	Beckemeyer
4.5	2	F	264	[redacted]	Bartelso
4.5	51	F	049	[redacted]	Centralia
4.6	71	M	159	[redacted]	Beckemeyer
4.6	9	F	189	[redacted]	Beckemeyer
4.7	54	M	042	[redacted]	Beckemeyer
4.7	11	M	145	[redacted]	Beckemeyer
4.8	53	F	206	[redacted]	Beckemeyer
4.8	46	F	253	[redacted]	Beckemeyer
4.8	51	F	229	[redacted]	Beckemeyer
4.8	6	F	233	[redacted]	Beckemeyer
4.9	34	F	119	[redacted]	Beckemeyer
4.9	37	M	064	[redacted]	Beckemeyer
4.9	23	M	223	[redacted]	Beckemeyer
5.0	75	F	062	[redacted]	Beckemeyer
5.2	64	F	114	[redacted]	Beckemeyer
5.2	32	M	265	[redacted]	Beckemeyer
5.2	56	M	048	[redacted]	Beckemeyer
5.2	52	M	175	[redacted]	Beckemeyer
5.3	10	M	243	[redacted]	Breese
5.3	52	M	255	[redacted]	Beckemeyer
5.3	33	M	057	[redacted]	Beckemeyer
5.3	56	M	126	[redacted]	Beckemeyer
5.4	59	F	203	[redacted]	Beckemeyer
5.4	15	M	185	[redacted]	Beckemeyer
5.5	3	M	025	[redacted]	Beckemeyer
5.5	43	F	221	[redacted]	Beckemeyer
5.6	1	M	174	[redacted]	Beckemeyer
5.6	39	M	046	[redacted]	Beckemeyer
5.6	66	F	001	[redacted]	Beckemeyer
5.7	12	M	181	[redacted]	Beckemeyer
5.7	33	M	008	[redacted]	Beckemeyer
5.8	49	M	219	[redacted]	Carlyle
5.9	35	M	186	[redacted]	Beckemeyer
5.9	4	M	007	[redacted]	Beckemeyer
5.9	29	M	236	[redacted]	Carlyle
6.1	61	M	143	[redacted]	Beckemeyer
6.2	7	M	238	[redacted]	Carlyle
6.3	4	F	035	[redacted]	Beckemeyer
6.3	68	M	045	[redacted]	Beckemeyer
6.5	1	F	269	[redacted]	Beckemeyer
6.6	7	F	157	[redacted]	Beckemeyer
6.7	70	F	206	[redacted]	Beckemeyer
6.7	35	M	266	[redacted]	Carlyle
6.7	13	M	267	[redacted]	Carlyle
6.9	69	M	019	[redacted]	Beckemeyer
7.0	5	F	158	[redacted]	Beckemeyer

7.1	5	F	125	[redacted]	[redacted]	Beckemeyer
7.1	53	F	111	[redacted]	[redacted]	Beckemeyer
7.7	81	M	016	[redacted]	[redacted]	Beckemeyer
7.8	2	F	225	[redacted]	[redacted]	Beckemeyer
8.1	37	M	163	[redacted]	[redacted]	Beckemeyer
8.4	53	F	121	[redacted]	[redacted]	Beckemeyer
8.6	1	M	270	[redacted]	[redacted]	Beckemeyer
8.9	76	M	160	[redacted]	[redacted]	Beckemeyer
10.5	59	M	140	[redacted]	[redacted]	Beckemeyer
11.0	34	M	215	[redacted]	[redacted]	Beckemeyer
11.2	29	M	074	[redacted]	[redacted]	Beckemeyer
11.8	36	M	031	[redacted]	[redacted]	Beckemeyer
12.9	71	M	156	[redacted]	[redacted]	Carlyle
17.4	2	F	268	[redacted]	[redacted]	Beckemeyer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 14 1994

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

OSWER Directive # 9355.4-12

MEMORANDUM

SUBJECT: Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities

FROM: Elliott P. Laws
Assistant Administrator

TO: Regional Administrators I-X

PURPOSE

As part of the Superfund Administrative Improvements Initiative, this interim directive establishes a streamlined approach for determining protective levels for lead in soil at CERCLA sites and RCRA facilities that are subject to corrective action under RCRA section 3004(u) or 3008(h) as follows:

- It recommends screening levels for lead in soil for residential land use (400 ppm);[1]
- It describes how to develop site-specific preliminary remediation goals (PRGs) at CERCLA sites and media cleanup standards (MCSs) at RCRA Corrective Action facilities for residential land use; and,
- It describes a plan for soil lead cleanup at CERCLA sites and RCRA Corrective Action facilities that have multiple sources of lead.

This interim directive replaces all previous directives on soil lead cleanup for CERCLA and RCRA programs (see the Background section, 1989-1991).

KEY MESSAGES

Screening levels are not cleanup goals. Rather, these screening levels may be used as a tool to determine which site

[1]The residential screening level is the same concept as the action level proposed in the RCRA Action Subpart S rule (July 27, 1990, 55 *Federal Register* 30798).

contribution of different environmental sources of lead to overall blood lead levels (e.g., consideration of the importance of soil lead levels relative to lead from drinking water, paint and household dust). It offers a flexible approach to considering risk reduction options (referred to as the "bubble" concept) that allows for remediation of lead sources that contribute significantly to elevated blood lead. This guidance encourages the risk manager to select, on a site-specific basis, the most appropriate combination of remedial measures needed to address site-specific lead exposure threats. These remedial measures may range widely from intervention to abatement. However, RCRA and CERCLA have very limited authority to address interior exposures from interior paint. For a detailed discussion of the decision logic for addressing lead-contaminated sites, see the Implementation section and Appendix A.

Relationship to lead paint guidance. In addition, this interim directive clarifies the relationship between guidance on Superfund and RCRA Corrective Action cleanups, and EPA's guidance on lead-based paint hazards (discussed further in Appendix C). The paint hazard guidance will be issued to provide information until the Agency issues regulations identifying lead-based paint hazards as directed by Section 403 of the Toxic Substances Control Act (TSCA)[2]. Lead-based paint hazards are those lead levels and conditions of paint, and residential soil and dust that would result in adverse health effects.

The two guidance documents have different purposes and are intended to serve very different audiences. As a result the approaches taken differ to some degree. The lead-based paint hazard guidance is intended for use by any person who may be involved in addressing residential lead exposures (from paint, dust or soil.) It thus relates to a potentially huge number of sites, and serves a very broad potential audience, including private property owners or residents in addition to federal or state regulators. Much residential lead abatement may take place outside any governmental program, and may not involve extensive site-specific study.

This OSWER guidance, on the other hand, deals with a much smaller number of sites, being addressed under close federal regulatory scrutiny, at which extensive site characterization will have been performed before cleanup decisions are made. Thus, the RCRA and CERCLA programs will often have the benefit of much site-specific exposure information. This guidance is intended for use by the relatively small number of agency officials who oversee and direct these cleanups.

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[2]Title IV of TSCA (including section 403) was added by the Residential Lead-Based Paint Hazard Reduction Act of 1992 (Title X of the Housing and Community Development Act of 1992).

Section 403. The Agency intends to promulgate regulations under Section 403 setting health-based standards for lead in soil and dust. OSWER intends to issue a final soil lead directive once the TSCA Section 403 regulations are finalized. For additional information on TSCA Section 403 developments, call (202) 260-1866.

However, the Agency believes that risk managers (risk assessors, on-scene coordinators, remedial project managers, and other decision-makers at Superfund and RCRA sites) are currently in need of the best guidance available today. The Agency believes that the IEUBK model is the best available tool currently available for assessing blood lead levels in children. Furthermore, use of the IEUBK provides allows the risk manager to consider site-specific information that can be very important in evaluating remediation options. Therefore, using the latest developments in the IEUBK model and the collective experience of the Superfund, RCRA Corrective Action, and TSCA Section 403 programs, the Agency is offering this guidance and is recommending a residential screening level for Superfund and RCRA sites of 400 ppm.

BACKGROUND

Early OSWER guidance (1989-1991). Four guidance documents on soil lead cleanup were issued by OSWER during the period of 1989 to 1991:

1. September 1989, OSWER Directive #9355.4-02. This guidance recommended a soil lead cleanup level of 500 - 1000 ppm for protection of human health at residential CERCLA sites.

2. May 9, 1990. RCRA Corrective Action program guidance on soil lead cleanup. This guidance described three alternative methods for setting "cleanup levels" (not action levels) for lead in soil at RCRA facilities. One approach was to use levels derived from preliminary results of IEUBK model runs. The other two approaches were to use the range of 500 to 1000 provided in the 1989 directive on CERCLA sites, or to use "background" levels at the facility in question.

3. June 1990, OSWER Directive #9355.4-02A. Supplement to Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites. This memorandum reiterated that the September 1989 directive was guidance and should not be interpreted as regulation.

4. August 29, 1991. This supplemental guidance discussed EPA's efforts to develop a new directive that would

"action" levels set forth in Appendix D of the proposed Subpart S Corrective Action rule. In the July 27, 1990 RCRA proposal (55 *Federal Register* 30798), EPA introduced the concept of "action levels" as trigger levels for further study and subsequent remediation at RCRA facilities. In this respect, the current directive's "screening levels" are analogous to the proposed rule's "action levels." In the proposal, where data were available, action levels were developed for three pathways of human exposure to contaminants: soil ingestion, water ingestion and inhalation of contaminated air. Exposure assumptions used in the calculations were set out in Appendix D of the proposal. For the soil pathway, action levels were calculated two different ways depending on whether the contaminant in the soil was a carcinogen or a systemic toxicant. Although lead was listed in Appendix A of the preamble to the rule as a class B2 carcinogen, no action level had been calculated because neither a carcinogenic slope factor (SF) nor a reference dose (RfD) had been developed by the Agency. Although the guidance in Appendix D of the proposed Corrective Action rule remains in effect with respect to other hazardous constituents, this directive now allows for the development of the lead screening ("action") level using the IEUBK model.

Recent developments (1992-Present). Following discussions among senior Regional and OSWER management, the OSWER Soil Lead Directive Workgroup (composed of Headquarters, Regional and other Federal agency representatives) recommended in the spring of 1992 that a "two step" decision framework be developed for establishing cleanup levels at sites with lead-contaminated soils. This framework would identify a single level of lead in soils that could be used as either the PRG for CERCLA site cleanups or the action level for RCRA Corrective Action sites, but would also allow site managers to establish site-specific cleanup levels (where appropriate) based on site-specific circumstances. The IEUBK model would be an integral part of this framework. OSWER then developed a draft of this directive which it circulated for review on June 4, 1992. The draft set 500 ppm as a PRG and an action level for RCRA facilities in residential settings.

Following development of this draft, OSWER held a meeting on July 31, 1992 to solicit a broad range of views and expertise. A wide range of interests, including environmental groups, citizens and representatives from the lead industry attended. This meeting encouraged OSWER to think more broadly about how the directive would affect urban areas, how lead paint and dust contribute to overall risk, and how blood lead data could be used to assess risk. In subsequent meetings with the Agency for Toxic Substances and Disease Control (ATSDR) and the Centers for Disease Control (CDC), options were discussed on how to use blood lead data and the need to evaluate the contribution of paint. In addition, during these meetings, a "decision tree" approach was levels in several communities. This variability arises from several sources including behavioral and cultural factors.

The identification of lead exposures from other sources (due to air, water, diet, paint, etc.) is an essential part of characterizing the appropriate blood lead distribution for a specific neighborhood or site. For the purpose of deriving a residential screening level, the background lead exposure inputs to the IEUBK model were determined using national averages, where suitable, or typical values. Thus, the estimated screening level of 400 ppm is associated with an expected "typical" response to these exposures, and should not be taken to indicate that a certain level of risk (e.g., exactly 5% of children exceeding 10 µg/dl blood) will be observed in a specific community, e.g., in a blood lead survey.

Because a child's exposure to lead involves a complex array of variables, because there is population sampling variability, and because there is variability in environmental lead measurements and background levels of lead in food and drinking water, results from the model may differ from results of blood lead screening of children in a community. Extensive field validation is in progress. The model will be evaluated further once these efforts are completed.

OBJECTIVE

With this interim directive, OSWER recommends using 400 ppm soil lead (based on application of the IEUBK model) as a screening level for lead in soil for residential scenarios at CERCLA sites and at RCRA Corrective Action sites. Residential areas with soil lead below 400 ppm generally require no further action. However, in some special situations, further study is warranted below the screening level. For example, agricultural areas, wetlands, areas with ecological risk, and areas of higher than expected human exposure are all situations that could require further study. For further guidance on ecological risks, Superfund risk managers are encouraged to consult their Regional Biological Technical Assistance Groups (BTAGs; see Appendix D).

Generally, the ground water pathway will not pose a significant risk since many lead compounds are generally not highly mobile. However, there are situations where, because of the form of lead, hydrogeology, or the presence of other contaminants at the site, lead may pose a threat to the ground water. In these situations, additional analysis is warranted, and the Superfund Regional Toxics Integration Coordinators (RTICs; see Appendix B) or RCRA hydrogeologists should be consulted.

IMPLEMENTATION

Superfund

This interim directive applies to all future CERCLA Remedial Investigation/Feasibility Study (RI/FS) work; this interim directive should generally not be applied at sites for which risk assessments have been completed. For removal sites, this interim directive recommends that decisions regarding removal actions be considered first by the Regional Decision Team (RDT). The RDT will then refer sites to the removal program for early action, as appropriate.

The approach in this interim directive helps meet the goals set by the Superfund Accelerated Cleanup Model (SACM) for streamlining remedial decision-making. (This streamlined approach is described in Appendix A, Suggested Decision Logic for CERCLA and RCRA Corrective Action.) This interim directive also recognizes that other methods (e.g., slope studies and others) for evaluating risks at lead sites may also be appropriate and may be used in lieu of, or in conjunction with, the IEUBK model. If an alternate approach to lead risk assessment is to be applied, an EPA scientific review should be obtained. For example, expert statisticians would need to review slope factor calculations for statistical biases before their use could be supported. Recognizing that all assessment methods involve some uncertainties, the Agency, at this time, believes the IEUBK model is the most appropriate and widely applicable tool for Superfund and RCRA sites. Alternatively, EPA may require setting cleanup levels below the screening level if site-specific circumstances warrant (e.g, ecological risk). For further information on the use of the IEUBK model at CERCLA sites, contact the Regional Toxics Integration Coordinators identified in Appendix B.

RCRA Corrective Action

It is expected that the RCRA corrective action program will generally follow an approach similar to CERCLA's (as described above) in using the IEUBK model. In the case of RCRA facilities at which lead contaminated soils are of concern, collection and evaluation of data for the purpose of using the model will be primarily the responsibility of the owner/operator.

Issues for Both Programs

Cleanup of soils vs. other lead sources: OSWER's approach to assessing and managing risks from lead is intended to address the multi-media/multi-source nature of environmental lead exposures because it is expected that people at or near CERCLA and RCRA Corrective Action sites will experience lead exposures from sources in addition to contaminated soil. In some instances, these other exposures may be large (e.g., where there are exposure pathway (intervention). These combinations of measures might include but not be limited to:

Abatement - Soil removal or interior and exterior lead paint abatement.

Intervention - Institutional controls, education/public outreach, gardening restrictions, indoor cleaning and dust removal, or additional cover.

Generally, the most appropriate CERCLA or RCRA response action or combination of actions will be based, in part, on the estimated level of threat posed at a given site. However, as mentioned earlier, key decision criteria also include the overall protectiveness of response options, attainment of Applicable or Relevant and Appropriate Requirements (for CERCLA), a preference for permanent remedies, implementability, cost-effectiveness, and public acceptance. Intervention measures may be more appropriate than abatement (e.g., soil excavation) at many sites, especially in areas where soil lead levels fall at or near the site-specific PRG or MCS.

Addressing exposure from other sources of lead may reduce risk to a greater extent and yet be less expensive than directly remediating soil. In some cases, cleaning up the soil to low levels may, by itself, provide limited risk reduction because other significant lead sources are present (e.g., contaminated drinking water or lead-based paint in residential housing). If it is possible to address the other sources, the most cost-effective approach may be to remediate the other sources as well as, or (if exposures to lead in soil are relatively low) instead of full soil lead abatement.

Lead-based paint can be a significant source of lead exposure and needs to be considered when determining the most appropriate response action. Interior paint can contribute to elevated indoor dust lead levels. In addition, exterior paint can be a significant source of recontamination of soil. Appendix A-3 of this document contains more information on how to evaluate and address the contribution of paint.

Certain legal considerations arise in considering remediation of sources other than soil. In particular, interior exposures from interior paint generally are not within the jurisdiction of RCRA or CERCLA. In addition, where other sources are addressed, issues may arise regarding the recoverability of costs expended by the Agency, or the possibility of claims being asserted against the Fund where other parties are ordered to do the work.

As discussed above, in considering whether to address sources other than soil, it is necessary to consider the risk recommends evaluating available blood lead data. In some cases, it may be appropriate to collect new or additional blood lead samples. In general, data from well-conducted blood lead studies of children on or near a site can provide useful information to both the risk assessor and site manager. However, the design and conduct of such studies, as well as the interpretation of results, are often difficult because of confounding factors such as a small population sample size. Therefore, any available blood lead data should be carefully evaluated by EPA Regional risk assessors to determine their usefulness. The Guidance Manual discusses how to evaluate observed blood lead survey data and blood lead data predicted by the IEUBK model.

The Guidance Manual recommends that blood lead data not be used <u>alone</u> either to assess risk from lead exposure or to develop soil lead cleanup levels. During its review of the IEUBK model, the SAB supported this position by asserting that site residents may temporarily modify their behavior (e.g., wash their children's hands more frequently) whenever public attention is drawn to a site. In such cases, this behavior could mask the true magnitude of potential risk at a site and lead to only temporary reductions in the blood lead levels of children. Thus, blood lead levels below 10 $\mu g/dl$ are not necessarily evidence that a potential for significant lead exposure does not exist, or that such potential could not occur in the future.

Non-residential (adult) screening level. EPA also believes there is a strong need to develop a non-residential (adult) screening level. The IEUBK model is, however, not appropriate for calculating this screening level since it is designed specifically for evaluating lead exposures in children. At this time, EPA is considering a few options for developing this screening level. Several adult models have recently become available. Developing a screening level by using any of them is likely to require significant additional work by the Agency. This work might include testing, validation, and selection of one of the existing models or development of its own model, both of which would require a considerable amount of time. Consequently this would probably be a long-term option. A short-term option would be to develop a screening level based on a simple approach that approximates the more complicated biokinetics in humans. This can serve in the interim while more sophisticated adult lead exposure assessment tools can be identified or developed.

<u>NOTICE</u>: Users of this directive should bear in mind that the recommendations in this document are intended solely as guidance, and that EPA risk managers may act at variance with any of these recommendations where site-specific conditions warrant, as has been noted above. These recommendations are not intended, and cannot be relied upon, to create any rights, substantive or procedural, enforceable by any party in litigation with the United States, and may change at any time without public notice.

APPENDICES

A   Suggested Decision Logic for CERCLA and RCRA Corrective Action

A-1   Suggested Decision Logic for Residential Scenarios for CERCLA and RCRA Corrective Action

A-2   Suggested Decision Logic for Lead-based Paint for CERCLA and RCRA Corrective Action

B   Regional Toxics Integration Coordinators (RTICS)

C   Relationship between the OSWER Soil Lead Directive and TSCA Section 403 Guidance

D   Biological Technical Assistance Group Coordinators (BTAGS)

If lead-based exterior or interior paint is the only major contributor to exposure, no Superfund action or RCRA corrective 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 lead-based paint and soil are major contributors to exposure, consider remediating both sources, using alternative options as described in Appendix A-2.

If indoor dust levels are greater than soil levels, consider evaluating the contribution of interior lead-based paint to the dust levels. If interior lead-based paint is a major contributor, consider remediating indoor paint to achieve a greater overall risk reduction at lower cost. (See Appendix A-2.)

NOTE: Available authority to remediate lead-based paint under CERCLA and RCRA is extremely limited.)

Step 6: If the IEUBK model predicts elevated blood leads, rerun the model using the site-specific parameters selected to reflect remedial options in Step 5 to determine site-specific PRGs or MCSs for soil.

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 lead-based paint is being addressed by other means, and narrow the response accordingly (possibly making this contingent on completion of the interior lead-based paint abatement effort.

Appendix C

Relationship between the OSWER Soil Lead Directive and TSCA Section 403 Guidance

Since lead exposures occur through all media, a variety of Agency programs address lead under a number of statutes. Lead in soil is addressed under TSCA Section 403, the RCRA Corrective Action program, and CERCLA, each of which differs somewhat in the types of sites that apply and the types of standards that are used. These differences are primarily due to differences in the purposes of the programs and the authority granted by the statutes under which they are developed. Section 403 soil standards will apply only to residential soil and the current TSCA guidance is generic in nature, with the same standards applying on a nationwide basis. Given the wide applicability of Section 403, generic standards are used in the current guidance in order to reduce resource requirements, as compared to site-specific decisions which can involve expensive and time-consuming analyses. Required RCRA and CERCLA activities are determined on a site-specific basis. The agency's recommendations for evaluating RCRA Corrective Action and CERCLA sites are contained in the OSWER Interim Soil Lead Directive.

In all three of these programs, the Agency's approach is to consider soil lead in the context of other lead sources that may be present and contribute to the total risk. For example, TSCA Section 403 specifically requires the Agency to consider the hazards posed by lead-based paint and lead-contaminated interior dust, as well as lead-contaminated soil. Likewise, the OSWER Soil Directive includes evaluation of other lead sources at a site as part of site assessment/investigation procedures. In addition, the primary focus of the three programs is primary prevention -- the prevention of future exposures from the source(s) being remediated.

The fundamental difference between the relatively new TSCA Section 403 program and the RCRA Corrective Action and CERCLA cleanup programs is that, under current guidance the Section 403 program seeks to establish national standards to prioritize responses to lead hazards whereas the other two programs usually develop site-specific cleanup requirements. This is because TSCA Section 403 deals with a potentially huge number of sites, and resources for the investigation needed to accurately identify their risks are typically very limited. Therefore most decisions under Section 403 will be made with little or no regulatory oversight and clear generic guidelines will be more effective. The more established RCRA and CERCLA programs, on the other hand, deal with a much smaller number of sites, at which extensive site characterization will have been performed before cleanup decisions are made. In addition, these programs have well-established funding mechanisms.

CDC
CENTERS FOR DISEASE CONTROL

Preventing Lead Poisoning in Young Children

A STATEMENT BY THE CENTERS FOR DISEASE CONTROL — OCTOBER 1991

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES / Public Health Service / Centers for Disease Control

Table 1-1. Interpretation of blood lead test results and follow-up activities: class of child based on blood lead concentration

Class	Blood lead concentration (µg/dL)	Comment
I	≤9	A child in Class I is not considered to be lead-poisoned.
IIA	10-14	Many children (or a large proportion of children) with blood lead levels in this range should trigger communitywide childhood lead poisoning prevention activities (Chapter 9). Children in this range may need to be rescreened more frequently.
IIB	15-19	A child in Class IIB should receive nutritional and educational interventions and more frequent screening. If the blood lead level persists in this range, environmental investigation and intervention should be done (Chapter 8).
III	20-44	A child in Class III should receive environmental evaluation and remediation (Chapter 8) and a medical evaluation (Chapter 7). Such a child may need pharmacologic treatment of lead poisoning (Chapter 7).
IV	45-69	A child in Class IV will need both medical and environmental interventions, including chelation therapy (Chapters 7 and 8).
V	≥70	A child with Class V lead poisoning is a medical emergency. Medical and environmental management must begin immediately (Chapters 7 and 8).

Primary prevention. Efforts need to be increasingly focused on preventing lead poisoning before it occurs. This will require communitywide environmental interventions, as well as educational and nutritional campaigns.

Succimer. In January, 1991, the U.S. Food and Drug Administration approved succimer, an oral chelating agent, for chelation of children with blood lead levels over 45 µg/dL.

Childhood lead poisoning prevention programs have had a tremendous impact on reducing the occurrence of lead poisoning in the United States. Because of these programs, deaths from lead poisoning and lead encephalopathy are now rare. These programs have targeted high-risk children for periodic screening; provided education to caretakers about the causes, effects, symptoms, and treatments for lead poisoning; and ensured medical treatment and environmental remediation for poisoned children. Screening and medical treatment of poisoned children will remain critically important until the environmental sources most likely to poison children are eliminated.

Federal regulatory and other actions have resulted in substantial progress in reducing blood lead levels in the entire U.S. population. In the last two decades, the virtual elimination of lead from gasoline has been reflected in reductions in blood lead levels in children and adults. Lead levels in food have also decreased since most manufacturers stopped using leaded solder in cans and since atmospheric deposition of lead on food crops declined as a result of reductions of lead in gasoline. In 1978, the Consumer Product Safety Commission banned the addition of lead to new residential paint.

Table I--EPA Recommendations for Response Activities for Residential Lead-Contaminated Bare Soil

Area of Concern	Bare Soil Lead Concentration (ppm)	Recommended Response Activities
Areas expected to be used by children, including: ▸ residential backyards, ▸ daycare and school yards, ▸ playgrounds, ▸ public parks, and ▸ other areas where children gather.	400 - 5000	Interim controls to change use patterns and establish barriers between children and contaminated soil, including: ▸ planting ground cover or shrubbery to reduce exposure to bare soil, ▸ moving play equipment away from contaminated bare soil, ▸ restricting access through posting, fencing, or other actions, and ▸ control further contamination of area. Monitor condition of interim controls. Public notice of contaminated common areas by local agency.
	> 5000	Abatement of soil, including: ▸ removal and replacement of contaminated soil, and ▸ permanent barriers. Public notice of contaminated common areas by local agency.
Areas where contact by children is less likely or infrequent	2000 - 5000	Interim controls to change use patterns and establish barriers between children and contaminated soil, including: ▸ planting ground cover or shrubbery to reduce exposure to bare soil, ▸ moving play equipment away from contaminated bare soil, ▸ restricting access through posting, fencing, or other actions, and ▸ control further contamination of area. Monitor condition of interim controls. Public notice of contaminated common areas by local agency.
	> 5000	Abatement of soil, including: ▸ removal and replacement of contaminated soil, and ▸ permanent barriers. Public notice of contaminated common areas by local agency.

ATTACHMENT 9

DOCUMENTS FOR THE ADMINISTRATIVE RECORD

The documents presented in Volumes I - VII of Attachment 9 are to be added to the Administrative Record for the Circle Smelter site located in the Village of Beckemeyer, Illinois. These documents are relevant to bioavailability, exposure, biomonitoring, contribution of lead in soil to blood lead levels, and other site-related issues. These documents are sequentially numbered and are organized by topic as described below. Refer to the attached index to locate the referenced document numbers.

1.0 Bioavailability:

Documents 1 - 17 relate to the bioavailability of lead in soils. Bioavailability is controlled by several factors including soil mineralogy, particle size, and the type and solubility of metal compounds. These factors may greatly affect the amount of the chemical absorbed through the gastrointestinal tract. In addition, for inhalation health risk, particle size would influence the amount of material that could become resuspended in air and reach the deeper areas of the lungs. In general, these studies seem to indicate that lead in soil from historical smelter sites which are of relatively large particle size, result in greatly reduced gastrointestinal absorption.

2.0 Epidemiological and Biomonitoring Studies:

Documents 18 - 37 are studies which were conducted in numerous communities in the U.S. and abroad where lead is present in soil from past smelting or mining activities. These studies show that lead in soil at these sites contributes less than expected to children's blood lead levels. Many of these communities in the U.S. have blood lead levels that are below the national average.

Documents 38 - 41 are studies that show that blood lead levels have been found to be greater in older cities which have a longer history of urban lead accumulation, and in minority children or low income families. The population near the Village of Beckemeyer is typical of western smelting and mining towns which do not have a long history of high population density and urban lead use. Blood lead data here shows that the residents of Beckemeyer have relatively low blood lead levels.

3.0 Contribution of Lead in Soil and Other Sources to Exposure:

Documents 23, 31, 37, and 41 - 45 contain recent investigations of the relative contributions from various sources and pathways which have noted that other urban sources such as paint, hobbies, lead solder in food cans, and leaded gasoline may have even a greater impact on blood lead levels than lead in soil.

4.0 Guidance on Risk Assessment:

Documents 45 - 57 are relevant to approximating the potential hazardous and risks at a site. These documents include studies of soil ingestion rates and outdoor soil versus indoor dust ingestion.

5.0 Other Relevant Documents:

Documents 58 - 60 include relevant guidance, site-specific information, and commentary on the usefulness of soil removals such as the one recommended at this site.

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<u>INDEX OF DOCUMENTS</u>

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Appendix D (Continued)

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AGENCY GUIDANCE ON RESIDENTIAL LEAD-BASED PAINT, LEAD-CONTAMINATED DUST, AND LEAD-CONTAMINATED SOIL

July 14, 1994

Recently EPA has received an increasing number of requests for advice on residential lead-based paint hazards, including hazards from lead-contaminated dust and soil in and around homes. These requests have come from State and EPA Regional officials, as well as from public health and housing personnel, concerned with childhood lead poisoning. While the Agency is in the process of developing a rule to identify these hazards under section 403 of the Toxic Substances Control Act (TSCA), 15 USC 2683, we believe it is appropriate to respond to these requests by issuing guidance at this time based upon our best currently available information.

EPA believes that it would not be prudent to issue national regulatory standards under section 403 at this time since a number of relevant research activities are currently underway and are scheduled to be completed in the near future. It is expected that this research will allow the Agency to develop standards that would more accurately direct resources toward residences that would benefit most from abatement and control activities. In the interim, the recommendations in this document represent the Agency's best judgement given its current state of knowledge and experience and are intended to serve as guidance until the promulgation of the TSCA section 403 rule. EPA emphasizes that these recommendations are intended solely as guidance and, as such, are not intended, nor can they be relied upon, to create any obligation or right that may be created in the future by rules issued under TSCA section 403. Persons to whom this guidance is directed may decide to follow it or to act at variance with it and may use the guidance in conjunction with analysis of specific site circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

Use of This Guidance

It is the Agency's intent that this guidance be used to prioritize primary prevention activities that address hazards from lead in and around residences. EPA expects that these hazards will be among those that will be identified when regulations are issued under TSCA section 403. The levels and conditions described in this guidance should be used by decisionmakers (risk assessors, risk managers, *etc.*) to identify lead-based paint hazards, sources of lead exposure, and the need for control actions in residential environments where children may be present. They should not be regarded as definitive statements of the lead hazard associated with specific environmental lead measurements, but the Agency believes that the criteria provided herein can inform and guide decisions on the identification of lead-based paint hazards and appropriate responses. Also, any lead-based paint-related activities (including lead detection, abatement, clearance, and disposal) should comply with all Federal, State, and local regulations.

Additionally, it should not be inferred that the recommendations in this guidance will, in and of themselves, guarantee the elimination of risks to children from residential lead exposure. Rather, this guidance is an attempt to identify the general types of environmental conditions and response activities that, given the current state of our knowledge, are likely to reduce risks over various broad ranges of environmental lead levels that may be found in the residential environment.

Finally, this guidance is not to be applied in addressing potential threats from lead at CERCLA and RCRA Corrective Action sites. Guidance developed by the Office of Solid Waste and Emergency Response is the appropriate tool for addressing these types of sites.

General

Although considerable progress has been made in the reduction of environmental lead (*e.g.*, the phase-out of leaded gasoline and lead-soldered food cans, more stringent drinking-water standards, *etc.*), residual lead contamination remains ubiquitous in both residential and commercial areas. In this guidance, the Agency's approach is to focus on the *s-urces* of lead that are related to the nation's housing stock. While there are numerous pathways for lead exposure, eliminating or reducing the role of lead-based paint and lead-contaminated soil as direct exposure sources (and as contributors to indoor lead dust) will significantly reduce total lead exposures from residential sources.

Soil and dust at other locations (*e.g.*, day care centers, public playgrounds, and other non-residential areas) can also be important contributors to a child's lead exposure. While these areas are outside the scope of TSCA section 403 authority, their potential contribution to a child's total lead exposure should also be considered when deciding upon community-wide responses to environmental lead.

In addition, the Agency recognizes that a number of factors contribute to risks from lead, including the nature of the lead sources, the amount of exposure to each source, and others. In this guidance, the Agency is using the levels of lead (and, for soil, the expected extent of children's contact) as a surrogate for risk.

At low to moderate levels of lead in soil and dust, and where paint deterioration is not extensive nor substrate failures or moisture problems present, EPA believes that interim controls[1] can be an effective way to temporarily reduce exposures. Interim control of lead in dust, soil, or painted surfaces must be predicated upon demonstrated ability to maintain and monitor such management strategies, based upon condition of the environment, expected use and contact, and reasonably anticipated changes in condition and/or use. At higher lead levels in soil and dust, and under deteriorated conditions of lead-based painted surfaces, more rigorous and long-term exposure reduction interventions should be taken. Under certain conditions related to extremely high soil concentrations or structural damage to painted surfaces, interim controls may not be appropriate for particular areas or components and only complete abatement of the component by an adequately trained professional will ensure adequate protection.

EPA policymakers do not believe that they are in a position to identify these levels and conditions as regulatory standards at this time. However, the Agency has developed this guidance based on consideration of estimated health impacts from lead exposure, the need to prioritize residences that would benefi from abatement, and comparison of risk reduction benefits and cost allocation projected for various control measures.

Sequence of Source Control Activities

Because of the interrelationship between lead-based paint, lead-contaminated dust, and lead-contaminated soil (*e.g.*, lead in paint can contribute lead to dust and soil, lead in soil can contribute lead to interior dust, *etc.*), it is important that the sources of lead be considered in proper order when conducting response activities. For example, if soil is being contaminated by deteriorating exterior lead-based paint, it is preferable to address the paint first, immediately followed by the soil. If the soil were addressed first, it may become recontaminated during work on the paint. In general, exterior paint should be addressed prior to soil, while soil and interior paint should be addressed prior to interior dust. This best avoids potential recontamination problems among the three. Exceptions should be made when there will be delays in addressing a source or when levels in one medium (such as interior dust) are clearly hazardous and immediate actions are needed to protect health. If, in the previous example, the exterior paint could not be

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[1] "Interim controls" means a set of measures designed to reduce temporarily human exposure or likely exposure to lead-based paint hazards, such as paint repair, specialized cleaning, temporary containment and ongoing monitoring of lead-based paint hazards or potential hazards.

addressed immediately for some reason, it would not be appropriate to delay attention to the soil, since the soil could continue to act as a source of exposure.

Lead-Based Paint

Lead-based paint is of concern both as a source of direct exposure through ingestion of paint chips, and as a contributor to lead in interior dust and exterior soil. Lead was widely used as a major ingredient in most interior and exterior oil-based paints prior to 1950. Lead compounds continued to be used as corrosion inhibitors, pigments, and drying agents from the early 1950's. In 1972, the Consumer Products Safety Commission limited lead content in new residential paint to 0.5% (5000 ppm) and, in 1978, to 0.06% (600 ppm).

The Department of Housing and Urban Development (HUD) estimates that three-quarters of pre-1980 housing contain some lead-based paint. The occurrence, extent and concentration of lead-based paint increase with the age of the housing. 90% of privately-owned housing units built before 1940 contain some lead-based paint; 80% of 1940-1959 units; and 62% of 1960-1979 units.[2]

Coatings of residential paint are defined by statute to be lead-based if the lead content exceeds either 1.0 mg/cm^2 or 0.5% by weight. Lead-based paint should be either abated or addressed through interim controls if it is found in any of the following circumstances: (1) it is deteriorated (in any location); (2) it is present (in any condition) on impact or friction surfaces; or (3) it is present (in any condition) on surfaces that are accessible for mouthing or chewing by children. "Deteriorated paint" means any interior or exterior paint that is peeling, chipping, chalking, or cracking, or is located on an interior or exterior surface or fixture that is damaged or deteriorated. An "impact surface" is an interior or exterior surface that is subject to damage from repeated impacts (*e.g.*, certain parts of door frames). A "friction surface" is an interior or exterior surface that is subject to abrasion or friction (*e.g.*, certain window, floor, and stair surfaces). A surface is considered to be accessible for mouthing or chewing by children if it protrudes from the surrounding area to the extent that a child can chew the surface, and is within three feet of the floor or ground (*e.g.*, window sills, railings, and the edges of stair treads). (Recommendations for sampling of painted surfaces are attached.)

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[2]Comprehensible and Workable Plan for the Abatement of Lead-Based Paint in Privately-Owned Housing: A Report to Congress, U.S. Department of Housing and Urban Development, Washington, DC, December 7, 1990.

When it is determined that paint abatement[3] and/or interim control activities will be performed on housing components, they should be performed according to practices that will be described in the 1995 HUD Guidelines[4] and the regulations to be promulgated under section 402 of TSCA, 15 USC 2682 (as appropriate for the unit in question), including clearance testing. The section 402 standards are expected to be proposed in several months. (Guidance on sampling and analysis of dust for clearance testing is attached.) Until either the HUD Guidelines are published in final form or the section 402 standards are issued, abatement activities should be performed according to the current HUD guidelines and interim control activities should be conducted according to state and local requirements, since they are not addressed in the existing HUD guidelines.

Lead-Contaminated Dust

In many cases, lead-contaminated interior dust can be the most direct source of a child's lead exposure, acting as a pathway for lead from lead-based paint, exterior soil, dust carried home from occupational exposure, *etc.* This guidance primarily confronts this source by addressing the residence-related sources of lead in dust--namely, lead-based paint and soil. The effect of the recommendations for paint and soil is removal or control of these two sources, followed by cleanup of the previously contaminated dust.

In the context of their lead abatement programs, HUD has established "clearance levels," which are part of the evaluation

[3]"Abatement" means any set of measures designed to permanently eliminate lead-based paint hazards, including the removal of lead-based paint and lead-contaminated dust, the permanent containment or encapsulation of lead-based paint, the replacement of lead-painted surfaces or fixtures, and the removal or permanent covering of lead-contaminated soil.

[4]HUD is developing detailed technical guidelines pursuant to section 1017 of Title X of the Housing and Community Development Act of 1992 to describe best practices for all activities related to the evaluation and control of lead-based paint hazards. While applicable specifically to federally-assisted housing, the described practices provide useful technical guidance for all types of housing with similar conditions. These Guidelines are now undergoing clearance and approval within HUD and are available in draft form for review. These Guidelines will supersede HUD's 1990 "Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing," which focused primarily on testing and abatement (and do not address risk assessment or interim controls).

of the thoroughness of abatement and subsequent cleanup activities. Clearance levels are "technology based"--that is, they indicate what can be achieved after proper abatement or interim control actions. Clearance levels are appropriate since the marginal cost of attaining them is typically quite low once an intervention is underway, and EPA and HUD experience indicates that they can be achieved through proper abatement and interim control activities. The Agency therefore recommends that the following clearance levels be met after abatement or interim control activities have been performed:

Location	Lead Loading
Uncarpeted Floors[5]	100 $\mu g/ft^2$ (0.93 mg/m^2)
Interior Window Sills	500 $\mu g/ft^2$ (4.65 mg/m^2)
Window Wells	800 $\mu g/ft^2$ (7.45 mg/m^2)

Section 403 directs the Agency to issue rules that identify lead-based paint hazards, which include lead-contaminated dust that would result in adverse health effects. The levels that will be developed in the section 403 rulemaking will indicate to risk assessors that a lead-based paint hazard (for dust) exists. Obviously, the levels will be different in purpose than clearance levels--the former indicating that a hazard is present and the latter indicating that source control and cleanup have been appropriately performed. Accordingly, hazard levels are to be used during risk assessment and re-evaluation, whereas clearance levels are used to confirm the success of abatement and/or interim control activities.

Until the standards can be developed under section 403 the above-listed clearance levels should be used in identifying lead-based paint hazards and sources of lead exposure, and determining the need for control actions. The Agency reiterates that these recommendations are based upon lead levels that have been demonstrated to be achievable through abatement and interim control activities and they are not based upon projected health effects associated with specific dust lead levels. As a result of continued Agency evaluation of the relationship between interior dust lead levels and health effects, these hazard levels

[5]It is anticipated that the 1995 revision to the HUD guidelines will lower the current clearance standard of 200 $\mu g/ft^2$ for uncarpeted floors to 100 $\mu g/ft^2$.

may be revised in future guidance.[6] Also, when assessing multiple sources of lead, dust lead concentration may be a more appropriate measurement. The utility of concentration measurements for identifying section 403 hazards from dust will be further considered in the development of the section 403 rulemaking.

Other potential sources of lead that may be present in house dust in addition to lead-based paint and lead-contaminated soil include neighborhood sources, such as demolition of a nearby building, sandblasting of a bridge, or other activities involving structures that may contain lead-based paint. Also, lead may be brought into the home on clothing of residents employed in lead-related occupations, or as the result of some hobbies. Additionally, deteriorated paint which contains some lead, but at levels lower than 1.0 mg/cm^2 or 0.5% by weight, could be a source. Depending upon the extent to which these sources contribute lead to interior dust, regular cleaning of the residence may not provide sufficient reduction in the level of lead exposure from dust, and the sources should be identified and controlled. It is often possible to identify these situations through sampling and analysis of the interior dust.

Since lead levels measured by wipe samples ("dust lead loading") are dependent upon both the amount of collectable dust on a surface and the concentration of lead in that dust, high values for either of these two factors could produce high wipe sample lead results. That is, a large amount of low-lead-concentration dust and a small amount of high-lead-concentration dust could result in similar wipe sample results. Therefore, while low dust lead loading values may indicate that sources that contribute to household dust have been sufficiently controlled, high values could result from any of the following situations: (1) there are some insufficiently controlled sources that continue to contribute significant amounts of lead to the dust; (2) relatively large amounts of low-lead dust are present; or (3) some combination of these occurs.

Dust lead concentration measurements can provide insight as to which of these conditions is resulting in high wipe sample values, as well as assist risk assessors in identifying possible sources. For example, if interior paint has been ruled out as a source, and dust concentrations approach those of exterior soil,

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[6]Principal among the studies expected to provide further information on the relationship between dust lead and children's blood lead levels is the recent Rochester Lead-in-Dust study. This HUD-funded study was conducted by the University of Rochester from May to December of 1993 and included approximately 200 children whose primary source of lead exposure was from house dust. Peer review of this study began in June of 1994.

it may well be the result of soil being tracked into the house from outside. Also, if paint is in sound condition and soil concentrations are low but the interior dust concentrations are high, it is possible that other sources, such as dust carried home from lead-related work, are present. Through a systematic process of elimination, many of the sources of lead in house dust can often be determined. While a detailed discussion on how to perform these types of assessments is outside the scope of this guidance, these issues will be addressed by certification procedures and training requirements for parties involved in lead-based-paint activities (which includes abatement, inspection and risk assessment) currently being developed under section 402 of TSCA.

To ensure that excessive exposures are not being caused by the *amount* of dust in the house, the Agency recommends that efforts always be made to minimize dust in residences, even after paint and dust sources have been addressed through any needed interim control and/or abatement activities. A key component of these efforts is the need to maintain a residence in a cleanable state (*i.e.*, in such a condition that it can be effectively cleaned by the occupant using reasonable cleaning procedures). For example, water-damaged or worn wood flooring may have a rough surface with crevices from which dust cannot be readily removed through routine wet mopping. Such surfaces should either be replaced or repaired so that they are cleanable. Likewise, it is important that the residence be effectively and regularly cleaned and that exposures to any interior dust be minimized. Recommended activities to reduce interior dust lead levels and associated exposures include: mopping floors, window ledges, and accessible surfaces with a warm detergent solution; washing pacifiers and bottles if they fall on the floor; washing toys and stuffed animals regularly; and ensuring that children wash their hands before meals, naps, and bedtime. These activities, as well as the importance of nutrition and other factors relevant to children's risk from lead exposure, should always be stressed as part of public education and awareness programs, regardless of the measured lead concentration in any one medium.

Lead-Contaminated Soil

Lead-contaminated exterior bare soil is of concern both as a direct source of exposure through inadvertent ingestion due to children's normal hand-to-mouth activity, and as a contributor to indoor dust lead levels (*e.g.*, when tracked into a residence from outside).

Common sources of lead in residential soil include deteriorating exterior lead-based paint and historical airborne deposition onto the soil surface as the result of point source emissions or leaded gasoline. These sources have added substantially to the naturally occurring lead in soils, which generally range from 5 - 50 parts per million[7]. Also, industrial sources such as smelters, recycling facilities, and mining activities can result in lead contamination at residential areas. This adds difficulty in relating lead levels in soil to potential health effects because lead from different sources may pose different levels of potential hazard. One apparent difference is the extent to which ingested lead originating from different sources is taken up into the body--that is, the bioavailability of the lead. Decisionmakers should consider this and any other available information when implementing the recommendations contained in this guidance, particularly where non-paint sources of lead are involved. That is, if the soil is contaminated by lead from other sources, rather than lead-based paint, decisionmakers should investigate the types of lead compounds present and their unique characteristics. Agency guidance on consideration of bioavailability of lead in risk assessment can be found in the Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (available from National Technical Information Service, U.S. Dept. of Commerce, Attn: Sales, Springfield, VA 22169 (703/487-4650), as document number PB 93-963510).

Soil lead concentrations in the United States vary widely, from less than one to tens of thousands of parts per million (ppm). This range of concentrations and attendant potential exposure levels indicates that it is appropriate to develop a scaled strategy of risk reduction activities, depending upon the concentrations at particular locations and other site-specific factors. The Agency's recommendations for response activities at varying soil lead concentrations are as follows.

The Agency is recommending that (depending upon use patterns, populations at risk, and other factors), when lead concentrations are observed that exceed 400 ppm in bare soil, further evaluation should be undertaken and physical exposure-reduction activities, commensurate with the expected degree of risk, are appropriate.[8] The Agency believes that the 400 ppm

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[7]U.S. Environmental Protection Agency (1989) Review of the National Ambient Air Quality Standards for Lead: Exposure Analysis Methodology and Validation. U.S. EPA Office of Air Quality Planning and Standards, RTP, NC. EPA-450/2-89/011.

[8]The selection of 400 ppm in this guidance is based upon two decisions. The first is that the level should help in reducing the threat that environmental lead poses to the public. In this guidance, EPA estimates that beginning exposure reduction activity at 400 ppm will help ensure that a typical child or group of children exposed to lead would have an estimated risk of no more than 5% of exceeding a blood lead level of 10 $\mu g/dl$. This benchmark may change in the future section 403 rulemaking.

The second decision is to use the best available tool for assessing the relationship between children's blood lead levels and environmental lead levels. Current research indicates that young children are particularly sensitive to the effects of lead and require specific attention in the development of lead standards. A level that is protective for young children is expected to be protective for older population subgroups. In the same environmental setting, pregnant women would be expected to have blood lead levels lower than would young children, and this may further limit fetal exposures.

The Agency has examined both epidemiological studies and modeling approaches for this purpose. Both of these will be further evaluated as part of the effort to develop section 403 rulemaking. However, given the need to issue guidance at this time, the Agency is choosing to base the guidance on the Integrated Exposure Uptake Biokinetic (IEUBK) model, which EPA designed to evaluate exposures to children in a residential setting.

In general the model generates a probability distribution of blood lead levels for a typical child, or group of children, exposed to a particular soil lead concentration and concurrent lead levels from other sources. The spread of the distribution reflects the observed variability of blood lead levels in several communities. This variability arises from several sources, including behavioral and cultural factors.

The identification of lead levels from other sources (due to air, water, diet, *etc.*) is an essential part of characterizing the appropriate blood lead distribution for a specific neighborhood or site. For the purpose of deriving the 400 ppm value used in this guidance, the background lead exposure inputs to the IEUBK model were determined using national averages, where suitable, or typical values. Thus, the estimated level of 400 ppm is associated with an expected "typical" response to these exposures, and should not be taken to indicate that a certain level of risk (*e.g.*, exactly 5% of children exceeding 10 μg/dl blood lead) will be observed in a specific community (*e.g.*, in a blood lead survey).

Because a child's exposure to lead involves a complex array of variables, because there is population sampling variability, and because there is variability in environmental lead measurements and background levels of lead in food and drinking water, results from the model may differ from results of blood lead screening of children in a community. Extensive field evaluation of the model is in progress and the model will be evaluated further once these efforts are completed. EPA may base the future section 403 rulemaking on the model once these level serves as a reasonable current benchmark for the purposes of this guidance. Therefore, the Agency recommends that further evaluation and appropriate exposure-reduction activities be undertaken when soil lead concentrations exceed 400 ppm at areas expected or intended to be used by children.[9] (Recommendations for soil sampling and analysis are attached.) Further evaluation activities may include blood lead screening of children and others in the community.

When soil lead levels exceed 400 ppm and children are likely to be present, exposure-reduction responses should focus on interim controls designed to change use patterns and create barriers between children and contaminated soil. This involves taking steps to keep children away from certain areas and to reduce exposure to bare soil in accessible areas. As an example of changing the use pattern, thorny shrubs can be planted to keep children from playing around houses that have elevated soil lead concentrations immediately next to the house. Also, play equipment can be moved from bare soil contaminated areas to encourage children to play elsewhere or, for more highly contaminated areas, access can be restricted by fencing. As an example of the use of barriers to reduce exposure, grass or other groundcover can be established and maintained or the area can be covered with mulch or gravel. While the effectiveness of many of these interim control actions cannot yet be quantified, the Agency believes that they can reduce exposure. However, whenever interim controls are used, their condition should be monitored to ensure continued effectiveness. For example, the condition of plants, groundcover, *etc.*, that serve as use-modifying and barrier-type elements should be visually inspected to ensure that they have become well established and remain effective at preventing exposure in accordance with the upcoming HUD Guidelines.

Within the range of 400 - 5000 ppm, the degree of risk reduction activity should be commensurate with the expected risk posed by the bare soil, considering both the severity of exposure (as reflected by the soil lead concentration) and the likelihood of children's exposure. At concentrations in the lower segment

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evaluations have been completed, or on another methodology.

[9]400 ppm is also used as the residential soil lead screening level for corrective Action under the Resource Conservation and Recovery Act (RCRA) and cleanups under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) in the Office of Solid Waste and Emergency Response (OSWER) Interim Soil Directive. OSWER's screening level is not a "cleanup standard," nor automatically a "cleanup goal." Rather, it is a level of contamination above which there is enough concern to warrant site-specific study of risks.

of this range (e.g., between 400 ppm and 2000 ppm), emphasis should be placed on reducing exposures through interim controls at those areas expected or intended to be used by children. If the area is not frequented by children, these exposure reduction activities may be less rigorous. Where bare-soil lead levels are found to be 2000 parts per million or more, interim controls should be implemented even if the area is not frequented by children.

Increasingly aggressive exposure-reduction activities are warranted at higher soil lead levels, with very high levels indicating that soil abatement may be necessary. For purposes of prioritizing abatements, the Agency recommends soil abatement when lead levels are found at 5000 parts per million or more in residential bare soil. Appropriate activities at this level of lead concentration may include removal and replacement of the soil, the use of more permanent covers (*e.g.*, paving), or other activities. Of course, state and local agencies should consider any other factors that affect the actual risks and benefits of abatement when determining whether abatements may be necessary at lower levels, including, for example, prevalence of elevated blood lead levels in children.

The Agency is suggesting 5000 ppm for this higher level because of the need to prioritize the types of activities that can often be resource intensive. Factors considered in the choice of this level include the risk reduction that may be achieved by different measures and the resources needed to reduce those risks. Consequently, this level is designed to indicate where there is a relatively higher certainty that abatement or other extreme activities would be appropriate from a risk reduction and resource prioritization perspective. Based upon estimates of residential soil lead distributions (from HUD, 1990), 5000 ppm would target the soil at an estimated 1/2% of U.S. homes.

Because of the likelihood that lead-contaminated soil will have previously contributed lead to interior dust, specialized cleaning is recommended for the interior of residences to meet dust clearance levels after soil abatement or interim control activities have been conducted.

The Agency's recommendations for residential lead-contaminated soil are summarized in Table I.

Table I--EPA Recommendations for Response Activities for Residential Lead-Contaminated Bare Soil		
Area of Concern	Bare Soil Lead Concentration (ppm)	Recommended Response Activities
Areas expected to be used by children, including: ▸ residential backyards, ▸ daycare and school yards, ▸ playgrounds, ▸ public parks, and ▸ other areas where children gather.	400 - 5000	Interim controls to change use patterns and establish barriers between children and contaminated soil, including: ▸ planting ground cover or shrubbery to reduce exposure to bare soil, ▸ moving play equipment away from contaminated bare soil, ▸ restricting access through posting, fencing, or other actions, and ▸ control further contamination of area. Monitor condition of interim controls. Public notice of contaminated common areas by local agency.
	> 5000	Abatement of soil, including: ▸ removal and replacement of contaminated soil, and ▸ permanent barriers. Public notice of contaminated common areas by local agency.
Areas where contact by children is less likely or infrequent	2000 - 5000	Interim controls to change use patterns and establish barriers between children and contaminated soil, including: ▸ planting ground cover or shrubbery to reduce exposure to bare soil, ▸ moving play equipment away from contaminated bare soil, ▸ restricting access through posting, fencing, or other actions, and ▸ control further contamination of area. Monitor condition of interim controls. Public notice of contaminated common areas by local agency.
	> 5000	Abatement of soil, including: ▸ removal and replacement of contaminated soil, and ▸ permanent barriers. Public notice of contaminated common areas by local agency.

Relationship of Soil Levels in This Guidance to the OSWER Interim Soil Lead Directive.

A variety of Agency programs address lead under a number of statutes. Lead in soil is addressed under TSCA Title IV (including TSCA sections 402 and 403), the RCRA Corrective Action program, and CERCLA (Superfund), each of which differs somewhat in purpose and in the types of sites to which they apply. Title IV section 403 regulations, which have yet to be issued, will identify lead hazards in paint and residential dust and soil. RCRA Corrective Action applies to RCRA hazardous waste sites. CERCLA applies to sites that have been contaminated by releases of CERCLA hazardous substances (which include lead).

While this guidance applies to housing, which is a significant part of the coverage of TSCA Title IV, it is not issued under the legal standards of any of these statutes, nor is it to be used to support statutorily driven requirements of CERCLA or RCRA. Instead, the guidance is designed to allow screening of the worst sources of lead-contaminated soil related to the housing stock among the potentially huge number of sites affected. The top one percent of housing sites consists of about 1,000,000 locations.

Because there is such a large number of housing sites, the purpose of this guidance is to recommend a set of nationwide levels that will screen those sites at which, EPA expects, decisionmakers will want to consider various risk reduction activities. The higher the level and the more likely exposure will occur, the more aggressive the risk reduction activities undertaken should be. The ultimate decision, however, will be made locally by various federal, state and local officials, or by building owners, operators or occupants. These decisionmakers will need to consider a variety of issues, including the risk reduction to be achieved by different measures and the resources needed to reduce those risks. Given the wide applicability of this guidance, EPA has developed generic standards to deal with the most risky sites--in particular, those where the Agency feels most confident that actual adverse effects could occur.

The Agency's recommendations for evaluating RCRA Corrective Action and CERCLA sites are contained in the OSWER Interim Soil Lead Directive. The OSWER directive deals with a much smaller number of sites, at which extensive site characterization will have been performed before cleanup decisions are made. RCRA and CERCLA programs, thus, will often have site-specific exposure values, which may be in a relatively narrow range. As a result, values chosen for action under the RCRA or CERCLA programs may be different from those selected under this guidance. Also, once the section 403 regulations are promulgated, OSWER intends to issue a final (to replace the interim) directive.

The Section 403 Rulemaking

At present, the Agency's section 403 rulemaking activities are focused on a variety of technical issues related to more accurate assessment of the risks associated with residential lead-based paint, lead-contaminated dust, and lead-contaminated soil. These activities include continued analysis of models and slope studies, including evaluation of the range of environmental conditions over which they are adequate. Complicating factors include likely differences in the bioavailability of lead from different sources and the variability in dust lead levels on interior surfaces. Because the Agency's work on these issues involves ongoing as well as previously published research, additional time will be required before levels for lead-based paint hazards can be determined with more specificity and proposed in the section 403 rulemaking.

As a result of these additional investigations, the section 403 rulemaking may differ from this guidance in a number of areas. These may include the role of dust concentration (in addition to, or in place of, dust lead loading), the quantitative or relative degree of blood lead level reduction that may be targeted, methods to relate environmental lead measurements to expected blood lead levels, and holistic standards rather than specific levels for each exposure source.

Attachments

Guidance for Measuring Lead in Soil and Paint

Sampling and Analysis of Dust for Clearance Testing